Environment Canada Environnement Canada

National Overview –

National Pollutant Release Inventory

Canadian Environmental Protection Act, 1999

www.ec.gc.ca/npri

On-site Releases of NPRI Pollutants

2002

Canada

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Table of Contents

1. Introduction

The National Pollutant Release Inventory (NPRI) is at the centre of the Government of Canada's efforts to track toxic substances. It is a legislated inventory of pollutants released to the environment. The NPRI was established in 1992 to inform Canadians about releases of pollutants from facilities in their communities, including the amounts discharged to the air, water and land and by underground injection and the amounts sent to other facilities for disposal, treatment or recycling and energy recovery. The NPRI is constantly evolving. Since it was established, substances have been added and deleted, the thresholds at which substances are reported have been adjusted, and the scope of the inventory has been expanded to collect data on recycling and pollution prevention. Further refinements are planned for future years. Please refer to **Appendix B** for information on:

- what is new for the 2002 NPRI,
- the NPRI substance list for 2002,
- the 2002 National Overview Series, and
- new groupings for releases and transfers.

See **Appendix C** for definitions of releases, disposals and transfers.

In 2002, criteria air contaminants (CAC) were added to the NPRI for the first time. As a result, the number of NPRI substance reports in the 2002 NPRI has almost doubled compared to 2001. For the purpose of comparing the 2002 data with those submitted in 2001, the information collected on CAC for 2002 are summarized separately. All non-CAC substance data collected for the 2002 reporting year will be referred to as "NPRI pollutants". The reasons for separating CAC substance data from non-CAC data are as follows:

- The information reported for CAC is limited to releases to air. However, the reports of other pollutants cover releases to all environmental media – air, water and land. They also cover disposal and recycling.
- Reporting separately allows for better comparison to historic NPRI data.
- The information for CAC from point sources for 2002 can be presented along with historic information on area sources to give a more complete picture of overall releases.

There are relatively few CAC, and they have always been discussed individually because each one poses different risks to human health and the environment. NPRI pollutants are sometimes grouped together to reveal trends, but it is not correct to add the CAC to the other NPRI pollutants because many NPRI pollutants are also volatile organic compounds (VOC) and this would lead to double counting. (See *2002 National Overview – Reporting Requirements,* **section 2.9**, for more information on double counting.)

The complete list of CAC and non-CAC data for the 2002 reporting year can be found on the NPRI Web site at **www.ec.gc.ca/npri**.

2. On-site Releases of NPRI Pollutants in 2002

For 2002, 3 191 facilities across Canada reported to the NPRI. Of these, 2 595 facilities submitted data for on-site releases greater than 0 tonne. That was an increase of approximately 18% from 2001. The total on-site releases of NPRI pollutants were estimated at 208 562.4 tonnes. Releases to air accounted for 129 778.0 tonnes (62.3%), releases to water 72 969.0 tonnes (35.0%) and releases to land 5 626.0 tonnes (2.7%). (See **figure 2–1** and **table 2–1**).

Figure 2–1

ON-SITE RELEASES OF NPRI POLUTANTS IN 2002

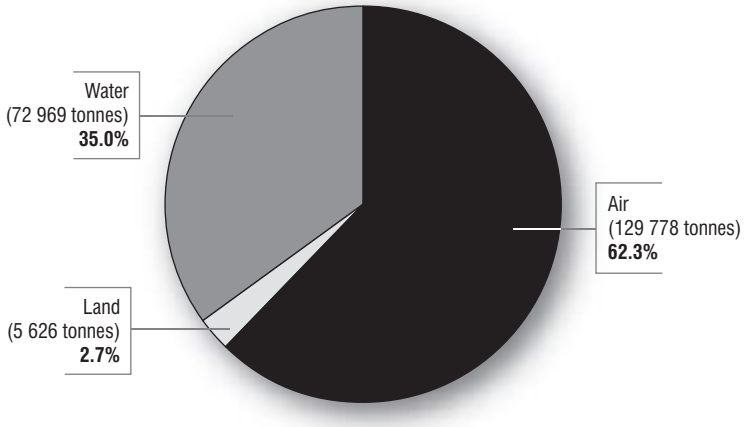

Table 2–1

NATIONAL SUMMARY OF ON-SITE RELEASES IN 2002

	2001 Releases (tonnes)	2002 Releases (tonnes)	Change 2002–2001 (tonnes)	% Change 2002–2001
Total facilities	2 660	3 191	531	19.9
Total reports	12 007	14 638	2 631	21.9
Pollutants reported	201	208	7	3.5
On-site Releases in Tonnes				
Air	124 613.1	129 778.2	5 165.1	4.1
Water	51 589.7	72 969.4	21 379.7	41.4
Land	4 731.9	5 625.8	893.8	18.9
Total on-site releases	181 116.5	208 562.4	27 437.9	15.2

The totals shown for 2001 and 2002 may not equal the sum of the individual values because facilities are not required to specify a release category if releases were less than one tonne. Instead they may choose to report under the category of "total releases".

