

# **Criteria Air Contaminants (CACs) Technical Source Guide for Reporting to the National Pollutant Release Inventory (NPRI)**

**2002**

*Canadian Environmental Protection Act, 1999*



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# **Criteria Air Contaminants (CACs) Technical Source Guide for Reporting to the National Pollutant Release Inventory (NPRI)**

**2002**

## Acknowledgments

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- Levelton Engineering Ltd., Richmond, BC (provided technical assistance)

### Disclaimer

Should any inconsistencies be found between this Technical Source Guide and the official *Canada Gazette* notice and its amendment, the notice published on December 29, 2001, and the amendment published on December 28, 2002, in the *Canada Gazette*, Part I, will prevail.

Website addresses mentioned in this guide may have changed or may have been removed from websites since the publication of this document. Consequently, an error message may appear when trying to access a website. Users are therefore requested to contact the organization in question to obtain the new website address.

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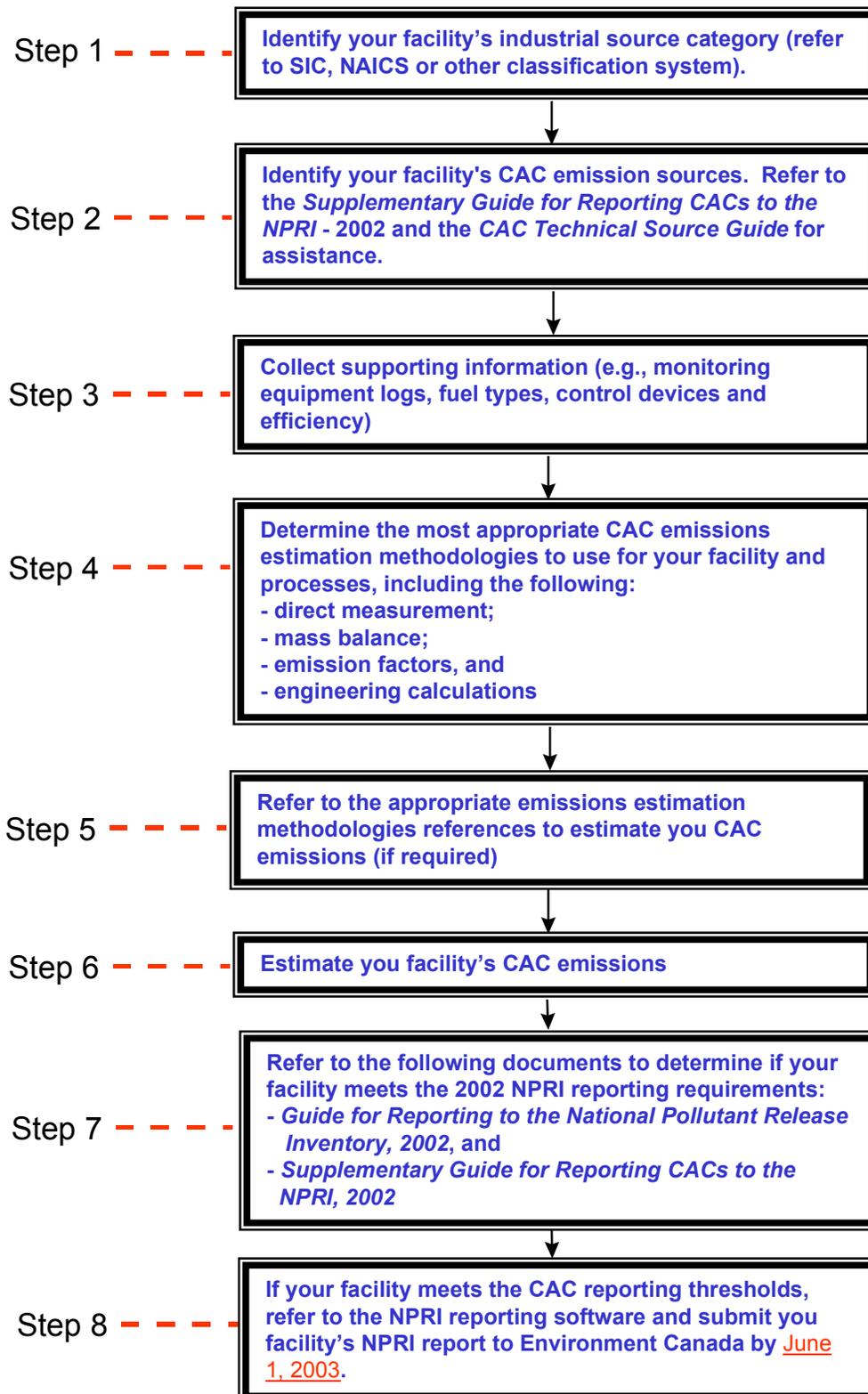
## **Preface — How to Use This Guide**

This guide was prepared to provide an overview of the sources and processes that may be sources of criteria air contaminants (CACs). Additionally, this guide provides a summary of references for each source that may be used to estimate CAC emissions.

It is important to note that facilities should refer to the *Guide for Reporting to the National Pollutant Release Inventory — 2002* and the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002* prior to consulting this guide.

Figure 1 proposes an eight-step methodology that facilities may use to estimate their CAC pollutant emissions and to report to the National Pollutant Release Inventory (NPRI).

**Figure 1 - Methodology to Estimate Criteria Air Contaminants (CAC) Emissions and Report to the National Pollutant Release Inventory (NPRI)**



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## 1. Introduction

The National Pollutant Release Inventory (NPRI) was created through a multi-stakeholder process in 1992. The data collected by the NPRI support a wide range of environmental initiatives, including pollution prevention and abatement activities. The NPRI has enabled governments and interested stakeholders to track progress on the reduction of releases and has assisted with the identification of areas where reductions are required. The NPRI data also provide Canadians with information on the pollutants released into their environment.

### 1.1 Addition of the Criteria Air Contaminants to the NPRI for the 2002 Reporting Year

The reporting criteria and requirements for the 2002 NPRI were published in the *Canada Gazette*, Part I, under the authority of the *Canadian Environmental Protection Act, 1999* (CEPA 1999). The notice specifies that any person owning or operating a facility that meets the reporting criteria prescribed in the notice must provide certain information to the Minister of the Environment by **June 1, 2003**.

The addition of Criteria Air Contaminants (CACs) for the 2002 reporting year is a significant expansion of the NPRI. Environment Canada held extensive consultations with stakeholders during 2001 to explore the addition of CACs to the 2002 NPRI.

CACs are composed of oxides of nitrogen (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), volatile organic compounds (VOCs), and particulate matter, including total particulate matter (TPM), particulate matter with a diameter less than or equal to 10 microns (PM<sub>10</sub>), and particulate matter with a diameter less than or equal to 2.5 microns (PM<sub>2.5</sub>).

The federal government, recognizing that clean air is a priority for Canadians, is working to improve air quality. CAC data collected through the NPRI will support numerous government initiatives to improve air quality.

To assist facilities in complying with the CAC reporting requirements and the NPRI for the 2002 reporting year, Environment Canada has developed a technical source guide that outlines process and emissions estimation information for each source. This guide provides an overview of CAC emissions per source based on the Canadian Standard Industrial Classification (CDN SIC) codes, the North American Industry Classification System (NAICS) codes, and equipment references identified by Source Classification Code (SCC).

#### **Notes:**

- a) SIC: SIC codes describe the primary service or product produced by an industrial source.

- b) **SCC**: An eight-digit code that describes the process/emission unit. An SCC may be used more than once for each facility or emission unit.
- c) **Source**: A grouping of similar industries and operations or other entities that are involved in common activities, such as petroleum refining. In many instances, a SIC code or NAICS code is used to describe an industry or activity for the purposes of facilitating the collection of data relating to that establishment. Data and information can then be compiled using an applicable database management system to record pollutant emissions for a particular source.

## 1.2 **Overview of Source Classification Code (SCC) Descriptors**

There are four levels of increasingly detailed source descriptors for each SCC. As described below, these descriptors are associated with the first one, three, six, and eight digits of the SCC.

**Level One SCC** - This first level of description refers to the first digit of an SCC and provides only the most general information on the following six categories of emission sources:

- External Combustion (1-XX-XXX-XX);
- Internal Combustion (2-XX-XXX-XX);
- Industrial Processes (3-XX-XXX-XX);
- Petroleum & Solvent Evaporation (4-XX-XXX-XX);
- Waste Disposal (5-XX-XXX-XX); and
- Maximum Achievable Control of Technology (MACT) Source Categories (6-XX-XXX-XX).

**Level Two SCC** - The second level of description is associated with the first three digits and subdivides the six major categories above into major industry/emission groups. Examples are listed below:

- External Combustion, Electric Generation Boilers (1-01-XXX-XX);
- Internal Combustion, Industrial Engines (2-02-XXX-XX); and
- Industrial Processes, Chemical Manufacturing (3-01-XXX-XX).

**Level Three SCC** - The third level of description requires that the first six digits be specified, and a specific industry or emission source category is then identified. The extra three digits, which are added to the Level Two SCC description, usually indicate the major product, raw material, or fuel used. Examples of six-digit SCCs are provided below:

- External Combustion, Electric Generation Boilers, Natural Gas-fired (1-01-006-XX);
- Internal Combustion, Industrial Engines, Diesel-fired (2-02-001-XX); and

- Industrial Processes, Chemical Manufacturing, Ammonia Production (3-01-003-XX).

**Level Four SCC** - The fourth level of description is associated with the full eight-digit code. The addition of two more digits beyond the third level specifies the particular emitting process within the third-level source category. Examples are provided below:

- External Combustion, Electric Generation Boilers, Natural Gas-fired, >100 Million Btu/hour (1-01-006-01);
- Internal Combustion, Industrial Engines, Diesel-fired, Turbine (2-02-001-01); and
- Industrial Processes, Chemical Manufacturing, Ammonia Production, Feedstock Desulphurization (3-01-003-05).

For some sources, Level Two and Level Three SCC descriptions are provided. Using this as a basis, facilities should then determine the Level Four (eight-digit) SCC descriptions for their source. A list of eight-digit SCCs and associated emission factors that are applicable to Canadian sources is referenced in this guide. If you cannot find the SCC for your facility's operation (one, two, three, or four levels of SCC) in this document, refer to the SCC list that is included in this guide.

Sources that are covered in this document are listed in Section 1.3. Specific guidance information for each source is divided into the following six parts:

- General Description;
- Applicable SIC and NAICS Codes;
- Source Description;
- Estimation Methodology;
- Supporting Information for CAC Emissions Estimation; and
- References and Links.

Facilities should carefully review each of the reference materials identified for each source and exercise due diligence in estimating their CAC emissions to air. Other issues, such as reporting information to the NPRI, are discussed in more detail in the *Guide for Reporting to the National Pollutant Release Inventory — 2002* and *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*. In addition, facilities should survey and identify all CAC emission sources to air at the facility. For example, a facility involved in the pharmaceutical source category should review emission sources to air from storage tanks, combustion sources (e.g., boilers and heaters), storage piles, etc.

### **1.3 Sources and Processes Covered in This Guide**

The following sources are highlighted in this guide:

- Fuel Combustion (all fuels);
- Industrial Incineration (solid waste);

- Solvent Evaporation (includes surface coating and cleaning and degreasing operations);
- Storage and Handling;
- Aluminum Industry;
- Chemicals Industry;
- Cement and Concrete Industry;
- Electric Power Generation;
- Grain Industries;
- Iron and Steel Industry;
- Iron Ore Mining Industries;
- Non-ferrous Mining and Smelting;
- Petrochemicals Industry;
- Petroleum Refining;
- Pulp and Paper;
- Wood Industry;
- Paint and Ink Manufacturing;
- Printing, Publishing, Packaging, and Graphic Arts Industry;
- Computer and Electronic Industry;
- Hot-Mix Asphalt Plants;
- Food Sector;
- Pharmaceutical Manufacturing;
- Abrasive Blasting;
- Industrial Flares; and
- Wet Cooling Towers.

## 2. Sources and the Methodology to Estimate CAC Emissions

### 2.1 Fuel Combustion

#### 2.1.1 General Description

Fuel combustion includes all combustion activities for the purpose of generating work or heat. Emissions from this source category are generally dependent on the quantity of fuel burned, type of fuel, combustion equipment used, and emission controls installed. However, some combustion processes and equipment, such as coke ovens and blast furnaces, are specific to certain industries and will be discussed under their respective source categories.

Fuel combustion can be classified as either external or internal combustion sources. A brief description of these two types of activities is provided below.

#### 2.1.2 Applicable SIC and NAICS Codes

Fuel combustion equipment is used in many industries and is typically categorized by SCCs. Generally, SIC and NAICS codes cannot be applied to fuel combustion equipment, since it is used in almost all manufacturing operations.

#### 2.1.3 Source Description

##### 2.1.3.1 *External Combustion*

External combustion sources include the following: steam/electric generating plants, industrial boilers, and heaters. Fossil fuels, such as coal, fuel oil, and natural gas or a combination of these fuels, are commonly used. Relatively small amounts of other fuels, such as liquefied petroleum gas (LPG), are used by these sources. SCCs applicable to external combustion sources, and the fuels used, are listed below:

SCC	Description (6 digit)	Description (8 digit)
10200101	Anthracite Coal	Pulverized Coal
10200104	Anthracite Coal	Travelling Grate (Overfeed) Stoker
10200107	Anthracite Coal	Hand-fired
10200117	Anthracite Coal	Fluidized Bed Boiler Burning Anthracite-Culm Fuel
10200201	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom
10200202	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom
10200203	Bituminous/Subbituminous Coal	Cyclone Furnace
10200204	Bituminous/Subbituminous Coal	Spreader Stoker
10200205	Bituminous/Subbituminous Coal	Overfeed Stoker
10200206	Bituminous/Subbituminous Coal	Underfeed Stoker
10200210	Bituminous/Subbituminous Coal	Overfeed Stoker
10200212	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Tangential)
10200213	Bituminous/Subbituminous Coal	Wet Slurry
10200217	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Bubbling Bed (Bituminous Coal)

SCC	Description (6 digit)	Description (8 digit)
10200218	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Circulating Bed (Bituminous Coal)
10200219	Bituminous/Subbituminous Coal	Cogeneration (Bituminous Coal)
10200221	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom (Subbituminous Coal)
10200222	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Subbituminous Coal)
10200223	Bituminous/Subbituminous Coal	Cyclone Furnace (Subbituminous Coal)
10200224	Bituminous/Subbituminous Coal	Spreader Stoker (Subbituminous Coal)
10200225	Bituminous/Subbituminous Coal	Travelling Grate (Overfeed) Stoker (Subbituminous Coal)
10200226	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom Tangential (Subbituminous Coal)
10200229	Bituminous/Subbituminous Coal	Cogeneration (Subbituminous Coal)
10200300	Lignite	Pulverized Coal: Wet Bottom
10200301	Lignite	Pulverized Coal: Dry Bottom, Wall Fired
10200302	Lignite	Pulverized Coal: Dry Bottom, Tangential Fired
10200303	Lignite	Cyclone Furnace
10200304	Lignite	Travelling Grate (Overfeed) Stoker
10200306	Lignite	Spreader Stoker
10200307	Lignite	Cogeneration
10200401	Residual Oil	Grade 6 Oil
10200402	Residual Oil	10-100 Million Btu/hr
10200403	Residual Oil	< 10 Million Btu/hr
10200404	Residual Oil	Grade 5 Oil
10200405	Residual Oil	Cogeneration
10200501	Distillate Oil	Grades 1 and 2 Oil
10200502	Distillate Oil	10-100 Million Btu/hr
10200503	Distillate Oil	< 10 Million Btu/hr
10200504	Distillate Oil	Grade 4 Oil
10200505	Distillate Oil	Cogeneration
10200601	Natural Gas	> 100 Million Btu/hr
10200602	Natural Gas	10-100 Million Btu/hr
10200603	Natural Gas	< 10 Million Btu/hr
10200604	Natural Gas	Cogeneration
10200701	Process Gas	Petroleum Refinery Gas
10200704	Process Gas	Blast Furnace Gas
10200707	Process Gas	Coke Oven Gas
10200710	Process Gas	Cogeneration
10200799	Process Gas	Other
10200802	Coke	All Boiler Sizes
10200804	Coke	Cogeneration
10200901	Wood/Bark Waste	Bark-fired Boiler (> 50,000 Lb Steam)
10200902	Wood/Bark Waste	Wood/Bark-fired Boiler (> 50,000 Lb Steam)
10200903	Wood/Bark Waste	Wood-fired Boiler (> 50,000 Lb Steam)
10200904	Wood/Bark Waste	Bark-fired Boiler (< 50,000 Lb Steam)
10200905	Wood/Bark Waste	Wood/Bark-fired Boiler (< 50,000 Lb Steam)
10200906	Wood/Bark Waste	Wood-fired Boiler (< 50,000 Lb Steam)
10200907	Wood/Bark Waste	Wood Cogeneration
10200910	Wood/Bark Waste	Fuel cell/Dutch oven boilers

SCC	Description (6 digit)	Description (8 digit)
10200911	Wood/Bark Waste	Stoker boilers
10200912	Wood/Bark Waste	Fluidized bed combustion boiler
10201001	Liquefied Petroleum Gas (LPG)	Butane
10201002	Liquefied Petroleum Gas (LPG)	Propane
10201003	Liquefied Petroleum Gas (LPG)	Butane/Propane Mixture: Specify Percent Butane
10201101	Bagasse	All Boiler Sizes
10201201	Solid Waste	Specify Waste Material
10201202	Solid Waste	Refuse Derived Fuel
10201301	Liquid Waste	Specify Waste Material
10201302	Liquid Waste	Waste Oil
10201401	CO Boiler	Natural Gas
10201402	CO Boiler	Process Gas
10201403	CO Boiler	Distillate Oil
10201404	CO Boiler	Residual Oil
10201601	Methanol	Industrial Boiler
10201701	Gasoline	Industrial Boiler
10300101	Anthracite Coal	Pulverized Coal
10300102	Anthracite Coal	Travelling Grate (Overfeed) Stoker
10300103	Anthracite Coal	Hand-fired
10300203	Bituminous/Subbituminous Coal	Cyclone Furnace (Bituminous Coal)
10300205	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom (Bituminous Coal)
10300206	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Bituminous Coal)
10300207	Bituminous/Subbituminous Coal	Overfeed Stoker (Bituminous Coal)
10300208	Bituminous/Subbituminous Coal	Underfeed Stoker (Bituminous Coal)
10300209	Bituminous/Subbituminous Coal	Spreader Stoker (Bituminous Coal)
10300211	Bituminous/Subbituminous Coal	Overfeed Stoker
10300214	Bituminous/Subbituminous Coal	Hand-fired (Bituminous Coal)
10300216	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Tangential) (Bituminous Coal)
10300217	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Bubbling Bed (Bituminous Coal)
10300218	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Circulating Bed (Bituminous Coal)
10300221	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom (Subbituminous Coal)
10300222	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Subbituminous Coal)
10300223	Bituminous/Subbituminous Coal	Cyclone Furnace (Subbituminous Coal)
10300224	Bituminous/Subbituminous Coal	Spreader Stoker (Subbituminous Coal)
10300225	Bituminous/Subbituminous Coal	Travelling Grate (Overfeed) Stoker (Subbituminous Coal)
10300226	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom Tangential (Subbituminous Coal)
10300300	Lignite	Pulverized Coal: Wet Bottom
10300305	Lignite	Pulverized Coal: Dry Bottom, Wall Fired
10300306	Lignite	Pulverized Coal: Dry Bottom, Tangential Fired
10300307	Lignite	Travelling Grate (Overfeed) Stoker
10300309	Lignite	Spreader Stoker
10300401	Residual Oil	Grade 6 Oil
10300402	Residual Oil	10-100 Million Btu/hr

SCC	Description (6 digit)	Description (8 digit)
10300403	Residual Oil	< 10 Million Btu/hr
10300404	Residual Oil	Grade 5 Oil
10300501	Distillate Oil	Grades 1 and 2 Oil
10300502	Distillate Oil	10-100 Million Btu/hr
10300503	Distillate Oil	< 10 Million Btu/hr
10300504	Distillate Oil	Grade 4 Oil
10300601	Natural Gas	> 100 Million Btu/hr
10300602	Natural Gas	10-100 Million Btu/hr
10300603	Natural Gas	< 10 Million Btu/hr
10300701	Process Gas	POTW Digester Gas-fired Boiler
10300799	Process Gas	Other Not Classified
10300811	Landfill Gas	Landfill Gas
10300901	Wood/Bark Waste	Bark-fired Boiler
10300902	Wood/Bark Waste	Wood/Bark-fired Boiler
10300903	Wood/Bark Waste	Wood-fired Boiler
10300910	Wood/Bark Waste	Fuel cell/Dutch oven boilers
10300911	Wood/Bark Waste	Stoker boilers
10300912	Wood/Bark Waste	Fluidized bed combustion boilers
10301001	Liquefied Petroleum Gas (LPG)	Butane
10301002	Liquefied Petroleum Gas (LPG)	Propane
10301003	Liquefied Petroleum Gas (LPG)	Butane/Propane Mixture: Specify Percent Butane
10301201	Solid Waste	Specify Waste Material
10301202	Solid Waste	Refuse Derived Fuel
10301301	Liquid Waste	Specify Waste Material
10301302	Liquid Waste	Waste Oil
10301303	Liquid Waste	Sewage Grease Skimmings
10500102	Industrial	Coal
10500105	Industrial	Distillate Oil
10500106	Industrial	Natural Gas
10500110	Industrial	Liquefied Petroleum Gas (LPG)
10500113	Industrial	Waste Oil: Air Atomized Burner
10500114	Industrial	Waste Oil: Vapourizing Burner
10500202	Commercial/Institutional	Coal
10500205	Commercial/Institutional	Distillate Oil
10500206	Commercial/Institutional	Natural Gas
10500209	Commercial/Institutional	Wood
10500210	Commercial/Institutional	Liquefied Petroleum Gas (LPG)
10500213	Commercial/Institutional	Waste Oil: Air Atomized Burner
10500214	Commercial/Institutional	Waste Oil: Vapourizing Burner

### 2.1.3.2 Internal Combustion

Stationary internal combustion sources are commonly used to generate electric power to pump gas or other fluids or to compress air for pneumatic machinery. These sources include mainly gas turbines and utility reciprocating engines. The following listing provides general SCCs applicable to this source category (including the fuels used):

SCC	Description (6 digit)	Description (8 digit)
20200101	Distillate Oil (Diesel)	Turbine
20200102	Distillate Oil (Diesel)	Reciprocating
20200103	Distillate Oil (Diesel)	Turbine: Cogeneration
20200104	Distillate Oil (Diesel)	Reciprocating: Cogeneration
20200105	Distillate Oil (Diesel)	Reciprocating: Crankcase Blowby
20200106	Distillate Oil (Diesel)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20200107	Distillate Oil (Diesel)	Reciprocating: Exhaust
20200108	Distillate Oil (Diesel)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20200109	Distillate Oil (Diesel)	Turbine: Exhaust
20200201	Natural Gas	Turbine
20200202	Natural Gas	Reciprocating
20200203	Natural Gas	Turbine: Cogeneration
20200204	Natural Gas	Reciprocating: Cogeneration
20200205	Natural Gas	Reciprocating: Crankcase Blowby
20200206	Natural Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)
20200207	Natural Gas	Reciprocating: Exhaust
20200208	Natural Gas	Turbine: Evaporative Losses (Fuel Delivery System)
20200209	Natural Gas	Turbine: Exhaust
20200252	Natural Gas	2-cycle Lean Burn
20200253	Natural Gas	4-cycle Rich Burn
20200254	Natural Gas	4-cycle Lean Burn
20200255	Natural Gas	2-cycle Clean Burn
20200256	Natural Gas	4-cycle Clean Burn
20200301	Gasoline	Reciprocating
20200305	Gasoline	Reciprocating: Crankcase Blowby
20200306	Gasoline	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20200307	Gasoline	Reciprocating: Exhaust
20200401	Large Bore Engine	Diesel
20200402	Large Bore Engine	Dual Fuel (Oil/Gas)
20200403	Large Bore Engine	Cogeneration: Dual Fuel
20200405	Large Bore Engine	Crankcase Blowby
20200406	Large Bore Engine	Evaporative Losses (Fuel Storage and Delivery System)
20200407	Large Bore Engine	Exhaust
20200501	Residual/Crude Oil	Reciprocating
20200505	Residual/Crude Oil	Reciprocating: Crankcase Blowby
20200506	Residual/Crude Oil	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20200507	Residual/Crude Oil	Reciprocating: Exhaust
20200701	Process Gas	Turbine
20200702	Process Gas	Reciprocating Engine
20200705	Process Gas	Refinery Gas: Turbine
20200706	Process Gas	Refinery Gas: Reciprocating Engine
20200710	Process Gas	Reciprocating: Crankcase Blowby

SCC	Description (6 digit)	Description (8 digit)
20200711	Process Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)
20200712	Process Gas	Reciprocating: Exhaust
20200713	Process Gas	Turbine: Evaporative Losses (Fuel Delivery System)
20200714	Process Gas	Turbine: Exhaust
20200901	Kerosene/Naphtha (Jet Fuel)	Turbine
20200902	Kerosene/Naphtha (Jet Fuel)	Reciprocating
20200905	Kerosene/Naphtha (Jet Fuel)	Reciprocating: Crankcase Blowby
20200906	Kerosene/Naphtha (Jet Fuel)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20200907	Kerosene/Naphtha (Jet Fuel)	Reciprocating: Exhaust
20200908	Kerosene/Naphtha (Jet Fuel)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20200909	Kerosene/Naphtha (Jet Fuel)	Turbine: Exhaust
20201001	Liquefied Petroleum Gas (LPG)	Propane: Reciprocating
20201002	Liquefied Petroleum Gas (LPG)	Butane: Reciprocating
20201005	Liquefied Petroleum Gas (LPG)	Reciprocating: Crankcase Blowby
20201006	Liquefied Petroleum Gas (LPG)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20201007	Liquefied Petroleum Gas (LPG)	Reciprocating: Exhaust
20201008	Liquefied Petroleum Gas (LPG)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20201009	Liquefied Petroleum Gas (LPG)	Turbine: Exhaust
20201011	Liquefied Petroleum Gas (LPG)	Turbine
20201012	Liquefied Petroleum Gas (LPG)	Reciprocating Engine
20201013	Liquefied Petroleum Gas (LPG)	Turbine: Cogeneration
20201014	Liquefied Petroleum Gas (LPG)	Reciprocating Engine: Cogeneration
20201601	Methanol	Turbine
20201602	Methanol	Reciprocating Engine
20201605	Methanol	Reciprocating: Crankcase Blowby
20201606	Methanol	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20201607	Methanol	Reciprocating: Exhaust
20201608	Methanol	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20201609	Methanol	Turbine: Exhaust
20201701	Gasoline	Turbine
20201702	Gasoline	Reciprocating Engine
20201705	Gasoline	Reciprocating: Crankcase Blowby
20201706	Gasoline	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20201707	Gasoline	Reciprocating: Exhaust
20201708	Gasoline	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20201709	Gasoline	Turbine: Exhaust
20280001	Equipment Leaks	Equipment Leaks
20282001	Wastewater, Aggregate	Process Area Drains
20282002	Wastewater, Aggregate	Process Equipment Drains

SCC	Description (6 digit)	Description (8 digit)
20282599	Wastewater, Points of Generation	Specify Point of Generation
20300101	Distillate Oil (Diesel)	Reciprocating
20300102	Distillate Oil (Diesel)	Turbine
20300105	Distillate Oil (Diesel)	Reciprocating: Crankcase Blowby
20300106	Distillate Oil (Diesel)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20300107	Distillate Oil (Diesel)	Reciprocating: Exhaust
20300108	Distillate Oil (Diesel)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20300109	Distillate Oil (Diesel)	Turbine: Exhaust
20300201	Natural Gas	Reciprocating
20300202	Natural Gas	Turbine
20300203	Natural Gas	Turbine: Cogeneration
20300204	Natural Gas	Cogeneration
20300205	Natural Gas	Reciprocating: Crankcase Blowby
20300206	Natural Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)
20300207	Natural Gas	Reciprocating: Exhaust
20300208	Natural Gas	Turbine: Evaporative Losses (Fuel Delivery System)
20300209	Natural Gas	Turbine: Exhaust
20300301	Gasoline	Reciprocating
20300305	Gasoline	Reciprocating: Crankcase Blowby
20300306	Gasoline	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20300307	Gasoline	Reciprocating: Exhaust
20300701	Digester Gas	Turbine
20300702	Digester Gas	Reciprocating: POTW Digester Gas
20300705	Digester Gas	Reciprocating: Crankcase Blowby
20300706	Digester Gas	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20300707	Digester Gas	Reciprocating: Exhaust
20300708	Digester Gas	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20300709	Digester Gas	Turbine: Exhaust
20300801	Landfill Gas	Turbine
20300802	Landfill Gas	Reciprocating
20300805	Landfill Gas	Reciprocating: Crankcase Blowby
20300806	Landfill Gas	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20300807	Landfill Gas	Reciprocating: Exhaust
20300808	Landfill Gas	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20300809	Landfill Gas	Turbine: Exhaust
20300901	Kerosene/Naphtha (Jet Fuel)	Turbine: JP-4
20300908	Kerosene/Naphtha (Jet Fuel)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20300909	Kerosene/Naphtha (Jet Fuel)	Turbine: Exhaust
20301001	Liquefied Petroleum Gas (LPG)	Propane: Reciprocating

SCC	Description (6 digit)	Description (8 digit)
20301002	Liquefied Petroleum Gas (LPG)	Butane: Reciprocating
20301005	Liquefied Petroleum Gas (LPG)	Reciprocating: Crankcase Blowby
20301006	Liquefied Petroleum Gas (LPG)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20301007	Liquefied Petroleum Gas (LPG)	Reciprocating: Exhaust
20380001	Equipment Leaks	Equipment Leaks
20382001	Wastewater, Aggregate	Process Area Drains
20382002	Wastewater, Aggregate	Process Equipment Drains
20382599	Wastewater, Points of Generation	Specify Point of Generation
20400101	Aircraft Engine Testing	Turbojet
20400102	Aircraft Engine Testing	Turboshaft
20400110	Aircraft Engine Testing	Jet A Fuel
20400111	Aircraft Engine Testing	JP-5 Fuel
20400112	Aircraft Engine Testing	JP-4 Fuel
20400199	Aircraft Engine Testing	Other Not Classified
20400201	Rocket Engine Testing	Rocket Motor: Solid Propellant
20400202	Rocket Engine Testing	Liquid Propellant
20400299	Rocket Engine Testing	Other Not Classified
20400301	Turbine	Natural Gas
20400302	Turbine	Diesel/Kerosene
20400303	Turbine	Distillate Oil
20400304	Turbine	Landfill Gas
20400305	Turbine	Kerosene/Naphtha
20400399	Turbine	Other Not Classified
20400401	Reciprocating Engine	Gasoline
20400402	Reciprocating Engine	Diesel/Kerosene
20400403	Reciprocating Engine	Distillate Oil
20400404	Reciprocating Engine	Process Gas
20400405	Reciprocating Engine	Landfill Gas
20400406	Reciprocating Engine	Kerosene/Naphtha (Jet Fuel)
20400407	Reciprocating Engine	Dual Fuel (Gas/Oil)
20400408	Reciprocating Engine	Residual Oil/Crude Oil
20400409	Reciprocating Engine	Liquefied Petroleum Gas (LPG)
20400499	Reciprocating Engine	Other Not Classified
20480001	Equipment Leaks	Equipment Leaks
20482001	Wastewater, Aggregate	Process Area Drains
20482002	Wastewater, Aggregate	Process Equipment Drains
20482501	Wastewater, Points of Generation	Water Deluge Solid Propellant Engine Test Unit
20482502	Wastewater, Points of Generation	Water Deluge Liquid Propellant Engine Test Unit
20482599	Wastewater, Points of Generation	Specify Point of Generation
26000320	Industrial Equipment	Industrial Fork Lift: Gasoline Engine (2-stroke)
26500320	Industrial Equipment	Industrial Fork Lift: Gasoline Engine (4-stroke)
27000320	Industrial Equipment	Industrial Fork Lift: Diesel
27300320	Industrial Equipment	Industrial Fork Lift: Liquefied Petroleum Gas (LPG)
27501001	Military	Piston Engine: Aviation Gas
27501014	Military	Jet Engine: JP-4
27501015	Military	Jet Engine: JP-5

SCC	Description (6 digit)	Description (8 digit)
27502001	Commercial	Piston Engine: Aviation Gas
27502011	Commercial	Jet Engine: Jet A
27505001	Civil	Piston Engine: Aviation Gas
27505011	Civil	Jet Engine: Jet A
27601001	Military	Piston Engine: Aviation Gas
27601014	Military	Jet Engine: JP-4
27601015	Military	Jet Engine: JP-5
27602001	Commercial	Piston Engine: Aviation Gas
27602011	Commercial	Jet Engine: Jet A
27605001	Civil	Piston Engine: Aviation Gas
27605011	Civil	Jet Engine: Jet A
28000211	Commercial	Crew Boats: Main Engine Exhaust: Idling
28000212	Commercial	Crew Boats: Main Engine Exhaust: Manoeuvring
28000213	Commercial	Crew Boats: Auxiliary Generator Exhaust: Hotelling
28000216	Commercial	Supply Boats: Main Engine Exhaust: Idling
28000217	Commercial	Supply Boats: Main Engine Exhaust: Manoeuvring
28000218	Commercial	Supply Boats: Auxiliary Generator Exhaust: Hotelling

#### 2.1.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory* — 2002):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:  

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time}$$
 (corrected to reference conditions and appropriate units)
- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on the sulphur content in the fuel being burned.
- **Emission factors** - for external combustion sources, these are normally expressed in terms of mass of the contaminant emitted per unit of fuel consumed. Data on fuel consumption are also required.
- **Engineering estimates**

Direct measurement and emission factors are commonly used methods to determine CAC emissions from fuel combustion activities. Mass balance and engineering calculation techniques can also be applied if the required data are available. Fuel combustion CAC estimates are dependent on the following parameters: fuel consumption, fuel composition, combustion technology, and pollution control equipment.

### 2.1.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected to estimate CAC emissions, the following supporting information may be required:

- monitoring equipment logs;
- fuel type, composition, and load/consumption;
- equipment type and operation parameters;
- firing capacity;
- schedule of process activity or loads; and
- emission control device and efficiency.

Emission factors may be obtained from the equipment manufacturer, government agencies, or reference documents. A comprehensive emission factor database is available from the United States Environmental Protection Agency (US EPA). The European and Australian environmental regulatory agencies also provide detailed descriptions of combustion equipment and associated CAC emission factors.

**It is important to note** that emission factors that are derived from the testing of combustion unit(s) at a given facility should be used where available.

Emission factors should be chosen with consideration of any add-on controls in place and the specific characteristics of the combustion source. For example, different emission factors are applied for different sizes of natural gas-fired boiler (>100 million Btu/hour, <100 million Btu/hour) and for uncontrolled emissions, those equipped with low-NO<sub>x</sub> burners, flue gas recirculation, etc.

Fuel consumption information (i.e., fuel properties) is required when using emission factors to calculate emissions. The following provides information for various fuels:

- For natural gas-fired equipment, fuel consumption data can be obtained directly from the facility's natural gas bill(s). Ideally, boilers and heaters consuming large amounts of natural gas would be metered separately, such that the fuel consumption for each unit could be quantified. In the absence of this information, facility-wide natural gas usage can be allocated to process and space heaters on the basis of the nameplate capacity of each unit. Judgment should be used when a combustion unit is not operating near capacity or when it is not in use consistently on a year-round basis. If natural gas consumption rates are not known, they may be estimated by "back-calculating" using the nameplate capacity and the hours of operation. For example, a

boiler with a firing capacity of 50 gigajoules per hour that operated 4 000 hours per year would require 200 000 gigajoules of fuel input per year. For natural gas with a heating value of 38.6 megajoules per cubic metre, this would equate to 5.2 million cubic metres per year. Data on the relevant properties of natural gas, such as heating value and sulphur content, should be available through the natural gas supplier.

- For liquid fuel-fired equipment, fuel consumption data should be available based on a facility's purchasing records. Data on the relevant properties of distillate or residual oil should be obtained from the fuel supplier.
- For solid fuels, data should be recorded based on the quantities used, as well as other properties needed for emission calculations, such as moisture and sulphur content.

### 2.1.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Combustion in Boilers Version 1.1	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html">http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html</a>
Emission Estimation Technique Manual for Combustion Engines Version 2.2	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/eng.html">http://www.npi.gov.au/handbooks/approved_handbooks/eng.html</a>

- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 2: Preferred and Alternative Methods for Estimating Air Emissions from Boilers	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Chapter 1: External Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch01/">http://www.epa.gov/ttn/chief/ap42/ch01/</a>
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Chapter 3: Stationary Internal Combustion Sources
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<a href="http://www.epa.gov/ttn/chief/ap42/ch03/">http://www.epa.gov/ttn/chief/ap42/ch03/</a>
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- ***U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.2 Industrial Incineration

### 2.2.1 General Description

Solid waste incineration commonly includes refuse combustion, open burning, sewage sludge incineration, and medical waste incineration. CAC emissions result from the incomplete combustion of fuel.

### 2.2.2 Applicable SIC and NAICS Codes

Incineration is practiced by municipal, industrial, and medical, as well as other sectors. Therefore, SIC and NAICS Codes should be applied appropriately.

### 2.2.3 Source Description

Refuse or municipal solid waste (MSW) combustion includes the burning of garbage and other non-hazardous waste in single chamber units, multiple chamber units, and trench incinerators. The three main classes of MSW combustion technologies include mass burn, refuse-derived fuel, and modular combustor.

Another type of municipal waste that may be disposed of is sewage sludge from wastewater treatment plants. Sewage sludge may be burned in multiple hearth, fluidized bed, and electric infrared incinerators. Biomedical waste is produced by hospitals, veterinary facilities, and medical research facilities and includes both infectious wastes and non-infectious (general housekeeping) wastes. The three main types of incinerators include controlled air, excess air, and rotary kiln. Depending on the characteristics of the solid waste and the combustion conditions in the incinerator, emissions can include all of the CACs.

A range of control technologies are used to control incinerator emissions, including fabric filters (baghouses), electrostatic precipitators, venturi scrubbers, wet scrubbers, dry sorbent injection, and catalytic and non-catalytic systems.

SCC	Description (6 digit)	Description (8 digit)
50100101	Municipal Incineration	Starved Air: Multiple Chamber
50100102	Municipal Incineration	Mass Burn: Single Chamber
50100103	Municipal Incineration	Refuse Derived Fuel
50100104	Municipal Incineration	Mass Burn Refractory Wall Combustor
50100105	Municipal Incineration	Mass Burn Waterwall Combustor
50100106	Municipal Incineration	Mass Burn Rotary Waterwall Combustor
50100107	Municipal Incineration	Modular Excess Air Combustor
50100108	Municipal Incineration	Fluidized Bed: Refuse Derived Fuel
50100505	Other Incineration	Medical Waste Incinerator, unspecified type, Infectious wastes only
50100506	Other Incineration	Sludge
50100507	Other Incineration	Conical Design (Tee Pee) Municipal Refuse
50100508	Other Incineration	Conical Design (Tee Pee) Wood Refuse
50100510	Other Incineration	Trench Burner: Wood

<b>SCC</b>	<b>Description (6 digit)</b>	<b>Description (8 digit)</b>
50100511	Other Incineration	Trench Burner: Tires
50100512	Other Incineration	Trench Burner: Refuse
50100515	Other Incineration	Sludge: Multiple Hearth
50100516	Other Incineration	Sludge: Fluidized Bed
50100517	Other Incineration	Sludge: Electric Infrared
50100518	Other Incineration	Sewage Sludge Incinerator: Single Hearth Cyclone
50100519	Other Incineration	Sewage Sludge Incinerator: Rotary Kiln
50100520	Other Incineration	Sewage Sludge Incinerator: High Pressure, Wet Oxidation
50200101	Incineration	Multiple Chamber
50200102	Incineration	Single Chamber
50200103	Incineration	Controlled Air
50200104	Incineration	Conical Design (Tee Pee) Municipal Refuse
50200105	Incineration	Conical Design (Tee Pee) Wood Refuse
50200501	Incineration: Special Purpose	Med. Waste Controlled Air Incin-aka Starved air, 2-stg, or Modular comb
50200502	Incineration: Special Purpose	Med. Waste Excess Air Incin - aka Batch, Multiple Chamber, or Retort
50200503	Incineration: Special Purpose	Medical Waste Rotary Kiln Incinerator
50200504	Incineration: Special Purpose	Medical Waste Incinerator, Unspecified Type (use 502005-01, -02, -03)
50200505	Incineration: Special Purpose	Medical Waste Incinerator, Unspecified Type, Infectious wastes only
50200506	Incineration: Special Purpose	Sludge
50200507	Incineration: Special Purpose	VOC Contaminated Soil
50200515	Incineration: Special Purpose	Sewage Sludge Incinerator: Multiple Hearth
50200516	Incineration: Special Purpose	Sewage Sludge Incinerator: Fluidized Bed
50200517	Incineration: Special Purpose	Sewage Sludge Incinerator: Electric Infrared
50200518	Incineration: Special Purpose	Sewage Sludge Incinerator: Single Hearth Cyclone
50200519	Incineration: Special Purpose	Sewage Sludge Incinerator: Rotary Kiln
50200520	Incineration: Special Purpose	Sewage Sludge Incinerator: High Pressure, Wet Oxidation
50300101	Incineration	Multiple Chamber
50300102	Incineration	Single Chamber
50300103	Incineration	Controlled Air
50300104	Incineration	Conical Design (Tee Pee) Municipal Refuse
50300105	Incineration	Conical Design (Tee Pee) Wood Refuse
50300106	Incineration	Trench Burner: Wood
50300107	Incineration	Trench Burner: Tires
50300108	Incineration	Auto Body Components
50300109	Incineration	Trench Burner: Refuse
50300111	Incineration	Mass Burn Refractory Wall Combustor

SCC	Description (6 digit)	Description (8 digit)
50300112	Incineration	Mass Burn Waterwall Combustor
50300113	Incineration	Mass Burn Rotary Waterwall Combustor
50300114	Incineration	Modular Starved-air Combustor
50300115	Incineration	Modular Excess-air Combustor
50300501	Incineration	Hazardous Waste
50300502	Incineration	Hazardous Waste Incinerators: Fluidized Bed
50300503	Incineration	Hazardous Waste Incinerators: Liquid Injection
50300504	Incineration	Hazardous Waste Incinerators: Rotary Kiln
50300505	Incineration	Hazardous Waste Incinerators: Multiple Hearth
50300506	Incineration	Sludge
50300515	Incineration	Sewage Sludge Incinerator: Multiple Hearth
50300516	Incineration	Sewage Sludge Incinerator: Fluidized Bed
50300517	Incineration	Sewage Sludge Incinerator: Electric Infrared
50300518	Incineration	Sewage Sludge Incinerator: Single Hearth Cyclone
50300519	Incineration	Sewage Sludge Incinerator: Rotary Kiln
50300520	Incineration	Sewage Sludge Incinerator: High Pressure, Wet Oxidation
50300599	Incineration	Fuel Not Classified

## 2.2.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory* — 2002):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance**
- **Emission factors** - for incineration sources, these are generally expressed in terms of mass of contaminant emitted per mass of waste incinerated. Data on waste quantities are required.
- **Engineering estimates**

Emission monitoring and emission factors are widely used methodologies for estimating CAC emissions from fuel combustion activities. Mass balance and engineering calculation techniques can also be applied if the necessary information is available.

The main factors that affect the emissions from the combustion of waste include the type of combustion system and air pollution control equipment used. Emission factors for specific types of incinerators with control devices are available from the US EPA. In addition, numerous reports focusing mainly on toxic substances (e.g., polychlorinated biphenyls) and incinerator efficiency/design are available on the Canadian Council of Ministers of the Environment (CCME) website at <www.ccme.ca>.

### 2.2.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected to estimate CAC emissions, the following supporting information may be required:

- monitoring equipment logs;
- fuel type, composition, and load/consumption;
- equipment type and operation parameters;
- firing capacity;
- schedule of process activity or loads; and
- emission control device and efficiency.

Supporting information for emissions generated by incinerators can also be found at a number of government agencies. For example, Australia's National Pollutant Inventory Guide entitled "Emission Estimation Technique Manual for Sewage Sludge and Biomedical Waste Incineration" is a comprehensive guide for waste incineration outlining specific emission factors (based on US EPA) and efficiency data that can be used to estimate emissions. That specific guide provides industry-measured data for SO<sub>2</sub>, NO<sub>x</sub>, and particulate matter in Australia.

### 2.2.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Sewage Sludge and Biomedical Waste Incineration	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/incineration.html">http://www.npi.gov.au/handbooks/approved_handbooks/incineration.html</a>
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- **U.S. Environmental Protection Agency, 1995, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 2: Solid Waste Disposal	<a href="http://www.epa.gov/ttn/chief/ap42/ch02/">http://www.epa.gov/ttn/chief/ap42/ch02/</a>
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- **U.S. Environmental Protection Agency, 2000, *Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.3 Solvent Evaporation

### 2.3.1 General Description

Solvent evaporation can occur during the manufacture or use of solvent or solvent-containing products in processes such as cleaning, degreasing, thinning, application of surface coatings (e.g., painting), and general solvent use. Emissions (i.e., particulate matter or VOCs) may be captured from mitigation or solvent recovery activities.

### 2.3.2 Applicable SIC and NAICS Codes

Solvents are used in many industries and are typically categorized by SCCs. Generally SIC and NAICS codes cannot be applied to solvents since they are used in many manufacturing operations.

### 2.3.3 Source Description

#### 2.3.3.1 *Solvent Cleaning and Degreasing*

Solvent cleaning and degreasing operations involve the use of organic solvents to remove grease, fats, oils, wax, or soil from metal, glass, or plastic items. Degreaser types include cold cleaners, vapour degreasers, and conveyORIZED degreasers. VOC emissions typically occur as a result of solvent evaporation. The user should refer to the detailed list of SCCs shown below:

SCC	Description (6 digit)	Description (8 digit)
40100201	Degreasing	Stoddard (Petroleum Solvent): Open-top Vapour Degreasing
40100202	Degreasing	1,1,1-Trichloroethane (Methyl Chloroform): Open-top Vapour Degreasing
40100203	Degreasing	Perchloroethylene: Open-top Vapour Degreasing
40100204	Degreasing	Methylene Chloride: Open-top Vapour Degreasing
40100205	Degreasing	Trichloroethylene: Open-top Vapour Degreasing
40100206	Degreasing	Toluene: Open-top Vapour Degreasing
40100207	Degreasing	Trichlorotrifluoroethane (Freon): Open-top Vapour Degreasing
40100208	Degreasing	Chlorosolve: Open-top Vapour Degreasing
40100209	Degreasing	Butyl Acetate
40100215	Degreasing	Entire Unit: Open-top Vapour Degreasing
40100216	Degreasing	Degreaser: Entire Unit
40100217	Degreasing	Entire Unit
40100221	Degreasing	Stoddard (Petroleum Solvent): ConveyORIZED Vapour Degreasing
40100222	Degreasing	1,1,1-Trichloroethane (Methyl Chloroform): ConveyORIZED Vapour Degreaser
40100223	Degreasing	Perchloroethylene: ConveyORIZED Vapour Degreasing
40100224	Degreasing	Methylene Chloride: ConveyORIZED Vapour Degreasing
40100225	Degreasing	Trichloroethylene: ConveyORIZED Vapour Degreasing
40100235	Degreasing	Entire Unit: with Vapourized Solvent: ConveyORIZED Vapour Degreasing.

