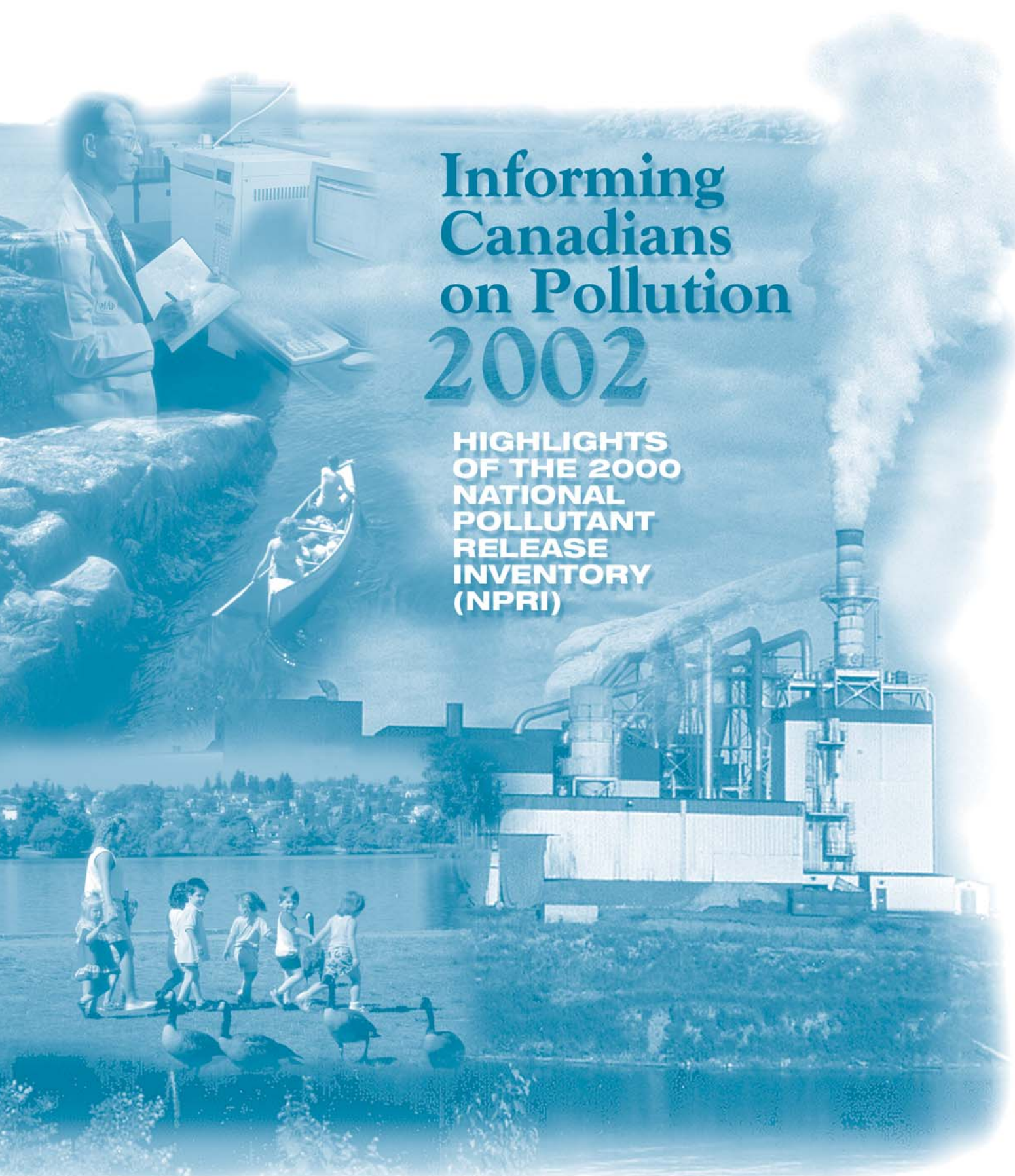


Informing Canadians on Pollution 2002

**HIGHLIGHTS
OF THE 2000
NATIONAL
POLLUTANT
RELEASE
INVENTORY
(NPRI)**



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(NPRI)**



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INTRODUCTION

The National Pollutant Release Inventory (NPRI) provides Canadians with access to information on industrial pollution in their communities. It is the only national, legislated, publicly accessible inventory of its kind in Canada. Established in 1992 and mandated under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), the NPRI requires companies to report information on releases and transfers of pollutants to the Government of Canada on an annual basis.

Environment Canada makes the information on pollutant releases and transfers available to Canadians in an annual public report, as well as by maintaining a detailed inventory that can be accessed and searched through an on-line database. By learning more about pollution in our communities, we will be better

equipped to make informed decisions on the environment, health and sustainable development. Canada's objectives for clean air and clean water, as well as other important issues, will be easier to achieve using information from the NPRI on the sources and quantities of pollutants entering our environment.



The NPRI is a major starting point for identifying and monitoring sources of industrial pollution in Canada. Public access to this type of information can motivate industry to prevent or reduce pollution. The NPRI helps the Government of Canada track progress in pollution prevention, evaluate releases and transfers of substances of concern, identify and take action on environmental priorities, and implement policy initiatives and risk management measures. It is an important consideration in managing risks to the environment and human health, as well as in monitoring indicators of the quality of our air, land and water and corporate environmental performance for companies with industrial and commercial facilities.

The NPRI does not present a complete picture of pollution in Canada. Only facilities that meet established reporting criteria are required to report to the NPRI. Pollutants from mobile sources such as trucks and cars, households, facilities that release pollutants on a smaller scale and certain sector activities, such as agriculture and education and some mining activities, are not included in the NPRI.

Informing Canadians on Pollution 2002: Highlights of the 2000 National Pollutant Release Inventory (NPRI) provides a snapshot of pollution from industrial and commercial companies in Canada in 2000. In addition, it also highlights trends in specific industrial and commercial sectors and provides information on recycling and the treatment and disposal of pollutants as well as a feature section on toxic substances. The NPRI data analysis presented in this report is based on data that was publicly available in the NPRI database as of December 15, 2001.

Detailed technical analysis of the 2000 NPRI can be found in the companion document, *Overview 2000: National Pollutant Release Inventory*. Additional information about the NPRI and a searchable on-line database are available on the NPRI website at <http://www.ec.gc.ca/npri>.



SECTION 1: THE NPRI AND YOU

From managing risks to our environment and our health to making investment choices, knowledge about the sources, trends, types and quantities of pollution in our communities can help us make many important decisions.

What's happening in your community?

Use the Internet to find out what's happening in your community. Visit <http://www.ec.gc.ca/npri> and use the search engine to find out about pollutants released and transferred by industrial and commercial facilities in your neighbourhood.