Note: *All data on releases are estimates.*

Releases of NPRI pollutants to air increased by 5 165 tonnes (or 4.1%) from 2001 and to water by 21 380 tonnes (or 41.4%). Releases to water can be attributed mainly to an increase in the amounts of total ammonia and nitrate ion in solution reported from facilities classified in the Water, Sewage and Other Systems category. Releases to land increased by 894 tonnes (18.9%) from 2001. This increase was largely due to land releases of ethylene glycol reported from facilities classified in the Oil and Gas Extraction category. Note that reporting requirements were changed for some of the NPRI pollutants. As a result, many more facilities reported for 2002. For additional information on the facilities and companies that reported to the NPRI for the 2002 reporting year and a summary of releases of individual pollutants by medium (air, water and land), see the supplementary tables found on the NPRI Web site at **www.ec.gc.ca/npri**.

It is important to note that increases and decreases in pollutant releases can have many causes, which should always be considered when NPRI information is being used. These causes include, but are not limited to, the following:

- facilities reporting to the NPRI for the first time;
- facilities using improved estimation methods;
- changes in infrastructure, processes or operations; and
- use of pollution prevention techniques.

3. NPRI Pollutants Released on Site in the Largest Quantities in 2002

In 2002, 25 pollutants accounted for 93.7% (195 323 tonnes) of all on-site releases (see **table 3–1**). The following six pollutants accounted for about 69.3% of total releases:

- ammonia (total): 53 900 tonnes (25.8%);
- nitrate ion in solution (at a pH of 6.0 or greater): 31 697 tonnes (15.2%);
- methanol: 22 807 tonnes (10.9%);
- hydrochloric acid: 15 726 tonnes (7.5%);
- sulphuric acid: 13 756 tonnes (6.6%); and
- xylene: 6 845 tonnes (3.3%).

The total releases of NPRI pollutants in 2002 (see **table 3–1**) were similar to release values reported in 2001. There were, however, increases for some pollutants, e.g., for nitrate ion in solution (at a pH of 6.0 or greater), an increase of 9 195 tonnes (+40.8%), and for ammonia (total), an increase of 13 187 tonnes (32.4%).

Table 3–1

25 NPRI POLLUTANTS RELEASED ON SITE IN THE LARGEST QUANTITIES IN 2002, BY ENVIRONMENTAL MEDIUM

		Releases (tonnes)						
CAS No.	Pollutant	Air	Water	Land	2002	2001	Change 2002–2001	% Change 2002–2001
NA	Ammonia (total)	16 944.70	36 924.44	25.65	53 894.79	40 713.06	13 181.73	32.38
NA	Nitrate ion in solution at pH ≥ 6.0	17.60	31 674.59	3.92	31 696.11	22 501.80	9 194.31	40.86
67-56-1	Methanol	22 240.06	553.40	3.76	22 807.39	20 763.44	2 043.94	9.84
7647-01-0	Hydrochloric acid	15 722.37	0.20	0.45	15 725.91	16 316.06	-590.15	-3.62
7664-93-9	Sulphuric acid	11 587.09	1 455.30	707.40	13 749.79	10 068.30	3 681.49	36.56
1330-20-7	Xylene (mixed isomers)	6 828.38	3.22	2.36	6 845.16	6 363.11	482.05	7.58
108-88-3	Toluene	6 726.42	36.30	2.22	6 776.76	6 076.12	700.63	11.53
75-15-0	Carbon disulphide	5 021.85	0.00	0.00	5 021.85	4 065.33	956.53	23.53
7783-06-4	Hydrogen sulphide	4 894.88	32.61	0.00	4 928.48	7 227.71	-2 299.24	-31.81
78-93-3	Methyl ethyl ketone	4 082.44	0.07	0.21	4 091.07	4 176.04	-84.97	-2.03
110-54-3	*n*-Hexane	3 729.58	0.17	27.59	3 765.49	3 561.77	203.72	5.72
7664-39-3	Hydrogen fluoride	3 597.40	0.00	0.00	3 597.40	3 257.72	339.68	10.43
NA	Zinc (and its compounds)	1 009.46	312.30	2 151.38	3 482.39	2 753.29	729.11	26.48
67-63-0	Isopropyl alcohol	2 336.21	0.00	18.04	2 365.76	1 815.75	550.01	30.29
100-42-5	Styrene	2 320.22	0.00	0.00	2 323.28	1 880.62	442.66	23.54
NA	Manganese (and its compounds)	338.24	1 205.44	681.03	2 232.53	2 018.16	214.37	10.62
74-85-1	Ethylene	2 056.00	0.00	0.00	2 056.88	2 471.10	-414.21	-16.76
50-00-0	Formaldehyde	1 789.87	42.87	0.00	1 835.13	1 729.87	105.26	6.08
107-21-1	Ethylene glycol	312.13	50.78	1 205.65	1 571.24	2 351.58	-780.34	-33.18
71-36-3	*n*-Butyl alcohol	1 252.19	0.00	0.00	1 254.41	1 050.30	204.11	19.43
110-82-7	Cyclohexane	1 128.25	0.29	0.77	1 137.26	1 387.61	-250.36	-18.04
75-09-2	Dichloromethane	1 084.15	0.00	0.00	1 085.56	1 796.35	-710.78	-39.57
111-76-2	2-Butoxyethanol	1 077.04	0.15	0.00	1 080.24	1 201.24	-121.01	-10.07
95-63-6	1,2,4-Trimethylbenzene	998.79	0.04	2.17	1 006.44	683.61	322.83	32.07
115-07-1	Propylene	977.96	0.00	0.13	979.29	1 022.06	-42.77	-4.37
	Total of top 25 pollutants	118 073.28	72 292.17	4 832.74	195 322.77	167 252.00	28 070.77	16.78
	National total of all pollutants	129 778.16	72 969.39	5 625.77	208 562.41	181 116.50	27 445.91	15.15
	% of National total	90.98	99.07	85.90	93.65	80.19		

