SHATTERING THE MYTH OF POLLUTION PROGRESS IN CANADA:

A NATIONAL REPORT

PollutionWatch

www.PollutionWatch.org

ENVIRONMENTAL | DEFENCE

Canadian Environmental Law Association

l'association canadienne du droit de l'environnement

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Table of Contents

List of Figures, Tables and Appendices

Executive Summary

Executive Summary

The PollutionWatch web site (www.PollutionWatch.org) and this accompanying National Report give Canadians the most complete picture to date of pollution trends in their communities and across the country between 1995 and 2002. Based on the PollutionWatch analysis of data from Environment Canada's pollution reporting program - the National Pollutant Release Inventory (NPRI) - it is clear that, despite years of government and industry rhetoric, the goal of pollution prevention has yet to be realized in Canada. Because NPRI only reflects a portion of pollution in Canada, the PollutionWatch analyses are very conservative estimates of the total amount of pollution across the country.

Key Findings

Surprising amounts of pollutants are still being released across Canada to the air, water, and land and injected underground each year. Over 4,187,866,272 kilograms of pollutants were released in Canada in 2002 (the last year for which data are available). These releases include criteria air contaminants (such as sulphur dioxide, particulate matter and carbon monoxide) and toxic pollutants (such as lead, hexachlorobenzene and ammonia).

Releases and transfers of toxic chemicals continue to increase in Canada. From 1995 to 2002, the amount of toxic pollutants reported released and transferred increased by 49%. Air releases increased by 21% and water releases increased by 137%. These numbers do not include criteria air contaminants, which were reported for the first time in 2002. Time trend numbers are based on 160 chemicals (called core chemicals) that have been reported to NPRI since 1995, and do not include recycling or energy recovery.

Looking at only those facilities (the core facilities) that have reported each year since 1995 for the common core of chemicals, the conclusions regarding increasing pollution are the same: air releases increased by 11%, releases to water by 27% and overall releases and transfers by 15%.

While air releases of chemicals designated as toxic under the *Canadian Environmental Protection Act* (CEPA) and carcinogens have decreased (4% and 22% respectively), air releases of pollutants associated with reproductive and developmental harm have increased (10%) from 1995-2002. Releases and transfers of CEPA toxics also increased (6%) from 1995-2002.

The majority of facilities in Canada are making little or no progress in reducing pollution. Based on trends from 1995-2002, only a handful of facilities made significant reductions in releases and transfers. These reductions were offset by a handful of facilities reporting large increases.

There is no evidence that a reduction in pollution can be expected any time soon. According to industry estimates, the releases of most chemicals are not expected to change from 2003 - 2005. Almost 90% of chemical reports filed by facilities to NPRI projected no change in releases of pollution from 2003 - 2005. Only 6% of chemical reports projected a decrease in releases from 2003 - 2005, and 7% of chemical reports projected an increase: a "pollution as usual" scenario.

Most pollutants are still released into the air. In 2002, Canadian facilities spewed 3,868,307,111 kilograms of pollutants into the air (92% of total releases). These releases included criteria air contaminants and toxic pollutants and most were suspected respiratory toxins. In fact, 96% of the air pollutants released in Canada in 2002 were suspected respiratory toxins - enough pollution to fill railroad cars stretching from Ottawa to Fredericton.

Most of the pollutants released into the air were also considered toxic under the *Canadian Environmental Protection Act*. In 2002, Canadian facilities released 2,693,967,288 kilograms of pollutants declared CEPA toxic into the air. This level represents over two-thirds of all pollutants released into the air in 2002. These releases included criteria air contaminants and toxic pollutants.

The top employers in Canada are not the top polluters. Analyzed using a ratio of emissions to employees, the corollary was also found to be true: the country's top polluters are not the top employers.

Recommendations

The amount of pollution in Canada, and the lack of progress in preventing it, is unacceptable. Our current method of regulating chemicals is not producing results. The federal government, industry and all citizens need to take additional actions that will result in the elimination and avoidance of releases of chemicals into our communities.

The federal government must demonstrate leadership in this area. We need a national action plan, coordinated with provinces and territories, to eliminate and avoid the release of pollutants known to be damaging to our health and environment. These action plans by Canada and provinces/territories should have common numeric targets for the reduction of pollution and specific reporting mechanisms.

The Federal Environment Commissioner should be charged with reviewing progress towards the targets. The process and results should be reported to the public.

PollutionWatch suggests, as a minimum, the following goals for the elimination and reduction of pollutants in these action plans:

- virtual elimination of releases of carcinogens to the air and water by 2008;
- interim target of 50% reduction in releases of CEPA toxics to the air and water by 2008;
- interim target of 50% reduction in releases of respiratory toxins to the air by 2008; and,
- interim target of 50% reduction in releases of pollutants known to cause developmental and reproductive harm to the air and water by 2008.

The most effective action is to prevent pollution from entering the Canadian environment in the first place. Pollution prevention needs to be the driving force for facilities and governments to take action on pollution. Pollution prevention needs to be seen as an industrial strategy aimed both at furthering the elimination or prevention of the generation of pollution and the greater efficiency, and hence, competitiveness of industry.

The reporting of pollutants under the NPRI is a critical tool for improving our understanding of pollution in Canada. The program should be improved and expanded. Increasing the number of chemicals reported, expanding reporting to new sectors, improving the coverage of facilities, decreasing reporting thresholds, (e.g. eliminate the 10 employee threshold), ensuring the comparability of greenhouse gas information, requiring toxics use data and improving auditing of data are important areas that will continue to make the NPRI program more effective and relevant.

Section 1: About PollutionWatch.org

1. About PollutionWatch.org

1.1 What is PollutionWatch.org?

PollutionWatch.org is a joint initiative of Environmental Defence and the Canadian Environmental Law Association. It is the best source of information on the amount of pollution in Canadian communities. With a click of the mouse, citizens can find the facilities in their community that are releasing carcinogens and other chemicals to the air, water or land.

PollutionWatch.org also tracks whether pollution is getting better or worse, whether pollution in individual communities is increasing or decreasing over time, and whether facilities are increasing or decreasing their releases. PollutionWatch.org has a number of powerful new tools to put the best pollution information in people's hands and allow them to take action.

PollutionWatch.org uses data from the federal government's National Pollutant Release Inventory (NPRI) because it is the only publicly available, annual source of information on a wide range of chemicals released and transferred from individual facilities across Canada. A major change to NPRI, reflected in PollutionWatch for the 2002 reporting year, is the addition of seven new pollutants, called criteria air contaminants, which contribute to acid rain, smog and poor health. The 2002 NPRI data is the most recently available. Time trends on PollutionWatch.org use NPRI data from 1995 to 2002.

In 2002, 4,652 facilities reported their releases of chemicals to the air, water and land, injected underground and transferred off-site to disposal, treatment, sewage, energy recovery and recycling. Under NPRI, facilities were required to report 274 chemicals in 2002.

PollutionWatch data can be used for a variety of purposes:

- to help citizens identify chemical releases and transfers from neighbouring facilities;
- to track trends in chemical releases and transfers over time; and,
- to help governments and industries assess progress in preventing and reducing chemical releases.

For more information about PollutionWatch and its features, please see **www.PollutionWatch.org.**

1.2 What is the purpose of the report?

The PollutionWatch National Report analyzes the pollution data found on the PollutionWatch web site and provides recommendations for action.

This report uses federal NPRI data to answer five questions:

1. How much pollution was released into our air, water and land, injected underground or transferred to disposal, sewage, energy recovery and treatment in Canada in 2002?
2. Did releases and transfers of pollutants increase or decrease between 1995 and 2002?
3. Are some of the chemicals released and transferred associated with health and environmental effects?
4. Are facilities reporting pollution prevention efforts for most chemicals and are these efforts projected to result in decreases in releases in the future?
5. Are the top employers proportionately the top polluters?

The PollutionWatch National Report provides important context for the upcoming parliamentary review of the *Canadian Environmental Protection Act* scheduled for spring 2005.

1.3 What are the limitations of the data?

The data used on the PollutionWatch web site are based on NPRI data submitted by facilities and annually collected by Environment Canada. It is important to note

that NPRI only reflects a portion of pollution in Canada. Therefore, the analyses in PollutionWatch are very conservative estimates of the total amount of pollution across the country.

A major change to NPRI, reflected in PollutionWatch for the 2002 reporting year, is the addition of seven new pollutants, called criteria air contaminants:

- carbon monoxide;
- oxides of nitrogen;
- sulphur dioxide;
- total particulate matter less than 100 microns;
- particulate matter less than or equal to 10 microns (PM 10);
- particulate matter less than or equal to 2.5 microns (PM 2.5); and,
- volatile organic compounds (VOCs).

The addition of these pollutants is important as they interact to create smog and acid rain and have been associated with respiratory problems such as asthma, bronchitis and emphysema. Only the air emissions of criteria air contaminants are reported to NPRI. Because criteria air contaminants tend to be reported in large amounts, they can dwarf the other categories of pollutants reported as toxic chemicals. However, some toxic chemicals, such as mercury, dioxins and furans, can have significant environmental and health impacts even when released in small amounts.