You can use the NPRI as a starting point to:

1. Learn more about the sources, types and quantities of pollution in your community.
 - Which facilities are releasing substances of concern?
 - What is being released to local landfills, lakes and rivers?
 - How much is being released in your community?
2. Learn more about industrial pollution trends at the local, regional or national level, or find out information on trends in releases by a specific company or a facility in your community.
 - Are releases of toxic and/or cancer-causing substances increasing or decreasing?
 - How do releases in your community compare with those in other communities?
3. Help improve or maintain your community's environmental quality, and manage certain risks to your health.
 - Identify, monitor and act on current or potential environmental and related health issues that are impacted by releases of NPRI substances or industrial pollution.
 - Reduce or minimize your impact on the environment by:
 - purchasing alternative products that are cleaner and greener;
 - considering a company's environmental performance as an investment factor and a shareholder concern;
 - reducing your use and/or consumption of certain products.



4. Monitor the progress that governments are making in managing and preventing pollution in Canada.
5. Lead or participate in supportive community and emergency planning initiatives.
6. Monitor key aspects of corporate, community and sector environmental performance.
 - Recognize and support environmental leaders in Canada.
 - Influence companies and industrial sectors to improve their environmental performance.
7. Get involved in the public consultation process on the NPRI or on other regulatory and voluntary measures to protect the environment.
 - Hold industry and governments accountable.
 - Monitor industrial pollution, pollution prevention and recycling trends.

Check out the EcoLogo[®] catalogue for environmentally responsible products that have been certified by Environment Canada's Environmental Choice Program[®]. The catalogue is available on-line at <http://www.environmentalchoice.com> and features more than 3000 environmentally responsible products, ranging from candles and coffee to paint and batteries.

SECTION 2: OVERVIEW OF THE NPRI

Can the public request changes to the NPRI reporting requirements?

Yes! Public consultations are an important part of the decision-making process for determining changes to the NPRI, including the list of reportable NPRI substances. Any person, government or organization in Canada can submit proposals to Environment Canada for changes to the NPRI program.

For more information on the NPRI reporting requirements, public consultations or how to propose changes to the NPRI, visit the NPRI website at <http://www.ec.gc.ca/npri>.

2.1 Reporting to the NPRI

Many manufacturing, processing and production operations generate pollutants. These pollutants are often captured before their release to the environment and recovered, recycled or reused on-site. In some cases, pollutants are released on-site or transferred off-site for final disposal, with or without pretreatment. Pollutants can also be transferred off-site for recovery, reuse or recycling elsewhere.

Companies in Canada must report to Environment Canada, on an annual basis, their on-site releases of pollutants to air, land and water, as well as their off-site pollutant transfers, for each of their facilities that meets the criteria for reporting to the NPRI. Most of these companies are large companies in Canada.

A list of substances for which reports are required is published annually, along with the reporting requirements and thresholds for each substance. Reporting criteria vary depending on the substance, but are generally based on a combination of three factors:

- the number of employees at a given facility;

- the amount of the substance that is manufactured, processed or otherwise used; and
- specific activities known to generate and release substances of concern.

Changes to the NPRI are considered on an annual basis. Environment Canada has established a working group of stakeholders that addresses proposed changes to the NPRI. This working group includes representatives from industry, non-governmental organizations, and the federal, provincial and territorial governments. The following questions are considered when proposed changes to the NPRI are reviewed:

- Is the substance manufactured, processed or otherwise used in Canada?
- Does the substance present a health and/or environmental concern?
- Is the substance released to the Canadian environment?
- Is the substance present in the Canadian environment?



For the 2000 NPRI, major changes included the addition of several toxic substances to the list of substances that must be reported. Reporting requirements for Mercury were also improved to enable reporting at lower emission levels.

The NPRI is a key information source on pollution from industrial and commercial companies in Canada, but it does not provide a total picture of pollution in Canada for several reasons, including the following:

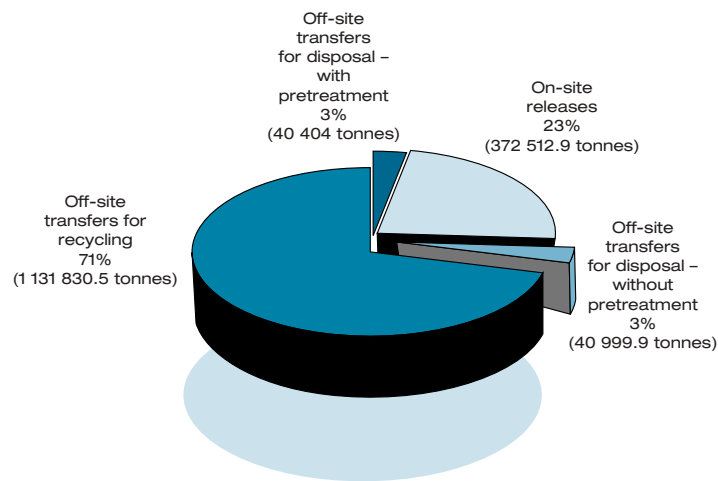
- Some facilities may not meet any or all of the NPRI reporting requirements. For example, levels of releases or transfers may be lower than the NPRI minimum reporting thresholds, or the industrial activity carried out may be exempt (e.g., research and testing, or the primary extraction of ore at mines).
- Some facilities may release substances of concern that are not on the NPRI list of reportable substances, some of which are tracked elsewhere.
- Some pollution in Canada is also generated from other countries. This is known as transboundary pollution. For example, transboundary pollution is a key source of smog and air pollution in Canada.
- Natural phenomena, such as forest fires, volcanic eruptions and the decay of organic matter, are also major sources of pollution.
- Individuals and households also generate pollution through their activities (e.g., transportation) and the products they consume.

Why are NPRI 2000 data being reported in 2002?

Facilities that were required to report to the NPRI for the 2000 calendar year had until June 1, 2001, to submit information to Environment Canada. After reviewing the data, Environment Canada made them available to the public in the fall of 2001. Detailed analysis and interpretation of the data required several additional months.



Figure 1 Breakdown of Total Pollutant Releases and Transfers from NPRI Reporting Facilities, by Weight (2000)



2.2 The Big Picture Results

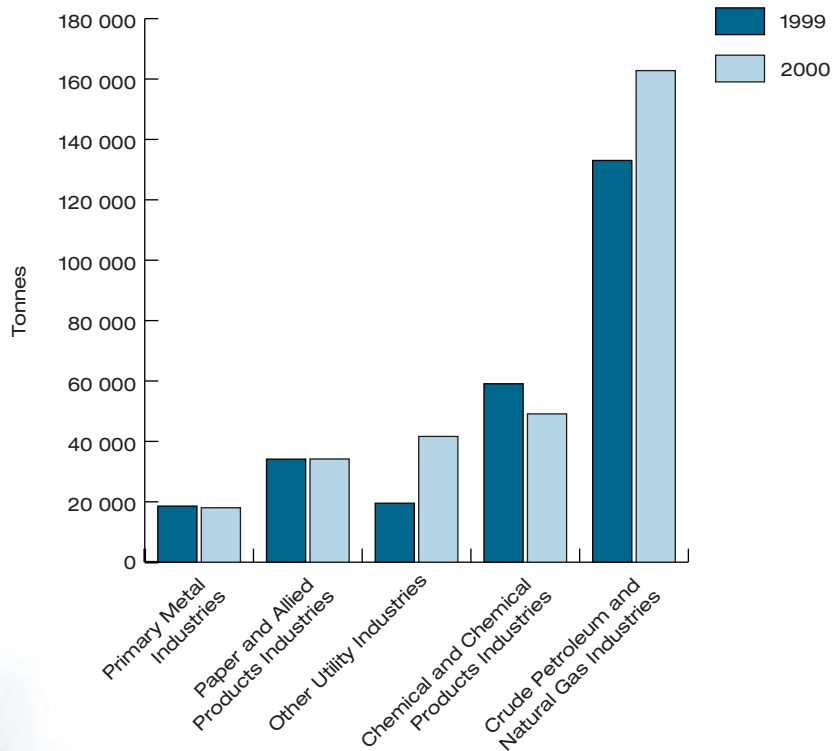
In 2000, 2419 facilities reported to the NPRI, up from 2211 facilities in 1999. There were 268 reportable substances listed on the NPRI substance list in 2000, compared with 245 in 1999.