4. Industrial Sectors Releasing the Largest Quantities of NPRI Pollutants on Site in 2002

In 2002, the following five industrial sectors reported the largest on-site releases of NPRI pollutants, accounting for an estimated 123 068 tonnes (58.9%) of total releases (see **table 4–1**):

- Water, Sewage and Other Systems: 59 042 tonnes (28.3%);
- Pulp, Paper and Paperboard Mills: 27 288 tonnes (13.1%);
- Electricity Generation, Transmission and Distribution: 18 032 tonnes (8.6%);
- Pesticide, Fertilizer and Other Agricultural Chemical Manufacturing: 10 303 tonnes (4.9%); and
- Oil and Gas Extraction: 8 403 tonnes (4.0%).

For North American Industry Classification System (NAICS) categories, see **table 4–1**.

In 2002, facilities in the Water, Sewage and Other Systems and Pulp, Paper and Paperboard Mills sectors accounted for more than 99% of all releases to water.

Facilities that reported from the Water, Sewage and Other Systems industrial sector reported an estimated 59 042 tonnes in 2002, an increase of 19 537 tonnes (49.5%) over 2001. It is important to note that facilities in this sector treat wastewater created by others and have little opportunity to reduce the amount of wastewater that others produce. This fact distinguishes the sector from others that are listed here. The amounts reported to the NPRI in 2002 from this sector were greatly affected by changes to the reporting criteria. For the 2002 reporting year, the 20 000-hour threshold for employee hours worked was removed, and as a result more facilities reported their releases. Consequently, much higher releases were reported for the following two pollutants:

- ammonia (total): 10 523 tonnes (46.7%); and
- nitrate ion in solution (at a pH of 6.0 or greater): 8 484 tonnes (50.6%).

Facilities in the Pulp, Paper and Paperboard Mills industrial sector reported an estimated 27 288 tonnes in 2002, an increase of 1 152 tonnes (4.4%) compared with 2001. Releases to water from this sector have decreased over the years mainly because of the requirement for wastewater treatment at these facilities. In 2002, there was a decrease in the reported nitrate and hydrogen sulphide releases of about 30% and 26% respectively. However, methanol and hydrochloric acid releases increased by 16% and 18% respectively.

Facilities in the Electricity Generation, Transmission and Distribution industrial sector reported an estimated release of 18 032 tonnes in 2002, a decrease of 1 180 tonnes (6.1%) from 2001. This was mainly due to an overall decrease from the sector of 906 tonnes (7.0%) in releases of hydrochloric and sulphuric acids to air.

Facilities in the Oil and Gas Extraction industrial sector reported an estimated 8 403 tonnes in 2002, an increase of 722 tonnes (9.4%) from 2001. This was mainly due to an increase of 1 101 tonnes (44.0%) in releases of carbon disulphide. Releases of sulphuric acid from the sector, however, decreased by approximately 508 tonnes (27%) compared with 2001.

Facilities in the Pesticide, Fertilizer and Other Agricultural Chemical Manufacturing industrial sector reported 10 303 tonnes in 2002, an increase of 181 tonnes (1.8%) compared with 2001.