The NPRI data are limited because they:

- do not cover all potential harmful chemicals - just 274 chemicals;
- do not cover all pollutants such as pesticides and greenhouse gases;
- generally do not include releases that fall below the reporting threshold of 10 tonnes manufactured, processed or otherwise used;
- do not include mobile sources such as cars, trucks and construction equipment;
- do not include natural sources such as forest fires and erosion;
- do not include sources such as dry cleaners and gas stations;
- do not include facilities that are exempted such as schools, research facilities, forestry, fishing, agriculture or mining (processing of mined materials is included in NPRI);
- generally do not include small facilities with less than 10 employees;
- do not include information on risks of chemicals released or transferred;
- do not include information on exposures to people or the environment; and,
- do not include information on the amount of chemicals allowed to be released under permits, regulations or agreements.

These limitations need to be kept in mind when reviewing NPRI data and the PollutionWatch web site. For some pollutants, such as sulphur dioxide, NPRI will cover the majority of major sources. For other pollutants, such as carbon monoxide, which is emitted from cars and trucks, NPRI data will cover only some of the major sources.

There are many different sources of information about pollution in Canadian communities. The PollutionWatch web site is based on one set of information, data from NPRI. Other sources of information include:

- *monitoring data* - actual measurements of the concentration of contaminants in our air, water and soil;
- *inventories* - based on one chemical or a group of chemicals such as hazardous waste or greenhouse gas inventories;
- *modeling estimates* - use of assumptions to predict the concentration, movement and transportation of contaminants; and
- *body burdens* - actual measurements of concentrations of contaminants in plants, fish and people.

Section 2: National Overview of Pollution

2. National Overview of Pollution

2.1 How much pollution is reported to NPRI?

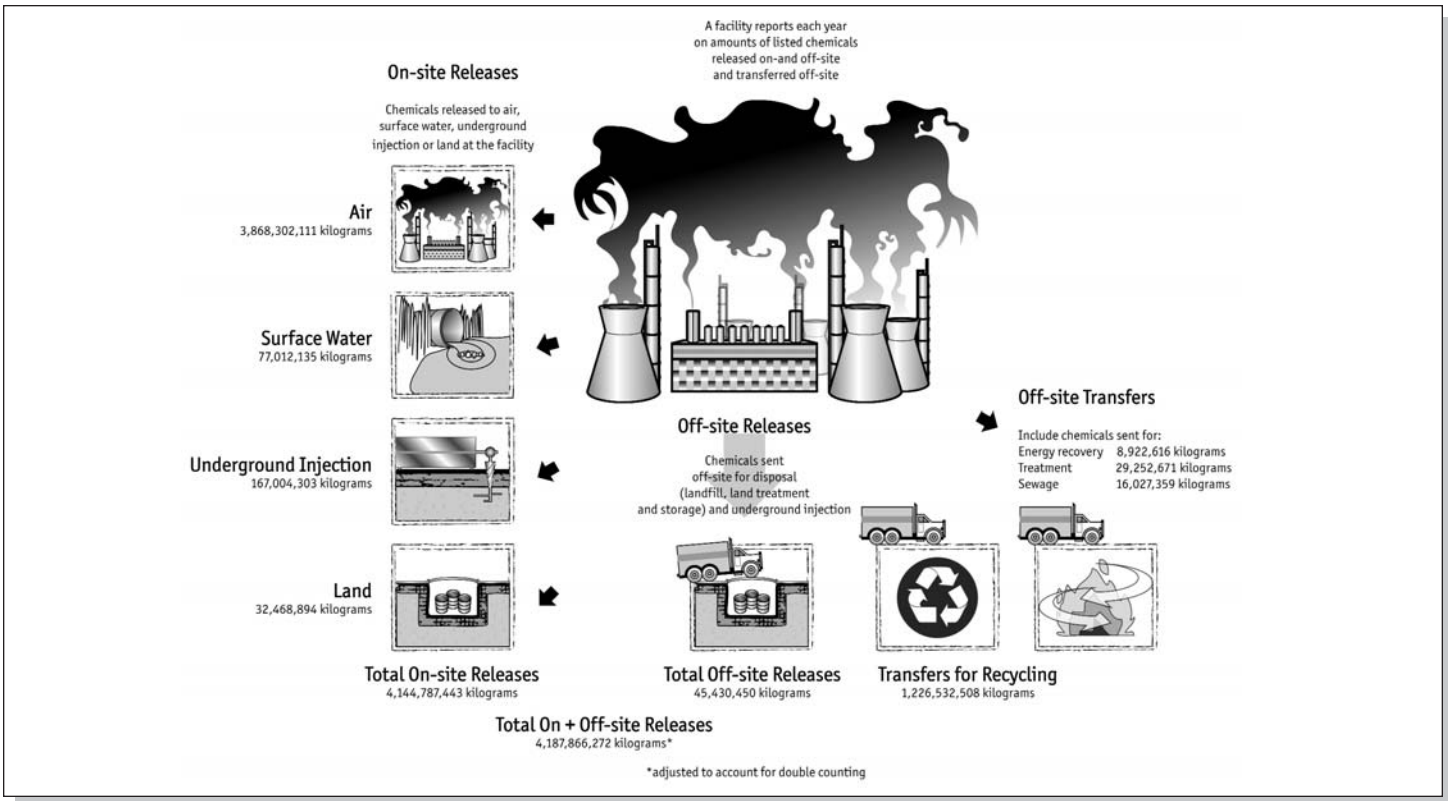
Large amounts of pollutants continue to be released to our air, water, and land, injected underground or transferred off-site to sewage treatment plants, energy recovery facilities and treatment facilities each year.

The total amount of pollutants released and transferred in Canada in 2002 (not including recycling) was 4,244,614,425 kilograms. This included pollutants known as criteria air contaminants (that include sulphur dioxide, nitrogen oxides, carbon monoxide, particulate matter and volatile organic compounds), which are known to create smog and acid rain. This total also included 274 toxic chemicals, comprising such known neurotoxins as lead and mercury (Figure 1).

Of this total, 4,187,866,272 kilograms of pollutants were released to the air, water, and land, or injected underground in Canada in 2002. Most releases were criteria air contaminants released to the air. This total releases number is adjusted to account for double counting. For a full discussion of double counting, see Appendix A.

In addition to facilities releasing pollutants to the air, water, land and underground injection, Canadian industries also sent about 54,202,646 kilograms of pollutants off-site to sewage treatment plants, energy recovery and treatment facilities. Facilities also sent 1,226,553,508 kilograms of pollutants to another facility for recycling.

Figure 1: Overview of amount of chemicals released, transferred and recycled in Canada in 2002 (kilograms as reported to NPRI)



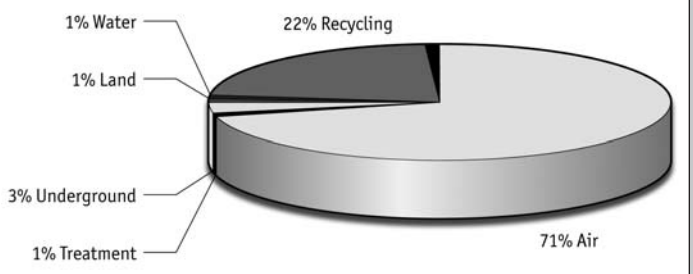
2.2 Where do facilities send their chemicals?

Releasing chemicals to the air is still the main method of dealing with pollution in Canada (Figure 2). **In fact, of all chemicals generated at company sites, 71% ended up in the air, a total of 3,868,302,111 kilograms.** This includes criteria air contaminants as well as toxic pollutants.

Many of these pollutants damage people's health and our environment. They create smog and acid rain. About one-half of the total air releases were one pollutant, sulphur dioxide, which contributes to respiratory illness, especially in children and the elderly, and aggravates existing heart and lung diseases (Environmental Protection Agency [EPA], 2003). Another one-quarter of total air releases were carbon monoxide, which may also cause respiratory, cardiovascular, reproductive and developmental effects (EPA, 2003).

About 22% (1,226,532,508 kilograms) of the total amount of chemicals generated at company sites was sent for recycling in 2002. Recycled pollutants such as hydrogen sulphide, sulphuric acid, copper, zinc and lead were shipped to another facility for recycling. One pollutant, hydrogen sulphide from natural gas processing, accounted for about 70% of the total amount of pollutants sent for recycling in 2002.

Figure 2: Where do facilities send their chemicals?



About 3% (176,014,957 kilograms) of all chemicals generated at company sites were injected underground, mainly in Alberta and British Columbia in 2002. The majority of this total amount - 167,004,303 kilograms - was injected on-site; most of it was hydrogen sulphide from gas processing. Approximately 9,010,654 kilograms of chemicals were sent off-site to be injected elsewhere.

About 1% (77,012,135 kilograms) of the total amount of all chemicals generated at company sites was released into water. Two pollutants, total ammonia and nitrate ion, accounted for 94% of all pollutants released into water.

About 1% (68,888,690 kilograms) of the total amount of all chemicals reported by facilities was disposed of on land, usually in landfill sites. Some facilities such as steel mills and power plants have landfills at their sites and some facilities send chemicals to another site for landfilling. In 2002, 32,468,894 kilograms of chemicals were sent for disposal on land (most to landfill) on-site and 36,419,796 kilograms of chemicals were sent to other sites for land disposal (mostly landfill). The top chemicals sent to landfill sites were the same for both on- and off-site releases: they included zinc and manganese and their compounds, and calcium fluoride.