A breakdown of releases and transfers of pollutants in 2000 is shown in Figures 1 and 2. Further details are provided in Sections 4 and 5.

The NPRI covers approximately 100 sectors of industrial and commercial activity, ranging from electric power generation to leather tanneries. A comparison of the releases in 1999 and 2000 for the five sectors reporting the largest total amounts of on-site releases of NPRI-listed substances in 2000 is shown in Figure 2.



Figure 2 Top Five Industrial/Commercial Sectors Releasing the Largest Quantities of NPRI Pollutants On-site in 1999 & 2000



How can I compare Canada's progress on pollutant releases and transfers with that of other countries in North America?

The Commission for Environmental Cooperation (CEC) is an international organization created by Canada, Mexico and the United States under the North American Agreement on Environmental Cooperation. The Agreement complements the environmental provisions of the North American Free Trade Agreement. One of the CEC's objectives is to increase access to and understanding of the sources and handling of toxic chemicals from industrial activities in North America.

The CEC publishes *Taking Stock*, an annual report on North American pollutant releases and transfers. *Taking Stock* is based on reports submitted to the NPRI and its U.S. counterpart, the Toxics Release Inventory. Reporting of data for Mexico is not mandatory yet, although enabling legislation was approved in 2001. For more information on the CEC, and to view the on-line version of *Taking Stock*, visit <http://www.cec.org>.



SECTION 3: MANAGING POLLUTION IN CANADA

The NPRI and the Virtual Elimination of Dioxins and Furans

Dioxins (polychlorinated dibenzo-p-dioxins or PCDDs) and furans (polychlorinated dibenzofurans or PCDFs) are toxic substances that cause cancer in humans. They are unintended by-products of combustion in utility boilers and incinerators used to dispose of municipal solid waste, hazardous or medical waste, and industrial waste. Other sources include the manufacture of chlorinated organic solvents, pulp and paper, as well as iron and steel. Natural sources of these substances include forest fires and volcanoes. Dioxins are also associated with a variety of health effects in humans, including endocrine disruption, immunotoxicity, developmental toxicity, dermal effects, cardiovascular disease and diabetes.

Releases of dioxins and furans are slated for virtual elimination under the Government of Canada's Toxic Substances Management Policy. Beginning in the 2000 NPRI reporting year, facilities engaged in certain activities, including power generation, incineration and base metal smelting, are required to report dioxin and furan releases and transfers to the NPRI, regardless of the amounts. In 2000, 307 facilities reported releases and transfers of dioxins and furans.

3.1 The *Canadian Environmental Protection Act, 1999* (CEPA 1999)

The *Canadian Environmental Protection Act, 1999* (CEPA 1999) is designed to protect the environment and human health and to promote sustainable development. CEPA 1999 includes information-gathering provisions, including some that allow the Minister of the Environment to require information on certain substances to be submitted to the Minister. The provisions also require the Minister to establish and publish a national inventory of releases of pollutants. These provisions under CEPA 1999 form the primary legislative basis for the NPRI.

The NPRI helps the Government of Canada, and all Canadians, track progress on pollution prevention, pollution reduction, the release and transfer of substances of concern, and the implementation of measures designed to protect the environment and human health from the effects of toxic substances. These measures are developed in consultation with industry, provincial/territorial and aboriginal governments, municipal governments, other federal

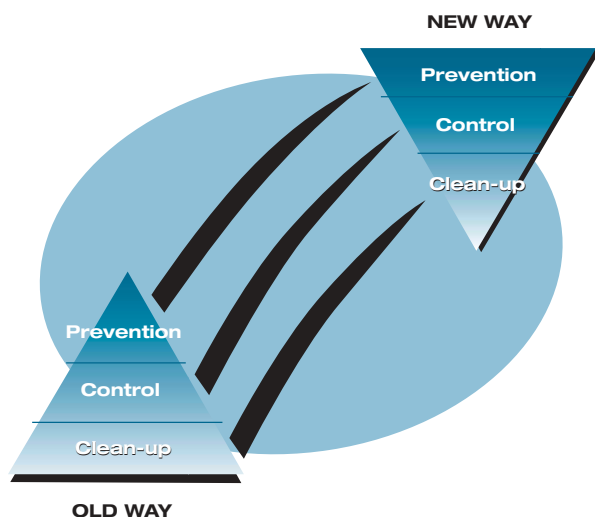
departments and non-governmental organizations (environmental, health, academia, youth, etc.). These measures include:

- regulations;
- guidelines;
- environmental codes of practice;
- environmental emergency plans;
- pollution prevention planning requirements;
- environmental performance agreements; and
- economic instruments.

3.2 About Pollution Prevention

Pollution prevention is “*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.*” Pollution prevention is the cornerstone of CEPA 1999 and helps to lessen the risks to the environment and human health by preventing pollution or waste before it is created (Figure 3). Other methods of environmental protection focus on managing waste and

Figure 3 The Pollution Prevention Paradigm Shift



For more information on pollution prevention, visit the Canadian Pollution Prevention Information Clearinghouse at <http://www.ec.gc.ca/cppic>.

pollution after they have been created. By adopting a preventive approach, we help protect the quality of our air, land, water, ecosystems and nature and can better manage risks to human health.

Pollution prevention can also have a significant positive impact on bottom line results, since waste in the manufacturing process increases costs. The U.S. National Academy of Engineering estimates that 93% of the materials that go into the production of consumer goods end up as waste before the goods are even sold.

Reporting on pollution prevention activities has been a mandatory requirement in the NPRI since 1997. Under the 2000 NPRI reporting requirements, facilities are required to report on the following types of activities employed at their facilities:

- material or feedstock substitution;
- product design/product reformulation;
- equipment or process changes;
- on-site recovery, reuse or recycling;
- improved inventory management or purchasing techniques;



Recognizing Corporate Environmental Achievement: Two NPRI Reporting Facilities Receive Pollution Prevention Awards!

In 1997, the Canadian Council of Ministers of the Environment (CCME) launched a Pollution Prevention Awards and Recognition Program. The program recognizes companies and organizations showing leadership in pollution prevention. Two NPRI reporting facilities received awards in 2001:

- IBM Canada received an award for three pollution prevention projects at its Bromont, Quebec, plant. The projects included process changes and new environmental technologies that enabled the plant to reduce its chemical and water use, eliminate hazardous waste and reuse energy. The projects generated annual savings of more than \$1.5 million.
- Dana Canada received pollution prevention awards for two plants in Thorold, Ontario. The firm implemented process changes that reduced costs, cut contaminant emissions by more than 60% and decreased greenhouse gas emissions by nearly 30%.