SCC	Description (6 digit)	Description (8 digit)
40100236	Degreasing	Entire Unit: with Non-boiling Solvent: Conveyorized Vapour Degreasing
40100251	Degreasing	Stoddard (Petroleum Solvent): General Degreasing Units
40100252	Degreasing	1,1,1-Trichloroethane (Methyl Chloroform): General Degreasing Units
40100253	Degreasing	Perchloroethylene: General Degreasing Units
40100254	Degreasing	Methylene Chloride: General Degreasing Units
40100255	Degreasing	Trichloroethylene: General Degreasing Units
40100256	Degreasing	Toluene: General Degreasing Units
40100257	Degreasing	Trichlorotrifluoroethane (Freon): General Degreasing Units
40100258	Degreasing	Trichlorofluoromethane: General Degreasing Units
40100259	Degreasing	1,1,1-Trichloroethane (Methyl Chloroform): General Degreasing Units
40100295	Degreasing	Other Not Classified: General Degreasing Units
40100296	Degreasing	Other Not Classified: General Degreasing Units
40100297	Degreasing	Other Not Classified: Open-top Vapour Degreasing
40100298	Degreasing	Other Not Classified: Conveyorized Vapour Degreasing
40100299	Degreasing	Other Not Classified: Open-top Vapour Degreasing
40100301	Cold Solvent Cleaning/Stripping	Methanol
40100302	Cold Solvent Cleaning/Stripping	Methylene Chloride
40100303	Cold Solvent Cleaning/Stripping	Stoddard (Petroleum Solvent)
40100304	Cold Solvent Cleaning/Stripping	Perchloroethylene
40100305	Cold Solvent Cleaning/Stripping	1,1,1-Trichloroethane (Methyl Chloroform)
40100306	Cold Solvent Cleaning/Stripping	Trichloroethylene
40100307	Cold Solvent Cleaning/Stripping	Isopropyl Alcohol
40100308	Cold Solvent Cleaning/Stripping	Methyl Ethyl Ketone
40100309	Cold Solvent Cleaning/Stripping	Freon
40100310	Cold Solvent Cleaning/Stripping	Acetone
40100311	Cold Solvent Cleaning/Stripping	Glycol Ethers
40100335	Cold Solvent Cleaning/Stripping	Entire Unit
40100336	Cold Solvent Cleaning/Stripping	Degreaser: Entire Unit
40100398	Cold Solvent Cleaning/Stripping	Other Not Classified
40100399	Cold Solvent Cleaning/Stripping	Other Not Classified

### 2.3.3.2 Surface Coating

Surface coating generally involves the application of paint, varnish, lacquer, or primers for decorative or protective purposes. Coatings may be in liquid or powder form and may be applied by brushing, rolling, dipping, spraying, or flow coating. Coating operations are sometimes conducted in enclosed, ventilated spray booths, some incorporating heating systems to facilitate drying or curing of products. Emissions of VOCs occur from surface coating operations because volatile solvents are part of the paint formulation and are emitted through evaporation as the coating dries. Facilities should refer to the detailed list of SCCs provided below:

SCC	Description (6 digit)	Description (8 digit)
40200101	Surface Coating Application - General	Paint: Solvent-base
40200110	Surface Coating Application - General	Paint: Solvent-base
40200201	Surface Coating Application - General	Paint: Water-base
40200210	Surface Coating Application - General	Paint: Water-base
40200301	Surface Coating Application - General	Varnish/Shellac
40200310	Surface Coating Application - General	Varnish/Shellac
40200401	Surface Coating Application - General	Lacquer
40200410	Surface Coating Application - General	Lacquer
40200501	Surface Coating Application - General	Enamel
40200510	Surface Coating Application - General	Enamel
40200601	Surface Coating Application - General	Primer
40200610	Surface Coating Application - General	Primer
40200701	Surface Coating Application - General	Adhesive Application
40200706	Surface Coating Application - General	Adhesive: Solvent Mixing
40200707	Surface Coating Application - General	Adhesive: Solvent Storage
40200710	Surface Coating Application - General	Adhesive: General
40200711	Surface Coating Application - General	Adhesive: Spray
40200712	Surface Coating Application - General	Adhesive: Roll-on
40200801	Coating Oven - General	General
40200802	Coating Oven - General	Dried < 175F
40200803	Coating Oven - General	Baked > 175F

SCC	Description (6 digit)	Description (8 digit)
40200810	Coating Oven - General	General
40200820	Coating Oven - General	Prime/Base Coat Oven
40200830	Coating Oven - General	Topcoat Oven
40200840	Coating Oven - General	Two Piece Can Curing Ovens: General (Includes Codes 41, 42, and 43)
40200841	Coating Oven - General	Two Piece Can Base Coat Oven
40200842	Coating Oven - General	Two Piece Can Over Varnish Oven
40200843	Coating Oven - General	Two Piece Can Interior Body Coat Oven
40200845	Coating Oven - General	Three Piece Can Curing Ovens (Includes Codes 46, 47, 48, and 49)
40200846	Coating Oven - General	Three Piece Can Sheet Base Coat (Interior) Oven
40200847	Coating Oven - General	Three Piece Can Sheet Base Coat (Exterior) Oven
40200848	Coating Oven - General	Three Piece Can Sheet Lithographic Coating Oven
40200849	Coating Oven - General	Three Piece Can Interior Body Coat Oven
40200855	Coating Oven - General	Filler Oven
40200856	Coating Oven - General	Sealer Oven
40200861	Coating Oven - General	Single Coat Application: Oven
40200870	Coating Oven - General	Color Coat Oven
40200871	Coating Oven - General	Topcoat/Texture Coat Oven
40200872	Coating Oven - General	EMI/RFI Shielding Coat Oven
40200898	Coating Oven - General	General
40200901	Thinning Solvents - General	General
40200902	Thinning Solvents - General	Acetone
40200903	Thinning Solvents - General	Butyl Acetate
40200904	Thinning Solvents - General	Butyl Alcohol
40200905	Thinning Solvents - General	Carbitol
40200906	Thinning Solvents - General	Cellosolve
40200907	Thinning Solvents - General	Cellosolve Acetate
40200908	Thinning Solvents - General	Dimethyl Formamide
40200909	Thinning Solvents - General	Ethyl Acetate
40200910	Thinning Solvents - General	Ethyl Alcohol
40200911	Thinning Solvents - General	Gasoline
40200912	Thinning Solvents - General	Isopropyl Alcohol
40200913	Thinning Solvents - General	Isopropyl Acetate
40200914	Thinning Solvents - General	Kerosene
40200915	Thinning Solvents - General	Lactol Spirits
40200916	Thinning Solvents - General	Methyl Acetate
40200917	Thinning Solvents - General	Methyl Alcohol
40200918	Thinning Solvents - General	Methyl Ethyl Ketone
40200919	Thinning Solvents - General	Methyl Isobutyl Ketone
40200920	Thinning Solvents - General	Mineral Spirits
40200921	Thinning Solvents - General	Naphtha
40200922	Thinning Solvents - General	Toluene
40200923	Thinning Solvents - General	Varsol
40200924	Thinning Solvents - General	Xylene
40200925	Thinning Solvents - General	Benzene
40200926	Thinning Solvents - General	Turpentine

SCC	Description (6 digit)	Description (8 digit)
40200927	Thinning Solvents - General	Hexylene Glycol
40200928	Thinning Solvents - General	Ethylene Oxide
40200929	Thinning Solvents - General	1,1,1-Trichloroethane (Methyl Chloroform)
40200930	Thinning Solvents - General	Methylene Chloride
40200931	Thinning Solvents - General	Perchloroethylene
40200998	Thinning Solvents - General	General
40201001	Coating Oven Heater	Natural Gas
40201002	Coating Oven Heater	Distillate Oil
40201003	Coating Oven Heater	Residual Oil
40201004	Coating Oven Heater	Liquefied Petroleum Gas (LPG)
40201101	Fabric Coating/Printing	Coating Operation (Also See Specific Coating Method Codes 4-02-04X)
40201103	Fabric Coating/Printing	Coating Mixing (Also See Specific Coating Method Codes 4-02-04X)
40201104	Fabric Coating/Printing	Coating Storage (Also See Specific Coating Method Codes 4-02-04X)
40201105	Fabric Coating/Printing	Equipment Cleanup: Fabric Coating(Also Spec Coat Method Codes 4-02-04X)
40201111	Fabric Coating/Printing	Fabric Printing: Roller (Also See New Codes Under 4-02-040-XX)
40201112	Fabric Coating/Printing	Fabric Printing: Roller (Also See New Codes Under 4-02-040-XX)
40201113	Fabric Coating/Printing	Fabric Printing: Rotary Screen (Also See New Codes Under 4-02-040-XX)
40201114	Fabric Coating/Printing	Fabric Printing: Rotary Screen (Also See New Codes Under 4-02-040-XX)
40201115	Fabric Coating/Printing	Fabric Printing: Flat Screen (Also See New Codes Under 4-02-040-XX)
40201116	Fabric Coating/Printing	Fabric Printing: Flat Screen (Also See New Codes Under 4-02-040-XX)
40201121	Fabric Coating/Printing	Fabric Print: Dryer: Steam Coil (Also See New Codes Under 4-02-040-XX)
40201122	Fabric Coating/Printing	Fabric Print: Dryer: Fuel-fired (Also See New Codes Under 4-02-040-XX)
40201197	Fabric Coating/Printing	Misc. Fugitives: (Also New Codes 4-02-040-XX)
40201198	Fabric Coating/Printing	Misc. Fugitives: (Also New Codes 4-02-040-XX)
40201199	Fabric Coating/Printing	Other Not Classified (also See New Codes Under 4-02-040-XX)
40201201	Fabric Dyeing	Dye Application: General (Also See New Codes Under 4-02-060-XX)
40201210	Fabric Dyeing	Dye Application: General (Also See New Codes Under 4-02-060-XX)
40201301	Paper Coating	Coating Operation
40201303	Paper Coating	Coating Mixing
40201304	Paper Coating	Coating Storage
40201305	Paper Coating	Equipment Cleanup
40201310	Paper Coating	Coating Application: Knife Coater
40201320	Paper Coating	Coating Application: Reverse Roll Coater
40201330	Paper Coating	Coating Application: Rotogravure Printer

SCC	Description (6 digit)	Description (8 digit)
40201399	Paper Coating	Other Not Classified
40201401	Large Appliances	Prime Coating Operation
40201402	Large Appliances	Cleaning/Pretreatment
40201403	Large Appliances	Coating Mixing
40201404	Large Appliances	Coating Storage
40201405	Large Appliances	Equipment Cleanup
40201406	Large Appliances	Topcoat Spray
40201410	Large Appliances	Prime Coat Flash-off
40201411	Large Appliances	Topcoat Flash-off
40201431	Large Appliances	Coating Line: General
40201432	Large Appliances	Prime Air Spray
40201433	Large Appliances	Prime Electrostatic Spray
40201434	Large Appliances	Prime Flow Coat
40201435	Large Appliances	Prime Dip Coat
40201436	Large Appliances	Prime Electro-deposition
40201437	Large Appliances	Top Air Spray
40201438	Large Appliances	Top Electrostatic Spray
40201499	Large Appliances	Other Not Classified
40201501	Magnet Wire Surface Coating	Coating/Application/Curing
40201502	Magnet Wire Surface Coating	Cleaning/Pretreatment
40201503	Magnet Wire Surface Coating	Coating Mixing
40201504	Magnet Wire Surface Coating	Coating Storage
40201505	Magnet Wire Surface Coating	Equipment Cleanup
40201531	Magnet Wire Surface Coating	Coating Line: General
40201599	Magnet Wire Surface Coating	Other Not Classified
40201601	Automobiles and Light Trucks	Prime Application/Electro-deposition/Dip/Spray
40201602	Automobiles and Light Trucks	Cleaning/Pretreatment
40201603	Automobiles and Light Trucks	Coating Mixing
40201604	Automobiles and Light Trucks	Coating Storage
40201605	Automobiles and Light Trucks	Equipment Cleanup
40201606	Automobiles and Light Trucks	Topcoat Operation
40201607	Automobiles and Light Trucks	Sealers
40201608	Automobiles and Light Trucks	Deadeners
40201609	Automobiles and Light Trucks	Anti-corrosion Priming
40201619	Automobiles and Light Trucks	Prime Surfacing Operation
40201620	Automobiles and Light Trucks	Repair Topcoat Application Area
40201621	Automobiles and Light Trucks	Prime Coating: Solvent-borne - Automobiles
40201622	Automobiles and Light Trucks	Prime Coating: Electro-deposition - Automobiles
40201623	Automobiles and Light Trucks	Guide Coating: Solvent-borne - Automobiles
40201624	Automobiles and Light Trucks	Guide Coating: Water-borne - Automobiles
40201625	Automobiles and Light Trucks	Topcoat: Solvent-borne - Automobiles
40201626	Automobiles and Light Trucks	Topcoat: Water-borne - Automobiles
40201627	Automobiles and Light Trucks	Prime Coating: Solvent-borne - Light Trucks
40201628	Automobiles and Light Trucks	Prime Coating: Electro-deposition - Light Trucks
40201629	Automobiles and Light Trucks	Guide Coating: Solvent-borne - Light Trucks
40201630	Automobiles and Light Trucks	Guide Coating: Water-borne - Light Trucks
40201631	Automobiles and Light Trucks	Topcoat: Solvent-borne - Light Trucks

SCC	Description (6 digit)	Description (8 digit)
40201632	Automobiles and Light Trucks	Topcoat: Water-borne - Light Trucks
40201699	Automobiles and Light Trucks	Other Not Classified
40201702	Metal Can Coating	Cleaning/Pretreatment
40201703	Metal Can Coating	Coating Mixing
40201704	Metal Can Coating	Coating Storage
40201705	Metal Can Coating	Equipment Cleanup
40201706	Metal Can Coating	Solvent Storage
40201721	Metal Can Coating	Two Piece Exterior Base Coating
40201722	Metal Can Coating	Interior Spray Coating
40201723	Metal Can Coating	Sheet Base Coating (Interior)
40201724	Metal Can Coating	Sheet Base Coating (Exterior)
40201725	Metal Can Coating	Side Seam Spray Coating
40201726	Metal Can Coating	End Sealing Compound (Also See 4-02-017-36 & -37)
40201727	Metal Can Coating	Lithography
40201728	Metal Can Coating	Over Varnish
40201729	Metal Can Coating	Exterior End Coating
40201731	Metal Can Coating	Three-piece Can Sheet Base Coating
40201732	Metal Can Coating	Three-piece Can Sheet Lithographic Coating Line
40201733	Metal Can Coating	Three-piece Can-side Seam Spray Coating
40201734	Metal Can Coating	Three-piece Can Interior Body Spray Coat
40201735	Metal Can Coating	Two-piece Can Coating Line
40201736	Metal Can Coating	Two-piece Can End Sealing Compound
40201737	Metal Can Coating	Three Piece Can End Sealing Compound
40201738	Metal Can Coating	Two Piece Can Lithographic Coating Line
40201739	Metal Can Coating	Three Piece Can Coating Line (All Coating Solvent Emission Points)
40201799	Metal Can Coating	Other Not Classified
40201801	Metal Coil Coating	Prime Coating Application
40201802	Metal Coil Coating	Cleaning/Pretreatment
40201803	Metal Coil Coating	Solvent Mixing
40201804	Metal Coil Coating	Solvent Storage (Use 4-07-004-01 through 4-07-999-98 if possible)
40201805	Metal Coil Coating	Equipment Cleanup
40201806	Metal Coil Coating	Finish Coating
40201807	Metal Coil Coating	Coating Storage
40201899	Metal Coil Coating	Other Not Classified
40201901	Wood Furniture Surface Coating	Coating Operation
40201903	Wood Furniture Surface Coating	Coating Mixing
40201904	Wood Furniture Surface Coating	Coating Storage
40201999	Wood Furniture Surface Coating	Other Not Classified
40202001	Metal Furniture Operations	Coating Operation
40202002	Metal Furniture Operations	Cleaning/Pretreatment
40202003	Metal Furniture Operations	Coating Mixing
40202004	Metal Furniture Operations	Coating Storage
40202005	Metal Furniture Operations	Equipment Cleanup
40202010	Metal Furniture Operations	Prime Coat Application

SCC	Description (6 digit)	Description (8 digit)
40202011	Metal Furniture Operations	Prime Coat Application: Spray, High Solids
40202012	Metal Furniture Operations	Prime Coat Application: Spray, Water-borne
40202013	Metal Furniture Operations	Prime Coat Application: Dip
40202014	Metal Furniture Operations	Prime Coat Application: Flow Coat
40202015	Metal Furniture Operations	Prime Coat Application: Flash-off
40202020	Metal Furniture Operations	Topcoat Application
40202021	Metal Furniture Operations	Topcoat Application: Spray, High Solids
40202022	Metal Furniture Operations	Topcoat Application: Spray, Water-borne
40202023	Metal Furniture Operations	Topcoat Application: Dip
40202024	Metal Furniture Operations	Topcoat Application: Flow Coat
40202025	Metal Furniture Operations	Topcoat Application: Flash-off
40202031	Metal Furniture Operations	Single Spray Line: General
40202032	Metal Furniture Operations	Spray Dip Line: General (Use 4-02-020-37)
40202033	Metal Furniture Operations	Spray High Solids Coating (Use 4-02-020-35)
40202034	Metal Furniture Operations	Spray Water-borne Coating (Use 4-02-020-36)
40202035	Metal Furniture Operations	Single Coat Application: Spray, High Solids
40202036	Metal Furniture Operations	Single Coat Application: Spray, Water-borne
40202037	Metal Furniture Operations	Single Coat Application: Dip
40202038	Metal Furniture Operations	Single Coat Application: Flow Coat
40202039	Metal Furniture Operations	Single Coat Application: Flash-off
40202099	Metal Furniture Operations	Other Not Classified
40202101	Flatwood Products	Base Coat
40202103	Flatwood Products	Coating Mixing
40202104	Flatwood Products	Coating Storage
40202105	Flatwood Products	Equipment Cleanup
40202106	Flatwood Products	Topcoat
40202107	Flatwood Products	Filler
40202108	Flatwood Products	Sealer
40202109	Flatwood Products	Inks
40202110	Flatwood Products	Grove Coat Application
40202111	Flatwood Products	Stain Application
40202117	Flatwood Products	Filler Sander
40202118	Flatwood Products	Sealer Sander
40202131	Flatwood Products	Water-borne Coating
40202132	Flatwood Products	Solvent-borne Coating
40202133	Flatwood Products	Ultraviolet Coating
40202140	Flatwood Products	Surface Preparation (Includes Tempering, Sanding, Brushing, Grove Cut)
40202199	Flatwood Products	Other Not Classified
40202201	Plastic Parts	Coating Operation
40202202	Plastic Parts	Cleaning/Pretreatment
40202203	Plastic Parts	Coating Mixing
40202204	Plastic Parts	Coating Storage
40202205	Plastic Parts	Equipment Cleanup
40202206	Plastic Parts	Business: Baseline Coating Mix
40202207	Plastic Parts	Business: Low Solids Solvent-borne Coating
40202208	Plastic Parts	Business: Medium Solids Solvent-borne Coating

SCC	Description (6 digit)	Description (8 digit)
40202209	Plastic Parts	Business: High Solids Coating (25% Efficiency)
40202210	Plastic Parts	Business: High Solids Solvent-borne Coating (40% Efficiency)
40202211	Plastic Parts	Business: Water-borne Coating
40202212	Plastic Parts	Business: Low Solids Solvent-borne EMI/RFI Shielding Coating
40202213	Plastic Parts	Business: Higher Solids Solvent-borne EMI/RFI Shielding Coating
40202214	Plastic Parts	Business: Water-borne EMI/RFI Shielding Coating
40202215	Plastic Parts	Business: Zinc Arc Spray
40202220	Plastic Parts	Prime Coat Application
40202229	Plastic Parts	Prime Coat Flash-off
40202230	Plastic Parts	Color Coat Application
40202239	Plastic Parts	Color Coat Flash-off
40202240	Plastic Parts	Topcoat/Texture Coat Application
40202249	Plastic Parts	Topcoat/Texture Coat Flash-off
40202250	Plastic Parts	EMI/RFI Shielding Coat Application
40202259	Plastic Parts	EMI/RFI Shielding Coat Flash-off
40202270	Plastic Parts	Sanding/Grit Blasting Prior to EMI/RFI Shielding Coat Application
40202280	Plastic Parts	Maskant Application
40202299	Plastic Parts	Other Not Classified
40202301	Large Ships	Prime Coating Operation
40202302	Large Ships	Cleaning/Pretreatment
40202303	Large Ships	Coating Mixing
40202304	Large Ships	Coating Storage
40202305	Large Ships	Equipment Cleanup
40202306	Large Ships	Topcoat Operation
40202399	Large Ships	Other Not Classified
40202401	Large Aircraft	Prime Coating Operation
40202402	Large Aircraft	Cleaning/Pretreatment
40202403	Large Aircraft	Coating Mixing
40202404	Large Aircraft	Coating Storage
40202405	Large Aircraft	Equipment Cleanup
40202406	Large Aircraft	Topcoat Operation
40202499	Large Aircraft	Other Not Classified
40202501	Miscellaneous Metal Parts	Coating Operation
40202502	Miscellaneous Metal Parts	Cleaning/Pretreatment
40202503	Miscellaneous Metal Parts	Coating Mixing
40202504	Miscellaneous Metal Parts	Coating Storage
40202505	Miscellaneous Metal Parts	Equipment Cleanup
40202510	Miscellaneous Metal Parts	Prime Coat Application
40202511	Miscellaneous Metal Parts	Prime Coat Application: Spray, High Solids
40202512	Miscellaneous Metal Parts	Prime Coat Application: Spray, Water-borne
40202515	Miscellaneous Metal Parts	Prime Coat Application: Flash-off
40202520	Miscellaneous Metal Parts	Topcoat Application
40202521	Miscellaneous Metal Parts	Topcoat Application: Spray, High Solids

SCC	Description (6 digit)	Description (8 digit)
40202522	Miscellaneous Metal Parts	Topcoat Application: Spray, Water-borne
40202523	Miscellaneous Metal Parts	Topcoat Application: Dip
40202524	Miscellaneous Metal Parts	Topcoat Application: Flow Coat
40202525	Miscellaneous Metal Parts	Topcoat Application: Flash-off
40202531	Miscellaneous Metal Parts	Conveyor Single Flow
40202532	Miscellaneous Metal Parts	Conveyor Single Dip
40202533	Miscellaneous Metal Parts	Conveyor Single Spray
40202534	Miscellaneous Metal Parts	Conveyor Two Coat, Flow and Spray
40202535	Miscellaneous Metal Parts	Conveyor Two Coat, Dip and Spray
40202536	Miscellaneous Metal Parts	Conveyor Two Coat, Spray
40202537	Miscellaneous Metal Parts	Manual Two Coat, Spray and Air Dry
40202542	Miscellaneous Metal Parts	Single Coat Application: Spray, High Solids
40202543	Miscellaneous Metal Parts	Single Coat Application: Spray, Water-borne
40202544	Miscellaneous Metal Parts	Single Coat Application: Dip
40202545	Miscellaneous Metal Parts	Single Coat Application: Flow Coat
40202546	Miscellaneous Metal Parts	Single Coat Application: Flash-off
40202599	Miscellaneous Metal Parts	Other Not Classified
40202601	Steel Drums	Coating Operation
40202602	Steel Drums	Cleaning/Pretreatment
40202603	Steel Drums	Coating Mixing
40202604	Steel Drums	Coating Storage
40202605	Steel Drums	Equipment Cleanup
40202606	Steel Drums	Interior Coating
40202607	Steel Drums	Exterior Coating
40202699	Steel Drums	Specify
40202701	Glass Mirrors	Mirror Backing: Coating Operation
40202710	Glass Mirrors	Mirror Backing: Coating Operation
40203001	Semiconductors	Specify Solvent
40204001	Fabric Printing	Roller: Print Paste
40204002	Fabric Printing	Roller: Application
40204003	Fabric Printing	Roller: Transfer
40204004	Fabric Printing	Roller: Steam Cans/Drying
40204010	Fabric Printing	Rotary Screen: Print Paste
40204011	Fabric Printing	Rotary Screen: Application
40204012	Fabric Printing	Rotary Screen: Transfer
40204013	Fabric Printing	Rotary Screen: Drying/Curing
40204020	Fabric Printing	Flat Screen: Print Paste
40204021	Fabric Printing	Flat Screen: Application
40204022	Fabric Printing	Flat Screen: Transfer
40204023	Fabric Printing	Flat Screen: Drying/Curing
40204121	Fabric Coating, Knife Coating	Mixing Tanks
40204130	Fabric Coating, Knife Coating	Coating Application
40204140	Fabric Coating, Knife Coating	Drying/Curing
40204150	Fabric Coating, Knife Coating	Cleanup
40204151	Fabric Coating, Knife Coating	Cleanup: Coating Application Equipment
40204152	Fabric Coating, Knife Coating	Cleanup: Empty Coating Drums
40204160	Fabric Coating, Knife Coating	Waste

SCC	Description (6 digit)	Description (8 digit)
40204161	Fabric Coating, Knife Coating	Waste: Cleaning Rags
40204162	Fabric Coating, Knife Coating	Waste: Waste Ink Disposal
40204221	Fabric Coating, Roller Coating	Mixing Tanks
40204230	Fabric Coating, Roller Coating	Coating Application
40204240	Fabric Coating, Roller Coating	Drying/Curing
40204250	Fabric Coating, Roller Coating	Cleanup
40204251	Fabric Coating, Roller Coating	Cleanup: Coating Application Equipment
40204252	Fabric Coating, Roller Coating	Cleanup: Empty Coating Drums
40204260	Fabric Coating, Roller Coating	Waste
40204261	Fabric Coating, Roller Coating	Waste: Cleaning Rags
40204262	Fabric Coating, Roller Coating	Waste: Waste Ink Disposal
40204321	Fabric Coating, Dip Coating	Mixing Tanks
40204330	Fabric Coating, Dip Coating	Coating Application
40204340	Fabric Coating, Dip Coating	Drying/Curing
40204350	Fabric Coating, Dip Coating	Cleanup
40204351	Fabric Coating, Dip Coating	Cleanup: Coating Application Equipment
40204352	Fabric Coating, Dip Coating	Cleanup: Empty Coating Drums
40204360	Fabric Coating, Dip Coating	Waste
40204361	Fabric Coating, Dip Coating	Waste: Cleaning Rags
40204362	Fabric Coating, Dip Coating	Waste: Waste Ink Disposal
40204421	Fabric Coating, Transfer Coating	Mixing Tanks
40204430	Fabric Coating, Transfer Coating	Coating Application
40204431	Fabric Coating, Transfer Coating	Coating Application: First Roll Applicator
40204432	Fabric Coating, Transfer Coating	Coating Application: Second Roll Applicator
40204435	Fabric Coating, Transfer Coating	Lamination: Laminating Device
40204440	Fabric Coating, Transfer Coating	Drying/Curing
40204441	Fabric Coating, Transfer Coating	Drying/Curing: First Pre-drier
40204442	Fabric Coating, Transfer Coating	Drying/Curing: Second Pre-drier
40204443	Fabric Coating, Transfer Coating	Drying/Curing: Main Drying Tunnel
40204450	Fabric Coating, Transfer Coating	Cooler
40204455	Fabric Coating, Transfer Coating	Winding
40204460	Fabric Coating, Transfer Coating	Cleanup
40204461	Fabric Coating, Transfer Coating	Cleanup: Coating Application Equipment
40204462	Fabric Coating, Transfer Coating	Cleanup: Empty Coating Drums
40204470	Fabric Coating, Transfer Coating	Waste
40204471	Fabric Coating, Transfer Coating	Waste: Cleaning Rags
40204472	Fabric Coating, Transfer Coating	Waste: Waste Ink Disposal
40204521	Fabric Coating, Extrusion Coating	Mixing Tanks
40204530	Fabric Coating, Extrusion Coating	Coating Application
40204531	Fabric Coating, Extrusion Coating	Coating Application: Extruder
40204532	Fabric Coating, Extrusion Coating	Coating Application: Coating Die
40204550	Fabric Coating, Extrusion Coating	Cooling Cylinder
40204555	Fabric Coating, Extrusion Coating	Winding
40204560	Fabric Coating, Extrusion Coating	Cleanup
40204561	Fabric Coating, Extrusion Coating	Cleanup: Coating Application Equipment
40204562	Fabric Coating, Extrusion Coating	Cleanup: Empty Coating Drums
40204570	Fabric Coating, Extrusion Coating	Waste

SCC	Description (6 digit)	Description (8 digit)
40204571	Fabric Coating, Extrusion Coating	Waste: Cleaning Rags
40204572	Fabric Coating, Extrusion Coating	Waste: Waste Ink Disposal
40204621	Fabric Coating, Melt Roll Coating	Mixing Tanks
40204630	Fabric Coating, Melt Roll Coating	Coating Application
40204631	Fabric Coating, Melt Roll Coating	Coating Application: Calendar Rolls
40204632	Fabric Coating, Melt Roll Coating	Coating Application: Pick Up Roll
40204650	Fabric Coating, Melt Roll Coating	Cooling Rolls
40204655	Fabric Coating, Melt Roll Coating	Winding
40204660	Fabric Coating, Melt Roll Coating	Cleanup
40204661	Fabric Coating, Melt Roll Coating	Cleanup: Coating Application Equipment
40204662	Fabric Coating, Melt Roll Coating	Cleanup: Empty Coating Drums
40204670	Fabric Coating, Melt Roll Coating	Waste
40204671	Fabric Coating, Melt Roll Coating	Waste: Cleaning Rags
40204672	Fabric Coating, Melt Roll Coating	Waste: Waste Ink Disposal
40204721	Fabric Coating, Coagulation Coating	Mixing Tanks
40204730	Fabric Coating, Coagulation Coating	Coating Application
40204735	Fabric Coating, Coagulation Coating	Coagulation Baths and Solvent Separation
40204740	Fabric Coating, Coagulation Coating	Solvent Recovery
40204750	Fabric Coating, Coagulation Coating	Drying
40204755	Fabric Coating, Coagulation Coating	Winding
40204760	Fabric Coating, Coagulation Coating	Cleanup
40204761	Fabric Coating, Coagulation Coating	Cleanup: Coating Application Equipment
40204762	Fabric Coating, Coagulation Coating	Cleanup: Empty Coating Drums
40204770	Fabric Coating, Coagulation Coating	Waste
40204771	Fabric Coating, Coagulation Coating	Waste: Cleaning Rags
40204772	Fabric Coating, Coagulation Coating	Waste: Waste Ink Disposal
40206010	Fabric Dyeing	Dye Preparation
40206030	Fabric Dyeing	Dye Application
40206031	Fabric Dyeing	Dye Application: Beam
40206032	Fabric Dyeing	Dye Application: Beck
40206033	Fabric Dyeing	Dye Application: Jig
40206034	Fabric Dyeing	Dye Application: Jet
40206035	Fabric Dyeing	Dye Application: Continuous
40206050	Fabric Dyeing	Waste
40280001	Equipment Leaks	Equipment Leaks
40282001	Wastewater, Aggregate	Process Area Drains
40282002	Wastewater, Aggregate	Process Equipment Drains

SCC	Description (6 digit)	Description (8 digit)
40282501	Wastewater, Points of Generation	Printing Blanket, Rotary Screen
40282599	Wastewater, Points of Generation	Specify Point of Generation
40288801	Fugitive Emissions	Specify
40288802	Fugitive Emissions	Specify
40288803	Fugitive Emissions	Specify
40288804	Fugitive Emissions	Specify
40288805	Fugitive Emissions	Specify
40288821	Fugitive Emissions	Basecoat
40288822	Fugitive Emissions	Coating
40288823	Fugitive Emissions	Cleartop Coat
40288824	Fugitive Emissions	Cleanup

### 2.3.3.3 General Commercial/Industrial Solvent Use

The use of various solvent-containing products such as aerosol products, rubbing compounds, polishes and waxes, and adhesives can result in VOC emissions. This is mainly dependent on the formulation of the product that is used. The user should refer to the detailed list of SCCs provided below:

SCC	Description (6 digit)	Description (8 digit)
49000201	Waste Solvent Recovery Operations	Storage Tank Vent
49000202	Waste Solvent Recovery Operations	Condenser Vent
49000203	Waste Solvent Recovery Operations	Incinerator Stack
49000204	Waste Solvent Recovery Operations	Solvent Spillage
49000205	Waste Solvent Recovery Operations	Solvent Loading
49000206	Waste Solvent Recovery Operations	Fugitive Leaks
49000207	Waste Solvent Recovery Operations	Distillation Vent
49000208	Waste Solvent Recovery Operations	Decanting
49000209	Waste Solvent Recovery Operations	Salting

VOC emissions from the various solvent evaporation categories may be prevented or controlled using the following methods:

- add-on controls;
- product reformulation;
- product substitution;
- improved transfer efficiency;
- alternative application methods;
- improved operating and housekeeping practices; and
- solvent recovery, reuse, and recycling.

### 2.3.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance**
- **Emission factors**
- **Engineering estimates**

Emissions estimates of solvent evaporation are commonly determined through mass balance and engineering calculation techniques. This methodology requires information on the volume of solvent-containing material used and its formulation, or solvent content. An estimate of the uncontrolled solvent loss emissions can then be obtained. If pollution control equipment and solvent recovery processes are used by the facility, a control or recovery efficiency factor should be applied to the uncontrolled emissions estimate.

If monitoring or mass balance information is not available, emission factors are also available for degreasing, surface coating, and general solvent use processes. These emission factors can be obtained from the US EPA website and other sources. Refer to Section 2.3.6 below.

### 2.3.5 Supporting Information for CAC Emissions Estimation

Using mass balance or emission factor methodologies to estimate VOC emissions from solvent evaporation requires data on the consumption volume and, if available, information on the type of coating, ink, or solvent. In addition, coating, ink, and solvent suppliers should be consulted to obtain information on the formulation of solvent-containing materials used at the facility. Refer to material safety data sheets (MSDS) for information on the substance density and volatile content. It should be noted that the “% volatiles” reported in some MSDS sometimes includes water, which should not be included in the estimation of VOC emissions. More generic data on solvent contents of specific product classes can be found in Section 2.3.6.

### 2.3.6 References and Links

- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Surface Coating	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fsurfc.html">http://www.npi.gov.au/handbooks/approved_handbooks/fsurfc.html</a>
Emission Estimation Technique Manual for Appliance, Machinery and Electrical Equipment Manufacture	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fappliance.html">http://www.npi.gov.au/handbooks/approved_handbooks/fappliance.html</a>
Emission Estimation Technique Manual for Solvent Recycling	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fsolvent.html">http://www.npi.gov.au/handbooks/approved_handbooks/fsolvent.html</a>

- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume III, Area Sources:**

Chapter 5: Consumer and Commercial Solvent Use	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii05.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii05.pdf</a>
Chapter 6: Solvent Cleaning	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii06fin.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii06fin.pdf</a>
Chapter 8: Industrial Surface Coating	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii08.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii08.pdf</a>

- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 7: Preferred and Alternative Methods for Estimating Air Emissions from Surface Coating Operations	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii07_july2001.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii07_july2001.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Chapter 4: Evaporation Loss Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch04/">http://www.epa.gov/ttn/chief/ap42/ch04/</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.4 Storage and Handling

### 2.4.1 General Description

This source category involves the storage of petroleum liquids and organic chemicals, as well as transfer and loading operations. VOCs and, in some instances, particulate matter can be discharged into the atmosphere during storage or during material loading and unloading. Emission control devices can be used to reduce VOC emissions during these activities.

### 2.4.2 Applicable SIC and NAICS Codes

The storage and handling of organic liquids can be found in a number of different industries, including the following:

CDN SIC	NAICS	Description
3611	324000	Petroleum and coal products manufacturing
3712	325000	Chemical manufacturing
3711	325110 325120 325130 325181 325189	Other sectors where petroleum liquids or other organic chemicals are stored or transferred

### 2.4.3 Source Description

Organic liquid storage tanks include the following:

- fixed roof (vertical and horizontal);
- external floating roof;
- domed external (or covered) floating roof;
- internal floating roof;
- variable vapour space;
- variable pressure (low and high); and
- underground tanks.

Evaporative losses of the liquid can occur during standing storage; this is mainly due to daily changes in temperature and barometric pressure. Working losses due to changes in the liquid level from loading and unloading activities can also result in emissions. Furthermore, emissions will vary with tank design, as well as the relative contribution of each type of emission source. Emissions may be controlled through tank design (e.g., use of floating roof tanks), improved tank seals, or tank vapour recovery or destruction systems. The following table provides a list of general SCCs for this source. The user should refer to the detailed list of SCCs referred to in Section 2.1.6.

SCC	Description (6 digit)	Description (8 digit)
40301001	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 13: Breathing Loss (67000 Bbl. Tank Size)
40301002	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 10: Breathing Loss (67000 Bbl. Tank Size)
40301003	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 7: Breathing Loss (67000 Bbl. Tank Size)
40301004	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 13: Breathing Loss (250000 Bbl. Tank Size)
40301005	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 10: Breathing Loss (250000 Bbl. Tank Size)
40301006	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 7: Breathing Loss (250000 Bbl. Tank Size)
40301007	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 13: Working Loss (Tank Diameter Independent)
40301008	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 10: Working Loss (Tank Diameter Independent)
40301009	Fixed Roof Tanks (Varying Sizes)	Gasoline RVP 7: Working Loss (Tank Diameter Independent)
40301010	Fixed Roof Tanks (Varying Sizes)	Crude Oil RVP 5: Breathing Loss (67000 Bbl. Tank Size)
40301011	Fixed Roof Tanks (Varying Sizes)	Crude Oil RVP 5: Breathing Loss (250000 Bbl. Tank Size)
40301012	Fixed Roof Tanks (Varying Sizes)	Crude Oil RVP 5: Working Loss (Tank Diameter Independent)
40301013	Fixed Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Breathing Loss (67000 Bbl. Tank Size)
40301014	Fixed Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Breathing Loss (250000 Bbl. Tank Size)
40301015	Fixed Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Working Loss (Tank Diameter Independent)
40301016	Fixed Roof Tanks (Varying Sizes)	Jet Kerosene: Breathing Loss (67000 Bbl. Tank Size)
40301017	Fixed Roof Tanks (Varying Sizes)	Jet Kerosene: Breathing Loss (250000 Bbl. Tank Size)
40301018	Fixed Roof Tanks (Varying Sizes)	Jet Kerosene: Working Loss (Tank Diameter Independent)
40301019	Fixed Roof Tanks (Varying Sizes)	Distillate Fuel #2: Breathing Loss (67000 Bbl. Tank Size)
40301020	Fixed Roof Tanks (Varying Sizes)	Distillate Fuel #2: Breathing Loss (250000 Bbl. Tank Size)
40301021	Fixed Roof Tanks (Varying Sizes)	Distillate Fuel #2: Working Loss (Tank Diameter Independent)
40301022	Fixed Roof Tanks (Varying Sizes)	Asphalt Oil: Breathing Loss (67000 Bbl. Tank Size)
40301023	Fixed Roof Tanks (Varying Sizes)	Asphalt Oil: Working Loss
40301024	Fixed Roof Tanks (Varying Sizes)	Asphalt Oil: Breathing Loss (250000 Bbl. Tank Size)
40301025	Fixed Roof Tanks (Varying Sizes)	Grade 6 Fuel Oil: Breathing Loss (67000 Bbl. Tank Size)

SCC	Description (6 digit)	Description (8 digit)
40301026	Fixed Roof Tanks (Varying Sizes)	Grade 5 Fuel Oil: Breathing Loss (67000 Bbl. Tank Size)
40301027	Fixed Roof Tanks (Varying Sizes)	Grade 4 Fuel Oil: Breathing Loss (67000 Bbl. Tank Size)
40301028	Fixed Roof Tanks (Varying Sizes)	Grade 2 Fuel Oil: Breathing Loss (67000 Bbl. Tank Size)
40301029	Fixed Roof Tanks (Varying Sizes)	Grade 1 Fuel Oil: Breathing Loss (67000 Bbl. Tank Size)
40301065	Fixed Roof Tanks (Varying Sizes)	Grade 6 Fuel Oil: Breathing Loss (250000 Bbl. Tank Size)
40301066	Fixed Roof Tanks (Varying Sizes)	Grade 5 Fuel Oil: Breathing Loss (250000 Bbl. Tank Size)
40301067	Fixed Roof Tanks (Varying Sizes)	Grade 4 Fuel Oil: Breathing Loss (250000 Bbl. Tank Size)
40301068	Fixed Roof Tanks (Varying Sizes)	Grade 2 Fuel Oil: Breathing Loss (250000 Bbl. Tank Size)
40301069	Fixed Roof Tanks (Varying Sizes)	Grade 1 Fuel Oil: Breathing Loss (250000 Bbl. Tank Size)
40301075	Fixed Roof Tanks (Varying Sizes)	Grade 6 Fuel Oil: Working Loss (Independent Tank Diameter)
40301076	Fixed Roof Tanks (Varying Sizes)	Grade 5 Fuel Oil: Working Loss (Independent Tank Diameter)
40301077	Fixed Roof Tanks (Varying Sizes)	Grade 4 Fuel Oil: Working Loss (Independent Tank Diameter)
40301078	Fixed Roof Tanks (Varying Sizes)	Grade 2 Fuel Oil: Working Loss (Independent Tank Diameter)
40301079	Fixed Roof Tanks (Varying Sizes)	Grade 1 Fuel Oil: Working Loss (Independent Tank Diameter)
40301097	Fixed Roof Tanks (Varying Sizes)	Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
40301098	Fixed Roof Tanks (Varying Sizes)	Specify Liquid: Breathing Loss (250000 Bbl. Tank Size)
40301099	Fixed Roof Tanks (Varying Sizes)	Specify Liquid: Working Loss (Tank Diameter Independent)
40301101	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 13: Standing Loss (67000 Bbl. Tank Size)
40301102	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 10: Standing Loss (67000 Bbl. Tank Size)
40301103	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 7: Standing Loss (67000 Bbl. Tank Size)
40301104	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 13: Standing Loss (250000 Bbl. Tank Size)
40301105	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 10: Standing Loss (250000 Bbl. Tank Size)
40301106	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 7: Standing Loss (250000 Bbl. Tank Size)
40301107	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 13/10/7: Withdrawal Loss (67000 Bbl. Tank Size)
40301108	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 13/10/7: Withdrawal Loss (250000 Bbl. Tank Size)

SCC	Description (6 digit)	Description (8 digit)
40301109	Floating Roof Tanks (Varying Sizes)	Crude Oil RVP 5: Standing Loss (67000 Bbl. Tank Size)
40301110	Floating Roof Tanks (Varying Sizes)	Crude Oil RVP 5: Standing Loss (250000 Bbl. Tank Size)
40301111	Floating Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Standing Loss (67000 Bbl. Tank Size)
40301112	Floating Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Standing Loss (250000 Bbl. Tank Size)
40301113	Floating Roof Tanks (Varying Sizes)	Jet Kerosene: Standing Loss (67000 Bbl. Tank Size)
40301114	Floating Roof Tanks (Varying Sizes)	Jet Kerosene: Standing Loss (250000 Bbl. Tank Size)
40301115	Floating Roof Tanks (Varying Sizes)	Distillate Fuel #2: Standing Loss (67000 Bbl. Tank Size)
40301116	Floating Roof Tanks (Varying Sizes)	Distillate Fuel #2: Standing Loss (250000 Bbl. Tank Size)
40301117	Floating Roof Tanks (Varying Sizes)	Crude Oil RVP 5: Withdrawal Loss
40301118	Floating Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Withdrawal Loss
40301119	Floating Roof Tanks (Varying Sizes)	Jet Kerosene: Withdrawal Loss
40301120	Floating Roof Tanks (Varying Sizes)	Distillate Fuel #2: Withdrawal Loss
40301125	Floating Roof Tanks (Varying Sizes)	Grade 6 Fuel Oil: Standing Loss (67000 Bbl. Tank Size)
40301126	Floating Roof Tanks (Varying Sizes)	Grade 5 Fuel Oil: Standing Loss (67000 Bbl. Tank Size)
40301127	Floating Roof Tanks (Varying Sizes)	Grade 4 Fuel Oil: Standing Loss (67000 Bbl. Tank Size)
40301128	Floating Roof Tanks (Varying Sizes)	Grade 2 Fuel Oil: Stand Loss (67000 Bbl Tank Size) (Use 4-03-011-15)
40301129	Floating Roof Tanks (Varying Sizes)	Grade 1 Fuel Oil: Standing Loss (67000 Bbl. Tank Size)
40301130	Floating Roof Tanks (Varying Sizes)	Specify Liquid: Standing Loss - External - Primary Seal
40301131	Floating Roof Tanks (Varying Sizes)	Gasoline: Standing Loss - External - Primary Seal
40301132	Floating Roof Tanks (Varying Sizes)	Crude Oil: Standing Loss - External - Primary Seal
40301133	Floating Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Standing Loss - External - Primary Seal
40301134	Floating Roof Tanks (Varying Sizes)	Jet Kerosene: Standing Loss - External - Primary Seal
40301135	Floating Roof Tanks (Varying Sizes)	Distillate Fuel #2: Standing Loss - External - Primary Seal
40301140	Floating Roof Tanks (Varying Sizes)	Specify Liquid: Standing Loss - External - Secondary Seal
40301141	Floating Roof Tanks (Varying Sizes)	Gasoline: Standing Loss - External - Secondary Seal
40301142	Floating Roof Tanks (Varying Sizes)	Crude Oil: Standing Loss - External - Secondary Seal
40301143	Floating Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Standing Loss - External - Secondary Seal

SCC	Description (6 digit)	Description (8 digit)
40301144	Floating Roof Tanks (Varying Sizes)	Jet Kerosene: Standing Loss - External - Secondary Seal
40301145	Floating Roof Tanks (Varying Sizes)	Distillate Fuel #2: Standing Loss - External - Secondary Seal
40301150	Floating Roof Tanks (Varying Sizes)	Specify Liquid: Standing Loss - Internal
40301151	Floating Roof Tanks (Varying Sizes)	Gasoline: Standing Loss - Internal
40301152	Floating Roof Tanks (Varying Sizes)	Crude Oil: Standing Loss - Internal
40301153	Floating Roof Tanks (Varying Sizes)	Jet Naphtha (JP-4): Standing Loss - Internal
40301154	Floating Roof Tanks (Varying Sizes)	Jet Kerosene: Standing Loss - Internal
40301155	Floating Roof Tanks (Varying Sizes)	Distillate Fuel #2: Standing Loss - Internal
40301165	Floating Roof Tanks (Varying Sizes)	Grade 6 Fuel Oil: Standing Loss (250000 Bbl. Tank Size)
40301166	Floating Roof Tanks (Varying Sizes)	Grade 5 Fuel Oil: Standing Loss (250000 Bbl. Tank Size)
40301167	Floating Roof Tanks (Varying Sizes)	Grade 4 Fuel Oil: Standing Loss (250000 Bbl. Tank Size)
40301168	Floating Roof Tanks (Varying Sizes)	Grade 2 Fuel Oil: Stand. Loss (250000 Bbl Tank Size) (Use 4-03-011-16)
40301169	Floating Roof Tanks (Varying Sizes)	Grade 1 Fuel Oil: Standing Loss (250000 Bbl. Tank Size)
40301175	Floating Roof Tanks (Varying Sizes)	Grade 6 Fuel Oil: Withdrawal Loss (Independent Tank Diameter)
40301176	Floating Roof Tanks (Varying Sizes)	Grade 5 Fuel Oil: Withdrawal Loss (Independent Tank Diameter)
40301177	Floating Roof Tanks (Varying Sizes)	Grade 4 Fuel Oil: Withdrawal Loss (Independent Tank Diameter)
40301178	Floating Roof Tanks (Varying Sizes)	Grade 2 Fuel Oil: Withdrawal Loss (Independent Tank Diameter)
40301179	Floating Roof Tanks (Varying Sizes)	Grade 1 Fuel Oil: Withdrawal Loss (Independent Tank Diameter)
40301180	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 13: Withdrawal Loss (Independent Tank Diameter)
40301181	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 10: Withdrawal Loss (Independent Tank Diameter)
40301182	Floating Roof Tanks (Varying Sizes)	Gasoline RVP 7: Withdrawal Loss (Independent Tank Diameter)
40301197	Floating Roof Tanks (Varying Sizes)	Specify Liquid: Withdrawal Loss
40301198	Floating Roof Tanks (Varying Sizes)	Specify Liquid: Standing Loss (67000 Bbl. Tank Size)
40301199	Floating Roof Tanks (Varying Sizes)	Specify Liquid: Standing Loss (250000 Bbl. Tank Size)
40301201	Variable Vapour Space	Gasoline RVP 13: Filling Loss
40301202	Variable Vapour Space	Gasoline RVP 10: Filling Loss
40301203	Variable Vapour Space	Gasoline RVP 7: Filling Loss
40301204	Variable Vapour Space	Jet Naphtha (JP-4): Filling Loss
40301205	Variable Vapour Space	Jet Kerosene: Filling Loss
40301206	Variable Vapour Space	Distillate Fuel #2: Filling Loss
40301207	Variable Vapour Space	Benzene: Filling Loss
40301299	Variable Vapour Space	Specify Liquid: Filling Loss

SCC	Description (6 digit)	Description (8 digit)
40400101	Bulk Terminals	Gasoline RVP 13: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400102	Bulk Terminals	Gasoline RVP 10: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400103	Bulk Terminals	Gasoline RVP 7: Breathing Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400104	Bulk Terminals	Gasoline RVP 13: Breathing Loss (250000 Bbl Capacity)-Fixed Roof Tank
40400105	Bulk Terminals	Gasoline RVP 10: Breathing Loss (250000 Bbl Capacity)-Fixed Roof Tank
40400106	Bulk Terminals	Gasoline RVP 7: Breathing Loss (250000 Bbl Capacity) - Fixed Roof Tank
40400107	Bulk Terminals	Gasoline RVP 13: Working Loss (Diameter Independent) - Fixed Roof Tank
40400108	Bulk Terminals	Gasoline RVP 10: Working Loss (Diameter Independent) - Fixed Roof Tank
40400109	Bulk Terminals	Gasoline RVP 7: Working Loss (Diameter Independent) - Fixed Roof Tank
40400110	Bulk Terminals	Gasoline RVP 13: Standing Loss (67000 Bbl Capacity)-Floating Roof Tank
40400111	Bulk Terminals	Gasoline RVP 10: Standing Loss (67000 Bbl Capacity)-Floating Roof Tank
40400112	Bulk Terminals	Gasoline RVP 7: Standing Loss (67000 Bbl Capacity)- Floating Roof Tank
40400113	Bulk Terminals	Gasoline RVP 13: Standing Loss (250000 Bbl Cap.) - Floating Roof Tank
40400114	Bulk Terminals	Gasoline RVP 10: Standing Loss (250000 Bbl Cap.) - Floating Roof Tank
40400115	Bulk Terminals	Gasoline RVP 7: Standing Loss (250000 Bbl Cap.) - Floating Roof Tank
40400116	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss (67000 Bbl Cap.) - Float Rf Tnk
40400117	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss (250000 Bbl Cap.) - Float Rf Tnk
40400118	Bulk Terminals	Gasoline RVP 13: Filling Loss (10500 Bbl Cap.) - Variable Vapour Space
40400119	Bulk Terminals	Gasoline RVP 10: Filling Loss (10500 Bbl Cap.) - Variable Vapour Space
40400120	Bulk Terminals	Gasoline RVP 7: Filling Loss (10500 Bbl Cap.) - Variable Vapour Space
40400121	Bulk Terminals	Diesel Fuel: Standing Loss (Diameter Independent) - Fixed Roof Tank
40400122	Bulk Terminals	Diesel Fuel: Working Loss (Diameter Independent) - Fixed Roof Tank
40400130	Bulk Terminals	Specify Liquid: Standing Loss - External Floating Roof w/ Primary Seal
40400131	Bulk Terminals	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Primary Seal
40400132	Bulk Terminals	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Primary Seal

SCC	Description (6 digit)	Description (8 digit)
40400133	Bulk Terminals	Gasoline RVP 7: Standing Loss - External Floating Roof w/ Primary Seal
40400140	Bulk Terminals	Specify Liquid: Standing Loss - Ext. Float Roof Tank w/ Secondary Seal
40400141	Bulk Terminals	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400142	Bulk Terminals	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400143	Bulk Terminals	Gasoline RVP 7: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400148	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss - Ext. Float Roof (Primary/Sec Seal)
40400149	Bulk Terminals	Specify Liquid: External Floating Roof (Primary/Secondary Seal)
40400150	Bulk Terminals	Miscellaneous Losses/Leaks: Loading Racks
40400151	Bulk Terminals	Valves, Flanges, and Pumps
40400152	Bulk Terminals	Vapour Collection Losses
40400153	Bulk Terminals	Vapour Control Unit Losses
40400154	Bulk Terminals	Tank Truck Vapour Leaks
40400160	Bulk Terminals	Specify Liquid: Standing Loss - Internal Floating Roof w/ Primary Seal
40400161	Bulk Terminals	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Primary Seal
40400162	Bulk Terminals	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Primary Seal
40400163	Bulk Terminals	Gasoline RVP 7: Standing Loss - Internal Floating Roof w/ Primary Seal
40400170	Bulk Terminals	Specify Liquid: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400171	Bulk Terminals	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400172	Bulk Terminals	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400173	Bulk Terminals	Gasoline RVP 7: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400178	Bulk Terminals	Gasoline RVP 13/10/7: Withdrawal Loss - Int. Float Roof (Primary/Sec Seal)
40400179	Bulk Terminals	Specify Liquid: Internal Floating Roof (Primary/Secondary Seal)
40400201	Bulk Plants	Gasoline RVP 13: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400202	Bulk Plants	Gasoline RVP 10: Breathing Loss (67000 Bbl Capacity) - Fixed Roof Tank
40400203	Bulk Plants	Gasoline RVP 7: Breathing Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400204	Bulk Plants	Gasoline RVP 13: Working Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400205	Bulk Plants	Gasoline RVP 10: Working Loss (67000 Bbl. Capacity) - Fixed Roof Tank
40400206	Bulk Plants	Gasoline RVP 7: Working Loss (67000 Bbl. Capacity) - Fixed Roof Tank

SCC	Description (6 digit)	Description (8 digit)
40400207	Bulk Plants	Gasoline RVP 13: Standing Loss (67000 Bbl Cap.) - Floating Roof Tank
40400208	Bulk Plants	Gasoline RVP 10: Standing Loss (67000 Bbl Cap.) - Floating Roof Tank
40400209	Bulk Plants	Gasoline RVP 7: Standing Loss (67000 Bbl Cap.) - Floating Roof Tank
40400210	Bulk Plants	Gasoline RVP 13/10/7: Withdrawal Loss (67000 Bbl Cap.) - Float Roof Tank
40400211	Bulk Plants	Gasoline RVP 13: Filling Loss (10500 Bbl Cap.) - Variable Vapour Space
40400212	Bulk Plants	Gasoline RVP 10: Filling Loss (10500 Bbl Cap.) - Variable Vapour Space
40400213	Bulk Plants	Gasoline RVP 7: Filling Loss (10500 Bbl Cap.) - Variable Vapour Space
40400230	Bulk Plants	Specify Liquid: Standing Loss - External Floating Roof w/ Primary Seal
40400231	Bulk Plants	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Primary Seal
40400232	Bulk Plants	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Primary Seal
40400233	Bulk Plants	Gasoline RVP 7: Standing Loss - External Floating Roof w/ Primary Seal
40400240	Bulk Plants	Specify Liquid: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400241	Bulk Plants	Gasoline RVP 13: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400242	Bulk Plants	Gasoline RVP 10: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400243	Bulk Plants	Gasoline RVP 7: Standing Loss - Ext. Floating Roof w/ Secondary Seal
40400248	Bulk Plants	Gasoline RVP 10/13/7: Withdrawal Loss - Ext. Float Roof (Primary/Sec Seal)
40400249	Bulk Plants	Specify Liquid: External Floating Roof (Primary/Secondary Seal)
40400250	Bulk Plants	Loading Racks
40400251	Bulk Plants	Valves, Flanges, and Pumps
40400252	Bulk Plants	Miscellaneous Losses/Leaks: Vapour Collection Losses
40400253	Bulk Plants	Miscellaneous Losses/Leaks: Vapour Control Unit Losses
40400254	Bulk Plants	Tank Truck Vapour Losses
40400255	Bulk Plants	Loading Racks - Jet Fuel
40400260	Bulk Plants	Specify Liquid: Standing Loss - Internal Floating Roof w/ Primary Seal
40400261	Bulk Plants	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Primary Seal
40400262	Bulk Plants	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Primary Seal
40400263	Bulk Plants	Gasoline RVP 7: Standing Loss - Internal Floating Roof w/ Primary Seal

SCC	Description (6 digit)	Description (8 digit)
40400270	Bulk Plants	Specify Liquid: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400271	Bulk Plants	Gasoline RVP 13: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400272	Bulk Plants	Gasoline RVP 10: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400273	Bulk Plants	Gasoline RVP 7: Standing Loss - Int. Floating Roof w/ Secondary Seal
40400278	Bulk Plants	Gasoline RVP 10/13/7: Withdrawal Loss - Int. Float Roof (Primary/Sec Seal)
40400279	Bulk Plants	Specify Liquid: Internal Floating Roof (Primary/Secondary Seal)
40400301	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank: Breathing Loss
40400302	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank: Working Loss
40400303	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank with Primary Seals: Standing Loss
40400304	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank with Secondary Seals: Standing Loss
40400305	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank: Standing Loss
40400306	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank: Withdrawal Loss
40400307	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank: Withdrawal Loss
40400311	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank, Condensate, working+breathing+flashing losses
40400312	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank, Crude Oil, working+breathing+flashing losses
40400313	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank, Lube Oil, working+breathing+flashing losses
40400314	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank, Specialty Chem- working+breathing+flashing
40400315	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank, Produced Water, working+breathing+flashing
40400316	Oil and Gas Field Storage and Working Tanks	Fixed Roof Tank, Diesel, working+breathing+flashing losses
40400321	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank, Condensate, working+breathing+flashing
40400322	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank, Crude Oil, working+breathing+flashing
40400323	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank, Lube Oil, working+breathing+flashing
40400324	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank, Specialty Chem. - working+breathing+flashing
40400325	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank, Produced Water - working+breathing+flashing
40400326	Oil and Gas Field Storage and Working Tanks	External Floating Roof Tank, Diesel, working+breathing+flashing

SCC	Description (6 digit)	Description (8 digit)
40400331	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank, Condensate, working+breathing+flashing
40400332	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank, Crude Oil, working+breathing+flashing
40400333	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank, Lube Oil, working+breathing+flashing
40400334	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank, Specialty Chem. - working+breathing+flashing
40400335	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank, Produced Water - working+breathing+flashing
40400336	Oil and Gas Field Storage and Working Tanks	Internal Floating Roof Tank, Diesel, working+breathing+flashing
40400340	Oil and Gas Field Storage and Working Tanks	Pressure Tanks (pressure relief from pop-off valves)
40400401	Petroleum Products - Underground Tanks	Gasoline RVP 13: Breathing Loss
40400402	Petroleum Products - Underground Tanks	Gasoline RVP 13: Working Loss
40400403	Petroleum Products - Underground Tanks	Gasoline RVP 10: Breathing Loss
40400404	Petroleum Products - Underground Tanks	Gasoline RVP 10: Working Loss
40400405	Petroleum Products - Underground Tanks	Gasoline RVP 7: Breathing Loss
40400406	Petroleum Products - Underground Tanks	Gasoline RVP 7: Working Loss
40400407	Petroleum Products - Underground Tanks	Crude Oil RVP 5: Breathing Loss
40400408	Petroleum Products - Underground Tanks	Crude Oil RVP 5: Working Loss
40400409	Petroleum Products - Underground Tanks	Jet Naphtha (JP-4): Breathing Loss
40400410	Petroleum Products - Underground Tanks	Jet Naphtha (JP-4): Working Loss
40400411	Petroleum Products - Underground Tanks	Jet Kerosene: Breathing Loss
40400412	Petroleum Products - Underground Tanks	Jet Kerosene: Working Loss
40400413	Petroleum Products - Underground Tanks	Distillate Fuel #2: Breathing Loss
40400414	Petroleum Products - Underground Tanks	Distillate Fuel #2: Working Loss
40400497	Petroleum Products - Underground Tanks	Specify Liquid: Breathing Loss
40400498	Petroleum Products - Underground Tanks	Specify Liquid: Working Loss
40700401	Fixed Roof Tanks - Acid Anhydrides	Acetic Anhydrides: Breathing Loss
40700402	Fixed Roof Tanks - Acid Anhydrides	Acetic Anhydrides: Working Loss
40700403	Fixed Roof Tanks - Acid Anhydrides	Maleic Anhydride: Breathing Loss
40700404	Fixed Roof Tanks - Acid Anhydrides	Maleic Anhydride: Working Loss
40700405	Fixed Roof Tanks - Acid Anhydrides	Phthalic Anhydride: Breathing Loss
40700406	Fixed Roof Tanks - Acid Anhydrides	Phthalic Anhydride: Working Loss
40700497	Fixed Roof Tanks - Acid Anhydrides	Specify Anhydride: Breathing Loss
40700498	Fixed Roof Tanks - Acid Anhydrides	Specify Anhydride: Working Loss
40700801	Fixed Roof Tanks - Alcohols	N-Butyl Alcohol: Breathing Loss
40700802	Fixed Roof Tanks - Alcohols	N-Butyl Alcohol: Working Loss
40700803	Fixed Roof Tanks - Alcohols	Sec-Butyl Alcohol: Breathing Loss
40700804	Fixed Roof Tanks - Alcohols	Sec-Butyl Alcohol: Working Loss
40700805	Fixed Roof Tanks - Alcohols	Tert-Butyl Alcohol: Breathing Loss
40700806	Fixed Roof Tanks - Alcohols	Tert-Butyl Alcohol: Working Loss
40700807	Fixed Roof Tanks - Alcohols	Cyclohexanol: Breathing Loss
40700808	Fixed Roof Tanks - Alcohols	Cyclohexanol: Working Loss
40700809	Fixed Roof Tanks - Alcohols	Ethyl Alcohol: Breathing Loss
40700810	Fixed Roof Tanks - Alcohols	Ethyl Alcohol: Working Loss