Table 4–1

INDUSTRIAL SECTORS RELEASING THE LARGEST QUANTITIES OF NPRI POLLUTANTS ON SITE IN 2002, BY ENVIRONMENTAL MEDIUM

		Releases (tonnes)						
CAS No.	Pollutant	Air	Water	Land	2002	2001	Change 2002–2001	% Change 2002–2001
# 1: NAICS 2213 – Water, Sewage and Other Systems								
NA	Ammonia (total)	2 386.29	30 651.37	15.09	33 052.75	22 529.31	10 523.45	46.71
NA	Nitrate ion in solution at pH ≥ 6.0	0.00	25 246.22	3.72	25 250.45	16 766.45	8 484.00	50.60
7782-50-5	Chlorine	170.66	278.46	0.01	450.52	117.16	333.36	284.52
108-88-3	Toluene	117.80	35.41	0.00	153.21	0.24	152.97	637.4
NA	Zinc (and its compounds)	0.11	134.95	0.09	135.15	85.97	49.19	57.22
Total pollutants in sector		2 674.86	5 6346.41	18.91	59 042.08	3 9504.94	19 537.14	49.45
# 2: NAICS 3221 – Pulp, Paper and Paperboard Mills								
67-56-1	Methanol	16 088.44	515.46	0.00	16 603.90	14 253.81	2 350.09	16.49
NA	Ammonia (total)	2 001.36	2 194.12	0.00	4 196.47	4 199.29	-2.82	-0.07
7783-06-4	Hydrogen sulphide	2 652.37	30.54	0.00	2 682.92	3 613.09	-930.18	-25.74
7647-01-0	Hydrochloric acid	2 314.54	0.00	0.00	2 314.54	1 953.69	360.85	18.47
NA	Nitrate ion in solution at pH ≥ 6.0	0.00	1 490.24	0.00	1 490.24	2 116.06	-625.82	-29.57
Total pollutants in sector		23 056.71	4 230.37	0.00	27 288.06	26 135.94	1 152.12	4.41
# 3: NAICS 2211 – Electricity Generation, Transmission and Distribution								
7647-01-0	Hydrochloric acid	11 954.64	0.00	0.00	11 954.64	12 860.30	-905.66	-7.04
7664-93-9	Sulphuric acid	3 668.35	60.00	0.00	3 728.35	4 195.71	-467.36	-11.14
7664-39-3	Hydrogen fluoride	1 753.13	0.00	0.00	1 753.13	1 604.04	149.08	9.29
NA	Manganese (and its compounds)	7.53	0.23	385.07	392.84	340.64	52.19	15.32
NA	Ammonia (total)	193.28	10.11	0.00	203.39	211.77	-8.38	-3.96
Total pollutants in sector		17 576.93	70.34	385.07	1 8032.35	19 212.47	-1 180.12	-6.14
# 4: NAICS 2111 – Oil and Gas Extraction								
75-15-0	Carbon disulphide	3 605.99	0.00	0.00	3 605.99	2 505.09	1 100.90	43.95
7664-93-9	Sulphuric acid	1 354.50	0.00	0.00	1 354.51	1 862.70	-508.19	-27.28
7783-06-4	Hydrogen sulphide	1 339.95	0.00	0.00	1 340.80	1 390.36	-49.56	-3.56
NA	Ammonia (total)	1 249.57	0.32	0.00	1 249.89	1 133.10	116.79	10.31
1330-20-7	Xylene (mixed isomers)	849.39	0.02	0.54	852.00	789.70	62.29	7.89
Total pollutants in sector		8 399.39	0.34	0.54	8 403.19	7 680.95	722.24	9.40
# 5: NAICS 3253 – Pesticide, Fertilizer and Other Agricultural Chemical Manufacturing								
NA	Ammonia (total)	9 146.24	60.17	0.01	9 206.62	8 901.02	305.60	3.43
67-56-1	Methanol	879.71	0.00	0.00	879.71	1 023.79	-144.09	-14.07
NA	Nitrate ion in solution at pH ≥ 6.0	17.59	152.79	0.00	170.38	131.26	39.12	29.80
7664-93-9	Sulphuric acid	28.89	0.00	0.00	30.06	47.01	-16.96	-36.07
7664-39-3	Hydrogen fluoride	16.37	0.00	0.00	16.37	18.72	-2.35	-12.54
Total pollutants in sector		10 088.79	212.96	0.01	10 303.14	10 121.80	181.33	1.79

5. Criteria Air Contaminants (CAC)

In 2002, CAC were added to the NPRI substance list so that more comprehensive and timely data would be available to governments and the public. Information on CAC emissions enable governments to assess whether risk-management activities by various industrial sources of CAC are reducing emissions. The emission inventories are also used for joint Canada–United States (U.S.) reporting, analyses and source receptor modelling, as required under the Ozone Annex of the Canada–U.S. Air Quality Agreement. For modelling and the other purposes mentioned, inventories of all sources of emissions (industrial, commercial, mobile, natural and household) must be compiled. These inventories are referred to as comprehensive emissions inventories. **Appendix A** contains the year 2000 comprehensive emissions inventory prepared by Environment Canada.

For information on the reporting requirements for CAC substances and their definitions, please refer to the *Guide for Reporting to the National Pollutant Release Inventory 2002* or the NPRI Web site at **www.ec.gc.ca/npri**.

5.1 Summary of CAC Releases to Air for 2002

When CAC were added to the NPRI substance list for the first time in 2002, the number of facilities that submitted substance reports increased from 2 660 (in 2001) to 4 530. This should not, however, be interpreted as a dramatic increase in pollutant releases. In fact, only 3 048 of the total 4 530 facilities reported CAC releases to air in the 2002 reporting year.

See **table 5–1** for a summary by pollutant of CAC air releases in 2002.

Table 5–1

2002 CAC EMISSIONS COMPARED WITH THE 2000 NATIONAL COMPREHENSIVE CAC EMISSIONS

Pollutant	2002 CAC Reported to NPRI (tonnes)	2000 National Comprehensive CAC Emissions (tonnes)[1]	2002 CAC Emissions as % of 2000 Emissions
Total particulate matter (TPM) ≤ 100 microns[2]	226 454	16 372 382	1
Particulate matter with a diameter ≤ 10 microns (PM_{10})[2]	108 678	5 135 494	2
Particulate matter with a diameter ≤ 2.5 microns ($PM_{2.5}$)[2]	61 058	963 305	6
Sulphur dioxide (SO_2)	1 977 312	2 352 424	84
Oxides of nitrogen (expressed as NO_2)	577 332	2 603 525	22
Volatile organic compounds (VOC)	244 021	2 751 607	9
Carbon monoxide (CO)	974 327	11 282 385	9

[1] Includes all sources. See the 2000 comprehensive CAC inventory **table 5–2** for details by sector and pollutant.

[2] Year 2000 comprehensive CAC inventory includes both filterable and condensable particulate matter.