For more information on the CCME Pollution Prevention Awards and profiles of award winners, visit the CCME website at <http://www.ccme.ca>.

- good operating practices or training; and
- spill or leak prevention activities.

Approximately 33% of all pollution prevention activity reported to the 2000 NPRI was in the form of “good operating practices or training.” “Spill or leak prevention” was the second most popular approach, at 18%.

SECTION 4: TRENDS ON RELEASES OF TOXIC SUBSTANCES (ON-SITE)

4.1 Understanding Toxic Substances

The NPRI is a major resource for identifying sources of pollution in Canada and managing the potential risks they pose to the environment and human health.

This section highlights trends for on-site releases of toxic substances to air, water and land from industrial and commercial facilities that report to the NPRI.

The use of the term “toxic substance” in this document refers to a substance or member of a class of substances that has been determined by Environment Canada and Health Canada to meet the definition of “toxic” under Section 64 of CEPA 1999.

On December 15, 2001, 58 toxic substances were reportable to the 2000 NPRI. These NPRI substances are listed in Appendix A. It should be noted that not all toxic substances are reportable to the NPRI. Also, since December 15, 2001, additional substances or classes of substances have been found to be toxic under CEPA 1999; some of these were on the 2000 NPRI list of substances.

4.2 Tracking Toxic Substances, 1997–2000

Calcium fluoride, lead¹, hydrogen fluoride, asbestos (friable form) and dichloromethane were the five toxic substances released in the largest quantities on-site in 2000 by facilities reporting to the NPRI. Hydrogen fluoride, asbestos, dichloromethane, arsenic and benzene topped the list in 1997 (see Table 1). With the exception of calcium fluoride, trends in on-site releases of these substances for 1997–2000 are shown in Figure 4. Calcium fluoride is not included in Figure 4, since it was not reportable to the NPRI prior to 1999. For more information on the substances referred to in Table 1, see the substance guide in Section 4.23.

The trends for total on-site releases for 17 toxic substances reported to the NPRI for 1997–2000 are shown in Figure 5. The substances on this list are identified in Appendix A and are part of a matched data set. The NPRI reporting requirements are reviewed on a regular basis to identify areas for improvement—including adding or changing requirements for toxic substances.

What is a toxic substance?

Under Section 64 of CEPA 1999, substances are defined as “toxic” if they enter or may enter the environment in amounts or concentrations or under conditions that have an immediate or long-term effect on the environment or its biological diversity, endanger the environment upon which life depends or endanger human life or health. Lead, for example, is a toxic substance, as it can hinder development of the human nervous system.

For more information on managing toxic substances in Canada, visit the CEPA Environmental Registry at <http://www.ec.gc.ca/ceparegistry/>.

¹ And its compounds.

Are companies allowed to release toxic substances in Canada?

Yes, to a certain extent, companies are allowed to release toxic substances. It is important to remember that the environmental and health risks and impacts of a substance are influenced by a number of factors, including the extent to which humans and the environment are exposed, the physical and chemical properties of the substance, and whether it is released to air, water or land.

The Government of Canada is committed to reducing the levels of toxic substances in the environment through CEPA 1999. For substances that are found to be toxic, Environment Canada and Health Canada have two years to develop preventive or control measures to reduce or eliminate the risks to the environment and human health posed by the use or release of the substances. These measures can include regulations, pollution prevention plans, environmental emergency plans, guidelines, standards and economic instruments. These measures must be implemented within 18 months after they are published.

Under the federal *Fisheries Act*, companies are prohibited from discharging a deleterious substance into water frequented by fish.

Table 1 Top Released Toxic Substances On-site from NPRI Reporting Facilities, 1997 & 2000

Substance	Amount Released On-site 1997 (tonnes)	Amount Released On-site 2000 (tonnes)	Percent Change from 1997 to 2000 (Amount Released On-site in tonnes)
Arsenic ¹	2 114.7	297.6	-85.9%
Asbestos (friable form)	3 067.7	3147.0	+2.6%
Benzene	1 772.9	1251.5	-29.4%
Calcium fluoride	(not reported in 1997)	11 732.8	N/A
Dichloromethane	2 459.0	2 219.9	-9.7%
Hydrogen fluoride	3 141.4	3 601.1	+14.6%
Lead ¹	1 534.1	3 727.6	+143.0%

¹ And its compounds.

The list may change due to the addition or deletion of substances or changes in the release or transfer thresholds and levels. To compensate for these changes, a set of “matched data” is used for trend analysis.

The matched data cover a common set of substances and reporting criteria over a specific period, allowing for valid comparisons.

In the 2000 NPRI, total releases of these 17 toxic substances were up slightly (4.5%) compared with 1997 levels. Of these 17 substances, releases decreased for 5 and increased for 7, with the remainder experiencing changes of less than 10% over the time period.

4.3 Substance Guide

This section contains additional information on the toxic substances named in the previous section of this report.

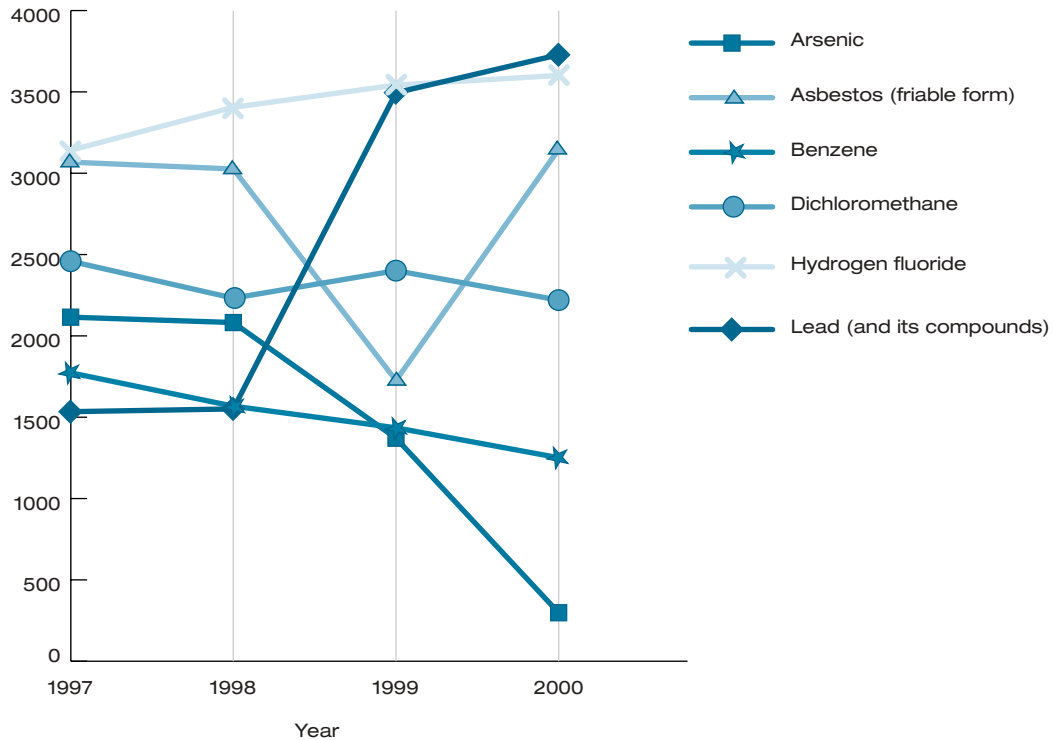
Arsenic²

On-site releases of arsenic, a toxic substance and a known carcinogen³, declined 86% between 1997 and 2000. This is largely due to the closure of a large gold mine in 2000—the largest source of on-site releases of arsenic in 1999. The mine closed in September of that year, accounting for a 78% drop in on-site releases of arsenic between 1999 and 2000. Discounting the contribution of this mine, compared with 1999,

² And its compounds.