SCC	Description (6 digit)	Description (8 digit)
40700811	Fixed Roof Tanks - Alcohols	Isobutyl Alcohol: Breathing Loss
40700812	Fixed Roof Tanks - Alcohols	Isobutyl Alcohol: Working Loss
40700813	Fixed Roof Tanks - Alcohols	Isopropyl Alcohol: Breathing Loss
40700814	Fixed Roof Tanks - Alcohols	Isopropyl Alcohol: Working Loss
40700815	Fixed Roof Tanks - Alcohols	Methyl Alcohol: Breathing Loss
40700816	Fixed Roof Tanks - Alcohols	Methyl Alcohol: Working Loss
40700817	Fixed Roof Tanks - Alcohols	N-Propyl Alcohol: Breathing Loss
40700818	Fixed Roof Tanks - Alcohols	N-Propyl Alcohol: Working Loss
40700819	Fixed Roof Tanks - Alcohols	Xylol: Breathing Loss
40700820	Fixed Roof Tanks - Alcohols	Xylol: Working Loss
40700897	Fixed Roof Tanks - Alcohols	Specify Alcohol: Breathing Loss
40700898	Fixed Roof Tanks - Alcohols	Specify Alcohol: Working Loss
40701601	Fixed Roof Tanks - Alkanes (Paraffins)	N-Decane: Breathing Loss
40701602	Fixed Roof Tanks - Alkanes (Paraffins)	N-Decane: Working Loss
40701603	Fixed Roof Tanks - Alkanes (Paraffins)	N-Dodecane: Breathing Loss
40701604	Fixed Roof Tanks - Alkanes (Paraffins)	N-Dodecane: Working Loss
40701605	Fixed Roof Tanks - Alkanes (Paraffins)	N-Heptane: Breathing Loss
40701606	Fixed Roof Tanks - Alkanes (Paraffins)	N-Heptane: Working Loss
40701607	Fixed Roof Tanks - Alkanes (Paraffins)	Isopentane: Breathing Loss
40701608	Fixed Roof Tanks - Alkanes (Paraffins)	Isopentane: Working Loss
40701609	Fixed Roof Tanks - Alkanes (Paraffins)	Pentadecane: Breathing Loss
40701610	Fixed Roof Tanks - Alkanes (Paraffins)	Pentadecane: Working Loss
40701611	Fixed Roof Tanks - Alkanes (Paraffins)	Naphtha: Breathing Loss
40701612	Fixed Roof Tanks - Alkanes (Paraffins)	Naphtha: Working Loss
40701613	Fixed Roof Tanks - Alkanes (Paraffins)	Petroleum Distillate: Breathing Loss
40701614	Fixed Roof Tanks - Alkanes (Paraffins)	Petroleum Distillate: Working Loss
40701615	Fixed Roof Tanks - Alkanes (Paraffins)	Hexane: Breathing Loss
40701616	Fixed Roof Tanks - Alkanes (Paraffins)	Hexane: Working Loss
40701697	Fixed Roof Tanks - Alkanes (Paraffins)	Specify Alkane: Breathing Loss
40701698	Fixed Roof Tanks - Alkanes (Paraffins)	Specify Alkane: Working Loss
40702001	Fixed Roof Tanks - Alkenes (Olefins)	Dodecene: Breathing Loss
40702002	Fixed Roof Tanks - Alkenes (Olefins)	Dodecene: Working Loss
40702003	Fixed Roof Tanks - Alkenes (Olefins)	Heptenes - General: Breathing Loss
40702004	Fixed Roof Tanks - Alkenes (Olefins)	Heptenes - General: Working Loss
40702097	Fixed Roof Tanks - Alkenes (Olefins)	Specify Olefin: Breathing Loss
40702098	Fixed Roof Tanks - Alkenes (Olefins)	Specify Olefin: Working Loss
40702801	Fixed Roof Tanks - Amides	Dimethylformamide: Breathing Loss
40702802	Fixed Roof Tanks - Amides	Dimethylformamide: Working Loss
40703201	Fixed Roof Tanks - Amines	Aniline: Breathing Loss
40703202	Fixed Roof Tanks - Amines	Aniline: Working Loss
40703203	Fixed Roof Tanks - Amines	Ethanolamines: Breathing Loss
40703204	Fixed Roof Tanks - Amines	Ethanolamines: Working Loss
40703205	Fixed Roof Tanks - Amines	Ethyleneamines: Breathing Loss
40703206	Fixed Roof Tanks - Amines	Ethyleneamines: Working Loss
40703207	Fixed Roof Tanks - Amines	Monoethanolamine: Breathing Loss
40703208	Fixed Roof Tanks - Amines	Monoethanolamine: Working Loss
40703209	Fixed Roof Tanks - Amines	Hexamine: Breathing Loss

SCC	Description (6 digit)	Description (8 digit)
40703210	Fixed Roof Tanks - Amines	Hexamine: Working Loss
40703211	Fixed Roof Tanks - Amines	Ethylenediamine: Breathing Loss
40703212	Fixed Roof Tanks - Amines	Ethylenediamine: Working Loss
40703297	Fixed Roof Tanks - Amines	Specify Amine: Breathing Loss
40703298	Fixed Roof Tanks - Amines	Specify Amine: Working Loss
40703601	Fixed Roof Tanks - Aromatics	Benzene: Breathing Loss
40703602	Fixed Roof Tanks - Aromatics	Benzene: Working Loss
40703603	Fixed Roof Tanks - Aromatics	Cresol: Breathing Loss
40703604	Fixed Roof Tanks - Aromatics	Cresol: Working Loss
40703605	Fixed Roof Tanks - Aromatics	Cumene: Breathing Loss
40703606	Fixed Roof Tanks - Aromatics	Cumene: Working Loss
40703607	Fixed Roof Tanks - Aromatics	Diisopropyl Benzene: Breathing Loss
40703608	Fixed Roof Tanks - Aromatics	Diisopropyl Benzene: Working Loss
40703609	Fixed Roof Tanks - Aromatics	Ethyl Benzene: Breathing Loss
40703610	Fixed Roof Tanks - Aromatics	Ethyl Benzene: Working Loss
40703611	Fixed Roof Tanks - Aromatics	Methyl Styrene: Breathing Loss
40703612	Fixed Roof Tanks - Aromatics	Methyl Styrene: Working Loss
40703613	Fixed Roof Tanks - Aromatics	Styrene: Breathing Loss
40703614	Fixed Roof Tanks - Aromatics	Styrene: Working Loss
40703615	Fixed Roof Tanks - Aromatics	Toluene: Breathing Loss
40703616	Fixed Roof Tanks - Aromatics	Toluene: Working Loss
40703617	Fixed Roof Tanks - Aromatics	m-Xylene: Breathing Loss
40703618	Fixed Roof Tanks - Aromatics	m-Xylene: Working Loss
40703619	Fixed Roof Tanks - Aromatics	o-Xylene: Breathing Loss
40703620	Fixed Roof Tanks - Aromatics	o-Xylene: Working Loss
40703621	Fixed Roof Tanks - Aromatics	p-Xylene: Breathing Loss
40703622	Fixed Roof Tanks - Aromatics	p-Xylene: Working Loss
40703623	Fixed Roof Tanks - Aromatics	Xylenes, Mixed: Breathing Loss
40703624	Fixed Roof Tanks - Aromatics	Xylenes, Mixed: Working Loss
40703625	Fixed Roof Tanks - Aromatics	Creosote: Breathing Loss
40703626	Fixed Roof Tanks - Aromatics	Creosote: Working Loss
40703697	Fixed Roof Tanks - Aromatics	Specify Aromatic: Breathing Loss
40703698	Fixed Roof Tanks - Aromatics	Specify Aromatic: Working Loss
40704001	Fixed Roof Tanks - Carboxylic Acids	Acetic Acid: Breathing Loss
40704002	Fixed Roof Tanks - Carboxylic Acids	Acetic Acid: Working Loss
40704003	Fixed Roof Tanks - Carboxylic Acids	Acrylic Acid: Breathing Loss
40704004	Fixed Roof Tanks - Carboxylic Acids	Acrylic Acid: Working Loss
40704005	Fixed Roof Tanks - Carboxylic Acids	Adipic Acid (Soln): Breathing Loss
40704006	Fixed Roof Tanks - Carboxylic Acids	Adipic Acid (Soln): Working Loss
40704007	Fixed Roof Tanks - Carboxylic Acids	Formic Acid: Breathing Loss
40704008	Fixed Roof Tanks - Carboxylic Acids	Formic Acid: Working Loss
40704009	Fixed Roof Tanks - Carboxylic Acids	Propionic Acid: Breathing Loss
40704010	Fixed Roof Tanks - Carboxylic Acids	Propionic Acid: Working Loss
40704011	Fixed Roof Tanks - Carboxylic Acids	Chloroacetic Acid: Breathing Loss
40704012	Fixed Roof Tanks - Carboxylic Acids	Chloroacetic Acid: Working Loss
40704097	Fixed Roof Tanks - Carboxylic Acids	Specify Acid: Breathing Loss
40704098	Fixed Roof Tanks - Carboxylic Acids	Specify Acid: Working Loss

SCC	Description (6 digit)	Description (8 digit)
40704099	Fixed Roof Tanks - Carboxylic Acids	Specify Acid: Breathing Loss
40704401	Fixed Roof Tanks - Esters	Butyl Acetate: Breathing Loss
40704402	Fixed Roof Tanks - Esters	Butyl Acetate: Working Loss
40704403	Fixed Roof Tanks - Esters	Butyl Acrylate: Breathing Loss
40704404	Fixed Roof Tanks - Esters	Butyl Acrylate: Working Loss
40704405	Fixed Roof Tanks - Esters	Ethyl Acetate: Breathing Loss
40704406	Fixed Roof Tanks - Esters	Ethyl Acetate: Working Loss
40704407	Fixed Roof Tanks - Esters	Ethyl Acrylate: Breathing Loss
40704408	Fixed Roof Tanks - Esters	Ethyl Acrylate: Working Loss
40704409	Fixed Roof Tanks - Esters	Isobutyl Acrylate: Breathing Loss
40704410	Fixed Roof Tanks - Esters	Isobutyl Acrylate: Working Loss
40704411	Fixed Roof Tanks - Esters	Isopropyl Acetate: Breathing Loss
40704412	Fixed Roof Tanks - Esters	Isopropyl Acetate: Working Loss
40704413	Fixed Roof Tanks - Esters	Methyl Acetate: Breathing Loss
40704414	Fixed Roof Tanks - Esters	Methyl Acetate: Working Loss
40704415	Fixed Roof Tanks - Esters	Methyl Acrylate: Breathing Loss
40704416	Fixed Roof Tanks - Esters	Methyl Acrylate: Working Loss
40704417	Fixed Roof Tanks - Esters	Methyl Methacrylate: Breathing Loss
40704418	Fixed Roof Tanks - Esters	Methyl Methacrylate: Working Loss
40704419	Fixed Roof Tanks - Esters	Vinyl Acetate: Breathing Loss
40704420	Fixed Roof Tanks - Esters	Vinyl Acetate: Working Loss
40704421	Fixed Roof Tanks - Esters	n-Propyl Acetate: Breathing Loss
40704422	Fixed Roof Tanks - Esters	n-Propyl Acetate: Working Loss
40704423	Fixed Roof Tanks - Esters	i-Butyl-i-Butyrate: Breathing Loss
40704424	Fixed Roof Tanks - Esters	i-Butyl-i-Butyrate: Working Loss
40704425	Fixed Roof Tanks - Esters	Acrylic Esters: Breathing Loss
40704426	Fixed Roof Tanks - Esters	Acrylic Esters: Working Loss
40704497	Fixed Roof Tanks - Esters	Specify Ester: Breathing Loss
40704498	Fixed Roof Tanks - Esters	Specify Ester: Working Loss
40704801	Fixed Roof Tanks - Ethers	Methyl-tert-Butyl Ether: Breathing Loss
40704802	Fixed Roof Tanks - Ethers	Methyl-tert-Butyl Ether: Working Loss
40704805	Fixed Roof Tanks - Ethers	1,4-Dioxane: Breathing Loss
40704806	Fixed Roof Tanks - Ethers	1,4-Dioxane: Working Loss
40704897	Fixed Roof Tanks - Ethers	Specify Ether: Breathing Loss
40704898	Fixed Roof Tanks - Ethers	Specify Ether: Working Loss
40705201	Fixed Roof Tanks - Glycol Ethers	Butyl Carbitol: Breathing Loss
40705202	Fixed Roof Tanks - Glycol Ethers	Butyl Carbitol: Working Loss
40705203	Fixed Roof Tanks - Glycol Ethers	Butyl Cellosolve: Breathing Loss
40705204	Fixed Roof Tanks - Glycol Ethers	Butyl Cellosolve: Working Loss
40705205	Fixed Roof Tanks - Glycol Ethers	Carbitol: Breathing Loss
40705206	Fixed Roof Tanks - Glycol Ethers	Carbitol: Working Loss
40705207	Fixed Roof Tanks - Glycol Ethers	Cellosolve: Breathing Loss
40705208	Fixed Roof Tanks - Glycol Ethers	Cellosolve: Working Loss
40705209	Fixed Roof Tanks - Glycol Ethers	Diethylene Glycol: Breathing Loss
40705210	Fixed Roof Tanks - Glycol Ethers	Diethylene Glycol: Working Loss
40705211	Fixed Roof Tanks - Glycol Ethers	Methyl Carbitol: Breathing Loss
40705212	Fixed Roof Tanks - Glycol Ethers	Methyl Carbitol: Working Loss

SCC	Description (6 digit)	Description (8 digit)
40705213	Fixed Roof Tanks - Glycol Ethers	Methyl Cellosolve: Breathing Loss
40705214	Fixed Roof Tanks - Glycol Ethers	Methyl Cellosolve: Working Loss
40705215	Fixed Roof Tanks - Glycol Ethers	Polyethylene Glycol: Breathing Loss
40705216	Fixed Roof Tanks - Glycol Ethers	Polyethylene Glycol: Working Loss
40705217	Fixed Roof Tanks - Glycol Ethers	Triethylene Glycol: Breathing Loss
40705218	Fixed Roof Tanks - Glycol Ethers	Triethylene Glycol: Working Loss
40705297	Fixed Roof Tanks - Glycol Ethers	Specify Glycol Ether: Breathing Loss
40705298	Fixed Roof Tanks - Glycol Ethers	Specify Glycol Ether: Working Loss
40705601	Fixed Roof Tanks - Glycols	1,4-Butanediol: Breathing Loss
40705602	Fixed Roof Tanks - Glycols	1,4-Butanediol: Working Loss
40705603	Fixed Roof Tanks - Glycols	Ethylene Glycol: Breathing Loss
40705604	Fixed Roof Tanks - Glycols	Ethylene Glycol: Working Loss
40705605	Fixed Roof Tanks - Glycols	Dipropylene Glycol: Breathing Loss
40705606	Fixed Roof Tanks - Glycols	Dipropylene Glycol: Working Loss
40705607	Fixed Roof Tanks - Glycols	Glycerol: Breathing Loss
40705608	Fixed Roof Tanks - Glycols	Glycerol: Working Loss
40705609	Fixed Roof Tanks - Glycols	Propylene Glycol: Breathing Loss
40705610	Fixed Roof Tanks - Glycols	Propylene Glycol: Working Loss
40705697	Fixed Roof Tanks - Glycols	Specify Glycol: Breathing Loss
40705698	Fixed Roof Tanks - Glycols	Specify Glycol: Working Loss
40706001	Fixed Roof Tanks - Halogenated Organics	Benzyl Chloride: Breathing Loss
40706002	Fixed Roof Tanks - Halogenated Organics	Benzyl Chloride: Working Loss
40706003	Fixed Roof Tanks - Halogenated Organics	Caprolactum (Soln): Breathing Loss
40706004	Fixed Roof Tanks - Halogenated Organics	Caprolactum (Soln): Working Loss
40706005	Fixed Roof Tanks - Halogenated Organics	Carbon Tetrachloride: Breathing Loss
40706006	Fixed Roof Tanks - Halogenated Organics	Carbon Tetrachloride: Working Loss
40706007	Fixed Roof Tanks - Halogenated Organics	Chlorobenzene: Breathing Loss
40706008	Fixed Roof Tanks - Halogenated Organics	Chlorobenzene: Working Loss
40706009	Fixed Roof Tanks - Halogenated Organics	o-Dichlorobenzene: Breathing Loss
40706010	Fixed Roof Tanks - Halogenated Organics	o-Dichlorobenzene: Working Loss
40706011	Fixed Roof Tanks - Halogenated Organics	p-Dichlorobenzene: Breathing Loss
40706012	Fixed Roof Tanks - Halogenated Organics	p-Dichlorobenzene: Working Loss
40706013	Fixed Roof Tanks - Halogenated Organics	Epichlorohydrin: Breathing Loss
40706014	Fixed Roof Tanks - Halogenated Organics	Epichlorohydrin: Working Loss
40706015	Fixed Roof Tanks - Halogenated Organics	Ethylene Dibromide: Breathing Loss
40706016	Fixed Roof Tanks - Halogenated Organics	Ethylene Dibromide: Working Loss
40706017	Fixed Roof Tanks - Halogenated Organics	Ethylene Dichloride: Breathing Loss
40706018	Fixed Roof Tanks - Halogenated Organics	Ethylene Dichloride: Working Loss
40706019	Fixed Roof Tanks - Halogenated Organics	Methylene Chloride: Breathing Loss
40706020	Fixed Roof Tanks - Halogenated Organics	Methylene Chloride: Working Loss
40706021	Fixed Roof Tanks - Halogenated Organics	Perchloroethylene: Breathing Loss
40706022	Fixed Roof Tanks - Halogenated Organics	Perchloroethylene: Working Loss
40706023	Fixed Roof Tanks - Halogenated Organics	Trichloroethylene: Breathing Loss
40706024	Fixed Roof Tanks - Halogenated Organics	Trichloroethylene: Working Loss
40706027	Fixed Roof Tanks - Halogenated Organics	1,1,1-Trichloroethane: Breathing Loss
40706028	Fixed Roof Tanks - Halogenated Organics	1,1,1-Trichloroethane: Working Loss
40706029	Fixed Roof Tanks - Halogenated Organics	Chlorosolve: Breathing Loss

SCC	Description (6 digit)	Description (8 digit)
40706030	Fixed Roof Tanks - Halogenated Organics	Chlorosolve: Working Loss
40706031	Fixed Roof Tanks - Halogenated Organics	Methyl Chloride: Breathing Loss
40706032	Fixed Roof Tanks - Halogenated Organics	Methyl Chloride: Working Loss
40706033	Fixed Roof Tanks - Halogenated Organics	Chloroform: Breathing Loss
40706034	Fixed Roof Tanks - Halogenated Organics	Chloroform: Working Loss
40706035	Fixed Roof Tanks - Halogenated Organics	Hexachlorobenzene: Breathing Loss
40706036	Fixed Roof Tanks - Halogenated Organics	Hexachlorobenzene: Working Loss
40706097	Fixed Roof Tanks - Halogenated Organics	Specify Halogenated Organic: Breathing Loss
40706098	Fixed Roof Tanks - Halogenated Organics	Specify Halogenated Organic: Working Loss
40706401	Fixed Roof Tanks - Isocyanates	MDI: Breathing Loss
40706402	Fixed Roof Tanks - Isocyanates	MDI: Working Loss
40706403	Fixed Roof Tanks - Isocyanates	TDI: Breathing Loss
40706404	Fixed Roof Tanks - Isocyanates	TDI: Working Loss
40706497	Fixed Roof Tanks - Isocyanates	Specify Isocyanate: Breathing Loss
40706498	Fixed Roof Tanks - Isocyanates	Specify Isocyanate: Working Loss
40706801	Fixed Roof Tanks - Ketones	Cyclohexanone: Breathing Loss
40706802	Fixed Roof Tanks - Ketones	Cyclohexanone: Working Loss
40706803	Fixed Roof Tanks - Ketones	Acetone: Breathing Loss
40706804	Fixed Roof Tanks - Ketones	Acetone: Working Loss
40706805	Fixed Roof Tanks - Ketones	Methyl Ethyl Ketone: Breathing Loss
40706806	Fixed Roof Tanks - Ketones	Methyl Ethyl Ketone: Working Loss
40706807	Fixed Roof Tanks - Ketones	Methyl Isobutyl Ketone: Breathing Loss
40706808	Fixed Roof Tanks - Ketones	Methyl Isobutyl Ketone: Working Loss
40706813	Fixed Roof Tanks - Ketones	Methylamyl Ketone: Breathing Loss
40706814	Fixed Roof Tanks - Ketones	Methylamyl Ketone: Working Loss
40706897	Fixed Roof Tanks - Ketones	Specify Ketone: Breathing Loss
40706898	Fixed Roof Tanks - Ketones	Specify Ketone: Working Loss
40707203	Fixed Roof Tanks - Mercaptans	Perchloromethyl Mercaptan: Breathing Loss
40707204	Fixed Roof Tanks - Mercaptans	Perchloromethyl Mercaptan: Working Loss
40707601	Fixed Roof Tanks - Nitriles	Acrylonitrile: Breathing Loss
40707602	Fixed Roof Tanks - Nitriles	Acrylonitrile: Working Loss
40707603	Fixed Roof Tanks - Nitriles	Acetonitrile: Breathing Loss
40707604	Fixed Roof Tanks - Nitriles	Acetonitrile: Working Loss
40707697	Fixed Roof Tanks - Nitriles	Specify Nitrile: Breathing Loss
40707698	Fixed Roof Tanks - Nitriles	Specify Nitrile: Working Loss
40708001	Fixed Roof Tanks - Nitro Compounds	Nitrobenzene: Breathing Loss
40708002	Fixed Roof Tanks - Nitro Compounds	Nitrobenzene: Working Loss
40708097	Fixed Roof Tanks - Nitro Compounds	Breathing Loss
40708098	Fixed Roof Tanks - Nitro Compounds	Working Loss
40708401	Fixed Roof Tanks - Phenols	Nonylphenol: Breathing Loss
40708402	Fixed Roof Tanks - Phenols	Nonylphenol: Working Loss
40708403	Fixed Roof Tanks - Phenols	Phenol: Breathing Loss
40708404	Fixed Roof Tanks - Phenols	Phenol: Working Loss
40708405	Fixed Roof Tanks - Phenols	2,4-Dichlorophenol: Breathing Loss
40708406	Fixed Roof Tanks - Phenols	2,4-Dichlorophenol: Working Loss
40708497	Fixed Roof Tanks - Phenols	Specify Phenol: Breathing Loss
40708498	Fixed Roof Tanks - Phenols	Specify Phenol: Working Loss

SCC	Description (6 digit)	Description (8 digit)
40714601	Fixed Roof Tanks - Miscellaneous	Carbon Disulphide: Breathing Loss
40714602	Fixed Roof Tanks - Miscellaneous	Carbon Disulphide: Working Loss
40714603	Fixed Roof Tanks - Miscellaneous	Dimethyl Sulphoxide: Breathing Loss
40714604	Fixed Roof Tanks - Miscellaneous	Dimethyl Sulphoxide: Working Loss
40714605	Fixed Roof Tanks - Miscellaneous	Tetrahydrofuran: Breathing Loss
40714606	Fixed Roof Tanks - Miscellaneous	Tetrahydrofuran: Working Loss
40714697	Fixed Roof Tanks - Miscellaneous	Breathing Loss
40714698	Fixed Roof Tanks - Miscellaneous	Working Loss
40715401	Floating Roof Tanks - Acid Anhydrides	Acetic Acid Anhydride: Standing Loss
40715402	Floating Roof Tanks - Acid Anhydrides	Acetic Acid Anhydride: Working Loss
40715403	Floating Roof Tanks - Acid Anhydrides	Maleic Anhydride: Standing loss
40715404	Floating Roof Tanks - Acid Anhydrides	Maleic Anhydride: Withdrawal Loss
40715405	Floating Roof Tanks - Acid Anhydrides	Phthalic Anhydride: Standing Loss
40715406	Floating Roof Tanks - Acid Anhydrides	Phthalic Anhydride: Withdrawal Loss
40715801	Floating Roof Tanks - Alcohols	Methanol: Standing Loss
40715802	Floating Roof Tanks - Alcohols	Methanol: Withdrawal Loss
40715809	Floating Roof Tanks - Alcohols	Ethyl Alcohol: Standing Loss
40715810	Floating Roof Tanks - Alcohols	Ethyl Alcohol: Working Loss
40715811	Floating Roof Tanks - Alcohols	Isopropanol: Standing Loss
40715812	Floating Roof Tanks - Alcohols	Isopropanol: Working Loss
40715817	Floating Roof Tanks - Alcohols	N-propyl Alcohol: Standing Loss
40715818	Floating Roof Tanks - Alcohols	N-propyl Alcohol: Withdrawal Loss
40715819	Floating Roof Tanks - Alcohols	Xylol: Standing Loss
40715820	Floating Roof Tanks - Alcohols	Xylol: Withdrawal Loss
40717201	Floating Roof Tanks - Aldehydes	Acetaldehyde: Standing Loss
40717202	Floating Roof Tanks - Aldehydes	Acetaldehyde: Withdrawal Loss
40717203	Floating Roof Tanks - Aldehydes	Acrolein: Standing Loss
40717204	Floating Roof Tanks - Aldehydes	Acrolein: Withdrawal Loss
40717205	Floating Roof Tanks - Aldehydes	n-Butyraldehyde: Standing Loss
40717206	Floating Roof Tanks - Aldehydes	n-Butyraldehyde: Withdrawal Loss
40717207	Floating Roof Tanks - Aldehydes	Formalin: Standing Loss
40717208	Floating Roof Tanks - Aldehydes	Formalin: Withdrawal Loss
40717209	Floating Roof Tanks - Aldehydes	Isobutyraldehyde: Standing Loss
40717210	Floating Roof Tanks - Aldehydes	Isobutyraldehyde: Withdrawal Loss
40717211	Floating Roof Tanks - Aldehydes	Propionaldehyde: Standing Loss
40717212	Floating Roof Tanks - Aldehydes	Propionaldehyde: Withdrawal Loss
40717297	Floating Roof Tanks - Aldehydes	Specify Aldehyde: Standing Loss
40717298	Floating Roof Tanks - Aldehydes	Specify Aldehyde: Withdrawal Loss
40717601	Floating Roof Tanks - Alkanes (Paraffins)	Cyclohexane: Standing Loss
40717602	Floating Roof Tanks - Alkanes (Paraffins)	Cyclohexane: Withdrawal Loss
40717603	Floating Roof Tanks - Alkanes (Paraffins)	n-Hexane: Standing Loss
40717604	Floating Roof Tanks - Alkanes (Paraffins)	n-Hexane: Withdrawal Loss
40717605	Floating Roof Tanks - Alkanes (Paraffins)	n-Pentane: Standing Loss
40717606	Floating Roof Tanks - Alkanes (Paraffins)	n-Pentane: Withdrawal Loss
40717611	Floating Roof Tanks - Alkanes (Paraffins)	Naphtha: Standing Loss
40717612	Floating Roof Tanks - Alkanes (Paraffins)	Naphtha: Withdrawal Loss
40717613	Floating Roof Tanks - Alkanes (Paraffins)	Petroleum Distillates: Standing Loss

SCC	Description (6 digit)	Description (8 digit)
40717614	Floating Roof Tanks - Alkanes (Paraffins)	Petroleum Distillates: Withdrawal Loss
40717697	Floating Roof Tanks - Alkanes (Paraffins)	Specify Alkane: Standing Loss
40717698	Floating Roof Tanks - Alkanes (Paraffins)	Specify Alkane: Withdrawal Loss
40718001	Floating Roof Tanks - Alkenes (Olefins)	Isoprene: Standing Loss
40718002	Floating Roof Tanks - Alkenes (Olefins)	Isoprene: Withdrawal Loss
40718003	Floating Roof Tanks - Alkenes (Olefins)	Methylallene: Standing Loss
40718004	Floating Roof Tanks - Alkenes (Olefins)	Methylallene: Withdrawal Loss
40718005	Floating Roof Tanks - Alkenes (Olefins)	1-Pentene: Standing Loss
40718006	Floating Roof Tanks - Alkenes (Olefins)	1-Pentene: Withdrawal Loss
40718007	Floating Roof Tanks - Alkenes (Olefins)	Piperylene: Standing Loss
40718008	Floating Roof Tanks - Alkenes (Olefins)	Piperylene: Withdrawal Loss
40718009	Floating Roof Tanks - Alkenes (Olefins)	Cyclopentene: Standing Loss
40718010	Floating Roof Tanks - Alkenes (Olefins)	Cyclopentene: Withdrawal Loss
40718097	Floating Roof Tanks - Alkenes (Olefins)	Specify Olefin: Standing Loss
40718098	Floating Roof Tanks - Alkenes (Olefins)	Specify Olefin: Withdrawal Loss
40718801	Floating Roof Tanks - Amides	Dimethylformamide: Standing Loss
40718802	Floating Roof Tanks - Amides	Dimethylformamide: Withdrawal Loss
40719201	Floating Roof Tanks - Amines	Aniline: Standing Loss
40719202	Floating Roof Tanks - Amines	Aniline: Withdrawal Loss
40719207	Floating Roof Tanks - Amines	Monoethanolamine: Standing Loss
40719208	Floating Roof Tanks - Amines	Monoethanolamine: Withdrawal Loss
40719209	Floating Roof Tanks - Amines	Hexamine: Standing Loss
40719210	Floating Roof Tanks - Amines	Hexamine: Withdrawal Loss
40719211	Floating Roof Tanks - Amines	Ethylenediamine: Standing Loss
40719212	Floating Roof Tanks - Amines	Ethylenediamine: Withdrawal Loss
40719601	Floating Roof Tanks - Aromatics	Benzene: Standing Loss
40719602	Floating Roof Tanks - Aromatics	Benzene: Withdrawal Loss
40719613	Floating Roof Tanks - Aromatics	Styrene: Standing Loss
40719614	Floating Roof Tanks - Aromatics	Styrene: Withdrawal Loss
40719615	Floating Roof Tanks - Aromatics	Toluene: Standing Loss
40719616	Floating Roof Tanks - Aromatics	Toluene: Withdrawal Loss
40719619	Floating Roof Tanks - Aromatics	o-Xylene: Breathing Loss
40719620	Floating Roof Tanks - Aromatics	o-Xylene: Working Loss
40719621	Floating Roof Tanks - Aromatics	p-Xylene: Standing Loss
40719622	Floating Roof Tanks - Aromatics	p-Xylene: Withdrawal Loss
40719623	Floating Roof Tanks - Aromatics	Xylenes: Standing Loss
40719624	Floating Roof Tanks - Aromatics	Xylenes: Withdrawal Loss
40719697	Floating Roof Tanks - Aromatics	Specify Aromatic: Standing Loss
40719698	Floating Roof Tanks - Aromatics	Specify Aromatic: Withdrawal Loss
40720001	Floating Roof Tanks - Carboxylic Acids	Acetic Acid: Standing Loss
40720002	Floating Roof Tanks - Carboxylic Acids	Acetic Acid: Withdrawal Loss
40720003	Floating Roof Tanks - Carboxylic Acids	Acrylic Acid: Standing Loss
40720004	Floating Roof Tanks - Carboxylic Acids	Acrylic Acid: Withdrawal Loss
40720011	Floating Roof Tanks - Carboxylic Acids	Chloroacetic Acid: Standing Loss
40720012	Floating Roof Tanks - Carboxylic Acids	Chloroacetic Acid: Withdrawal Loss
40720097	Floating Roof Tanks - Carboxylic Acids	Specify Carboxylic Acid: Standing Loss
40720098	Floating Roof Tanks - Carboxylic Acids	Specify Carboxylic Acid: Withdrawal Loss

SCC	Description (6 digit)	Description (8 digit)
40720401	Floating Roof Tanks - Esters	Butyl Acetate: Standing Loss
40720402	Floating Roof Tanks - Esters	Butyl Acetate: Withdrawal Loss
40720405	Floating Roof Tanks - Esters	Ethyl Acetate: Standing Loss
40720406	Floating Roof Tanks - Esters	Ethyl Acetate: Withdrawal Loss
40720417	Floating Roof Tanks - Esters	Methyl Methacrylate: Standing Loss
40720418	Floating Roof Tanks - Esters	Methyl Methacrylate: Withdrawal Loss
40720419	Floating Roof Tanks - Esters	Vinyl Acetate: Standing Loss
40720420	Floating Roof Tanks - Esters	Vinyl Acetate: Withdrawal Loss
40720425	Floating Roof Tanks - Esters	Acrylic Esters: Standing Loss
40720426	Floating Roof Tanks - Esters	Acrylic Esters: Withdrawal Loss
40720801	Floating Roof Tanks - Ethers	Ethyl Ether: Standing Loss
40720802	Floating Roof Tanks - Ethers	Ethyl Ether: Withdrawal Loss
40720803	Floating Roof Tanks - Ethers	Propylene Oxide: Standing Loss
40720804	Floating Roof Tanks - Ethers	Propylene Oxide: Withdrawal Loss
40720805	Floating Roof Tanks - Ethers	1,4-Dioxane: Standing Loss
40720806	Floating Roof Tanks - Ethers	1,4-Dioxane: Withdrawal Loss
40720897	Floating Roof Tanks - Ethers	Specify Ether: Standing Loss
40720898	Floating Roof Tanks - Ethers	Specify Ether: Withdrawal Loss
40721205	Floating Roof Tanks - Glycol Ethers	Carbitol: Standing Loss
40721206	Floating Roof Tanks - Glycol Ethers	Carbitol: Withdrawal Loss
40721207	Floating Roof Tanks - Glycol Ethers	Cellosolve: Standing Loss
40721208	Floating Roof Tanks - Glycol Ethers	Cellosolve: Withdrawal Loss
40721217	Floating Roof Tanks - Glycol Ethers	Triethylene Glycol: Standing Loss
40721218	Floating Roof Tanks - Glycol Ethers	Triethylene Glycol: Withdrawal Loss
40721603	Floating Roof Tanks - Glycols	Ethylene Glycol: Standing Loss
40721604	Floating Roof Tanks - Glycols	Ethylene Glycol: Withdrawal Loss
40722001	Floating Roof Tanks - Halogenated Organics	Carbon Tetrachloride: Standing Loss
40722002	Floating Roof Tanks - Halogenated Organics	Carbon Tetrachloride: Withdrawal Loss
40722003	Floating Roof Tanks - Halogenated Organics	Chloroform: Standing Loss
40722004	Floating Roof Tanks - Halogenated Organics	Chloroform: Withdrawal Loss
40722005	Floating Roof Tanks - Halogenated Organics	Ethylene Dichloride: Standing Loss
40722006	Floating Roof Tanks - Halogenated Organics	Ethylene Dichloride: Withdrawal Loss
40722007	Floating Roof Tanks - Halogenated Organics	Methylene Chloride: Standing Loss
40722008	Floating Roof Tanks - Halogenated Organics	Methylene Chloride: Withdrawal Loss
40722009	Floating Roof Tanks - Halogenated Organics	Trichlorethylene: Standing Loss
40722010	Floating Roof Tanks - Halogenated Organics	Trichlorethylene: Withdrawal Loss
40722011	Floating Roof Tanks - Halogenated Organics	1,1,1-Trichloroethane: Standing Loss

SCC	Description (6 digit)	Description (8 digit)
40722012	Floating Roof Tanks - Halogenated Organics	1,1,1-Trichloroethane: Withdrawal Loss
40722021	Floating Roof Tanks - Halogenated Organics	Perchloroethylene: Standing Loss
40722022	Floating Roof Tanks - Halogenated Organics	Perchloroethylene: Withdrawal Loss
40722029	Floating Roof Tanks - Halogenated Organics	Chlorosolve: Standing Loss
40722030	Floating Roof Tanks - Halogenated Organics	Chlorosolve: Withdrawal Loss
40722031	Floating Roof Tanks - Halogenated Organics	Methyl Chloride: Standing loss
40722032	Floating Roof Tanks - Halogenated Organics	Methyl Chloride: Withdrawal Loss
40722033	Floating Roof Tanks - Halogenated Organics	Chlorobenzene: Standing Loss
40722034	Floating Roof Tanks - Halogenated Organics	Chlorobenzene: Withdrawal Loss
40722035	Floating Roof Tanks - Halogenated Organics	Hexachlorobenzene: Standing Loss
40722036	Floating Roof Tanks - Halogenated Organics	Hexachlorobenzene: Withdrawal Loss
40722097	Floating Roof Tanks - Halogenated Organics	Specify Halogenated VOC: Standing Loss
40722098	Floating Roof Tanks - Halogenated Organics	Specify Halogenated VOC: Withdrawal Loss
40722801	Floating Roof Tanks - Ketones	Acetone: Standing Loss
40722802	Floating Roof Tanks - Ketones	Acetone: Withdrawal Loss
40722803	Floating Roof Tanks - Ketones	Methyl Ethyl Ketone: Standing Loss
40722804	Floating Roof Tanks - Ketones	Methyl Ethyl Ketone: Withdrawal Loss
40722805	Floating Roof Tanks - Ketones	Methyl Isobutyl Ketone: Standing Loss
40722806	Floating Roof Tanks - Ketones	Methyl Isobutyl Ketone: Withdrawal Loss
40722807	Floating Roof Tanks - Ketones	Cyclohexanone: Standing Loss
40722808	Floating Roof Tanks - Ketones	Cyclohexanone: Withdrawal Loss
40722897	Floating Roof Tanks - Ketones	Specify Ketone: Standing Loss
40722898	Floating Roof Tanks - Ketones	Specify Ketone: Withdrawal Loss
40723201	Floating Roof Tanks - Mercaptans	Ethyl Mercaptan: Standing Loss
40723202	Floating Roof Tanks - Mercaptans	Ethyl Mercaptan: Withdrawal Loss
40723203	Floating Roof Tanks - Mercaptans	Perchloromethyl Mercaptan: Standing Loss
40723204	Floating Roof Tanks - Mercaptans	Perchloromethyl Mercaptan: Withdrawal Loss
40723297	Floating Roof Tanks - Mercaptans	Specify Mercaptan: Standing Loss
40723298	Floating Roof Tanks - Mercaptans	Specify Mercaptan: Withdrawal Loss
40723601	Floating Roof Tanks - Nitriles	Acrylonitrile: Standing Loss
40723602	Floating Roof Tanks - Nitriles	Acrylonitrile: Withdrawal Loss
40723603	Floating Roof Tanks - Nitriles	Acetonitrile: Standing Loss
40723604	Floating Roof Tanks - Nitriles	Acetonitrile: Withdrawal Loss
40724403	Floating Roof Tanks - Phenols	Phenol: Standing Loss
40724404	Floating Roof Tanks - Phenols	Phenol: Withdrawal Loss
40724405	Floating Roof Tanks - Phenols	2,4-Dichlorophenol: Standing Loss

SCC	Description (6 digit)	Description (8 digit)
40724406	Floating Roof Tanks - Phenols	2,4-Dichlorophenol: Withdrawal Loss
40729601	Floating Roof Tanks - Miscellaneous	Carbon Disulphide: Standing Loss
40729602	Floating Roof Tanks - Miscellaneous	Carbon Disulphide: Withdrawal Loss
40729603	Floating Roof Tanks - Miscellaneous	Dimethyl Sulphoxide: Standing Loss
40729604	Floating Roof Tanks - Miscellaneous	Dimethyl Sulphoxide: Withdrawal Loss
40729605	Floating Roof Tanks - Miscellaneous	Tetrahydrofuran: Standing Loss
40729606	Floating Roof Tanks - Miscellaneous	Tetrahydrofuran: Withdrawal Loss
40729697	Floating Roof Tanks - Miscellaneous	Breathing Loss
40729698	Floating Roof Tanks - Miscellaneous	Working Loss
40780401	Pressure Tanks - Anhydrides	Acetic Anhydride: Withdrawal Loss
40780403	Pressure Tanks - Anhydrides	Maleic Anhydride: Withdrawal Loss
40780815	Pressure Tanks - Alcohols	Methanol: Withdrawal Loss
40780819	Pressure Tanks - Alcohols	Xylol: Withdrawal Loss
40781201	Pressure Tanks - Aldehydes	Acetaldehyde: Withdrawal Loss
40781202	Pressure Tanks - Aldehydes	Acrolein: Withdrawal Loss
40781601	Pressure Tanks - Alkanes (Paraffins)	Ethane: Withdrawal Loss
40781602	Pressure Tanks - Alkanes (Paraffins)	Butane: Withdrawal Loss
40781603	Pressure Tanks - Alkanes (Paraffins)	Methane: Withdrawal Loss
40781604	Pressure Tanks - Alkanes (Paraffins)	Natural Gas: Withdrawal Loss
40781605	Pressure Tanks - Alkanes (Paraffins)	Propane: Withdrawal Loss
40781606	Pressure Tanks - Alkanes (Paraffins)	Isopentane: Withdrawal Loss
40781607	Pressure Tanks - Alkanes (Paraffins)	n-Pentane: Withdrawal Loss
40781699	Pressure Tanks - Alkanes (Paraffins)	Specify Gas: Withdrawal Loss
40782001	Pressure Tanks - Alkenes (Olefins)	1,3-Butadiene: Withdrawal Loss
40782002	Pressure Tanks - Alkenes (Olefins)	1-Butene: Withdrawal Loss
40782003	Pressure Tanks - Alkenes (Olefins)	2-Butene: Withdrawal Loss
40782004	Pressure Tanks - Alkenes (Olefins)	Ethylene: Withdrawal Loss
40782005	Pressure Tanks - Alkenes (Olefins)	Isobutylene: Withdrawal Loss
40782006	Pressure Tanks - Alkenes (Olefins)	Propylene: Withdrawal Loss
40782007	Pressure Tanks - Alkenes (Olefins)	Isoprene: Withdrawal Loss
40782008	Pressure Tanks - Alkenes (Olefins)	Methylallene: Withdrawal Loss
40782009	Pressure Tanks - Alkenes (Olefins)	1-Pentene: Withdrawal Loss
40782010	Pressure Tanks - Alkenes (Olefins)	Piperylene: Withdrawal Loss
40782011	Pressure Tanks - Alkenes (Olefins)	Cyclopentene: Withdrawal Loss
40782012	Pressure Tanks - Alkenes (Olefins)	Vinylidene Chloride: Withdrawal Loss
40782099	Pressure Tanks - Alkenes (Olefins)	Specify Alkene: Withdrawal Loss
40782401	Pressure Tanks - Alkynes (Acetylenes)	Acetylene: Withdrawal Loss
40782499	Pressure Tanks - Alkynes (Acetylenes)	Specify Alkyne: Withdrawal Loss
40783201	Pressure Tanks - Amines	Methylamine: Withdrawal Loss
40783202	Pressure Tanks - Amines	Dimethylamine: Withdrawal Loss
40783203	Pressure Tanks - Amines	Trimethylamine: Withdrawal Loss
40783204	Pressure Tanks - Amines	Hexamine: Withdrawal Loss
40783205	Pressure Tanks - Amines	Aniline: Withdrawal Loss
40783299	Pressure Tanks - Amines	Specify Amine: Withdrawal Loss
40783601	Pressure Tanks - Aromatics	Benzene: Withdrawal Loss
40783621	Pressure Tanks - Aromatics	p-Xylene: Withdrawal Loss
40784801	Pressure Tanks - Ethers	Ethylene Oxide: Withdrawal Loss

SCC	Description (6 digit)	Description (8 digit)
40784899	Pressure Tanks - Ethers	Specify Ether: Withdrawal Loss
40786001	Pressure Tanks - Halogenated Organics	Ethyl Chloride: Withdrawal Loss
40786002	Pressure Tanks - Halogenated Organics	Methyl Chloride: Withdrawal Loss
40786003	Pressure Tanks - Halogenated Organics	Phosgene: Withdrawal Loss
40786004	Pressure Tanks - Halogenated Organics	Vinyl Chloride: Withdrawal Loss
40786005	Pressure Tanks - Halogenated Organics	Trichlorotrifluoroethane: Withdrawal Loss
40786006	Pressure Tanks - Halogenated Organics	Carbon Tetrachloride: Withdrawal Loss
40786019	Pressure Tanks - Halogenated Organics	Methylene Chloride: Withdrawal Loss
40786021	Pressure Tanks - Halogenated Organics	Perchloroethylene: Withdrawal Loss
40786023	Pressure Tanks - Halogenated Organics	Trichloroethylene: Withdrawal Loss
40786099	Pressure Tanks - Halogenated Organics	Specify Halogenated VOC: Withdrawal Loss
40786401	Pressure Tanks - Isocyanates	Methyl Isocyanate: Withdrawal Loss
40786499	Pressure Tanks - Isocyanates	Specify Isocyanate: Withdrawal Loss
40786801	Pressure Tanks - Ketones	Cyclohexanone: Withdrawal Loss
40786803	Pressure Tanks - Ketones	Acetone: Withdrawal Loss
40786805	Pressure Tanks - Ketones	Methyl Ethyl Ketone: Withdrawal Loss
40787201	Pressure Tanks - Mercaptans (Thiols)	Methyl Mercaptan: Withdrawal Loss
40787203	Pressure Tanks - Mercaptans (Thiols)	Perchloromethyl Mercaptan: Withdrawal Loss
40787299	Pressure Tanks - Mercaptans (Thiols)	Specify Mercaptan: Withdrawal Loss
40788403	Pressure Tanks - Phenols	Phenol: Withdrawal Loss
40788405	Pressure Tanks - Phenols	2,4-Dichlorophenol: Withdrawal Loss
40799901	Miscellaneous	Carbon Disulphide: Withdrawal Loss
40799903	Miscellaneous	Dimethyl Sulphoxide: Withdrawal Loss
40799905	Miscellaneous	Tetrahydrofuran: Withdrawal Loss

Transfer losses can occur during the loading and unloading of liquids from the following:

- tanker trucks;
- railcars; and
- barges and ships.

Emissions from the loading of liquids are mainly due to the displacement of vapours in the container as liquid is being loaded. Other loss mechanisms include transit losses, ballasting losses, spills, and tank cleaning. Vapour balancing (an exchange of vapours between the delivering and receiving tank) and vapour recovery/destruction systems are the main control methodologies for loading emissions. The following table provides a list of general SCCs for this source category. The user should refer to the detailed list of SCCs referred to in Section 2.1.6.

SCC	Description (6 digit)	Description (8 digit)
40600101	Tank Cars and Trucks	Gasoline: Splash Loading
40600126	Tank Cars and Trucks	Gasoline: Submerged Loading
40600129	Tank Cars and Trucks	Asphalt: Splash Loading
40600130	Tank Cars and Trucks	Distillate Oil: Submerged Loading
40600131	Tank Cars and Trucks	Gasoline: Submerged Loading (Normal Service)

SCC	Description (6 digit)	Description (8 digit)
40600132	Tank Cars and Trucks	Crude Oil: Submerged Loading (Normal Service)
40600133	Tank Cars and Trucks	Jet Naphtha: Submerged Loading (Normal Service)
40600134	Tank Cars and Trucks	Kerosene: Submerged Loading (Normal Services)
40600135	Tank Cars and Trucks	Distillate Oil: Submerged Loading (Normal Service)
40600136	Tank Cars and Trucks	Gasoline: Splash Loading (Normal Service)
40600137	Tank Cars and Trucks	Crude Oil: Splash Loading (Normal Service)
40600138	Tank Cars and Trucks	Jet Naphtha: Splash Loading (Normal Service)
40600139	Tank Cars and Trucks	Kerosene: Splash Loading (Normal Service)
40600140	Tank Cars and Trucks	Distillate Oil: Splash Loading (Normal Service)
40600141	Tank Cars and Trucks	Gasoline: Submerged Loading (Balanced Service)
40600142	Tank Cars and Trucks	Crude Oil: Submerged Loading (Balanced Service)
40600143	Tank Cars and Trucks	Jet Naphtha: Submerged Loading (Balanced Service)
40600144	Tank Cars and Trucks	Gasoline: Splash Loading (Balanced Service)
40600145	Tank Cars and Trucks	Crude Oil: Splash Loading (Balanced Service)
40600146	Tank Cars and Trucks	Jet Naphtha: Splash Loading (Balanced Service)
40600147	Tank Cars and Trucks	Gasoline: Submerged Loading (Clean Tanks)
40600148	Tank Cars and Trucks	Crude Oil: Submerged Loading (Clean Tanks)
40600149	Tank Cars and Trucks	Jet Naphtha: Submerged Loading (Clean Tanks)
40600160	Tank Cars and Trucks	Kerosene: Submerged Loading (Clean Tanks)
40600161	Tank Cars and Trucks	Distillate Oil: Submerged Loading (Clean Tanks)
40600162	Tank Cars and Trucks	Gasoline: Loaded with Fuel (Transit Losses)
40600163	Tank Cars and Trucks	Gasoline: Return with Vapour (Transit Losses)
40600164	Tank Cars and Trucks	Crude Oil: Loaded with Product
40600165	Tank Cars and Trucks	Crude Oil: Loaded with Vapour
40600166	Tank Cars and Trucks	Jet Fuel: Loaded with Product
40600167	Tank Cars and Trucks	Jet Fuel: Loaded with Vapour
40600168	Tank Cars and Trucks	Kerosene: Loaded with Product
40600169	Tank Cars and Trucks	Kerosene: Loaded with Vapour
40600170	Tank Cars and Trucks	Distillate Oil: Loaded with Product
40600171	Tank Cars and Trucks	Distillate Oil: Loaded with Vapour
40600172	Tank Cars and Trucks	Transit Losses - LPG: Loaded with Fuel
40600173	Tank Cars and Trucks	Transit Losses - LPG: Return with Vapour
40600197	Tank Cars and Trucks	Not Classified
40600198	Tank Cars and Trucks	Not Classified
40600199	Tank Cars and Trucks	Not Classified
40600231	Marine Vessels	Gasoline: Ship Loading - Cleaned and Vapour Free Tanks
40600232	Marine Vessels	Gasoline: Ocean Barges Loading
40600233	Marine Vessels	Gasoline: Barge Loading - Cleaned and Vapour Free Tanks
40600234	Marine Vessels	Gasoline: Ship Loading - Ballasted Tank
40600235	Marine Vessels	Gasoline: Ocean Barges Loading - Ballasted Tank
40600236	Marine Vessels	Gasoline: Ship Loading - Uncleaned Tanks
40600237	Marine Vessels	Gasoline: Ocean Barges Loading - Uncleaned Tanks
40600238	Marine Vessels	Gasoline: Barges Loading - Uncleaned Tanks
40600239	Marine Vessels	Gasoline: Tanker Ship - Ballasted Tank Condition
40600240	Marine Vessels	Gasoline: Barge Loading - Average Tank Condition

SCC	Description (6 digit)	Description (8 digit)
40600241	Marine Vessels	Gasoline: Tanker Ship - Ballasting
40600242	Marine Vessels	Gasoline: Transit Loss
40600243	Marine Vessels	Crude Oil: Loading Tankers
40600244	Marine Vessels	Jet Fuel: Loading Tankers
40600245	Marine Vessels	Kerosene: Loading Tankers
40600246	Marine Vessels	Distillate Oil: Loading Tankers
40600248	Marine Vessels	Crude Oil: Loading Barges
40600249	Marine Vessels	Jet Fuel: Loading Barges
40600250	Marine Vessels	Kerosene: Loading Barges
40600251	Marine Vessels	Distillate Oil: Loading Barges
40600253	Marine Vessels	Crude Oil: Tanker Ballasting
40600254	Marine Vessels	Crude Oil: Transit Loss
40600255	Marine Vessels	Jet Fuel: Transit Loss
40600256	Marine Vessels	Kerosene: Transit Loss
40600257	Marine Vessels	Distillate Oil: Transit Loss
40600259	Marine Vessels	Tanker/Barge Cleaning
40600260	Marine Vessels	Gasoline: Barge Loading - Ballasted
40600261	Marine Vessels	Gasoline: Tanker Ship - Uncleaned Tanks
40600298	Marine Vessels	Not Classified
40600299	Marine Vessels	Not Classified
40600301	Gasoline Retail Operations - Stage I	Splash Filling
40600302	Gasoline Retail Operations - Stage I	Submerged Filling w/o Controls
40600305	Gasoline Retail Operations - Stage I	Unloading
40600306	Gasoline Retail Operations - Stage I	Balanced Submerged Filling
40600307	Gasoline Retail Operations - Stage I	Underground Tank Breathing and Emptying
40600399	Gasoline Retail Operations - Stage I	Not Classified
40600401	Filling Vehicle Gas Tanks - Stage II	Vapour Loss w/o Controls
40600402	Filling Vehicle Gas Tanks - Stage II	Liquid Spill Loss w/o Controls
40600403	Filling Vehicle Gas Tanks - Stage II	Vapour Loss w/o Controls
40600499	Filling Vehicle Gas Tanks - Stage II	Not Classified
40600501	Pipeline Petroleum Transport - General - All Products	Pipeline Leaks
40600502	Pipeline Petroleum Transport - General - All Products	Pipeline Venting
40600503	Pipeline Petroleum Transport - General - All Products	Pump Station
40600504	Pipeline Petroleum Transport - General - All Products	Pump Station Leaks

SCC	Description (6 digit)	Description (8 digit)
40600601	Consumer (Corporate) Fleet Refuelling - Stage II	Vapour Loss w/o Controls
40600602	Consumer (Corporate) Fleet Refuelling - Stage II	Liquid Spill Loss w/o Controls
40600603	Consumer (Corporate) Fleet Refuelling - Stage II	Vapour Loss w/controls
40600630	Consumer (Corporate) Fleet Refuelling - Stage II	Asphalt: Splash Loading
40600651	Consumer (Corporate) Fleet Refuelling - Stage II	Diesel: Vapour Loss w/o Controls
40600701	Consumer (Corporate) Fleet Refuelling - Stage I	Splash Filling
40600702	Consumer (Corporate) Fleet Refuelling - Stage I	Submerged Filling w/o Controls
40600706	Consumer (Corporate) Fleet Refuelling - Stage I	Balanced Submerged Filling
40600707	Consumer (Corporate) Fleet Refuelling - Stage I	Underground Tank Breathing and Emptying
40880001	Equipment Leaks	Equipment Leaks
40899995	Specific Liquid	Cars/Trucks: Loading Rack
40899997	Specific Liquid	Marine Vessels: Loading Rack
40899999	Specific Liquid	Loading Rack

#### 2.4.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurements** (continuous emission monitoring systems [CEMS], predictive emission monitoring [PEM], and source testing)
- **Mass balance**
- **Emission factors**
- **Engineering estimates**

Direct monitoring can be used to estimate emissions from storage tanks, but is often difficult due to the fugitive nature of the emissions. Continuous and/or source testing methods can be applied to vapour recovery systems used in loading operations or to fixed roof or underground tanks with a discharge vent.

