TAKING STOCK

2002 North American Pollutant Releases and Transfers

Commission for
Environmental Cooperation
of North America

May 2005

Disclaimer

The National Pollutant Release Inventory (NPRI) and the Toxics Release Inventory (TRI) data sets are constantly evolving, as facilities revise previous submissions to correct reporting errors or make other changes. For this reason, both Canada and the United States "lock" their data sets on a specific date and use the "locked" data set for annual summary reports. Each year, both countries issue revised databases that cover all reporting years.

The CEC follows a similar process. For the purposes of this report, the TRI data set of June 2004 and the NPRI data set of July 2004 were used. The CEC is aware that changes have occurred to both data sets for the reporting year 2002 since this time that are not reflected in this report. These changes will be reflected in the next reports, which will summarize the 2003 data and make year-to-year comparisons with previous years' data.

This publication was prepared by the Secretariat of the Commission for Environmental Cooperation (CEC). The views contained herein do not necessarily reflect the views of the governments of Canada, Mexico or the United States of America.

Published by the Communications Department of the CEC Secretariat.

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ISBN 2-923358-17-1

(French edition: ISBN: 2-923358-19-8

Spanish edition: ISBN: 2-923358-18-X)

Legal Deposit-Bibliothèque nationale du Québec, 2005

Legal Deposit-Bibliothèque nationale du Canada, 2005

Disponible en français – Disponible en español

Layout: Jean Racicot
Printed in Canada

Chapter — Taking Stock

Preface

The mission of the Commission for Environmental Cooperation (CEC) is to foster the conservation, protection, and enhancement of the North American environment in the context of increasing economic and trade links among Canada, Mexico, and the United States.

Good information is the foundation upon which we can act to protect our shared environment. This is true for policy makers and the public alike—as the basis for sound decision making or simply to know what's happening in our communities. *Taking Stock*, the CEC's yearly analysis of the status and trends of the most commonly reported toxic chemicals released and transferred throughout the continent is a key part of this foundation.

Taking Stock provides environmental information in the spirit of right-to-know. With North America becoming increasingly integrated through economic and social ties, it is essential that all citizens have access to information on activities that impinge on the health of our shared environment. The data reported in *Taking Stock* are important indicators for policy makers, regulators, facility managers, CEOs, community groups, researchers and citizens to inform their various efforts to assess, reduce and prevent pollution. Compiling, comparing, and sharing this information supports decision-making at all levels of society to better manage toxic releases.

As always, *Taking Stock* builds on data collected by the national governments through their pollutant release and transfer registers (PRTRs), thereby providing a North American perspective on the generation and handling of toxic substances by industrial facilities. The "matched" data presented in *Taking Stock*, which we use to examine the sectors and chemicals that are common to the national systems, provide a common yardstick for analyzing what is happening across the continent with respect to the release, recycling and treatment of toxic chemicals generated by industry. Data from the 2002 reporting year, the most recent data publicly available at the time this report was initiated, are presented in this report, along with trend data dating back to 1995.

Until this year, *Taking Stock* was limited to information concerning the release and transfer of toxic chemicals in the United States and Canada. This report marks a major step forward by including comparable Mexican data for certain Criteria Air Contaminants for the first time. Mexico continues to progress in the implementation of its now mandatory PRTR program with the recent announcement of a list of 104 toxic chemicals that will become the basis for its reporting program. We look forward to including these chemicals in future editions of *Taking Stock*.

Last year marked the tenth anniversary of the CEC. A ten-year review undertaken to measure our progress and chart a path for the future made special reference to the importance of *Taking Stock*. Some observers cited *Taking Stock* as an example of CEC work that has helped "move the agenda forward" by making critical information accessible to the public. Others pointed out the limitations posed by aggregating all PRTR emissions data without considering relative toxicity, or information on economic production. These are important observations and will help shape *Taking Stock* into an even more relevant and meaningful document in the future.

Following the ten-year review, the CEC Council determined that *Information for Decision-making* would become one of three pillars to guide our work over the next ten years, together with Capacity Building and the exploration of Trade and Environment Linkages. *Taking Stock* thus remains at the core of our work activity.

As we close the first decade of the CEC, we trust that this report will help guide our collective pursuit of a clean and healthy environment and a strong economy. As always, we welcome your suggestions on how *Taking Stock* can continue to evolve and in order to better meet your needs. We especially want to increase collaboration with the private sector across North America to help improve the quality and consistency of PRTR reporting across our three countries.

William V. Kennedy
Executive Director

Acknowledgements

Numerous groups and individuals have played important roles in bringing this report to fruition.

Officials from Environment Canada, Semarnat and the US EPA contributed vital information and assistance throughout the report's development. This past year we have worked with the following officials from these agencies: Canada—Arun Chatterjee, Alain Chung and François Lavallée; Mexico—MariCruz Rodriguez Gallegos, Sergio Sánchez Martínez, Juan David Reyes Vazquez, Ivette Garcia, Floreida Paz Benito, Fabiola Ramirez Hernández, Victor Manuel Sánchez Rodriguez, Teresa Zarate Romano, Pedro Miguel Ramirez Ramirez; and the United States—John Dombrowski and Michelle Price.

Special thanks and recognition go to the team of consultants who worked tirelessly to put this report together: Catherine Miller of Hampshire Research Institute (United States); Sarah Rang of Environmental Economics International (Canada); Isabel Kreiner of UV Lateinamerika S. de R.L. de C.V. (Mexico). Thanks also go to Hampshire Research Institute, in particular, to Rich Puchalski and Catherine Miller for their work in creating the *Taking Stock Online* web site <http://www.cec.org/takingstock/>.

A number of CEC Secretariat staff have been involved in the development and launching of this report and the companion web site. Vic Shantora, head of the Pollutants and Health program, kept us focused on the big picture, on the essential nature of this report within the pollution prevention and reduction policy arena. Marilou Nichols, program assistant, provided continuing assistance throughout this process. Paul Miller provided helpful perspectives for the new three-country data. Erica Phipps, consultant, was indispensable in guiding the development of the *Taking Stock* series, including coordinating the public consultations. The CEC's publications staff have handled the tremendous task of coordinating the editing, translation and publication of the document in the three languages. Evan Lloyd and Spencer Ferron-Tripp were instrumental in coordinating the public release of the document. We look forward to working with Keith Chanon, the CEC's new PRTR program manager.

Above all, CEC would like to thank the many individuals and groups from throughout North America who have given generously of their time and ideas to the development of this report through their participation in the Consultative Group for the North American PRTR Project.

Become Involved in the Development of *Taking Stock*

Taking Stock is developed with the advice of governments, industry and nongovernmental organizations and citizens from the three North American countries.

For more information or to get involved in the CEC's North American PRTR project, please contact:

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Contacting and Obtaining Information from North America's Pollutant Release and Transfer Registers

Public Access to Canadian National Pollutant Release Inventory Data and Information

Information on NPRI, the annual report, and the databases can be obtained from Environment Canada's national office:

Headquarters:
Tel: (819) 953-1656
Fax: (819) 994-3266

NPRI data on the Internet, in English: <http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm>
NPRI data on the Internet, in French: <http://www.ec.gc.ca/pdb/npri/npri_home_f.cfm>
e-mail: npri@ec.gc.ca
Pollution Watch Scorecard home page: <http://www.pollutionwatch.org/>

Additional Information on *Mexican Registro de Emisiones y Transferencia de Contaminantes* (RETC)

Semarnat
Dirección de Gestión Ambiental
Av. Revolución 1425 – 9
Col. Tlacopac, San Angel
01040 Mexico, D.F.
Tel: (525) 55 624–3470
Fax: (525) 55 624–3584

Semarnat on the Internet: <http://www.semarnat.gob.mx>
RETC: <http://www.semarnat.gob.mx/dgca/retc/general/gral.shtml>

Public Access to US Toxics Release Inventory Data and Information

The EPA's TRI User Support (TRI-US), (800) 424-9346 within the United States or (202) 260-1531, provides TRI technical support in the form of general information, reporting assistance, and data requests.

TRI information and selected data on the Internet: <http://www.epa.gov/tri>

Online Data Access:
TRI Explorer: <http://www.epa.gov/triexplorer>
EPA's Envirofacts: <http://www.epa.gov/enviro/html/toxic_releases.html>
RTK-NET: <http://www.rtk.net>
National Library of Medicine's Toxnet (Toxicology Data Network) computer system: <http://toxnet.nlm.nih.gov/>
Environmental Defense Scorecard home page: <http://www.scorecard.org>

Acronym	Meaning
CAC	Criteria Air Contaminant
CAS	Chemical Abstract Service
CEC	Commission for Environmental Cooperation
CEPA	Canadian Environmental Protection Act
C.I.	Color index
CMAP	*Clasificación Mexicana de Actividades y Productos* (Mexican Activities and Products Classification)
CO	Carbon monoxide
COA	*Cédula de Operación Anual* (Annual Certificate of Operation)
EPA	US Environmental Protection Agency
EPCRA	US Emergency Planning and Community Right-to-Know Act
HCB	Hexachlorobenzene
IARC	International Agency for Research on Cancer
IFCS	Intergovernmental Forum on Chemical Safety
INE	*Instituto Nacional de Ecología* (Mexican National Institute of Ecology)
IOMC	Inter-Organization Programme for the Sound Management of Chemicals
iTEQ	International Toxic Equivalents
kg	Kilograms
LGEEPA	*Ley General del Equilibrio Ecológico y la Protección al Ambiente* (General Ecological Equilibrium and Environmental Protection Law)
MSDS	Material Safety Data Sheet
MSTP	Municipal sewage treatment plant
NAICS	North American Industry Classification System
NCASI	National Council of the Paper Industry for Air and Stream Improvements
NEI	US National Emissions Inventory
NMX	*Norma Mexicana* (Mexican Standard)
NOM	*Norma Oficial Mexicana* (Mexican Official Standard)
NO_x	Nitrogen oxides
NPRI	National Pollutant Release Inventory (PRTR for Canada)
NTP	US National Toxicological Program
OECD	Organization for Economic Cooperation and Development
PBT	Persistent bioaccumulative toxicant

PDIA	*Programa de Desarrollo Institucional Ambiental* (Program of Institutional Environmental Development)
POTWs	US publicly owned treatment works
PM	Particulate matter
PRTR	Pollutant release and transfer register
RETC	*Registro de Emisiones y Transferencias de Contaminantes* (PRTR for Mexico)
Semarnat	*Secretaría de Medio Ambiente y Recursos Naturales* (Mexican Secretariat of the Environment and Natural Resources)
SIC	Standard Industrial Classification
SO_2	Sulfur dioxide
TEF	Toxic equivalency factor
TEQs	Toxic equivalents
TRI	Toxics Release Inventory (PRTR for US)
UN/ECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
US	United States
VOC	Volatile organic compound

Carcinogens
The International Agency for Research on Cancer <http://www.iarc.fr> and the US National Toxicological Program <http://ntp-server.niehs.nih.gov> evaluate chemical substances for their cancer-causing potential. Chemicals in the matched data set that have been designated as known or suspected carcinogens by one or both agencies are analyzed in this report.

Chemical category
A group of closely-related individual chemicals that are counted together for purposes of PRTR reporting thresholds and release and transfer calculations. The chemicals are reported to the PRTRs under a single name.

Energy recovery
The combustion or burning of a wastestream to produce heat.

Environmental management hierarchy
The types of waste management plus source reduction prioritized as to environmental desirability. In order of preference, the one most beneficial to the environment is source reduction (prevention of pollution at its source), followed by recycling, energy recovery, treatment, and disposal as the least desirable option.

Form
The standardized data that are submitted for each chemical by a facility. In NPRI one form is submitted for each chemical. In TRI generally one form is submitted for each chemical. However, more than one may be submitted in cases where different operations at a facility use the same chemical.

Fugitive emissions
Air emissions that are not released through stacks, vents, ducts, pipes, or any other confined air stream. Examples are equipment leaks or evaporation from surface impoundments.

Incineration
A method of treating solid, liquid, or gaseous wastes by burning.

Matched data set
Compilation of data for reporting elements that are comparable among the PRTRs. The "matched" data set selects from each PRTR only those industry sectors and those chemicals that are reported the same under both systems. Which industries and chemicals are included in the matched data set may differ from year to year depending on changes in reporting in one or the other of the systems.

Nonpoint sources
Diffuse sources such as from mobile sources (that is, motor vehicles and other forms of transportation), area sources (such as, agriculture or parking lots), or small sources (such as, dry cleaners or automobile service stations). These sources are not generally covered in PRTRs but may be substantial contributors to pollution of the chemicals reported under PRTRs.

Nonproduction-related waste
Waste that is generated as a one-time event, including large accidental spills, waste from a remedial action to clean up the environmental contamination from past disposal practices, or other wastes not occurring as a routine part of production operations. This does not include spills that occur as a routine part of the production operations that could be reduced or eliminated by improved handling, loading or unloading procedures.

Off-site releases
Chemicals in waste that are moved off the grounds of the facility and sent to other facilities or other locations for disposal. They are activities that are similar to on-site releases, but that occur at other locations. They also include metals sent to disposal, treatment, sewage, and energy recovery. This approach recognizes the physical nature of metals and acknowledges that metals in such wastes are not likely to be destroyed or burned and so may eventually enter the environment.

Off-site transfers
Chemicals in waste that are moved off the grounds of the facility, including transfers of waste sent to other facilities or other locations, such as hazardous waste treatment facilities, municipal sewage treatment plants or landfills. See also off-site releases and transfers for further management.

On-site
Within the boundaries of the facility, including areas where wastes may be stored, treated or disposed of that are separate from the production processes but still within the boundaries of the reporting facility.

On-site releases
Chemicals in waste released on-site to air, water, underground injection, or land at the location of the reporting facility.

Otherwise used
Any use of a chemical that is not manufacturing or processing, such as the use as a chemical processing aid, a manufacturing aid or an ancillary use during the production process.

Ozone depleter
A substance that contributes to the destruction of the stratospheric ozone layer, a layer of the atmosphere which lies approximately 15-40 kilometers above the Earth's surface.

Point source
The origin of known or deliberate environmental releases from fixed points such as smokestacks and wastewater discharge pipes.