About 1% (54,202,646 kilograms) of the total amount of chemicals reported was transferred to another facility for treatment, sewage or energy recovery in 2002. Most of these transfers, over 29,252,671 kilograms, were sent for treatment (such as chemical, biological or physical treatment). Some facilities sent chemicals through the sewers to sewage treatment plants. In 2002, this method of disposal totalled 16,027,359 kilograms. Facilities also sent chemicals such as xylene, toluene and methyl ethyl ketone to be burnt in incinerators, cement kilns and other facilities to produce

Section 3: National Pollution Trends

energy. This method of disposal totalled 8,922,616 kilograms.

2.3 Which provinces have the largest releases and transfers of chemicals?

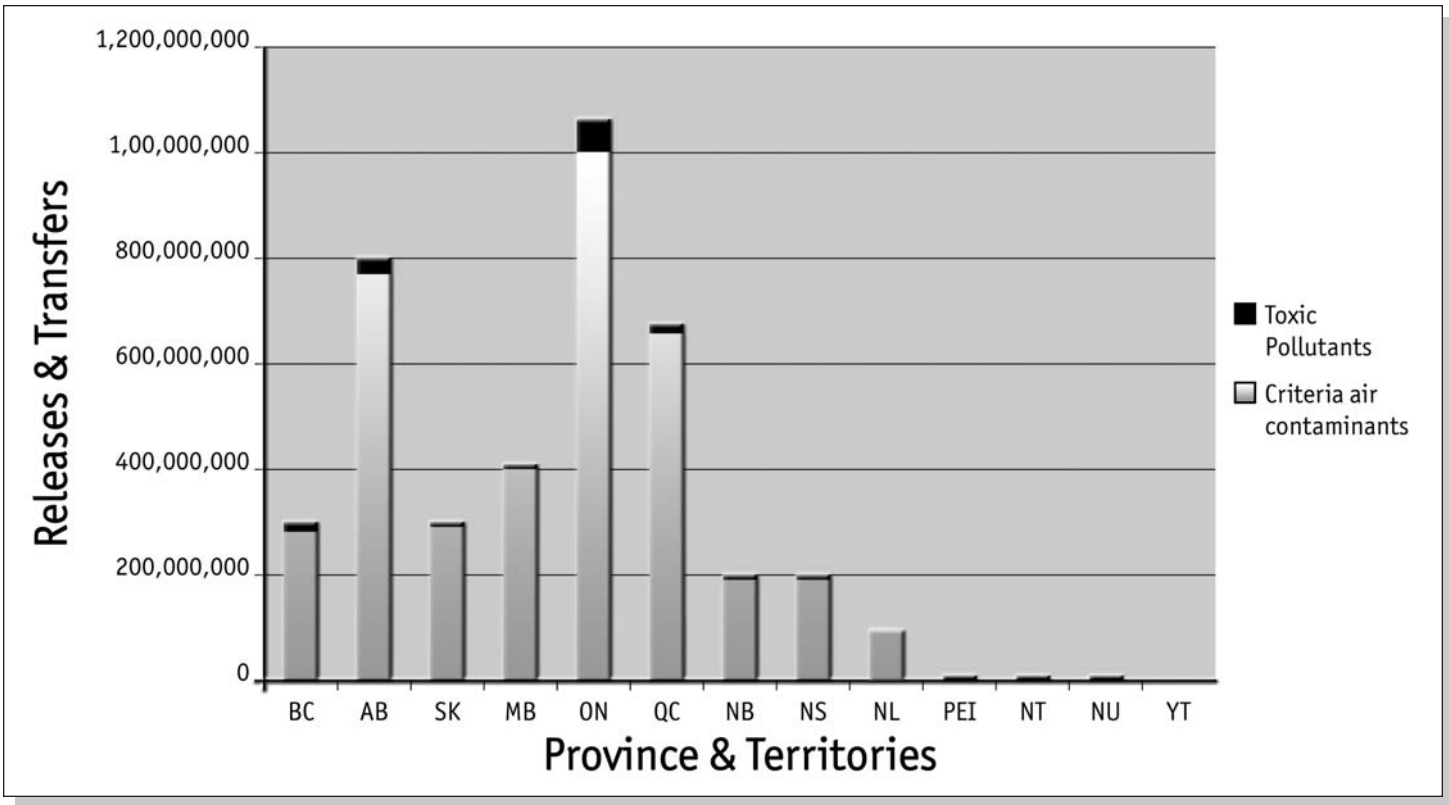
The province of Ontario had the largest amount of releases and transfers of chemicals in 2002, followed by Alberta and Quebec (Figure 3). The provinces with the largest amounts of chemicals released to the air were: Ontario, Alberta, and Quebec. For carcinogens released to the air, the ranking was Ontario, Quebec, and Alberta. For substances considered toxic under CEPA, and released to the air, the ranking was Ontario, Alberta and Manitoba. Ontario also had the largest number of facilities reporting to NPRI, followed by Quebec and then Alberta.

3. National Pollution Trends

The amount of chemicals released and transferred in Canada increased by 49% from 1995 to 2002. Air releases increased by 21% from 1995-2002. Water releases increased by 137% from 1995-2002.

These trends are based on analyses of 160 core chemicals that have been consistently reported to NPRI since 1995. Because facilities started reporting emissions of criteria air contaminants in 2002, these contaminants were not included in the trend analysis. Recycling and energy recovery were also not included in these time trends as reporting only became mandatory in 1998 (Figures 4,5,6).

Figure 3: Amount of chemicals released and transferred across Canada in 2002 (kilograms as reported to NPRI)



The number of facilities reporting on core chemicals increased by 1,158 facilities (68%) from 1995-2002 (Table 1). Environment Canada notes that the number of facilities reporting increased from 2001 to 2002 due to changes in reporting requirements (including the addition of criteria air contaminants) and increased compliance promotion activities. This increase in the number of facilities may be a factor in some time trends.

In addition, a number of sectors (such as pulp and paper) have changed their reporting methods over time, which may be a factor in some time trends.

Trends in pollution from core facilities were consistent with the overall trends in pollution described earlier. For core facilities and core chemicals, releases to the air increased by 11%, releases to the water increased by 27% and releases to the land by 24% between 1995 and 2002 (Figure 7). Releases and transfers of core chemicals from core facilities increased by 15% from 1995 to 2002 (Figure 8).

There did appear to be some progress in reducing releases of carcinogens to the air (down by 39%) and water (down by 9%) from 1995 to 2002 for core chemicals and core facilities.

Releases of CEPA toxics to the air decreased (19%) for core chemicals and core facilities, but releases to the water of CEPA toxics increased (188%). Releases of CEPA toxics increased by 10% and releases and transfers of CEPA toxics increased by 12% for core chemicals and core facilities (Appendix C).

Air releases of chemicals with known or suspected respiratory effects also increased (29% for core chemicals and 21% for core chemicals and core facilities).

Figure 4: Trends in the total releases and transfers of core chemicals from 1995-2002 (kilograms as reported to NPRI)

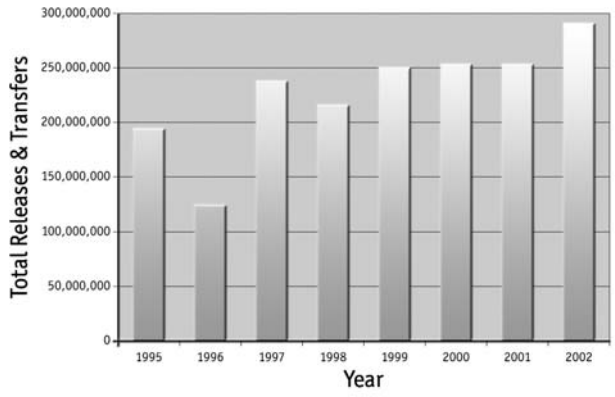


Figure 5: Trends in the total releases of core chemicals from 1995-2002 (kilograms as reported to NPRI)

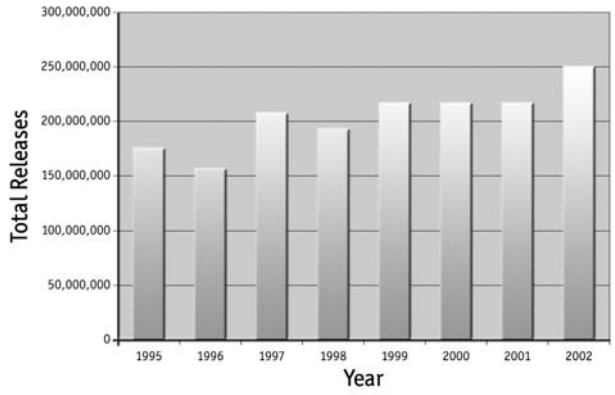


Figure 6: Trends in the air releases of core chemicals from 1995-2002 (kilograms as reported to NPRI)

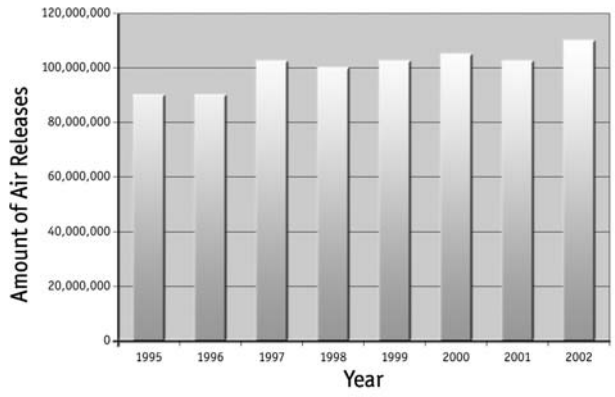


Table 1 : Releases and transfers of core chemicals from 1995-2002 (kilograms as reported to NPRI)