Emission estimation models are also available for the storage of some materials. The *TANKS* model, developed by the US EPA and American Petroleum Institute (API), is a methodology that can be used to determine emissions from large storage facilities, including areas in petroleum refineries and bulk terminals. The *TANKS* model requires specific information on the design parameters of the storage vessel and data on the stored material.

Emission factors can also be used to estimate storage tank losses. SCCs relating to storage tanks are based on the tank type, tank capacity, and material stored in the tank. In general, these factors are based on tank capacity for standing or breathing losses and on tank throughput for working or withdrawal losses.

#### 2.4.5 Supporting Information for CAC Emissions Estimation

The *TANKS* model can be obtained from US EPA's website at <[www.epa.gov/ttn/chief/software/tanks/index.html](http://www.epa.gov/ttn/chief/software/tanks/index.html)>. A user's manual can also be downloaded from this website. The *TANKS* model should be used in conjunction with Chapter 7 of US EPA's AP-42 Compilation of Air Pollutant Emission Factors Volume 1. Other requirements for the *TANKS* model include:

- meteorological data;
- tank design parameters; and
- chemical reference resources.

If meteorological data for your facility are not available, the *TANKS* model contains some default values for select U.S. cities. Furthermore, meteorological information in Canada can be obtained from Environment Canada, Meteorological Service of Canada (refer to the following website: <[www.msc-smc.ec.gc.ca/climate/index\\_e.cfm](http://www.msc-smc.ec.gc.ca/climate/index_e.cfm)>). In addition, screening meteorological data for six regions in Alberta can also be obtained. Properties for chemical substances (e.g., VOCs) can be found in literature, such as the CRC Handbook of Chemistry and Physics or Perry's Chemical Engineering Handbook, or from suppliers (MSDS).

The Canadian Petroleum Products Institute's (CPPI) document entitled "Code of Practice for Developing an Emission Inventory for Refineries and Terminals" (referred to as CPPI's Code of Practice) references the *TANKS* model and includes detailed methodologies for estimating losses from tanks and emissions from loading operations. CPPI's Code of Practice can be downloaded from the CPPI website (see Section 2.4.6).

#### 2.4.6 References and Links

- ***Canadian Petroleum Products Institute, 2002, Code of Practice for Developing an Emission Inventory for Refineries and Terminals, Revision 6:***

Download at: <a href="http://www.cppei.ca/tech/COPREI.pdf">http://www.cppei.ca/tech/COPREI.pdf</a>
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- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Fuel and Organic Liquid Storage	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fols.html">http://www.npi.gov.au/handbooks/approved_handbooks/fols.html</a>
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Emission Estimation Technique Manual for Organic Chemical Processing Industries	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/forgchem.html">http://www.npi.gov.au/handbooks/approved_handbooks/forgchem.html</a>
Emission Estimation Technique Manual for Petroleum Refining	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/petroleum.html">http://www.npi.gov.au/handbooks/approved_handbooks/petroleum.html</a>

- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume III, Area Sources:**

Chapter 12: Marine Vessel Loading, Ballasting, and Transit	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii12_apr2001.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii12_apr2001.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Section 5.2: Transportation and Marketing of Petroleum Liquids	<a href="http://www.epa.gov/ttn/chief/ap42/ch05/final/c05s02.pdf">http://www.epa.gov/ttn/chief/ap42/ch05/final/c05s02.pdf</a>
Chapter 7: Liquid Storage Tanks	<a href="http://www.epa.gov/ttn/chief/ap42/ch07/">http://www.epa.gov/ttn/chief/ap42/ch07/</a>

- **U.S. Environmental Protection Agency, 2000, Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.5 Aluminum Industry

### 2.5.1 General Description

The aluminum industry involves both primary and secondary aluminum production. Elemental aluminum produced directly from the mined ore is referred to as “primary aluminum,” while “secondary aluminum” processing involves the recycling of aluminum-containing scrap to aluminum.

Bauxite or alumina ( $Al_2O_3$ ) are typical raw materials used in primary aluminum production. Primary aluminum production may consist of two processes: the Bayer Process and the Hall-Heroult Process. The Bayer Process is a refining step, where bauxite ore (a hydrated oxide of aluminum consisting of 36 to 56 percent alumina) is converted into alumina. The Hall-Heroult Process involves an electrolytic operation where alumina is reduced to aluminum metal in a molten bath of cryolite and various salts.

Secondary aluminum processing involves two main operations: scrap pretreatment and smelting/refining. Sorting, processing, and cleaning make up the pretreatment stage, while smelting/refining operations involve cleaning, melting, refining, alloying, and transferring aluminum.

### 2.5.2 Applicable SIC and NAICS Codes

The following codes generally apply to this source category:

CDN SIC	NAICS	Description
2951	3313	Aluminum Production
2951	331313	Primary Aluminum Production
2951	331314	Carbon and Graphite Electrodes
2961	331317	Aluminum Rolling/Casting and Extruding

### 2.5.3 Source Description

#### 2.5.3.1 *Primary Aluminum Operations*

General SCCs that are applicable to primary aluminum operations are listed below. Reporters are advised to consult their industry association (if applicable) and other related documents for specific SCCs.

SCC	Description (6 digit)	Description (8 digit)
30300001	Aluminum Ore (Bauxite)	Crushing/Handling
30300002	Aluminum Ore (Bauxite)	Drying Oven
30300003	Aluminum Ore (Bauxite)	Fine Ore Storage
30300004	Aluminum Ore (Bauxite)	Loading and Unloading
30300101	Aluminum Ore (Electro-reduction)	Pre-baked Reduction Cell
30300102	Aluminum Ore (Electro-reduction)	Horizontal Stud Soderberg Cell

SCC	Description (6 digit)	Description (8 digit)
30300103	Aluminum Ore (Electro-reduction)	Vertical Stud Soderberg Cell
30300104	Aluminum Ore (Electro-reduction)	Materials Handling
30300105	Aluminum Ore (Electro-reduction)	Anode Baking Furnace
30300106	Aluminum Ore (Electro-reduction)	Degassing
30300107	Aluminum Ore (Electro-reduction)	Roof Vents
30300108	Aluminum Ore (Electro-reduction)	Pre-bake: Fugitive Emissions
30300109	Aluminum Ore (Electro-reduction)	H.S.S.: Fugitive Emissions
30300110	Aluminum Ore (Electro-reduction)	V.S.S.: Fugitive Emissions
30300111	Aluminum Ore (Electro-reduction)	Anode Baking: Fugitive Emissions
30304001	Alumina Processing - Bayer Process	Bayer Process
30304010	Alumina Processing - Bayer Process	Ore Crushing/Grinding
30304011	Alumina Processing - Bayer Process	Mixer
30304012	Alumina Processing - Bayer Process	Digester
30304013	Alumina Processing - Bayer Process	Filter/Wash
30304014	Alumina Processing - Bayer Process	Hydrolization/Cooling
30304015	Alumina Processing - Bayer Process	Precipitate Filtering/Washing
30304016	Alumina Processing - Bayer Process	Calcination/Heating
30304017	Alumina Processing - Bayer Process	Cooling of Alumina

### 2.5.3.2 Secondary Aluminum Operations

General SCCs that are applicable to secondary aluminum operations are listed below. Reporters are advised to consult their industry association and other related documents for specific SCCs.

SCC	Description (6 digit)	Description (8 digit)
30400101	Aluminum	Sweating Furnace
30400102	Aluminum	Smelting Furnace/Crucible
30400103	Aluminum	Smelting Furnace/Reverberatory
30400104	Aluminum	Fluxing: Chlorination
30400105	Aluminum	Fluxing: Fluoridation
30400106	Aluminum	Degassing
30400107	Aluminum	Hot Dross Processing
30400108	Aluminum	Crushing/Screening
30400109	Aluminum	Burning/Drying
30400110	Aluminum	Foil Rolling
30400111	Aluminum	Foil Converting
30400112	Aluminum	Annealing Furnace
30400113	Aluminum	Slab Furnace
30400114	Aluminum	Pouring/Casting
30400115	Aluminum	Sweating Furnace: Grate
30400116	Aluminum	Dry Milling Dross
30400117	Aluminum	Wet Milling Dross
30400118	Aluminum	Leaching
30400120	Aluminum	Can Manufacture

SCC	Description (6 digit)	Description (8 digit)
30400121	Aluminum	Roasting
30400130	Aluminum	Damagging
30400131	Aluminum	Raw Material Charging
30400132	Aluminum	Raw Material Storage
30400133	Aluminum	Tapping
30400150	Aluminum	Rolling/Drawing/Extruding
30400160	Aluminum	Material Handling

## 2.5.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory* — 2002):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance**
- **Emission factors**
- **Engineering estimates**

Facility-specific information obtained from stack sampling or CEM is typically available for only some CACs; other methodologies should be used to estimate emissions of other pollutants.

## 2.5.5 Supporting Information for CAC Emissions Estimation

Source testing reports available from on-site stack monitoring or CEM are a primary source of information that can be used to estimate CAC emissions from the aluminum industry.

In addition to source testing and monitoring data, process material throughputs and composition are also important. Emission factors can also be used and can be obtained for specific operations from US EPA's AP-42, Section 12.8, Secondary Aluminum Operations. AP-42, Table 12.8-1 to 12.8-4, highlights particulate matter emission factors for sweating furnaces, crucible furnaces, reverberatory furnaces, and chlorine

demagging processes. The US EPA FIRE database should also be referred to to obtain SO<sub>2</sub> and VOC emission factors specific for sweating furnaces.

These sources are listed in Section 2.5.6. Emission factors identified for primary and secondary aluminum production utilize numerous base quantities, such as the following:

- tonnes of aluminum produced (primary);
- tonnes of bauxite processed (primary);
- tonnes of metal processed (secondary);
- tonnes of chlorine used (chlorine demagging);
- anode consumption (anode baking furnace); and
- fuel use (for combustion sources).

It is important to note that emission factors should be selected with consideration of any pollution control devices.

### 2.5.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow “Related Links”
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- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Aluminium Smelting	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/falsmelt.html">http://www.npi.gov.au/handbooks/approved_handbooks/falsmelt.html</a>
Emission Estimation Technique Manual for Alumina Refining	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/falref.html">http://www.npi.gov.au/handbooks/approved_handbooks/falref.html</a>

- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 9: Preferred and Alternative Methods for Estimating Air Emissions from Secondary Metal Processing	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii09.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii09.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Section 12.1: Primary Aluminum Production Section 12.8: Secondary Aluminum Operations	<a href="http://www.epa.gov/ttn/chief/ap42/ch12/">http://www.epa.gov/ttn/chief/ap42/ch12/</a>
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- ***U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <http://www.epa.gov/ttn/chief/software/fire/index.html>

## 2.6 Chemicals Industry

### 2.6.1 General Description

The chemical industrial sector is composed of a large number of different organic and inorganic chemical product industries with various raw materials, processes used, and products produced. Although some chemical plants may produce similar products, individual plants generally employ different and/or plant-specific processes.

### 2.6.2 Applicable SIC and NAICS Codes

The following codes applicable to this source category include:

CDN SIC	NAICS	Description
3799	311940	Salt Production
2959	331410	Magnesium Production
3799	325100	Chemical Industries
3711	325120	Industrial Inorganic Chemicals
3711	325120	Industrial Inorganic Chemical Industries. n.e.c.
3711	325189	Carbon Black Production
3711	325100	Phosphorus Production, Elemental
3711	325100	Ammonium Sulphate
3711 or 3721	325100	Ammonium Phosphate
3711	325100	Single Superphosphate
3711	325100	Triple Superphosphate
3711	325100	Phosphoric Acid, Thermal Process
3711	325000	Industrial Organic Chemicals
3711	325313	Ammonia Production
3712	325313	Red Phosphorus Production
3711	325300	Sodium Chlorate Production
3712	325313	Ammonium Nitrate Production
3711	325300	Sodium Nitrate Production
3711	325300	Trinitrotoluene Production
3721	325313	Fertilizer Production
3721	325314	Chemical Fertilizer and Fertilizer Mtl's
3712	325313	Nitrate Fertilizer - Urea
3729	325320	Other Agricultural Chemistry Industry
3799	325900	Other Chemical Products Industries

### 2.6.3 Source Description

Source descriptions for all of the chemical industries are difficult due to the large number of sectors and associated processes, which are very specific to the type of product produced. The following general SCCs are applicable to this source category. The user should also refer to the FIRE database for detailed listing of SCCs and sources.

SCC	Description (6 digit)	Description (8 digit)
30100305	Ammonia Production	Feedstock Desulphurization
30100306	Ammonia Production	Primary Reformer: Natural Gas Fired
30100307	Ammonia Production	Primary Reformer: Oil Fired
30100308	Ammonia Production	Carbon Dioxide Regenerator
30100309	Ammonia Production	Condensate Stripper
30100310	Ammonia Production	Storage and Loading Tanks
30100399	Ammonia Production	Other Not Classified
30100501	Carbon Black Production	Channel Process
30100502	Carbon Black Production	Thermal Process
30100503	Carbon Black Production	Gas Furnace Process: Main Process Vent
30100504	Carbon Black Production	Oil Furnace Process: Main Process Vent
30100506	Carbon Black Production	Transport Air Vent
30100507	Carbon Black Production	Pellet Dryer
30100508	Carbon Black Production	Bagging/Loading
30100509	Carbon Black Production	Furnace Process: Fugitive Emissions
30100510	Carbon Black Production	Main Process Vent with CO Boiler and Incinerator
30100599	Carbon Black Production	Other Not Classified
30100601	Charcoal Manufacturing	General
30100603	Charcoal Manufacturing	Batch Kiln
30100604	Charcoal Manufacturing	Continuous Kiln
30100605	Charcoal Manufacturing	Briquetting
30100606	Charcoal Manufacturing	Raw Material Handling
30100607	Charcoal Manufacturing	Crushing
30100608	Charcoal Manufacturing	Handling and Storage
30100699	Charcoal Manufacturing	Other Not Classified
30100701	Chlorine	Carbon Reactivation
30100702	Chlorine	Carbon Reactivation/Impregnation Kiln
30100704	Chlorine	Carbon Reactivation/Heating Ovens
30100705	Chlorine	Carbon Reactivation/Fugitives
30100706	Chlorine	Carbon Reactivation/Afterburner
30100707	Chlorine	Carbon Reactivation/Multiple Hearth Furnace
30100708	Chlorine	Carbon Reactivation/Indirect Furnace
30100709	Chlorine	Carbon Reactivation/Product Handling (Mesh, Press)
30100799	Chlorine	Other Not Classified
30100801	Chlor-alkali Production	Liquefaction (Diaphragm Cell Process)
30100802	Chlor-alkali Production	Liquefaction (Mercury Cell Process)
30100803	Chlor-alkali Production	Chlorine Loading: Tank Car Vent
30100804	Chlor-alkali Production	Chlorine Loading: Storage Car Vent
30100805	Chlor-alkali Production	Air Blowing of Mercury Cell Brine
30100899	Chlor-alkali Production	Other Not Classified
30100901	Cleaning Chemicals	Spray Drying: Soaps and Detergents
30100902	Cleaning Chemicals	Specialty Cleaners
30100905	Cleaning Chemicals	Alkaline Saponification
30100906	Cleaning Chemicals	Direct Saponification
30100907	Cleaning Chemicals	Blending And Mixing
30100908	Cleaning Chemicals	Soap Packaging

SCC	Description (6 digit)	Description (8 digit)
30100909	Cleaning Chemicals	Detergent Slurry Preparation
30100910	Cleaning Chemicals	Detergent Granule Handling
30100999	Cleaning Chemicals	Other Not Classified
30101005	Explosives (Trinitrotoluene)	Nitric/Sulphuric Acid Mixing
30101010	Explosives (Trinitrotoluene)	Process Vents: Batch Process
30101011	Explosives (Trinitrotoluene)	Batch Process: Nitration Reactors Fume Recovery
30101012	Explosives (Trinitrotoluene)	Batch Process: Nitration Reactors Acid Recovery
30101013	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentrators
30101014	Explosives (Trinitrotoluene)	Batch Process: Sulphuric Acid Concentrators
30101015	Explosives (Trinitrotoluene)	Batch Process: Red Water Incinerator
30101021	Explosives (Trinitrotoluene)	Continuous Process: Nitration Reactor Fume Recover (Use 3-01-010-51)
30101022	Explosives (Trinitrotoluene)	Continuous Process: Nitration Reactor Acid Recover (Use 3-01-010-52)
30101023	Explosives (Trinitrotoluene)	Continuous Process: Red Water Incinerator (Use 3-01-010-53)
30101025	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Denitrating Tower
30101026	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30101027	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Bleacher
30101028	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Reflux Columns
30101030	Explosives (Trinitrotoluene)	Open Burning: Waste
30101033	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Distillation Tower
30101034	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Bleacher
30101035	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Condenser
30101036	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Absorber Column
30101037	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Dehydrating Unit
30101040	Explosives (Trinitrotoluene)	Batch Process: Purification
30101045	Explosives (Trinitrotoluene)	Batch Process: Finishing: Melt Tank
30101046	Explosives (Trinitrotoluene)	Batch Process: Finishing: Dryers
30101047	Explosives (Trinitrotoluene)	Batch Process: Finishing: Flaker Drum
30101050	Explosives (Trinitrotoluene)	Process Vents: Continuous Process
30101051	Explosives (Trinitrotoluene)	Continuous Process: Nitration Reactor Fume Recovery
30101052	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery
30101053	Explosives (Trinitrotoluene)	Continuous Process: Red Water Incineration
30101054	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentrators
30101055	Explosives (Trinitrotoluene)	Continuous Process: Sulphuric Acid Concentrators
30101061	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Denitrating Tower
30101062	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30101063	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Bleacher
30101064	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Reflux Columns
30101073	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Distillation Tower

SCC	Description (6 digit)	Description (8 digit)
30101074	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Bleacher
30101075	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Condenser
30101076	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Absorber Column
30101077	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Dehydrating Unit
30101080	Explosives (Trinitrotoluene)	Continuous Process: Purification
30101085	Explosives (Trinitrotoluene)	Continuous Process: Finishing: Melt Tank
30101086	Explosives (Trinitrotoluene)	Continuous Process: Finishing: Dryers
30101087	Explosives (Trinitrotoluene)	Continuous Process: Finishing: Flaker Drum
30101099	Explosives (Trinitrotoluene)	Other Not Classified
30101101	Hydrochloric Acid	By-product Process
30101198	Hydrochloric Acid	Handling and Storage (99.9% Removal)
30101199	Hydrochloric Acid	Other Not Classified
30101202	Hydrofluoric Acid	Rotary Kiln: Acid Reactor
30101203	Hydrofluoric Acid	Fluorspar Grinding/Drying
30101204	Hydrofluoric Acid	Fluorspar Handling Silos
30101205	Hydrofluoric Acid	Fluorspar Transfer
30101206	Hydrofluoric Acid	Tail Gas Vent
30101207	Hydrofluoric Acid	Fluorspar Drying Kiln: Fuel Combustion
30101208	Hydrofluoric Acid	Rotary Kiln: Fuel Combustion
30101299	Hydrofluoric Acid	Other Not Classified
30101301	Nitric Acid	Absorber Tail Gas (Pre-1970 Facilities)
30101302	Nitric Acid	Absorber Tail Gas (Post-1970 Facilities)
30101303	Nitric Acid	Nitric Acid Concentrators (Pre-1970)
30101304	Nitric Acid	Nitric Acid Concentrators (Post-1970)
30101399	Nitric Acid	Other Not Classified
30101601	Phosphoric Acid: Wet Process	Reactor
30101602	Phosphoric Acid: Wet Process	Gypsum Pond
30101603	Phosphoric Acid: Wet Process	Condenser
30101699	Phosphoric Acid: Wet Process	Other Not Classified
30101702	Phosphoric Acid: Thermal Process	Absorber: General
30101703	Phosphoric Acid: Thermal Process	Absorber with Packed Tower
30101704	Phosphoric Acid: Thermal Process	Absorber with Venturi Scrubber
30101705	Phosphoric Acid: Thermal Process	Absorber with Glass Mist Eliminator
30101706	Phosphoric Acid: Thermal Process	Absorber with Wire Mist Eliminator
30101707	Phosphoric Acid: Thermal Process	Absorber with High-pressure Mist Eliminator
30101708	Phosphoric Acid: Thermal Process	Absorber with ESP
30102101	Sodium Carbonate	Solvay Process: NH3 Recovery
30102102	Sodium Carbonate	Solvay Process: Handling
30102103	Sodium Carbonate	Trona Crushing/Screening
30102104	Sodium Carbonate	Monohydrate Process: Rotary Ore Calciner: Gas-fired
30102105	Sodium Carbonate	Monohydrate Process: Rotary Ore Calciner: Coal-fired
30102106	Sodium Carbonate	Rotary Soda Ash Dryers
30102107	Sodium Carbonate	Fluid-bed Soda Ash Dryers/Coolers
30102108	Sodium Carbonate	Dissolver

SCC	Description (6 digit)	Description (8 digit)
30102110	Sodium Carbonate	Trona Calcining
30102111	Sodium Carbonate	Trona Dryer
30102112	Sodium Carbonate	Rotary Pre-dryer
30102113	Sodium Carbonate	Bleacher: Gas-fired
30102114	Sodium Carbonate	Rotary Dryer: Steam Tube
30102120	Sodium Carbonate	Brine Evaporation
30102121	Sodium Carbonate	Ore Crushing and Screening
30102122	Sodium Carbonate	Soda Ash Storage: Loading and Unloading
30102123	Sodium Carbonate	Ore Mining
30102124	Sodium Carbonate	Ore Transfer
30102125	Sodium Carbonate	Sesquicarbonate Process: Rotary Calciner
30102126	Sodium Carbonate	Sesquicarbonate Process: Fluid-bed Calciner
30102127	Sodium Carbonate	Soda Ash Screening
30102199	Sodium Carbonate	Other Not Classified
30102201	Sulphuric Acid (Chamber Process)	General
30102301	Sulphuric Acid (Contact Process)	Absorber/@ 99.9% Conversion
30102304	Sulphuric Acid (Contact Process)	Absorber/@ 99.5% Conversion
30102306	Sulphuric Acid (Contact Process)	Absorber/@ 99.0% Conversion
30102308	Sulphuric Acid (Contact Process)	Absorber/@ 98.0% Conversion
30102310	Sulphuric Acid (Contact Process)	Absorber/@ 97.0% Conversion
30102312	Sulphuric Acid (Contact Process)	Absorber/@ 96.0% Conversion
30102314	Sulphuric Acid (Contact Process)	Absorber/@ 95.0% Conversion
30102316	Sulphuric Acid (Contact Process)	Absorber/@ 94.0% Conversion
30102318	Sulphuric Acid (Contact Process)	Absorber/@ 93.0% Conversion
30102319	Sulphuric Acid (Contact Process)	Concentrator
30102320	Sulphuric Acid (Contact Process)	Tank Car and Truck Unloading
30102321	Sulphuric Acid (Contact Process)	Storage Tank Vent
30102322	Sulphuric Acid (Contact Process)	Process Equipment Leaks
30102323	Sulphuric Acid (Contact Process)	Sulphur Melting and Filtering
30102324	Sulphuric Acid (Contact Process)	Oleum Tower
30102325	Sulphuric Acid (Contact Process)	Gas Cleaning and Cooling
30102330	Sulphuric Acid (Contact Process)	Combustion Chamber
30102331	Sulphuric Acid (Contact Process)	Drying Tower
30102332	Sulphuric Acid (Contact Process)	Converter
30102701	Ammonium Nitrate Production	Prilling Tower: Neutralizer
30102704	Ammonium Nitrate Production	Neutralizer
30102705	Ammonium Nitrate Production	Granulator
30102706	Ammonium Nitrate Production	Dryers and Coolers
30102707	Ammonium Nitrate Production	Rotary Drum Granulator
30102708	Ammonium Nitrate Production	Pan Granulator
30102709	Ammonium Nitrate Production	Bulk Loading (General)
30102710	Ammonium Nitrate Production	Bagging of Product
30102711	Ammonium Nitrate Production	Neutralizer: High Density
30102712	Ammonium Nitrate Production	Prilling Tower: High Density
30102713	Ammonium Nitrate Production	High Density Dryers and Coolers
30102714	Ammonium Nitrate Production	Prilling Cooler: High Density
30102717	Ammonium Nitrate Production	Evaporator/Concentrator: High Density

SCC	Description (6 digit)	Description (8 digit)
30102718	Ammonium Nitrate Production	Coating: High Density
30102720	Ammonium Nitrate Production	Solids Screening
30102721	Ammonium Nitrate Production	Neutralizer: Low Density
30102722	Ammonium Nitrate Production	Prilling Tower: Low Density
30102723	Ammonium Nitrate Production	Low Density Dryers and Coolers
30102724	Ammonium Nitrate Production	Prilling Cooler: Low Density
30102725	Ammonium Nitrate Production	Prilling Dryer: Low Density
30102727	Ammonium Nitrate Production	Evaporator/Concentrator: Low Density
30102728	Ammonium Nitrate Production	Coating: Low Density
30102729	Ammonium Nitrate Production	Rotary Drum Granulator Coolers
30102730	Ammonium Nitrate Production	Pan Granulator Coolers
30102801	Normal Superphosphates	Grinding/Drying
30102803	Normal Superphosphates	Rock Unloading
30102804	Normal Superphosphates	Rock Feeder System
30102805	Normal Superphosphates	Mixer/Den
30102806	Normal Superphosphates	Curing/Building
30102807	Normal Superphosphates	Bagging/Handling
30102820	Normal Superphosphates	Mixing
30102821	Normal Superphosphates	Den
30102822	Normal Superphosphates	Curing
30102823	Normal Superphosphates	Ammoniator/Granulator
30102824	Normal Superphosphates	Dryer
30102825	Normal Superphosphates	Cooler
30102826	Normal Superphosphates	Pulverizer: Granular Phosphate
30102903	Triple Superphosphate	Rock Unloading
30102904	Triple Superphosphate	Rock Feeder System
30102905	Triple Superphosphate	Run of Pile: Mixer/Den/Curing
30102906	Triple Superphosphate	Granulator: Reactor/Dryer
30102907	Triple Superphosphate	Granulator: Curing
30102908	Triple Superphosphate	Bagging/Handling
30102909	Triple Superphosphate	Mechanical Cutting
30102910	Triple Superphosphate	Crushing and Screening
30102920	Triple Superphosphate	Mixing
30102921	Triple Superphosphate	Den
30102922	Triple Superphosphate	Curing
30102923	Triple Superphosphate	Ammoniator/Granulator
30102924	Triple Superphosphate	Dryer
30102925	Triple Superphosphate	Cooler
30103000	Ammonium Phosphates	Entire Plant
30103001	Ammonium Phosphates	Dryers and Coolers
30103002	Ammonium Phosphates	Ammoniator/Granulator
30103003	Ammonium Phosphates	Screening/Transfer
30103004	Ammonium Phosphates	Bagging/Handling
30103020	Ammonium Phosphates	Mixing
30103021	Ammonium Phosphates	Den
30103022	Ammonium Phosphates	Curing
30103023	Ammonium Phosphates	Ammoniator/Granulator

SCC	Description (6 digit)	Description (8 digit)
30103024	Ammonium Phosphates	Dryer
30103025	Ammonium Phosphates	Cooler
30103201	Elemental Sulphur Production	Mod. Claus: 2 Stage w/o Control (92-95% Removal)
30103202	Elemental Sulphur Production	Mod. Claus: 3 Stage w/o Control (95-96% Removal)
30103203	Elemental Sulphur Production	Mod. Claus: 4 Stage w/o Control (96-97% Removal)
30103204	Elemental Sulphur Production	Sulphur Removal Process (99.9% Removal)
30103205	Elemental Sulphur Production	Sulphur Storage
30103299	Elemental Sulphur Production	Other Not Classified
30103301	Pesticides	Malathion
30103311	Pesticides	General
30103312	Pesticides	General
30103399	Pesticides	Other Not Classified
30103402	Aniline/Ethanolamines	General: Aniline
30103403	Aniline/Ethanolamines	Reactor Cycle Purge Vent
30103404	Aniline/Ethanolamines	Dehydration Column Vent
30103405	Aniline/Ethanolamines	Purification Column Vent
30103406	Aniline/Ethanolamines	Fugitive Emissions
30103410	Aniline/Ethanolamines	General: Ethanolamines
30103411	Aniline/Ethanolamines	Ammonia Scrubber Vent
30103412	Aniline/Ethanolamines	Vacuum Distillation: Jet Vent
30103414	Aniline/Ethanolamines	Fugitive Emissions
30103415	Aniline/Ethanolamines	Ethylenediamine
30103420	Aniline/Ethanolamines	Hexamethylenediamine
30103425	Aniline/Ethanolamines	Hexamethylenetetramine
30103430	Aniline/Ethanolamines	Melamine
30103435	Aniline/Ethanolamines	Methylamines
30103499	Aniline/Ethanolamines	Other Not Classified
30103501	Inorganic Pigments	TiO2 Sulphate Process: Calciner
30103502	Inorganic Pigments	TiO2 Sulphate Process: Digester
30103503	Inorganic Pigments	TiO2 Chloride Process: Reactor
30103506	Inorganic Pigments	Lead Oxide: Barton Pot
30103507	Inorganic Pigments	Lead Oxide: Calciner
30103510	Inorganic Pigments	Red Lead
30103515	Inorganic Pigments	White Lead
30103520	Inorganic Pigments	Lead Chromate
30103550	Inorganic Pigments	Ore Grinding
30103551	Inorganic Pigments	Ore Dryer
30103552	Inorganic Pigments	Pigment Milling
30103553	Inorganic Pigments	Pigment Dryer
30103554	Inorganic Pigments	Conveying/Storage/Packing
30103599	Inorganic Pigments	Other Not Classified
30103801	Sodium Bicarbonate	General
30103901	Hydrogen Cyanide	Air Heater: General
30103902	Hydrogen Cyanide	Ammonia Absorber
30103903	Hydrogen Cyanide	HCN Absorber
30104001	Urea Production	General
30104002	Urea Production	Solution Concentration (Controlled)

SCC	Description (6 digit)	Description (8 digit)
30104003	Urea Production	Prilling
30104004	Urea Production	Drum Granulation
30104005	Urea Production	Coating
30104006	Urea Production	Bagging
30104007	Urea Production	Bulk Loading
30104008	Urea Production	Non-fluidized Bed Prilling (Agricultural Grade)
30104009	Urea Production	Non-fluidized Bed Prilling (Feed Grade)
30104010	Urea Production	Fluidized Bed Prilling (Agricultural Grade)
30104011	Urea Production	Fluidized Bed Prilling (Feed Grade)
30104012	Urea Production	Rotary Drum Cooler
30104013	Urea Production	Solids Screening
30104014	Urea Production	Pan Granulation
30104020	Urea Production	Solution Synthesis
30104101	Nitrocellulose	Nitration Reactor
30104102	Nitrocellulose	Sulphuric Acid Concentrators
30104103	Nitrocellulose	Boiling Tubs
30104104	Nitrocellulose	Nitric Acid Concentrators
30104105	Nitrocellulose	Nitric/Sulphuric Acid Mixing
30104106	Nitrocellulose	Batch Process: Purification Beaters
30104107	Nitrocellulose	Batch Process: Purification Poacher
30104108	Nitrocellulose	Batch Process: Purification Blender
30104109	Nitrocellulose	Batch Process: Purification Wringer
30104110	Nitrocellulose	Raw Cellulose Purification
30104120	Nitrocellulose	Batch Process: Spent Acid Recovery
30104121	Nitrocellulose	Batch Process: Spent Acid Recovery: Denitrating Tower
30104122	Nitrocellulose	Batch Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30104123	Nitrocellulose	Batch Process: Spent Acid Recovery: Bleacher
30104124	Nitrocellulose	Batch Process: Spent Acid Recovery: Reflux Columns
30104130	Nitrocellulose	Batch Process: Nitric Acid Concentration
30104131	Nitrocellulose	Batch Process: Nitric Acid Concentration: Distillation Tower
30104132	Nitrocellulose	Batch Process: Nitric Acid Concentration: Bleacher
30104133	Nitrocellulose	Batch Process: Nitric Acid Concentration: Condenser
30104134	Nitrocellulose	Batch Process: Nitric Acid Concentration: Absorber Column
30104135	Nitrocellulose	Batch Process: Nitric Acid Concentration: Dehydrating Unit
30104150	Nitrocellulose	Continuous Process: Nitration Reactors
30104151	Nitrocellulose	Continuous Process: Sulphuric Acid Concentrators
30104152	Nitrocellulose	Continuous Process: Purification Boiling Tubs
30104153	Nitrocellulose	Continuous Process: Nitric Acid Concentrators
30104154	Nitrocellulose	Continuous Process: Purification Beaters
30104155	Nitrocellulose	Continuous Process: Purification Poacher
30104156	Nitrocellulose	Continuous Process: Purification Blender
30104157	Nitrocellulose	Continuous Process: Purification Wringer
30104160	Nitrocellulose	Continuous Process: Spent Acid Recovery

SCC	Description (6 digit)	Description (8 digit)
30104161	Nitrocellulose	Continuous Process: Spent Acid Recovery: Denitrating Tower
30104162	Nitrocellulose	Continuous Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30104163	Nitrocellulose	Continuous Process: Spent Acid Recovery: Bleacher
30104164	Nitrocellulose	Continuous Process: Spent Acid Recovery: Reflux Columns
30104170	Nitrocellulose	Continuous Process: Nitric Acid Concentration
30104171	Nitrocellulose	Continuous Process: Nitric Acid Concentration: Distillation Tower
30104172	Nitrocellulose	Continuous Process: Nitric Acid Concentration: Bleacher
30104173	Nitrocellulose	Continuous Process: Nitric Acid Concentration: Condenser
30104174	Nitrocellulose	Continuous Process: Nitric Acid Concentration: Absorber Column
30104175	Nitrocellulose	Continuous Process: Nitric Acid Concentration: Dehydrating Unit
30107001	Inorganic Chemical Manufacturing (General)	Fugitive Leaks
30107002	Inorganic Chemical Manufacturing (General)	Storage/Transfer
30107101	Hydrogen	Reformers
30107102	Hydrogen	CO Converter
30107103	Hydrogen	Hydrogen Storage
30111103	Asbestos Chemical	Brake Line/Grinding
30111199	Asbestos Chemical	Not Classified
30111201	Elemental Phosphorous	Calciner
30111202	Elemental Phosphorous	Furnace
30111299	Elemental Phosphorous	Other Not Classified
30111301	Boric Acid	Dryer
30111401	Potassium Chloride	Dryer
30111501	Aluminum Sulphate Manufacturing	Bauxite Unloading
30111502	Aluminum Sulphate Manufacturing	Hammer Mill
30111503	Aluminum Sulphate Manufacturing	Bauxite Storage
30111504	Aluminum Sulphate Manufacturing	Elevator
30111505	Aluminum Sulphate Manufacturing	Conveyor
30111506	Aluminum Sulphate Manufacturing	Cooker
30111507	Aluminum Sulphate Manufacturing	Alums Storage
30111508	Aluminum Sulphate Manufacturing	H2SO4 Process Tank
30111509	Aluminum Sulphate Manufacturing	Alums Loading
30113001	Ammonium Sulphate	Caprolactum By-product Plants
30113003	Ammonium Sulphate	Process Vents
30113004	Ammonium Sulphate	Caprolactum By-product: Rotary Dryer
30113005	Ammonium Sulphate	Caprolactum By-product: Fluid Bed Dryer
30113006	Ammonium Sulphate	Caprolactum By-product: Crystallizer (Evaporator)
30113007	Ammonium Sulphate	Caprolactum By-product: Screening
30140101	Nitroglycerin Production	Continuous Nitrator
30140102	Nitroglycerin Production	Product Purification/Neutralization

SCC	Description (6 digit)	Description (8 digit)
30140103	Nitroglycerin Production	Nitric Acid Recovery (Use more specific codes 3-01-410-10 through -25)
30140105	Nitroglycerin Production	Nitric/Sulphuric Acid Mixing
30140110	Nitroglycerin Production	Continuous Process: Separation
30140120	Nitroglycerin Production	Continuous Process: Spent Acid Recovery
30140121	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Denitrating Column
30140122	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30140123	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Sulphuric Acid Concentrator
30140124	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Bleacher
30140125	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Reflux Columns
30140130	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration
30140131	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Distillation Tower
30140132	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Bleacher
30140133	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Condenser
30140134	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Absorber Column
30140135	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Dehydrating Unit
30140136	Nitroglycerin Production	Continuous Process: Nitric Acid Conc.: Nitric Acid Concentrators
30140150	Nitroglycerin Production	Waste Disposal: Neutralization and Wash
30140151	Nitroglycerin Production	Waste Disposal: Separation
30140199	Nitroglycerin Production	Other Not Classified
30140210	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Process Vents: Batch Process
30140211	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitration Reactors and Washers
30140214	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Stabilization
30140217	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Acetone Distillation and Recovery
30140220	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery
30140221	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Denitrating Tower
30140222	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30140223	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Sulphuric Acid Concentrator
30140224	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Bleacher
30140225	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Reflux Column

SCC	Description (6 digit)	Description (8 digit)
30140230	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration
30140231	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Distillation Column
30140232	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Bleacher
30140233	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Condenser
30140234	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Absorber Column
30140235	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Dehydrating Unit
30140236	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Nitric Acid Concentrators
30140250	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Process Vents: Continuous Process
30140251	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitration Reactors and Washers
30140252	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Stabilization
30140253	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Acetone Distillation and Recovery
30140260	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery
30140261	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Denitrating Tower
30140262	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30140263	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Sulphuric Acid Concentrator
30140264	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Bleacher
30140265	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Reflux Column
30140270	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration
30140271	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Distillation Column
30140272	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Bleacher
30140273	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Condenser
30140274	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Absorber Column
30140275	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Dehydrating Unit
30140276	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Conc.: Nitric Acid Concentrators
30140299	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Other Not Classified

SCC	Description (6 digit)	Description (8 digit)
30140306	Explosives Manufacture - RDX/HMX Production	Nitric Acid/Ammonium Nitrate Mixing
30140307	Explosives Manufacture - RDX/HMX Production	Hexamine/Acetic Acid Mixing
30140310	Explosives Manufacture - RDX/HMX Production	Process Vents: Batch Process
30140311	Explosives Manufacture - RDX/HMX Production	Batch Process: Nitration Reactor
30140312	Explosives Manufacture - RDX/HMX Production	Batch Process: Aging Tank
30140313	Explosives Manufacture - RDX/HMX Production	Batch Process: Simmer Tank
30140320	Explosives Manufacture - RDX/HMX Production	Batch Process: Refinement
30140330	Explosives Manufacture - RDX/HMX Production	Batch Process: Blending
30140340	Explosives Manufacture - RDX/HMX Production	Batch Process: Formulation
30140350	Explosives Manufacture - RDX/HMX Production	Batch Process: Acetic Acid Recovery
30140360	Explosives Manufacture - RDX/HMX Production	Batch Process: Acetone or Cyclohexanone Recovery
30140399	Explosives Manufacture - RDX/HMX Production	Other Not Classified
30180001	General Processes	Fugitive Leaks
30180002	General Processes	Pipeline Valves: Gas Stream
30180003	General Processes	Pipeline Valves: Light Liquid/Gas Stream
30180004	General Processes	Pipeline Valves: Heavy Liquid Stream
30180005	General Processes	Pipeline Valves: Hydrogen Stream
30180006	General Processes	Open-ended Valves: All Streams
30180007	General Processes	Flanges: All Streams
30180008	General Processes	Pump Seals: Light Liquid/Gas Stream
30180009	General Processes	Pump Seals: Heavy Liquid Stream
30180010	General Processes	Compressor Seals: Gas Stream
30180011	General Processes	Compressor Seals: Heavy Liquid Stream
30180012	General Processes	Drains: All Streams
30180013	General Processes	Vessel Relief Valves: All Streams
30181001	General Processes	Air Oxidation Units
30182001	Wastewater Treatment	Wastewater Stripper
30182002	Wastewater Treatment	Wastewater Treatment
30182003	Wastewater Treatment	Wastewater Treatment
30182004	Wastewater Treatment	Chemical Plant Wastewater System: Junction Box
30182005	Wastewater Treatment	Chemical Plant Wastewater System: Lift Station
30182006	Wastewater Treatment	Chemical Plant Wastewater System: Aerated Impoundment
30182007	Wastewater Treatment	Chemical Plant Wastewater System: Non-aerated Impoundment
30182008	Wastewater Treatment	Chemical Plant Wastewater System: Weir

SCC	Description (6 digit)	Description (8 digit)
30182009	Wastewater Treatment	Chemical Plant Wastewater System: Activated Sludge Impoundment
30182010	Wastewater Treatment	Chemical Plant Wastewater System: Clarifier
30182011	Wastewater Treatment	Chemical Plant Wastewater System: Open Trench
30182501	Wastewater, Points of Generation	TNT: Waterwash of Crude TNT (Yellow Water)
30182502	Wastewater, Points of Generation	TNT: Sellite Treatment and Subsequent Washing of Crude TNT (Red H <sub>2</sub> O)
30182503	Wastewater, Points of Generation	TNT: Nitration Fume Scrubber
30182504	Wastewater, Points of Generation	TNT: Finishing Operation Fume Scrubber
30182510	Wastewater, Points of Generation	NG: NG/Acid Separator Soda Wash
30182511	Wastewater, Points of Generation	NG: Separator Following Soda Wash
30182512	Wastewater, Points of Generation	NG: Separator Following Fresh Water Wash
30182513	Wastewater, Points of Generation	NG: Emulsifier
30182514	Wastewater, Points of Generation	NG: Refrigeration House
30182515	Wastewater, Points of Generation	NG: Spent Acid Storage
30182516	Wastewater, Points of Generation	NG: Air Compressor House
30182517	Wastewater, Points of Generation	NG: Refrigeration House
30182530	Wastewater, Points of Generation	NC: Nitric Acid Concentrators
30182531	Wastewater, Points of Generation	NC: Nitration Reactor
30182532	Wastewater, Points of Generation	NC: Purification Boiling Tubs
30182533	Wastewater, Points of Generation	NC: Purification Beaters
30182534	Wastewater, Points of Generation	NC: Purification Poacher
30182535	Wastewater, Points of Generation	NC: Purification Blender
30182536	Wastewater, Points of Generation	NC: Purification Wringer
30182550	Wastewater, Points of Generation	PETN: Nitration Reactors
30182551	Wastewater, Points of Generation	PETN: Spent Acid Recovery
30182552	Wastewater, Points of Generation	PETN: Nitric Acid Concentrators
30182553	Wastewater, Points of Generation	PETN: Stabilization
30182560	Wastewater, Points of Generation	RDX/HMX: Nitration
30182561	Wastewater, Points of Generation	RDX/HMX: Filter/Wash
30182562	Wastewater, Points of Generation	RDX/HMX: Recrystallization
30182563	Wastewater, Points of Generation	RDX/HMX: Dewatering
30182599	Wastewater, Points of Generation	Specify Point of Generation
30183001	General Processes	Storage/Transfer
30184001	General Processes	Distillation Units

Emissions can result from the following:

- production processes;
- combustion sources, such as boilers and heaters;
- storage and transfer of raw materials, products, and intermediates;
- fugitive emissions from process equipment and storage and transfer;
- wastewater handling; and
- emergency vents.

The recovery of products and intermediates may result in emissions of gaseous CACs and particulate matter. These emissions may be controlled by adsorption and absorption methods and other types of particulate control technologies.

#### 2.6.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory* — 2002):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance**
- **Emission factors**
- **Engineering estimates**

It should be noted that emission monitoring data are typically available for only some of the CACs (e.g., source test data on particulate from solid fuel-burning sources). In situations when emissions monitoring information is not available, CAC emissions estimates should be determined using other methodologies.

Emission factors are available from US EPA AP-42 Chapters 6 and 8 for specific chemical products (inorganic and organic), such as ammonium nitrate, phosphate fertilizer, and carbon black.

#### 2.6.5 Supporting Information for CAC Emissions Estimation

Estimating CAC emissions requires supporting information, such as fuel analysis, process activity or schedule, information on control devices, source emission parameters, and equipment capacity. General sources of information for process activity and emissions may be available through the Canadian Chemical Producers' Association (<[www.ccpa.ca](http://www.ccpa.ca)>).

Additionally, the following information may be required to support the estimation of CAC emissions:

- monitoring equipment logs;
- source testing reports;

- process material throughputs and composition;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity; and
- emission control device and efficiency.

Emission factors applicable to the chemical industrial sector utilize a variety of different base quantities, such as:

- mass of product produced; and
- fuel use (for combustion sources).

### 2.6.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Inorganic Chemicals Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/finorga.html">http://www.npi.gov.au/handbooks/approved_handbooks/finorga.html</a>
Emission Estimation Technique Manual for Chemical Product Manufacture	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fchempro.html">http://www.npi.gov.au/handbooks/approved_handbooks/fchempro.html</a>

- ***U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 8: Inorganic Chemical Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch08/">http://www.epa.gov/ttn/chief/ap42/ch08/</a>
Chapter 6: Organic Chemical Process Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch06/">http://www.epa.gov/ttn/chief/ap42/ch06/</a>

- ***U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.7 Cement and Concrete Industry

### 2.7.1 General Description

Hydraulic cement, of which Portland cement accounts for nearly all production, is used primarily for ready-mix concrete and is produced by either a dry or wet process. After preparing and blending raw materials (comprising mainly limestone, iron ore, and shale or clay), the materials are calcined and fused in a rotary kiln to form “clinker.” The clinker is then further treated and blended with gypsum to produce cement. In the wet process, between 45 and 65 percent of raw material weight is removed as carbon dioxide and water vapour during the conversion of calcium carbonate to lime and calcium silicates.

Concrete is composed mainly of water, cement, sand or fine aggregate, and coarse aggregate (i.e., gravel, crushed stone, or iron blast furnace slag). Concrete batching plants store, convey, measure, and discharge these constituents into trucks for transport to a job site or to a process for use in the manufacturing of concrete pipe and concrete blocks.

CACs can be generated throughout the production of cement and concrete, although the predominant contaminant is particulate matter, which is then exhausted from the kiln. Fugitive particulate matter can also result in a number of intermediate processes, such as the transferring and storage of raw materials. In addition, combustion-related CACs such as NO<sub>x</sub> and SO<sub>2</sub> are generated.

### 2.7.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
3521	327310	Cement and Concrete Industry
3541	327330	Concrete Pipe Industry
3542	327390	Structural Concrete Products Industry
3549	327300	Other Concrete Products Industry
3511, 3512, 3521, 3541, 3542, 3549, 3551	327300	Concrete Industry
3551	327320	Ready-Mix Concrete Industry

### 2.7.3 Source Description

Process-specific SCCs applicable to cement production are provided in the tables below :

- **Dry Process:**

SCC	Description (6 digit)	Description (8 digit)

SCC	Description (6 digit)	Description (8 digit)
30500606	Cement Manufacturing	Kilns
30500607	Cement Manufacturing	Raw Material Unloading
30500608	Cement Manufacturing	Raw Material Piles
30500609	Cement Manufacturing	Primary Crushing
30500610	Cement Manufacturing	Secondary Crushing
30500611	Cement Manufacturing	Screening
30500612	Cement Manufacturing	Raw Material Transfer
30500613	Cement Manufacturing	Raw Material Grinding and Drying
30500614	Cement Manufacturing	Clinker Cooler
30500615	Cement Manufacturing	Clinker Piles
30500616	Cement Manufacturing	Clinker Transfer
30500617	Cement Manufacturing	Clinker Grinding
30500618	Cement Manufacturing	Cement Silos
30500619	Cement Manufacturing	Cement Load Out
30500620	Cement Manufacturing	Pre-dryer
30500621	Cement Manufacturing	Pulverized Coal Kiln Feed Units
30500622	Cement Manufacturing	Preheater Kiln
30500623	Cement Manufacturing	Preheater/Precalciner Kiln
30500624	Cement Manufacturing	Raw Mill Feed Belt
30500625	Cement Manufacturing	Raw Mill Weigh Hopper
30500626	Cement Manufacturing	Raw Mill Air Separator
30500627	Cement Manufacturing	Finish Grinding Mill Feed Belt
30500628	Cement Manufacturing	Finish Grinding Mill Weigh Hopper
30500629	Cement Manufacturing	Finish Grinding Mill Air Separator

- **Wet Process:**

SCC	Description (6 digit)	Description (8 digit)
30500706	Cement Manufacturing	Kilns
30500707	Cement Manufacturing	Raw Material Unloading
30500708	Cement Manufacturing	Raw Material Piles
30500709	Cement Manufacturing	Primary Crushing
30500710	Cement Manufacturing	Secondary Crushing
30500711	Cement Manufacturing	Screening
30500712	Cement Manufacturing	Raw Material Transfer
30500714	Cement Manufacturing	Clinker Cooler
30500715	Cement Manufacturing	Clinker Piles
30500716	Cement Manufacturing	Clinker Transfer
30500717	Cement Manufacturing	Clinker Grinding
30500718	Cement Manufacturing	Cement Silos
30500719	Cement Manufacturing	Cement Load Out
30500727	Cement Manufacturing	Finish Grinding Mill Feed Belt
30500728	Cement Manufacturing	Finish Grinding Mill Weigh Hopper
30500729	Cement Manufacturing	Finish Grinding Mill Air Separator

### 2.7.3.1 Concrete and Concrete Products

Emissions from concrete manufacturing are similar to those released from cement production. Particulate matter is the CAC primarily released from all processes. Process-specific SCCs applicable to cement production are provided in the table below:

SCC	Description (6 digit)	Description (8 digit)
30501101	Concrete Batching	General (Non-fugitive)
30501106	Concrete Batching	Transfer: Sand/Aggregate to Elevated Bins
30501107	Concrete Batching	Cement Unloading: Storage Bins
30501108	Concrete Batching	Weigh Hopper Loading of Cement/Sand/Aggregate
30501109	Concrete Batching	Mixer Loading of Cement/Sand/Aggregate
30501110	Concrete Batching	Loading of Transit Mix Truck
30501111	Concrete Batching	Loading of Dry-batch Truck
30501112	Concrete Batching	Mixing: Wet
30501113	Concrete Batching	Mixing: Dry
30501114	Concrete Batching	Transferring: Conveyors/Elevators
30501115	Concrete Batching	Storage: Bins/Hoppers
30501120	Concrete Batching	Asbestos/Cement Products

### 2.7.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory* — 2002):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance** - for example, SO<sub>2</sub> emissions can be estimated based on the amount of input sulphur in the fuel being burned. However, the alkaline nature of cement has an effect on SO<sub>2</sub> emissions due to the absorption of SO<sub>2</sub> onto the product.
- **Emission factors** - for external combustion sources, these are normally expressed in terms of the mass of contaminant emitted per unit of fuel consumed. Data on fuel consumption are therefore required.
- **Engineering estimates**

It should be noted that emission monitoring data are typically available for only some of the CACs. In those situations where monitoring information is not available, emissions estimates should be determined using other methodologies listed above.

If direct monitoring information is not available, emission factors for cement production based on the volume consumed and tonnes of production can be applied. AP-42 contains emission factors for cement manufacturing, by kiln type (wet or dry) and other sources, with specific factors for different levels of particulate control. Emission factors for both filterable and condensable particulate matter, as well as for PM<sub>10</sub>, are included. For additional information on particulate species (PM<sub>10</sub> and PM<sub>2.5</sub>), emission factors can be derived from the US EPA's PM Calculator program.

Similarly, for concrete batching, emission factors are published in AP-42 for various sources, such as transfer operations, loading and unloading, and wind erosion of storage piles. Emission factors are generally based on the tonnes of material mixed.

### 2.7.5 Supporting Information for CAC Emissions Estimation

Estimating CAC emissions requires supporting information, such as fuel analysis, process activity or schedule, information on control devices, or source emission parameters. Depending on the estimation methodology, the information required to perform calculations can vary greatly depending on the facility and processes involved. However, it is important to document all supporting data used in the estimation.

Depending on the methodology selected, one or more of the following may be required:

- monitoring equipment logs;
- source testing reports;
- process material throughputs and composition;
- fuel types, composition, and consumption (including the use of waste fuels and tire-derived fuels);
- equipment type and operation parameters;
- schedule of process activity; and
- emission control device and efficiency.

### 2.7.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***EMEP/CORINAIR 2001, Atmospheric Emission Inventory Guidebook, Third Edition, European Environmental Agency, Copenhagen:***

Group 4: Production Processes	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page013.html">http://reports.eea.eu.int/technical_report_2001_3/en/page013.html</a>
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- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Cement Manufacturing Version 1.1	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fcement.html">http://www.npi.gov.au/handbooks/approved_handbooks/fcement.html</a>
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- ***U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 11: Mineral Products Industry Section 11.6: Portland Cement Manufacturing Section 11.12: Concrete Batching	<a href="http://www.epa.gov/ttn/chief/ap42/ch11/">http://www.epa.gov/ttn/chief/ap42/ch11/</a>
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- ***U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <http://www.epa.gov/ttn/chief/software/fire/index.html>

## 2.8 Electric Power Generation

### 2.8.1 General Description

Electric power generation includes electrical power produced by utilities and by industry for commercial sale and/or for private use. Various fuel types are considered, including natural gas, coke oven gases, diesel fuel oil, light fuel oil, heavy fuel oil, Canadian bituminous coal, subbituminous coal, lignite coal, anthracite coal, imported coal, wood waste, and biomass. Hydroelectric generation is not included in this category.

Depending on the equipment type, fuel, and the level of pre- or post-combustion control, emissions of particulate matter, SO<sub>2</sub>, NO<sub>x</sub>, CO, and VOCs can result from this source category.

### 2.8.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
4911	221112	Electric Power Generation
4921	221210	Gas Distribution System
4911	221119	Electricity Industry

### 2.8.3 Source Description

The thermal power generation sector includes a wide variety of sources, including external and internal combustion units that may be inventoried as point or area sources. Brief descriptions of external and internal combustors are provided below.