³ The use of the term “carcinogen” in this document refers to substances or classes of substances that have been classified as known or suspected carcinogens by Health Canada and/or substances or classes of substances that have been classified as known or probable carcinogens by the International Agency for Research on Cancer.

Figure 4 Top Released Toxic Substances On-site from NPRI Reporting Facilities, 1997–2000



on-site air emissions of arsenic decreased nearly 7%, while releases to surface waters decreased 77% and releases to land increased 39%.

The highest concentrations of arsenic and its inorganic compounds in the Canadian environment occur near active and abandoned gold and base metal mining and ore processing facilities and in areas affected by the use of pesticides containing arsenic. Canadians are exposed to inorganic arsenic in food, drinking water, soil and ambient air, with food representing the major source of intake. Exposure to arsenic may be elevated in communities that are near industrial and geological sources of arsenic.

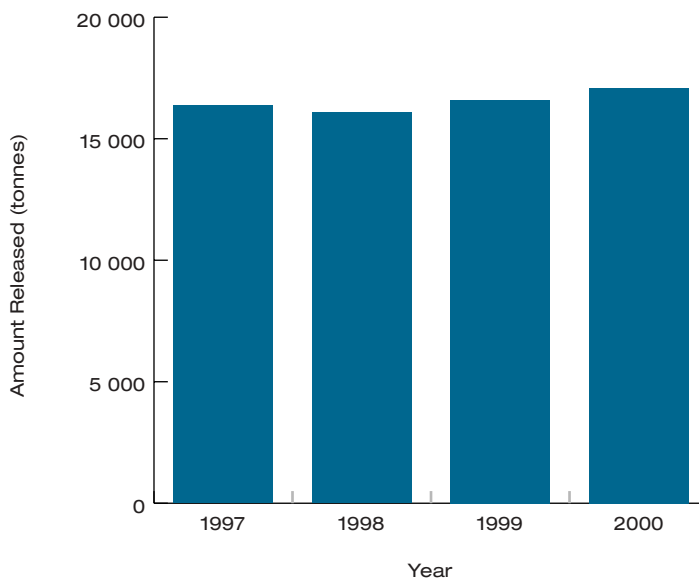
The Metal Mining Effluent Regulations, published in *Canada Gazette*, Part II, on June 19, 2002, require limits on the releases of arsenic from mines.

Asbestos

On-site releases of asbestos (friable form) varied greatly between 1997 and 2000, including an 82% increase between 1999 and 2000 yet overall 2000 release levels were less than 3% higher than 1997 levels. This form of asbestos was commonly used as an insulating material in plants and buildings and is a toxic substance. The increase between 1999 and 2000 was due primarily to the disposal of asbestos in landfills as facilities removed it to replace it with alternative substances—reducing



Figure 5 On-site Releases of Selected Toxic Substances to Air, Land and Water and Underground Injection by NPRI Reporting Facilities (1997–2000)



the risk of exposure to this toxic substance and known carcinogen.

Benzene

Benzene is a toxic substance and a known carcinogen. Total on-site releases of benzene reported to the NPRI exhibited a downward trend (29%) between 1997 and 2000. The steel, chemical and oil refinery industries were the primary sources of these emission reductions.

The *Benzene in Gasoline Regulations* took effect in July 1999 and prohibit the supply of gasoline containing more than 1% benzene by volume. The regulations also prohibit the sale of gasoline that contains benzene at a concentration that exceeds 1.5% by volume. The levels of benzene

in gasoline in 2000 were reduced by about 50% compared with 1994 levels, based on reports by primary gasoline suppliers.

In addition, the *Gasoline and Gasoline Blend Dispensing Flow-Rate Regulations*, which came into effect on February 1, 2001, prohibit the dispensing of fuel beyond a maximum flow rate of 38 litres per minute. Benzene emissions will be reduced as a result of this restriction.

The primary steel sector reduced emissions of benzene by 38% between 1997 and 2000.


Spotlight on Mercury

Mercury is a toxic substance as defined in CEPA 1999. It is also on the list of NPRI-reportable substances. In most chemical forms, mercury is a neurotoxin. This means that it can cause damage to the brain and central nervous system. It also affects the kidneys and lungs. Methylmercury, one of the most toxic forms of mercury, is known to affect learning ability and neurological development in children.

While exposure to high levels of mercury can cause immediate severe health problems for humans, the accumulation of low quantities of mercury is a greater risk to future mothers and their babies.

Mercury emissions to air (from NPRI reporting facilities as well as from other pollution sources) decreased by 35% between 1995 and 2000. Canada-wide Standards for mercury for base metal smelters have accounted for substantial emission reductions in this sector. Canada-wide Standards for coal-fired electricity generators are being developed and are expected to reduce mercury emissions further. Canada-wide Standards have also been developed for mercury-containing lamps and mercury in dental amalgams. These standards are intended to significantly reduce releases from these sources.

The NPRI reporting threshold (the minimum quantity reportable) for mercury was lowered for the 2000 reporting year from 10 tonnes to 5 kilograms. This will improve access to facility- and company-specific, local, regional and national information on industrial and commercial sources of mercury pollution.



A Canada-wide Standard for benzene called for a 30% reduction in air emissions by 2000. Based on reported data (December 2001 report), benzene emissions decreased by 39% between 1995 and 1999.

Calcium fluoride

Calcium fluoride was the toxic substance released on-site in the largest quantity in 2000. Reporting to the NPRI on releases and transfers of calcium fluoride is a relatively new phenomenon, as the chemical was added to the NPRI only in 1999. On-site releases in 2000 were down approximately 10% compared with 1999 levels. Most of this substance was generated during the production of aluminum and was disposed of via landfill.

Dichloromethane

On-site releases of dichloromethane in 2000 were down 9.7% compared with 1997 levels. Dichloromethane is a toxic substance and is also

classified as a substance that is probably carcinogenic to humans under certain conditions. In Canada, dichloromethane is used in paint removal applications, as a blowing agent in foam production and as a component in aerosols. During its use, most dichloromethane is released to the atmosphere. More than 99% of the dichloromethane releases reported to the 2000 NPRI were air emissions.