Pollution prevention
A strategy for reduction of pollution that involves preventing the generation of waste in the first place, rather than cleaning it up, treating it, or recycling it after it has been produced. TRI and NPRI indicate actions undertaken to reduce the generation of waste. NPRI facilities may also indicate on-site reuse, recycling or recovery as a category of action to prevent pollution; TRI source reduction (pollution prevention) reporting does not include this category. See also source reduction activity.

Processing use
The use of a chemical as part of a chemical or physical process, including as a reactant, in processing a mixture or formulation, or as an article component.

Production ratio/activity index
The ratio of the production level associated with the chemical in the current reporting year to the previous year's level.

Production-related waste
A term used by the US EPA to denote chemical waste generated as a result of routine production that could potentially be reduced or eliminated by improved handling, more efficient processes, change of product or in product quality, or change in raw materials. This does not include spills resulting from large-scale accidents or waste from remedial actions to clean up contamination. As used by the US EPA, it includes chemicals released, sent off-site for disposal, recycling and energy recovery, and recycled or used for energy recovery on-site.

Recycling
Extraction of a chemical from a manufacturing process stream that would otherwise have been treated as waste, with the extracted chemical being reused in the original production process, in another production process, or sold as a separate product.

SIC codes
The standard industrial classification codes used to describe the types of activities or operations performed by an industrial facility. The actual groups of activities or operations (and, therefore, the codes) differ from country to country. The North America Industrial Classification System (NAICS) has been established and is in the process of being adopted by the United States, Canada and Mexico.

Source Reduction Activity
The types of activities undertaken to accomplish source reduction. The term includes equipment or technology modifications, process or procedure modifications, reformulations or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control. See also pollution prevention.

Total Releases
The sum of on-site and off-site releases, including the amounts released to the air, water, land and underground injection at the facility and all chemicals sent to other locations for disposal and any metals sent to treatment, sewage or energy recovery.

Total Reported Amounts
The sum of on- and off-site releases and transfers to recycling and other transfers for further management. This is the best estimate of a facility's total amount of chemicals requiring management that is available for the PRTR data.

Tonne
A metric tonne, which is 1,000 kilograms or 1,1023 short tons or 0.9842 long tons.

Transfers for further management
Chemicals in waste that are sent from the reporting facility to a facility that treats (including sewage treatment plants) or burns the chemical for energy recovery.

Treatment
A variety of processes that change the chemical in waste into another substance. Treatment also includes physical or mechanical processes that reduce the environmental impact of the waste. This is the term used in TRI reports to summarize chemical, physical, biological treatment and incineration.

Waste
The amount of the chemical that does not become a product and is not consumed or transformed during the production process. PRTRs differ as to whether materials destined for recycling or energy recovery are included or not in their definition of waste.

Executive Summary

Executive Summary

North Americans are concerned about the effects of chemicals on their health and their environment. Pollutant release and transfer registers (PRTRs) are designed to track the quantities of chemicals released from industrial activities into the air, water or land and provide detailed information on the types, locations and amounts of chemicals that facilities have released or transferred. Results are fed into a national database, which allows information to be made available to the public by chemical, community, or facility and over time.

The Commission for Environmental Cooperation (CEC) recognizes the importance of PRTRs, such as the Toxics Release Inventory (TRI) in the United States, the National Pollutant Release Inventory (NPRI) in Canada, and the *Registro de Emisiones y Transferencia de Contaminantes* in Mexico, for their potential to enhance the quality of the North American environment. This *Taking Stock* is the ninth of the CEC's annual studies of these programs and comparison of their data. It analyzes publicly available data from TRI and NPRI from reporting year 2002 (the most current available), as well as trends in reported data from 1995 to 2002. As Mexico's RETC data become available (reporting was voluntary for 2002), they will be included in future reports.

In addition, data on criteria air contaminants for 2002 are included. Air releases of these pollutants were reported for the first time to NPRI for 2002 and comparable data are provided from the draft preliminary reporting to the 2002 US National Emissions Inventory and the Mexican Annual Certificate of Operation (*Cédula de Operación Anual*—COA), Section 2.

The PRTR data used as the basis of this report do not account for all sources of releases and transfers or all chemicals. Many sources of chemical releases—small sources such as dry cleaners, gasoline service stations, mobile sources such as cars and trucks, area sources such as farms and natural sources such as volcanoes—are not included in PRTR data and hence are not within the purview of this report. Likewise, small manufacturing companies with fewer than 10 employees or that fall below the stipulated processing, manufactured or "otherwise used" thresholds are also not required to report to PRTRs. A limited number of chemicals must be reported to TRI (about 650) and NPRI (about 275)—far fewer than the tens of thousands estimated to be in commerce. So while PRTR data can provide important information on releases and transfers of chemicals, this information should be seen as part of a larger pollution picture.

Each country's PRTR has evolved with its own list of chemicals and industries. In order to obtain a North American picture of releases and transfers of chemicals, not all data submitted to the individual countries' PRTR systems can be used; only those data common to both systems. This matching process eliminates chemicals reported under one system but not the other. It also eliminates data from industry sectors covered by one PRTR but not the other. Thus, the North American database used in this report consists of matched data of industries and chemicals common to NPRI and TRI.

In the matched data, over 3.25 million tonnes of toxic chemicals were released and transferred in North America in 2002. One-quarter were on-site air releases (for both Canada and the United States). One-third were transferred off-site for recycling, although for Canada, half were transferred to recycling and 2 percent were transferred to energy recovery while for the United States, one-third were transferred for recycling and 20 percent to energy recovery (**Table 4–1**).

Three states and one province accounted for more than one-quarter of total releases and transfers in North America in 2002: Texas, Ohio, Ontario and Michigan (**Table 4–2**). More than one-quarter of all North American releases (both on- and off-site) originated in four states: Arizona, Ohio, Texas and Indiana (**Map 5–1**). Ontario, the Canadian province with the largest releases, ranked sixth in North America for total releases.

Electric utilities reported the largest total releases of any matched industry sector in North America, with 45 percent of all air releases (mainly hydrochloric acid). The primary metals sector accounted for the second-largest total releases, with 24 percent of total releases (mainly zinc and its compounds transferred to disposal) (**Table 5–3**).

Among the more than 24,000 reporting facilities in North America, the 50 with the largest total releases contributed almost one-third of the total releases in 2002. They included 19 electric utilities and 15 primary metals facilities. Among these 50 facilities were two electric utilities in Canada; the remaining were located in the United States (**Table 5–5**).

Canada had a higher percentage of total releases from paper products, rubber and plastics, and transportation equipment manufacturing sectors. The United States had higher percentages from electric utilities, primary metals and chemical manufacturers (**Figure 5–3**).

Average total releases per facility were about the same in Canada and the United States. However, average air releases per facility were over one-third higher in Canada than in the United States. Average on-site land disposal and surface water discharges per facility in the United States were twice those in Canada. On the other hand, the average off-site transfers to disposal of non-metals and off-site transfers to recycling in Canada were almost twice those in the United States (**Table 4–4**).

Analysis of changes in releases and transfers in NPRI and TRI over time highlight individual facilities, industrial sectors and states and provinces reporting lower or higher releases and transfers. The report includes trends from 1998 to 2002, which include manufacturing sectors as well as electric utilities, hazardous waste and solvent recovery facilities, coal mining, and chemical wholesale distributors. Trends from 1995 to 2002 include just manufacturing sectors because the other sectors have reported to TRI only since 1998.

Total releases and transfers fell by 7 percent from 1998 to 2002, but had risen by 3 percent in the most recent period from 2001 to 2002. Total releases decreased by 11 percent from 1998 to 2002 (**Table 6–1**). For the manufacturing sectors, total releases decreased by 12 percent from 1995 to 2002 (**Table 7–1**).

Canadian total releases and transfers increased by 7 percent from 1998 to 2002, including an increase in on-site air releases of 8 percent. The Canadian NPRI experienced an increase in the number of facilities reporting to it over the time period 1998 to 2002. For facilities reporting in both 1998 and 2002, NPRI total releases and transfers decreased by 3 percent, however air releases from those facilities increased by 1 percent (**Table 6–1**).

US total releases and transfers decreased by 8 percent from 1998 to 2002, but had risen in the most recent period from 2001 to 2002. The number of US facilities reporting to TRI decreased over that time period and total releases and transfers from US facilities reporting in both 1998 and 2002 decreased by 6 percent, including an 18 percent decrease in air releases (**Table 6–1**).

Because a small group of facilities report large amounts of releases and transfers and tend to dominate the database, this year's *Taking Stock* also analyzes the data without the largest facilities. The group of facilities with the largest reported releases and transfers had an overall decrease of 8 percent in total releases and 17 percent in air releases. The group of facilities with the smallest reported releases and transfers showed an overall increase of more than 150 percent in total releases and of 84 percent in air releases from 1998 to 2002. This was true for both Canada and the United States (**Table 6–9**).

Most off-site transfers are sent for recycling to sites within the country's borders. Cross-border transfers are sent by a few facilities, 285 US facilities and 163 Canadian facilities. Cross-border transfers from Canada to the United States increased by 25 percent from 1998 to 2002, while off-site transfers to sites within Canada increased by 5 percent. Cross-border transfers from the United States to Canada decreased by 44 percent from 1998 to 2002, while off-site transfers to sites within the United States increased by 5 percent (**Table 8–11**).

Known or suspected carcinogens accounted for 10 percent of total releases in 2002 (**Table 9–1**). This group of chemicals decreased by 26 percent from 1998 to 2002, compared to a decrease of 11 percent for all matched chemicals (**Figure 9–2**).

Chemicals linked to cancer or birth defects (California Proposition 65 chemicals) were 12 percent of total releases in 2002 (**Table 9–9**). This group of chemicals decreased by 31 percent from 1998 to 2002, compared to a decrease of 11 percent for all matched chemicals (**Figure 9–5**).

Persistent, bioaccumulative toxic chemicals (PBTs) are reported to NPRI and TRI under lower thresholds than other chemicals. These include such chemicals as lead, mercury, dioxins, hexachlorobenzene and polycyclic aromatic compounds. The reporting requirements differ for some PBTs, but those for both lead and mercury are similar and can be included in the matched database.

More than four times as many facilities reported on lead and its compounds than previously under the lowered reporting thresholds. In 2002, total releases of lead and its compounds were 43 million kilograms with air releases 2 percent of the total releases (**Table 10–1**). While Canadian facilities reported 9 percent of total releases of lead and its compounds, they reported 42 percent of air releases. Three primary metals facilities in Canada reported the largest air releases in North America, accounting for 30 percent of total air releases of lead and its compounds in 2002 (**Table 10–5**). Electric utilities (oil and coal-fired power plants only) had the largest surface water discharges of lead and its compounds and the second largest air releases (behind primary metals facilities), and third largest on-site land releases (**Table 10–3**). Three-quarters of all releases and transfers of lead and its compounds were transfers to recycling. The electronic/electrical equipment manufacturing sector had the largest transfers to recycling of any industry sector, accounting for over half (54 percent) of all transfers to recycling of lead and its compounds (**Table 10–8**).

Mercury and its compounds have been reported under lower thresholds since the 2000 reporting year. In 2002, total releases of mercury and its compounds were over 243 tonnes with air releases accounting for more than one-quarter of this amount (**Table 10–16**). US facilities in Texas reported the largest air releases of mercury and its compounds, accounting for 11 percent of total air releases in 2002 (**Table 10–17**). Electric utilities (oil and coal-fired power plants only) reported two-thirds (65 percent) of all air releases in 2002 (**Table 10–18**). From 2000 to 2002, total releases of mercury and its compounds decreased by 56 percent. Air releases decreased by 10 percent in both Canada and the United States (**Table 10–22**).

The year 2002 is the first year NPRI required reporting on criteria air contaminants (CACs). The Mexican COA has mandatory reporting for three CACs. TRI does not require reporting on these pollutants, but the US has a preliminary draft National Emissions Inventory (NEI) for CACs for 2002. Comparable data from these national databases were selected based on substance, reporting threshold and industry sector.

Comparable data from Canada and the United States include carbon monoxide, nitrogen oxides, particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide and volatile organic compounds, and is based on US reporting thresholds. Comparable data from all three countries include air releases of nitrogen oxides, sulfur dioxide and volatile organic compounds, and is based on US reporting thresholds and Mexican industry sectors.

CACs are emitted from a variety of sources, including fuel combustion, industrial process, vehicles (mobile sources) and agricultural activities. The first two are the ones covered by our database. Major sources of sulfur dioxide are industrial and combustion processes. Mobile sources are the major emitters of VOCs and, in urban areas, of carbon monoxide. Both industrial and mobile sources are sources of nitrogen oxides. Direct emissions of particulates are more often from other sources, such as construction sites, unpaved roads, and agricultural activities.

Nitrogen Oxides: US facilities accounted for 61 percent of nitrogen oxides releases, Mexican facilities for 34 percent and Canadian facilities for 5 percent. Electric utilities reported the largest amounts in all three countries (**Table 3–7**).

Sulfur Dioxide: US facilities accounted for 73 percent of sulfur dioxide releases, Mexican facilities for 14 percent and Canadian facilities for 13 percent. In the United States and Mexico, electric utilities reported the largest amounts. In Canada, primary metals facilities reported the largest air releases (**Table 3–9**).

Volatile Organic Compounds: US facilities accounted for 76 percent, Canadian facilities for 18 percent and Mexican facilities for 6 percent of the releases of these compounds. In the United States and in Mexico, chemical manufacturers reported the largest air releases of VOCs. In Canada, the oil and gas extraction sector had the largest such releases (**Table 3–10**).

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Introduction

This report is intended to serve as an information source for governments, industry and communities in analyzing such data from a North American perspective and for identifying opportunities for pollution reduction. The analyses are based on 1995–2002 data from the US Toxics Release Inventory (TRI) and the Canadian National Pollutant Release Inventory (NPRI). Results from 2002, trends over the eight years from 1995 to 2002, and from 1998 to 2002 are presented here. As data become available from the Mexican *Registro de Emisiones y Transferencia de Contaminantes* (voluntary for the 2002 reporting year), they will be included in future reports. This year, for the first time, information on criteria air contaminants from Canada, Mexico and the United States is included, since NPRI has added reporting on criteria air contaminants starting with the 2002 reporting year.

Taking Stock 2002 is the ninth in the CEC's *Taking Stock* series on sources, releases and transfers of industrial pollutants in North America.