- **External Combustion:**

The following table provides SCCs applicable to power generation using external combustion:

SCC	Description (6 digit)	Description (8 digit)
10100101	Anthracite Coal	Pulverized Coal
10100102	Anthracite Coal	Travelling Grate (Overfeed) Stoker
10100201	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom (Bituminous Coal)
10100202	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Bituminous Coal)
10100203	Bituminous/Subbituminous Coal	Cyclone Furnace (Bituminous Coal)
10100204	Bituminous/Subbituminous Coal	Spreader Stoker (Bituminous Coal)
10100205	Bituminous/Subbituminous Coal	Travelling Grate (Overfeed) Stoker (Bituminous Coal)
10100211	Bituminous/Subbituminous Coal	Wet Bottom (Tangential) (Bituminous Coal)
10100212	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Tangential) (Bituminous Coal)
10100215	Bituminous/Subbituminous Coal	Cell Burner (Bituminous Coal)

SCC	Description (6 digit)	Description (8 digit)
10100217	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Bubbling Bed (Bituminous Coal)
10100218	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion: Circulating Bed (Bituminous Coal)
10100221	Bituminous/Subbituminous Coal	Pulverized Coal: Wet Bottom (Subbituminous Coal)
10100222	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom (Subbituminous Coal)
10100223	Bituminous/Subbituminous Coal	Cyclone Furnace (Subbituminous Coal)
10100224	Bituminous/Subbituminous Coal	Spreader Stoker (Subbituminous Coal)
10100225	Bituminous/Subbituminous Coal	Travelling Grate (Overfeed) Stoker (Subbituminous Coal)
10100226	Bituminous/Subbituminous Coal	Pulverized Coal: Dry Bottom Tangential (Subbituminous Coal)
10100235	Bituminous/Subbituminous Coal	Cell Burner (Subbituminous Coal)
10100238	Bituminous/Subbituminous Coal	Atmospheric Fluidized Bed Combustion - Circulating Bed (Subbituminous coal)
10100300	Lignite	Pulverized Coal: Wet Bottom
10100301	Lignite	Pulverized Coal: Dry Bottom, Wall Fired
10100302	Lignite	Pulverized Coal: Dry Bottom, Tangential Fired
10100303	Lignite	Cyclone Furnace
10100304	Lignite	Travelling Grate (Overfeed) Stoker
10100306	Lignite	Spreader Stoker
10100316	Lignite	Atmospheric Fluidized Bed (See 101003-17 & -18)
10100317	Lignite	Atmospheric Fluidized Bed Combustion - Bubbling Bed
10100318	Lignite	Atmospheric Fluidized Bed Combustion - Circulating Bed
10100401	Residual Oil	Grade 6 Oil: Normal Firing
10100404	Residual Oil	Grade 6 Oil: Tangential Firing
10100405	Residual Oil	Grade 5 Oil: Normal Firing
10100406	Residual Oil	Grade 5 Oil: Tangential Firing
10100501	Distillate Oil	Grades 1 and 2 Oil
10100504	Distillate Oil	Grade 4 Oil: Normal Firing
10100505	Distillate Oil	Grade 4 Oil: Tangential Firing
10100601	Natural Gas	Boilers > 100 Million Btu/hr except Tangential
10100602	Natural Gas	Boilers < 100 Million Btu/hr except Tangential
10100604	Natural Gas	Tangentially Fired Units
10100701	Process Gas	Boilers > 100 Million Btu/hr
10100702	Process Gas	Boilers < 100 Million Btu/hr
10100801	Coke	All Boiler Sizes
10100901	Wood/Bark Waste	Bark-fired Boiler
10100902	Wood/Bark Waste	Wood/Bark Fired Boiler
10100903	Wood/Bark Waste	Wood-fired Boiler
10100910	Wood/Bark Waste	Fuel cell/Dutch oven boilers
10100911	Wood/Bark Waste	Stoker boilers
10100912	Wood/Bark Waste	Fluidized bed combustion boilers

SCC	Description (6 digit)	Description (8 digit)
10101001	Liquefied Petroleum Gas (LPG)	Butane
10101002	Liquefied Petroleum Gas (LPG)	Propane
10101003	Liquefied Petroleum Gas (LPG)	Butane/Propane Mixture: Specify Percent Butane
10101101	Bagasse	All Boiler Sizes
10101201	Solid Waste	Specify Waste Material
10101202	Solid Waste	Refuse Derived Fuel
10101301	Liquid Waste	Specify Waste Material
10101302	Liquid Waste	Waste Oil
10101501	Geothermal Power Plants	Geothermal Power Plant: Off-gas Ejectors
10101502	Geothermal Power Plants	Geothermal Power Plant: Cooling Tower Exhaust

Coal-fired boilers can be classified by the heat transfer method (water-tube, fire-tube, or cast iron), heat transfer arrangement (horizontal or vertical, straight or bent tube), and firing configuration (suspension and stoker or fluidized bed).

In pulverized coal furnaces, pulverized coal with the consistency of talcum powder is generally entrained in primary air before being fed through the burners to the combustion chamber, where it is fired in suspension. Pulverized coal furnaces may be classified as either wet bottom or dry bottom, depending on the ash removal technique. Further classifications are based on the firing position of the burners (single front or rear wall, horizontally opposed, vertical, tangential, turbo, or arch fired).

In cyclone furnaces, crushed low ash fusion temperature coal is fed tangentially to a horizontal cylindrical combustion chamber. The finer coal particles burn while in suspension. The coarser particles are thrown to the walls by centrifugal forces. The walls have a surface coating of molten slag, which retains most of these coal particles until they are burned.

Mechanical stokers burn coal in fuel beds (as opposed to burning in suspension). All mechanical stokers feed coal onto a grate with provisions for ash removal. The spreader stoker, commonly used in utility applications, introduces coal into the furnace over the fire bed with a uniform spreading action. Combustion occurs partly in suspension and partly on the grate. Fly ash reinjection from mechanical collectors is commonly employed to improve boiler efficiency. Anthracite coal is burned in travelling grate stokers because of the high ignition temperature. Coal is fed onto a travelling or vibrating grate and burns as it travels through the furnace.

Residual oil utility boilers have burner arrangements similar to those found for pulverized coal-fired utility boilers. Tangential, front wall, and horizontally opposed are the primary firing configurations. Distillate oil and natural gas are typically used for start-up and flame stabilization in boilers, and distillate oil may be blended with residual oil to reduce the total sulphur content of the fuel oil consumed.

The three major types of boilers used for natural gas combustion are water-tube, fire-tube, and cast iron, with the water-tube design being common in large industrial and utility applications.

The main sources of CAC emissions from utility boilers include the following:

- solid fuel handling operations, such as loading and transfer, which may result in the emission of particulate matter;
- particulate emissions from fuel combustion;
- NO<sub>x</sub> emissions originating from both the combustion air (thermal NO<sub>x</sub>) and fuel-bound nitrogen (fuel NO<sub>x</sub>);
- sulphur oxide (SO<sub>x</sub>) emissions related to the sulphur content of the fuel being burned;
- CO emissions due to incomplete combustion; and
- VOC or unburned hydrocarbons due to incomplete combustion.

In general, three main types of emissions control are used for utility boiler emissions reduction: boiler modification, fuel substitution, and flue gas cleaning. Boiler modification includes any physical change in the unit or its operation. For example, flue gas recirculation and low-NO<sub>x</sub> burners may be used to reduce NO<sub>x</sub> emissions. Fuel substitution involves the firing of "cleaner"-burning fuels by either substitution or blending. Flue gas cleaning or post-combustion controls on utility boilers are mainly directed at reducing emissions of particulate, SO<sub>2</sub>, and NO<sub>x</sub>.

For particulate control, electrostatic precipitators (ESPs) and cyclones are commonly used with pulverized coal, while multiple cyclones are generally used for stokers and oil-fired units. Natural gas-fired units do not normally have particulate control. Other particulate control devices include fabric filters (baghouses) and scrubbers.

Flue gas desulphurization (FGD) processes can be wet, semi-dry, or dry. Wet systems generally use alkali slurries as the adsorbent medium. Particulate reduction of up to 99 percent is also possible with wet scrubbers, but fly ash is often collected by upstream ESPs or baghouses to increase the efficiencies and life span of these units. FGD units are largely used on bituminous and lignite coal-fired units, although some oil-fired units do have these installed.

Post-combustion NO<sub>x</sub> controls include selective catalytic reduction and selective non-catalytic reduction.

- **Internal Combustion:**

The following table provides SCCs applicable to power generation using internal combustion:

SCC	Description (6 digit)	Description (8 digit)
20100101	Distillate Oil (Diesel)	Turbine
20100102	Distillate Oil (Diesel)	Reciprocating
20100105	Distillate Oil (Diesel)	Reciprocating: Crankcase Blowby

SCC	Description (6 digit)	Description (8 digit)
20100106	Distillate Oil (Diesel)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)
20100107	Distillate Oil (Diesel)	Reciprocating: Exhaust
20100108	Distillate Oil (Diesel)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20100109	Distillate Oil (Diesel)	Turbine: Exhaust
20100201	Natural Gas	Turbine
20100202	Natural Gas	Reciprocating
20100205	Natural Gas	Reciprocating: Crankcase Blowby
20100206	Natural Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)
20100207	Natural Gas	Reciprocating: Exhaust
20100208	Natural Gas	Turbine: Evaporative Losses (Fuel Delivery System)
20100209	Natural Gas	Turbine: Exhaust
20100702	Process Gas	Reciprocating
20100705	Process Gas	Reciprocating: Crankcase Blowby
20100706	Process Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)
20100707	Process Gas	Reciprocating: Exhaust
20100801	Landfill Gas	Turbine
20100802	Landfill Gas	Reciprocating
20100805	Landfill Gas	Reciprocating: Crankcase Blowby
20100806	Landfill Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)
20100807	Landfill Gas	Reciprocating: Exhaust
20100808	Landfill Gas	Turbine: Evaporative Losses (Fuel Delivery System)
20100809	Landfill Gas	Turbine: Exhaust
20100901	Kerosene/Naphtha (Jet Fuel)	Turbine
20100902	Kerosene/Naphtha (Jet Fuel)	Reciprocating
20100905	Kerosene/Naphtha (Jet Fuel)	Reciprocating: Crankcase Blowby
20100906	Kerosene/Naphtha (Jet Fuel)	Reciprocating: Evaporative Losses (Fuel Delivery System)
20100907	Kerosene/Naphtha (Jet Fuel)	Reciprocating: Exhaust
20100908	Kerosene/Naphtha (Jet Fuel)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)
20100909	Kerosene/Naphtha (Jet Fuel)	Turbine: Exhaust
20101001	Geysers/Geothermal	Steam Turbine
20101010	Geysers/Geothermal	Well Drilling: Steam Emissions
20101020	Geysers/Geothermal	Well Pad Fugitives: Blowdown
20101030	Geysers/Geothermal	Pipeline Fugitives: Blowdown
20101031	Geysers/Geothermal	Pipeline Fugitives: Vents/Leaks
20101302	Liquid Waste	Waste Oil - Turbine
20180001	Equipment Leaks	Equipment Leaks
20182001	Wastewater, Aggregate	Process Area Drains
20182002	Wastewater, Aggregate	Process Equipment Drains
20182599	Wastewater, Points of Generation	Specify Point of Generation

SCC	Description (6 digit)	Description (8 digit)
20190099	Flares	Heavy Water

Stationary internal combustion sources include both gas turbines and heavy-duty reciprocating engines. This section deals with the use of these sources to generate electric power, using a wide variety of fuels, equipment designs, and applications. Gas turbines for power generation include simple cycle, regenerative cycle, cogeneration, and combined cycle turbines. Reciprocating engines are either spark ignition (gasoline-fuelled) or compression ignition (diesel-fuelled). These may be further categorized into two-stroke and four-stroke designs.

The primary CACs emitted from gas turbines include NO<sub>x</sub>, CO, and VOCs. Particulate matter emissions may be higher when using liquid fuels. SO<sub>x</sub> emissions are dependent on the sulphur content of the fuel used. As for external combustion sources, NO<sub>x</sub> formation is dependent on fuel combustion temperatures, while CO and VOC emissions are primarily the result of incomplete combustion. Emission levels are highly dependent on the operating load of the turbine. NO<sub>x</sub> emissions may be controlled with the use of diluents such as steam or water injection to reduce flame temperatures or staged combustion systems. Add-on controls such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) can also be used. Catalytic oxidation systems may also be employed to reduce emissions of CO or VOCs by promoting burnout.

Like turbines, the primary CACs emitted from reciprocating engines include NO<sub>x</sub>, CO, and VOCs. Three generic control techniques include parametric controls (timing and adjustment of air-to-fuel ratio), combustion modifications (advanced engine design for new sources or modifications to existing engines), and post-combustion catalytic controls (SCR, SNCR, and CO oxidation catalysts, as described above).

## 2.8.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on the amount of input sulphur in the fuel being burned.
- **Emission factors** - for external combustion sources, these are normally expressed in terms of the mass of contaminant emitted per unit of fuel consumed. Data on fuel consumption are required.
- **Engineering estimates**

It should be noted that emission monitoring data are typically available for only some of the CACs. In situations where monitoring information is not available, emissions estimates should be determined using other methodologies listed above.

Direct monitoring and emission factors are commonly used methods for estimating CAC emissions from fuel combustion activities. Mass balance and engineering calculation techniques can also be applied if information is available. CAC emissions estimates for fuel combustion are dependent on many factors, including fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants.

### **2.8.5 Supporting Information for CAC Emissions Estimation**

Estimating CACs emissions requires supporting information, such as fuel analysis, process activity or schedule, information on control devices, or source emission parameters. For each estimation methodology, the information required to perform calculations can vary greatly depending on the facility and processes involved. However, it is important to document all supporting data used in the estimation.

Depending on the methodology selected, one or more of the following may be required:

- monitoring equipment logs;
- source testing reports;
- process material throughputs and composition;
- fuel types, composition, and consumption (including the use of waste fuels and tire-derived fuels);
- equipment type and operation parameters;
- schedule of process activity; and
- emission control device and efficiency.

Emission factors may be obtained from the equipment manufacturer, government agencies, or open literature. A comprehensive emission factor database is available from the US EPA. The European and Australian environmental agencies also provide detailed descriptions of combustion equipment and associated emission factors, which are partly based on US EPA AP-42 data. Emission factors that are derived from actual testing of combustion unit(s) at a given facility should be used when available.

Emission factors should be selected with consideration of any add-on controls in place and the specific characteristics of the combustion source. For example, different sets of emission factors are applied for different sizes of natural gas-fired boiler (>100 million Btu/hour, <100 million Btu/hour) and for uncontrolled emissions, those equipped with low-NO<sub>x</sub> burners, flue gas recirculation, etc.

Data on fuel consumption and properties are required for emission factor calculations. The following provides information for various fuels:

- For natural gas-fired equipment, fuel consumption data can be obtained directly from the facility's natural gas bill(s). Ideally, sources consuming large amounts of gas would be separately metered, such that fuel consumption for each unit could be quantified. When this information is not available, facility-wide natural gas use can be allocated to process and space heaters on the basis of the nameplate capacity of each unit; judgment should be used where a unit is known not to be operating near capacity or is not in use year-round. Where natural gas consumption rates are not known, they may be estimated by "back-calculating" from the nameplate capacity and hours of operation. For example, a boiler with a firing capacity of 50 gigajoules per hour operated 4 000 hours per year would require 200 000 gigajoules of fuel input per year. For natural gas with a heating value of 38.6 megajoules per cubic metre, this would equate to 5.2 million cubic metres per year. Data on the relevant properties of natural gas, such as heating value and sulphur content, can be obtained from the gas supplier.
- For liquid fuel-fired equipment, fuel consumption data should be available based on purchase records. Data on the relevant properties of distillate or residual oil should be available from the fuel supplier.
- For solid fuels, data should be kept on the quantities used, as well as other properties needed for emission calculations, such as moisture and sulphur content.

### 2.8.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- **EMEP/CORINAIR 2001, Atmospheric Emission Inventory Guidebook, Third Edition, European Environmental Agency, Copenhagen:**

Group 1: Combustion in Energy and Transformation Industries	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page010.html">http://reports.eea.eu.int/technical_report_2001_3/en/page010.html</a>
Group 2: Non-Industrial Combustion Plants	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page011.html">http://reports.eea.eu.int/technical_report_2001_3/en/page011.html</a>

Group 3: Combustion in Manufacturing Industry	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page012.html">http://reports.eea.eu.int/technical_report_2001_3/en/page012.html</a>
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- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Combustion in Boilers Version 1.1	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html">http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html</a>
Emission Estimation Technique Manual for Combustion Engines Version 2.2	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/eng.html">http://www.npi.gov.au/handbooks/approved_handbooks/eng.html</a>

- ***STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:***

Chapter 2: Preferred and Alternative Methods for Estimating Air Emissions from Boilers	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf</a>
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- ***U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 1: External Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch01/">http://www.epa.gov/ttn/chief/ap42/ch01/</a>
Chapter 3: Stationary Internal Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch03/">http://www.epa.gov/ttn/chief/ap42/ch03/</a>

- ***U.S. Environmental Protection Agency, 2000, Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.9 Grain Industries

### 2.9.1 General Description

Grain elevators are primarily transfer and storage units. They are divided into four groups based on their location and function: primary, process, transfer, and terminal elevators.

Particulate matter is the only CAC released from operations in this sector.

### 2.9.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
4711	493130	Grain Handling and Milling Terminal Elevators
4711	493130	Grain Handling and Milling Primary Elevators
4711	493130	Grain Handling and Milling Transfer Elevators
4711	493130	Grain Handling and Milling Process Elevators

### 2.9.3 Source Description

The SCCs provided in the table below represent typical processes found in this industry source category.

- **Feed and Grain Terminal Elevators:**

SCC	Description (for 8-digit SCC)
30200501	Shipping/Receiving
30200502	Transfer/Convey
30200503	Cleaning
30200504	Drying
30200505	Unloading (Receiving)
30200506	Loading (Shipping)
30200507	Removal from Bins (Tunnel Belt)
30200508	Elevator Legs (Headhouse)
30200509	Tripper (Gallery Belt)
30200510	Removal from Bins (Tunnel Belt)
30200511	Elevator Legs (Headhouse)
30200512	Country Elevators: General
30200513	Fumigation Tanks
30200514	General
30200515	Cleaning
30200516	Loading
30200517	Turning
30200518	Turning

<b>SCC</b>	<b>Description (for 8-digit SCC)</b>
30200519	Tripper (Gallery)
30200520	Batch Dryer
30200521	Cross-flow Dryer
30200522	Counter-flow Dryer
30200523	Batch Dryer
30200524	Cross-flow Dryer
30200525	Counter-flow Dryer
30200526	General
30200527	Grain Drying - Column Dryer
30200528	Grain Drying - Rack Dryer
30200530	Headhouse & Internal Handling (legs, belts, distributors, scale, etc.)
30200531	Fugitive Emissions: General
30200532	Fugitive Emissions: Shipping/Receiving
30200537	Grain Cleaning - Internal Vibrating
30200538	Grain Cleaning - Stationary Enclosed
30200540	Storage Bin Vents
30200550	Unloading (Receiving) from Trucks (unspecified type)
30200551	Unloading (Receiving) from Straight Trucks
30200552	Unloading (Receiving) from Hopper Trucks
30200553	Unloading (Receiving) from Railcars
30200554	Unloading (Receiving) from Barges
30200555	Unloading (Receiving) from Ships
30200560	Unloading (Shipping) into Trucks (unspecified type)
30200561	Loading (Shipping) into Straight Trucks
30200562	Loading (Shipping) into Hopper Trucks
30200563	Loading (Shipping) into Railcars
30200564	Loading (Shipping) into Barges
30200565	Loading (Shipping) into Ships

- **Feed and Grain Country Primary Elevators:**

<b>SCC</b>	<b>Description (for 8-digit SCC)</b>
30200601	Shipping/Receiving
30200602	Transfer/Convey
30200603	Cleaning
30200604	Drying
30200605	Unloading (Receiving)
30200606	Loading (Shipping)
30200607	Removal from Bins (Tunnel Belt)
30200608	Elevator Legs (Headhouse)
30200609	Tripper (Gallery Belt)
30200610	Removal from Bins (Tunnel Belt)
30200611	Elevator Legs (Headhouse)
30200699	General

- **Grain Millings:**

SCC	Description (for 8-digit SCC)
30200701	General
30200702	General
30200703	Barley Cleaning
30200704	Milo Cleaning
30200705	Barley Flour Mill
30200706	Barley: Receiving
30200707	Barley: Bulk Loading
30200708	Barley Malting: Grain Receiving
30200709	Barley Malting: Gas-fired Malt Kiln
30200710	Milo: Receiving
30200711	Durum Milling: Grain Receiving
30200712	Durum Milling: Precleaning/Handling
30200713	Durum Milling: Cleaning House
30200714	Durum Milling: Millhouse
30200721	Rye: Grain Receiving
30200722	Rye: Precleaning/Handling
30200723	Rye: Cleaning House
30200724	Rye: Millhouse
30200730	General
30200731	Wheat: Grain Receiving
30200732	Wheat: Precleaning/Handling
30200733	Wheat: Cleaning House
30200734	Wheat: Millhouse
30200740	Dry Corn Milling: Silo Storage
30200741	Dry Corn Milling: Grain Receiving
30200742	Dry Corn Milling: Grain Drying
30200743	Dry Corn Milling: Precleaning/Handling
30200744	Dry Corn Milling: Cleaning House
30200745	Dry Corn Milling: Degerming and Milling
30200746	Dry Corn Milling: Bulk Loading
30200747	Dry Corn Milling: Pneumatic Conveyor
30200748	Dry Corn Milling: Grinding
30200751	Wet Corn Milling: Grain Receiving
30200752	Wet Corn Milling: Grain Handling
30200753	Wet Corn Milling: Grain Cleaning
30200754	Wet Corn Milling: Dryers
30200755	Wet Corn Milling: Bulk Loading
30200756	Wet Corn Milling: Milling
30200757	Dry Corn Milling: Mixing Tank
30200758	Dry Corn Milling: Extruder
30200759	Dry Corn Milling: Kettle Cooker
30200760	Oat: General
30200761	Steeping: Grain Conditioning in Tanks Containing Dilute Sulphurous Acid
30200762	Evaporators: Concentrate Steepwater to 30-55 % Solids by Evaporation

<b>SCC</b>	<b>Description (for 8-digit SCC)</b>
30200763	Gluten Feed Drying: Direct-fired Dryer - Produces Corn Gluten Feed
30200764	Gluten Feed Drying: Indirect-fired Dryer - Produces Corn Gluten Feed
30200765	Degerminating Mills: Separates Germ from Starch and Gluten
30200766	Germ Drying: Drying Germ from Degerminating Mills
30200767	Fibre Drying: Drying Corn Hulls after Separation from Starch & Gluten
30200768	Gluten Drying: Direct-fired Dryer - Produces Corn Gluten Meal
30200769	Gluten Drying: Indirect-fired Dryer - Produces Corn Gluten Meal
30200770	Dextrose Drying
30200771	Rice: Grain Receiving
30200772	Rice: Precleaning/Handling
30200773	Rice: Drying
30200774	Rice: Cleaning/Millhouse
30200775	Rice: Paddy Cleaning
30200776	Rice: Mill House
30200777	Rice: Aspirator
30200778	Rice: Cleaning/Millhouse
30200781	Soybean: Grain Receiving
30200782	Soybean: Grain Handling
30200783	Soybean: Grain Cleaning
30200784	Soybean: Drying
30200785	Soybean: Cracking and Dehulling
30200786	Soybean: Hull Grinding
30200787	Soybean: Bean Conditioning
30200788	Soybean: Flaking
30200789	Soybean: Meal Dryer
30200790	Soybean: Meal Cooler
30200791	Soybean: Bulk Loading
30200792	Soybean: White Flake Cooler
30200793	Soybean: Meal Grinder/Sizing

- **Export Grain Elevators:**

<b>SCC</b>	<b>Description (for 8-digit SCC)</b>
30203103	Cleaning
30203104	Drying
30203105	Unloading
30203106	Loading
30203107	Removal from Bins (Tunnel Belt)
30203108	Elevator Legs (Headhouse)
30203109	Tripper (Gallery Belt)
30203110	Removal from Bins (Tunnel Belt)
30203111	Elevator Legs (Headhouse)

## 2.9.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance**
- **Emission factors**
- **Engineering estimates**

Since particulate matter is emitted primarily from material handling and transfer operations, which are fugitive in nature, direct monitoring information may not be readily available. Fugitive emissions are highly variable and are dependent on a number of criteria, including local climate conditions, mitigation measures, properties of material, and the activities involved. Generally, emission factors are used to estimate CAC emissions from this source category.

## 2.9.5 Supporting Information for CAC Emissions Estimation

Depending on the estimation methodology selected, the following information may be required:

- direct measurement logs;
- material throughputs;
- equipment type and operation parameters;
- schedule of activity; and
- emission control device and efficiency.

Throughput data can be obtained from grain receipts. Control devices such as cyclones and fabric filters are generally used in grain handling operations, and their respective control efficiencies can be obtained from the equipment suppliers. If emission factors are used to estimate emissions, they can be obtained from government agencies and/or published literature.

## 2.9.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- **Canadian Grain Commission Website:**

Website at:	<a href="http://www.grainscanada.gc.ca/">http://www.grainscanada.gc.ca/</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Chapter 9: Food and Agricultural Industries	<a href="http://www.epa.gov/ttn/chief/ap42/ch09/">http://www.epa.gov/ttn/chief/ap42/ch09/</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.10 Iron and Steel Industry

### 2.10.1 General Description

Large integrated steel companies have smelting and refining capabilities to produce raw steel from iron ore with the use of blast furnaces and other converting processes. Companies that use steel scrap as the primary raw feed to the electric furnace are classified as electric furnace mills, or "mini-mills," which account for half of Canada's steel-making capacity.

After sintering and iron production, all contemporary steel-making processes convert pig iron, scrap, direct-reduced iron, or specific mixtures into molten steel by refining processes to reduce the carbon, silicon, and oxygen content. These processes also remove impurities, such as phosphorus and sulphur. Steel mill products such as iron and steel castings, bars or rolls, and specialty steels are produced by various semi-finishing or finishing operations within the complex. A majority of primary iron is produced in Canada with blast furnaces.

Coke used for metallurgical processes is generally produced in Canada at integrated iron and steel plants using the slot oven coke by-product process. This process involves the destructive distillation of coal under pyrolytic conditions in a series of rectangular ovens arranged in parallel batteries. A solid coke residue is formed, which is subsequently quenched and dried. During heating, the volatile constituents expelled from the coal are collected as fuel or recoverable by-products. Although operations are cyclical for individual ovens, by-product yield is basically continuous due to the large number of ovens within each battery.

A majority of CACs are emitted from the iron and steel industry's process operations, in particular, CO and particulate matter. Mitigating emission control devices are necessary to reduce CO and particulate matter emissions below regulatory guidelines.

### 2.10.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source category:

CDN SIC	NAICS	Description
2919	331000	Primary Steel Industries
2912	331514	Steel Foundries
2911	331110	Iron and Steel Production
2911	331110	Iron and Steel Industry Miscellaneous
2919	331110	Other Primary Steel Industries
2941	331511	Iron Foundries

### 2.10.3 Source Description

The SCCs provided in the table below represent typical processes found in this industrial source category:

- **Sinter Production:**

SCC	Description (for 8-digit SCC)
30301502	Sintering: Raw Materials Handling
30301503	Sintering: Windbox
30301504	Sintering: Discharge End
30301505	Sintering: Cooler
30301506	Sintering: Cold Screen

- **Furnace Operations:**

SCC	Description (for 8-digit SCC)
30301510	Blast Furnace: Slip
30301511	Blast Furnace: Charging
30301512	Blast Furnace: Casting, Uncontrolled Casthouse Roof Monitor
30301513	Blast Furnace: Casting, Furnace with Local Evacuation
30301514	Blast Furnace: Taphole and Trough Only
30301518	Hot Metal Desulphurization
30301520	Basic Oxygen Furnace (BOF)
30301521	BOF, Top Blown Furnace: Charging
30301522	BOF, Top Blown Furnace: Melting and Refining
30301523	BOF, Top Blown Furnace: Tapping
30301524	BOF, Top Blown Furnace: Hot Metal Transfer
30301530	QBOP: Melting and Refining
30301540	Electric Arc Furnace (EAF): Charging
30301541	EAF: Melting and Refining
30301542	EAF: Tapping
30301543	EAF: Slagging
30301550	Open Hearth Furnace: Charging
30301551	Open Hearth Furnace: Melting and Refining
30301552	Open Hearth Furnace: Tapping
30301553	Open Hearth Furnace: Hot Metal Transfer
30301554	Open Hearth Furnace: Slagging

- **Hot Forming and Semi-finishing:**

SCC	Description (for 8-digit SCC)
30301570	Machine Scarfing
30301571	Manual Scarfing
30300922	Continuous Casting
30300923	Steel Furnace Slag Tapping
30300931	Hot Rolling

- **Coke Production:**

SCC	Description (for 8-digit SCC)
30300302	Oven Charging
30300302	Quenching
30300306	Oven Underfiring
30300309	Coal Conveying
30300310	Coal Crushing
30300311	Coal Screening
30300313	Coal Preheater
30300317	Combustion Stack: Coke Oven Gas (COG)

### 2.10.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:
 

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)
- Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on the amount of input sulphur in the fuel being burned.
- Emission factors** - these are normally expressed in terms of the mass of contaminant emitted per unit of process activity, such as feed charged or fuel consumed.
- Engineering estimates**

It should be noted that emission monitoring data are typically available for only some of the CACs. In situations where monitoring information is not available, emissions estimates should be determined using other methodologies listed above.

Emission factors are also commonly used to estimate CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if information is available. CAC emissions from fuel combustion are dependent on many factors, including fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for

specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

Fugitive particulate emissions are highly variable and are dependent on a number of factors, including local climate conditions, mitigation measures, properties of material, and the activities involved. Emission factors may be the most appropriate methodology to use in this case.

### **2.10.5 Supporting Information for CAC Emissions Estimation**

Depending on the methodology selected for estimating emissions, the following information may be required:

- monitoring equipment logs;
- source testing reports;
- process material throughputs and composition;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity; and
- emission control device and efficiency.

If emission factors are to be applied, they may be obtained from the equipment manufacturer, government agencies, or open literature. A comprehensive emission factor database is available from the US EPA. The European and Australian environmental agencies also provide similar information, which is partly based on US EPA AP-42 data. Emission factors that are derived from actual testing of combustion unit(s) at a given facility should be used where available.

Emission factors should be selected with consideration of any pollution control devices in place and the specific characteristics of the combustion source. For example, different emission factors are applied for different sizes of natural gas-fired boiler (>100 million Btu/hour, <100 million Btu/hour) and for uncontrolled emissions, those equipped with low-NO<sub>x</sub> burners, flue gas recirculation, etc.

The following data on fuel consumption and properties are required for emission factor calculations:

- Fuel meter records should be used if available to determine the quantity of fuel consumed by the given unit. Data on the relevant properties of the fuel gas, such as heating value and sulphur content, should be used if available.

If fuel consumption records are not available, fuel use may be estimated by “back-calculating” from the nameplate capacity of the unit and its hours of operation. For example, a boiler with a firing capacity of 50 gigajoules per hour operated a total of 4 000 hours would require 200 000 gigajoules of fuel input per year. For fuel gas with a heating value of 38.6 megajoules per cubic metre, this would equate to 5.2 million cubic metres of fuel consumed per year. However, judgment should be used

where a combustion unit is known not to be operating near capacity to allow for the appropriate fuel use adjustment.

- For fuel that is purchased, consumption data should be available from purchase records. Data on the relevant fuel properties should be available from the fuel supplier. Since purchase records are usually not specific to any one piece of equipment, the total fuel purchased for an entire facility may be allocated to each unit on the basis of the nameplate capacity of the unit and its total hours of operation in the year.

## 2.10.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- **Canadian Steel Producers Association:**

Website:	<a href="http://www.canadiansteel.ca">http://www.canadiansteel.ca</a>
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- **EMEP/CORINAIR 2001, Atmospheric Emission Inventory Guidebook, Third Edition, European Environmental Agency, Copenhagen:**

Group 1: Combustion in Energy and Transformation Industries	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page010.html">http://reports.eea.eu.int/technical_report_2001_3/en/page010.html</a>
Group 2: Non-Industrial Combustion Plants	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page011.html">http://reports.eea.eu.int/technical_report_2001_3/en/page011.html</a>
Group 3: Combustion in Manufacturing Industry	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page012.html">http://reports.eea.eu.int/technical_report_2001_3/en/page012.html</a>
Group 4: Production Processes	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page013.html">http://reports.eea.eu.int/technical_report_2001_3/en/page013.html</a>

- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Combustion in Boilers Version 1.1	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html">http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html</a>
Emission Estimation Technique Manual for Combustion Engines Version 2.2	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/eng.html">http://www.npi.gov.au/handbooks/approved_handbooks/eng.html</a>
Emission Estimation Technique Manual for Iron & Steel Production	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fironste.html">http://www.npi.gov.au/handbooks/approved_handbooks/fironste.html</a>

- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 2: Preferred and Alternative Methods for Estimating Air Emissions from Boilers	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 1: External Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch01/">http://www.epa.gov/ttn/chief/ap42/ch01/</a>
Chapter 3: Stationary Internal Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch03/">http://www.epa.gov/ttn/chief/ap42/ch03/</a>
Chapter 12: Metallurgical Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch12/">http://www.epa.gov/ttn/chief/ap42/ch12/</a>

- **U.S. Environmental Protection Agency, 2000, *Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.11 Iron Ore Mining Industries

### 2.11.1 General Description

This section focuses on activities associated with the processing of mined materials at the mine site.

Crude iron ore is mined either by open pit or by underground methods, after which it is crushed for ease of handling and transportation. A majority of ore produced in Canada then undergoes some beneficiation by concentration and possibly agglomeration. Particulate matter, predominantly of coarse size, is the primary CAC pollutant associated with this source.

### 2.11.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
0617	21221	Iron Ore Mining and Beneficiation

### 2.11.3 Source Description

The SCCs given in the table below represent typical processes found in this industry source. However, it is emphasized that each mine is unique, and its SCCs and associated emissions should be determined on a case-by-case basis.

SCC	Description (6 digit)	Description (8 digit)
30302301	Taconite Iron Ore Processing	Primary Crushing
30302302	Taconite Iron Ore Processing	Tertiary Crusher
30302303	Taconite Iron Ore Processing	Ore Screening
30302304	Taconite Iron Ore Processing	Ore Transfer
30302305	Taconite Iron Ore Processing	Ore Storage
30302306	Taconite Iron Ore Processing	Dry Grinding/Milling
30302307	Taconite Iron Ore Processing	Bentonite Storage
30302308	Taconite Iron Ore Processing	Bentonite Blending
30302309	Taconite Iron Ore Processing	Travelling Grate Feed (use 3-03-023-79)
30302310	Taconite Iron Ore Processing	Travelling Grate Discharge (use 3-03-023-80)
30302311	Taconite Iron Ore Processing	Chip Regrinding
30302312	Taconite Iron Ore Processing	Indurating Furnace: Gas Fired (see 3-03-023-51 through -88)
30302313	Taconite Iron Ore Processing	Indurating Furnace: Oil Fired (see 3-03-023-51 through -88)
30302314	Taconite Iron Ore Processing	Indurating Furnace: Coal Fired (see 3-03-023-51 through -88)
30302315	Taconite Iron Ore Processing	Pellet Cooler
30302316	Taconite Iron Ore Processing	Pellet Transfer to Storage
30302317	Taconite Iron Ore Processing	Magnetic Separation

SCC	Description (6 digit)	Description (8 digit)
30302318	Taconite Iron Ore Processing	Non-magnetic Separation
30302319	Taconite Iron Ore Processing	Kiln (see 3-03-023-51 through -88)
30302320	Taconite Iron Ore Processing	Conveyors, Transfer, and Loading (see 3-03-023-51 through -88)
30302321	Taconite Iron Ore Processing	Haul Road: Rock
30302322	Taconite Iron Ore Processing	Haul Road: Taconite
30302325	Taconite Iron Ore Processing	Primary Crusher Return Conveyor Transfer
30302327	Taconite Iron Ore Processing	Secondary Crushing Line (includes Feed & Discharge Points)
30302328	Taconite Iron Ore Processing	Secondary Crusher Return Conveyor Transfer
30302330	Taconite Iron Ore Processing	Tertiary Crushing Line (includes Feed & Discharge Points)
30302331	Taconite Iron Ore Processing	Tertiary Crushing Line Discharge Conveyor
30302334	Taconite Iron Ore Processing	Grinder Feed
30302336	Taconite Iron Ore Processing	Classification
30302338	Taconite Iron Ore Processing	Secondary Grinding
30302340	Taconite Iron Ore Processing	Tailings Basin
30302341	Taconite Iron Ore Processing	Conveyor Transfer to Concentrator
30302344	Taconite Iron Ore Processing	Concentrate Storage
30302345	Taconite Iron Ore Processing	Bentonite Transfer to Blending
30302347	Taconite Iron Ore Processing	Green Pellet Screening
30302348	Taconite Iron Ore Processing	Hearth Layer Feed to Furnace
30302349	Taconite Iron Ore Processing	Grate/Kiln Furnace Feed
30302350	Taconite Iron Ore Processing	Grate/Kiln Furnace Discharge
30302351	Taconite Iron Ore Processing	Induration: Grate/Kiln, Gas-fired, Acid Pellets
30302352	Taconite Iron Ore Processing	Induration: Grate/Kiln, Gas-fired, Flux Pellets
30302353	Taconite Iron Ore Processing	Induration: Grate/Kiln, Gas & Oil-fired, Acid Pellets
30302354	Taconite Iron Ore Processing	Induration: Grate/Kiln, Gas & Oil-fired, Flux Pellets
30302355	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coke-fired, Acid Pellets
30302356	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coke-fired, Flux Pellets
30302357	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coke & Coal-fired, Acid Pellets
30302358	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coke & Coal-fired, Flux Pellets
30302359	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coal-fired, Acid Pellets
30302360	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coal-fired, Flux Pellets
30302361	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coal & Oil-fired, Acid Pellets
30302362	Taconite Iron Ore Processing	Induration: Grate/Kiln, Coal & Oil-fired, Flux Pellets
30302369	Taconite Iron Ore Processing	Vertical Shaft Furnace Feed
30302370	Taconite Iron Ore Processing	Vertical Shaft Furnace Discharge
30302371	Taconite Iron Ore Processing	Induration: Vertical Shaft, Gas-fired, Acid Pellets, Top Gas Stack
30302372	Taconite Iron Ore Processing	Induration: Vertical Shaft, Gas-fired, Flux Pellets, Top Gas Stack
30302373	Taconite Iron Ore Processing	Induration: Vertical Shaft, Gas-fired, Acid Pellets, Bottom Gas Stack

SCC	Description (6 digit)	Description (8 digit)
30302374	Taconite Iron Ore Processing	Induration: Vertical Shaft, Gas-fired, Flux Pellets, Bottom Gas Stack
30302379	Taconite Iron Ore Processing	Straight Grate Furnace Feed
30302380	Taconite Iron Ore Processing	Straight Grate Furnace Discharge
30302381	Taconite Iron Ore Processing	Induration: Straight Grate, Gas-fired, Acid Pellets
30302382	Taconite Iron Ore Processing	Induration: Straight Grate, Gas-fired, Flux Pellets
30302383	Taconite Iron Ore Processing	Induration: Straight Grate, Oil-fired, Acid Pellets
30302384	Taconite Iron Ore Processing	Induration: Straight Grate, Oil-fired, Flux Pellets
30302385	Taconite Iron Ore Processing	Induration: Straight Grate, Coke-fired, Acid Pellets
30302386	Taconite Iron Ore Processing	Induration: Straight Grate, Coke-fired, Flux Pellets
30302387	Taconite Iron Ore Processing	Induration: Straight Grate, Coke & Gas-fired, Acid Pellets
30302388	Taconite Iron Ore Processing	Induration: Straight Grate, Coke & Gas-fired, Flux Pellets
30302393	Taconite Iron Ore Processing	Hearth Layer Screen
30302395	Taconite Iron Ore Processing	Pellet Screen
30302396	Taconite Iron Ore Processing	Pellet Storage Bin Loading
30302397	Taconite Iron Ore Processing	Secondary Storage Bin Loading
30302398	Taconite Iron Ore Processing	Tertiary Storage Bin Loading

#### 2.11.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance**
- **Emission factors**
- **Engineering estimates**

Since a majority of particulate emissions are fugitive in nature, data from direct monitoring may not be readily available unless monitoring is required as part of the conditions of an air discharge permit. Fugitive emissions are highly variable and are dependent on a number of factors, including local climate conditions, mitigation

measures, properties of material, and the activities involved. Emission factors may be the most appropriate methodology to use in this case.

### 2.11.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected for calculating emissions, the following may be required:

- process material throughputs and composition;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity; and
- emission control device and efficiency.

If the emission factors are applied, these factors can be obtained from government agencies and/or published literature. A comprehensive emission factor database is maintained by the US EPA, while the European and Australian environmental agencies also provide similar information that is partly based on US EPA data.

For fuel that is purchased, consumption data should be available from purchase records. Data on the relevant fuel properties should be available from the fuel supplier. Since purchase records are usually not specific to any one piece of equipment, the total fuel purchased for an entire facility may be allocated to each unit on the basis of the nameplate capacity of the unit and its total hours of operation in the year.

### 2.11.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow “Related Links”
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- ***EMEP/CORINAIR 2001, Atmospheric Emission Inventory Guidebook, Third Edition, European Environmental Agency, Copenhagen:***

Group 1: Combustion in Energy and Transformation Industries	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page010.html">http://reports.eea.eu.int/technical_report_2001_3/en/page010.html</a>
Group 2: Non-Industrial Combustion Plants	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page011.html">http://reports.eea.eu.int/technical_report_2001_3/en/page011.html</a>
Group 3: Combustion in Manufacturing Industry	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page012.html">http://reports.eea.eu.int/technical_report_2001_3/en/page012.html</a>
Group 4: Production Processes	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page013.html">http://reports.eea.eu.int/technical_report_2001_3/en/page013.html</a>

- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Combustion in Boilers Version 1.1	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html">http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html</a>
Emission Estimation Technique Manual for Combustion Engines Version 2.2	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/eng.html">http://www.npi.gov.au/handbooks/approved_handbooks/eng.html</a>
Emission Estimation Technique Manual for Mining Version 2.3	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/mining.html">http://www.npi.gov.au/handbooks/approved_handbooks/mining.html</a>

- **Mineral and Mining Statistics Division, Natural Resources Canada (NRCan):**

Website:	<a href="http://mmsd1.mms.nrcan.gc.ca/mmsd/default.html">http://mmsd1.mms.nrcan.gc.ca/mmsd/default.html</a>
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- **Mining Association of Canada (MAC):**

Website:	<a href="http://www.mining.ca">http://www.mining.ca</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 2: Preferred and Alternative Methods for Estimating Air Emissions from Boilers	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Chapter 1: External Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch01/">http://www.epa.gov/ttn/chief/ap42/ch01/</a>
Chapter 3: Stationary Internal Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch03/">http://www.epa.gov/ttn/chief/ap42/ch03/</a>
Chapter 11: Mineral Products Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch11/">http://www.epa.gov/ttn/chief/ap42/ch11/</a>

- **U.S. Environmental Protection Agency, 2000, Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.12 Non-ferrous Mining and Smelting

### 2.12.1 General Description

There are a number of technologies that can be used for the smelting and refining of ore concentrates to produce primary copper and nickel. These pyrometallurgical operations

include successive stages of roasting, smelting, converting, and electrolytic refining in specialized furnace processes to remove sulphur and other metallic impurities.

Lead metal is typically extracted from the ore concentrate by means of a sintering and blast furnace process. New technologies that eliminate the sintering stage have also been adopted in some Canadian smelters. Sulphur-bearing ore concentrate is roasted during the sintering process to convert sulphides to lead and other oxides, which are then reduced to metallic lead in a blast furnace. The molten lead is further purified in a drossing kettle to remove other metallic impurities.

Many zinc smelters in Canada utilize the electrolytic process, which involves roasting, leaching, purification, and electrolysis to produce zinc metal. During the roasting process, zinc sulphide in the ore concentrate is converted to oxide, which is then converted to zinc sulphate in the leaching step that follows. After purification, the sulphate solution is fed into electrolytic tanks, where zinc metal is deposited in the cathode during electrolysis.

Particulate matter and SO<sub>2</sub> are the primary CACs emitted from the above non-ferrous metal smelting and refining processes. A majority of the SO<sub>2</sub> emissions originate from the sulphide in the concentrate feed, while particulate is generated during material handling operations. Process- and utility-related fuel combustion operations contribute to emissions of nitrogen dioxide (NO<sub>2</sub>), CO, SO<sub>2</sub>, VOCs, and particulate matter.

### 2.12.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
2959	331410	Copper Smelting and Refining
2959	331410	Nickel Smelting and Refining
2959	331410	Non-ferrous Smelting and Refining
2959	331410	Lead Smelting and Refining
2959	331410	Zinc Smelting and Refining

### 2.12.3 Source Description

The operations described below outline typical key process features; however, since each processing facility is unique, its emissions should be determined on a case-by-case basis.

- **Copper Production:**

SCC	Description (for 8-digit SCC)
30300502	Multiple Hearth Roaster

30300503	Reverberatory Smelting Furnace after Roaster
30300504	Converter (All Configurations)
30300505	Fire (Furnace) Refining
30300506	Ore Concentrate Dryer
30300507	Reverberatory Smelting Furnace w/ Ore Charge w/o Roasting
30300508	Refined Metal Finishing Operations
30300509	Fluidized Bed Roaster
30300510	Electric Smelting Furnace
30300511	Electrolytic Refining
30300512	Flash Smelting
30300513	Roasting: Fugitive Emissions
30300514	Reverberatory Furnace: Fugitive Emissions
30300515	Converter: Fugitive Emissions
30300516	Anode Refining Furnace: Fugitive Emissions
30300517	Slag Cleaning Furnace: Fugitive Emissions
30300518	Converter Slag Return: Fugitive Emissions
30300519	Unpaved Road Traffic: Fugitive Emissions
30300521	Noranda Reactor
30300522	Slag Cleaning Furnace
30300523	Reverberatory Furnace with Converter
30300524	AFT MHR+RF/FBR+EF
30300525	Fluid Bed Roaster with Reverberatory Furnace and Converter
30300526	Dryer with Electric Furnace and Cleaning Furnace and Converter
30300527	Dryer with Flash Furnace and Converter
30300528	Norander Reactor and Converter
30300529	Multiple Hearth Roaster with Reverberatory Furnace and Converter
30300530	Fluid Bed Roaster with Electric Furnace and Converter
30300531	Reverberatory Furnace After Multiple Hearth Roaster
30300532	Reverberatory Furnace After Fluid Bed Roaster
30300533	Electric Furnace After Concentrate Dryer
30300534	Flash Furnace After Concentrate Dryer
30300535	Electric Furnace After Fluid Bed Roaster
30300541	Concentrate Dryer Followed by Noranda Reactors and Converter

• **Nickel Production:**

SCC	Description (for 8-digit SCC)
30401001	Flux Furnace
30401002	Mixing/Blending/Grinding/Screening
30401004	Heat Treat Furnace
30401005	Induction Furnace (Inlet Air)
30401006	Induction Furnace (Under Vacuum)
30401007	Electric Arc Furnace with Carbon Electrode
30401008	Electric Arc Furnace
30401010	Finishing: Pickling/Neutralizing
30401011	Finishing: Grinding
30401015	Multiple Hearth Roaster

SCC	Description (for 8-digit SCC)
30401016	Converters
30401017	Reverberatory Furnace
30401018	Electric Furnace
30401019	Sinter Machine
30401061	Roasting: Fugitive Emissions
30401062	Reverberatory Furnace: Fugitive Emissions
30401063	Converter: Fugitive Emissions
30401099	Other Not Classified

• **Lead Production:**

SCC	Description (for 8-digit SCC)
30301001	Sintering: Single Stream
30301002	Blast Furnace Operation
30301003	Dross Reverberatory Furnace
30301004	Ore Crushing
30301005	Materials Handling (Includes 30301011, 12, 13, 04, 14)
30301006	Sintering: Dual Stream Feed End
30301007	Sintering: Dual Stream Discharge End
30301008	Slag Fume Furnace
30301009	Lead Drossing
30301010	Raw Material Crushing and Grinding
30301011	Raw Material Unloading
30301012	Raw Material Storage Piles
30301013	Raw Material Transfer
30301014	Sintering Charge Mixing
30301015	Sinter Crushing/Screening
30301016	Sinter Transfer
30301017	Sinter Fines Return Handling
30301018	Blast Furnace Charging
30301019	Blast Furnace Tapping (Metal and Slag)
30301020	Blast Furnace Lead Pouring
30301021	Blast Furnace Slag Pouring
30301022	Lead Refining/Silver Retort
30301023	Lead Casting
30301024	Reverberatory or Kettle Softening
30301025	Sinter Machine Leakage
30301026	Sinter Dump Area
30301027	Vacuum Distillation
30301028	Tetrahedrite Dryer
30301029	Sinter Machine (Weak Gas)
30301030	Sinter Storage
30301031	Speiss Pit
30301032	Ore Screening
30301099	Other Not Classified

• **Zinc Production:**

SCC	Description (for 8-digit SCC)
30303002	Multiple Hearth Roaster
30303003	Sinter Strand
30303005	Vertical Retort/Electrothermal Furnace
30303006	Electrolytic Processor
30303007	Flash Roaster
30303008	Fluid Bed Roaster
30303009	Raw Material Handling and Transfer
30303010	Sinter Breaking and Cooling
30303011	Zinc Casting
30303012	Raw Material Unloading
30303013	Suspension Roaster
30303014	Crushing/Screening
30303015	Zinc Melting
30303016	Alloying
30303017	Leaching
30303018	Purification
30303019	Sinter Plant Wind Box
30303020	Sinter Plant Discharge and Screens
30303021	Retort Furnace
30303022	Flue Dust Handling
30303023	Dross Handling
30303024	Roasting: Fugitive Emissions
30303025	Sinter Plant, Wind Box: Fugitive Emissions
30303026	Sinter Plant, Discharge Screens: Fugitive Emissions
30303027	Retort Building: Fugitive Emissions
30303028	Casting: Fugitive Emissions
30303029	Electric Retort
30303099	Other Not Classified

**2.12.4 Estimation Methodology**

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

It should be noted that emission monitoring data are typically available for only some of the CACs (e.g., source testing data on SO<sub>2</sub> from furnace stack). In these situations, estimates of the remaining CACs should be prepared using other methods from the list above.

Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on parameters such as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

### 2.12.5 Supporting Information for CAC Emissions Estimation

Estimating CAC emissions requires supporting information, such as fuel analysis, process activity or schedule, information on control devices, or source emission parameters. Depending on the estimation methodology, the information required to perform calculations can vary greatly depending on the facility and processes involved. However, it is important to document all supporting data used in the estimation.

Depending on the methodology selected for estimating emissions, the following information may be required:

- monitoring equipment logs;
- source testing reports;
- process material throughputs and composition;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity; and
- emission control device and efficiency.

If emission factors are to be applied, they may be obtained from the equipment manufacturer, government agencies, or open literature. A comprehensive emission factor database is available from the US EPA. The European and Australian environmental agencies also provide similar information, which is partly based on US EPA AP-42 data. Emission factors that are derived from actual testing of combustion unit(s) at a given facility should be used where available.

Emission factors should be selected with consideration of any pollution control devices in place and the specific characteristics of the combustion source. For example, different emission factors are applied for different sizes of natural gas-fired boiler (>100 million Btu/hour, <100 million Btu/hour) and for uncontrolled emissions, those equipped with low-NO<sub>x</sub> burners, flue gas recirculation, etc.

The following data on fuel consumption and properties are required for emission factor calculations:

- Fuel meter records should be used if available to determine the quantity of fuel consumed by the given unit. Data on the relevant properties of the fuel gas, such as heating value and sulphur content, should be used if available.

If fuel consumption records are not available, fuel use may be estimated by “back-calculating” from the nameplate capacity of the unit and its hours of operation. For example, a boiler with a firing capacity of 50 gigajoules per hour operated a total of 4 000 hours would require 200 000 gigajoules of fuel input per year. For fuel gas with a heating value of 38.6 megajoules per cubic metre, this would equate to 5.2 million cubic metres of fuel consumed per year. However, judgment should be used where a combustion unit is known not to be operating near capacity to allow for the appropriate fuel use adjustment.

- For fuel that is purchased, consumption data should be available from purchase records. Data on the relevant fuel properties should be available from the fuel supplier. Since purchase records are usually not specific to any one piece of equipment, the total fuel purchased for an entire facility may be allocated to each unit on the basis of the nameplate capacity of the unit and its total hours of operation in the year.

The Mining Association of Canada (MAC) is a source of information regarding the mining and smelting industry in Canada. MAC is also a source of guidance documents, specific to this industrial source category, for reporting to the NPRI.

### **2.12.6 References and Links**

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow “Related Links”
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- **EMEP/CORINAIR 2001, Atmospheric Emission Inventory Guidebook, Third Edition, European Environmental Agency, Copenhagen:**

Group 1: Combustion in Energy and Transformation Industries	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page010.html">http://reports.eea.eu.int/technical_report_2001_3/en/page010.html</a>
Group 2: Non-Industrial Combustion Plants	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page011.html">http://reports.eea.eu.int/technical_report_2001_3/en/page011.html</a>
Group 3: Combustion in Manufacturing Industry	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page012.html">http://reports.eea.eu.int/technical_report_2001_3/en/page012.html</a>
Group 4: Production Processes	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page013.html">http://reports.eea.eu.int/technical_report_2001_3/en/page013.html</a>

- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Combustion in Boilers Version 1.1	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html">http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html</a>
Emission Estimation Technique Manual for Combustion Engines Version 2.2	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/eng.html">http://www.npi.gov.au/handbooks/approved_handbooks/eng.html</a>
Emission Estimation Technique Manual for Nickel Concentrating, Smelting and Refining	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fnickel.html">http://www.npi.gov.au/handbooks/approved_handbooks/fnickel.html</a>
Emission Estimation Technique Manual for Copper Concentrating, Smelting and Refining	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fcopper.html">http://www.npi.gov.au/handbooks/approved_handbooks/fcopper.html</a>
Emission Estimation Technique Manual for Lead Concentrating, Smelting and Refining	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/flead.html">http://www.npi.gov.au/handbooks/approved_handbooks/flead.html</a>
Emission Estimation Technique Manual for Zinc Concentrating, Smelting and Refining	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fzinc.html">http://www.npi.gov.au/handbooks/approved_handbooks/fzinc.html</a>

- **Mining Association of Canada:**

Website at:	<a href="http://www.mining.ca">http://www.mining.ca</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 2: Preferred and Alternative Methods for Estimating Air Emissions from Boilers	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 1: External Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch01/">http://www.epa.gov/ttn/chief/ap42/ch01/</a>
Chapter 3: Stationary Internal Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch03/">http://www.epa.gov/ttn/chief/ap42/ch03/</a>
Chapter 12: Metallurgical Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch12/">http://www.epa.gov/ttn/chief/ap42/ch12/</a>

- **U.S. Environmental Protection Agency, 2000, *Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.13 Petrochemicals Industry

### 2.13.1 General Description

The petrochemicals source category is broadly defined as industrial activity that uses petroleum (crude oil) or natural gas as a source of raw materials to produce various organic chemical products. In general, fuel and fertilizer products are not included as petrochemicals.