YEAR	Number of core facilities	Total releases and transfers	Air releases	Water releases	Land releases
		Core chemicals- Kilograms			
1995	1,691	198,233,695	92,370,039	32,436,380	15,495,176
1996	1,774	183,901,533	91,928,907	13,674,918	12,477,090
1997	1,896	242,374,292	104,203,159	21,115,171	17,049,029
1998	1,942	225,630,867	102,170,201	17,176,173	15,879,930
1999	2,097	252,497,026	103,504,005	21,162,056	26,035,959
2000	2,228	258,402,357	107,860,935	47,379,653	19,020,244
2001	2,426	258,478,188	103,149,632	52,520,016	18,925,775
2002	2,849	295,814,483	111,527,917	76,809,895	19,089,156
Percent change 1995-2002	**+68.5%**	**+49.0%**	**+20.7%**	**+136.8%**	**+23.2%**

Another way to look at pollution trends is to analyze how many facilities are reporting decreases, increases or no change. A few facilities reported decreases over time (Table 2). In the aggregate, however, the increase in the amount of pollutants released and transferred was greater than the decrease. The top 25 facilities showing decreases from 1995 to 2002 in core chemicals accounted for 64% of all decreases. The top 25 facilities reporting increases accounted for 51% of all increases. **The majority of facilities made no progress in reducing releases and transfers from 1995-2002.** Only a handful of facilities made significant reductions, offset by a handful reporting large increases.

Figure 7: Trends in releases of core chemicals to the air from core facilities from 1995-2002(kilograms as reported to NPRI)

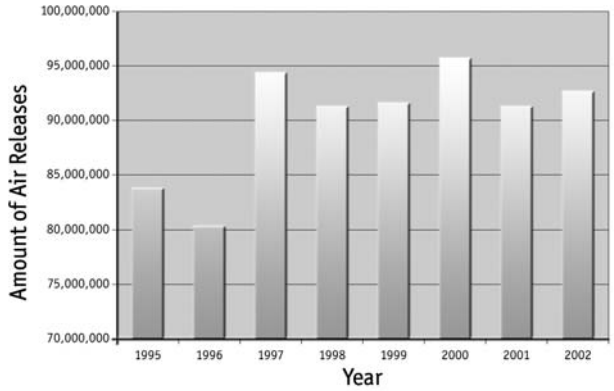


Figure 8: Trends in releases and transfers of core chemicals from core facilities from 1995-2002 (kilograms as reported to NPRI)

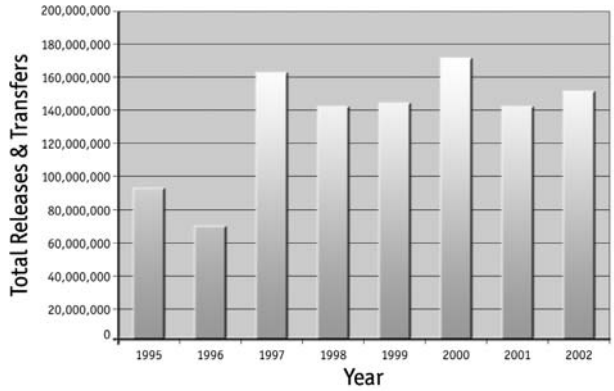


Table 2: Facilities with large changes in total release and transfers of core chemicals from 1995-2002 (kilograms as reported to NPRI)

Rank change 1995-2002	Facility		Location	Releases and transfers of core chemicals (kilograms)			
Decreases				1995	2002	kilograms	Percent Change
1	Gerdau AmeriSteel Corporation		Whitby, ON	7,443,522	1,211,505	-6,232,017	-83.7%
2	Sherritt International Corporation		Fort Saskatchewan, AB	4,612,109	95,586	-4,516,523	-97.9%
3	Irving Pulp & Paper Limited / Irving Tissue Company		Saint John, NB	3,663,628	842,639	-2,820,989	-77.0%
4	IPSCO Saskatchewan Inc.		Regina, SK	5,610,082	2,989,708	-2,620,374	-46.7%
5	General Chemical Canada Limited		Nanaimo, BC	1,997,244	302	-1,996,942	-100.0%
Increases							
1	Ontario Power Generation	Nanticoke Generating Station	Town of Haldimand, ON	2,237,232	7,870,392	5,633,160	252
2	Clean Harbors Inc.	Lambton Facility	Corunna, ON	268	4,438,549	4,438,281	1,656,075
3	Greater Vancouver Regional District	Annacis Island Wastewater Treatment Plant	Greater Vancouver Regional District, BC	0	4,423,990	4,423,990	-
4	City of Toronto	Ashbridges Bay Treatment Plant	City of Toronto, ON	0	4,193,200	4,193,200	-
5	Regional Municipality of Halton	Skyway Waste Water Treatment Plant	Burlington, ON	0	2,976,559	2,976,559	-

Section 4: How Hazardous Are These Chemicals?

4. How Hazardous Are These Chemicals?

The PollutionWatch project recognizes that chemicals can have different health and environmental impacts. PollutionWatch is based on NPRI data that provide information on the amount of chemicals released and transferred by facilities across Canada. These estimates of releases and transfers need to be combined with other information to fully understand exposure, health and environmental impacts. The actual health and environmental impacts will depend on a number of factors, including the type of chemical (including its toxicity, persistence, ability to accumulate in plants, fish, etc.), the amount of chemical released, where the chemical is released (to the air, water, land), weather patterns, and the sensitivity of the person or region.

The PollutionWatch web site provides additional information on the health and environmental impacts of specific chemicals through links to other web sites. Another way to use NPRI data to better understand health and environmental impacts is to analyze the data based on chemical lists associated with health and environmental effects. Six lists of chemicals with different potential health and environmental effects are presented on PollutionWatch:

1. Suspected respiratory chemicals.
2. Chemicals considered toxic under the *Canadian Environmental Protection Act* (CEPA toxics).
3. Chemicals that have reproductive/developmental effects.
4. Carcinogens.
5. Ozone depleters.
6. Suspected endocrine disrupters (chemicals that affect the endocrine/hormone system).

Appendix B lists references upon which these six lists are based.

4.1 Suspected Respiratory Toxins

In 2002, Canadian facilities released 3,723,470,288 kilograms of chemicals suspected to harm the respiratory system (Table 3). **Over 96% of all air releases were suspected respiratory toxins, enough pollutants to fill railroad cars stretching from Ottawa to Fredericton.** These top pollutants are criteria air contaminants, and were reported for the first time to NPRI in 2002. This new reporting provides Canadians with the ability for the first time to understand which facilities in their community are releasing these harmful contaminants.

Some criteria air contaminants are the ingredients for smog. Smog is created when nitrogen oxides and volatile organic compounds react in sunlight. When Canadians hear the word smog, many picture the chemical "soup" that often appears as a brownish-yellow haze over cities. But smog isn't always visible. It's a mixture of air pollutants, including gases and particles, that are too small to see. Smog often begins in big cities, but smog levels can be just as high or higher in rural and suburban areas (Health Canada, 2004).

The health of our lungs and entire respiratory system is affected by the quality of the air we breathe. Smog can cause damage to heart and lungs - even when it can't be seen or smelled. The people especially at risk from smog are those who suffer from heart and lung problems. Many of these problems are more common in seniors, making them more likely to suffer health effects from air pollution. Children can be more sensitive to the effects of air pollution because their respiratory systems are still developing and they tend to have an active lifestyle. Even healthy young adults breathe less well on days when the air is heavily polluted (Health Canada, 2004).

Table 3: Pollutants released to the air in the largest quantities in Canada in 2002 (kilograms as reported to NPRI).

Chemical	Health List	Amount of air releases 2002 (kilograms)
1. Sulphur dioxide	Respiratory toxin, CEPA toxic	1,978,934,552
2. Carbon monoxide	Respiratory toxin, reproductive/developmental toxin	953,721,485
3. Oxides of nitrogen (expressed as NO2)	Respiratory toxin, CEPA toxic	576,739,210
4. Volatile Organic Compounds (VOCs)	Only some VOCs (not all VOCs) are respiratory toxins, CEPA toxic	267,553,214
5. PM - Total Particulate Matter	Mainly consists of PM 10 and PM 2.5 which are respiratory toxins	227,900,416
PM 10 - Particulate Matter <= 10 Microns	Respiratory toxin, CEPA toxic	108,889,355
PM 2.5 - Particulate Matter <= 2.5 Microns	Respiratory toxin, CEPA toxic	61,149,937
Total-All respiratory pollutants		**3,723,470,288**
Total-All pollutants		**3,868,302,111**

Studies suggest that long-term regular exposure to particulate matter can increase the risk of early death and perhaps lung cancer. Studies on ozone show that once it gets into human lungs, it can continue to cause damage even in the absence of noticeable symptoms (Health Canada, 2004).

The respiratory system (lungs and airways) is particularly sensitive to air pollutants because much of it is made up of exposed membrane. Lung tissue cells can be injured directly by air pollutants. Ozone, for example, can damage alveoli - the individual air sacs in the lung. When injured, lung cells release chemicals that may critically affect the function of other organs, including the cardiovascular system. This response may also cause lung inflammation and reduce lung function (Health Canada, 2004).