Scope of this Year's Report

Taking Stock 2002 includes:

- data on releases and transfers of toxic chemicals from industrial facilities for 2002 (**Chapters 4** and **5**);
- five-year trends in releases and transfers of toxic chemicals (1998–2002) (**Chapter 6**)
- eight-year trends in releases and transfers of toxic chemicals from manufacturing sectors (1995–2002) (**Chapter 7**);
- transfers for recycling, energy recovery, treatment and disposal within and between US and Canada. (**Chapter 8**);
- analyses of groups of chemicals (**Chapter 9**):
  - carcinogens, and
  - chemicals associated with cancer, reproductive and developmental effects (California Proposition 65 chemicals);
- a special look at lead and its compounds (**Chapter 9**);
- reporting on persistent bioaccumulative toxics (PBTs), including mercury, dioxins and furans, hexachlorobenzene and polycyclic aromatic compounds (**Chapter 10**); and
- industrial air releases of criteria air contaminants for 2002 (**Chapter 3**).

New in this year's report are the special analyses on:

- lead and its compounds, looking at the data on releases and transfers as well as providing context on lead's health and environmental effects (**Chapter 10**), and
- industrial air releases of criteria air contaminants, since they were reported through NPRI for the first time for 2002 (**Chapter 3**).

While this report can provide answers to many questions, readers may need to go to other sources for more information. The report does not provide information on all pollutants, all sources of chemicals, data from facilities in Mexico (with the exception of criteria air contaminants), environmental damage, or health risks.

This report uses data from Canada and the United States. The data are "matched" for a particular span of years; that is, they are based on chemicals and industrial sectors that are common to both TRI and NPRI for the years in question. Reporting to the Mexican PRTR system was voluntary for 2002 and prior years, and thus the data are not currently comparable.

Taking Stock Online

The *Taking Stock 2002* report, past volumes of *Taking Stock* (as PDF files), and searchable access to the data sets used in *Taking Stock 2002* are all available at *Taking Stock Online*. Try Taking Stock Online at <http://www.cec.org/takingstock>. The web site permits searches of the entire matched data set from 1995 to 2002 and allows users to customize reports. Queries can be made by chemical, facility, sector, or geographic region. The site also includes links to electronic versions of *Taking Stock* reports, the three North American PRTRs, and other PRTR-related information.

CEC Action Plan to Enhance the Comparability of Pollutant Release and Transfer Registers in North America

The governments of Canada, Mexico and the United States have worked together through the CEC's PRTR program to develop an action plan to implement changes in their respective PRTRs that will enhance the comparability of the three systems. Much progress has already been made, including:

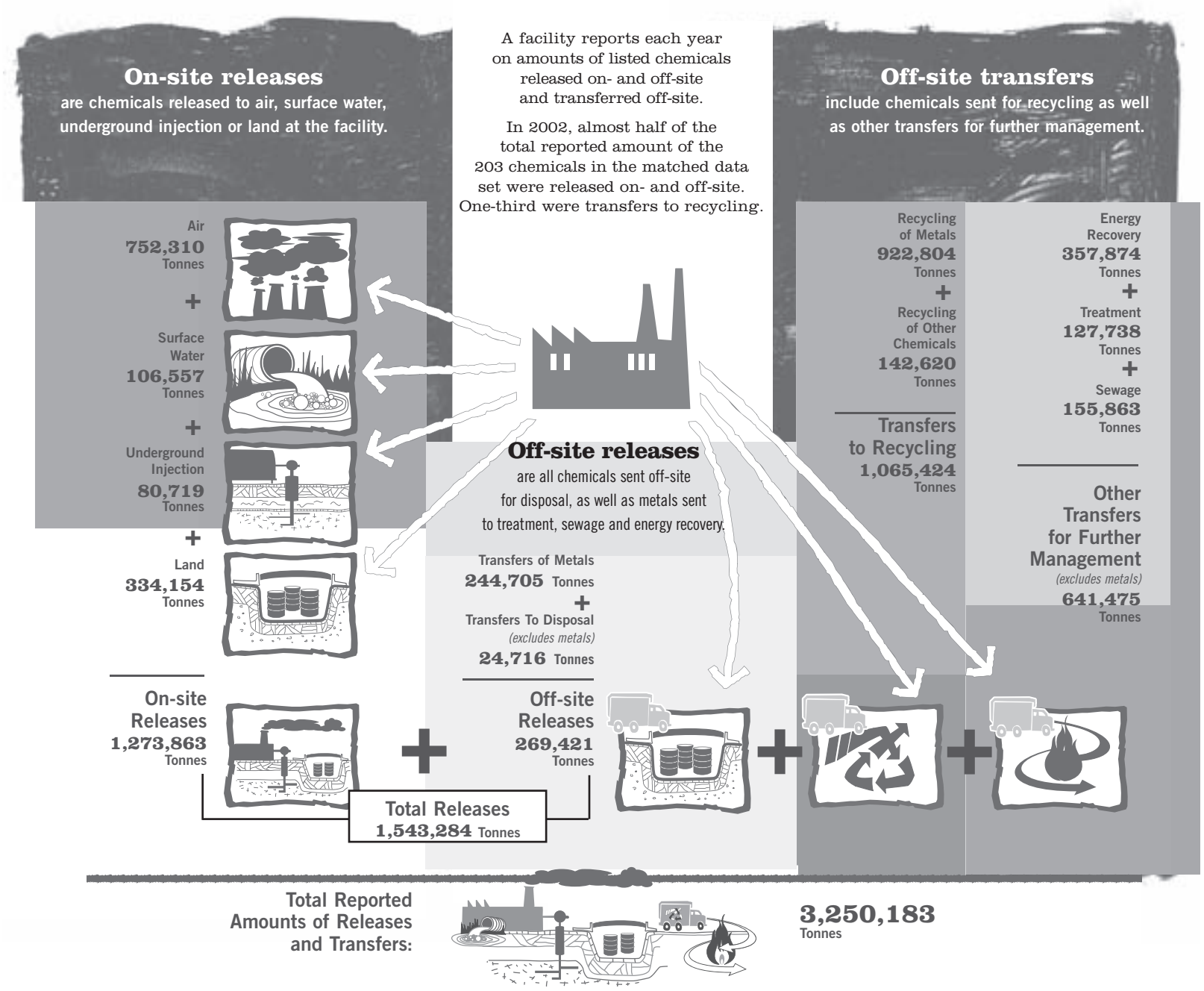
- expanding the number of industries covered under TRI,
- adding mandatory reporting of transfers to recycling and energy recovery to the NPRI,
- expanding both the chemical lists and the reporting on persistent bioaccumulative toxic chemicals (NPRI and TRI),
- requiring reporting on pollution prevention activities (NPRI), and
- the adoption of a mandatory requirement for RETC reporting in Mexico.

The Action Plan to Enhance the Comparability of PRTRs in North America, adopted by the CEC Council in June 2002, identifies specific issues for which action is still needed, such as:

- lists of chemicals,
- use of standardized North American industry-sector classification codes, and
- types of reporting thresholds and exemptions used.

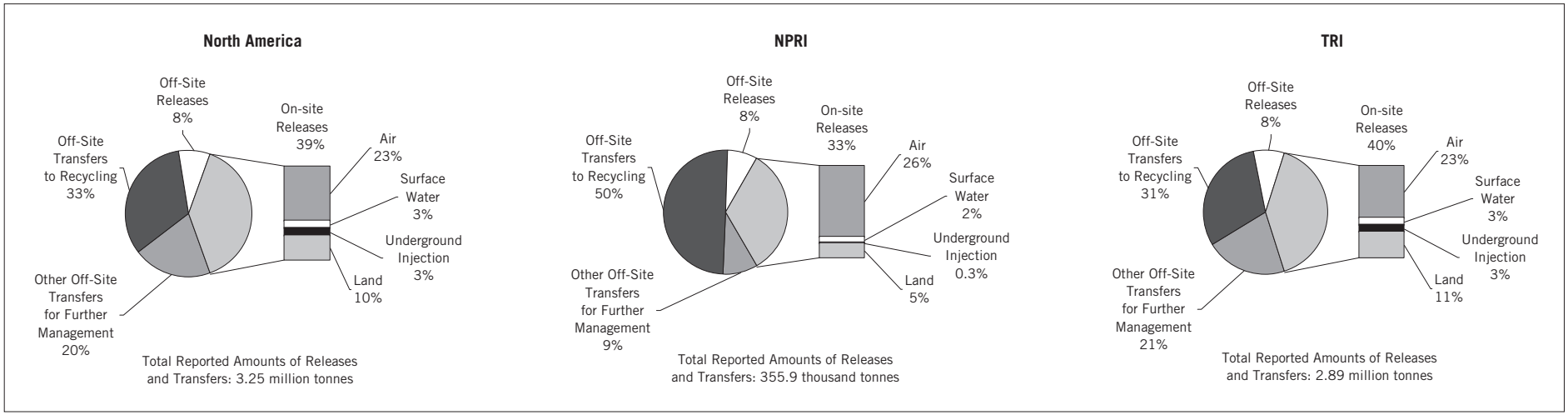
The Action Plan includes a description of such issues and outlines steps to be taken by the national programs to increase the comparability among the three systems. The Action Plan can be found on the CEC web site at <http://www.cec.org>.

Figure 1. Pollutant Releases and Transfers in North America, 2002



Note: Canada and US data only. Mexico data not available for 2002. Analyses are based on the matched set of chemicals and industry sectors for which comparable data are available for 2002. Total on-site releases are greater than the sum of the individual media because an NPRI facility can report only the total if it is less than one tonne.

Figure 2. Total Reported Amounts of Releases and Transfers in North America by Category, 2002



Note: Canada and US data only. Mexico data not available for 2002.

2002 Results

The data for 2002 include reporting by 24,192 industrial facilities in North America on:

- the set of 203 chemicals common to both NPRI and TRI;
- manufacturing facilities, as well as electric utilities, hazardous waste management/solvent recovery facilities, chemical wholesale distributors, coal mining and petroleum bulk storage terminals; and
- all categories of releases and transfers, including transfers to recycling and energy recovery.

Analyses of 2002 data are presented in **Chapter 4** (total releases and transfers) and **Chapter 5** (total releases).

Releases and Transfers in North America in 2002

In 2002, over 3.25 million tonnes of matched chemicals were released and transferred in North America (Figure 1 and **Chapter 4**, Table 4–1). Almost half of the total reported amounts of releases and transfers (1.54 million tonnes) were released on- and off-site. Almost one-quarter, 752,300 tonnes, were released into the air at facility sites. This large amount of chemicals emitted to the air was more than all the chemicals released on-site to land, water and underground injection combined.

One-third of the total reported amounts, almost 1.07 million tonnes, were substances sent off-site for recycling. About 20 percent, or 641,500 tonnes, were other transfers for further management, including to energy recovery, treatment, and sewage (Figure 2).

NPRI facilities reported 11 percent of the total North American amounts, while TRI facilities had 89 percent of the North American total reported amounts (See **Chapter 4**, Table 4–1). Total releases on- and off-site were 41 percent of total releases and transfers in NPRI and were 48 percent in TRI. NPRI on-site air releases comprised 26 percent of total releases and transfers compared to 23 percent in TRI. On the other hand, surface water discharges and on-site land releases were proportionally higher in TRI than in NPRI. Also, NPRI transfers to recycling accounted for 50 percent of total releases and transfers while TRI recycling was 31 percent, and TRI other transfers for further management were 21 percent of total releases and transfers while NPRI's accounted for 9 percent.

Releases of Carcinogens and Chemicals Causing Reproductive and Developmental Harm

Almost 10 percent of all releases of chemicals in North America in 2002 were known or suspected carcinogens. For NPRI facilities, most carcinogens (59 percent) were released to the air. For TRI facilities, 39 percent of carcinogens were released to the air and 27 percent were on-site land releases, mainly disposal in landfills. (See **Chapter 9**, Figure 9–1.)

Almost 12 percent of all releases were chemicals known to cause cancer, reproductive or developmental harm (California Proposition 65 chemicals). For NPRI facilities, 67 percent of these chemicals were released to the air. For TRI facilities, 47 percent were released to the air and 23 percent were on-site land releases, mainly disposal in landfills. (See **Chapter 9**, Figure 9–4.)