The emissions of CAC substances reported to the NPRI will be included in the 2002 comprehensive CAC inventory. It is important to note that there are important differences between the NPRI and the comprehensive CAC inventory, specifically concerning the releases from point sources. Many sources of CAC, such as residential firewood combustion, motor vehicles and road dust, do not report to the NPRI but account for significant contributions to the national comprehensive CAC inventory.

Table 5–2 shows 13 sectors which rank among the top five emitters in one or more pollutants.

Table 5–2

NPRI REPORTED SECTORS RANKING IN THE TOP FIVE FOR AT LEAST ONE CONTAMINANT FOR 2002

	TPM		PM_{10}		$PM_{2.5}$	
Sector	Emission (tonnes)	Rank	Emission (tonnes)	Rank	Emission (tonnes)	Rank
Alumina and Aluminum Production and Processing (NAICS 3313)	12 130	5	891		495	
Cement and Concrete Product Manufacturing	3 477		2 293		1 207	
Electricity Generation, Transmission and Distribution (NAICS 2212)	75 672	1	28 594	1	12 398	2
Foundries (NAICS 3315)	1 642		865		504	
Iron and Steel Mills and Ferro-Alloy Manufacturing (NAICS 3311)	9 431		4 801		3 727	5
Metal Ore Mining (NAICS 2122)	19 824	3	10 300	3	5 297	3
Non-Metallic Mineral Mining and Quarrying (NAICS 2123)	7 999		6 079	4	4 670	4
Oil and Gas Extraction (NAICS 2111)	4 963		4 489		1 649	
Petroleum and Coal Products Manufacturing (NAICS 3241)	7 824		5 365		3 336	
Pulp, Paper and Paperboard Mills (NAICS 3221)	30 304	2	17 971	2	13 200	1
Sawmills and Wood Preservation (NAICS 3211)	13 630	4	5 306		2 479	
Veneer, Plywood and Engineered Wood Product Manufacturing (NAICS 3212)	10 062		6 066	5	3 087	
Water, Sewage and Other Systems (NAICS 2213)	149		153		137	

Note: Blanks in the Rank column mean that the sector was not in the top five for that pollutant.

SO_2		NO_x		VOC		CO	
Emission (tonnes)	Rank	Emission (tonnes)	Rank	Emission (tonnes)	Rank	Emission (in tonnes)	Rank
58 974		4 830		2 231		361 947	1
34 557		30 428	5	422		18 599	
620 457	2	266 785	1	1 552		30 392	
63 104	5	486		762		3 842	
27 612		10 738		1 328		44 976	
688 054	1	15 704		1 828		33 345	
760		3 442		255		2 617	
259 728	3	70 360	2	57 552	1	75 004	5
105 669	4	31 979	4	19 064	4	78 676	4
54 640		46 123	3	19 780	3	102 348	2
815		3 091		7 984		83 239	3
439		4 988		19 866	2	40 003	
227		1 236		12 360	5	605	

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Statistics Canada. *Standard Industrial Classification – 1980.* Catalogue 12-501-E, Ottawa: Statistics Canada, 1989.

6.2 Web Sites for Substance Information

6.2.1 Environment Canada

The Green Lane: **www.ec.gc.ca**

National Pollutant Release Inventory On-line Data Search: **www.ec.gc.ca/npri**

CEPA Environmental Registry: **www.ec.gc.ca/CEPARegistry**

New and Existing Substances: **www.ec.gc.ca/substances**

List of Toxic Substances (Schedule 1 of CEPA 1999): **www.ec.gc.ca/CEPARegistry/subs_list/Toxicupdate.cfm**

Management of Toxic Substances: **www.ec.gc.ca/toxics**

Mercury: **www.ec.gc.ca/mercury**

6.2.2 Health Canada

Existing Substances Division: **www.hc-sc.gc.ca/hecs-sesc/exsd/index.htm**

6.2.3 International Links

Agency for Toxic Substances and Disease Registry (ATSDR): **www.atsdr.cdc.gov**

Chemfinder: **chemfinder.cambridgesoft.com**

Commission for Environmental Cooperation (CEC): **www.cec.org**

Environmental Defense Scorecard: **www.scorecard.org**

International Agency for Research on Cancer (IARC): **www.iarc.fr**

International Programme on Chemical Safety (IPCS): **www.inchem.org**

National Toxicology Program (NTP): **ntp-server.niehs.gov**

Organization for Economic Co-operation and Development (OECD): **www.oecd.org/home**

PollutionWatch: **www.pollutionwatch.org**

United Nations Environment Programme (UNEP): **www.unep.org**

World Health Organization: **www.who.int**

6.3 Additional Sources of Information

Agency for Toxic Substances and Disease Registry (ATSDR)
1600 Clifton Road (E29)
Atlanta, GA 30333
U.S.A.
Tel.: (404) 639-6300
Fax: (404) 639-6315
Web site: **www.atsdr.cdc.gov**

Canadian Centre for Occupational Health and Safety
Chemical Evaluation Search and Retrieval System (CESARS)
250 Main Street East
Hamilton, ON L8N 1H6
Tel.: (905) 570-8094
Fax: (905) 572-2206
Web site: **www.ccohs.ca/products/databases/cesars.html**