The inhalation of air pollutants eventually leads to their absorption into the bloodstream and transport to the heart. Some pollutants may affect the heart's rhythm and ability to contract. If severe enough, this may lead to lethal arrhythmias without major evidence of structural damage to the heart.

Particulates are a mixture of solid particles in the air, and are classified by their size. Particulates less than or equal to 10 microns are known as PM 10. The smallest particulates are called fine or respirable particles, or PM 2.5, and measure less than or equal to 2.5 microns - about 1/40th the width of a human hair. The group of particulates (less than or equal to 100 microns) is called total particulate matter.

Research shows that particulates, especially the smallest particulates, are inhaled deep into the lungs. These small particulates can cause respiratory health problems, such as aggravated asthma, coughing and painful breathing, chronic bronchitis, decreased lung function, increased hospitalization for heart and lung disease, increased work and school absences, and premature death (EPA, 2004).

Adverse health effects have been associated with both exposure to PM 2.5 for short periods of time, such as a day, and longer periods of time, such as a year (Ministry of the Environment, 2004). Parts of a diseased lung collect eight to 10 times more particles than a healthy lung. This suggests that people with lung diseases may be more affected by increasing levels of particulates because they receive greater doses (EPA, 2004).

Scientists have also found that the smallest particulates, PM 2.5, move easily indoors where people spend most of their time (EPA, 2004).

There has never been any doubt that smog kills...Doctors see the adverse effects of smog in our offices and emergency wards every day - we realize the importance of giving people the tools they need to protect themselves.

Ontario Medical Association President
Dr. Larry Erlick, June 2003

The Ontario Medical Association (OMA) estimates that approximately 1,900 premature deaths occur every year in Ontario as a result of air pollution. As well, 9,800 hospital admissions, 13,000 emergency room visits and 47 million minor illness days are expected to occur every year that are attributable to air pollutants. (OMA, 1998).

These health damages total about $600 million in costs to the health-care system and another $560 million in direct losses to employers and employees. This represents over $1 billion in direct costs to the people of Ontario. Using conservative estimates of the value of pain and suffering, and loss of life, these add a staggering $5 billion and $4 billion respectively to the total. This gives a total annual economic loss of $10 billion in 2000 (OMA, 1998).

The PollutionWatch National Report has ranked the facilities with the largest amounts of PM 2.5, the size of the particulate of most concern to health (Table 4). With the addition of PM 2.5 to NPRI, this is the first time that Canadians can see the top facilities that are producing these health-damaging particulates.

Of the top 20 facilities for PM 2.5, eight are pulp and paper facilities, five are primary metal (smelters), four are power plants, two are fertilizer plants and one is an oil and gas extraction facility. **These top 20 facilities, which make up 0.4 % of all facilities reporting under NPRI, emit 36% of all PM 2.5 in Canada.**

Table 4: Top 20 facilities in Canada for air releases of Particulate Matter less than or equal to 2.5 microns (PM 2.5) in 2002 (kilograms as reported to NPRI)

Rank	Company Name	Facility Name	Location	Amount of Particulate Matter less than or equal to 2.5 microns (PM 2.5) released into the air in 2002 (kilograms)
1	SaskPower	Boundary Dam Power Station	Estevan, SK	2,717,723
2	Inco Limited	Copper Cliff Smelter Complex	Copper Cliff, ON	2,545,840
3	Ontario Power Generation	Nanticoke Generating Station	Haldimand, ON	2,224,400
4	Kimberly-Clark Corporation	Kimberly- Clark Inc.	Terrace Bay, ON	1,256,636
5	Newfoundland and Labrador Hydro	Holyrood Thermal Generating Station	Holyrood, NL	1,194,000
6	Weyerhaeuser Canada Limited	Kamloops Pulp Division	Kamloops, BC	1,188,415
7	TransAlta Corporation	Sundance Thermal Generating Plant	Duffield, AB	1,124,930
8	IMC Global Inc.	IMC Canada Ltd. (IMC Potash Belle Plaine)	Belle Plaine, SK	1,067,400
9	IMC Esterhazy Canada Limited Partnership	IMC Potash - K2 Plant	Esterhazy, SK	873,600
10	Stelco Inc.	Stelco Hamilton	Hamilton, ON	866,554
11	Stelco Inc.	Nanticoke	Nanticoke, ON	851,377
12	Ontario Power Generation	Lambton Generating Station	Courtright,ON	844,014
13	Iron Ore Company of Canada	Carol Project	Labrador City, NL	774,000
14	Domtar Inc.	Espanola Mill	Espanola,ON	714,174
15	Weyerhaeuser Canada Limited	Weyerhaeuser Dryden Operations	Dryden,ON	676,389
16	Riverside Forest Products Limited	Armstrong	Armstrong, BC	660,146
17	Kimberly-Clark Corporation	Kimberly-Clark Nova Scotia	New Glasgow, NS	631,500
18	Dofasco Inc.	Dofasco Hamilton	Hamilton, ON	615,000
19	Syncrude Canada Ltd.	Mildred Lake Plant Site	Fort McMurray, AB	605,635
20	Canadian Forest Products Ltd.	Northwood Pulp Mill	Prince George, BC	598,476
	Total Top 20			**22,032,216**
	Total Canada			**61,149,937**

4.2 Chemicals considered toxic under the *Canadian Environmental Protection Act* (CEPA toxics)

A large amount of the chemicals released into the air and water are considered toxic under the *Canadian Environmental Protection Act* (CEPA). The federal legislation, CEPA, seeks to protect the environment and human health from the risks associated with chemicals. Under CEPA, the federal government is responsible for the categorization of the 23,000 chemicals on the federal Domestic Substances List. Environment Canada and Health Canada are required to determine the persistence, or bioaccumulation and inherent toxicity, of these chemicals. Health Canada must also determine the chemicals with the greatest potential for human exposure.

Under section 64 of CEPA, a substance is declared "toxic" if it is entering or may enter the environment in a quantity or concentration or under conditions that:

a) have or may have an immediate or long term harmful effect on the environment or its biological diversity;

b) constitutes or may constitute a danger to the environment on which it depends; or

c) constitutes or may constitute a danger in Canada to human life or health.

Some chemicals on the Domestic Substances List have already been assessed and declared toxic. For these CEPA toxic chemicals, Environment Canada is required to propose tools to manage emissions.

In 2002, over two-thirds of all pollutants released by Canadian facilities into the air were CEPA toxics. Of the 77 chemicals reported to NPRI that are considered CEPA toxic, one substance, sulphur dioxide, accounted for over half (51%) of the total air releases.

Of the top 25 facilities releasing CEPA toxics to the air in Canada in 2002, 18 were power plants. The top three facilities were base metal smelters, two from Inco Ltd. and Hudson Bay Mining and Smelting (Table 5). **These top 25 facilities are less than 1% of the total number of Canadian facilities reporting under NPRI, yet account for 62% of the total releases of CEPA toxics to the air in Canada.**

PollutionWatch also found that 39,414,265 kilograms of chemicals were released into the water in 2002 that are considered CEPA toxics - 51% of all chemicals released to water that year.

Currently, not all CEPA toxic chemicals are required to be reported to NPRI. NPRI lists 77 chemicals considered CEPA toxic.

Table 5: Top 25 facilities releasing pollutants considered CEPA toxic to the air in Canada in 2002 (kilograms as reported to NPRI)

Rank	Company Name	Facility Name	Location	Amount of Pollutants considered CEPA toxic released to the air in 2002 (kilograms)
1	Inco Limited	Copper Cliff Smelter Complex	Copper Cliff, ON	239,345,582
2	Inco Limited	Thomson Operations	Thompson, MB	197,528,380
3	Hudson Bay Mining and Smelting Company Ltd.	HBM&S Co. Ltd. Metallurgical Complex	Flin Flon, MB	178,053,222
4	Ontario Power Generation	Nanticoke Generating Station	Haldimand, ON	130,559,516
5	Syncrude Canada Ltd.	Mildred Lake Plant Site	Fort McMurray, AB	96,814,823
6	Nova Scotia Power Inc.	Lingan Generating Station	Lingan, NS	89,303,679
7	SaskPower	Boundary Dam Power Station	Estevan, SK	69,618,086
8	Noranda Inc.	Fonderie Horne	Rouyn-Noranda, QC	62,533,414
9	NB Power	Coleson Cove Station	Saint John, NB	58,437,097
10	Sask Power	Poplar River Power Station	Coronach, SK	54,897,569
11	TransAlta Corporation	Sundance Thermal Generating Plant	Duffield, AB	53,972,650
12	Ontario Power Generation	Lambton Generating Station	Courtright, ON	47,872,434
13	Nova Scotia Power Inc.	Trenton Generating Station	Trenton, NS	46,424,371
14	TransAlta Utilities Inc./ATCO Power	Sheerness Generating Station	Hanna, AB	43,699,367
15	Falconbridge Limited	Smelter Complex	Falconbridge, ON	39,212,969
16	ATCO Power	Battle River Generating Station	Forestburg, AB	36,906,736
17	Suncor Energy Inc.	Suncor Energy Inc. Oil Sands	Fort McMurray, AB	32,096,146
18	Newfoundland and Labrador Hydro	Holyrood Thermal Generating Station	Holyrood, NL	29,441,974
19	EPCOR Generation Inc.	Genesee Thermal Generating Station	Warburg, AB	28,428,738
20	Imperial Oil	Sarnia Refinery Plant	Sarnia, ON	28,298,232
21	TransAlta Corporation	Keephills Thermal Generating Station	Duffield, AB	27,520,484
22	NB Power	Grand Lake Generating Station	New Castle Creek, NB	25,261,067
23	TransAlta Corporation	Wabamun Thermal Generating Plant	Wabamun, AB	22,139,980
24	Sask Power	Shand Power Station	Estevan, SK	19,655,469
25	Ontario Power Generation	Lakeview Generating Station	Mississauga, ON	19,481,488
	Total Top 25			**1,677,505,475**
	Total Canada			**2,693,967,288**

4.3 Carcinogens

In 2002, 7,007,091 kilograms of carcinogens were released into the air in Canada. About 176,030 kilograms of carcinogens were released into the water. Chemicals reported to NPRI were categorized as carcinogens according to the *State of California Proposition 65*, one of the most comprehensive lists available.