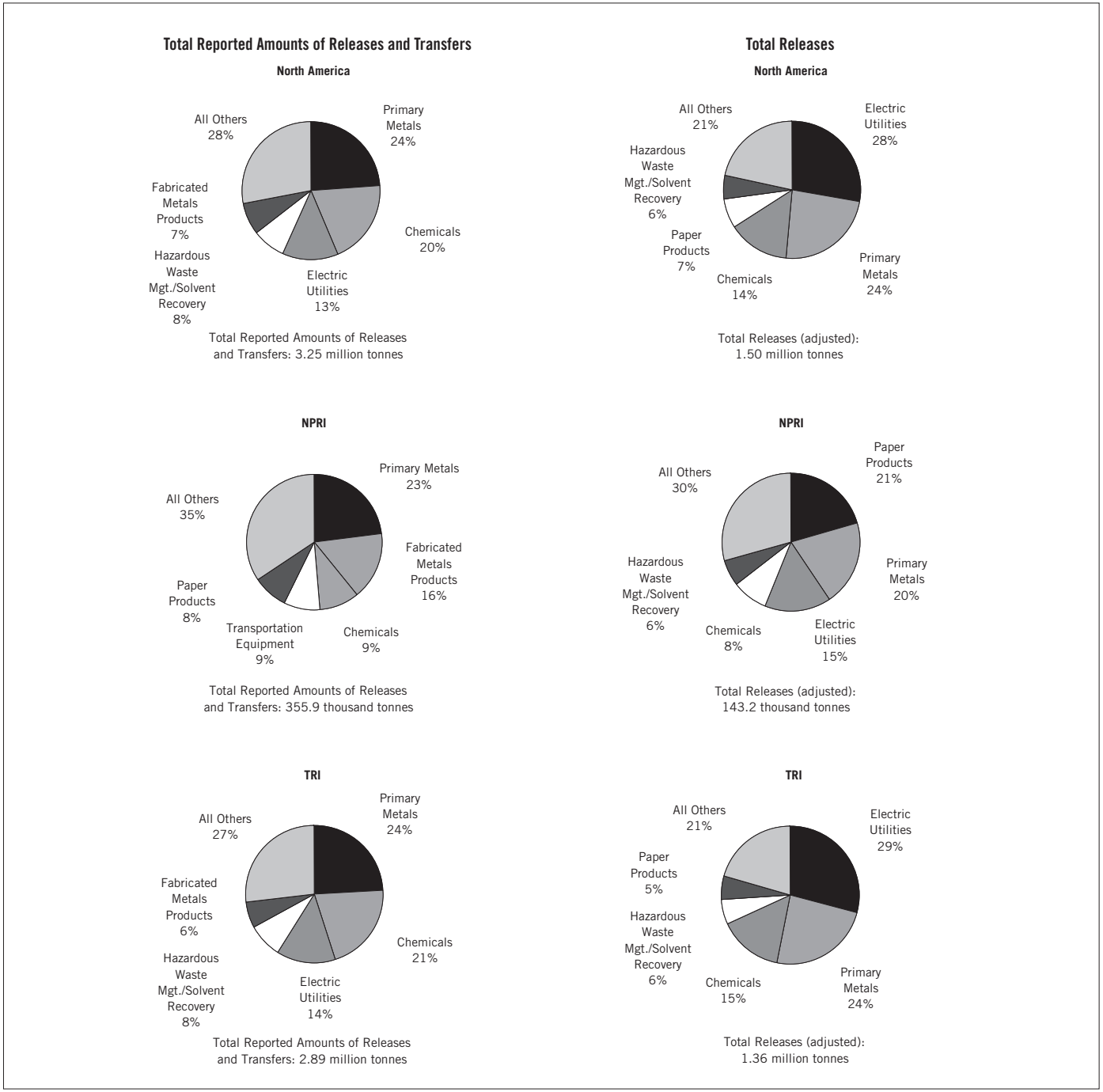
Industry Sectors with the Largest Amounts in North America in 2002

Five industries—primary metals, chemical manufacturing, electric utilities, hazardous waste management/solvent recovery and fabricated metals products—accounted for almost three-quarters of total releases and transfers in North America in 2002 (Figure 3 and **Chapter 4**, Table 4–3). In TRI, the sectors with the largest totals were primary metals and chemical manufacturing; in NPRI, the primary metals and fabricated metals sectors had the largest totals.

Looking at releases alone, electric utilities reported almost 28 percent of total releases in North America. The primary metals, chemical manufacturing, paper products, and hazardous waste management/solvent recovery sectors had the next-largest total releases (Figure 3 and **Chapter 5**, Table 5–3).

In TRI, electric utilities and the primary metals and chemical manufacturing sectors reported the largest total releases. These three sectors accounted for over two-thirds of total TRI releases. For NPRI, paper products, primary metals and electric utilities reported the largest total releases. These three sectors accounted for over half of total NPRI releases.

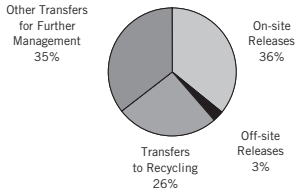
Figure 3. Contribution of Top Industry Sectors to Total Reported Amounts of Releases and Transfers and to Total Releases, 2002



Note: Canada and US data only. Mexico data not available for 2002.

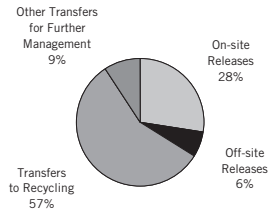
Figure 4. States/Provinces with Largest Total Reported Releases and Transfers Amounts in 2002 (Ordered by Total Reported Amounts)

Texas



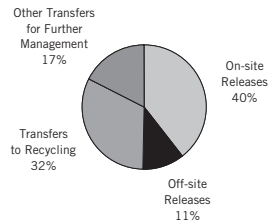
	tonnes
On-site Releases	90,933
Off-site Releases	7,449
Transfers to Recycling	65,282
Other Transfers for Further Management	90,452
Total Reported Amounts of Releases and Transfers	254,116
Number of Facilities	1,354
2002 Population (000)	21,737
Land Area (sq/km)	678,305
2002 Gross Domestic Product (millions of US$)	773,455

Ontario



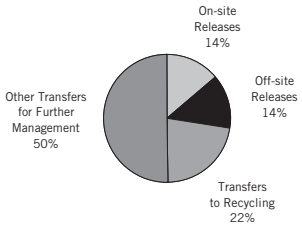
	tonnes
On-site Releases	58,124
Off-site Releases	13,516
Transfers to Recycling	120,600
Other Transfers for Further Management	19,393
Total Reported Amounts of Releases and Transfers	211,632
Number of Facilities	1,256
2002 Population (000)	12,097
Land Area (sq/km)	1,068,586
2002 Gross Domestic Product (millions of US$)	304,462

Ohio



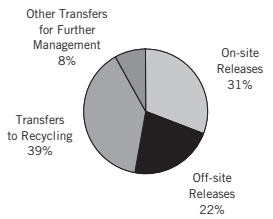
	tonnes
On-site Releases	82,877
Off-site Releases	22,468
Transfers to Recycling	67,866
Other Transfers for Further Management	36,524
Total Reported Amounts of Releases and Transfers	209,735
Number of Facilities	1,542
2002 Population (000)	11,409
Land Area (sq/km)	106,060
2002 Gross Domestic Product (millions of US$)	388,224

Michigan



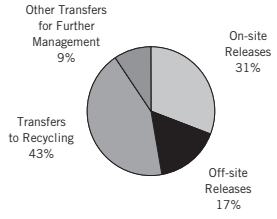
	tonnes
On-site Releases	27,275
Off-site Releases	26,986
Transfers to Recycling	43,987
Other Transfers for Further Management	99,220
Total Reported Amounts of Releases and Transfers	197,468
Number of Facilities	872
2002 Population (000)	10,043
Land Area (sq/km)	147,124
2002 Gross Domestic Product (millions of US$)	351,287

Indiana



	tonnes
On-site Releases	56,136
Off-site Releases	39,899
Transfers to Recycling	71,198
Other Transfers for Further Management	14,631
Total Reported Amounts of Releases and Transfers	181,864
Number of Facilities	986
2002 Population (000)	6,157
Land Area (sq/km)	92,896
2002 Gross Domestic Product (millions of US$)	204,946

Pennsylvania



	tonnes
On-site Releases	46,665
Off-site Releases	24,953
Transfers to Recycling	65,838
Other Transfers for Further Management	14,325
Total Reported Amounts of Releases and Transfers	151,780
Number of Facilities	1,312
2002 Population (000)	13,329
Land Area (sq/km)	116,075
2002 Gross Domestic Product (millions of US$)	428,950

Note: Canada and US data only. Mexico data not available for 2002. The data are estimates of releases and transfers of chemicals reported by facilities. None of the rankings are meant to imply that a facility, state or province is not meeting its legal requirements. The data do not predict levels of exposure of the public to those chemicals.

States and Provinces with the Largest Amounts in North America in 2002

In 2002, the jurisdictions with the largest total releases and transfers of the matched chemicals were Texas, Ontario, Ohio, Michigan, Indiana, and Pennsylvania, each reporting more than 150,000 tonnes. These six jurisdictions were responsible for 37 percent of all releases and transfers of chemicals in North America in 2002 and almost one-third (32 percent) of all releases on- and off-site (Figure 4 and **Chapter 4**, Table 4–2).

Facilities in Texas released and transferred the largest amounts. Texas facilities also reported the largest amounts of chemicals injected underground and discharged to surface waters at facility sites of any jurisdiction in North America. Ontario facilities had the largest transfers to recycling. Ohio had the largest on-site air releases, mainly from electric utilities. Michigan had the largest other off-site transfers for further waste management, particularly transfers to energy recovery. Indiana facilities reported releasing the largest amount off-site in North America, mainly transfers of metals to disposal. Pennsylvania had the third-largest off-site releases, also mainly transfers of metals to disposal.

Arizona had the largest on-site releases in 2002, with 129.5 thousand tonnes, due to reporting by one primary metals facility that reported 111.2 thousand tonnes, primarily as on-site land disposal of copper and manganese compounds. The facility reported that it had a one-time amount of on-site land disposal due to discontinued operations related to mining. Texas and Ohio had the second- and third-largest amounts of on-site releases—each reporting more than 80,000 tonnes. These three jurisdictions were responsible for almost one-quarter (24 percent) of all on-site releases of chemicals in North America in 2002 (**Chapter 5**, Table 5–2).

Facilities Reporting the Largest Releases

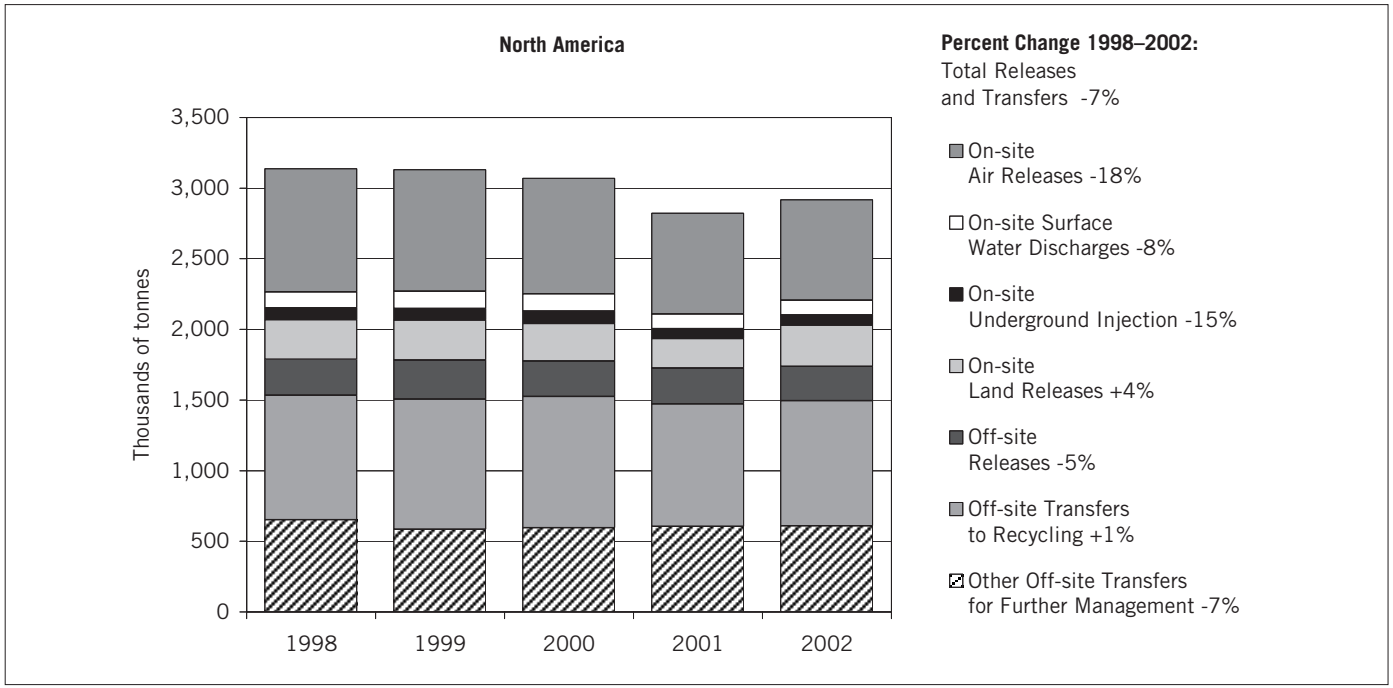
In North America, a relatively small number of facilities account for a large proportion of releases. The 20 facilities with the largest total releases (on- and off-site) accounted for 20 percent of total releases reported in 2002 (Table 1). Nineteen of the 20 facilities were located in the United States. Ten were primary metals facilities, five were electric utilities, three were chemical manufacturers and two were hazardous waste management/ solvent recovery facilities. (See **Chapter 5**, Table 5–5 for additional top facilities.)

Table 1. The 20 North American Facilities with the Largest Total Reported Amounts of Releases On- and Off-site, 2002

Rank	Facility	City, Province/State	SIC Codes Canada	SIC Codes US	Number of Forms	Total On-site Releases (kg)	Total Off-site Releases (kg)	Total On-site and Off-site Releases Reported (kg)	Major Chemicals Reported (Primary Media/ Transfers) (chemicals accounting for more than 70% of total reported releases from the facility)
1	BHP Copper N.A., San Manuel Ops.	San Manuel, AZ		33	7	111,224,621	1,043	111,225,664	Copper/Manganese and compounds (land)
2	ASARCO Inc., Ray Complex Hayden Smelter & Concentrator, Americas Mining Corp.	Hayden, AZ		33	12	15,586,734	1,303	15,588,037	Copper/Zinc and compounds (land)
3	US Ecology Idaho Inc., American Ecology Corp.	Grand View, ID		495/738	15	12,688,715	0	12,688,715	Zinc and compounds (land)
4	National Steel Corp. Greatlakes Ops.	Ecorse, MI		33	23	124,017	12,492,672	12,616,689	Zinc and compounds (transfers of metals)
5	Nucor Steel, Nucor Corp.	Crawfordsville, IN		33	11	17,629	12,375,940	12,393,569	Zinc and compounds (transfers of metals)
6	Zinc Corp. of America, Monaca Smelter, Horsehead Inds.	Monaca, PA		33	12	437,669	11,731,187	12,168,856	Zinc and compounds (transfers of metals)
7	Solutia Inc.	Cantonment, FL		28	22	11,411,311	1,562	11,412,873	Nitric acid and nitrate compounds (UIJ)
8	Steel Dynamics Inc.	Butler, IN		33	16	275,571	10,420,512	10,696,082	Zinc and compounds (transfers of metals)
9	AK Steel Corp. (Rockport Works)	Rockport, IN		33	8	10,291,162	223,265	10,514,427	Nitric acid and nitrate compounds (water)
10	Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT		33	17	10,096,046	4,339	10,100,384	Copper/Zinc and compounds (land)
11	Georgia Power, Bowen Steam Electric Generating Plant, Southern Co.	Cartersville, GA		491/493	14	9,760,636	2	9,760,638	Hydrochloric acid (air)
12	Peoria Disposal Co. 1, Coulter Cos. Inc.	Peoria, IL		495/738	7	9,287,268	5	9,287,273	Zinc and compounds (land)
13	American Electric Power, Amos Plant	Winfield, WV		491/493	13	8,344,553	434,273	8,778,826	Hydrochloric acid (air)
14	Lenzing Fibers Corp.	Lowland, TN		28	10	8,417,073	0	8,417,073	Carbon disulfide (air)
15	BASF Corp.	Freeport, TX		28	27	8,157,457	19,233	8,176,690	Nitric acid and nitrate compounds (water)
16	Rouge Steel Co., Rouge Inds. Inc.	Dearborn, MI		33	11	33,573	8,095,377	8,128,950	Zinc and compounds (transfers of metals)
17	Ontario Power Generation Inc, Nanticoke Generating Station	Nanticoke, ON	49	491/493	15	7,983,133	0	7,983,133	Hydrochloric acid (air)
18	US TVA Johnsonville Fossil Plant	New Johnsonville, TN		491/493	14	7,802,074	5,422	7,807,496	Hydrochloric acid (air)
19	Nucor Steel, Nucor Corp.	Huger, SC		33	9	22,946	7,743,059	7,766,005	Zinc and compounds (transfers of metals)
20	Reliant Energy, Keystone Power Plant	Shelocta, PA		491/493	12	7,688,282	2	7,688,284	Hydrochloric acid (air)
	Subtotal				**275**	**239,650,469**	**63,549,195**	**303,199,665**	
	% of Total				**0.3**	**19**	**24**	**20**	
	Total				**84,654**	**1,273,863,312**	**269,421,125**	**1,543,284,437**	

Note: Canada and US only. Mexico data not available for 2002. The data are estimates of releases and transfers of chemicals as reported by facilities and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements.
UIJ = underground injection.