A proposed pollution prevention planning notice for users of dichloromethane was published in *Canada Gazette*, Part I, in August 2002. In addition, Environment Canada is developing a code of practice for the use of paint stripping products containing dichloromethane.

Hydrogen fluoride

On-site releases of this substance changed little compared with 1999 (up 1.7%), but were up about 14% comparing 2000 levels to 1997 levels.

Ninety percent of the emissions were generated by the primary metals sector and electric power generating facilities. All reported on-site releases of hydrogen fluoride were air emissions. The electric utilities sector and the primary metals sector were the main sources of these emissions. During the burning of coal to produce electric power and during the manufacture of metals such as aluminum, several air pollutants, including hydrogen fluoride, are produced and may be released to the environment.

Hydrogen fluoride gas (air emissions) dissolved in clouds, fog, rain or snow can impact the environment in the form of acid rain. Hydrogen fluoride gas can also impact certain plant species.

Lead

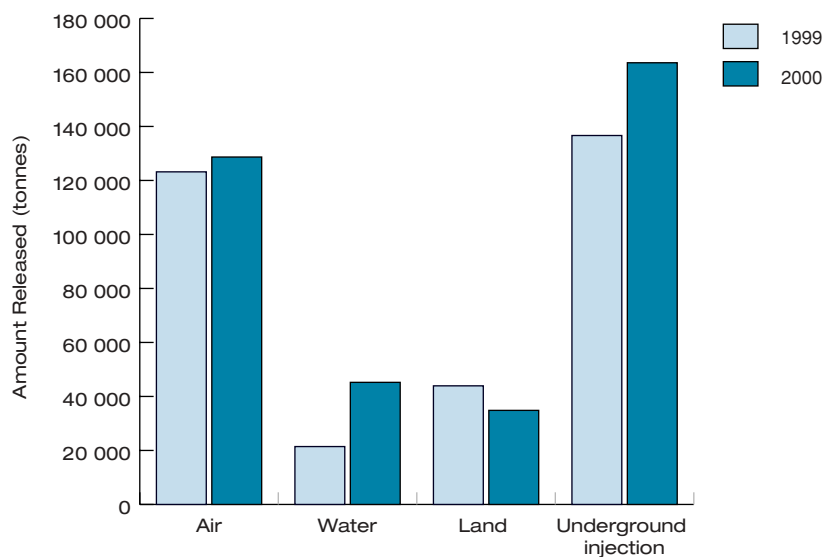
Of the toxic substances released on-site in 2000, lead was the second most important in terms of the quantity released. On-site releases of lead in 2000 increased 6.6% compared with 1999. Thirteen percent of all on-site releases of lead were emitted to air. More than 82% of these lead releases on-site were placed in landfills by waste treatment and disposal companies. The primary metals sector reported the second largest on-site releases of lead to the 2000 NPRI.

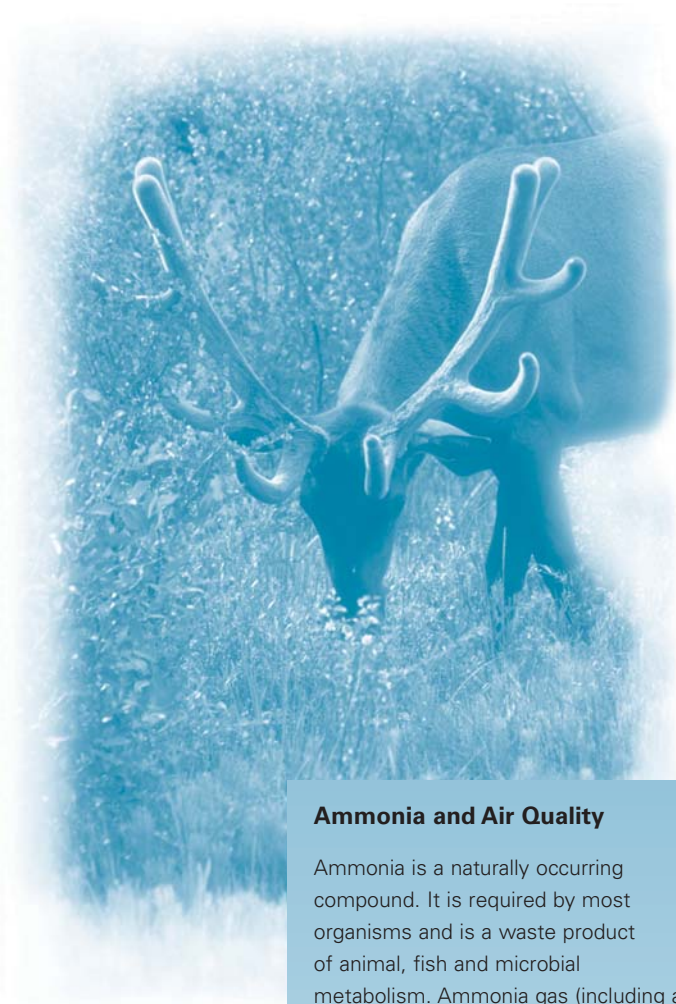
Prior to the phase-out of leaded gasoline, on-road vehicles were the primary source of lead emissions, and these were emitted to the air. Exposure to small amounts of lead can be hazardous to human health, especially for infants, young children and pregnant women.

SECTION 5: ON-SITE RELEASES TO AIR, WATER AND LAND AND UNDERGROUND INJECTION

The NPRI is a detailed inventory of on-site releases to air, water and land and underground injection by industrial and commercial companies in Canada. The changes in on-site releases to these media are shown in Figure 6 and discussed along with substance-specific highlights in this section.

Figure 6 Changes in Total On-site Releases to Air, Water and Land and Underground Injection, 1999 and 2000





Ammonia and Air Quality

Ammonia is a naturally occurring compound. It is required by most organisms and is a waste product of animal, fish and microbial metabolism. Ammonia gas (including air emissions) reacts chemically with other substances in the atmosphere and can produce fine particles in the air. These fine particles are a concern for human health because they can penetrate deep into the lungs, where they can cause irritation and exacerbate lung disease. Particulate matter and ammonia also contribute to poor air quality conditions, such as smog and reduced visibility.

The chemical and chemical products industry was the primary source of air emissions of ammonia in the 2000 NPRI. Commercial fertilizer application and livestock operations are two other major sources of ammonia air emissions. This non-industrial activity is not reportable to the NPRI, although it is reflected in Canada's National Emissions Inventory of Atmospheric Ammonia.

For more information, visit Environment Canada's Air Pollutant Emissions website at <http://www.ec.gc.ca/pdb/ape/>.

How is water quality being managed in Canada?

Canada has adopted a multi-barrier approach to protecting water quality from source to tap. This approach identifies the tools needed to reduce public health risks at every stage of the drinking water system (source water protection, drinking water treatment and drinking water distribution systems). In addition, all governments are collaborating on accelerating the development of guidelines for the quality of Canadian drinking water and source water, linking monitoring networks across the country to better share information on water quality issues and trends, and providing Canadians with information on the quality of their water.

Ammonia and Water Quality

Under some conditions related to water temperature and acidity levels, ammonia, when dissolved in water, can become highly toxic to fish and other aquatic animals.