Table 6: Top 10 facilities releasing carcinogens to the air in Canada in 2002 (kilograms as reported to NPRI)

Rank	Company Name	Facility Name	Location	Amount of carcinogens released into the air in 2002 (kilograms)
1	Vitafoam Products Canada Ltd	Toronto Facility	Toronto, ON	265,340
2	Inco Limited	Copper Cliff Smelter Complex	Copper Cliff, ON	226,907
3	Weyerhaeuser Canada Limited	Miramichi OSB	Miramichi, NB	199,553
4	Stelco Inc.	Stelco Hamilton	Hamilton, ON	194,027
5	Sandvik Materials Technology	Tube Production Unit	Arnprior, ON	185,186
6	Domfoam International Inc. Montreal, QC	Domfoam	Montreal, QC	178,427
7	Noranda Inc. Rouyn-Noranda, QC	Fonderie Horne	Rouyn-Noranda, QC	167,310
8	Inco Limited	Thompson Operations	Thompson, MB	165,710
9	HBM&S Co, Ltd. Hudson Bay Mining and Smelting Company Ltd.	HBM&S Co., Ltd. - Metallurgical Complex	Flin Flon, MB	154,934
10	Ainsworth Lumber Co. Ltd.	Grande Prairie OSB Mill	Grande Prairie, AB	132,050
	Total Top 10			**1,871,446**
	Total Canada			**7,007,091**

4.4 Chemicals that cause reproductive and developmental harm

In 2002, almost 1 billion kilograms of chemicals (968,107,576 kilograms) known to cause reproductive and developmental harm were released into the air, the majority of this amount being carbon monoxide. Because a significant amount of the carbon monoxide emitted into the environment is from cars and trucks - a source not tracked by NPRI - the PollutionWatch National Report focused on significant emissions of other chemicals known to cause reproductive and developmental harm. Once carbon monoxide was factored out, 14,386,091 kilograms of air releases known to cause reproductive or developmental harm remained. The list of chemicals of reproductive and developmental harm is drawn from the S*tate of California Proposition 65*.

Table 7: Top 15 facilities releasing chemicals known to cause reproductive or developmental harm in Canada in 2002 (kilograms as reported to NPRI)

Rank	Company Name	Facility Name	Location	Amount of air releases of Reproductive and Developmental chemicals in 2002 (kilograms)
1	Shell Canada Limited	Shell Burnt Timber Complex	Caroline, AB	831,756
2	Duke Energy Gas Transmission	Pine River Gas Plant	Chetwynd, BC	763,500
3	Bayer Inc.	Bayer Inc. Sarnia Site	Sarnia, ON	744,601
4	Husky Oil Operations Limited	Ram River Gas Plant	Rocky Mountain House, AB	694,780
5	Shell Canada Limited	Waterton Complex	Pincher Creek, AB	487,251
6	Canadian Technical Tape	Montreal plant	St-Laurent (Montreal) QC	435,259
7	Duke Energy Gas Transmission	Fort Nelson Gas Plant	Fort Nelson, BC	425,905
8	General Motors of Canada Limited	Oshawa Car Assembly Plant	Oshawa, ON	393,918
9	Syncrude Canada Ltd.	Mildred Lake Plant Site	Fort McMurray, AB	276,253
10	3M Canada Company	Perth, Ontario	Perth, ON	275,433
11	Canadian General-Tower Ltd.	Cambridge, Ontario	Cambridge, ON	262,010
12	Quebecor Inc.	Quebecor World Islington	Toronto, ON	255,964
13	Suncor Energy Inc.	Suncor Energy Inc. Oil Sands	Fort McMurray, AB	254,021
14	Shell Canada Limited	Jumping Pound Complex	Calgary, AB	245,000
15	ExxonMobil Canada Ltd.	Lone Pine Creek Gas Plant	Carstairs, AB	235,001
	Total Top 15			**6,580,652**
	Total Canada			**14,386,091**

Section 5: Pollution Prevention

5. Pollution Prevention

Pollution prevention is defined by CEPA as "the use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste, and reduce the overall risk to the environment or human health" (CEPA, 1999). Pollution prevention seeks to eliminate the causes of pollution rather than managing it after it has been created. It encourages the kinds of changes that are likely to lead to lower production costs, increased efficiencies and more effective protection of the environment and human health (Environment Canada, 2003).

Pollution prevention does not include pollution control, recycling, disposal, waste treatment, transfers, dilution, and transferring hazardous and/or toxic constituents from one environmental medium to another (Environment Canada, 2003).

Unfortunately, NPRI reporting cannot tell us how much pollution has been prevented. Facilities are required to identify all of their pollution prevention activities, from a list of over 50 different types of activities that have been implemented for a particular chemical in the current year. Facilities do not report that they have reduced the chemical benzene by 10 tonnes, for example, rather they select which types of pollution prevention activities such as spill and leak detection, good operating practice, and product design and reformulation they have implemented for benzene.

A facility files one report per chemical. In 2002, 4,596 facilities filed 24,453 chemical reports. To get a picture of the progress in pollution prevention in Canada, the PollutionWatch National Report analyzed the number of chemical reports that indicated no pollution prevention activity.

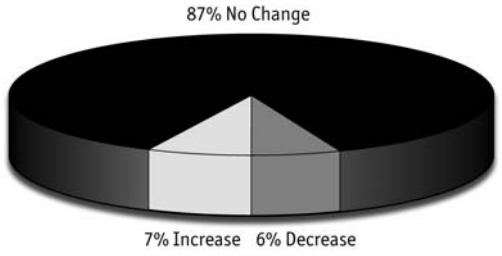
In 2002, facilities filed 12,967 reports stating they had no pollution prevention activities for the chemical in question - about half (53%) of the total number of chemical reports filed by facilities in 2002. In other words, there were no actions to prevent pollution for the majority of the chemicals reported by facilities.

Of the types of pollution prevention activities reported, most were "Good operating practice or training" (7,450 activities) and "Spill and leak prevention" (2,245 activities). Few facilities reported on the more "upstream" methods of pollution prevention, i.e. preventing pollution before it is created, namely "Material or feedstock substitution" (537 activities) and "Product design or reformulation" (475 activities).

Another way to look at pollution prevention is to see how many facilities are projecting a decrease in releases. If pollution prevention is having an effect, then a facility should start to show reductions in releases in future years. Facilities are required to report their projections for the releases of each chemical for the next three years to NPRI.

In 2002, out of the 24,453 chemical reports filed almost 90% (21,328 reports) projected no change in releases in future years. Only 6% (1,386 reports) projected a decrease in releases in future years. Roughly the same number (7% or 1,775 reports) projected an increase in releases in future years (Figure 9).

Figure 9 : Number of reports projecting no change in chemical releases, increases and decreases in chemical releases from 2003-2005



Section 6: Releases per Job

The majority of facilities did not project a decrease in chemical releases over the subsequent three years. While a small number of facilities did project a decrease, it only totalled about 376,794 kilograms over three years. A small number of facilities projected an increase totalling 26,699,954 kilograms over the subsequent three years. One facility, Ainsworth Lumber Ltd. in Grande Prairie, projected an increase of 26,579,967 kilograms of carbon monoxide. Without this one facility, releases were projected to increase by 109,987 kilograms. This results in a net overall decrease in releases of 266,807 kilograms in the next three years. This net decrease is tiny, representing only 0.006% of total on-site releases in 2002. **In other words, this looks like "pollution as usual" for the next three years in Canada.**

6. Releases per Job

Under NPRI, each facility reports the amount of their releases to the air, water, land, underground injection and transfers off-site. These releases and transfers may vary based on many factors, including the type of

Table 8: Top 10 NPRI sectors with largest number of jobs, total combined releases and total combined releases per job in 2002

Canadian SIC code	Name of Sector	Number of jobs	2002 Total Combined releases -CACs and toxics to air, water, land and underground injection (kilograms)	Rank of Sector for Total Combined Release	Total Releases per job
32	Transportation Equipment Industries	136,475	15,029,294	13	110
85	Educational Service Industries	68,995	2,275,711	26	33
29	Primary Metal Industries	68,265	1,332,728,759	1	19,523
81	Federal Government Service Industries	64,315	1,792,381	28	28
27	Paper and Allied Products Industries	62,521	287,615,872	5	4,600
86	Health and Social Service Industries	60,381	640,762	34	11
25	Wood Industries	53,807	178,976,437	7	3,326
10	Food Industries	50,365	12,177,172	14	242
30	Fabricated Metal Products Ind. (Except Machinery and Trans. Equipment Ind.)	45,531	6,161,936	18	135
37	Chemical and Chemical Products Ind.	44,754	118,776,520	35	2,654
	Total NPRI	**967,733**			

Section 7: Key Findings and Recommendations

industry, type of process, size of facility, production, year, environmental controls and methods of estimation. In this section, the PollutionWatch National report looks at one factor, the amount of combined releases per job. Sectors with low emissions per job ratios are considered to be more efficient, while jurisdictions with high emission per job ratios have correlated with a wide range of social factors, such as poverty, low education and large expenditures on health care (Templet, 2001).