The predominant feedstocks for this industrial sector include natural gas, natural gas liquids, and, from crude oil, naphtha, gas oil, and refinery gases. The primary petrochemicals produced include olefins (ethylene, propylene, and butadiene), aromatics (benzene, toluene, and xylenes), and methanol. Primary petrochemicals may be further converted to petrochemical intermediates, which are used to form more complex derivative products. For example, polymerization processes may be used to form plastics, resins, fibres, and synthetic materials.

The petrochemicals source category is composed of a large number of chemical product industries, and the processes and products are unique to individual plants. Emissions from this broad source include process- as well as fuel combustion-related emissions.

VOCs are the main pollutants emitted by the petrochemical sector. CACs, including SO<sub>2</sub>, NO<sub>x</sub>, CO, VOCs, and particulate matter, are emitted from fuel combustion in the generation of process steam or in process heaters.

### 2.13.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
3711	325313	Nitric Acid Production
3711	325189	Sulphuric Acid Production
3712	325100	Isobutylene Production
3712	325190	Ketene Acid Production
3712	325100	Acetaldehyde Production
3761	325610	Soap and Cleaning Compounds
3712	325100	Industrial Chemicals
3712	325110	Petrochemical - Acrylonitrile Butadiene Styrene
3712	325110	Petrochemical - Acetic Acid
3712	325110	Petrochemical - Acetone
3712	325120	Petrochemical - Acetylene
3712	325190	Petrochemical - Adipic Acid
3712	325110	Petrochemical - Benzene
3712	325110	Petrochemical - <i>n</i> -Butyraldehyde

CDN SIC	NAICS	Description
3712	325110	Petrochemical - Butadiene
3712	325110	Petrochemical - Butylenes
3712	325210	Petrochemical - Butyl Rubber
3712	325190	Petrochemical - Benzoic Acid
3712	325110	Petrochemical - Cellulose acetate
3712	325110	Petrochemical - Cumene
3712	325110	Petrochemical - Cyclohexane
3712	325110	Petrochemical - Dodecene
3712	325190	Petrochemical - Ethylene Dichloride
3712	325190	Petrochemical - Ethylene Glycols
3712	325210	Petrochemical - Ethylene Oxide
3712	325110	Petrochemical - Epoxy Resins
3712	325190	Petrochemical - Ethanolamines
3712	325110	Petrochemical - Ethylbenzene
3712	325110	Petrochemical - Ethylene
3712	325190	Petrochemical - 2-Ethyl Hexanol
3712	325190	Petrochemical - Ethoxylated Alcohols
1121 or 3712	325190	Petrochemical - Ethyl Alcohol
3712	325190	Petrochemical - Formaldehyde
3712	325190	Petrochemical - Hexamethylene Diamine
3712	325190	Petrochemical - Hexamethylene Tetramine
3712	325190	Petrochemical - Isopropyl Alcohol
3712	325190	Petrochemical - Methanol
3712	325110	Petrochemical - Nonene
3712	325110	Petrochemical - Nonyl Phenol
3712	325110	Petrochemical - Nylon
3712	325110	Petrochemical - Polybutadiene
3712	325110	Petrochemical - Polyethylene - high density
3712	325110	Petrochemical - Polyethylene - low density
3712	325110	Petrochemical - Polyethylene - linear low density
3712	325110	Petrochemical - Pentaerythritol
3712	325110	Petrochemical - Polyetherpolyols
3712	325110	Petrochemical - Polyethylene terephthalate
3712	325110	Petrochemical - Propylene Glycols
3712	325110	Petrochemical - Phthalic Anhydride
3712	325210	Petrochemical - Phenol Formaldehyde Resin
3712	325110	Petrochemical - Phenol
3712	325110	Petrochemical - Propylene Oxide
3712	325110	Petrochemical - Polystyrene
3712	325110	Petrochemical - Polypropylene
3712	325110	Petrochemical - Propylene
3712	325190	Petrochemical - Polyvinylchloride

CDN SIC	NAICS	Description
3712	325210	Petrochemical - Styrene Butadiene Latex
3712	325210	Petrochemical - Styrene Butadiene Rubber
3712	325110	Petrochemical - Styrene
3712	325110	Petrochemical - Tetraethyl Lead
3712	325110	Petrochemical - Toluene
3712	325210	Petrochemical - Urea Formaldehyde Resin
3712	325110	Petrochemical - Vinyl Acetate
3712	325190	Petrochemical - Vinyl Chloride
3712	325110	Petrochemical - Xylenes
3712	325110	Petrochemical - Maleic Anhydride
3712	325110	Petrochemical - Fugitive Emissions

### 2.13.3 Source Description

Source descriptions applicable to the petrochemical source category are difficult to define. This is due mainly to the large number of sources and associated processes that can be very specific to the type of product produced. The following SCCs and descriptions are applicable for the organic and petrochemical industry:

SCC	Description (6 digit)	Description (8 digit)
30100101	Adipic Acid	General
30100102	Adipic Acid	Raw Material Storage
30100103	Adipic Acid	Cyclohexane Oxidation
30100104	Adipic Acid	Nitric Acid Reaction
30100105	Adipic Acid	Adipic Acid Refining
30100106	Adipic Acid	Drying, Loading, and Storage
30100107	Adipic Acid	Absorber
30100108	Adipic Acid	Dryer
30100109	Adipic Acid	Cooler
30100110	Adipic Acid	Loading And Storage
30100180	Adipic Acid	Fugitive Emissions: General
30100199	Adipic Acid	Other Not Classified
30100901	Cleaning Chemicals	Spray Drying: Soaps and Detergents
30100902	Cleaning Chemicals	Specialty Cleaners
30100905	Cleaning Chemicals	Alkaline Saponification
30100906	Cleaning Chemicals	Direct Saponification
30100907	Cleaning Chemicals	Blending And Mixing
30100908	Cleaning Chemicals	Soap Packaging
30100909	Cleaning Chemicals	Detergent Slurry Preparation
30100910	Cleaning Chemicals	Detergent Granule Handling
30100999	Cleaning Chemicals	Other Not Classified
30101005	Explosives (Trinitrotoluene)	Nitric/Sulphuric Acid Mixing
30101010	Explosives (Trinitrotoluene)	Process Vents: Batch Process

SCC	Description (6 digit)	Description (8 digit)
30101011	Explosives (Trinitrotoluene)	Batch Process: Nitration Reactors Fume Recovery
30101012	Explosives (Trinitrotoluene)	Batch Process: Nitration Reactors Acid Recovery
30101013	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentrators
30101014	Explosives (Trinitrotoluene)	Batch Process: Sulphuric Acid Concentrators
30101015	Explosives (Trinitrotoluene)	Batch Process: Red Water Incinerator
30101021	Explosives (Trinitrotoluene)	Continuous Process: Nitration Reactor Fume Recover (Use 3-01-010-51)
30101022	Explosives (Trinitrotoluene)	Continuous Process: Nitration Reactor Acid Recover (Use 3-01-010-52)
30101023	Explosives (Trinitrotoluene)	Continuous Process: Red Water Incinerator (Use 3-01-010-53)
30101025	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Denitrating Tower
30101026	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30101027	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Bleacher
30101028	Explosives (Trinitrotoluene)	Batch Process: Spent Acid Recovery: Reflux Columns
30101030	Explosives (Trinitrotoluene)	Open Burning: Waste
30101033	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Distillation Tower
30101034	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Bleacher
30101035	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Condenser
30101036	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Absorber Column
30101037	Explosives (Trinitrotoluene)	Batch Process: Nitric Acid Concentration: Dehydrating Unit
30101040	Explosives (Trinitrotoluene)	Batch Process: Purification
30101045	Explosives (Trinitrotoluene)	Batch Process: Finishing: Melt Tank
30101046	Explosives (Trinitrotoluene)	Batch Process: Finishing: Dryers
30101047	Explosives (Trinitrotoluene)	Batch Process: Finishing: Flaker Drum
30101050	Explosives (Trinitrotoluene)	Process Vents: Continuous Process
30101051	Explosives (Trinitrotoluene)	Continuous Process: Nitration Reactor Fume Recovery
30101052	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery
30101053	Explosives (Trinitrotoluene)	Continuous Process: Red Water Incineration
30101054	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentrators
30101055	Explosives (Trinitrotoluene)	Continuous Process: Sulphuric Acid Concentrators
30101061	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Denitrating Tower
30101062	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Sulphuric Acid Regenerator

SCC	Description (6 digit)	Description (8 digit)
30101063	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Bleacher
30101064	Explosives (Trinitrotoluene)	Continuous Process: Spent Acid Recovery: Reflux Columns
30101073	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Distillation Tower
30101074	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Bleacher
30101075	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Condenser
30101076	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Absorber Column
30101077	Explosives (Trinitrotoluene)	Continuous Process: Nitric Acid Concentration: Dehydrating Unit
30101080	Explosives (Trinitrotoluene)	Continuous Process: Purification
30101085	Explosives (Trinitrotoluene)	Continuous Process: Finishing: Melt Tank
30101086	Explosives (Trinitrotoluene)	Continuous Process: Finishing: Dryers
30101087	Explosives (Trinitrotoluene)	Continuous Process: Finishing: Flaker Drum
30101099	Explosives (Trinitrotoluene)	Other Not Classified
30101801	Plastics Production	Polyvinyl Chlorides and Copolymers (Use 6-46-3X0-XX)
30101802	Plastics Production	Polypropylene and Copolymers
30101803	Plastics Production	Ethylene-Propylene Copolymers
30101805	Plastics Production	Phenolic Resins
30101807	Plastics Production	General: Polyethylene (High Density)
30101808	Plastics Production	Monomer and Solvent Storage
30101809	Plastics Production	Extruder
30101810	Plastics Production	Conveying
30101811	Plastics Production	Storage
30101812	Plastics Production	General: Polyethylene (Low Density)
30101813	Plastics Production	Recovery and Purification System
30101814	Plastics Production	Extruder
30101815	Plastics Production	Pellet Silo
30101816	Plastics Production	Transferring/Handling/Loading/Packing
30101817	Plastics Production	General
30101818	Plastics Production	Reactor
30101819	Plastics Production	Solvent Recovery
30101820	Plastics Production	Polymer Drying
30101821	Plastics Production	Extruding/Pelletizing/Conveying/Storage
30101822	Plastics Production	Acrylic Resins
30101827	Plastics Production	Polyamide Resins
30101832	Plastics Production	Urea-Formaldehyde Resins
30101837	Plastics Production	Polyester Resins
30101838	Plastics Production	Reactor Kettle (Use 6-45-200-11 or 6-45-210-11)
30101839	Plastics Production	Resin Thinning Tank (Use 6-45-200-21 or 6-45-210-21)
30101840	Plastics Production	Resin Storage Tank (Use 6-45-200-23 or 6-45-210-23)

SCC	Description (6 digit)	Description (8 digit)
30101842	Plastics Production	Melamine Resins
30101847	Plastics Production	Epoxy Resins
30101849	Plastics Production	Acrylonitrile-Butadiene-Styrene (ABS) Resin
30101852	Plastics Production	Polyfluorocarbons
30101860	Plastics Production	Recovery System (Polyethylene)
30101861	Plastics Production	Purification System (Polyethylene)
30101863	Plastics Production	Extruder
30101864	Plastics Production	Pellet Silo/Storage
30101865	Plastics Production	Transferring/Conveying
30101866	Plastics Production	Packing/Shipping
30101870	Plastics Production	Reactor (Polyether Resins)
30101871	Plastics Production	Blowing Agent: Freon (Polyether Resins)
30101872	Plastics Production	Miscellaneous (Polyether Resins)
30101880	Plastics Production	Reactor (Polyurethane)
30101881	Plastics Production	Blowing Agent: Freon (Polyurethane)
30101882	Plastics Production	Blowing Agent: Methylene Chloride (Polyurethane)
30101883	Plastics Production	Transferring/Conveying/Storage (Polyurethane)
30101884	Plastics Production	Packing/Shipping (Polyurethane)
30101885	Plastics Production	Other Not Classified (Polyurethane)
30101890	Plastics Production	Catalyst Preparation
30101891	Plastics Production	Reactor Vents
30101892	Plastics Production	Separation Processes
30101893	Plastics Production	Raw Material Storage
30101894	Plastics Production	Solvent Storage
30101899	Plastics Production	Others Not Specified
30101901	Phthalic Anhydride	o-Xylene Oxidation: Main Process Stream
30101902	Phthalic Anhydride	o-Xylene Oxidation: Pre-Treatment
30101904	Phthalic Anhydride	o-Xylene Oxidation: Distillation
30101905	Phthalic Anhydride	Naphthalene Oxidation: Main Process Stream
30101906	Phthalic Anhydride	Naphthalene Oxidation: Pre-Treatment
30101907	Phthalic Anhydride	Naphthalene Oxidation: Distillation
30101908	Phthalic Anhydride	Dryer
30101909	Phthalic Anhydride	Flaking and Bagging
30102401	Synthetic Organic Fibre Manufacturing	Nylon #6: Staple (Uncontrolled)
30102402	Synthetic Organic Fibre Manufacturing	Polyesters: Staple
30102403	Synthetic Organic Fibre Manufacturing	Polyester: Yarn
30102404	Synthetic Organic Fibre Manufacturing	Nylon #6: Yarn
30102405	Synthetic Organic Fibre Manufacturing	Polyfluorocarbons (e.g., Teflon)
30102406	Synthetic Organic Fibre Manufacturing	Nylon#66: Controlled
30102407	Synthetic Organic Fibre Manufacturing	Nylon #66: Uncontrolled
30102408	Synthetic Organic Fibre Manufacturing	Acrylic: Copolymer (Inorganic)
30102409	Synthetic Organic Fibre Manufacturing	Acrylic: Controlled
30102410	Synthetic Organic Fibre Manufacturing	Acrylic: Uncontrolled
30102411	Synthetic Organic Fibre Manufacturing	Modacrylic: Dry Spun
30102412	Synthetic Organic Fibre Manufacturing	Acrylic and Modacrylic: Wet Spun

SCC	Description (6 digit)	Description (8 digit)
30102413	Synthetic Organic Fibre Manufacturing	Acrylic: Homopolymer (Inorganic): Wet Spun
30102414	Synthetic Organic Fibre Manufacturing	Polyolefin: Melt Spun
30102415	Synthetic Organic Fibre Manufacturing	Vinyls (e.g., Saran)
30102416	Synthetic Organic Fibre Manufacturing	Aramid
30102417	Synthetic Organic Fibre Manufacturing	Spandex: Dry Spun (Use 6-49-300-XX)
30102418	Synthetic Organic Fibre Manufacturing	Spandex: Reaction Spun (Use 6-49-310-XX)
30102419	Synthetic Organic Fibre Manufacturing	Vinyon: Dry Spun
30102421	Synthetic Organic Fibre Manufacturing	Dope Preparation (Use 6-49-300-11 or 6-49-310-11 for Spandex)
30102422	Synthetic Organic Fibre Manufacturing	Filtration (Use 6-49-300-12 or 6-49-310-12 for Spandex)
30102423	Synthetic Organic Fibre Manufacturing	Fibre Extrusion (Use 6-49-300-21 or 6-49-310-21 for Spandex)
30102424	Synthetic Organic Fibre Manufacturing	Washing/Drying/Finishing (Use 6-49-300-30 or 6-49-310-30 for Spandex)
30102425	Synthetic Organic Fibre Manufacturing	Fibre Storage (Use 6-49-300-45 or 6-49-310-45 for Spandex)
30102426	Synthetic Organic Fibre Manufacturing	Equipment Cleanup (Use 6-49-300-50 or 6-49-310-50 for Spandex)
30102427	Synthetic Organic Fibre Manufacturing	Solvent Storage (Use 4-07-004-01 through 4-07-999-98 for Spandex)
30102428	Synthetic Organic Fibre Manufacturing	Leaching
30102429	Synthetic Organic Fibre Manufacturing	Mixing
30102431	Synthetic Organic Fibre Manufacturing	Heat Treating Furnace: Carbonization
30102432	Synthetic Organic Fibre Manufacturing	Curing Oven: Carbonization
30102434	Synthetic Organic Fibre Manufacturing	Fibre Laminate Process
30102435	Synthetic Organic Fibre Manufacturing	Fibre Handling and Storage
30102499	Synthetic Organic Fibre Manufacturing	Other Not Classified
30102501	Cellulosic Fibre Production	Viscose (e.g., Rayon) (Use 6-49-200-XX)
30102505	Cellulosic Fibre Production	Cellulose Acetate: Filer Tow
30102506	Cellulosic Fibre Production	Cellulose Acetate and Triacetitic, Filament Yarn
30102599	Cellulosic Fibre Production	Other Not Classified
30102601	Synthetic Rubber (Manufacturing Only)	General
30102602	Synthetic Rubber (Manufacturing Only)	Butyl (Isobutylene)
30102608	Synthetic Rubber (Manufacturing Only)	Acrylonitrile
30102609	Synthetic Rubber (Manufacturing Only)	Dryers
30102610	Synthetic Rubber (Manufacturing Only)	Blowdown Tank
30102611	Synthetic Rubber (Manufacturing Only)	Steam Stripper
30102612	Synthetic Rubber (Manufacturing Only)	Pre-storage Tank
30102613	Synthetic Rubber (Manufacturing Only)	Monomer Recovery: Absorber Vent

SCC	Description (6 digit)	Description (8 digit)
30102614	Synthetic Rubber (Manufacturing Only)	Blending Tanks
30102615	Synthetic Rubber (Manufacturing Only)	Isoprene
30102616	Synthetic Rubber (Manufacturing Only)	Latex: Monomer Removal
30102617	Synthetic Rubber (Manufacturing Only)	Latex: Blending Tank
30102618	Synthetic Rubber (Manufacturing Only)	Uninhibited Monomer Storage
30102619	Synthetic Rubber (Manufacturing Only)	Inhibited Monomer Storage
30102620	Synthetic Rubber (Manufacturing Only)	Monomer Inhibitor Removal
30102621	Synthetic Rubber (Manufacturing Only)	Emulsion Crumb Process: Polymerization
30102622	Synthetic Rubber (Manufacturing Only)	Emulsion Crumb Process: Monomer Recovery: Uncontrolled
30102623	Synthetic Rubber (Manufacturing Only)	Emulsion Crumb Process: Styrene Recovery
30102624	Synthetic Rubber (Manufacturing Only)	Emulsion Crumb Process: Crumb Screens
30102625	Synthetic Rubber (Manufacturing Only)	Chloroprene
30102626	Synthetic Rubber (Manufacturing Only)	Emulsion Crumb Process: Crumb Bailing and Weighing
30102627	Synthetic Rubber (Manufacturing Only)	Emulsion Crumb Process: Crumb Storage
30102628	Synthetic Rubber (Manufacturing Only)	Emulsion Crumb Process: Rotary Press
30102630	Synthetic Rubber (Manufacturing Only)	Silicone Rubber
30102641	Synthetic Rubber (Manufacturing Only)	Emulsion Latex Process: Polymerization
30102642	Synthetic Rubber (Manufacturing Only)	Emulsion Latex Process: Styrene Condenser
30102643	Synthetic Rubber (Manufacturing Only)	Emulsion Latex Process: Latex Screen Filters
30102644	Synthetic Rubber (Manufacturing Only)	Emulsion Latex Process: Latex Packaging
30102645	Synthetic Rubber (Manufacturing Only)	Emulsion Latex Process: Latex Loading
30102646	Synthetic Rubber (Manufacturing Only)	Emulsion Latex Process: Latex Product Storage
30102650	Synthetic Rubber (Manufacturing Only)	Fugitive Emissions: Monomer Unloading
30102651	Synthetic Rubber (Manufacturing Only)	Fugitive Emissions: Soap Solution Storage
30102652	Synthetic Rubber (Manufacturing Only)	Fugitive Emissions: Activated Catalyst Storage

SCC	Description (6 digit)	Description (8 digit)
30102653	Synthetic Rubber (Manufacturing Only)	Fugitive Emissions: Modifier Storage
30102654	Synthetic Rubber (Manufacturing Only)	Fugitive Emissions: Stabilizer Storage
30102655	Synthetic Rubber (Manufacturing Only)	Fugitive Emissions: Antioxidant Storage
30102656	Synthetic Rubber (Manufacturing Only)	Fugitive Emissions: Carbon Black Storage
30103101	Terephthalic Acid/Dimethyl Terephthalate	HNO3 - Para-xylene: General
30103102	Terephthalic Acid/Dimethyl Terephthalate	Reactor Vent
30103103	Terephthalic Acid/Dimethyl Terephthalate	Crystallization, Separation, and Drying Vent
30103104	Terephthalic Acid/Dimethyl Terephthalate	Distillation and Recovery Vent
30103105	Terephthalic Acid/Dimethyl Terephthalate	Product Transfer Vent
30103106	Terephthalic Acid/Dimethyl Terephthalate	Gas/Liquid Separator
30103107	Terephthalic Acid/Dimethyl Terephthalate	High Pressure Absorber
30103108	Terephthalic Acid/Dimethyl Terephthalate	Solid/Liquid Separator
30103109	Terephthalic Acid/Dimethyl Terephthalate	Residue Still
30103110	Terephthalic Acid/Dimethyl Terephthalate	C-TPA Purification
30103180	Terephthalic Acid/Dimethyl Terephthalate	Fugitive Emissions
30103199	Terephthalic Acid/Dimethyl Terephthalate	Other Not Classified
30103402	Aniline/Ethanolamines	General: Aniline
30103403	Aniline/Ethanolamines	Reactor Cycle Purge Vent
30103404	Aniline/Ethanolamines	Dehydration Column Vent
30103405	Aniline/Ethanolamines	Purification Column Vent
30103406	Aniline/Ethanolamines	Fugitive Emissions
30103410	Aniline/Ethanolamines	General: Ethanolamines
30103411	Aniline/Ethanolamines	Ammonia Scrubber Vent
30103412	Aniline/Ethanolamines	Vacuum Distillation: Jet Vent
30103414	Aniline/Ethanolamines	Fugitive Emissions
30103415	Aniline/Ethanolamines	Ethylenediamine
30103420	Aniline/Ethanolamines	Hexamethylenediamine
30103425	Aniline/Ethanolamines	Hexamethylenetetramine
30103430	Aniline/Ethanolamines	Melamine
30103435	Aniline/Ethanolamines	Methylamines
30103499	Aniline/Ethanolamines	Other Not Classified
30104201	Lead Alkyl Manufacturing (Sodium/Lead Alloy Process)	Recovery Furnace

SCC	Description (6 digit)	Description (8 digit)
30104202	Lead Alkyl Manufacturing (Sodium/Lead Alloy Process)	Process Vents: Tetraethyl Lead
30104203	Lead Alkyl Manufacturing (Sodium/Lead Alloy Process)	Process Vents: Tetramethyl Lead
30104204	Lead Alkyl Manufacturing (Sodium/Lead Alloy Process)	Sludge Pits
30104301	Lead Alkyl Manufacturing (Electrolytic Process)	General
30104501	Organic Fertilizer	General: Mixing/Handling
30105001	Adhesives	General/Compound Unknown
30105101	Animal Adhesives	Animal Adhesives
30105105	Animal Adhesives	Raw Materials Grinding
30105108	Animal Adhesives	Degreasing
30105110	Animal Adhesives	Lining/Plumping
30105112	Animal Adhesives	Washing
30105114	Animal Adhesives	Cooking
30105116	Animal Adhesives	Hot Water Extractions
30105118	Animal Adhesives	Filtering/Centrifuging
30105120	Animal Adhesives	Evaporation
30105122	Animal Adhesives	Chilling
30105124	Animal Adhesives	Drying
30105130	Animal Adhesives	End Product Finishing
30105201	Casein	Casein Manufacture
30105205	Casein	Precipitation
30105210	Casein	Draining
30105211	Casein	Draining: Batch Method
30105212	Casein	Draining: Continuous Method
30105215	Casein	Washing
30105220	Casein	Dewatering
30105221	Casein	Dewatering: Continuous Power Press
30105222	Casein	Dewatering: Hand Press
30105230	Casein	Grinding Curd
30105235	Casein	Drying
30105240	Casein	Grinding, Packaging, and Storing
30106001	Pharmaceutical Preparations	Vacuum Dryers
30106002	Pharmaceutical Preparations	Reactors
30106003	Pharmaceutical Preparations	Distillation Units
30106004	Pharmaceutical Preparations	Filters
30106005	Pharmaceutical Preparations	Extractors
30106006	Pharmaceutical Preparations	Centrifuges
30106007	Pharmaceutical Preparations	Crystallizers
30106008	Pharmaceutical Preparations	Exhaust Systems
30106009	Pharmaceutical Preparations	Air Dryers
30106010	Pharmaceutical Preparations	Storage/Transfer
30106011	Pharmaceutical Preparations	Coating Process
30106012	Pharmaceutical Preparations	Granulation Process
30106013	Pharmaceutical Preparations	Fermentation Tanks

SCC	Description (6 digit)	Description (8 digit)
30106021	Pharmaceutical Preparations	Raw Material Unloading
30106022	Pharmaceutical Preparations	Miscellaneous Fugitives
30106023	Pharmaceutical Preparations	Miscellaneous Fugitives
30109101	Acetone/Ketone Production	Acetone: General
30109105	Acetone/Ketone Production	Methyl Ethyl Ketone
30109110	Acetone/Ketone Production	Methyl Isobutyl Ketone
30109151	Acetone/Ketone Production	Acetone: Cumene Oxidation
30109152	Acetone/Ketone Production	Acetone: CHP Concentrator
30109153	Acetone/Ketone Production	Acetone: Light-ends Distillation Vent
30109154	Acetone/Ketone Production	Acetone: Finishing Column
30109180	Acetone/Ketone Production	Acetone: Fugitive Emissions
30109199	Acetone/Ketone Production	Ketone: Other Not Classified
30110002	Maleic Anhydride	Product Recovery Absorber
30110003	Maleic Anhydride	Vacuum System Vent
30110004	Maleic Anhydride	Briquetting
30110005	Maleic Anhydride	Secondary Sources: Dehydration Column, Vacuum System
30110080	Maleic Anhydride	Fugitive Emissions
30110099	Maleic Anhydride	Other Not Classified
30112001	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Formaldehyde: Silver Catalyst
30112002	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Formaldehyde: Mixed Oxide Catalyst
30112005	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Formaldehyde: Absorber Vent
30112006	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Formaldehyde: Fractionator Vent
30112007	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Formaldehyde: Fugitive Emissions
30112011	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acetaldehyde from Ethylene
30112012	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acetaldehyde from Ethanol
30112013	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acetaldehyde: Off-air Absorber Vent
30112014	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acetaldehyde: Off-gas Absorber Vent
30112017	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acetaldehyde: Fugitive Emissions
30112021	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Butyraldehyde: General
30112031	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acrolein: CO2 Stripping Tower
30112032	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acrolein: Aqueous Acrolein Receiver
30112033	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acrolein: Distillation System
30112034	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acrolein: Refrigeration Unit

SCC	Description (6 digit)	Description (8 digit)
30112037	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acrolein: Fugitive Emissions
30112099	Formaldehyde, Acrolein, Acetaldehyde, Butyraldehyde	Acrolein: Other Not Classified
30112199	Organic Dyes/Pigments	Other Not Classified
30112401	Chloroprene	General
30112402	Chloroprene	Butadiene Dryer
30112403	Chloroprene	Chlorination Reactor
30112404	Chloroprene	Dichlorobutene Still
30112405	Chloroprene	Isomerization and 3,4-DCB Recovery Vent
30112406	Chloroprene	Chloroprene Stripper
30112407	Chloroprene	Brine Stripper
30112480	Chloroprene	Fugitive Emissions
30112501	Chlorine Derivatives	Ethylene Dichloride via Oxychlorination
30112502	Chlorine Derivatives	Ethylene Dichloride via Direct Chlorination
30112504	Chlorine Derivatives	Ethylene Dichloride: Caustic Scrubber
30112505	Chlorine Derivatives	Ethylene Dichloride: Reactor Vessel
30112506	Chlorine Derivatives	Ethylene Dichloride: Distillation Unit
30112509	Chlorine Derivatives	Ethylene Dichloride: Fugitive Emissions
30112510	Chlorine Derivatives	Chloromethanes: General
30112511	Chlorine Derivatives	Chloromethanes: Recycled Methane Inert-purge
30112512	Chlorine Derivatives	Chloromethanes: Drying Bed Regeneration Vent
30112514	Chlorine Derivatives	Chloromethanes: Fugitive Emissions
30112515	Chlorine Derivatives	Ethyl Chloride: General
30112520	Chlorine Derivatives	Perchloroethylene: General
30112521	Chlorine Derivatives	Perchloroethylene: Distillation Vent
30112522	Chlorine Derivatives	Perchloroethylene: Caustic Scrubber
30112524	Chlorine Derivatives	Perchloroethylene: Fugitive Emissions
30112525	Chlorine Derivatives	Trichloroethane: General
30112526	Chlorine Derivatives	Trichloroethane: HCl Absorber Vent
30112527	Chlorine Derivatives	Trichloroethane: Drying Column Vent
30112528	Chlorine Derivatives	Trichloroethane: Distillation Column Vent
30112529	Chlorine Derivatives	Trichloroethane: Fugitive Emissions
30112530	Chlorine Derivatives	Trichloroethylene: General
30112531	Chlorine Derivatives	Trichloroethylene: Distillation Unit
30112532	Chlorine Derivatives	Trichloroethylene: Neutralizer
30112533	Chlorine Derivatives	Trichloroethylene: Product Drying Column
30112534	Chlorine Derivatives	Trichloroethylene: Fugitive Emissions
30112535	Chlorine Derivatives	Chlorobenzenes: General
30112540	Chlorine Derivatives	Vinyl Chloride: General
30112541	Chlorine Derivatives	Vinyl Chloride: Cracking Furnace
30112542	Chlorine Derivatives	Vinyl Chloride: HCl Recovery
30112543	Chlorine Derivatives	Vinyl Chloride: Light-ends Recovery
30112544	Chlorine Derivatives	Dichloroethane: Drying Column
30112545	Chlorine Derivatives	Vinyl Chloride Monomer: Drying Column

SCC	Description (6 digit)	Description (8 digit)
30112546	Chlorine Derivatives	Vinyl Chloride: Product Recovery Still
30112547	Chlorine Derivatives	Vinyl Chloride: Cracking Furnace Decoking
30112550	Chlorine Derivatives	Vinyl Chloride: Fugitive Emissions
30112551	Chlorine Derivatives	Vinylidene Chloride: General
30112552	Chlorine Derivatives	Vinylidene Chloride: Dehydrochlorination Reactor
30112553	Chlorine Derivatives	Vinylidene Chloride: Distillation Column Vent
30112555	Chlorine Derivatives	Vinylidene Chloride: Fugitive Emissions
30112556	Chlorine Derivatives	Chloromethanes via MH & MCC Processes: Inert-gas Purge Vent
30112557	Chlorine Derivatives	Chloromethanes via MH & MCC Processes: Methylene Chloride Condenser
30112558	Chlorine Derivatives	Chloromethanes via MH & MCC Processes: Chloroform Condenser
30112599	Chlorine Derivatives	Other Not Classified
30112699	Brominated Organics	Bromine Organics
30112701	Fluorocarbons/Chlorofluorocarbons	General
30112702	Fluorocarbons/Chlorofluorocarbons	Distillation Column
30112703	Fluorocarbons/Chlorofluorocarbons	HCl Recovery Column
30112720	Fluorocarbons/Chlorofluorocarbons	Chlorofluorocarbon 12/11
30112730	Fluorocarbons/Chlorofluorocarbons	Chlorofluorocarbon 23/22
30112740	Fluorocarbons/Chlorofluorocarbons	Chlorofluorocarbon 113/114
30112780	Fluorocarbons/Chlorofluorocarbons	Fugitive Emissions
30113201	Organic Acid Manufacturing	Acetic Acid via Methanol
30113205	Organic Acid Manufacturing	Acetic Acid via Butane
30113210	Organic Acid Manufacturing	Acetic Acid via Acetaldehyde
30113221	Organic Acid Manufacturing	General: Acrylic Acid
30113222	Organic Acid Manufacturing	Quench Absorber
30113223	Organic Acid Manufacturing	Extraction Column
30113224	Organic Acid Manufacturing	Vacuum System
30113227	Organic Acid Manufacturing	Fugitive Emissions
30113299	Organic Acid Manufacturing	Other Not Classified
30113301	Acetic Anhydride	General
30113302	Acetic Anhydride	Reactor By-product Gas Vent
30113303	Acetic Anhydride	Distillation Column Vent
30113380	Acetic Anhydride	Fugitive Emissions
30113701	Esters Production	Ethyl Acrylate
30113710	Esters Production	Butyl Acrylate
30113799	Esters Production	Acrylates
30114001	Acetylene Production	Raw Material Handling
30114002	Acetylene Production	Grinding/Milling
30114003	Acetylene Production	Mixing
30114004	Acetylene Production	Waste Handling
30114005	Acetylene Production	General
30115201	Bisphenol A	General
30115301	Butadiene	General
30115310	Butadiene	Houdry Process: Total

SCC	Description (6 digit)	Description (8 digit)
30115311	Butadiene	Houdry Process: Flue Gas Vent
30115312	Butadiene	Houdry Process: Dehydrogenation Reactor
30115320	Butadiene	n-Butene Process: Total
30115321	Butadiene	n-Butene Process: Flue Gas Vent
30115322	Butadiene	n-Butene Process: Hydrocarbon Absorber Column
30115380	Butadiene	Fugitive Emissions
30115601	Cumene	General
30115602	Cumene	Aluminum Chloride Catalyst Process: Benzene Drying Column
30115603	Cumene	Aluminum Chloride Catalyst Process: Catalyst Mix Tank Scrubber Vent
30115604	Cumene	Aluminum Chloride Catalyst Process: Wash-Decant System Vent
30115605	Cumene	Aluminum Chloride Catalyst Process: Benzene Recovery
30115606	Cumene	Aluminum Chloride Catalyst Process: Cumene Distillation Vent
30115607	Cumene	Aluminum Chloride Catalyst Process: DIPB Stripping Vent
30115609	Cumene	Solid Phosphoric Acid Catalyst Process: Cumene Distillation System Vent
30115680	Cumene	Fugitive Emissions
30115701	Cyclohexane	General
30115702	Cyclohexane	Blowdown Tank Discharge
30115703	Cyclohexane	Pumps/Valves/Compressors
30115704	Cyclohexane	Catalyst Replacement
30115780	Cyclohexane	Fugitive Emissions
30115801	Cyclohexanone/Cyclohexanol	General
30115802	Cyclohexanone/Cyclohexanol	High Pressure Scrubber Vent
30115803	Cyclohexanone/Cyclohexanol	Low Pressure Scrubber Vent
30115821	Cyclohexanone/Cyclohexanol	Hydrogenation Reactor Vent
30115822	Cyclohexanone/Cyclohexanol	Distillation Vent
30115880	Cyclohexanone/Cyclohexanol	Fugitive Emissions
30116701	Vinyl Acetate	General
30116702	Vinyl Acetate	Inert-gas Purge Vent
30116703	Vinyl Acetate	CO2 Purge Vent
30116704	Vinyl Acetate	Inhibitor Mix Tank Discharge
30116780	Vinyl Acetate	Fugitive Emissions
30116799	Vinyl Acetate	Other Not Classified
30116901	Ethyl Benzene	General
30116902	Ethyl Benzene	Alkylation Reactor Vent
30116903	Ethyl Benzene	Benzene Drying
30116904	Ethyl Benzene	Benzene Recovery/Recycle
30116905	Ethyl Benzene	Ethylbenzene Recovery
30116906	Ethyl Benzene	Polyethylbenzene Recovery
30116980	Ethyl Benzene	Fugitive Emissions
30117401	Ethylene Oxide	General

SCC	Description (6 digit)	Description (8 digit)
30117402	Ethylene Oxide	Air Oxidation Process Reactor: Main Vent
30117410	Ethylene Oxide	Oxygen Oxidation Process Reactor: CO2 Purge Vent
30117411	Ethylene Oxide	Oxygen Oxidation Process Reactor: Argon Purge Vent
30117421	Ethylene Oxide	Stripper Purge Vent
30117480	Ethylene Oxide	Fugitive Emissions
30117601	Glycerin (Glycerol)	General
30117610	Glycerin (Glycerol)	Chlorination Process: General
30117611	Glycerin (Glycerol)	CO2 Absorber
30117612	Glycerin (Glycerol)	Evaporator
30117613	Glycerin (Glycerol)	Concentrator
30117614	Glycerin (Glycerol)	Stripping Column
30117615	Glycerin (Glycerol)	Light-ends Stripping Column
30117616	Glycerin (Glycerol)	Solvent Stripping Column
30117617	Glycerin (Glycerol)	Product Distillation Column
30117618	Glycerin (Glycerol)	Cooling Tower
30117630	Glycerin (Glycerol)	Oxidation Process: General
30117631	Glycerin (Glycerol)	Light-ends Stripper
30117632	Glycerin (Glycerol)	Concentrator
30117633	Glycerin (Glycerol)	Glycerin Flasher Column
30117634	Glycerin (Glycerol)	Product Distillation Column
30117680	Glycerin (Glycerol)	Fugitive Emissions
30118101	Toluene Diisocyanate	General
30118102	Toluene Diisocyanate	Sulphuric Acid Concentrator
30118103	Toluene Diisocyanate	Nitration Reactor
30118104	Toluene Diisocyanate	Catalyst Filtration
30118105	Toluene Diisocyanate	TDA Vacuum Distillation Vent
30118106	Toluene Diisocyanate	Dichlorobenzene Solvent Recovery
30118107	Toluene Diisocyanate	TDI Flash Distillation
30118108	Toluene Diisocyanate	TDI Purification
30118109	Toluene Diisocyanate	Residue Vacuum Distillation Unit
30118110	Toluene Diisocyanate	HCl Absorber
30118180	Toluene Diisocyanate	Fugitive Emissions
30119001	Methyl Methacrylate	General
30119002	Methyl Methacrylate	Acetone Cyanohydrin Reactor Off-gas
30119003	Methyl Methacrylate	Recovery Columns
30119004	Methyl Methacrylate	Acetone Evaporation Vacuum Vent
30119010	Methyl Methacrylate	Hydrolysis Reactor
30119011	Methyl Methacrylate	Distillation Unit
30119012	Methyl Methacrylate	MMA and Light-ends Distillation Unit
30119013	Methyl Methacrylate	Acid Distillation
30119014	Methyl Methacrylate	MMA Purification
30119080	Methyl Methacrylate	Fugitive Emissions
30119501	Nitrobenzene	General
30119502	Nitrobenzene	Reactor and Separator Vent
30119503	Nitrobenzene	Acid Stripper Vent

SCC	Description (6 digit)	Description (8 digit)
30119504	Nitrobenzene	Washer and Neutralizer Vent
30119505	Nitrobenzene	Nitrobenzene Stripper Vent
30119506	Nitrobenzene	Waste Acid Storage
30119580	Nitrobenzene	Fugitive Emissions
30119701	Butylene, Ethylene, Propylene, Olefin Production	Ethylene: General
30119705	Butylene, Ethylene, Propylene, Olefin Production	Propylene: General
30119706	Butylene, Ethylene, Propylene, Olefin Production	Propylene: Reactor
30119707	Butylene, Ethylene, Propylene, Olefin Production	Propylene: Drying Tower
30119708	Butylene, Ethylene, Propylene, Olefin Production	Propylene: Light-ends Stripper
30119709	Butylene, Ethylene, Propylene, Olefin Production	Propylene: Fugitive Emissions
30119710	Butylene, Ethylene, Propylene, Olefin Production	Butylene: General
30119741	Butylene, Ethylene, Propylene, Olefin Production	Ethylene: Flue Gas Vent
30119742	Butylene, Ethylene, Propylene, Olefin Production	Ethylene: Pyrolysis Furnace Decoking
30119743	Butylene, Ethylene, Propylene, Olefin Production	Ethylene: Acid Gas Removal
30119744	Butylene, Ethylene, Propylene, Olefin Production	Ethylene: Catalyst Regeneration
30119745	Butylene, Ethylene, Propylene, Olefin Production	Ethylene: Compressor Lube Oil Vent
30119749	Butylene, Ethylene, Propylene, Olefin Production	Ethylene: Fugitive Emissions
30119799	Butylene, Ethylene, Propylene, Olefin Production	Other Not Classified
30120201	Phenol	General
30120202	Phenol	Cumene Oxidation
30120203	Phenol	CHP Concentrator
30120204	Phenol	Light-ends Distillation Vent
30120205	Phenol	Acetone Finishing
30120206	Phenol	Phenol Distillation Column
30120210	Phenol	Oxidate Wash/Separation
30120211	Phenol	CHP Cleavage Vent
30120280	Phenol	Fugitive Emissions
30120501	Propylene Oxide	General
30120502	Propylene Oxide	Chlorohydrination Process: General
30120503	Propylene Oxide	Vent Gas Scrubber Vent
30120504	Propylene Oxide	Saponification Column Vent
30120505	Propylene Oxide	PO Stripping Column Vent
30120506	Propylene Oxide	Light-ends Stripping Column Vent
30120507	Propylene Oxide	PO Final Distillation Column Vent
30120508	Propylene Oxide	DCP Distillation Column Vent

SCC	Description (6 digit)	Description (8 digit)
30120509	Propylene Oxide	DCIPE Distillation Column Vent
30120520	Propylene Oxide	Isobutane Hydroperoxide Process: General
30120521	Propylene Oxide	Oxidation Reactor Scrubber Vent
30120522	Propylene Oxide	TBA Stripping Column Vent
30120523	Propylene Oxide	Catalyst Mix Tank Vent
30120524	Propylene Oxide	PO Stripping Column Vent
30120525	Propylene Oxide	Crude TBA Recovery Column Vent
30120526	Propylene Oxide	TBA Wash-Decant System Vent
30120527	Propylene Oxide	Wastewater Stripping Column Vent
30120528	Propylene Oxide	Solvent Scrubber Vent
30120529	Propylene Oxide	Solvent Recovery Column Vent
30120530	Propylene Oxide	Water Stripping Column Vent
30120531	Propylene Oxide	Propylene Glycol and Dipropylene Glycol Combined Vent
30120532	Propylene Oxide	Flue Gas Vent
30120540	Propylene Oxide	Ethylbenzene Hydroperoxide Process: General
30120541	Propylene Oxide	Oxidation Reactor Scrubber Vent
30120542	Propylene Oxide	Falling Film Evaporator Vent
30120543	Propylene Oxide	Catalyst Mix Tank Vent
30120544	Propylene Oxide	Separation Column Vent
30120545	Propylene Oxide	Light-ends Stripping Column Vent
30120546	Propylene Oxide	Propylene Recovery Column Vent
30120547	Propylene Oxide	Product Wash-Decant System Vent
30120548	Propylene Oxide	Mixed Hydrocarbon Wash-Decant System Vent
30120549	Propylene Oxide	Ethyl Benzene Wash-Decant System Vent
30120550	Propylene Oxide	Ethyl Benzene Stripping Column Vent
30120551	Propylene Oxide	Light-hydrocarbon Stripping Column Vent
30120552	Propylene Oxide	MBA-AP Stripping Column Vent
30120553	Propylene Oxide	Dehydration Reactor System Vent
30120554	Propylene Oxide	Light-impurities Stripping Column Vent
30120555	Propylene Oxide	Styrene Finishing Column Vent
30120580	Propylene Oxide	Fugitive Emissions
30120601	Styrene	General
30120602	Styrene	Benzene Recycle
30120603	Styrene	Styrene Purification
30120680	Styrene	Fugitive Emissions
30121001	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	General
30121002	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Cyclohexanone Purification Vent
30121003	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Dehydrogenation Reactor Vent

SCC	Description (6 digit)	Description (8 digit)
30121004	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Oleum Reactor
30121005	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Neutralization Reactor Vent
30121006	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Solvent Separation/Recovery
30121007	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Oximation Reactor/Separator
30121008	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Caprolactum Purification
30121009	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Ammonium Sulphate Drying (Use 3-01-130-04 or 3-01-130-05)
30121010	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	AS: Cool/Screen/Storage (Use 301130-06&07,301870-25&26,301875-25&26)
30121080	Caprolactum (Use 3-01-130 for Ammonium Sulphate By-product Production)	Fugitive Emissions
30121101	Linear Alkylbenzene	Olefin Process: General
30121102	Linear Alkylbenzene	Benzene Drying
30121103	Linear Alkylbenzene	Hydrogen Fluoride Scrubber Vent
30121104	Linear Alkylbenzene	Vacuum Refining
30121121	Linear Alkylbenzene	Chlorination Process: General
30121122	Linear Alkylbenzene	Paraffin Drying Column Vent
30121123	Linear Alkylbenzene	HCl Absorber Vent
30121124	Linear Alkylbenzene	Atmospheric Wash-Decant Vent
30121125	Linear Alkylbenzene	Benzene Stripping Column
30121180	Linear Alkylbenzene	Fugitive Emissions
30125001	Methanol/Alcohol Production	Methanol: General
30125002	Methanol/Alcohol Production	Methanol: Purge Gas Vent
30125003	Methanol/Alcohol Production	Methanol: Distillation Vent
30125004	Methanol/Alcohol Production	Methanol: Fugitive Emissions
30125005	Methanol/Alcohol Production	Ethanol via Ethylene
30125010	Methanol/Alcohol Production	Ethanol by Fermentation
30125015	Methanol/Alcohol Production	Isopropanol
30125020	Methanol/Alcohol Production	Alcohols by Oxo Process
30125025	Methanol/Alcohol Production	Fatty Alcohols by Hydrogenation
30125099	Methanol/Alcohol Production	Other Not Classified
30125101	Ethylene Glycol	General
30125102	Ethylene Glycol	Evaporator Purge Vent
30125103	Ethylene Glycol	Water Removal Steam: Jet Ejector
30125104	Ethylene Glycol	Distillation Column Vent
30125180	Ethylene Glycol	Fugitive Emissions

SCC	Description (6 digit)	Description (8 digit)
30125201	Etherene Production	General
30125301	Glycol Ethers	General
30125302	Glycol Ethers	Vacuum System Vent
30125305	Glycol Ethers	Catalyst: Methanol Mix Tank
30125306	Glycol Ethers	Methanol Recovery Column Vent
30125315	Glycol Ethers	Catalyst: Ethanol Mix Tank
30125316	Glycol Ethers	Ethanol Recovery Column Vent
30125325	Glycol Ethers	Catalyst: Butanol Mix Tank
30125326	Glycol Ethers	Butanol Recovery Column Vent
30125330	Glycol Ethers	Secondary Emissions: Handling and Disposal of Process Waste Streams
30125380	Glycol Ethers	Fugitive Emissions
30125401	Nitriles, Acrylonitrile, Adiponitrile Production	Acetonitrile
30125405	Nitriles, Acrylonitrile, Adiponitrile Production	General: Acrylonitrile
30125406	Nitriles, Acrylonitrile, Adiponitrile Production	Absorber Vent: Normal
30125407	Nitriles, Acrylonitrile, Adiponitrile Production	Absorber Vent: Startup
30125408	Nitriles, Acrylonitrile, Adiponitrile Production	Recovery/Purification Column Vent
30125409	Nitriles, Acrylonitrile, Adiponitrile Production	Fugitive Emissions
30125410	Nitriles, Acrylonitrile, Adiponitrile Production	Via Adipic Acid: General
30125411	Nitriles, Acrylonitrile, Adiponitrile Production	Ammonia Recovery Still
30125412	Nitriles, Acrylonitrile, Adiponitrile Production	Product Fractionator Vent
30125413	Nitriles, Acrylonitrile, Adiponitrile Production	Product Recovery Vent
30125415	Nitriles, Acrylonitrile, Adiponitrile Production	Via Butadiene: General
30125416	Nitriles, Acrylonitrile, Adiponitrile Production	Chlorination Reactor
30125417	Nitriles, Acrylonitrile, Adiponitrile Production	Cyanide Synthesis
30125418	Nitriles, Acrylonitrile, Adiponitrile Production	Cyanation/Isomerization
30125420	Nitriles, Acrylonitrile, Adiponitrile Production	Fugitive Emissions
30125499	Nitriles, Acrylonitrile, Adiponitrile Production	Other Not Classified
30125801	Benzene/Toluene/Aromatics/Xylenes	Benzene: General
30125802	Benzene/Toluene/Aromatics/Xylenes	Benzene: Reactor
30125803	Benzene/Toluene/Aromatics/Xylenes	Benzene: Distillation Unit
30125805	Benzene/Toluene/Aromatics/Xylenes	Toluene: General
30125806	Benzene/Toluene/Aromatics/Xylenes	Toluene: Reactor
30125807	Benzene/Toluene/Aromatics/Xylenes	Toluene: Distillation Unit

SCC	Description (6 digit)	Description (8 digit)
30125810	Benzene/Toluene/Aromatics/Xylenes	p-Xylene: General
30125815	Benzene/Toluene/Aromatics/Xylenes	Xylenes: General
30125816	Benzene/Toluene/Aromatics/Xylenes	Xylenes: Reactor
30125817	Benzene/Toluene/Aromatics/Xylenes	Xylenes: Distillation Unit
30125880	Benzene/Toluene/Aromatics/Xylenes	Aromatics: Fugitive Emissions
30130101	Chlorobenzene	Tail Gas Scrubber
30130102	Chlorobenzene	Benzene Drying: Distillation
30130103	Chlorobenzene	Benzene Recovery
30130104	Chlorobenzene	Heavy-ends Processing
30130105	Chlorobenzene	MCB Distillation
30130106	Chlorobenzene	Vacuum System Vent
30130107	Chlorobenzene	DCB Crystallization
30130108	Chlorobenzene	DCB Crystal Handling/Loading
30130110	Chlorobenzene	Catalyst Incineration
30130114	Chlorobenzene	Secondary Emissions: Handling and Disposal of Wastewater
30130115	Chlorobenzene	Atmospheric Distillation Vents
30130180	Chlorobenzene	Fugitive Emissions
30130201	Carbon Tetrachloride	General
30130202	Carbon Tetrachloride	Distillation Vent
30130203	Carbon Tetrachloride	Caustic Scrubber
30130280	Carbon Tetrachloride	Fugitive Emissions
30130301	Allyl Chloride	Chlorination Process: General
30130302	Allyl Chloride	HCl Absorber
30130303	Allyl Chloride	Light-ends Distillation
30130304	Allyl Chloride	Allyl Chloride Distillation Column
30130305	Allyl Chloride	DCP Distillation Column
30130380	Allyl Chloride	Fugitive Emissions
30130401	Allyl Alcohol	General
30130402	Allyl Alcohol	Catalyst Preparation
30130403	Allyl Alcohol	Filtration System
30130404	Allyl Alcohol	Light-ends Stripper
30130405	Allyl Alcohol	Distillation System Condenser
30130480	Allyl Alcohol	Fugitive Emissions
30130501	Epichlorohydrin	General
30130502	Epichlorohydrin	Epoxidation Reactor
30130503	Epichlorohydrin	Azeotrope Column
30130504	Epichlorohydrin	Light-ends Stripper
30130505	Epichlorohydrin	Finishing Column
30130580	Epichlorohydrin	Fugitive Emissions
30140101	Nitroglycerin Production	Continuous Nitrator
30140102	Nitroglycerin Production	Product Purification/Neutralization
30140103	Nitroglycerin Production	Nitric Acid Recovery (Use more specific codes 3-01-410-10 through -25)
30140105	Nitroglycerin Production	Nitric/Sulphuric Acid Mixing
30140110	Nitroglycerin Production	Continuous Process: Separation
30140120	Nitroglycerin Production	Continuous Process: Spent Acid Recovery

SCC	Description (6 digit)	Description (8 digit)
30140121	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Denitrating Column
30140122	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30140123	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Sulphuric Acid Concentrator
30140124	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Bleacher
30140125	Nitroglycerin Production	Continuous Process: Spent Acid Recovery: Reflux Columns
30140130	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration
30140131	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Distillation Tower
30140132	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Bleacher
30140133	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Condenser
30140134	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Absorber Column
30140135	Nitroglycerin Production	Continuous Process: Nitric Acid Concentration: Dehydrating Unit
30140136	Nitroglycerin Production	Continuous Process: Nitric Acid Conc.: Nitric Acid Concentrators
30140150	Nitroglycerin Production	Waste Disposal: Neutralization and Wash
30140151	Nitroglycerin Production	Waste Disposal: Separation
30140199	Nitroglycerin Production	Other Not Classified
30140210	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Process Vents: Batch Process
30140211	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitration Reactors and Washers
30140214	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Stabilization
30140217	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Acetone Distillation and Recovery
30140220	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery
30140221	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Denitrating Tower
30140222	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30140223	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Sulphuric Acid Concentrator
30140224	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Bleacher
30140225	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Spent Acid Recovery: Reflux Column
30140230	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration
30140231	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Distillation Column

SCC	Description (6 digit)	Description (8 digit)
30140232	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Bleacher
30140233	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Condenser
30140234	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Absorber Column
30140235	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Dehydrating Unit
30140236	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Batch Process: Nitric Acid Concentration: Nitric Acid Concentrators
30140250	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Process Vents: Continuous Process
30140251	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitration Reactors and Washers
30140252	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Stabilization
30140253	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Acetone Distillation and Recovery
30140260	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery
30140261	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Denitrating Tower
30140262	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Sulphuric Acid Regenerator
30140263	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Sulphuric Acid Concentrator
30140264	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Bleacher
30140265	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Spent Acid Recovery: Reflux Column
30140270	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration
30140271	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Distillation Column
30140272	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Bleacher
30140273	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Condenser
30140274	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Absorber Column
30140275	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Concentration: Dehydrating Unit
30140276	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Continuous Process: Nitric Acid Conc.: Nitric Acid Concentrators
30140299	Explosives Manufacture - Pentaerythritol Tetranitrate (PETN)	Other Not Classified
30140306	Explosives Manufacture - RDX/HMX Production	Nitric Acid/Ammonium Nitrate Mixing
30140307	Explosives Manufacture - RDX/HMX Production	Hexamine/Acetic Acid Mixing

SCC	Description (6 digit)	Description (8 digit)
30140310	Explosives Manufacture - RDX/HMX Production	Process Vents: Batch Process
30140311	Explosives Manufacture - RDX/HMX Production	Batch Process: Nitration Reactor
30140312	Explosives Manufacture - RDX/HMX Production	Batch Process: Aging Tank
30140313	Explosives Manufacture - RDX/HMX Production	Batch Process: Simmer Tank
30140320	Explosives Manufacture - RDX/HMX Production	Batch Process: Refinement
30140330	Explosives Manufacture - RDX/HMX Production	Batch Process: Blending
30140340	Explosives Manufacture - RDX/HMX Production	Batch Process: Formulation
30140350	Explosives Manufacture - RDX/HMX Production	Batch Process: Acetic Acid Recovery
30140360	Explosives Manufacture - RDX/HMX Production	Batch Process: Acetone or Cyclohexanone Recovery
30140399	Explosives Manufacture - RDX/HMX Production	Other Not Classified
30180001	General Processes	Fugitive Leaks
30180002	General Processes	Pipeline Valves: Gas Stream
30180003	General Processes	Pipeline Valves: Light Liquid/Gas Stream
30180004	General Processes	Pipeline Valves: Heavy Liquid Stream
30180005	General Processes	Pipeline Valves: Hydrogen Stream
30180006	General Processes	Open-ended Valves: All Streams
30180007	General Processes	Flanges: All Streams
30180008	General Processes	Pump Seals: Light Liquid/Gas Stream
30180009	General Processes	Pump Seals: Heavy Liquid Stream
30180010	General Processes	Compressor Seals: Gas Stream
30180011	General Processes	Compressor Seals: Heavy Liquid Stream
30180012	General Processes	Drains: All Streams
30180013	General Processes	Vessel Relief Valves: All Streams
30181001	General Processes	Air Oxidation Units
30182001	Wastewater Treatment	Wastewater Stripper
30182002	Wastewater Treatment	Wastewater Treatment
30182003	Wastewater Treatment	Wastewater Treatment
30182004	Wastewater Treatment	Chemical Plant Wastewater System: Junction Box
30182005	Wastewater Treatment	Chemical Plant Wastewater System: Lift Station
30182006	Wastewater Treatment	Chemical Plant Wastewater System: Aerated Impoundment
30182007	Wastewater Treatment	Chemical Plant Wastewater System: Non-aerated Impoundment
30182008	Wastewater Treatment	Chemical Plant Wastewater System: Weir
30182009	Wastewater Treatment	Chemical Plant Wastewater System: Activated Sludge Impoundment
30182010	Wastewater Treatment	Chemical Plant Wastewater System: Clarifier

SCC	Description (6 digit)	Description (8 digit)
30182011	Wastewater Treatment	Chemical Plant Wastewater System: Open Trench
30182501	Wastewater, Points of Generation	TNT: Waterwash of Crude TNT (Yellow Water)
30182502	Wastewater, Points of Generation	TNT: Sellite Treatment and Subsequent Washing of Crude TNT (Red H2O)
30182503	Wastewater, Points of Generation	TNT: Nitration Fume Scrubber
30182504	Wastewater, Points of Generation	TNT: Finishing Operation Fume Scrubber
30182510	Wastewater, Points of Generation	NG: NG/Acid Separator Soda Wash
30182511	Wastewater, Points of Generation	NG: Separator Following Soda Wash
30182512	Wastewater, Points of Generation	NG: Separator Following Fresh Water Wash
30182513	Wastewater, Points of Generation	NG: Emulsifier
30182514	Wastewater, Points of Generation	NG: Refrigeration House
30182515	Wastewater, Points of Generation	NG: Spent Acid Storage
30182516	Wastewater, Points of Generation	NG: Air Compressor House
30182517	Wastewater, Points of Generation	NG: Refrigeration House
30182530	Wastewater, Points of Generation	NC: Nitric Acid Concentrators
30182531	Wastewater, Points of Generation	NC: Nitration Reactor
30182532	Wastewater, Points of Generation	NC: Purification Boiling Tubs
30182533	Wastewater, Points of Generation	NC: Purification Beaters
30182534	Wastewater, Points of Generation	NC: Purification Poacher
30182535	Wastewater, Points of Generation	NC: Purification Blender
30182536	Wastewater, Points of Generation	NC: Purification Wringer
30182550	Wastewater, Points of Generation	PETN: Nitration Reactors
30182551	Wastewater, Points of Generation	PETN: Spent Acid Recovery
30182552	Wastewater, Points of Generation	PETN: Nitric Acid Concentrators
30182553	Wastewater, Points of Generation	PETN: Stabilization
30182560	Wastewater, Points of Generation	RDX/HMX: Nitration
30182561	Wastewater, Points of Generation	RDX/HMX: Filter/Wash
30182562	Wastewater, Points of Generation	RDX/HMX: Recrystallization
30182563	Wastewater, Points of Generation	RDX/HMX: Dewatering
30182599	Wastewater, Points of Generation	Specify Point of Generation
30183001	General Processes	Storage/Transfer
30184001	General Processes	Distillation Units

Organic chemical and petrochemical industries in Canada utilize raw materials, which are primarily derived from natural gas and crude oil. These raw materials (which include methanol, ethylene, propylene, butadiene, butylenes, benzene, toluene, and xylenes) are converted into intermediates and derivatives by means of one or more chemical processes.