The major sources of ammonia released to water are municipal wastewater treatment plants. Livestock operations represent another major source. Municipal wastewater treatment plants receive water from many sources, including industrial and commercial operations, human sewage, stormwater runoff and agricultural operations.

Changes to the NPRI reporting requirements for 2002 will allow Environment Canada to gather, monitor and publish more information about pollution from municipal wastewater facilities in future years.

5.1 Air

Air emissions accounted for nearly 35% of NPRI on-site releases in 2000. Total emissions to air were up 4.5% from 1999.

Methanol, ammonia and hydrochloric acid were the top three air pollutants reported to the NPRI in 2000. Total ammonia and methanol emissions to air reported to the NPRI in 2000 were virtually unchanged from 1999. The pulp and paper sector as well as the chemical and chemical products sector were the primary sources of these emissions.

Coal-fired power generating facilities were the primary source of air emissions of hydrochloric acid. Air emissions of hydrochloric acid for the sector were up by 39% in 2000 compared with 1999.

5.2 Water

Releases to water accounted for approximately 12% of NPRI on-site releases in 2000. They were up by 111% from 1999.

Ammonia and nitrate ion were the top substances released to water. They increased by more than 110% and 172%, respectively, compared with 1999. New reporting by municipal wastewater facilities, one of the largest sources of pollutant discharges to Canadian waters, accounted for most of this increase.

5.3 Land

Land releases, not including underground injection, accounted for approximately 9% of on-site releases in 2000, a decrease of about 20% compared with 1999. A reduction in on-site releases of zinc at a waste disposal facility in Ontario contributed significantly to this change.

Releases of asbestos (friable form) to landfill increased by 83% from 1999 because a number of Alberta facilities disposed of it as they moved to replace it with alternative substances, reducing the likelihood of exposure to this toxic substance and known carcinogen. This form of asbestos was commonly used as an insulating material in plants and buildings.

5.4 Underground Injection

Underground injection is a waste disposal method by which materials are injected into underground wells. It accounted for more than 40% of NPRI on-site releases in 2000, an increase of 14.5% from 1999.

Hydrogen sulphide, released as a by-product of the petroleum and natural gas processing industries, made up 90% of the underground injection total. On-site releases of this substance increased because of higher production levels in these industries, especially in Alberta and British Columbia.

A Primer on Disposal to Land

Land disposal, landfill, land treatment, spills and leaks are the major types of on-site land releases reported to the NPRI other than underground injection. Landfill is the most commonly used of these disposal methods.

Landfills are sites in which wastes are buried. Most landfills in Canada are approved by provincial or territorial governments as sites for waste disposal. All landfills are required to have appropriate permits and be specifically designed under strict guidelines for use as final disposal sites for waste.

Hydrogen sulphide must be removed from raw natural gas before it can be safely transported to markets. It is removed from natural gas in the form of an acid gas that is then flared (burned), injected into an underground reservoir or processed to recover elemental sulphur.

SECTION 6: OFF-SITE RECYCLING, ENERGY RECOVERY AND DISPOSAL

6.1 Off-site Recycling and Energy Recovery

The long-term goal of environmental protection is to prevent the creation of pollutants and waste and to produce durable, recyclable, less hazardous goods. Off-site reuse and recycling of pollutants and waste are desirable, complementary to pollution prevention and valued methods of environmental protection that can offer environmental and economic benefits. Certain types of energy recovery also yield environmental benefits. Of the pollutants reported to the NPRI, 71% (by weight) were not released to the environment—they were sent off-site for recycling and energy recovery. This is an increase of 4.7% from 1999.

The substance recycled in the largest quantity was hydrogen sulphide, primarily from three natural gas processing plants in British Columbia. Hydrogen sulphide accounted for 82% of off-site transfers for recycling and energy recovery in 2000.

6.2 Off-site Disposal with and without Treatment

Approximately 6% of the substances reported to the NPRI were transferred off-site for disposal. About half underwent pretreatment prior to disposal. Treating waste prior to disposal can reduce or eliminate potential harmful effects that the substance may have on the environment and human health.

There was a 17% increase in substances transferred off-site for disposal with pretreatment in 2000. Options for pretreatment include physical, chemical and biological processes as well as incineration and treatment at municipal solid waste treatment plants. In 2000, the largest quantities of pollutants were sent to the latter two of these options. Of notable interest is the change seen with biological treatment: 3.5% of the pretreated pollutants underwent biological treatment prior to disposal in 1999, compared with nearly 8% in 2000.



Off-site transfers for disposal without further treatment decreased by 58% from 1999 to 2000. This was due primarily to the closure of a large waste facility in Ontario. The top four pollutants transferred off-site for disposal without treatment were zinc (and its compounds), manganese (and its compounds), sulphuric acid and calcium fluoride.

Heavy Metals

Lead, cadmium, mercury, arsenic, copper and zinc belong to a class of substances called heavy metals. Heavy metals are persistent and inherently toxic substances that have been linked to numerous adverse effects in humans and wildlife. Canada ratified an international convention on heavy metals in 1998 and is required to reduce emissions from industrial sources, combustion sources and waste incineration, as well as develop and maintain emission inventories of cadmium, lead and mercury.

SECTION 7: THE 2000 NPRI AND BEYOND

One new substance (N,N-dimethylformamide) was added to the list of substances reportable to the 2001 NPRI. In response to growing demand from the public for earlier access to NPRI data, Environment Canada released preliminary (unreviewed) NPRI data to the public for the first time. The 2001 inventory data were published on Environment Canada's website in August 2002. Reviewed data will be made available to the public by the end of January 2003, and detailed analysis and interpretation will follow later in the year.

Striving for Clean Air

Air pollution affects the health of all Canadians, especially children, the elderly and those with respiratory and cardiac conditions. Federal studies show that thousands of deaths in Canada can be attributed to air pollution every year. For more information on clean air, visit Environment Canada's clean air website at <http://www.ec.gc.ca/air>.

Beginning in 2003, facilities reports that are submitted to the NPRI will include data on the emissions of the major air pollutants that contribute to smog and other forms of poor air quality. In addition, changes were made to require reporting from more municipal waste water facilities and to improve data gathered on heavy metals.

Requirements to report greenhouse gas emissions to the NPRI and more detailed information on certain air pollutants are currently being considered. Greenhouse gases are generated by many industrial and commercial sectors, including the

electric power generation and petroleum industries, the chemical industry, the metal smelting and refining industry, and the transportation and manufacturing sectors.

The NPRI continues to grow and provide important pollution information to Canadians. Other improvements include a pilot project for on-line reporting for industry, improved search and on-line database query capabilities, and new tools to help the general public better access, understand and take action on sources of pollution in Canada.

Climate Change and Greenhouse Gases

Our atmosphere is a complex mixture of gases that trap the sun's heat near the Earth's surface in much the same way that the glass of a greenhouse traps the sun's warmth. Human activities have resulted in the release of significant quantities of greenhouse gases, which remain in the atmosphere for long periods of time. This intensifies the natural greenhouse effect. Climate change is more than a warming trend. Increasing temperatures will cause changes in many aspects of weather, such as wind patterns, the amount and type of precipitation, and the types and frequency of severe weather events that may be expected to occur in an area.