Some of the sectors with the largest number of jobs have the lowest releases per job (Table 8). The top employers are not always the top polluters. Other sectors such as primary metal (including smelters) have higher releases per job. The corollary is also true: the top polluters are not the top employers.

7. Key Findings and Recommendations

Key findings:

- The amount of pollutants released and transferred in Canada increased between 1995 and 2002 (as reported to NPRI).
- Few facilities reduced their releases and transfers of chemicals between 1995 and 2002.
- Facilities are not projecting any change in releases of pollutants for the majority of chemicals reported to NPRI from 2003 - 2005.

The current amount of pollution in Canada is unacceptable. It is not acceptable or necessary to continue releasing large amounts of CEPA toxics, carcinogens and other pollutants known to damage human health and the environment. Our use of Canada's air and water as free dumping grounds cannot continue. While it is often difficult to link releases to exposure and effect, it is both prudent and appropriate to reduce pollution releases. The precautionary principle[1] demands that we accelerate programs to prevent or avoid the generation of pollution in Canada.

Industries can find additional ways to prevent or avoid the generation of pollution, if this is seen as a priority. Companies that have taken pollution reduction seriously, have significantly reduced pollution. NPRI data tell us that most facilities do not appear to be taking pollution seriously. **For many facilities, it's pollution as usual.**

Urgent action is needed to address pollution in Canada. Environmental Defence and the Canadian Environmental Law Association recommend that:

1. The federal government create an action plan for Canada, coordinated with provincial/territorial action plans, to reduce the levels of pollution, and to eliminate the pollutants known to be damaging to our health and environment. These action plans by Canada and provinces/territories should have common numeric targets for reduction of pollution and reporting mechanisms.

2. The Federal Environment Commissioner be charged with reviewing progress towards the action plan targets. The process and results should be reported to the public.

3. The federal government focus on the upcoming review of the *Canadian Environmental Protection Act* to design a CEPA regulation to implement the federal/provincial/territorial action plans.

4. Pollution prevention be made the central focus for facilities and government to take action on pollution. The pollution prevention provisions in CEPA need strengthening to ensure that significant reductions in pollution levels in Canada are realized.

[1] The precautionary principle concept was accepted by the Supreme Court of Canada in the case Spray-Tech v. Hudson (2001). Canada has also signed a number of international agreements that incorporate the precautionary prinicple.

Amendments to these provisions would include developing a list of criteria for identifying pollution prevention activities, enhancing transparency in reporting pollution prevention activities by facilities, and incorporating a process for facilities to consider safer alternatives and techniques to toxic chemicals.

5. The federal and provincial/territorial action plans require as a minimum, the following goals:

- virtual elimination[2] of releases of carcinogens to the air and water by 2008;
- an interim target of 50% reduction in releases of CEPA toxics to the air and water by 2008;
- an interim target of 50% reduction in releases of suspected respiratory toxins to the air by 2008;
- an interim target of 50% reduction in releases of pollutants known to cause developmental and reproductive harm to the air and water by 2008.

Further reduction targets will be established beyond 2008.

6. Other elements to be included in these action plans would include:

- Expanding NPRI reporting to include all CEPA toxic substances, additional industries such as mining and additional chemicals suggested by the NPRI Working Group. NPRI should also continue to lower the threshold for existing chemicals (e.g. eliminate the 10 employee threshold and require toxics data from facilities).
- Encouraging corporations to prepare a public pledge outlining reduction target goals, with the opportunity for third party audits. NPRI data and the reduction targets could be outlined in corporate annual reports. Environment Canada should develop a model for presentation of NPRI data and trends in corporate reports.
- Ensuring that the reporting of greenhouse gas data (which was proposed to be collected by NPRI) currently collected by Statistics Canada be publicly available, annually, at no charge, by facility, and by chemical, and in a format that allows for matching with NPRI data.
- Creating policies and programs that promote the use and development of safer alternatives and techniques to toxic substances.
- Requiring the reporting of current NPRI data and trends for a facility as significant environmental information that will be required in the company filing of information with the provincial security commissions.

We are awash with good environmental intentions in Canada. We have strategic options processes, Canada wide standards and stakeholder consultations designed to propose management tools for specific toxic substances. Many of these efforts have been years in the making with years more expected before implementation.

Despite all this, PollutionWatch data effectively demonstrate that for many of these chemicals, sectors, and facilities, we have not made significant progress. Our current system of managing chemicals is not working, and needs immediate changing for the benefit of all Canadians.

[2] Virtual elimination is articulated in Article 2 of the Great Lakes Water Quality Agreement. Also see section 65 of CEPA on virtual elimination.

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Appendices

Appendix A: How are the data presented on PollutionWatch.org and in this report?

Who Reports to the National Pollutant Release Inventory (NPRI)?

Facilities across Canada that meet certain thresholds are required to report annually to NPRI their best estimate of the amount of chemicals they release into the air, water and land, and inject underground or transfer off-site to disposal, treatment, sewage, recycling and energy recovery.

Facilities that report to NPRI include:

- companies that manufacture chemical products, primary metals, transportation equipment, rubber products, metal products, pulp and paper, food products, wood products, textiles, mineral products, and electrical equipment;
- companies involved in air transportation, printing, waste management and treatment, power generation, oil and gas extraction and refining and mining; and,
- public utilities, such as power plants, water treatment plants and sewage treatment plants.

The owner or operator of any facility that meets the NPRI reporting requirements must submit a report to Environment Canada by June of the following year. The original reporting requirements are:

- the total number of hours worked by all employees is 20,000 hours or greater (generally corresponds to 10 employees);
- the facility manufactured, processed or otherwise used 10 tonnes or more of a NPRI listed substance in the calendar year;
- the NPRI substance was manufactured, processed or otherwise used at a concentration greater than or equal to 1% by weight, with the exception of NPRI substances considered to be by-products. The total weight of by-products must also be included in the calculation of the 10 tonne threshold for each NPRI substance.

These original requirements apply to the majority of the pollutants listed on NPRI. As new pollutants have been added to NPRI, or information on the potential environment and health impacts of existing chemicals has increased, a number of different reporting requirements have been applied.

Sectors such as incinerators, wood preservation, waste water treatment plants, base metal smelters, secondary lead and aluminum smelters, magnesium production, Portland cement manufacturing, pulp and paper boilers, stationary combustion equipment and a number of other sectors have specific reporting requirements.

For the 2000-2002 reporting years, there were special reporting requirements for dioxins/furans, hexachlorobenzene, mercury and polycyclic aromatic hydrocarbons because these substances are often considered persistent, bioaccumulative and toxic. For the 2002 reporting year, there were also special reporting requirements for criteria air contaminants and metals such as hexavalent chromium, arsenic and lead. Some facilities such as waste water treatment plants, incinerators and petroleum terminal operations also had changed reporting requirements in 2002. For more information on NPRI visit Environment Canada's NPRI web site at www.ec.gc.ca/pdb/npri/.

Presentation of Releases and Transfers:

In 2002, facilities were required to report releases and transfers of 274 chemicals. PollutionWatch uses the following classification to present data. Please note that this method of presentation on PollutionWatch differs from Environment Canada's NPRI presentation. These different methods of presentation will yield different perspectives on the data. For more information on Environment Canada's data presentation, visit the NPRI web site at www.ec.gc.ca/pdb/npri.

(1) Releases: A release is a discharge of a pollutant to the environment. Releases can be divided into:

(a) On-site releases: A release at the site of the facility, within the boundaries of the facility.

> **Air release:** A release of chemicals into the air at the facility site. Included in this category are releases through the stack, from storage or handling, from fugitive sources such as leaks from valves, seals and connections, spills and other non-point air releases. Air releases can be presented as criteria air contaminants alone, toxic chemicals alone or a combination of criteria air contaminants and toxic chemicals.
>
> **Water release:** A release of chemicals into the water, usually a stream, lake or ocean. Included in this category are direct discharges, spills and leaks.
>
> **Land release:** A release of chemicals onto the land at the facility site. Included in this category are landfills, land treatment (a chemical is applied onto or incorporated into soil), spills, leaks and other land releases.
>
> **Underground Injection:** A release of chemicals injected into the ground at the facility site.

(b) Off-Site releases: A release of chemicals, generally transferred from the facility to another location for disposal using one of the following methods.

> **Containment:** either landfill or other storage at an off-site location.
>
> **Land Treatment:** either land application or land farming at an off-site location.
>
> **Underground injection:** Chemicals injected underground at an off-site location.

(c) Total Releases: The sum of on and off-site releases. Total releases can be presented on PollutionWatch as criteria air contaminants alone, toxic chemicals alone or a combination of criteria air contaminants and toxic chemicals.