Organic chemical manufacturers produce varying chemicals from different raw materials. However, this industrial sector uses common processes, such as distillation, adsorption, absorption, reaction, crystallization, and liquid/liquid extraction, in its operations. Emissions can generally be categorized into the following groups:

- process (production) emissions;
- fuel combustion emissions, from boilers, heaters, and furnaces;
- storage and transfer of raw materials, intermediates, and products;
- fugitive emissions from process equipment and storage and transfer;
- wastewater handling; and
- emergency vents.

#### 2.13.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance**
- **Emission factors**
- **Engineering estimates**

Facility-specific emission factors can be based on per unit production (end product or intermediate), per unit consumption, or per unit operating time. Care should be taken when estimating annual emissions using these emission factors, since the factors correspond specifically to an intermediate product or final product or operating schedule. For time-dependent emission factors, it is important to record process characteristics during direct monitoring that are representative of the facility's annual operation.

Emission factors for this source are available from Chapters 6 and 8, US EPA AP-42, for specific inorganic and organic chemical products. These references and links are provided in Section 2.13.6 below.

- **Storage and Handling:**

Emission estimations of handling and material loss in storage vessels can be determined from mass balances when feedstock/product (e.g., consumption and production) data are available. The approach assumes that all losses from handling and storage result in emissions. VOC emissions from storage vessels are commonly

estimated using this method, especially if storage records (e.g., monthly/annual vessel throughput) are up-to-date and available.

Working and storage losses can also be determined for specific chemicals using emission factors. Working losses are based on the annual vessel throughput, while static storage losses are based on volumetric capacity. Emission rates determined through this process should be adjusted for actual storage periods, taking into consideration periods when the vessel is empty.

The US EPA *TANKS* model calculates VOC emissions from storage tanks; however, the tank design parameters and meteorological data should be available. Additional parameters required for the software can be obtained from the US EPA's main website.

- **Fugitive VOC Emissions:**

Fugitive emissions from pumps, valves, and flanges can be determined from leakage emission factors. Process identification diagrams are useful, in that the location and quantities of equipment can be obtained from the diagram. The following four approaches have been identified for equipment component leaks:

- **Unit-specific correlation** - requires the bagging of components (mass emission rate) where the leak rate is determined from the equipment enclosed in the bag. A unit-specific correlation is developed from the bagging data and is applied to similar equipment.
- **Screening ranges** - requires the use of a portable organic vapour analyzer that probes the surface of the equipment and records a "screening value" concentration. This screening value concentration provides an indication of the leak rate and allows the classification of the component as either "leaking" or "non-leaking" (or intermediate categories between those two). An emission factor is then applied to each component based on its type and categorization as either "leaking" or "non-leaking."
- **EPA correlation equations** - relate screening values described above to mass emission rate correlation equations.
- **Average emission factors** - applying emission factors developed by regulatory agencies (US EPA) and available data from associations (e.g., API).

For all approaches, a survey of all equipment components (i.e., pumps, valves, and flanges) is required. The type and service record of each component should also be obtained. Detailed information on the four approaches, noted above, to fugitive emissions resulting from leaks is presented in US EPA's EIIP Volume 2 Report entitled "Preferred and Alternative Methods for Estimating Fugitive Emissions from Equipment Leaks."

### 2.13.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected for calculating emissions, one or more of the following may be required:

- monitoring equipment logs;
- source testing reports;
- process material throughputs and composition;
- annual consumption/production data;
- intermediate products and end products;
- storage tank throughputs and capacities;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity;
- emission control device and efficiency; and
- material safety data sheets.

This information is available from plant records (e.g., receipts, chemical analysis, discharge permits, and process flow sheets). Other supporting information for estimating CAC emissions can be obtained from industrial associations.

For example, the Canadian Petroleum Products Institute's "Code of Practice for Developing an Emission Inventory for Refineries and Terminals" provides guidelines for completing NPRI reports. The document provides information on emission sources from process, tankage, loading/transfer, wastewater, combustion, and other operations.

In cases where production data and storage volumes are not available for a specific plant, estimates can be obtained from aggregate production values reported to industrial associations, Statistics Canada, trade journals, and other relevant sources.

### 2.13.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***Canadian Association of Petroleum Producers (CAPP):***

Website:	<a href="http://www.capp.ca">http://www.capp.ca</a>
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- ***Canadian Chemical Producers' Association (CCPA):***

Website:	<a href="http://www.ccpa.ca">http://www.ccpa.ca</a>
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- **Canadian Petroleum Products Institute 2002, Code of Practice for Developing an Emission Inventory for Refineries and Terminals, Revision 6:**

Download at: <http://www.cppi.ca/tech/COPREI.pdf>

- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Organic Chemical Processing Industries	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/forgchem.html">http://www.npi.gov.au/handbooks/approved_handbooks/forgchem.html</a>
Emission Estimation Technique Manual for Chemical Product Manufacture	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fchempro.html">http://www.npi.gov.au/handbooks/approved_handbooks/fchempro.html</a>
Emission Estimation Technique Manual for Paint and Ink Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fpaintin.html">http://www.npi.gov.au/handbooks/approved_handbooks/fpaintin.html</a>
Emission Estimation Technique Manual for Rubber Product Manufacture Version 1.1	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/frubber.html">http://www.npi.gov.au/handbooks/approved_handbooks/frubber.html</a>
Emission Estimation Technique Manual for Explosives Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fexploman.html">http://www.npi.gov.au/handbooks/approved_handbooks/fexploman.html</a>
Emission Estimation Technique Manual for Medicinal and Pharmaceutical Product Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fpharm.html">http://www.npi.gov.au/handbooks/approved_handbooks/fpharm.html</a>

- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 11: Preferred and Alternative Methods for Estimating Air Emissions from Plastic Products Manufacturing	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii11.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii11.pdf</a>
Chapter 8: Preferred and Alternative Methods for Estimating Air Emissions from Paint and Ink Manufacturing Facilities	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii08.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii08.pdf</a>

- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Chapter 6: Organic Chemical Process Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch06/">http://www.epa.gov/ttn/chief/ap42/ch06/</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <http://www.epa.gov/ttn/chief/software/fire/index.html>

## **2.14 Petroleum Refining**

### **2.14.1 General Description**

Operations in the petroleum refining industry generally include the conversion of crude oil into numerous types of refined petroleum products, such as gasoline, diesel fuel, fuel oils, lubricating oils, liquefied petroleum gas, aviation fuel, and kerosene, as well as feedstocks for the petrochemical industry. The petroleum refining activities included in this section include receipt and storage of crude oil at the refinery, petroleum handling and refining operations, and the storage and loading of finished products. Downstream fuel marketing activities are not considered here.

Component processes can differ between each refinery, depending on the crude oil feedstock, the products produced, and governing regulations and standards for the products. In general, refining processes can be broken down into the following:

- i. Separation Processes (e.g., atmospheric and vacuum distillation, light ends recovery/gas processing);
- ii. Petroleum Conversion Processes (e.g., thermal or catalytic cracking, reforming, alkylation, polymerization, isomerization, coking, visbreaking);
- iii. Petroleum Treating Processes (e.g., hydrodesulphurization, hydrotreating, chemical sweetening, acid gas removal, de-asphalting);
- iv. Feedstock and Product Handling (e.g., storage, blending, loading, unloading); and
- v. Auxiliary Operations (e.g., boilers, wastewater treatment, hydrogen production, sulphur recovery, cooling towers, blowdown system, compressor engines).

CAC emissions resulting from these refining processes include fugitive emissions from tanks, loading, and process equipment leaks and auxiliary equipment associated with fuel combustion, wastewater treatment, and engines.

### **2.14.2 Applicable SIC and NAICS Codes**

The following codes are applicable to this source:

<b>CDN SIC</b>	<b>NAICS</b>	<b>Description</b>
3611	324110	Petroleum Refining
3611	324110	Refined Petroleum Products Industry
3612, 3699	324190	Refined Products

### **2.14.3 Source Description**

The following SCCs are included in this source:

SCC	Description (6 digit)	Description (8 digit)
30600101	Process Heaters	Oil-fired
30600102	Process Heaters	Gas-fired
30600103	Process Heaters	Oil-fired
30600104	Process Heaters	Gas-fired
30600105	Process Heaters	Natural Gas-fired
30600106	Process Heaters	Process Gas-fired
30600107	Process Heaters	LPG-fired
30600108	Process Heaters	Landfill Gas-fired
30600111	Process Heaters	Oil-fired (No. 6 Oil) > 100 Million Btu Capacity
30600199	Process Heaters	Other Not Classified
30600201	Catalytic Cracking Units	Fluid Catalytic Cracking Unit
30600202	Catalytic Cracking Units	Catalyst Handling System
30600301	Catalytic Cracking Units	Thermal Catalytic Cracking Unit
30600401	Blowdown Systems	Blowdown System with Vapour Recovery System with Flaring
30600402	Blowdown Systems	Blowdown System w/o Controls
30600503	Wastewater Treatment	Process Drains and Wastewater Separators
30600504	Wastewater Treatment	Process Drains and Wastewater Separators
30600505	Wastewater Treatment	Wastewater Treatment w/o Separator
30600506	Wastewater Treatment	Wastewater Treatment w/o Separator
30600508	Wastewater Treatment	Oil/Water Separator
30600510	Wastewater Treatment	Liquid-Liquid Separator: Hydrocarbon/Amine
30600511	Wastewater Treatment	Sour Water Treating
30600514	Wastewater Treatment	Petroleum Refinery Wastewater System: Junction Box
30600515	Wastewater Treatment	Petroleum Refinery Wastewater System: Lift Station
30600516	Wastewater Treatment	Petroleum Refinery Wastewater System: Aerated Impoundment
30600517	Wastewater Treatment	Petroleum Refinery Wastewater System: Non-aerated Impoundment
30600518	Wastewater Treatment	Petroleum Refinery Wastewater System: Weir
30600519	Wastewater Treatment	Petroleum Refinery Wastewater System: Activated Sludge Impoundment
30600520	Wastewater Treatment	Petroleum Refinery Wastewater System: Clarifier
30600521	Wastewater Treatment	Petroleum Refinery Wastewater System: Open Trench
30600522	Wastewater Treatment	Petroleum Refinery Wastewater System: Auger Pumps
30600602	Vacuum Distillate Column Condensers	Vacuum Distillation Column Condenser
30600603	Vacuum Distillate Column Condensers	Vacuum Distillation Column Condenser
30600701	Cooling Towers	Cooling Towers
30600702	Cooling Towers	Cooling Towers
30600801	Fugitive Emissions	Pipeline Valves and Flanges
30600802	Fugitive Emissions	Vessel Relief Valves
30600803	Fugitive Emissions	Pump Seals w/o Controls
30600804	Fugitive Emissions	Compressor Seals

SCC	Description (6 digit)	Description (8 digit)
30600805	Fugitive Emissions	Miscellaneous: Sampling/Non-Asphalt Blowing/Purging/etc.
30600806	Fugitive Emissions	Pump Seals with Controls
30600807	Fugitive Emissions	Blind Changing
30600811	Fugitive Emissions	Pipeline Valves: Gas Streams
30600812	Fugitive Emissions	Pipeline Valves: Light Liquid/Gas Streams
30600813	Fugitive Emissions	Pipeline Valves: Heavy Liquid Streams
30600814	Fugitive Emissions	Pipeline Valves: Hydrogen Streams
30600815	Fugitive Emissions	Open-ended Valves: All Streams
30600816	Fugitive Emissions	Flanges: All Streams
30600817	Fugitive Emissions	Pump Seals: Light Liquid/Gas Streams
30600818	Fugitive Emissions	Pump Seals: Heavy Liquid Streams
30600819	Fugitive Emissions	Compressor Seals: Gas Streams
30600820	Fugitive Emissions	Compressor Seals: Heavy Liquid Streams
30600821	Fugitive Emissions	Drains: All Streams
30600822	Fugitive Emissions	Vessel Relief Valves: All Streams
30600901	Flares	Distillate Oil
30600902	Flares	Residual Oil
30600903	Flares	Natural Gas
30600904	Flares	Process Gas
30600905	Flares	Liquefied Petroleum Gas
30600906	Flares	Hydrogen Sulphide
30600999	Flares	Not Classified
30601001	Sludge Converter	General
30601011	Sludge Converter	Oil/Sludge Dewatering Unit: General
30601101	Asphalt Blowing	General
30601201	Fluid Coking Units	General
30601301	Coke Handling System	Storage and Transfer
30601401	Petroleum Coke Calcining	Coke Calciner
30601402	Petroleum Coke Calcining	Delayed Coking
30601599	Bauxite Burning	Other Not Classified
30601601	Catalytic Reforming Unit	General
30601602	Catalytic Reforming Unit	Alkylation Feed Treater
30601603	Catalytic Reforming Unit	Alkylation Unit: Hydrofluoric Acid
30601604	Catalytic Reforming Unit	Alkylation Unit: Sulphuric Acid
30601701	Catalytic Hydrotreating Unit	General
30601801	Hydrogen Generation Unit	General
30601901	Mercox Treating Unit	General
30602001	Crude Unit Atmospheric Distillation	General
30602101	Light Ends Fractionation Unit	General
30602201	Gasoline Blending Unit	General
30602301	Hydrocracking Unit	General
30602401	Reciprocating Engine Compressors	Natural Gas Fired
30603201	Sour Gas Treating Unit	General
30603301	Desulphurization	Sulphur Recovery Unit
30609901	Incinerators	Distillate Oil (No. 2)
30609902	Incinerators	Residual Oil

SCC	Description (6 digit)	Description (8 digit)
30609903	Incinerators	Natural Gas
30609904	Incinerators	Process Gas
30609905	Incinerators	Liquefied Petroleum Gas
30610001	Lube Oil Refining	General
30622001	Underground Storage	Underground Storage Remediation and Other Remediation:
30622002	Underground Storage	Underground Storage and Other Remediation: Soil: Residual Oil
30622003	Underground Storage	Underground Storage and Other Remediation: Soil: Natural Gas
30622004	Underground Storage	Underground Storage and Other Remediation: Soil: Distillate Oil
30622005	Underground Storage	Underground Storage and Other Remediation: Soil: LPG
30622006	Underground Storage	Underground Storage and Other Remediation: Soil: Waste Oil
30630005	Re-refining of Lube Oils and Greases	Waste Oil Still Vent
30630006	Re-refining of Lube Oils and Greases	Waste Oil Storage Tank
30630007	Re-refining of Lube Oils and Greases	Finished Product Storage Tank
30688801	Fugitive Emissions	Specify
30688802	Fugitive Emissions	Specify
30688803	Fugitive Emissions	Specify
30688804	Fugitive Emissions	Specify
30688805	Fugitive Emissions	Specify
30699998	Petroleum Products - Not Classified	Not Classified
30699999	Petroleum Products - Not Classified	Not Classified

#### 2.14.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance** - for example, the emissions of sulphur dioxide can be estimated based on an account of the quantity of sulphur in each process input and output

stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.

- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

In those situations where direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

- **Process Discharges:**

As noted above, if CAC direct monitoring information is not available, emission estimates can be calculated using material balance. In particular, for SO<sub>2</sub> emissions, data on sulphur balance are important for calculating emission rates from the refining industrial sector. Pertinent data are required, including identification of the type, origin, sulphur content, density (API gravity) of crude oil inputs, and purchased materials. Typically, gas analyses and capacities of feeds and products are tracked for suppliers and customers. In many instances, plant recovery efficiency (acid gas feed to sulphur recovery ratio) should be included to ensure that facility operations involving sulphur are accounted for.

Emission factors for NO<sub>x</sub>, CO, and VOCs are available from a number of sources. Emission factors are typically provided in units of mass of pollutant emitted per volume of refinery feed or amount (mass or volume) of refined products.

- **Storage and Loading:**

Emission models such as the US EPA *TANKS* model are generally used to calculate VOC emissions from storage tanks. The *TANKS* model is available from the US EPA website and requires information on tank parameters, material stored, and meteorological data. The *TANKS* model is based on established US EPA and API methodologies for estimating losses from petroleum storage tanks, which can be used in place of *TANKS*. Generic emission factors are also available for estimating tank emissions based on the tank capacity and throughput and material stored.

Emissions from loading operations, such as truck racks and wharves, are generally based on emission factors that require information on the volumes loaded, method of

loading (splash, submerged, bottom fill), use of controls, and properties of the liquid being loaded.

- **Fugitive Sources:**

Fugitive emissions from pumps, valves, and flanges can be determined from leakage emission factors. Process identification diagrams are useful, in that the location and quantities of equipment can be obtained from the diagram. The following four approaches have been identified for equipment component leaks:

- **Unit-specific correlation** - requires the bagging of components (mass emission rate) where the leak rate is determined from the equipment enclosed in the bag. A unit-specific correlation is developed from the bagging data and is applied to similar equipment.
- **Screening ranges** - require the use of a portable organic vapour analyzer that probes the surface of the equipment and records a “screening value” concentration. This screening value concentration provides an indication of the leak rate and allows the classification of the component as either “leaking” or “non-leaking” (or intermediate categories between those two). An emission factor is then applied to each component based on its type and categorization as either “leaking” or “non-leaking.”
- **EPA correlation equations** - relate screening values described above to mass emission rate correlation equations.
- **Average emission factors** - applying emission factors developed by regulatory agencies (US EPA) and available data from associations (e.g., API).

For all approaches, a survey of all equipment components (i.e., pumps, valves, and flanges) is required. The type and service record of each component should also be obtained. Detailed information on the four approaches, noted above, to fugitive emissions resulting from leaks is presented in US EPA’s EIIP Volume 2 Report entitled “Preferred and Alternative Methods for Estimating Fugitive Emissions from Equipment Leaks.”

The Canadian Petroleum Products Institute’s “Code of Practice for Developing an Emission Inventory for Refineries and Terminals” provides guidelines for completing NPRI reports. The document provides information on emission sources from process, tankage, loading/transfer, wastewater, combustion, and other operations.

#### **2.14.5 Supporting Information for CAC Emissions Estimation**

Depending on the methodology selected for estimating emissions, the following information may be required:

- monitoring equipment logs;

- source testing reports;
- process material throughputs, base quantities (annual feed and product quantities);
- quality and content of materials;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity;
- emission control device and efficiency;
- storage vessel design; and
- physical and chemical properties of substances.

Supporting information from this industrial sector can be obtained from technical papers and books, equipment manufacturers, and government agencies. Material safety data sheets (MSDS) of substances may also provide relevant information on density and other physical and chemical properties. Other supporting information for CAC emissions estimation can be obtained from industrial associations.

The guidelines available from Environment Canada for petroleum storage, listed below, can be used as technical supporting documents to supplement the *TANKS* model and emissions calculation.

#### 2.14.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***Canadian Association of Petroleum Producers (CAPP):***

Website:	<a href="http://www.capp.ca">http://www.capp.ca</a>
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- ***Canadian Petroleum Products Institute, 2002, Code of Practice for Developing an Emission Inventory for Refineries and Terminals, Revision 6:***

Download at: <a href="http://www.cppi.ca/tech/COPREI.pdf">http://www.cppi.ca/tech/COPREI.pdf</a>
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- ***EMEP/CORINAIR 2001, Atmospheric Emission Inventory Guidebook, Third Edition, European Environmental Agency, Copenhagen:***

Group 5: Extraction & Distribution of Fossil Fuels and Geothermal Energy	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page014.html">http://reports.eea.eu.int/technical_report_2001_3/en/page014.html</a>
Group 4: Production Processes	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page013.html">http://reports.eea.eu.int/technical_report_2001_3/en/page013.html</a>

- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Petroleum Refining	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/petroleum.html">http://www.npi.gov.au/handbooks/approved_handbooks/petroleum.html</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 4: Preferred and Alternative Methods for Estimating Fugitive Emissions from Equipment Leaks	<a href="http://www.epa.gov/ttn/chief/eiip/technical_report/volume02/ii04_a.pdf">http://www.epa.gov/ttn/chief/eiip/technical_report/volume02/ii04_a.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Chapter 5: Petroleum Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch05/">http://www.epa.gov/ttn/chief/ap42/ch05/</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.15 Pulp and Paper

### 2.15.1 General Description

This industrial source category consists of a wide range of paper and paper products industries.

In kraft pulping, the wood chips are pressure-digested, washed, bleached, and dried to a finished product. The chemical recovery processes may also contribute to CAC emissions. Fuel combustion equipment, including power boilers and process heaters, is also a source of CACs.

Acid sulphite pulping operations produce a relatively small fraction of the total pulp produced in Canada, but represent a source of SO<sub>2</sub> emissions. The acid sulphite pulping process involves high-pressure and -temperature ingestion of wood chips in sulphurous acid solution that is buffered with bisulphites of sodium, magnesium, calcium, or ammonium. A majority of Canadian plants use sodium-based buffer solutions.

### 2.15.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
2799	322000	Pulp and Paper Industry (non classified)
2711	322121	Integrated pulp & paper mills
2711	322111	Thermo-mechanical Pulping
2711	322111	Neutral Sulphite Pulping
2711	322112	Kraft (Sulphate) Pulping
2711	322112	Sulphite Pulping
2712	322122	Newsprint Industry
2713	322121	Paperboard Industry
2714	321216	Building Board Industry
2719	322121	Other Paper Industries
2733	322210	Paper Bag Industry
2731	322212	Folding Carton and Set-Up Box Industry
2732	322211	Corrugated Box Industry
2799	322219	Other Paper Converters
2791	322220	Coated and Treated Paper Industry

### 2.15.3 Source Description

The operations described below outline typical key process features; however, it should be emphasized that each facility is unique, and its SCCs and associated emissions should be determined on a case-by-case basis.

- **Kraft Pulping:**

SCC	Description (for 8-digit SCC)
30700101	Digester Relief and Blow Tank
30700102	Washer/Screens
30700103	Multi-effect Evaporator
30700104	Recovery Furnace/Direct Contact Evaporator
30700105	Smelt Dissolving Tank
30700106	Lime Kiln
30700107	Turpentine Condenser
30700108	Fluid Bed Calciner
30700109	Liquor Oxidation Tower
30700110	Recovery Furnace/Indirect Contact Evaporator
30700111	Filtrate Tanks
30700112	Lime Mud Washers
30700113	Lime Mud Filter System
30700114	Bleaching Reactors
30700115	Chlorine Dioxide
30700116	Turpentine Loading Facilities
30700117	Condensate Strippers
30700118	Liquor Clarifiers
30700119	Boiler Ash Handling
30700120	Stock Washing/Screening
30700121	Wastewater: General
30700122	Causticizing: General

- **Sulphite Pulping:**

SCC	Description (for 8-digit SCC)
30700203	Digester/Blow Pit/Dump Tank: All Bases except Calcium
30700211	Digester/Blow Pit/Dump Tank: Calcium
30700212	Digester/Blow Pit/Dump Tank: MgO with Recovery System
30700213	Digester/Blow Pit/Dump Tank: MgO with Process Change
30700214	Digester/Blow Pit/Dump Tank: NH <sub>3</sub> with Process Change
30700215	Digester/Blow Pit/Dump Tank: Na with Process Change
30700221	Recovery System: MgO
30700222	Recovery System: NH <sub>3</sub>
30700223	Recovery System: Na
30700231	Acid Plant: NH <sub>3</sub>
30700232	Acid Plant: Na
30700233	Acid Plant: Ca
30700234	Knotters/Washers/Screens/etc.

### 2.15.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

Emission factors for this industry have typically been based upon long-term averages and derived from direct source sampling. Typically, emission factors are reported in kilograms per megagram of air-dried unbleached pulp for pulping processes and are categorized into uncontrolled or controlled releases. Although emissions of NO<sub>x</sub> are relatively small from recovery kiln and lime kilns, the US EPA reports respective emission factors in the order of 0.5 to 1.0 kilogram per megagram of air-dried pulp produced.

### 2.15.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected for calculating emissions, one or more of the following may be required:

- monitoring equipment logs;
- source testing reports;
- process material throughputs;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity (batch/multiple stream); and
- emission control device and efficiency.

Additional supporting information can be obtained from government agencies, pulp and paper associations, and trade journals.

The Forest Products Association of Canada (FPAC, formerly the Canadian Pulp and Paper Association) currently distributes to its member companies a handbook to assist mill personnel in reporting to the NPRI. The handbook includes methodologies for calculating emissions and relevant substance-specific information. The FPAC website includes general publications on yearly production data. Also available on the website is a document entitled “Report on the Preliminary Assessment of the Contributions of Pulp and Paper Mills to Ambient Air Quality” (Forest Products Association of Canada, 2001), which includes emissions calculated for specific facilities.

The Pulp and Paper Products Council (PPPC) provides monthly and annual statistical data on production and other publications.

### 2.15.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow “Related Links”
<i>Environment Canada, 2001, Guide for Reporting to the National Pollutant Release Inventory, National Pollutant Release Inventory, Environment Canada, Hull, Quebec.</i>	
<i>Environment Canada, 2001, Supplementary Guide for Reporting the National Pollutant Release Inventory Alternate Threshold, National Pollutant Release Inventory, Environment Canada, Hull, Quebec.</i>	

- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Combustion in Boilers <i>Version 1.1</i>	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html">http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html</a>
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Emission Estimation Technique Manual for Combustion Engines <i>Version 2.2</i>	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/eng.html">http://www.npi.gov.au/handbooks/approved_handbooks/eng.html</a>
Emission Estimation Technique Manual for Paper and Paper Product Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fpaper.html">http://www.npi.gov.au/handbooks/approved_handbooks/fpaper.html</a>

- **Forest Products Association of Canada (FPAC):**

Website:	<a href="http://www.fpac.ca">http://www.fpac.ca</a>
<i>Forest Products Association of Canada, 2001, Report on the Preliminary Assessment of the Contributions of Pulp and Paper Mills to Ambient Air Quality. Prepared by Jacques Whitford Environmental Limited for the Environment Section, Forest Products Association of Canada, Montreal.</i>	

- **Pulp and Paper Products Council (PPPC):**

Website:	<a href="http://www.pppc.org">http://www.pppc.org</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 2: Preferred and Alternative Methods for Estimating Air Emissions from Boilers	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:**

Chapter 1: External Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch01/">http://www.epa.gov/ttn/chief/ap42/ch01/</a>
Chapter 3: Stationary Internal Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch03/">http://www.epa.gov/ttn/chief/ap42/ch03/</a>
Section 10.2: Chemical Wood Pulping	<a href="http://www.epa.gov/ttn/chief/ap42/ch10/final/c10s02.pdf">http://www.epa.gov/ttn/chief/ap42/ch10/final/c10s02.pdf</a>

- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.16 Wood Industry

### 2.16.1 General Description

The wood industry involves the conversion of trees into lumber and wood products, such as finished plywood, veneer, and particleboard. Sawmill operations such as debarking and sawing emit primarily particulate matter, while fuel combustion equipment, such as dryers, presses, and process heaters, is a source of CACs. Plywood manufacturing consists of two products: softwood plywood originating from coniferous species and hardwood plywood corresponding to deciduous species. Reconstituted wood products include particleboard, waferboard or oriented strandboard, medium-density fibreboard, and hardboard.

### 2.16.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
2512	321111	Sawmill and Planing Mill Products Industry (Except Shingles and Shakes)
2521	321211	Hardwood Veneer and Plywood Industry
2522	321212	Softwood Veneer and Plywood Industry
2592	321216	Particleboard Industry
2593	321217	Waferboard Industry
2511	321112	Shingles and Shakes

### 2.16.3 Source Description

The SCCs given in the table that follows represent typical processes found in the wood industry. However, it should be emphasized that each facility is unique, and its SCCs and associated emissions should be determined on a case-by-case basis.

SCC	Description (6 digit)	Description (8 digit)
30700602	Particleboard Manufacture	Direct Wood-fired Rotary Dryer, Unspecified Pines, <730F Inlet Air
30700604	Particleboard Manufacture	Direct Wood-fired Rotary Dryer, Unspecified Pines, >900F Inlet Air
30700606	Particleboard Manufacture	Direct Wood-fired Rotary Dryer, Southern Yellow Pine
30700610	Particleboard Manufacture	Direct Wood-fired Rotary Dryer, Hardwoods
30700611	Particleboard Manufacture	Direct Natural Gas-Fired Rotary Dryer, Unspecified Pines
30700621	Particleboard Manufacture	Direct Wood-fired Rotary Final Dryer, Unspecified Pines
30700628	Particleboard Manufacture	Direct Wood-fired Rotary Pre-dryer, Douglas Fir
30700629	Particleboard Manufacture	Direct Wood-fired Tube Final Dryer, Douglas Fir
30700651	Particleboard Manufacture	Batch Hot Press, Urea Formaldehyde Resin

SCC	Description (6 digit)	Description (8 digit)
30700661	Particleboard Manufacture	Particleboard Board Cooler, Urea-Formaldehyde Resin
30700701	Plywood Operations	General: Not Classified
30700702	Plywood Operations	Sanding Operations
30700703	Plywood Operations	Particleboard Drying(See 3-07-006 For More Detailed Particleboard SCC)
30700704	Plywood Operations	Waferboard Dryer (See 3-07-010 For More Detailed OSB SCCs)
30700705	Plywood Operations	Hardboard: Coe Dryer
30700706	Plywood Operations	Hardboard: Pre-dryer
30700707	Plywood Operations	Hardboard: Pressing
30700708	Plywood Operations	Hardboard: Tempering
30700709	Plywood Operations	Hardboard: Bake Oven
30700710	Plywood Operations	Sawing
30700711	Plywood Operations	Fir: Sapwood: Steam-fired Dryer
30700712	Plywood Operations	Fir: Sapwood: Gas-fired Dryer
30700713	Plywood Operations	Fir: Heartwood Plywood Veneer Dryer
30700714	Plywood Operations	Larch Plywood Veneer Dryer
30700715	Plywood Operations	Southern Pine Plywood Veneer Dryer
30700716	Plywood Operations	Poplar Wood Fired Veneer Dryer
30700717	Plywood Operations	Gas Veneer Dryer: Pines (use 3-07-007-50)
30700718	Plywood Operations	Steam Veneer Dryer: Pines (use 3-07-007-60)
30700720	Plywood Operations	Veneer Dryer: Steam Heated: Re-dry
30700725	Plywood Operations	Veneer Cutting
30700727	Plywood Operations	Veneer Laying and Glue Spreading
30700730	Plywood Operations	Wood Steaming
30700740	Plywood Operations	Direct Wood-Fired Dryer: Non-specified Pine Species Veneer
30700744	Plywood Operations	Direct Wood-Fired Dryer: Hemlock Veneer
30700746	Plywood Operations	Direct Wood-Fired Dryer: Non-specified Fir Species Veneer
30700747	Plywood Operations	Direct Wood-Fired Dryer: Douglas Fir Veneer
30700750	Plywood Operations	Direct Natural Gas-Fired Dryer: Non-specified Pine Species Veneer
30700760	Plywood Operations	Indirect Heated Dryer: Non-specified Pine Species Veneer
30700766	Plywood Operations	Indirect Heated Dryer: Non-specified Fir Species Veneer
30700767	Plywood Operations	Indirect Heated Dryer: Douglas Fir Veneer
30700769	Plywood Operations	Indirect Heated Dryer: Poplar Veneer
30700770	Plywood Operations	Radio Frequency Heated Dryer: Non-specified Pine Species
30700780	Plywood Operations	Plywood Press: Phenol-formaldehyde Resin
30700781	Plywood Operations	Plywood Press: Urea-formaldehyde Resin
30700798	Plywood Operations	Other Not Classified
30700799	Plywood Operations	Other Not Classified
30700801	Sawmill Operations	Log Debarking
30700802	Sawmill Operations	Log Sawing

SCC	Description (6 digit)	Description (8 digit)
30700803	Sawmill Operations	Sawdust Pile Handling
30700804	Sawmill Operations	Sawing: Cyclone Exhaust
30700805	Sawmill Operations	Planing/Trimming: Cyclone Exhaust
30700806	Sawmill Operations	Sanding: Cyclone Exhaust
30700807	Sawmill Operations	Sanderdust: Cyclone Exhaust
30700808	Sawmill Operations	Other Cyclones: Exhaust
30700820	Sawmill Operations	Chipping and Screening
30700821	Sawmill Operations	Chip Storage Piles
30700822	Sawmill Operations	Chip Transfer/Conveying
30700895	Sawmill Operations	Log Storage
30700921	Medium Density Fibreboard (MDF) Manufacture	Direct Wood-fired Tube Dryer, Unspecified Pines
30700925	Medium Density Fibreboard (MDF) Manufacture	Direct Wood-fired Tube Dryer, Hardwoods
30700931	Medium Density Fibreboard (MDF) Manufacture	Indirect-heated Tube Dryer, Unspecified Pines
30700935	Medium Density Fibreboard (MDF) Manufacture	Indirect-heated Tube Dryer, Hardwoods
30700939	Medium Density Fibreboard (MDF) Manufacture	Indirect-heated Tube Dryer, 50% Softwood, 50% Hardwood
30700950	Medium Density Fibreboard (MDF) Manufacture	Continuous Hot Press, UF Resin
30700960	Medium Density Fibreboard (MDF) Manufacture	Batch Hot Press, UF Resin
30700971	Medium Density Fibreboard (MDF) Manufacture	MDF Board Cooler, UF Resin
30701001	Oriented Strandboard (OSB) Manufacture	Direct Wood-fired Rotary Dryer, Unspecified Pines
30701008	Oriented Strandboard (OSB) Manufacture	Direct Wood-fired Rotary Dryer, Aspen
30701010	Oriented Strandboard (OSB) Manufacture	Direct Wood-fired Rotary Dryer, Hardwoods
30701020	Oriented Strandboard (OSB) Manufacture	Direct Natural Gas-fired Rotary Dryer, Hardwoods
30701053	Oriented Strandboard (OSB) Manufacture	Hot Press, Phenol-Formaldehyde Resin
30701055	Oriented Strandboard (OSB) Manufacture	Hot Press, Methylene Diphenyl Diisocyanate Resin
30701057	Oriented Strandboard (OSB) Manufacture	Hot Press, PF Resin (surface layers) / MDI Resin (core layers)
30701199	Paper Coating and Glazing	Extrusion Coating Line with Solvent Free Resin/Wax
30701201	Miscellaneous Paper Processes	Cyclones
30701220	Miscellaneous Paper Processes	Thermomechanical Process
30701301	Miscellaneous Paper Products	Shredding Newspaper for Insulation Manufacturing
30701399	Miscellaneous Paper Products	Other Not Classified
30702001	Furniture Manufacture	Rough-end
30702002	Furniture Manufacture	Machine Room
30702003	Furniture Manufacture	Sanding

SCC	Description (6 digit)	Description (8 digit)
30702004	Furniture Manufacture	Wood Hog
30702021	Furniture Manufacture	Veneer Hot Press, Urea Formaldehyde Resin
30703001	Miscellaneous Wood Working Operations	Wood Waste Storage Bin Vent
30703002	Miscellaneous Wood Working Operations	Wood Waste Storage Bin Loadout
30703096	Miscellaneous Wood Working Operations	Sanding/Planning Operations: Specify
30703097	Miscellaneous Wood Working Operations	Sanding/Planning Operations: Specify
30703098	Miscellaneous Wood Working Operations	Sanding/Planning Operations: Specify
30703099	Miscellaneous Wood Working Operations	Sanding/Planning Operations: Specify
30704001	Bulk Handling and Storage - Wood/Bark	Storage Bins
30704002	Bulk Handling and Storage - Wood/Bark	Stockpiles
30704003	Bulk Handling and Storage - Wood/Bark	Unloading
30704004	Bulk Handling and Storage - Wood/Bark	Loading
30704005	Bulk Handling and Storage - Wood/Bark	Conveyors

#### 2.16.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.

- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

Emission factors for the wood industry are available from US EPA's AP-42 documents. Pollution control equipment efficiencies should be factored in when estimating emissions. Emission factors for wood dryers are based on the type of unit (direct/indirect fired), type of fuel burned (wood or natural gas), type of wood feed, and dryer inlet temperature. Dryer emission factor units are in pounds of pollutants per thousand square feet of 3/8-inch thick panel produced. Emission factors for fugitive particulate emissions from debarking, sawing, and sanding operations are also available from AP-42. Fugitive emissions may be based on the weights of processed logs or sawdust handled.

### **2.16.5 Supporting Information for CAC Emissions Estimation**

Depending on the methodology selected for calculating emissions, one or more of the following may be required:

- monitoring equipment logs;
- source testing reports;
- wood species and type;
- log volumes;
- fuel types, composition, and consumption;
- equipment type and operation parameters;
- schedule of process activity (batch/multiple stream); and
- emission control device and efficiency.

Additional supporting information may be obtained from government agencies, industry associations such as the Council of Forest Industries (COFI), and trade journals (Canadian Wood Products, Logging and Sawmilling Journal).

### **2.16.6 References and Links**

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Combustion in Boilers <i>Version 1.1</i>	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html">http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html</a>
Emission Estimation Technique Manual for Combustion Engines <i>Version 2.2</i>	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/eng.html">http://www.npi.gov.au/handbooks/approved_handbooks/eng.html</a>
Emission Estimation Technique Manual for Timber and Wood Product Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/ftimber.html">http://www.npi.gov.au/handbooks/approved_handbooks/ftimber.html</a>

- ***STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:***

Chapter 2: Preferred and Alternative Methods for Estimating Air Emissions from Boilers	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii02.pdf</a>
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- ***U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 1: External Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch01/">http://www.epa.gov/ttn/chief/ap42/ch01/</a>
Chapter 3: Stationary Internal Combustion Sources	<a href="http://www.epa.gov/ttn/chief/ap42/ch03/">http://www.epa.gov/ttn/chief/ap42/ch03/</a>
Chapter 10: Wood Products Industry	<a href="http://www.epa.gov/ttn/chief/ap42/ch10/">http://www.epa.gov/ttn/chief/ap42/ch10/</a>

- ***U.S. Environmental Protection Agency, 2000, Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## **2.17 Paint and Ink Manufacturing**

### **2.17.1 General Description**

Generally, paint and inks are suspensions of finely separated pigment particles in a liquid that, when spread over a surface in a thin layer, will form a solid, cohesive, and adherent film. The types of paints that are currently manufactured include architectural coatings, product finishes (e.g., finishes for automobiles, machinery, metal and wood

furniture, and appliances), and special purpose coatings (e.g., industrial new construction and maintenance paints, traffic marking paints, and marine paints).

Inks that are currently manufactured include letterpress, lithographic and offset, gravure, and flexographic inks. Letterpress and lithographic inks are typically classified as paste inks. Gravure and flexographic inks are typically water- or solvent-based and are classified as liquid inks. Specialty ink products include textile and silk screen, invisible, powder, carbon paper, typewriter, and duplicating inks.

### 2.17.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
3751	325510	Paint & Coating Mfg. (including varnish)
3791	325910	Printing Ink Mfg. (except writing and drawing inks)

### 2.17.3 Source Description

The process-specific SCCs that are applicable to paint, varnish, and ink production are provided below:

- **Paint Manufacturing:**

SCC	Description (for 8-digit SCC)
30101401	General Mixing and Handling
30101402	Pigment Handling
30101403	Solvent Loss: General
30101404	Raw Material Storage
30101415	Premix/Preassembly
30101416	Premix/Preassembly: Mix Tanks and Agitators
30101417	Premix/Preassembly: Drums
30101418	Premix/Preassembly: Material Loading
30101430	Pigment Grinding/Milling
30101431	Pigment Grinding/Milling: Roller Mills
30101432	Pigment Grinding/Milling: Ball and Pebble Mills
30101433	Pigment Grinding/Milling: Attritors
30101434	Pigment Grinding/Milling: Sand Mills
30101435	Pigment Grinding/Milling: Bead Mills
30101436	Pigment Grinding/Milling: Shot Mills
30101437	Pigment Grinding/Milling: Stone Mills
30101438	Pigment Grinding/Milling: Colloid Mills
30101439	Pigment Grinding/Milling: Kady Mills
30101440	Pigment Grinding/Milling: Impingement Mills
30101441	Pigment Grinding/Milling: Horizontal Media Mills
30101450	Product Finishing

SCC	Description (for 8-digit SCC)
30101451	Product Finishing, Tinting: Mix Tank and Dispenser
30101452	Product Finishing, Tinting: Fixed Blend Tank
30101453	Product Finishing, Thinning: Mix Tank and Dispenser
30101454	Product Finishing, Thinning: Fixed Blend Tank
30101460	Product Filling
30101461	Product Filling: Scale System
30101462	Product Filling: Product Filtering
30101463	Product Filling: Filling Operations
30101470	Equipment Cleaning
30101471	Equipment Cleaning: Hand Wipe
30101472	Equipment Cleaning: Tanks, Vessels, etc.

- **Varnish Manufacturing:**

SCC	Description (for 8-digit SCC)
30101501	Bodying Oil
30101502	Oleoresinous
30101503	Alkyd
30101505	Acrylic
30101510	Oil Storage
30101515	Kettle Loading
30101520	Varnish Cooking
30101521	Varnish Cooking: Open Kettle
30101522	Varnish Cooking: Closed Kettle
30101530	Varnish Thinning
30101540	Clarification
30101541	Clarification: Strainer
30101542	Clarification: Centrifuge
30101543	Clarification: Filter Press
30101550	End Product Transfer
30101560	End Product Storage

- **Ink Manufacturing:**

SCC	Description (for 8-digit SCC)
30102001	Vehicle Cooking: General
30102002	Vehicle Cooking: Oils
30102003	Vehicle Cooking: Oleoresin
30102004	Vehicle Cooking: Alkyds
30102005	Pigment Mixing
30102015	Premix/Preassembly
30102017	Premix/Preassembly: Drums
30102018	Premix/Preassembly: Material Loading
30102030	Pigment Grinding/Milling

SCC	Description (for 8-digit SCC)
30102031	Pigment Grinding/Milling: Roller Mills
30102032	Pigment Grinding/Milling: Ball and Pebble Mills
30102033	Pigment Grinding/Milling: Attritors
30102034	Pigment Grinding/Milling: Sand Mills
30102035	Pigment Grinding/Milling: Bead Mills
30102036	Pigment Grinding/Milling: Shot Mills
30102037	Pigment Grinding/Milling: Stone Mills
30102038	Pigment Grinding/Milling: Colloid Mills
30102039	Pigment Grinding/Milling: Kady Mills
30102040	Pigment Grinding/Milling: Impingement Mills
30102041	Pigment Grinding/Milling: Horizontal Media Mills
30102050	Product Finishing
30102051	Product Finishing, Tinting: Mix Tank and Disperser
30102052	Product Finishing, Tinting: Fixed Blend Tank
30102053	Product Finishing, Thinning: Mix Tank and Disperser
30102054	Product Finishing, Thinning: Fixed Blend Tank
30102060	Product Filling
30102061	Product Filling: Scale System
30102062	Product Filling: Product Filtering
30102063	Product Filling: Filling Operations
30102070	Equipment Cleaning
30102071	Equipment Cleaning: Hand Wipe
30102072	Equipment Cleaning: Tanks, Vessels, etc.

#### 2.17.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:
 

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)
- Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.

- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

### 2.17.5 Supporting Information for CAC Emissions Estimation

Depending on the estimation methodology selected to estimate CAC releases, supporting information from one or more of the following sources may be required:

- monitoring equipment logs;
- equipment type and operation parameters;
- schedule of process activity or loads; and
- emission control device and efficiency.

Emission factors may be obtained from the equipment manufacturer, government agencies, or open literature. A comprehensive emission factor database is available from the US EPA. The European and Australian environmental agencies also provide detailed descriptions.

### 2.17.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Paint and Ink Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fpaintin.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fpaintin.pdf</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIIP Technical Report Series — Volume II, Point Sources:**

Chapter 8: Preferred and Alternative Methods for Estimating Air Emissions from Paint and Ink Manufacturing Facilities (Updated March 2002)	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii08.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii08.pdf</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.18 Printing, Publishing, Packaging, and Graphic Arts Industry

### 2.18.1 General Description

The printing, publishing, packaging, and graphic arts industrial sector includes the following:

- companies whose business is dominated by printing operations;
- companies performing operations commonly associated with printing, such as bookbinding; and
- publishers, whether or not they actually print their own material.

Generally, this industrial source category is organized according to the type of printing process used; printing processes include lithography, flexography, gravure, screen printing, letterpress, and digital.

### 2.18.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
2819	323113	Commercial Screen Printing
2819	323114	Quick Printing
2819	323115	Digital Printing
2811	323116	Manifold Business Forms Printing
2819	323119	Other Commercial Printing
2821	323120	Support Activities for Printing

### 2.18.3 Source Description

The process-specific SCCs that are applicable are given below:

SCC	Description (for 8-digit SCC)
40500101	Dryer
40500199	Dryer
40500201	Letter Press: 2751
40500202	Ink Thinning Solvent (Kerosene)
40500203	Ink Thinning Solvents (Mineral Solvents)
40500211	Letter Press: 2751
40500212	Printing: Letter Press
40500215	Letterpress: Cleaning Solution
40500301	Printing: Flexographic
40500302	Ink Thinning Solvent (Carbitol)
40500303	Ink Thinning Solvent (Cellosolve)
40500304	Ink Thinning Solvent (Ethyl Alcohol)

<b>SCC</b>	<b>Description (for 8-digit SCC)</b>
40500305	Ink Thinning Solvent (Isopropyl Alcohol)
40500306	Ink Thinning Solvent (n-Propyl Alcohol)
40500307	Ink Thinning Solvent (Naphtha)
40500311	Printing: Flexographic
40500312	Printing: Flexographic
40500314	Printing: Flexographic: Propyl Alcohol Cleanup
40500315	Flexographic: Steam: Water-based
40500316	Flexographic: Steam: Water-based
40500317	Flexographic: Steam: Water-based
40500318	Flexographic: Steam: Water-based in Ink
40500319	Flexographic: Steam: Water-based Ink Storage
40500401	Lithographic: 2752
40500411	Lithographic: 2752
40500412	Lithographic: 2752
40500413	Lithographic: Isopropyl Alcohol Cleanup
40500414	Flexographic: Propyl Alcohol Cleanup
40500415	Offset Lithography: Dampening Solution with Alcohol Substitute
40500416	Offset Lithography: Dampening Solution with High Solvent Content
40500417	Offset Lithography: Cleaning Solution: Water-based
40500418	Offset Lithography: Dampening Solution with Isopropyl Alcohol
40500421	Offset Lithography: Heatset Ink Mixing
40500422	Offset Lithography: Heatset Solvent Storage
40500431	Offset Lithography: Nonheated Lithographic Inks
40500432	Offset Lithography: Nonheated Lithographic Inks
40500433	Offset Lithography: Nonheated Lithographic Inks
40500501	Gravure: 2754
40500502	Ink Thinning Solvent: Dimethylformamide
40500503	Ink Thinning Solvent: Ethyl Acetate
40500506	Ink Thinning Solvent: Methyl Ethyl Ketone
40500507	Ink Thinning Solvent: Methyl Isobutyl Ketone
40500510	Ink Thinning Solvent: Toluene
40500511	Gravure: 2754
40500512	Gravure: 2754
40500513	Gravure: 2754
40500514	Gravure: Cleanup Solvent
40500597	Other Not Classified
40500598	Ink Thinning Solvent: Other Not Specified
40500599	Ink Thinning Solvent: Other Not Specified
40500601	Ink Mixing
40500701	Solvent Storage
40500801	Screen Printing
40500802	Fugitive Emissions: Cleaning Rags
40500811	Screen Printing
40500812	Screen Printing
40588801	Printing/Publishing - Fugitives
40588802	Printing/Publishing - Fugitives
40588803	Printing/Publishing - Fugitives

SCC	Description (for 8-digit SCC)
40588804	Printing/Publishing - Fugitives
40588805	Printing/Publishing - Fugitives

### 2.18.4 Estimation Methodology

Depending on the type of information available, CAC emissions from paint and ink manufacturing can be estimated using the following methods (detailed descriptions of these methods can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurements** (continuous emission monitoring systems [CEMS], predictive emission monitoring [PEM], and source testing)
- **Mass balance**
- **Emission factors**
- **Engineering estimates**

Solvent evaporation emissions are commonly estimated using mass balance and engineering calculation techniques. Furthermore, it is assumed that all VOCs in the coating or solvent are emitted. This method requires information on the volume of solvent-containing material used and its formulation (solvent content) and provides an estimate of the uncontrolled solvent loss emission. If pollution control equipment and solvent recovery processes are used by the facility, a control or recovery efficiency should be factored into the uncontrolled emission estimate.

### 2.18.5 Supporting Information for CAC Emissions Estimation

The estimation of VOC emissions from solvent evaporation by mass balance or emission factor methods requires data on the consumption volume and, if available, some information on the type of material used. Ink and solvent suppliers should be able to provide information on the formulation of the various solvent-containing materials. Material safety data sheets (MSDS) are useful in providing information on the density of the substance and volatile content. It should be noted that the “% volatiles” reported in some MSDS sometimes includes water, which should not be included in the calculation of VOC emissions. More generic data on solvent contents of specific product classes can be found in the references listed below.

### 2.18.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow “Related Links”
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- **Air & Waste Management Association**, 1992, Air Pollution Engineering Manual, Van Nostrand Reinhold, New York.