Figure 5. Change in Releases and Transfers in North America, 1998–2002



Note: Canada and US data only. Mexico data not available for 1998–2002. Data include 153 chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data, in combination with other information, can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.

Changes Over Time, 1998–2002

Taking Stock presents analyses of changes in releases and transfers over time. The data in this section have been consistently reported over the 1998–2002 period and include:

- 153 chemicals; and
- manufacturing facilities, electric utilities, hazardous waste management facilities, chemical wholesalers, and coal mines.

These data are therefore a subset of the 2002 data presented earlier. Analyses of 1998–2002 data are presented in **Chapter 6**.

Changes in Releases and Transfers from 1998 to 2002

Total releases and transfers of chemicals in North America decreased by 7 percent from 1998 to 2002. Total releases decreased by 11 percent, on-site releases decreased by 13 percent, off-site releases decreased by 5 percent and other transfers for further management decreased by 7 percent. Transfers to recycling increased by 1 percent over the same period (Figure 5 and Chapter 6, Table 6–1).

Compared with a decrease in total releases of 11 percent for all matched chemicals from 1998 to 2002, releases of carcinogens decreased by 26 percent and chemicals known to cause cancer, reproductive or development harm (California Proposition 65 chemicals) decreased by 31 percent. (See Chapter 9, Figures 9–2 and 9–5.)

There was an increase from 2001 to 2002 of 95.3 thousand tones for all matched chemicals, including increases in on-site land releases (primarily due to one facility's reports), transfers to recycling of metals (of 3 percent), transfers to treatment (5 percent) and transfers to sewage (3 percent). One primary metals facility that reported an increase of 110.5 thousand tonnes, primarily as on-site land disposal of copper and manganese compounds, from 2001 to 2002. The facility reported that it had a one-time amount of on-site land disposal due to discontinued operations related to mining. Without reporting by this one facility, total releases and transfers showed a decrease of 1 percent from 2001 to 2002.

Industry Sectors Changes from 1998 to 2002

The industry sectors with the largest total releases and transfers in both 1998 and 2002 were:

- primary metals, with an increase of 7 percent,
- chemicals and electric utilities, each reporting an approximately 7-percent decrease; and
- the hazardous waste management/solvent recovery sector, with a 31-percent reduction.

Four industry sectors reported overall increases in total releases from 1998 to 2002. The primary metals sector had an increase of 10 percent (33.3 thousand tonnes) due to reporting by one facility with an increase of 108.9 thousand tonnes. The food products industry had a 49-percent increase (of 14.8 thousand tonnes). The lumber and wood products sector and the stone/clay/glass sector each reported a 12-percent increase (of more than 1.5 thousand tonnes). (See **Chapter 6**, Table 6–3.)

States and Provinces with Largest Change in Releases and Transfers from 1998 to 2002

The states and provinces with the largest decreases from 1998 to 2002 were (see **Chapter 6**, Table 6–2):

- Ohio, with a decrease of 75,100 tonnes (28 percent) in releases and transfers. Ohio had the largest total releases and transfers in 1998 and the third-largest in 2002, behind Texas and Ontario. Ohio also had the largest decreases in total reported releases, with a reduction of 37,800 tonnes, or 28 percent. One hazardous waste management facility, Envirosafe Services of Ohio, in Oregon, Ohio, reported a reduction of more than 15,100 tonnes, mainly in on-site land releases.
- Michigan, with a decrease of 31,200 tonnes (14 percent) in releases and transfers, including a decrease of 13,200 tonnes of transfers to recycling and 18,700 tonnes of other transfers for further management.
- Utah, with a decrease of 25,300 tonnes, including the second-largest decrease in total releases behind Ohio. One facility, Magnesium Corp. of America in Rowley, Utah, reported a reduction of 19,500 tonnes, primarily of chlorine air releases.

The states and provinces with the largest increases from 1998 to 2002 were (see **Chapter 6**, Table 6–2):

- Arizona, with an increase of 88,400 tonnes (191 percent), due to an increase reported by one primary metals facility, BHP Copper in San Manuel, Arizona, which had a one-time amount of on-site land disposal due to discontinued operations related to mining.
- Arkansas, with an increase of 17,600 tonnes (40 percent) in total releases and transfers, mainly in other transfers for further management (transfers to energy recovery). Total releases in Arkansas decreased by 5,900 tonnes.
- Kansas, with an increase of 11,600 tonnes (41 percent) in total releases and transfers. Kansas had an increase in transfers for further management of 22,400 tonnes, but total releases decreased by 6,900 tonnes.
- Indiana reported the second-largest increase in total releases, with an increase of 11,500 tonnes (15 percent). One primary metals facility, AK Steel in Rockport, Indiana, did not report in 1998 and reported 9,700 tonnes of releases in 2002, mainly surface water discharges of nitrate compounds.
- British Columbia reported the third-largest increase in total releases—8,100 tonnes (127 percent). Four pulp and paper mills in British Columbia were among the ten facilities in NPRI with the largest increases in total releases. These facilities indicated that the increases were due to improved estimates and production increases.

Query Builder

http://www.cec.org/takingstock/

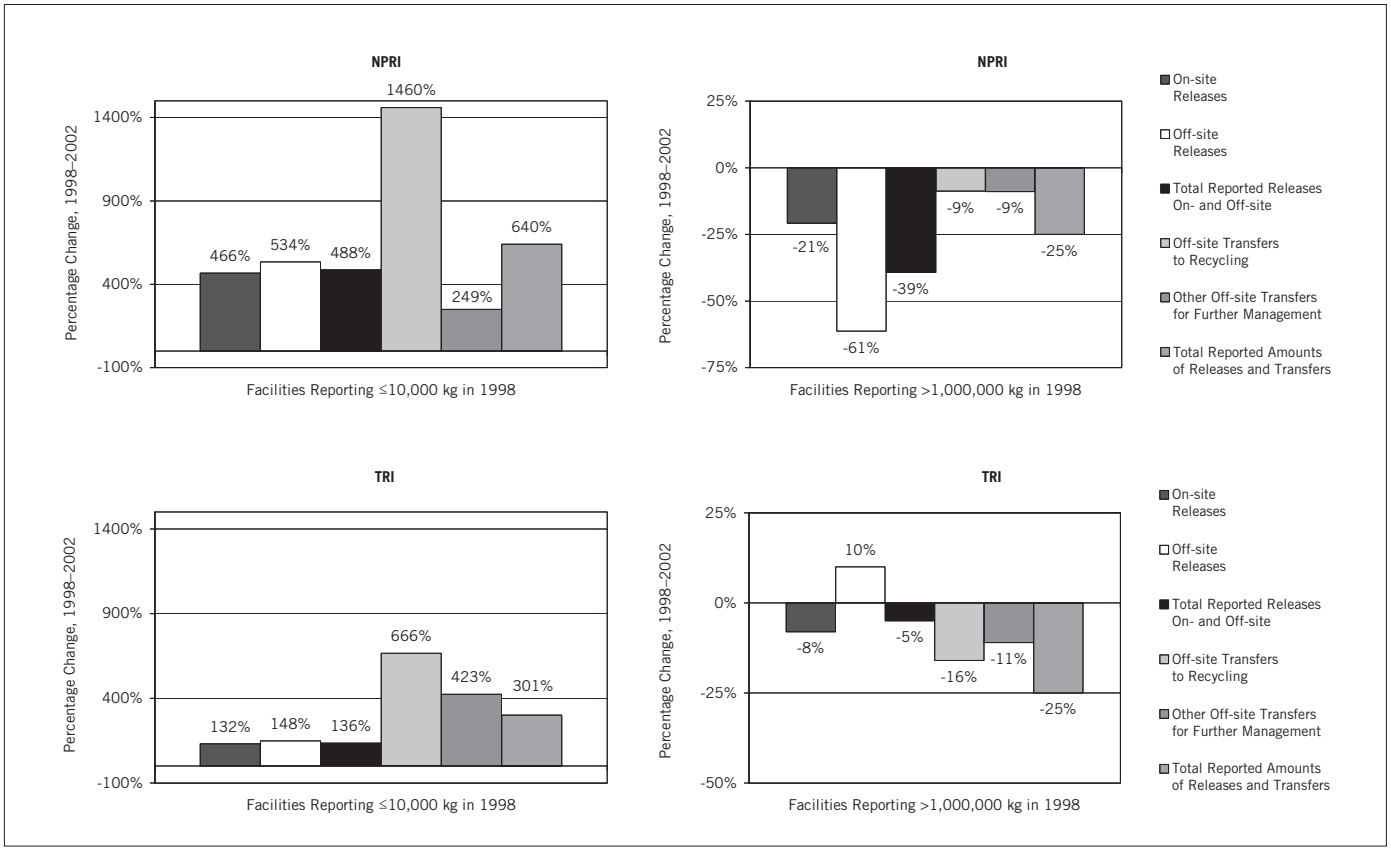
To find out which facilities had the largest amounts in your provice or state using *Taking Stock Online*:

1. select **Facility** report.
2. select the **year 2002**.
3. select **Your Province or State** for the geographic area,
   select **All** for the chemical,
   select **All industries** for the industrial sector.
4. select **Total releases**.

Then click on ✓ **Run the query**

Then go to the column titled "Total Releases" and click on the **up arrow** to get the 10 facilities with the largest amounts.

Figure 6. Percentage Change in Total Reported Amounts of Releases and Transfers in NPRI and TRI, by Facilities Reporting in Both Years, 1998 and 2002



Note: Does not include facilities reporting only in 1998 or only in 2002 and does not include 31 facilities that reported less than 100,000 kg in 1998 and more than 1,000,000 kg in 2002.

Top-Reporting Facilities Reported Decreases while others Showed Overall Increases

The overall changes in releases and transfers within a jurisdiction, nation or sector are often dominated by changes in the group of facilities reporting the largest releases and transfers. However, the facilities reporting smaller releases and transfers also tell an important story. These much more numerous facilities, located in communities throughout Canada and the United States, are increasing in every category: on-site releases, off-site releases and transfers.

There were 615 facilities that reported 1,000 tonnes or more of releases and transfers in 1998. This group of largest reporters released and transferred over 1.7 million tonnes in 1998 and had an overall reduction of 10 percent from 1998 to 2002. The group of largest reporters represented over half of the releases and transfers in 2002 but just 4 percent of the facilities reporting in both 1998 and 2002 (Figure 6 and **Chapter 6,** Tables 6–9, 6–10 and 6–11).

In contrast, the 7,400 facilities reporting less than 10 tonnes in 1998 showed remarkably different patterns over the period from 1998 to 2002. While the group of largest reporters reported an overall decrease in their releases and transfers, the group of smaller reporters reported an overall increase of 323 percent, including substantial increases in all categories of releases and transfers, from 1998 to 2002.[1] For the remaining facilities, those with more than 10 tonnes but less than 100 tonnes also reported an overall increase (of 16 percent) although on-site releases for these facilities as a whole decreased (by 1 percent), and those with more than 100 tonnes but less than 1,000 tonnes reported on overall decrease (of 8 percent).

The overall pattern of increases for the smaller reporters and decreases for the largest reporters was true for both NPRI and TRI. However, there were notable differences between NPRI and TRI industry sectors within the groups.

For the NPRI group of smaller reporters, the paper products sector represented 39 percent of total releases for the group in 2002 and increased from 45 tonnes in 1998 to 1,500 tonnes in 2002. Some facilities in the paper industry in NPRI indicated that they changed their method of estimating releases, resulting in increased estimates, as well as increased production. (Generally, TRI paper facilities had made a similar change in their method of estimation during the 1994 reporting year.)

For the TRI group of smaller reporters, the food industry had the largest total releases in 2002, representing 21 percent of the total for the group. Their releases were almost 20-times larger in 2002 than in 1998. Ten TRI facilities in this group had increases greater than 175 tonnes, primarily in discharges of nitric acid and nitrate compounds to surface waters.

[1] This does not include 20 facilities reporting less than 100 tonnes in 1998 and greater than 1,000 tonnes in 2002.

Changes in Cross-Border Transfers from 1998 to 2002

Chemicals may be transferred off-site for disposal, treatment, energy recovery, or recycling. Most materials are transferred to sites within state and national boundaries. However, each year, some materials are sent outside the country.

Cross-border transfers from Canada to the United States increased by 25 percent from 1998 to 2002. Most transfers to the United States are of metals for recycling. (See Map 1 and Chapter 8, Table 8–11 and Figure 8-6.) Total transfers within Canada increased by 5 percent.