Commission for Environmental Cooperation (CEC)
393 St. Jacques Street West
Suite 200
Montreal, QC H2Y 1N9
Tel.: (514) 350-4300
Fax: (514) 350-4314
Web site: **www.cec.org**

Health Canada
Publishing Coordinator
Environmental Health Centre
Tunney's Pasture 0801B3
Ottawa, ON K1A 0L2
Tel.: (613) 957-3143
Fax: (613) 941-8632
Web site: **www.hc-sc.gc.ca**

International Agency for Research on Cancer (IARC)
150 cours Albert Thomas
F-69372 Lyon cedex 08
France
Tel.: +33 (0)4 72 73 84 85
Fax: +33 (0)4 72 73 85 75
Web site: **www.iarc.fr**

National Library of Medicine (TOXNET)
8600 Rockville Park, Bldg. 38A
Bethesda, MD 20894
U.S.A.
Tel.: (301) 496-6531
Fax: (301) 480-3537
Web site: **www.nlm.nih.gov/hinfo.html**

Appendix A:
2000 CRITERIA AIR CONTAMINANT EMISSIONS FOR CANADA

Version 1 (February 2004)

Category or Sector	TPM (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	SO_x (tonnes)	NO_x (tonnes)	VOCs (tonnes)	CO (tonnes)
Industrial sources							
Abrasives manufacture	394	235	215	859	96	794	239
Aluminum industry	12 495	7 537	4 380	49 246	891	1 644	226 028
Asbestos industry	42	34	20	475	151	1	15
Asphalt paving industry	35 893	6 202	2 018	135	199	922	945
Bakeries	0	0	0	0	4	6 724	2
Cement and concrete industry	17 582	9 069	3 769	41 234	42 808	282	14 671
Chemicals industry	7 574	4 762	2 813	17 803	30 249	4 557	20 887
Clay products industry	2 298	599	385	414	170	10	393
Coal mining industry	10 380	6 400	2 844	1 958	1 538	807	46
Ferrous foundries	1 576	1 305	1 027	1 240	197	1 192	3 045
Grain industries	57 614	11 873	1 903	0	0	0	0
Iron and steel industries	21 791	13 233	9 052	28 122	16 985	20 161	39 578
Iron ore mining industry	45 767	27 222	13 151	17 482	10 117	3 231	64 777
Mining and rock quarrying	99 164	13 830	3 697	6 002	11 025	421	2 965
Non-ferrous mining and smelting industry	14 756	11 540	5 798	765 459	3 858	57	717
Oil sands	4 221	3 010	611	92 021	43 985	34 304	39 323
Other petroleum and coal products industry	577	295	88	1	124	204	20
Paint and varnish manufacturing	72	59	22	0	24	2 566	11
Petrochemical industry	158	140	110	383	11 809	7 763	4 122
Petroleum refining	7 713	4 994	3 181	128 353	31 927	27 481	22 177
Plastics and synthetic resins fabrication	45	37	26	54	287	10 095	532
Pulp and paper industry	50 759	30 752	23 834	78 213	56 008	23 548	163 302
Upstream oil and gas industry	1 726	1 528	1 522	352 700	338 414	739 733	81 684
Wood industry	123 234	69 413	35 375	2 642	15 529	41 280	629 844
Other industries	56 849	35 840	24 882	17 704	38 027	59 854	42 654
Total industrial sources	572 680	259 910	140 723	1 602 504	654 421	987 631	1 357 977
Non-industrial fuel combustion							
Commercial fuel combustion	5 022	3 797	3 064	20 548	31 506	6 549	8 080
Electric power generation (utilities)	121 607	55 418	21 735	639 781	298 221	2 407	29 173
Residential fuel combustion	4 639	3 865	3 623	14 809	36 943	2 283	13 954
Residential fuel wood combustion	107 685	101 934	101 818	1 417	9 916	147 727	665 942
Total non-industrial fuel combustion	238 952	165 014	130 239	676 555	376 585	158 966	717 149
Transportation							
Air transportation	2 248	1 372	1 051	2 230	35 200	8 874	52 144
Heavy-duty diesel vehicles	17 651	17 651	16 319	9 499	442 613	29 588	151 329
Heavy-duty gasoline trucks	258	251	193	387	14 264	8 624	134 406
Light-duty diesel trucks	855	855	789	527	6 355	3 031	5 537
Light-duty diesel vehicles	314	314	290	128	1 871	769	1 826
Light-duty gasoline trucks	1 611	1 581	1 416	5 102	113 136	148 353	2 152 857
Light-duty gasoline vehicles	2 718	2 679	2 589	9 586	207 168	239 716	3 208 148
Marine transportation	6 558	6 378	6 008	42 201	105 395	22 766	60 085
Motorcycles	15	15	11	25	802	1 712	9 458
Off-road use of diesel	28 288	28 288	26 025	22 257	444 701	50 984	160 095
Off-road use of gasoline	9 650	7 949	7 223	2 746	32 747	191 158	2 105 599
Rail transportation	2 402	2 397	2 209	3 442	101 748	4 904	19 335
Tire wear and brake lining	5 212	5 151	1 769	0	0	0	0
Total transportation	77 780	74 882	65 893	98 132	1 506 000	710 479	8 060 819