- **Canadian Council of Ministers of the Environment**, 1999, Environmental Code of Practice for the Reduction of Volatile Organic Compound Emissions from the Commercial Printing Industry.
- **EMEP/CORINAIR 2001, Atmospheric Emission Inventory Guidebook, Third Edition, European Environmental Agency, Copenhagen:**

Group 6: Solvent and Other Product Use	<a href="http://reports.eea.eu.int/technical_report_2001_3/en/page015.html">http://reports.eea.eu.int/technical_report_2001_3/en/page015.html</a>
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- **Environment Australia:**

Emission Estimation Technique Manual for Printing, Publishing, and Packaging	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fprint.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fprint.pdf</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 15: Preferred and Alternative Methods for Estimating Air Emissions from the Printing, Packaging, and Graphic Arts Industry (May 2002)	<a href="http://www.epa.gov/ttn/chief/eiip/technical_report/volume02/ii15_may2002.pdf">http://www.epa.gov/ttn/chief/eiip/technical_report/volume02/ii15_may2002.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources:**

Chapter 4: Evaporation Loss Sources (Section 4.9.1, General Graphical Printing, and Section 4.9.2, Publication Gravure Printing)	<a href="http://www.epa.gov/ttn/chief/ap42/ch04/">http://www.epa.gov/ttn/chief/ap42/ch04/</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.19 Computer and Electronic Industry

### 2.19.1 General Description

Generally, a semiconductor is a material that has an electrical conductivity between that of a conductor and an insulator. Silicon has traditionally been the substrate used to manufacture semiconductors. However, the focus in recent years has been on developing valence III-V compounds, such as gallium arsenide (GaAs), as a substrate material. GaAs has several advantages over silicon, such as increased electron mobility and semi-insulating properties

The semiconductor manufacturing process involves a wide variety of distinct processing steps and is continually evolving. As a result, a range of processes may occur at a single plant, and non-uniformity exists for a process design from plant to plant. An average semiconductor manufacturing process consists of hundreds of process steps. Furthermore, many of the manufacturing steps are repeated several times during the production process. This section will discuss the general manufacturing steps.

A clean environment is essential to the manufacture of semiconductors; thus, cleaning operations precede and follow many of the manufacturing process steps. Wet processing, during which semiconductor devices are repeatedly immersed in or sprayed with solutions, are commonly used to minimize the risk of contamination. These processes also give rise to emissions of a variety of pollutants. The primary component of a semiconductor is the wafer. The general steps in the semiconductor manufacturing process include wafer preparation, wafer fabrication, and die assembly.

### 2.19.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
3361	334110	Computer & Peripheral Equipment Mfg.
3351	334410	Semiconductor & Electronic Component Mfg.

### 2.19.3 Source Description

The following SCCs are included in this source:

SCC	Description (for 8-digit SCC)
31303001	Circuit Board Manufacturing
31303061	Circuit Board Etching: Acid
31303062	Circuit Board Etching: Alkaline
31303063	Circuit Board Etching: Plasma
31303501	Soldering
31303502	Cleaning
31306500	Integrated Circuit Manufacturing: General

31306501	Cleaning Processes: Wet Chemical: Specify Aqueous Solution
31306502	Cleaning Process: Plasma Process: Specify Gas Used
31306505	Photoresist Operations: General
31306510	Chemical Vapour Deposition: General: Specify Gas Used
31306520	Diffusion Process: Deposition Operation: Specify Gas Used
31306530	Etching Process: Wet Chemical: Specify Aqueous Solution
31306531	Etching Process: Plasma/Reactive Ion: Specify Gas Used
31306599	Miscellaneous Operations

#### 2.19.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

Solvent evaporation emissions are commonly estimated using mass balance and engineering calculation techniques. Typically, it is assumed that all VOCs in the coating or solvent are emitted. This method requires information on the volume of solvent-containing material used and its formulation (solvent content) and provides an estimate of the uncontrolled solvent loss emission. If pollution control equipment and solvent recovery processes are used by the facility, a control or recovery efficiency should be applied to the uncontrolled emissions estimate.

### 2.19.5 Supporting Information for CAC Emissions Estimation

The estimation of VOC emissions using mass balance or emission factor methodologies requires data on the consumption volume and, if available, information on the type of material used. Solvent suppliers can provide information on the formulation of the various solvent-containing materials. Material safety data sheets (MSDS) are useful in providing information on the density of the substance and volatile content. It should be noted that the “% volatiles” reported in some MSDS sometimes includes water, which should not be included in the calculation of VOC emissions. More generic data on solvent contents of specific product classes can be found in the references listed below.

### 2.19.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow “Related Links”
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- **Environment Australia:**

Emission Estimation Technique Manual for The Electronics and Computer Industry	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/telecom.html">http://www.npi.gov.au/handbooks/approved_handbooks/telecom.html</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 6: Preferred and Alternative Methods for Estimating Air Emissions from Semiconductor Manufacturing (February 1999)	<a href="http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii06.pdf">http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii06.pdf</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.20 Hot-Mix Asphalt Plants

### 2.20.1 General Description

Hot-mix asphalt (HMA) paving materials are a mixture of size-graded, high-quality aggregate (which can include reclaimed asphalt pavement [RAP]) and liquid asphalt cement. These materials are then heated and mixed in measured quantities to produce HMA. Aggregate and RAP (if used) constitute over 92 percent by weight of the total mixture. Aside from the amount and grade of asphalt cement used, the relative amount and type of aggregates determine mix characteristics and RAP used. A certain percentage of fine aggregate (less than 74 micrometres in physical diameter) is required for the production of good-quality HMA.

Hot-mix asphalt paving materials can be manufactured by (1) batch mix plants, (2) continuous mix (mix outside dryer drum) plants, (3) parallel flow drum mix plants, and (4) counterflow drum mix plants.

### 2.20.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
3699	324121	Asphalt Paving Mixture & Block Mfg.
3699	324122	Asphalt Shingle & Coating Material Mfg.

### 2.20.3 Source Description

The following SCCs apply to the hot-mix asphalt plants:

SCC	Description (for 8-digit SCC)
30500201	Rotary Dryer: Conventional Plant
30500202	Hot Elevators, Screens, Bins and Mixer
30500203	Storage Piles
30500204	Cold Aggregate Handling
30500205	Drum Dryer: Hot Asphalt Plants (see 3-05-002-55 & -58 for subtypes)
30500206	Asphalt Heater: Natural Gas (Use 3-05-050-20 for MACT)
30500207	Asphalt Heater: Residual Oil (Use 3-05-050-21 for MACT)
30500208	Asphalt Heater: Distillate Oil (Use 3-05-050-22 for MACT)
30500209	Asphalt Heater: LPG (Use 3-05-050-23 for MACT)
30500210	Asphalt Heater: Waste Oil
30500211	Rotary Dryer Conventional Plant with Cyclone (se 3-05-002-01 w/CTL)
30500212	Heated Asphalt Storage Tanks: Drum Mix
30500213	Storage Silo
30500214	Truck Load-out
30500215	In Place Recycling: Propane
30500216	Cold Aggregate Feed Bins

SCC	Description (for 8-digit SCC)
30500217	Cold Aggregate Conveyors and Elevators
30500220	Elevators: Batch Process
30500221	Elevators: Continuous Process
30500230	Hot Bins and Screens: Batch Process
30500231	Hot Bins and Screens: Continuous Process
30500240	Mixers: Batch Process
30500241	Mixers: Continuous Process
30500242	Mixers: Drum Mix Process (use 3-05-002-005 and subtypes)
30500250	Conventional Continuous Mix (outside of drum) Plant: Rotary Dryer
30500251	Conventional Batch Mix Plant: Rotary Dryer, Natural Gas - Fired
30500252	Conventional Batch Mix Plant: Rotary Dryer, Oil - Fired
30500255	Drum Mix Plant: Rotary Drum Dryer / Mixer, Natural Gas - Fired
30500256	Drum Mix Plant: Rotary Drum Dryer / Mixer, Natural Gas, Parallel Flow
30500257	Drum Mix Plant: Rotary Drum Dryer / Mixer, Natural Gas, Counterflow
30500258	Drum Mix Plant: Rotary Drum Dryer / Mixer, Oil - Fired
30500259	Drum Mix Plant: Rotary Drum Dryer / Mixer, Oil - Fired, Parallel Flow
30500260	Drum Mix Plant: Rotary Drum Dryer / Mixer, Oil - Fired, Counterflow
30500290	Haul Roads: General

#### 2.20.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:
 
$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time}$$
 (corrected to reference conditions and appropriate units)
- Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.

- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

### **2.20.5 Supporting Information for CAC Emissions Estimation**

Depending on the methodology selected to estimate CAC emissions, supporting information from one or more of the following sources may be required:

- monitoring equipment logs;
- equipment type and operation parameters;
- schedule of process activity or loads;
- annual and daily throughputs; and
- emission control device and efficiency.

### **2.20.6 References and Links**

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***Environment Australia:***

Emission Estimation Technique Manual for Hot Mix Asphalt Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fasphalt.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fasphalt.pdf</a>
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- **STAPPA/ALAPCO/US EPA Emission Inventory Improvement Program, 2001, EIIP Technical Report Series — Volume II, Point Sources:**

Chapter 3: Preferred and Alternative Methods for Estimating Air Emissions from Hot-Mix Asphalt Plants, Final Report (July 1996)	<a href="http://www.epa.gov/ttn/chief/eiip/technicalreport/volume02/ii03.pdf">http://www.epa.gov/ttn/chief/eiip/technicalreport/volume02/ii03.pdf</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <http://www.epa.gov/ttn/chief/software/fire/index.html>

## 2.21 Food Sector

### 2.21.1 General Description

This sector is composed of a variety of sources in the preparation of food, beverages, and products, which are listed below.

### 2.21.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
1011 - 1099	311	Food Manufacturing
1053	3111	Animal Food Manufacturing
1053	31111	Animal Food Manufacturing
1053	311111	Dog and Cat Food Manufacturing
1053	311119	Feed Industry (other animal food manufacturing)
1094	31121	Flour Milling and Malt Manufacturing
1052	311211	Flour Milling
1094, 1099	311214	Rice Milling and Malt Manufacturing
1099	311221	Wet Corn Milling (including starch mfg.)
1061	311224	Oilseed Processing
1099	311225	Fat and Oil Refining and Blending
1052	31123	Breakfast Cereal Manufacturing
1052	311230	Breakfast Cereal Manufacturing
1081	3113	Sugar and Confectionery Product Manufacturing
1081	31131	Sugar Manufacturing
1081	311310	Sugar Manufacturing (including sugar beet)
1083	31132	Chocolate and Confectionery Manufacturing from Cacao
1083	311320	Chocolate and Confectionery Manufacturing from Cacao
1083	31133	Confectionery Manufacturing from Purchased Chocolate
1083	311330	Confectionery Manufacturing from Purchased Chocolate
1083	31134	Non-Chocolate Confectionery Manufacturing
1083	311340	Non-Chocolate Confectionery Manufacturing
1032	3114	Fruit and Vegetable Preserving and Specialty Food
1099	31141	Frozen Food Manufacturing
1099	311410	Frozen Food Manufacturing
1031	31142	Fruit and Vegetable Canning, Pickling and Drying
1031	311420	Fruit and Vegetable Canning, Pickling and Drying
1041	311511	Fluid Milk Manufacturing
1049	311515	Butter, Cheese, and Dry and Condensed Dairy Products
1049	31152	Ice Cream and Frozen Dessert Manufacturing
1049	311520	Ice Cream and Frozen Dessert Manufacturing
1011, 1053	31161	Animal Slaughtering and Processing
1011	311611	Animal (except Poultry) Slaughtering
1011, 1099	311614	Rendering and Meat Processing from Carcasses
1012	311615	Poultry Processing

CDN SIC	NAICS	Description
1021	3117	Seafood Product Preparation and Packaging
1021	31171	Seafood Product Preparation and Packaging
1021	311710	Seafood Product Preparation and Packaging
6013	3118	Bakeries and Tortilla Manufacturing
6013	31181	Bread and Bakery Product Manufacturing
6013	311811	Retail Bakeries
1072	311814	Commercial Bakeries and Frozen Bakery Product
1071	311821	Cookie and Cracker Manufacturing
1052, 1072	311822	Flour Mixes and Dough Manufacturing from Purchased Flour
1092	311823	Dry Pasta Manufacturing
1072	31183	Tortilla Manufacturing
1072	311830	Tortilla Manufacturing
1099	3119	Other Food Manufacturing
1099	31191	Snack Food Manufacturing
1099	311911	Roasted Nut and Peanut Butter Manufacturing
1093	311919	Other Snack Food Manufacturing
1091	31192	Coffee and Tea Manufacturing
1091	311920	Coffee and Tea Manufacturing
1099, 1111	31193	Flavouring Syrup and Concentrate Manufacturing
1099, 1111	311930	Flavouring Syrup and Concentrate Manufacturing
1031, 1099	311940	Seasoning and Dressing Manufacturing
1099	31199	All Other Food Manufacturing
1099	311990	All Other Food Manufacturing (including baker's yeast mfg.)
1111, 3999	3121	Beverage Manufacturing
1111, 3999	31211	Soft Drink and Ice Manufacturing
1111, 3999	312110	Soft Drink and Ice Manufacturing
1131	31212	Breweries
1131	312120	Breweries
1141	31213	Wineries
1141	312130	Wineries
1121	31214	Distilleries
1121	312140	Distilleries
0135	111940	Alfalfa Farming

### 2.21.3 Source Description

The SCCs provided in the table below represent typical processes found in this industry source. The codes are given for each sub-source category.

- **Alfalfa Dehydration:**

SCC	Description (for 8-digit SCC)
30200102	Primary Cyclone and Dryer
30200103	Meal Collector Cyclone

SCC	Description (for 8-digit SCC)
30200104	Pellet Cooler Cyclone
30200107	Pellet Collector Cyclone
30200111	Gas-fired, Triple-Pass Dryer Cyclone
30200112	Coal-fired, Triple-Pass Dryer Cyclone
30200115	Gas-fired, Single-Pass Dryer Cyclone
30200117	Wood-fired, Single-Pass Dryer Cyclone
30200120	Pellet Storage Bin Cyclone

• **Coffee Roasting and Instant Coffee Products:**

SCC	Description (for 8-digit SCC)
30200201	Direct Fired Roaster
30200202	Indirect Fired Roaster
30200203	Stoner/Cooler
30200204	Green Coffee Bean Unloading
30200206	Screening - Debris Removal from Green Coffee Beans
30200208	Green Coffee Bean Storage and Handling
30200210	Decaffeination : Solvent Extraction
30200211	Decaffeination : Supercritical CO2 Extraction
30200216	Steam or Hot Air Drying of Decaffeinated Green Coffee Beans
30200220	Indirect-fired Batch Roaster -Natural Gas (including combustion emissions)
30200221	Indirect-fired Continuous Roaster -Natural Gas (including combustion emissions)
30200224	Direct-fired Batch Roaster - Natural Gas
30200225	Direct-fired Continuous Roaster - Natural Gas
30200228	Cooling of Roasted Coffee Beans
30200230	De-stoning - Air Classification for Debris Removal
30200234	Equilibration - Air Drying & Stabilization of Roasted Coffee Beans
30200299	Other Not Classified
30200301	Spray Drying (Instant Coffee) Ground Coffee after H2O Extraction
30200306	Freeze Drying (Instant Coffee) Ground Coffee after H2O Extraction

• **Feed Manufacture:**

SCC	Description (for 8-digit SCC)
30200801	General
30200802	Grain Receiving
30200803	Shipping
30200804	Handling
30200805	Grinding
30200806	Pellet Coolers
30200807	Grain Cleaning
30200808	Milling
30200809	Mixing/Blending
30200810	Conveying

SCC	Description (for 8-digit SCC)
30200811	Scalping
30200812	Bulk Load-out
30200813	Shaking
30200814	Storage
30200815	Grinding
30200816	Pellet Cooler
30200817	Grain Milling: Hammermill
30200818	Grain Milling: Flaker
30200819	Grain Milling: Grain Cracker
30200821	Fugitive Emissions: General
30200822	Fugitive Emissions: Shipping/Receiving
30200823	Fugitive Emissions: Packing
30200832	Citrate: Handling/Transferring
30200833	Citrate: Grinding
30200834	Citrate: Drying
30200835	Citrate: Storage

- **Beer Production:**

SCC	Description (for 8-digit SCC)
30200901	Grain Handling (see also 3-02-005-xx)
30200902	Drying Spent Grains
30200903	Brew Kettle
30200904	Aging Tank: Secondary Fermentation
30200905	Malt Kiln
30200906	Malt Mill
30200907	Brew Kettle
30200908	Aging Tank: Filling
30200910	Beer Bottling: Storage
30200911	Fugitive Emissions: General
30200912	Fugitive Emissions: General
30200915	Milled Malt Hopper
30200920	Raw Material Storage
30200921	Mash Tun
30200922	Cereal Cooker
30200923	Lauter Tun or Strainmaster
30200924	Hot Wort Settling Tank
30200925	Wort Cooler
30200926	Trub Vessel
30200930	Brewers Grain Dryer: Natural Gas-fired
30200931	Brewers Grain Dryer: Fuel Oil-fired
30200932	Brewers Grain Dryer: Steam-heated
30200935	Fermenter Venting: Closed Fermenter
30200937	Fermenter Venting: Open Fermenter
30200939	Activated Carbon Regeneration

SCC	Description (for 8-digit SCC)
30200940	Brewers Yeast Disposal
30200941	Yeast Propagation
30200951	Can Filling Line
30200952	Sterilized Can Filling Line
30200953	Bottle Filling Line
30200954	Sterilized Bottle Filling Line
30200955	Keg Filling Line
30200960	Bottle Soaker and Cleaner
30200961	Bottle Crusher
30200962	Can Crusher with Pneumatic Conveyor
30200963	Beer Sump
30200964	Waste Beer Recovery
30200965	Waste Beer Storage Tanks
30200966	Ethanol Removal from Waste Beer
30200967	Ethanol Recovery from Waste Beer

- **Distilled Spirits:**

SCC	Description (for 8-digit SCC)
30201001	Grain Handling
30201002	Dryer House Operations
30201003	Aging
30201004	Fermentation Tank
30201005	Malt Milling
30201006	Malt Drying
30201010	Whiskey Bottling: Storage
30201011	Fugitive Emissions: General
30201012	Fugitive Emissions: General
30201013	Whiskey: Grain Mashing
30201014	Whiskey: Fermentation Tank
30201015	Whiskey: Distillation
30201017	Whiskey: Aging - Evaporation Loss
30201018	Whiskey: Blending/Bottling
30201020	Raw Material Storage
30201099	Other, Not Classified

- **Wine, Brandy, and Brandy Spirits:**

SCC	Description (for 8-digit SCC)
30201101	Grape Crushing/Treatment: White Wines
30201102	Grape Crushing/Treatment: Red Wine
30201103	Aging
30201104	Fermentation Tank
30201105	Wine Fermentation - White Wine

SCC	Description (for 8-digit SCC)
30201106	Wine Fermentation - Red Wine
30201110	Wine Bottling: Storage
30201111	Fugitive Emissions: Pomace Screening - Red Wine
30201112	Fugitive Emissions: Pomace Press - Red Wine
30201120	Raw Material Storage
30201121	Wine Bottling - White Wine

- **Fish Processing:**

SCC	Description (for 8-digit SCC)
30201201	Cookers: Fresh Fish Scrap
30201202	Cookers: Stale Fish Scrap
30201203	Dryers
30201204	Canning Cookers
30201205	Steam Tube Dryer
30201206	Direct Fired Dryer

- **Meat Smokehouses:**

SCC	Description (for 8-digit SCC)
30201301	Combined Operations
30201302	Batch Smokehouses: Smoking Cycle
30201303	Batch Smokehouses: Cooking Cycle
30201304	Continuous Smokehouse: Smoke Zone
30201305	Continuous Smokehouse: Heat Zone
30201311	Meat Charbroiler

- **Starch Manufacturing:**

SCC	Description (for 8-digit SCC)
30201401	Combined Operations
30201402	Steeping (Acidification)
30201403	Grinding
30201404	Screening
30201405	Centrifuging
30201406	Starch Filtering
30201407	Starch Storage Bin
30201408	Starch Bulk Loadout
30201410	Modified Starch Drying: Flash Dryers
30201411	Modified Starch Drying: Spray Dryers
30201412	Unmodified Starch Drying: Flash Dryers
30201413	Unmodified Starch Drying: Spray Dryers

30201421	Fugitive Emissions: General
30201422	Fugitive Emissions: Starch Packaging

- **Sugarcane Refining:**

SCC	Description (for 8-digit SCC)
30201501	General
30201503	Evaporators
30201505	Clarifier
30201507	Vacuum Pans
30201510	Cane Sugar Dryer
30201512	Bulk Sugar Storage
30201514	Bulk Sugar Loadout
30201520	Clarification (Phosphatation)
30201521	Clarification (Carbonation)
30201525	Adsorbent Regeneration
30201526	Adsorbent Conveyor Transfer
30201530	Evaporator
30201532	Vacuum Pans
30201535	Sugar Dryer
30201536	Sugar Cooler
30201537	Sugar Granulator (Dryer & Cooler)
30201540	Screen
30201542	Sugar Storage and Packaging
30201544	Bulk Loadout

- **Sugar Beet Processing:**

SCC	Description (for 8-digit SCC)
30201601	Pulp Dryer : Coal-fired
30201605	Pulp Dryer : Oil-fired
30201608	Pulp Dryer : Natural Gas-fired
30201612	Dried Pulp Pelletizer
30201616	Dried Pulp Pellet Cooler
30201621	First Carbonation Tank
30201622	Second Carbonation Tank
30201631	Sulphur Stove Contacting Tower
30201641	First Effect Evaporator Vent
30201651	Sugar Dryer
30201655	Sugar Cooler
30201658	Sugar Granulator (Dryer & Cooler)
30201661	Sugar Conveying and Sacking
30201682	Lime Crusher
30201684	Lime Kiln : Coal-fired
30201686	Lime Kiln : Natural Gas-fired
30201688	Lime Slaker

• ***Peanut Processing:***

<b>SCC</b>	<b>Description (for 8-digit SCC)</b>
30201701	Loading/Unloading
30201702	Cleaning
30201703	Shelling
30201704	Milling
30201705	Dryer
30201711	Unloading of Almonds to Receiving Pit
30201712	Precleaning of Orchard Debris from Almonds
30201713	Hull Removal and Separation from In-shell Almonds
30201714	Hulling and Shelling of Almonds (Huller/Sheller)
30201715	Classifier Screen Deck to Remove Shell from Meats
30201716	Air Leg to Separate Shells from Meats
30201717	Almond Roaster: Direct-fired Rotating Drum

• ***Vegetable Oil Processing:***

<b>SCC</b>	<b>Description (for 8-digit SCC)</b>
30201901	Corn Oil: General
30201902	Cottonseed Oil: General
30201903	Soybean Oil: General
30201904	Peanut Oil: General
30201905	General
30201906	Corn Oil: General
30201907	Cottonseed Oil: General
30201908	Soybean Oil: General
30201909	Peanut Oil: General
30201911	Oil Extraction
30201912	Meal Preparation
30201913	Oil Refining
30201914	Fugitive Leaks
30201916	Oil Extraction
30201917	Meal Preparation
30201918	Oil Refining
30201919	Fugitive Leaks
30201921	Solvent Work Tank
30201923	Aspiration Exhaust Vent: Startup and Shutdown
30201925	Oil Extraction Rotary Cell Extractor
30201926	Oil Extraction Vertically Arranged Basket Type Extractor
30201927	Oil Extraction Continuous, Shallowbed, Rectangular Loop, No Baskets
30201930	Meal Preparation: Desolventizer/Toaster
30201931	Meal Preparation: Dryer
30201932	Meal Preparation: Cooler
30201933	Meal Preparation: Pneumatic Conveyor

SCC	Description (for 8-digit SCC)
30201935	Meal Preparation: Screening and Grinding
30201939	Meal Storage Tanks
30201941	Oil Refining: Miscellaneous Holding Tank
30201942	Oil Refining: Evaporator(s)
30201945	Oil Refining: Oil Stripping Column
30201949	Crude Oil Storage Tanks
30201950	Solvent/Water Separator
30201960	Wastewater Evaporator
30201997	Soybean Oil Production: Complete Process-Solvent Loss(Plant-specific)
30201998	Soybean Oil Production: Complete Process-Solvent Loss (average)

- **Dairy Products:**

SCC	Description (for 8-digit SCC)
30203001	Milk: Spray Dryer
30203010	Whey Dryer
30203020	Cheese Dryer

- **Bakeries:**

SCC	Description (for 8-digit SCC)
30203201	Bread Baking: Sponge-Dough Process
30203202	Bread Baking: Straight-Dough Process
30203203	Material Handling and Transferring
30203204	Flour Storage

- **Baker's Yeast Manufacturing (dry and compressed yeast):**

SCC	Description (for 8-digit SCC)
30203404	Intermediate Fermenter (F4 Stage)
30203405	Stock Fermentor (F5 Stage)
30203406	Pitch Fermentor (F6 Stage)
30203407	Trade Fermentor (F7 Stage)
30203410	Wastewater Treatment
30203415	Extrusion
30203420	Dryer
30203421	Drying Chamber
30203422	Rotolouvre Dryer
30203423	Airlift Dryer: Batch Process
30203424	Airlift Dryer: Continuous Process
30203504	Intermediate Fermentor (F4 Stage)
30203505	Stock Fermentor (F5 Stage)

SCC	Description (for 8-digit SCC)
30203506	Pitch Fermentor (F6 Stage)
30203507	Trade Fermentor (F7 Stage)
30203510	Wastewater Treatment
30203530	Harvesting
30203531	Harvesting: Centrifuge
30203532	Harvesting: Plate and Frame Filter Press
30203533	Harvesting: Rotary Vacuum Filter
30203534	Harvesting: Mixers
30203535	Harvesting: Extrusion
30203536	Harvesting: Cutting
30203540	Packaging

- **Deep Fat Frying:**

SCC	Description (for 8-digit SCC)
30203601	Continuous Deep Fat Fryer: Potato Chips
30203602	Continuous Deep Fat Fryer: Other Snack Chips
30203603	Batch Deep Fat Fryer: Potato Chips
30203604	Gas-fired Toaster: Snack Chips

- **Cereal Production:**

SCC	Description (for 8-digit SCC)
30204001	Dryer
30204002	Cereal Conveying
30204003	Cereal Packaging
30204004	Cereal Coating

- **Carob Kibble:**

SCC	Description (for 8-digit SCC)
30203901	Roaster
30203902	Receiving

- **Other Sources:**

SCC	Description (for 8-digit SCC)
30280001	Equipment Leaks
30282001	Wastewater, Aggregate, Process Area Drains
30282002	Wastewater, Aggregate, Process Equipment Drains
30282501	Wastewater, Points of Generation, Mineral Oil Stripper

SCC	Description (for 8-digit SCC)
30282502	Wastewater, Points of Generation, Desolventizer/Toaster
30282503	Wastewater, Points of Generation, Condensate from Condensers
30282504	Wastewater, Points of Generation, Wastewater Separator
30290001	Fuel Fired Equipment, Distillate Oil #2, Process Heaters
30290002	Fuel Fired Equipment, Residual Oil, Process Heaters
30290003	Fuel Fired Equipment, Natural Gas, Process Heaters
30290005	Fuel Fired Equipment, LPG, Process Heaters
30291001	Fuel Fired Equipment, Broiling Food, Natural Gas

### 2.21.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time}$$

(corrected to reference conditions and appropriate units)
- Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific

pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

Since particulate matter is typically emitted from material handling and transfer operations, direct monitoring information may not be available. Fugitive emissions are highly variable and are dependent on a number of factors, including local climate conditions, mitigation measures, properties of material, and the activities involved. Generally, emission factors may be used to estimate fugitive emissions.

### 2.21.5 Supporting Information for CAC Emissions Estimation

Depending on the estimation methodology selected, one or more of the following supporting data may be required:

- direct measurement logs;
- material throughputs;
- equipment type and operation parameters;
- schedule of activity; and
- emission control device and efficiency.

Throughput data can be obtained from grain receipts. Control devices such as cyclones and fabric filters are generally used in grain handling operations, and their respective control efficiencies can be obtained from the equipment suppliers. If emission factors are to be applied, they can be obtained from government agencies and/or published literature.

### 2.21.6 References and Links

- ***Environment Canada:***

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- ***Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:***

Emission Estimation Technique Manual for Snack Foods Roasting and Frying Industry	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fsnack.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fsnack.pdf</a>
Emission Estimation Technique Manual for Coffee Roasting	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fcoffee.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fcoffee.pdf</a>
Emission Estimation Technique Manual for Fruit and Vegetable Processing Industry	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/ffruitveg.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/ffruitveg.pdf</a>
Emission Estimation Technique Manual for Bread Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/bakery.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/bakery.pdf</a>
Emission Estimation Technique Manual for Dairy Product Manufacturing	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fdairy.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fdairy.pdf</a>

Emission Estimation Technique Manual for Vegetable Oil Processing Industry	<a href="http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fvegoil.pdf">http://www.npi.gov.au/handbooks/approved_handbooks/pubs/fvegoil.pdf</a>
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- ***U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition and Supplements:***

Chapter 9: Food and Agricultural Industries	<a href="http://www.epa.gov/ttn/chief/ap42/ch09/">http://www.epa.gov/ttn/chief/ap42/ch09/</a>
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- ***U.S. Environmental Protection Agency, 2000, Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):***

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.22 Pharmaceutical Manufacturing

### 2.22.1 General Description

Pharmaceutical manufacturing consists mainly of the manufacture and packaging of medication used by humans and animals. Due to the importance of the product purity and the presence of toxic and biologically active constituents, operations in this source category are typically found to be sterile and closely controlled.

The pharmaceutical manufacturing sector may be divided into four categories: chemical synthesis, formulation, fermentation, and extraction. Air emission sources from the pharmaceutical manufacturing sector vary from facility to facility and will depend on the product that is manufactured. A majority of processes in this source category can be considered batch operations.

### 2.22.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
3741	325410	Pharmaceutical & Medicine Mfg.

### 2.22.3 Source Description

The process-specific SCCs for the source are provided below:

SCC	Description (for 8-digit SCC)
30106001	Vacuum Dryers
30106002	Reactors
30106003	Distillation Units
30106004	Filters
30106005	Extractors
30106006	Centrifuges
30106007	Crystallizers
30106008	Exhaust Systems
30106009	Air Dryers
30106010	Storage/Transfer
30106011	Coating Process
30106012	Granulation Process
30106013	Fermentation Tanks
30106021	Raw Material Unloading
30106022	Miscellaneous Fugitives
30106023	Miscellaneous Fugitives

### 2.22.4 Estimation Methodology

It is usually quite difficult to characterize CAC emissions from this source due to the batch nature of operations. However, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

### 2.22.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected to estimate CAC emissions, the following supporting information may be required:

- monitoring equipment logs;
- equipment type and operation parameters;
- schedule of process activity or loads;

- annual and daily throughputs;
- number of cycles per year and operational duration; and
- emission control device and efficiency.

### 2.22.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow “Related Links”
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- **Environment Australia, 2002, National Pollutant Inventory, Industry Handbooks:**

Emission Estimation Technique Manual for Medicinal and Pharmaceutical Product Manufacturing	<a href="http://www.npi.gov.au/handbooks/aproved_handbooks/pubs/fpharm.pdf">http://www.npi.gov.au/handbooks/aproved_handbooks/pubs/fpharm.pdf</a>
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- **U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources:**

Section 6.13: Pharmaceuticals Production	<a href="http://www.epa.gov/ttn/chief/ap42/ch06/final/c06s13.pdf">http://www.epa.gov/ttn/chief/ap42/ch06/final/c06s13.pdf</a>
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- **U.S. Environmental Protection Agency, 2000, Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units):**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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## 2.23 Abrasive Blasting

### 2.23.1 General Description

Abrasive blasting is the use of abrasive material to clean or texturize a material such as metal or masonry. Sand is a widely used blasting abrasive. Other abrasive materials include coal slag, smelter slags, mineral abrasives, metallic abrasives, and synthetic abrasives. Industries that use abrasive blasting include the shipbuilding industry, automotive industry, and other industries that involve surface preparation and painting.

### 2.23.2 Applicable SIC and NAICS Codes

The following codes are applicable to this source:

CDN SIC	NAICS	Description
3571	327910	Abrasive Industry

### 2.23.3 Source Description

The SCCs that are applicable for abrasive blasting are provided below:

SCC	Description (for 8-digit SCC)
30900201	Abrasive Blasting - General
30900202	Abrasive Blasting - Sand Abrasive
30900203	Abrasive Blasting - Slag Abrasive
30900204	Abrasive Blasting - Garnet Abrasive
30900205	Abrasive Blasting - Steel Grit Abrasive
30900206	Abrasive Blasting - Walnut Shell Abrasive
30900207	Abrasive Blasting - Shotblast with Air
30900208	Abrasive Blasting - Shotblast w/o Air
30900298	Abrasive Blasting - General
30900299	Abrasive Blasting - General

### 2.23.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- **Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

### 2.23.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected to estimate CAC emissions, the following supporting information may be required:

- monitoring equipment logs;
- equipment type and operation parameters;
- schedule of process activity or loads; and
- emission control device and efficiency.

Emission factors may be obtained from the equipment manufacturer, government agencies, or open literature. A comprehensive emission factor database is available from the US EPA.

### 2.23.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- **U.S. Environmental Protection Agency, 1995, *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*:**

Section 13.2.6: Abrasive Blasting	<a href="http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-6.pdf">http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-6.pdf</a>
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- **U.S. Environmental Protection Agency, 2000, *Factor Information REtrieval (FIRE) Data System, Version 6.23 (Imperial units)*:**

Download at: <http://www.epa.gov/ttn/chief/software/fire/index.html>

## 2.24 Industrial Flares

### 2.24.1 General Description

Flaring is a high-temperature oxidation process used to burn combustible components (e.g., hydrocarbons) of waste gases from industrial operations. Typically, natural gas, propane, ethylene, propylene, butadiene, and butane constitute over 95 percent of the waste gases that are flared. Ideally, during the combustion process, gaseous hydrocarbons react with atmospheric oxygen to form carbon dioxide and water.

### 2.24.2 Applicable SIC and NAICS Codes

Generally, flares are used by many industries. SCCs that are applicable to flaring activities are listed in Section 2.24.3. Furthermore, SIC and NAICS codes typically cannot be applied to flares, since they are used in many types of industrial processes.

### 2.24.3 Source Description

The process-specific SCCs that are applicable to industrial flares are provided below:

SCC	Description (for 8-digit SCC)
30600901	Petroleum Industry Flares - Distillate Oil
30600902	Petroleum Industry Flares - Residual Oil
30600903	Petroleum Industry Flares - Natural Gas
30600904	Petroleum Industry Flares - Process Gas
30600905	Petroleum Industry Flares - Liquefied Petroleum Gas
30600906	Petroleum Industry Flares - Hydrogen Sulphide
30600999	Petroleum Industry Flares - Not Classified
20190099	Internal Combustion Engines-Flares
30190021	Chemical Manufacturing-Distillate Oil (No. 2): Flares
30190022	Chemical Manufacturing-Residual Oil: Flares
30190023	Chemical Manufacturing-Natural Gas: Flares
30390021	Primary Metal Production-Distillate Oil (No. 2): Flares
30390022	Primary Metal Production-Residual Oil: Flares
30390023	Primary Metal Production-Natural Gas: Flares
30390024	Primary Metal Production-Process Gas: Flares
30490021	Secondary Metal Production-Distillate Oil (No. 2): Flares
30490022	Secondary Metal Production-Residual Oil: Flares
30490023	Secondary Metal Production-Natural Gas: Flares
30490024	Secondary Metal Production-Process Gas: Flares
30590021	Mineral Products-Distillate Oil (No. 2): Flares
30590023	Mineral Products-Natural Gas: Flares
30790021	Pulp and Paper and Wood Products-Distillate Oil (No. 2): Flares
30790022	Pulp and Paper and Wood Products-Residual Oil: Flares
30790023	Pulp and Paper and Wood Products-Natural Gas: Flares
30790024	Pulp and Paper and Wood Products-Process Gas: Flares
30890021	Rubber and Misc. Plastic Products-Distillate Oil (No. 2): Flares
30890022	Rubber and Misc. Plastic Products-Residual Oil: Flares

SCC	Description (for 8-digit SCC)
30890023	Rubber and Misc. Plastic Products-Natural Gas: Flares
30990023	Fabricated Metal Products-Natural Gas: Flares
31000160	Oil and Gas Production-Flares
31000205	Oil and Gas Production-Flares
31000215	Natural Gas Production-Flares Combusting Gases >1000 BTU/scf
31000216	Natural Gas Production-Flares Combusting Gases <1000 BTU/scf
39990021	Misc. Manufacturing Industries-Distillate Oil (No. 2 Oil): Flares
39990022	Misc. Manufacturing Industries-Residual Oil: Flares
39990023	Misc. Manufacturing Industries-Natural Gas: Flares
39990024	Misc. Manufacturing Industries-Process Gas: Flares
40290023	Petroleum and Solvent Evaporation-Natural Gas: Flares
49090021	Petroleum and Solvent Evaporation-Distillate Oil (No. 2): Flares
49090022	Petroleum and Solvent Evaporation-Residual Oil: Flares
49090023	Petroleum and Solvent Evaporation-Natural Gas: Flares
50100410	Landfill Dump-Waste Gas Destruction-Waste Gas Flares
50300601	Landfill Dump-Waste Gas Flares

#### 2.24.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

$$\Rightarrow \text{Pollutant concentration} \times \text{volumetric flow rate} \times \text{sampling period or time} \\ (\text{corrected to reference conditions and appropriate units})$$
- Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

#### **2.24.5 Supporting Information for CAC Emissions Estimation**

Depending on the methodology selected to estimate CAC emissions, the following supporting information may be required:

- monitoring equipment logs;
- fuel type, composition, and load/consumption;
- equipment type and operation parameters;
- firing capacity;
- schedule of process activity or loads; and
- emission control device and efficiency.

Emission factors may be obtained from the equipment manufacturer, government agencies, or open literature. A comprehensive emission factor database is available from the US EPA. Emission factors that are derived from actual testing of combustion unit(s) at a given facility should be used where available.

The following information is required for emission factor calculations:

- For natural gas-fired equipment, fuel consumption data can be obtained from the facility's natural gas bill(s). Ideally, boilers and heaters consuming large amounts of gas would be separately metered, such that fuel consumption for each unit could be quantified. If this information is not available, facility-wide natural gas use can be allocated to process and space heaters on the basis of the nameplate capacity of each unit; judgment should be used where a unit is known to not operate near capacity or to not be in use year-round. Where natural gas consumption rates are not known, they may be estimated by "back-calculating" from the nameplate capacity and hours of operation. For example, a boiler with a firing capacity of 50 gigajoules per hour operated 4 000 hours per year would require 200 000 gigajoules of fuel input per year. For natural gas with a heating value of 38.6 megajoules per cubic metre, this would equate to 5.2 million cubic metres per year. Data on the relevant properties of natural gas, such as heating value and sulphur content, should be available through the gas supplier.
- For liquid fuel-fired equipment, fuel consumption data should be available based on purchase records. Data on the relevant properties of distillate or residual oil should be available from the fuel supplier.

- For solid fuels, data should be kept on the quantities used, as well as other properties needed for emission calculations, such as moisture and sulphur content.

#### **2.24.6 References and Links**

- ***U.S. Environmental Protection Agency, 1995, Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources:***

Section 13.5: Industrial Flares	<a href="http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s05.pdf">http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s05.pdf</a>
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## 2.25 Wet Cooling Towers

### 2.25.1 General Description

Cooling towers typically are heat exchangers that are used to dissipate large heat loads to the atmosphere. They are used as an important component in many industrial and commercial processes needing to dissipate heat. Cooling towers may range in size from less than 5.3 million kilojoules per hour for small air conditioning cooling towers to over 5 275 x million kilojoules per hour for large power plant cooling towers.

When water is used as the heat transfer medium, wet or evaporative cooling towers may be used. Wet cooling towers rely on the latent heat of water evaporation to exchange heat between the process and the air passing through the cooling tower. The cooling water may be an integral part of the process or may provide cooling via heat exchangers.

### 2.25.2 Applicable SIC and NAICS Codes

Wet cooling towers are used in many industries and are typically categorized by SCCs shown below. Generally, SIC and NAICS codes cannot be applied to wet cooling towers.

### 2.25.3 Source Description

Process-specific SCCs applicable to wet cooling towers are provided below:

SCC	Description (for 8-digit SCC)
10101502	Geothermal Power Plants - Cooling Tower Exhaust
38500101	Industrial Processes - Cooling Tower - Mechanical Draft
38500102	Industrial Processes - Cooling Tower - Natural Draft
38500110	Industrial Processes - Cooling Tower - Other Not Specified
30600701	Petroleum Industry - Cooling Towers
30600702	Petroleum Industry - Cooling Towers
30117618	Chemical Manufacturing - Cooling Tower

### 2.25.4 Estimation Methodology

Depending on the type of data available, CAC emissions can be estimated from one or a combination of the following methods (detailed descriptions of these methodologies can be found in Section 4 of the *Supplementary Guide for Reporting Criteria Air Contaminants (CACs) to the National Pollutant Release Inventory — 2002*):

- Direct measurement** - includes source testing (often as a requirement under a provincial air discharge permit) or continuous emission monitoring (CEM). Measurement data that are usually collected include information on the concentration of a given pollutant in the emission or effluent stream, moisture content, temperature, and volumetric flow rate. The annual mass emission of a pollutant can then be calculated using the following equation:

⇒ Pollutant concentration x volumetric flow rate x sampling period or time  
(corrected to reference conditions and appropriate units)

- **Mass balance** - for example, the emissions of SO<sub>2</sub> can be estimated based on an account of the quantity of sulphur in each process input and output stream. In some cases, some direct measurements may be needed to determine the sulphur content of the input and output streams.
- **Emission factors** - for combustion sources, these are normally expressed in terms of mass of contaminant emitted per unit of process activity, such as fuel consumption.
- **Engineering estimates**

If direct monitoring information is not available, estimates of CAC emissions should be prepared using other methods from the list above. Emission monitoring and emission factors are commonly used methods for determining CAC emissions from fuel combustion and process activities. Mass balance and engineering calculation techniques can also be applied if required data are available. Fuel combustion CAC estimates are dependent on such parameters as fuel consumption, fuel composition, combustion technology, and the use of pollution control equipment for specific pollutants. Process CAC emissions are influenced by parameters such as unit throughput and the presence and type of pollution control equipment.

### 2.25.5 Supporting Information for CAC Emissions Estimation

Depending on the methodology selected to estimate CAC emissions, the following supporting information may be required:

- monitoring equipment logs;
- equipment type and operation parameters;
- schedule of process activity or loads; and
- emission control device and efficiency.

Emission factors may be obtained from the equipment manufacturer, government agencies, or open literature. A comprehensive emission factor database is available from the US EPA.

### 2.25.6 References and Links

- **Environment Canada:**

Emission factors (in metric units) and SCC codes in FIRE database	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a> and follow "Related Links"
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- **U.S. Environmental Protection Agency, 1995, *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*:**

Section 13.4: Wet Cooling Towers	<a href="http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s04.pdf">http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s04.pdf</a>
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- **U.S. Environmental Protection Agency, 2000, *Factor Information RETrieval (FIRE) Data System, Version 6.23 (Imperial units)*:**

Download at: <a href="http://www.epa.gov/ttn/chief/software/fire/index.html">http://www.epa.gov/ttn/chief/software/fire/index.html</a>
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### 3. References and Bibliography

*Canada Gazette* (1991) “Domestic Substances List,” Department of the Environment, Extract, Supplement *Canada Gazette*, Part I (January 26, 1991).

*Canada Gazette* (1992) “Export and Import of Hazardous Wastes Regulations,” Department of the Environment, Extract *Canada Gazette*, Part II (December 2, 1992).

*Canada Gazette* (2001) “Notice with Respect to Substances in the National Pollutant Release Inventory for 2002,” Department of the Environment, Extract *Canada Gazette*, Part I (December 29, 2001).

*Canada Gazette* (2002) “Notice with Respect to Substances in the National Pollutant Release Inventory for 2002 — Amendment,” Department of the Environment, Extract *Canada Gazette*, Part I (December 28, 2002).

Canada-wide Standards for Particulate Matter (PM) and Ozone.  
<[http://www2.ccme.ca/assets/pdf/pmozone\\_standard\\_e.pdf](http://www2.ccme.ca/assets/pdf/pmozone_standard_e.pdf)>

*Canadian Environmental Protection Act, 1999*. <<http://laws.justice.gc.ca/en/C-15.31/text.html>>

Environment Canada (2003) “Guide for Reporting to the National Pollutant Release Inventory — 2002.”

Government of Canada’s Interim Plan 2001 on Particulate Matter and Ozone.  
<[www.ec.gc.ca/air/interim2001/minister\\_e.html](http://www.ec.gc.ca/air/interim2001/minister_e.html)>

Government of Ontario (2001) *Environmental Protection Act* - Ontario Reg.127/01.  
<[www.e-laws.gov.on.ca/DBLaws/Regs/English/010127\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Regs/English/010127_e.htm)>

Ozone Annex to Canada–U.S. Air Quality Agreement.  
<[www.ec.gc.ca/pdb/can\\_us/canus\\_links\\_e.cfm](http://www.ec.gc.ca/pdb/can_us/canus_links_e.cfm)>

Statistics Canada (1989) “Standard Industrial Classification — 1980,” Standards Division, Catalogue 12-501E, Ottawa, ON.

Statistics Canada (1998) “North American Industry Classification System (NAICS) Canada Manual — 1997,” Catalogue 12-501-XPE, Ottawa, ON.

#### 3.1 **Software and Publications of the U.S. Environmental Protection Agency**

##### 3.1.1 US EPA Software Tools

Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. <[www.epa.gov/ttn/chief/ap42/index.html](http://www.epa.gov/ttn/chief/ap42/index.html)>

Factor Information REtrieval (FIRE).

<[www.epa.gov/ttn/chief/software/fire/index.html](http://www.epa.gov/ttn/chief/software/fire/index.html)>

PM Calculator. <[www.epa.gov/ttn/chief/software/pmcalc/index.html](http://www.epa.gov/ttn/chief/software/pmcalc/index.html)>

TANKS Emission Estimation Model.

<[www.epa.gov/ttn/chief/software/tanks/index.html](http://www.epa.gov/ttn/chief/software/tanks/index.html)>

Technology Transfer Network Clearinghouse for Inventories & Emission Factors.

<[www.epa.gov/ttn/chief/index.html](http://www.epa.gov/ttn/chief/index.html)>

### **3.1.2 Guidance Documents for Reporting to the Toxics Release Inventory**

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

1. *Estimating Chemical Releases from Monofilament Fiber Manufacturing*, EPA 560/4-88-004a (January 1988).
2. *Estimating Chemical Releases from Printing Operations*, EPA 560/4-88-004b (January 1988).
3. *Estimating Chemical Releases from Electrodeposition of Organic Coatings*, EPA 560/4-88-004c (January 1988).
4. *Estimating Chemical Releases from Spray Application of Organic Coatings*, EPA 560/4-88-004d (January 1988).
5. *Estimating Chemical Releases from Semi-Conductor Manufacturing*, EPA 560/4-88-004e (January 1988).
6. *Estimating Chemical Releases from Formulation of Aqueous Solutions*, EPA 560/4-88-004f (March 1988).
7. *Estimating Chemical Releases from Electroplating Operations*, EPA 560/4-88-004g (January 1988).
8. *Estimating Chemical Releases from Textile Dyeing*, EPA 560/4-88-004h (February 1988).
9. *Estimating Chemical Releases from Presswood and Laminated Wood Products Manufacturing*, EPA 560/4-88-004i (March 1988).
10. *Estimating Chemical Releases from Roller, Knife, and Gravure Coating Operations*, EPA 560/4-88-004j (February 1988).
11. *Estimating Chemical Releases from Paper and Paperboard Production*, EPA 560/4-88-004k (February 1988).
12. *Estimating Chemical Releases from Leather Tanning and Finishing*, EPA 560/4-88-0041 (February 1988).

13. *Estimating Chemical Releases from Wood Preserving Operations*, EPA 560/4-88-004p (February 1988).
14. *Estimating Chemical Releases from Rubber Production and Compounding Operations*, EPA 560/4-88-004q (March 1988).
15. *Issue Paper — Clarification and Guidance for the Metal Fabrication Industry*, (January 1990).
16. *Guidance for Food Processors*, EPA 560/4-90-014 (June 1990).
17. *EPCRA Section 313 Reporting Guidance for Food Processors (Update)*, EPA 745-R-98-011 (September 1998).
18. *EPCRA Section 313 Reporting Guidance for Spray Application and Electrodeposition of Organic Coatings*, EPA 745-R-98-014 (December 1998).
19. *Industry Guidance for Coal Mining Facilities*, EPA 745-B-99-002 (January 1999).
20. *Industry Guidance for Electricity Generating Facilities*, EPA 745-B-99-003 (January 1999).
21. *Industry Guidance for Metal Mining Facilities*, EPA 745-B-99-001 (January 1999).
22. *Industry Guidance for Chemical Distribution Facilities*, EPA 745-B-99-005 (January 1999).
23. *Industry Guidance for RCRA Subtitle C TSD Facilities and Solvent Recovery Facilities*, EPA 745-B-99-004 (January 1999).
24. *Industry Guidance for Petroleum Terminals and Bulk Storage Facilities*, EPA 745-B-99-006 (January 1999).
25. *EPCRA Section 313 Reporting Guidance for Semiconductor Manufacturing*, EPA 745-R-99-007 (July 1999).
26. *EPCRA Section 313 Reporting Guidance for Leather Tanning and Finishing Industry*, EPA 745-B-00-012 (April 2000).
27. *EPCRA Section 313 Reporting Guidance for the Printing, Publishing, and Packaging Industry*, EPA 745-B-00-005 (May 2000).
28. *EPCRA Section 313 Reporting Guidance for Rubber and Plastics Manufacturing*, EPA 745-B-00-017 (May 2000).
29. *EPCRA Section 313 Reporting Guidance for the Textile Processing Industry*, EPA 745-B-00-008 (May 2000).
30. *EPCRA Section 313 Reporting Guidance for the Presswood and Laminated Products Industry*, EPA 260-B-01-013 (August 2001).

In addition, the US EPA has developed guidance documents specific to individual chemicals and chemical categories. Some of these documents are relevant to reporting to the NPRI:

31. *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).

32. *Guidance for Reporting Toxic Chemicals within the Polycyclic Aromatic Compounds Category (Final)*, EPA 260-B-01-03 (August 2001).
33. *List of Toxic Chemicals within the Polychlorinated Alkanes Category and Guidance for Reporting*, EPA 745-B-99-023 (June 1999).
34. *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)
35. *Guidance for Reporting Toxic Chemicals within the Dioxin and Dioxin-like Compounds Category (Final)*, EPA 260-B-01-004 (August 2001).

### **3.1.3 Other Documents from the US EPA**

36. *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*, AP-42, 5th Edition (1996), and AP-42 Supplements A, B, C, D, E, and F (1996, 1997, 1998, 1999, and 2000).
37. EPA Emission Inventory Improvement Program (EIIP).  
<<http://www.epa.gov/ttn/chief/eiip/techreport/volume02/index.html>>
38. *Toxic Air Pollutant Emission Factors — A Compilation for Selected Air Toxic Compounds and Sources, Second Edition*, EPA 450/2-90-011 (1990).
39. *Protocols for Equipment Leak Emission Estimates*, EPA 453/R-95-017 (November 1995).
40. *Hot Mix Asphalt Plants - Emission Assessment Report (Draft)*, EPA 454/R-00-0XX (June 2000). < <http://www.epa.gov/ttn/chief/ap42/ch11/related/c11s01.html>>

**Copies of US EPA documents are available from:**

**U.S. Environmental Protection Agency  
National Center for Environmental Publications and Information (NCEPI)  
P.O. Box 42419  
Cincinnati, OH 45242  
U.S.A.**

**Tel: (513) 489-8190  
Fax: (513) 489-8695**

**US EPA documents can be downloaded from the U.S. Toxics Release Inventory (TRI) website at <[www.epa.gov/tri](http://www.epa.gov/tri)> or the US EPA's Technology Transfer Network website at <[www.epa.gov/ttn/chief/](http://www.epa.gov/ttn/chief/)>.**

**Or, they can be ordered from:**

**National Technical Information Service  
5285 Port Royal Road  
Springfield, VA 22161  
U.S.A.**

**Tel: (703) 605-6000**  
**Fax: (703) 605-6900**  
**E-mail: [orders@ntis.fedworld.gov](mailto:orders@ntis.fedworld.gov)**  
**<[www.ntis.gov/](http://www.ntis.gov/)>**

### **3.2 Documents Produced by Industry Associations**

41. *Code of Practice for Developing an Emission Inventory for Refineries and Terminals*, Rev. 6, Canadian Petroleum Products Institute (CPPI) (2001).  
**<[www.cppi.ca/tech/COPREI.pdf](http://www.cppi.ca/tech/COPREI.pdf)>**
42. *Evaporation Loss from External Floating-roof Tanks*, American Petroleum Institute, Publication 2517 (1994).
43. *Evaporation Loss from Fixed-roof Tanks*, American Petroleum Institute, Chapter 19.1 (1991).
44. *Evaporation Loss from Internal Floating-roof Tanks*, American Petroleum Institute, Publication 2519 (1996).
45. *Review of Air Toxic Emission Calculations from Storage Tanks, Air Toxic Emissions Calculation Validation Program: Analysis of Crude Oil and Refined Product Samples and Comparison of Vapor Composition to Model Predictions*, American Petroleum Institute, Publication 2525 (1992).

**Copies of the reports in references 42-45 above can be ordered from:**

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

**Tel: (202) 682-8375**  
**Fax: (202) 962-4776**

### **3.3 General Information**

46. Howard, P.H. and M. Neal, *Dictionary of Chemical Names and Synonyms*, Lewis Publishers, Chelsea, MI (1992).
48. Lide, David R., *CRC Handbook of Chemistry and Physics, 75th Edition*, CRC Press, Inc., Boca Raton, FL (1995) pp. 15–38, Characteristics of Particles and Particle Dispersoids.

### **3.4 Internet Sources of General Guidance Information**

The following documents and associated websites provide useful information on preparing CAC emission estimates:

- National Pollutant Release Inventory website. <[www.ec.gc.ca/pdb/npri/](http://www.ec.gc.ca/pdb/npri/)>
- Ontario Ministry of Environment (ON MOE). Mandatory Air Emissions Monitoring and Reporting. <[www.ene.gov.on.ca/envision/monitoring/monitoring.htm](http://www.ene.gov.on.ca/envision/monitoring/monitoring.htm)>
- Ontario Ministry of Environment (ON MOE). “Step by Step Guideline for Emission Calculation, Record Keeping and Reporting for Airborne Contaminant Discharge.” <[www.ene.gov.on.ca/envision/env\\_reg/er/documents/2001/ra00e0016b.pdf](http://www.ene.gov.on.ca/envision/env_reg/er/documents/2001/ra00e0016b.pdf)>.
- *Canadian Environmental Protection Act (CEPA) Criteria Air Pollutants.* <[http://www.ec.gc.ca/pdb/ape/cape\\_home\\_e.cfm](http://www.ec.gc.ca/pdb/ape/cape_home_e.cfm)>
- National Pollutant Inventory (NPI) website (Government of Australia). <[www.npi.gov.au](http://www.npi.gov.au)>

NPI Industry Handbooks.

<[www.npi.gov.au/handbooks/approved\\_handbooks/index.html](http://www.npi.gov.au/handbooks/approved_handbooks/index.html)>