Cross-border transfers from the United States to Canada decreased by 44 percent from 1998 to 2002. Such transfers vary considerably from year to year, with some years (including 1998) totaling about 25,000 tonnes and other years (including 2002) about 14,000 tonnes. From 2001 to 2002, transfers from the United States to Canada decreased by 43 percent (10,900 tonnes), mainly due to the decrease reported by one hazardous waste facility, Petro-Chem Processing Group/Solvent Distillers Group in Detroit, Michigan, which reported 11,000 tonnes fewer transfers to energy recovery in 2001 than in 2002.

Transfers from the United States to Mexico increased by 48 percent from 1998 to 2002. More than 99 percent of such transfers are of metals for recycling. There was an increase of 15 percent from 2001 to 2002, after a decrease from 2000 to 2001. Canadian facilities did not report any transfers to Mexico. Data on the amount of transfers from Mexico to the United States are not available for the years 1998–2002.

The changes in cross-border transfers are largely a result of changes at a few facilities. Facilities in primary and fabricated metals sectors often change their transfer sites due to changes in metal prices offered by recyclers. Facilities in the hazardous waste sector have changed their transfer sites as a result of business consolidation, price or changes in services offered.

Map 1. Off-site Transfers Across North America, 1998–2002 (Amounts in Thousand Tonnes)

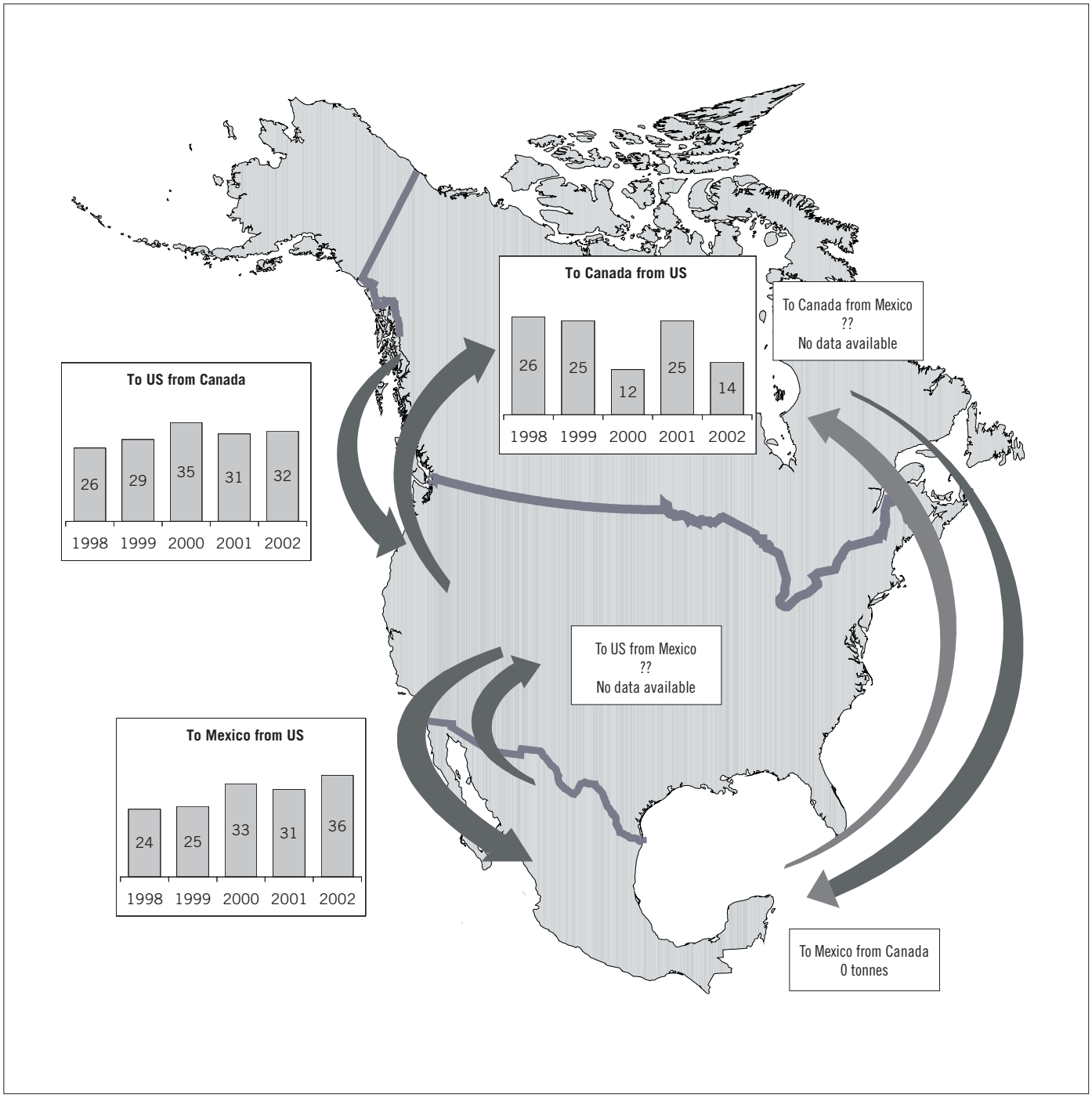
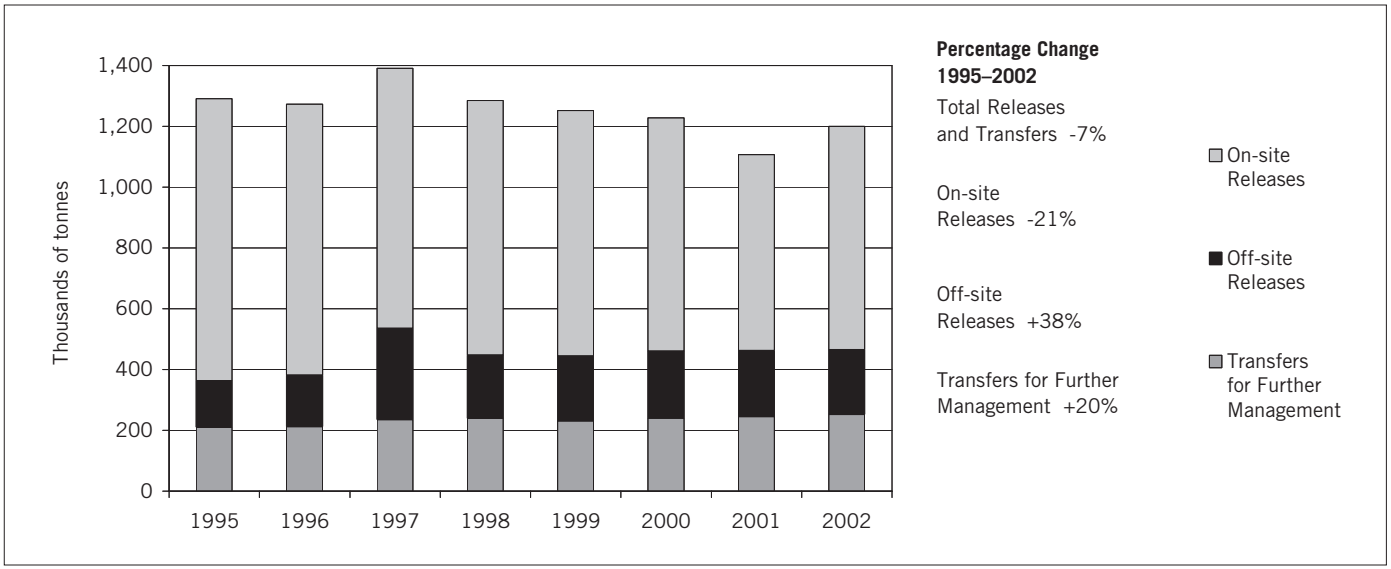


Figure 7. Total Releases and Transfers in North America, 1995–2002



Note: Canada and US only. Mexico data not available for 1995–2002.

Eight-Year Trends: 1995–2002 Results

Taking Stock 2002 can analyze trends in releases and transfers of chemicals in North America over the period from 1995 to 2002. The data in this section have been consistently reported over these eight years and include:

- 153 chemicals,
- manufacturing industries, and
- on- and off-site releases and transfers to treatment and sewage.

Analyses of the 1995–2002 trends are presented in **Chapter 7**.

Over the eight-year period from 1995 to 2002, total releases and transfers decreased by 7 percent, including a decrease of 9 percent for NPRI and 7 percent for TRI. On-site releases decreased by 21 percent, with a 15-percent decrease reported by NPRI facilities and a 21-percent decrease by TRI facilities. Off-site releases (transfers to disposal, mainly to landfills) decreased by 14 percent in NPRI; however, they increased by 49 percent in TRI, for a North American total increase of 38 percent. Transfers off-site for further management increased in both countries, with NPRI showing a 70-percent increase and TRI an 18-percent increase (Figure 7 and **Chapter 7**, Table 7–1 and Figures 7-2 and 7-3).

Most manufacturing industry sectors reported overall decreases. Chemical manufacturers reported the largest releases and transfers in 1995 and, with an 18-percent reduction, had the second-largest in 2002. The primary metals sector, with the second-largest total releases and transfers in 1995 had a 36-percent increase and the largest totals in 2002. The paper products sector had the third-largest totals in both 1995 and 2002, with a 22-percent reduction. (See **Chapter 7**, Table 7–3.)

Persistent Bioaccumlative Toxic Chemicals

Many persistent bioaccumulative toxic (PBT) chemicals were required to be reported to the North American PRTRs for the first time in 2000. These chemicals have properties that make them a long term environmental and health threat. Even small quantities are a concern because when PBTs are released into the environment, they persist (i.e., they do not break down easily into other compounds), meaning their exposure to humans and the environment can potentially occur over longer periods of time than with other chemicals. They can be transported in the atmosphere over long distances and end up far from the source of their release. They bioaccumulate in the food chain (increasing in concentration at higher levels), so exposure to these chemicals may arise through food consumption. They are also toxic, often causing damage to humans, plants and wildlife.

Because of reporting differences, PBT chemicals are generally not in the matched data set. Nevertheless, **Chapter 10** presents information available for lead, mercury, dioxins and furans, hexachlorobenzene, and polycyclic aromatic compounds. The implications of the reporting differences are presented as part of the continuing effort to enhance the comparability of the data.

Lead and its Compounds

Lead is a persistent, bioaccumulative toxic chemical. It is a probable human carcinogen and a recognized developmental toxicant and recognized reproductive toxicant (California Proposition 65). Lead is considered a hazardous air pollutant under the US Clean Air Act and a Priority Pollutant under the US Clean Water Act. Lead and its compounds are considered toxic under the Canadian Environmental Protection Act.

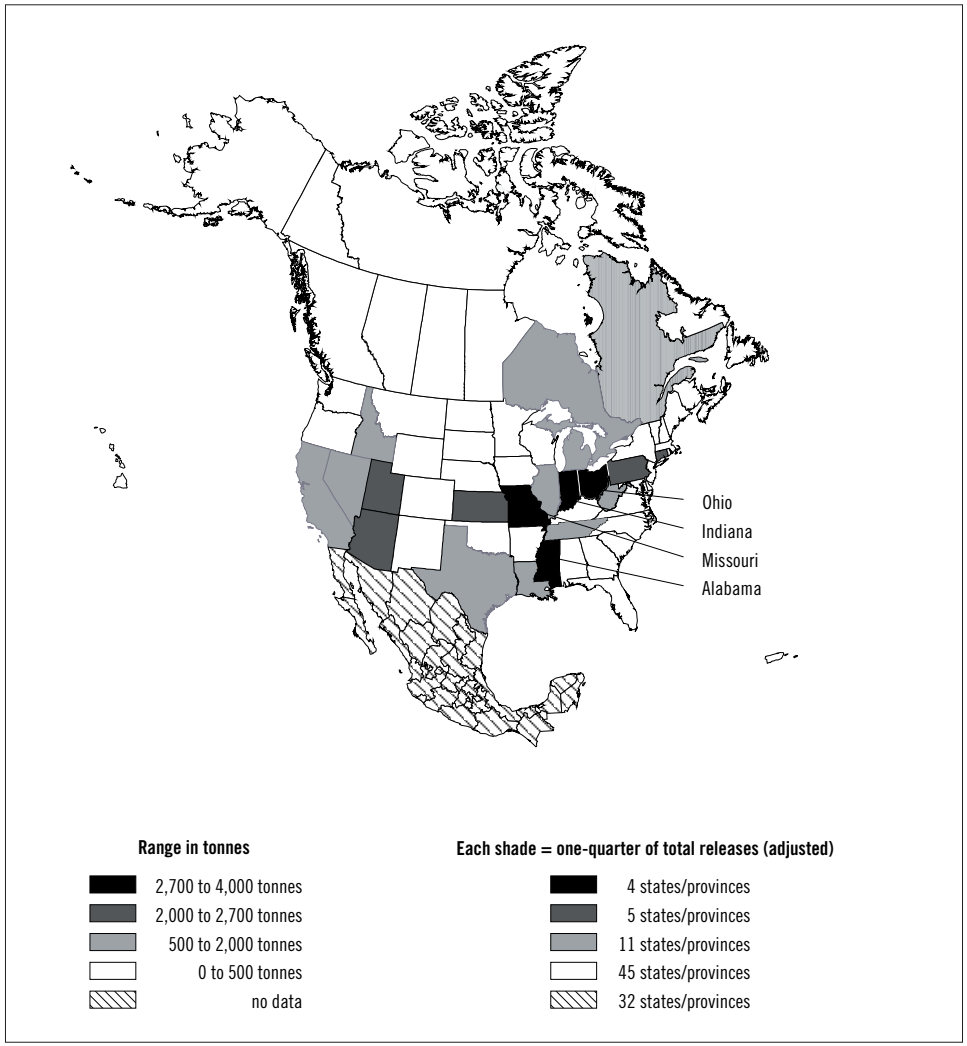
Children are especially sensitive to lead. It can damage a child's developing brain, kidneys and reproductive system. Even low levels of lead are associated with learning disabilities, behavioral problems, impaired growth and hearing loss. Lead is stored in the bones, where it accumulates over time and remains for long periods. Therefore, mothers exposed to lead in the past may have higher levels of lead in their bones, which can cause impaired mental development in their infants. Effects of lead can also be irreversible, affecting IQ and school achievement.