Category or Sector	TPM (tonnes)	PM_{10} (tonnes)	$PM_{2.5}$ (tonnes)	SO_x (tonnes)	NO_x (tonnes)	VOCs (tonnes)	CO (tonnes)
Incineration							
Crematorium	0	0	0	4	22	1	10
Industrial and commercial incineration	25	19	13	278	348	331	1 107
Municipal incineration	527	360	226	695	1 564	990	2 464
Wood waste incineration	2 237	1 230	895	48	386	5 309	50 120
Other incineration and utilities	563	342	248	563	4 334	739	1 777
Total incineration	3 353	1 951	1 381	1 589	6 654	7 370	55 478
Miscellaneous							
Cigarette smoking	879	879	879	0	6	10	3 148
Dry cleaning	0	0	0	0	2	841	1
Fuel marketing	0	0	0	11	5	91 062	2
General solvent use	0	0	0	0	0	309 452	0
Marine cargo handling industry	2 902	1 395	423	0	0	1	0
Meat cooking	1 528	1 528	1 528	0	0	0	0
Pesticides and fertilizer application	12 054	5 906	1 687	0	0	0	0
Printing	12	4	4	0	34	34 614	27
Structural fires	4 344	4 300	3 910	0	2	4 211	8 729
Surface coatings	0	0	0	0	0	110 752	0
Total miscellaneous	21 718	14 012	8 432	11	49	550 943	11 907
Open sources							
Agriculture (animals)	263 315	148 387	23 455	0	0	214 826	0
Agriculture (tilling and wind erosion)	1 713 507	833 911	23 243	0	0	0	0
Construction operations	3 374 356	742 355	15 036	0	0	0	0
Dust from paved roads	3 134 953	639 980	145 315	0	0	0	0
Dust from unpaved roads	6 808 116	2 151 304	320 516	0	0	0	0
Forest fires	90 969	75 759	63 465	90	20 917	85 979	693 373
Landfill sites	4 224	486	130	1	169	8 576	693
Mine tailings	47 626	3 810	953	0	0	0	0
Prescribed burning	20 204	14 192	13 837	101	2 612	7 518	127 245
Total open sources	15 457 271	4 610 185	605 950	192	23 699	316 899	821 311
National total							
Total with open sources	16 371 754	5 125 954	952 618	2 378 982	2 567 408	2 732 288	11 024 641
Total without open sources	914 483	515 769	346 668	2 378 790	2 543 709	2 415 389	10 203 330

Note: Numbers may not add to totals due to rounding.

Source: Criteria Air Contaminants Division, Environment Canada – Pollution Data Branch, Gatineau, QC, February 2004.

In the fall of 2004, Environment Canada will publish the 2002 comprehensive CAC emissions inventory and report, which will be available from the NPRI Web site. For further information about CAC, please see the Air Pollutant Emissions section on Environment Canada's NPRI Web site at **www.ec.gc.ca/npri**.

Appendix B: Overview of the NPRI

The National Pollutant Release Inventory (NPRI) is at the centre of the Government of Canada's efforts to track toxic substances. It is a legislated inventory of pollutants released to the environment. The NPRI was established in 1992 to inform Canadians about releases of pollutants from facilities located in their communities, including the amounts discharged to air, water and land and by underground injection and the amounts sent to other facilities for disposal, treatment, or recycling and energy recovery. It also supports a number of environmental initiatives, by providing information that:

- helps governments and others to identify priorities for action;
- encourages industry to take proactive measures to reduce releases;
- allows for tracking of progress in reducing releases;
- supports international commitments; and
- provides information used in the development of new preventive or control instruments such as codes of practice, regulations and guidelines.

The NPRI is a constantly evolving program. Consultation with the public and stakeholders has become an integral part of the changes to the program. Since the NPRI was set up, substances have been added and deleted, the thresholds at which substances are reported have been adjusted, and the scope of the inventory has been expanded to collect data on recycling and preventing pollution. Further refinements are planned for future years.

The NPRI program is administered by Environment Canada under the authority of the *Canadian Environmental Protection Act, 1999* (CEPA 1999). Owners or operators of facilities that manufacture, process, or otherwise use one or more of the NPRI-listed substances under prescribed conditions are required to submit an annual report to Environment Canada on the releases and transfers of those substances.[1] See **Appendix C** for definitions of releases, disposals and transfers.

All non-confidential information collected by the NPRI is available to the public on Environment Canada's Web site in the form of downloadable databases, reports and analyses, and through a linked query site that allows the user to view information submitted by an individual facility. See **www.ec.gc.ca/npri** or contact your nearest NPRI office.

What's New for the 2002 NPRI?

The following changes were made to the NPRI for the 2002 reporting year:

Addition of New Substances

- Hexavalent chromium compounds
- Criteria air contaminants (CAC)
  - Carbon monoxide (CO)
  - Oxides of nitrogen (NO_x)
  - Sulphur dioxide (SO_2)
  - Particulate matter (PM)
    - equal to or less than 2.5 microns in diameter ($PM_{2.5}$)
    - equal to or less than 10 microns in diameter (PM_{10})
    - total particulate matter (TPM)
  - Volatile organic compounds (VOCs)

[1] *The requirements for the 2002 NPRI were published in the* Canada Gazette*, Part I, on December 29, 2001.*

Changes in Mass and Concentration Thresholds

- Cadmium (and its compounds): The threshold for reporting based on mass was reduced from 10 tonnes to 5 kg and 0.1% concentration.
- Arsenic (and its compounds), lead (and its compounds), hexavalent chromium and tetraethyl lead: The threshold for reporting was based on mass reduced from 10 tonnes to 50 kg and 0.1% concentration.
- Chromium (and its compounds) no longer includes hexavalent chromium.