(2) Transfers

Transfers for further management: Chemicals transferred off the facility site to another facility for:

(a) Treatment:

> **Physical Treatment:** Includes methods such as drying, evaporation, encapsulation and vitrification.
>
> **Chemical Treatment:** Includes methods such as precipitation, stabilization or neutralization.
>
> **Biological Treatment:** Includes methods such as bio-oxidation or composting.

(b) Incineration: Chemicals transferred to an incinerator. This differs from energy recovery as the substance or the material containing the substance does not have sufficient fuel value to contribute to energy recovery.

(c) Sewage: Chemicals discharged to a sewer system or a waste water treatment facility.

(d) Energy recovery: The substance or the material containing the substance has sufficient energy content to be used as a fuel for energy recovery.

(e) Transfers for recycling: Chemicals sent off-site for recycling. Recycling is subdivided into nine categories that are reported separately:

- recovery of solvents;
- recovery of organic chemicals (not solvents);
- recovery of metals and metal compounds;
- recovery of inorganic materials (not metals);
- recovery of acids and bases;
- recovery of catalysts;
- recovery of pollution abatement residues;
- refining or reuse of used oil and other recycling.

Reporting for recycling was made mandatory starting with the 1998 NPRI reporting year. Therefore the amounts of chemicals sent for recycling before 1998 cannot be compared with quantities from 1998-2002. PollutionWatch presents recycling data separately from other releases and transfer data. On the PollutionWatch web site, data for transfers for recycling can be obtained by searching under "Who is Polluting?" and "Pollution Rankings."

(f) Total Reported Transfers: The sum of all transfers to treatment, sewage, energy recovery and underground injection. PollutionWatch does not include data for transfers for recycling in total reported transfers.

(3) Total Reported Releases and Transfers: The sum of total releases (on- and off-site) and total transfers. PollutionWatch does not include data for transfers for recycling in total reported releases and transfers. Total releases can be presented as criteria air contaminants alone, toxic chemicals alone or a combination of criteria air contaminants and toxic chemicals.

Presentation of Criteria Air Contaminants (CACs) Data

A major change to NPRI, reflected in PollutionWatch for the 2002 reporting year, is the addition of seven new pollutants, called criteria air contaminants:

- carbon monoxide;
- oxides of nitrogen;
- sulphur dioxide;
- total particulate matter less than 100 microns;
- particulate matter less than or equal to 10 microns (PM 10);
- particulate matter less than or equal to 2.5 microns (PM 2.5); and,
- volatile organic compounds (VOCs).

The addition of these pollutants is important as they interact to create smog and acid rain and have been associated with respiratory problems.

Criteria air contaminants and their environmental and health effects

Pollutant	Smog	Acid Deposition/ Acid Rain	Odour	Visibility/ Soiling	Toxic under the *Canadian Environmental Protection Act*	Suspected Respiratory Toxin	Reproductive/ Developmental
Sulphur dioxide	√	√		√	√	√	
Carbon monoxide	√					√	√
Nitrogen oxides	√	√		√	√	√	
Particulates	√	√	√	√	√	√	
VOCs	√		√		√		

Adapted from MOE, Air Quality in Ontario, 2002, Scorecard and NPRI Overview. Note: sulphur dioxide and nitrogen oxides are considered ozone precursors, proposed to be CEPA toxic. Only PM 10 and PM 2.5, not total particulate matter, proposed to be CEPA toxic and respiratory toxin.

PollutionWatch presents a range of options for users to view pollution data:

- *Total combined air releases:* includes both CACs and other toxic chemicals, (but not including VOCs)
  - air releases for toxic chemicals alone; or
  - air releases for CACs alone.
- *Total combined releases:* includes both CACs and other toxic chemicals, (but not including VOCs)
  - air releases for toxic chemicals alone; or
  - air releases for CACs alone.
- *Total combined releases and transfers:* includes both CACs and other toxic chemicals (but not including VOCs),
  - air releases for toxic chemicals alone; or
  - air releases for CACs alone.

When total combined air releases, total combined releases and total combined releases and transfers (including both CACs and other toxic chemicals) are selected, VOCs are not included. This is because under CACs, VOCs are reported as a group while under toxic chemicals they can be reported by individual chemical. For example, benzene and toluene are included in VOCs under CACs, but are also reported individually to NPRI. To prevent counting some of these VOCs twice, the total group of VOCs reported as a CAC is subtracted from total air releases. This may result in an underestimate of air releases from a facility, but avoids an overestimate based on counting some VOCs twice. A user can still select VOCs and get rankings of sectors, facilities and jurisdictions based on this measure alone.

Total combined air releases, total combined releases and total combined releases and transfers also only use total particulate matter and do not add the amount reported as particulate matter less than 10 microns (PM 10) or the amount reported as particulate matter less than 2.5 microns (PM 2.5). Total particulate matter already includes these smaller particulate categories (PM 10 and PM 2.5).

Criteria air contaminants were not included in the time trend data as they were only reported for 2002, and not for previous years.

Because CACs tend to be reported in large amounts they can dwarf the other categories of pollutants reported as toxic chemicals. However, some toxic chemicals, such as mercury, dioxins and furans can have significant environmental and health impacts even when released in small amounts.

Adjusting for Double Counting of Chemicals

PollutionWatch accounts for double counting of chemicals. Since PollutionWatch adds together on-and off-site releases, it was important to address this issue. Double counting occurs when one facility transfers chemicals to another facility which then reports the same chemical released into the air, water, and land or injected underground on-site. For example, a steel mill may transfer metals to a hazardous waste facility for their disposal in an on-site landfill. Both the steel mill and the hazardous waste facility are obliged to report these metals to NPRI.

All analyses in the PollutionWatch National Report use numbers adjusted for double-counting. On the PollutionWatch web site, the term "Adjusted total releases" is used to indicate the total releases that have been adjusted to account for double counting.

Appendix B: Sources of health effects lists used on PollutionWatch.org

For more information on health effects lists, see **www.PollutionWatch.org**

Name of list	Source of List	URL	Number of chemicals that match NPRI in 2002
Suspected Respiratory Toxics	Scorecard	www.scorecard.org	150
Toxic under the *Canadian Environmental Protection Act* (CEPA toxics)	CEPA list	www.ec.gc.ca	77
Reproductive/developmental toxics	California Proposition 65	www.oehha.org/prop65.html	24
Carcinogens	California Proposition 65	www.oehha.org/prop65.html	67
Ozone Depleters	Federal lists	www.ec.gc.ca	10
Suspected Endocrine disruptors	Scorecard	www.scorecard.org	40

Appendix C: Trends in releases and transfers of core chemicals from core facilities from 1995-2002 (kilograms reported to NPRI). Core facilities are those facilities that have reported each year from 1995 to 2002. Core chemicals are those 160 chemicals that have been reported each year from 1995 to 2002.

YEAR	Number of Core Facilities	Total Releases and Transfers	Air Releases	Water Releases	Land Releases
1995	1311	168,053,829	84,011,560	19,918,844	12,675,668
1996	1311	162,583,245	80,750,078	13,220,204	9,231,917
1997	1311	193,370,033	94,516,372	17,415,691	11,147,515
1998	1311	176,299,306	92,059,952	12,903,524	10,225,946
1999	1311	190,372,641	92,353,207	16,174,835	22,692,554
2000	1311	195,746,660	95,855,414	22,848,613	14,895,445
2001	1311	190,342,718	91,629,275	25,323,688	13,997,758
2002	1311	193,817,791	93,437,320	25,320,991	15,692,714
Percent change 1995-2002		15.3%	11.2%	27.1%	23.8%

Trends in releases and transfers of core chemicals declared CEPA toxic from core facilities from 1995-2002 (kilograms reported to NPRI).

YEAR	Number of Core Facilities	Total Releases and Transfers	Air Releases	Water Releases	Land Releases
1995	1311	41,788,602	26,750,476	45,77,383	945,293
1996	1311	42,452,341	24,903,132	614,3109	380,658
1997	1311	49,290,440	25,369,928	10,914,546	352,522
1998	1311	45,658,959	27,102,053	7,803,261	474,386
1999	1311	44,898,812	25,562,261	8,236,082	393,379
2000	1311	51,743,090	25,086,920	13,291,495	755,145
2001	1311	49,423,083	21,842,592	13,863,501	1,234,827
2002	1311	46,693,829	21,586,726	13,185,354	669,919
Percent change 1995-2002		+11.7%	-19.3%	+188.0%	-29.1%

Disclaimer

The data used in this report are based on the federal National Pollutant Release Inventory, a publicly available database administered by Environment Canada. The material on the PollutionWatch web site and national report is developed by the Canadian Environmental Law Association and Environmental Defence and their consultants on an "as is" basis. PollutionWatch makes no warranties or representation of any kind with respect to its contents and disclaims all such representations and warranties. It is hereby acknowledged that the use of the material is done at the viewer's own discretion and risk. PollutionWatch will not be liable for damages arising out of or in connection with its use. This is a comprehensive limitation of liability that applies to all damages of any kind including (without limitation) compensatory, direct, indirect or consequential damages, loss of data, income, or profit, loss of or damage to property and claims of third parties. Neither PollutionWatch or any other person acting on its behalf makes any warranty, expressed or implied, or assumes any legal responsibility for the accuracy of any information or accepts liability from the use or damages from the use.

The views and recommendations presented in this report are those of the Canadian Environmental Law Association and Environmental Defence and not those of their funders.

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