Both TRI and NPRI have lowered the reporting threshold for lead and its compounds, TRI for the 2001 reporting year and NPRI for the 2002 reporting year. The threshold was lowered from approximately 10 tonnes to approximately 50 kg, giving a more complete picture of releases and transfers of lead from industrial sources.

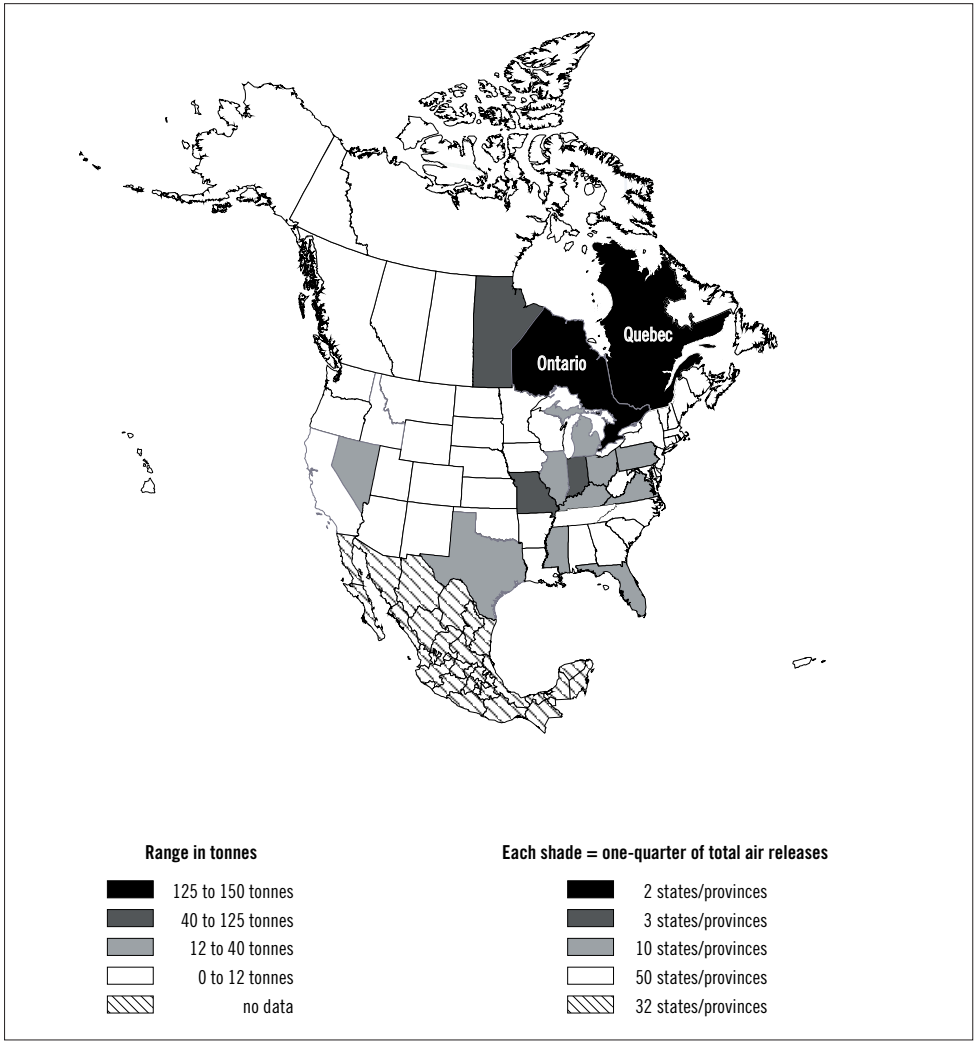
Lead is a metal primarily produced by the mining and smelting of ores and secondarily through recycling. Lead is found in a wide variety of products: lead acid batteries used in vehicles, pigments, plastics, glass, electronics, plumbing, cigarettes, ammunition and consumer products such as jewelry and pottery.

Most of the lead in the environment is from air emissions. Larger lead-bearing particles can fall out of the air close to the source of release, or if the lead is bound to

Map 2. Largest Sources of Total Releases On-site and Off-site (adjusted) of Lead and its Compounds in North America, 2002: States and Provinces



Map 3. Largest Sources of On-site Air Releases of Lead and its Compounds in North America, 2002: States and Provinces



very fine particles, it can travel thousands of miles from its source and be deposited onto the ground or water by dry fallout, or be precipitated by rain, snow or fog. Lead levels can be high due to local sources, such as deteriorating lead-based paint, lead contaminated dust, drinking water passing through leaded pipes, cigarette smoke, clothes and materials contaminated from working in a plant using lead such as metal processing plants, battery manufacturers, and electronics plants, as well as from long range transport.

Based on the matched TRI and NPRI data, 8,703 industrial facilities in North America reported on lead in 2002. Over three-quarters of these facilities had not reported on lead and its compounds in 2000, under the higher threshold.

Almost 211,200 tonnes of releases and transfers of lead and its compounds were reported in 2002, including 961 tonnes in on-site air releases and 67 tonnes in on-site surface water discharges. More than three-quarters of total reported amounts of lead and its compounds was transferred for recycling. Primary metals facilities reported 39 percent of total releases, including 66 percent of the air releases and 19 percent of the surface water discharges. Hazardous waste management facilities reported 33 percent of total releases, including 38 percent of on-site land releases. Electric utilities reported 13 percent of air releases and 26 percent of surface water discharges. (See **Chapter 10**, Table 10–3.)

TRI and NPRI had different patterns for lead releases. While NPRI represented 5 percent of facilities reporting lead and its compounds, they accounted for 42 percent of the on-site air releases. Three NPRI facilities—Hudson Bay Mining and Smelting Company in Flin Flon, Manitoba, Noranda Horne Smelter in Rouyn-Noranda, Quebec and Inco Limited, Copper Cliff Smelter Complex in Copper Cliff, Ontario—reported the largest air releases of lead and its compounds in 2002, together accounting for 30 percent of all air releases (almost 291 tonnes). On the other hand, of the ten facilities with the largest surface water releases, nine were TRI facilities. They included Kennedy Valve, owned by McWane Inc. in Elmira, New York, which accounted for 10 percent (almost 7 tonnes) of the total surface water discharges, and PCS Nitrogen Fertilizer in Geismar, Louisiana, with 7 percent (almost 5 tonnes) of the total. Six electric utilities, all located in the US, were among the ten facilities with the largest surface water discharges of lead and its compounds in 2002. Some of these facilities were located in the states and provinces with the largest total releases and largest air releases in 2002. (See Maps 2 and 3 and **Chapter 10**, Tables 10-2, 10-5 and 10-6.)

Transfers of lead and its compounds for recycling accounted for 77 percent of total releases and transfers in 2002. The electronic/electrical equipment manufacturing sector reported the largest portion, with 55 percent of all transfers to recycling from this sector and about 1 percent of the total releases in 2002. (See **Chapter 10**, Table 10-8.)

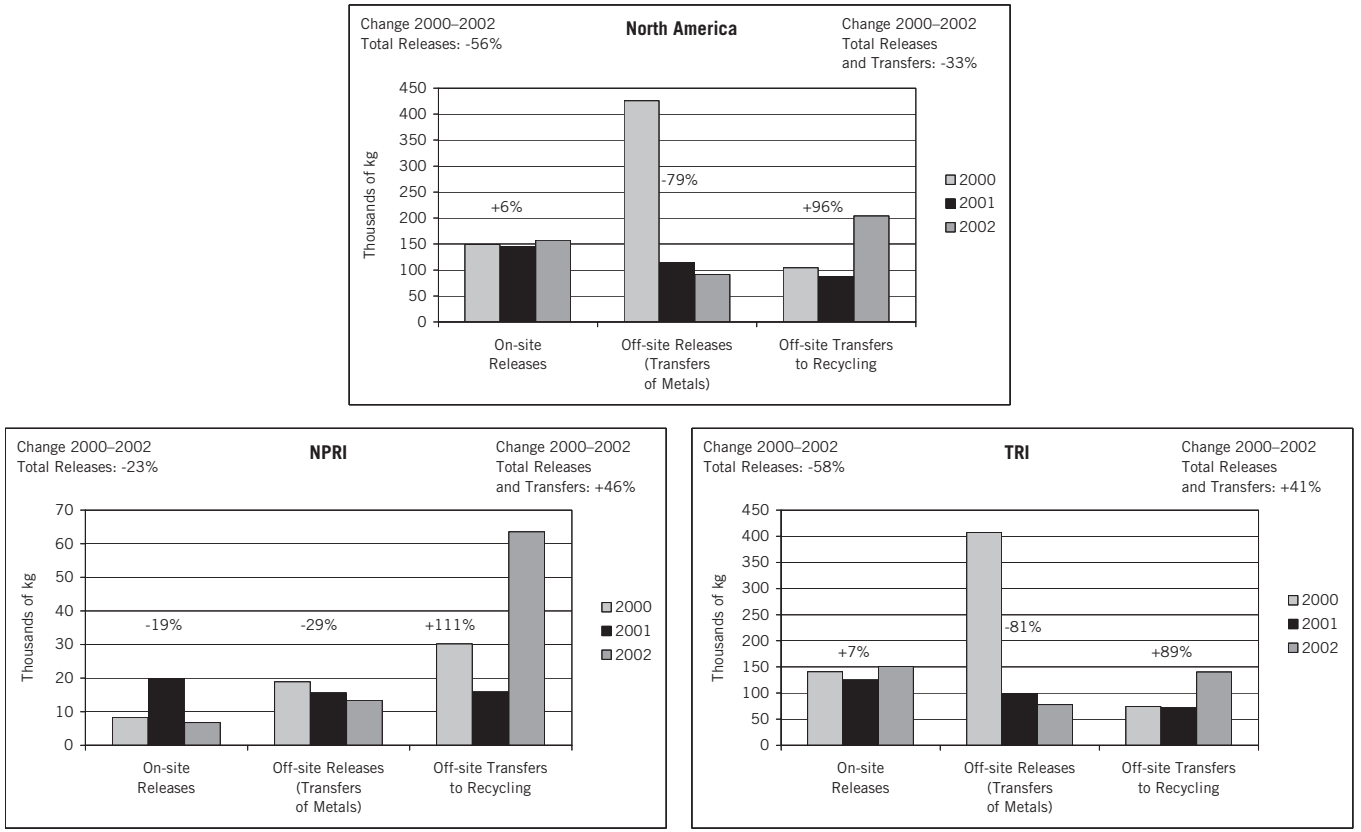
Mercury and its Compounds

Mercury can cause neurological and developmental damage, especially in children. A major pathway of human exposure to mercury is through the food chain. Mercury in the air is deposited in water or runs off the land into water. It bioaccumulates in fish, and humans are exposed through their consumption of fish, shellfish and marine mammals.

Both TRI and NPRI lowered the reporting threshold for mercury and its compounds for the 2000 reporting year. Based on the matched TRI and NPRI data, 1,787 facilities in North America reported almost 453,300 kg of releases and transfers of mercury and its compounds in 2002, including 65,900 kg in on-site air releases and 608 kg in on-site surface water discharges. Electric utilities reported 65 percent of the air releases and 38 percent of the surface water discharges. Hazardous waste management facilities reported 40 percent of total releases and transfers, including 26 percent of on-site land releases and 53 percent of transfers to recycling. (See **Chapter 10**, Tables 10–16 and 10–18.)

Total releases of mercury and its compounds decreased by 56 percent from 2000 to 2002, including a 10-percent reduction in on-site air releases and a 48-percent reduction in on-site surface water discharges. TRI facilities reported a decrease of 58 percent in total releases of mercury and its compounds. NPRI facilities reported a decrease of 23 percent. Both TRI and NPRI showed a decrease of 10 percent in air releases of mercury and its compounds. (See Figure 8 and **Chapter 10**, Table 10–22.)

Figure 8. Releases and Transfers in North America for Mercury and its Compounds, NPRI and TRI, 2000–2002



Note: Canada and US data only. Mexico data not available for 2000–2002.

Dioxins and Furans

Dioxin and furans are persistent, bioaccumulative toxics. They are a family of chemicals some members of which are considered to be carcinogens or suspected to be neurotoxicants, developmental toxicants and endocrine disruptors. Dioxins and furans can come from a number of sources, including incomplete combustion such as backyard burning, agricultural field burning, incineration, and industrial sources. Dioxins and furans can travel some distance from their source of release. Human exposure to dioxins and furans occurs largely through food. Dioxins and furans enter the food chain when animals eat contaminated plants or feed, or when fish consume contaminated water or food.

Dioxins and furans were required to be reported to NPRI and TRI for the first time in the 2000 reporting year. However, the reporting requirements differ so the data on dioxins and furans are not comparable.

About 5 percent of all TRI facilities reported releasing or transferring dioxins and furans in 2002. TRI facilities reported a decrease of 12 percent in total releases on- and off-site of dioxins and furans from 2000 to 2002 (in grams-iTEQ), with chemical manufacturers reporting the largest amounts in all three years. (See **Chapter 10**, Table 10–30.)

Only certain NPRI facilities must report on dioxins and furans, based on activities or processes used at the facility. About 11 percent of all NPRI facilities did so in 2002. They reported a 32-percent decrease in total releases on- and off-site from 2000 to 2002 (in grams-iTEQ), with the paper products industry reporting the largest amounts of releases in all three years. (See **Chapter 10**, Table 10–32.)

Criteria Air Contaminants

In 2002, for the first time, NPRI required reporting of air releases of a set of pollutants known as the criteria air contaminants. These pollutants are important as they contribute to environmental issues such as smog, acid rain, regional haze, and nutrient loading (eutrophication) and to health effects such as stroke, heart attack, respiratory illness, including asthma, bronchitis and emphysema, and premature mortality.

The Canadian NPRI added reporting on five criteria air contaminants for the 2002 reporting year. The United States has a preliminary draft National Emissions Inventory (NEI) for criteria air contaminants for 2002. The Mexican Annual Certificate of Operation (*Cédula de Operación Anual*—COA), Section 2, has mandatory reporting for three of the criteria air contaminants on the NPRI list for 2002.

Comparable criteria air contaminants data from Canada and the United States include data on:

- carbon monoxide,
- nitrogen oxides,
- particulate matter (PM_{10} and $PM_{2.5}$),
- sulfur dioxide, and
- volatile organic compounds.