Changes Where Employee Threshold (20 000 hours) Does Not Apply

- Throughput was reduced from 100 to 26 tonnes per year for incineration of non-hazardous, solid waste, biomedical and hospital waste.
- Terminal operations (for storage or transfer of crude and refined petroleum products).
- Discharges from wastewater collection systems of 10 000 m^3 or more into surface waters.

Changes to Exemptions for Specific Facilities

- Painting, stripping or rebuilding components for maintenance and repair of transportation vehicles is now included in the NPRI.
- Terminal operations used in the distribution or storage of fuels for retail sale are now included in the NPRI.

Pollution Prevention

- Reporting of pollution prevention activities has been expanded.

Administrative Changes

- Facilities that reported in 2001 must notify Environment Canada if they are not reporting for 2002.

Changes in Definitions

- Facility – now includes pipeline installation.
- Other use – includes use or disposal.

NPRI Substance List for 2002

For the 2002 reporting year, 273 substances were listed on the NPRI, 82 of which were determined to be toxic under CEPA 1999. There were 241 substances listed with the original 1993 NPRI reporting criteria of 10 tonnes and 1% concentration, excluding by-products. Thirty-two substances were listed with different reporting criteria – mercury, cadmium, arsenic, lead and their compounds, hexavalent chromium compounds, tetraethyl lead, 17 individual polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzo-*p*-dioxins/polychlorinated dibenzofurans (dioxins/furans), hexachlorobenzene (HCB), and seven CAC.

The CAC were added to the NPRI for the 2002 reporting year. As a result, the total number of substance reports submitted for the 2002 NPRI almost doubled compared to 2001. Information on CAC is summarized separately from other NPRI substances, which are referred to as "NPRI pollutants".

The total list of NPRI substances for the 2002 reporting year can be found on the NPRI Web site at **www.ec.gc.ca/npri**.

2002 National Overview Series

The 2002 NPRI National Overview (referred to as the "2002 National Overview") consists of the following series of documents:

- 2002 National Overview – Reporting Requirements;
- 2002 National Overview – Summary of Data;
- 2002 National Overview – On-site Releases of NPRI Pollutants;
- 2002 National Overview – Final Disposal and Off-site Transfers for Treatment Prior to Final Disposal; and
- 2002 National Overview – Off-site Transfers for Recycling and Energy Recovery.

The 2002 National Overview Series includes data as they appeared in the NPRI database on December 18, 2003.

In addition to the National Overview Series, Environment Canada has developed another report entitled *Informing Canadians on Pollution*. This report provides a snapshot of pollution from industrial and commercial companies in Canada. In addition to making progress on sector and pollutant releases and disposal and recycling trends, other highlights include special sections on toxic substances, pollution prevention, managing pollution in Canada, and tips on how communities and individuals can use the NPRI.

New Groupings for Releases and Transfers

The following groupings were used to summarize information collected through the NPRI for the 2001 reporting year and continued for the 2002 reporting period:

- On-site Pollutant Releases
  - air
  - water
  - land: includes spills, leaks and other
- Disposal
  - on-site disposal: landfill, land treatment and underground injection
  - off-site disposal: landfill, land treatment, underground injection and storage
  - off-site transfers for treatment prior to final disposal:
    - physical treatment
    - chemical treatment
    - biological treatment
    - incineration or thermal treatment where energy is not recovered
    - treatment at a municipal sewage treatment plant (MSTP)
- Off-site Transfers for Recycling and Energy Recovery
  - recycling
  - energy recovery

As a result of consultations with stakeholders, new groupings were developed for on-site releases. It should be noted that "releases to land" no longer include disposal. The new groupings are different from those found in the *Guide for Reporting to the National Pollutant Release Inventory 2002.* In 2003, these changes were included in the *Guide for Reporting to the National Pollutant Release Inventory 2003* and the software for reporting to the NPRI.

Appendix C: Detailed Data Elements Reported to the NPRI

On-site Releases

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

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

Final Disposal Activities – On Site and Off Site

The following activities or operations are included in the category classified as "final disposal" – on site and off site:

- containment – two forms of containment are identified:
  - i) landfill; and
  - ii) other storage;
- underground injection at an off-site location;
- land treatment – for the purpose of land application or land farming; and
- off-site final disposal for storage.

Off-site Transfers for Treatment Prior to Final Disposal

A shipment of an NPRI-listed substance may be transferred to an off-site location for treatment prior to final disposal. The treatment processes include:

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

Off-site Transfers for Recycling and Energy Recovery

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

- recovery of solvents;
- recovery of organic substances (other than solvents);
- recovery of metals and metal compounds;
- recovery of inorganic materials (other than metals);
- recovery of acids and bases;
- recovery of catalysts;
- recovery of pollution abatement residues;
- refining or reuse of used oil; and
- other recovery, reuse or recycling activities.

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