For more information on climate change, visit the Government of Canada climate change website at <http://www.climatechange.gc.ca>.

APPENDIX A: TOXIC SUBSTANCES REPORTABLE TO THE 2000 NPRI

The toxic substances¹ that were reportable to the 2000 NPRI are listed below. For those pollutants that are members of a class of toxic substances that have been determined to be toxic under CEPA 1999, the name of the class is listed in the middle column. Those substances that are also included in the “matched data” set for 1997–2000 (Figure 4) are so indicated in the third column of the table. For more information regarding “matched data” please refer to the glossary in Appendix B of this report.

Pollutant	CEPA Toxic ¹ Substance Class	Included in the Matched Data Set (1997–2000) ²
Acetaldehyde		yes
Acrolein		
Acrylonitrile		yes
Alkanes, C _{10–13} , chloro	Chlorinated paraffins - short chain	
Alkanes, C _{6–18} , chloro	Chlorinated paraffins - short chain ³	
Arsenic (and its compounds)		yes
Asbestos (friable form)		yes
Benzene		yes
Benzo(a)anthracene	Polycyclic aromatic hydrocarbons	
Benzo(a)phenanthrene	Polycyclic aromatic hydrocarbons	
Benzo(a)pyrene	Polycyclic aromatic hydrocarbons	
Benzo(b)fluoranthene	Polycyclic aromatic hydrocarbons	
Benzo(e)pyrene	Polycyclic aromatic hydrocarbons	
Benzo(g,h,i)perylene	Polycyclic aromatic hydrocarbons	
Benzo(j)fluoranthene	Polycyclic aromatic hydrocarbons	
Benzo(k)fluoranthene	Polycyclic aromatic hydrocarbons	
Bis(2-ethylhexyl) phthalate		yes
1,3-Butadiene		yes
Cadmium (and its compounds)		yes
Calcium fluoride	Inorganic fluorides	
Carbon tetrachloride		yes
CFC-11	Chlorofluorocarbons	
CFC-12	Chlorofluorocarbons	
CFC-13	Chlorofluorocarbons	
CFC-114	Chlorofluorocarbons	
CFC-115	Chlorofluorocarbons	

Pollutant	CEPA Toxic ¹ Substance Class	Included in the Matched Data Set (1997-2000) ²
Dibenz(a,j)acridine	Polycyclic aromatic hydrocarbons	
Dibenzo(a,h)anthracene	Polycyclic aromatic hydrocarbons	
Dibenzo(a,i)pyrene	Polycyclic aromatic hydrocarbons	
7H-Dibenzo(c,g)carbazole	Polycyclic aromatic hydrocarbons	
3,3'-Dichlorobenzidine dihydrochloride		
1,2-Dichloroethane		yes
Dichloromethane		yes
Fluoranthene	Polycyclic aromatic hydrocarbons	
(Halon 1211) Bromochlorodifluoromethane		
(Halon 1301) Bromotrifluoromethane		
HCFC-22	Hydrochlorofluorocarbons	
HCFC-122 and all isomers	Hydrochlorofluorocarbons	
HCFC-123 and all isomers	Hydrochlorofluorocarbons	
HCFC-124 and all isomers	Hydrochlorofluorocarbons	
HCFC-141b	Hydrochlorofluorocarbons	
HCFC-142b	Hydrochlorofluorocarbons	
Hexachlorobenzene		
Hydrogen fluoride	Inorganic fluorides	yes
Indeno(1,2,3-CD)pyrene	Polycyclic aromatic hydrocarbons	
Lead (and its compounds)		yes
Mercury (and its compounds)		
Nickel (and its compounds)		yes
Perylene	Polycyclic aromatic hydrocarbons	
Phenanthrene	Polycyclic aromatic hydrocarbons	
Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans		
Pyrene	Polycyclic aromatic hydrocarbons	
Sodium fluoride	Inorganic fluorides	
Sulphur hexafluoride	Inorganic fluorides	
Tetrachloroethylene		yes
Tetraethyl lead		
Trichloroethylene		yes
Vinyl chloride		yes

¹ Substance or member of a class of substances that has been determined by Environment Canada and Health Canada to meet the definition of "toxic" under Section 64 of CEPA 1999.

² A set of substances reported that were common to the NPRI list of substances for the years 1997, 1998, 1999 & 2000 for which the reporting requirements (e.g. thresholds) did not change.

³ Alkanes, C₆₋₁₈, chloro includes both short-chain chlorinated paraffins and medium-chain chlorinated paraffins. Only short chain paraffins (i.e., <C₁₃) have been found to meet the definition of toxic under Section 64 of CEPA 1999.

APPENDIX B: NPRI NATIONAL AND REGIONAL OFFICE CONTACTS AT ENVIRONMENT CANADA

National and Regional NPRI Offices

Headquarters

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

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

National Pollutant Release Inventory
Environment Canada
16th Floor, Queen Square
45 Alderney Drive
Dartmouth, NS B2Y 2N6
Tel: (902) 426-4482 / 426-4805
Fax: (902) 490-0722
E-mail: NPRI_ATL@ec.gc.ca

Quebec

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

Ontario

National Pollutant Release Inventory
Environment Canada
4905 Dufferin Street, 2nd Floor
Downsview, ON M3H 5T4
Tel: (416) 739-5955 / 739-5886 /
739-4602 / 739-4608
Fax: (416) 739-4326
E-mail: NPRI_ONTARIO@ec.gc.ca

Manitoba, Saskatchewan, Alberta, Northwest Territories and Nunavut

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

National Pollutant Release Inventory
Environment Canada
123 Main Street, Suite 150
Winnipeg, MB R3C 4W2
Tel: (780) 951-8989
Fax: (780) 495-2615

National Pollutant Release Inventory
Environment Canada
Room 300, Park Plaza
2365 Albert Street
Regina, SK S4P 4K1
Tel: (306) 780-6465
Fax: (306) 780-6466

National Pollutant Release Inventory
Environment Canada
3rd Floor, Diamond Plaza
5204 - 50th (Franklin) Avenue
Yellowknife, NT X1A 2R2
Tel: (867) 669-4727
Fax: (867) 873-8185

National Pollutant Release Inventory
Environment Canada
P.O. Box 607
Iqaluit, NU X0A 0H0
Tel: (867) 975-4636
Fax: (867) 975-4645

British Columbia and Yukon
National Pollutant Release Inventory
Environment Canada
to March 31, 2003:
224 West Esplanade
North Vancouver, BC V7M 3H7

after April 21, 2003:
401 Burrard Street, Suite 201
Vancouver, BC V6C 3S5
Tel: (604) 666-3221 / 666-3890
Fax: (604) 666-6800
E-mail: NPRI_PYR@ec.gc.ca

National Pollutant Release Inventory
Environment Canada
91782 Alaska Highway
Whitehorse, YT Y1A 5B7
Tel: (867) 667-3402
Fax: (867) 667-7962
E-mail: NPRI_YK@ec.gc.ca

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