Comparable data from all three countries include:

- nitrogen oxides,
- sulfur dioxide, and
- volatile organic compounds.

Comparable data from each of the countries' databases are selected based on the US NEI thresholds which are higher than reporting in Canada and Mexico (see **Chapter 3**, Table 3–2). For the three-country analysis, further selection is based on the industry sectors required to report to the Mexican COA (see **Chapter 3**, Table 3–3).

While these databases contain information on air releases of criteria air contaminants from industrial sources, there may be differences in methodology between them. For example, estimation methods for specific sectors may differ, threshold for reporting differ and classification of industrial sectors may differ. Also, the US data are preliminary draft data as of February 2005. However, they are the best available sources for facility specific information about criteria air contaminants in 2002.

The data are only from industrial sources. For some of the criteria air contaminants, other sources such as transportation vehicles, construction sites, open burning and agricultural activities are much larger sources than industrial facilities. This is especially true for carbon monoxide, whose major source includes motor vehicles, and particulates, whose major sources are construction sites, unpaved roads, wood burning and tilled fields.

Criteria air contaminants are emitted from a variety of sources including fuel combustion, industrial processes, vehicles (mobile sources), and agricultural activities. (See Box below.)

Industrial and combustion processes are major sources of sulfur dioxide. Mobile sources, such as cars, trucks and off-road vehicles are major sources of volatile organic compounds and, in urban areas, of carbon monoxide. Both industrial and mobile sources contribute significantly to emissions of nitrogen oxides. Direct emissions of particulate matter (called primary particulate matter) more often comes from other sources such as construction sites, unpaved roads, tilled fields, and wood burning. Sulfur dioxide, nitrogen oxides and volatile organic compounds can become secondary particulate matter, formed chemically in the atmosphere rather than emitted directly from a source. The amount of secondary particulate matter formed in the atmosphere is not included in a national inventory as they are not direct emissions.

Largest Sources of Criteria Air Contaminants

	Fuel Combustion	Industrial Sources	Mobile (Transportation) Sources	Other
Carbon monoxide			√	
Nitrogen oxides		√	√	
Particulates				√
Sulfur dioxide	√	√		
Volatile organic compounds	√	√		

Nitrogen Oxides

Nitrogen oxides (NO_x) are a group of gases that can irritate the lungs, cause bronchitis and pneumonia and increase susceptibility to respiratory infection. Nitrogen oxides are of concern because of their role in ozone, acid rain and particulate matter formation and in eutrophication. Nitrogen oxides are created during combustion. Transportation, utilities, incineration and primary metals production are large sources of NO_x.

Selection of the Canadian NPRI, Mexican COA and the US NEI data for just those industry sectors required to report to the Mexican COA and those reporting above the US NEI threshold results in data from 4,074 facilities and 9.8 million tonnes of air releases of nitrogen oxides from these industrial facilities in North America (see Figures 9 and 10 and **Chapter 3**, Table 3–7).

- United States facilities accounted for 61 percent, Mexican facilities for 34 percent and Canadian facilities for 5 percent of the total air releases of nitrogen oxides from this matched set of facilities.
- In all three countries, electric utilities reported the largest amounts of nitrogen oxides in 2002.
- In Canada, electric utilities accounted for 54 percent of nitrogen oxide air emissions, followed by oil and gas extraction facilities with 15 percent.
- In Mexico, electric utilities accounted for 61 percent, followed by oil and gas extraction facilities with 15 percent.
- In the United States, electric utilities accounted for 78 percent of nitrogen oxide air emissions, followed by stone/clay/glass and concrete manufacturers with 5 percent.

Figure 9. North American Air Releases of Criteria Air Contaminants, by Country, 2002: Nitrogen Oxides

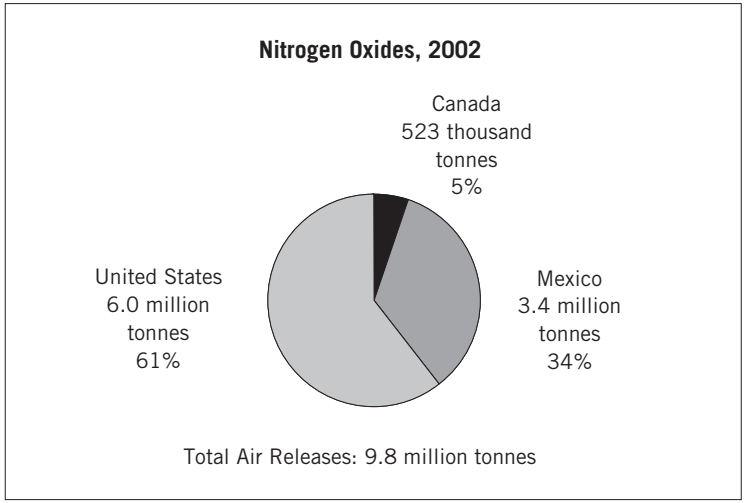
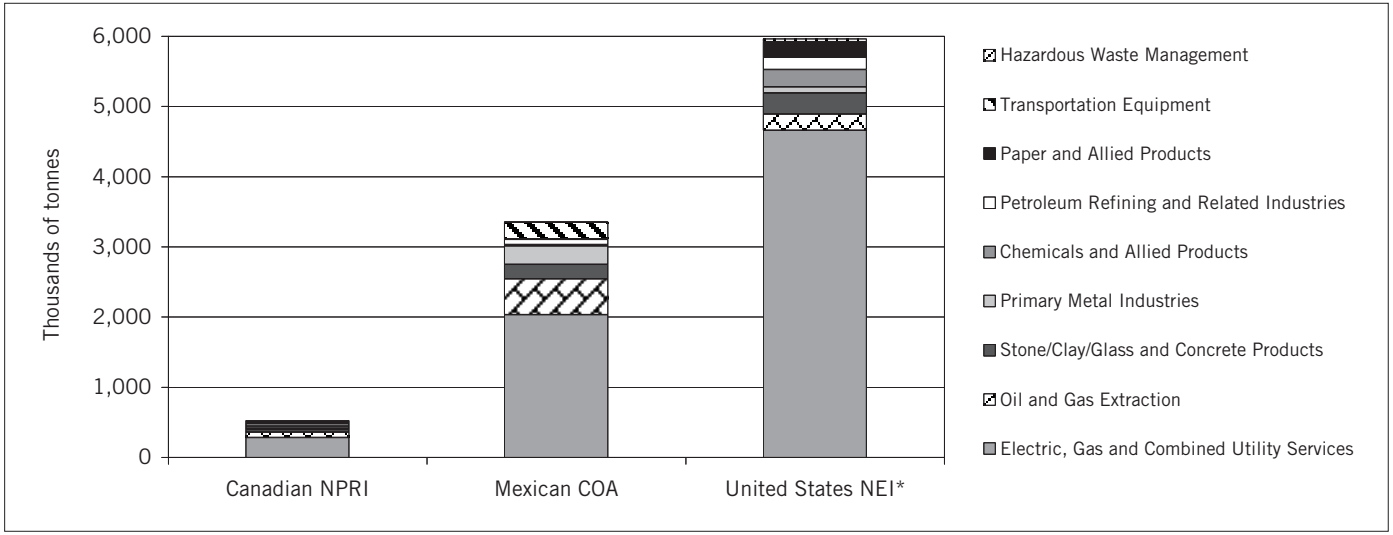


Figure 10. North American Air Releases of Criteria Air Contaminants, by Industry, 2002: Nitrogen Oxides



* Preliminary draft data from US National Emissions Inventory as of February 2005.

Figure 11. North American Air Releases of Criteria Air Contaminants, by Country, 2002: Sulfur Dioxide

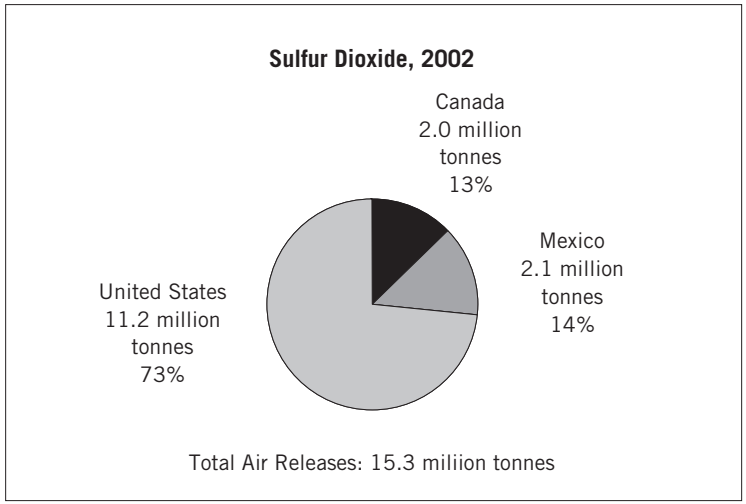
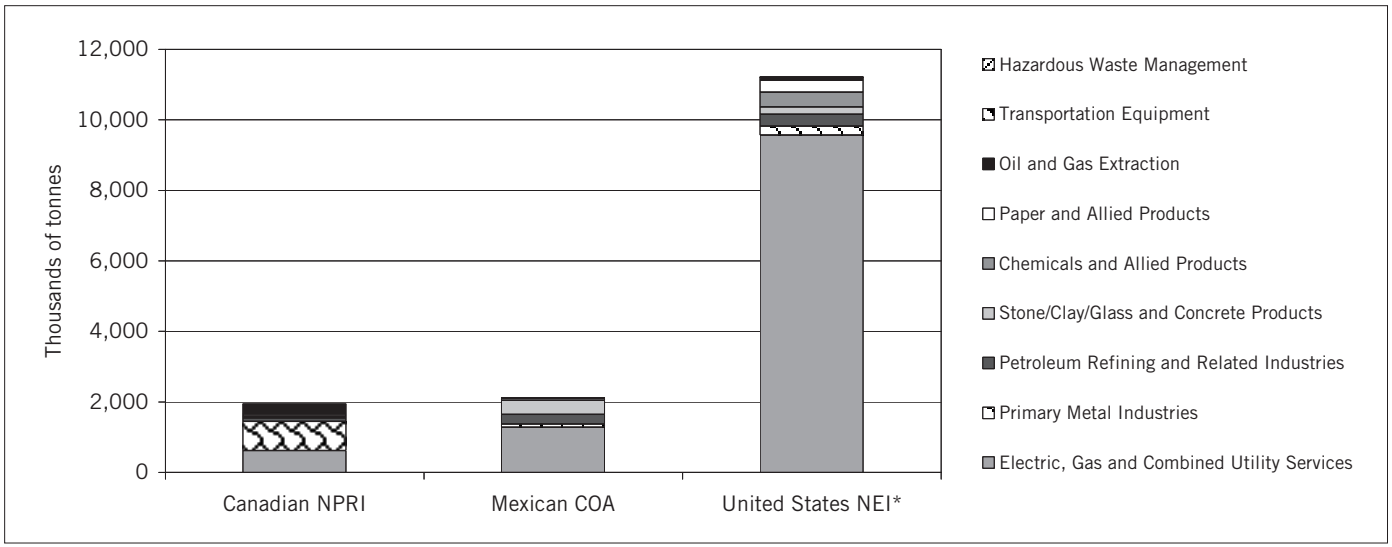


Figure 12. North American Air Releases of Criteria Air Contaminants, by Industry, 2002: Sulfur Dioxide



* Preliminary draft data from US National Emissions Inventory as of February 2005.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, pungent gas, which can react with other chemicals in the atmosphere to form sulfate particles. Health effects include premature death, increased respiratory symptoms and disease, decreased lung function, and alterations in lung tissue and structure and in respiratory tract defense mechanisms.

SO_2 emissions are also a major contributor to acid deposition, commonly known as "acid rain," which can result in harm to fish and other aquatic life, forests, crops, buildings, and monuments. Fine particles formed from SO_2 emissions also are significant contributors to poor visibility at scenic panoramas across North America because the particles efficiently scatter natural light, thus creating hazy views.

Sulfur dioxide is emitted primarily from fuel combustion, followed by industrial processes such as smelters, steel mills, refineries and pulp and paper mills, and then transportation.

Selection of the Canadian NPRI, Mexican COA and the US NEI data for just those industry sectors required to report to the Mexican COA and those reporting above the US NEI threshold results in data from 2,075 facilities and 15.3 million tonnes of air releases of sulfur dioxide from these facilities in North America (see Figures 11 and 12 and **Chapter 3** Table 3-9).

- US facilities accounted for 73 percent, Mexican facilities for 14 percent and Canadian facilities for 13 percent of the total air releases of sulfur dioxide from this matched set of facilities.
- In both the United States and Mexico, electric utilities reported the largest amounts in 2002. For Canada, it was the primary metals sector that had the largest air releases of sulfur dioxide in 2002.
- In Canada, the primary metals sector accounted for 42 percent of sulfur dioxide air emissions, followed by electric utilities with 32 percent.

- In Mexico, electric utilities accounted for 60 percent, followed by stone/clay/glass and concrete manufacturers with 19 percent.
- In the United States, electric utilities accounted for 85 percent of sulfur dioxide air releases, followed by chemical manufacturers with 4 percent.

Volatile Organic Compounds (VOCs)

Volatile organic compounds are a large category of chemicals that share one characteristic, they evaporate or volatilize into the air. VOCs are one of the building blocks of ozone, a major component of smog. VOCs can also form particulates in the atmosphere. VOCs are a group of chemicals with varying environmental and health effects and they come from a wide range of sources, including vehicles, fossil fuel combustion, chemical and steel manufacturing, painting and stripping activities, petroleum refining and solvent use. There are also significant natural sources of VOCs, including transpiration from vegetation and forest fires.

Selection of the Canadian NPRI, Mexican COA and the US NEI data for just those industry sectors required to report to the Mexican COA and those reporting above the US NEI threshold results in data from 1,687 facilities and 743 thousand tonnes of air releases of volatile organic compounds from these facilities in North America (see Figures 13 and 14 and **Chapter 3** Table 3–10).

- US facilities accounted for 76 percent, Canadian facilities for 18 percent and Mexican facilities for 6 percent of the total air releases of volatile organic compounds from this matched set of industrial facilities.

The industry sectors reporting the largest amounts in the three countries differed.

- In Canada, the oil and gas extraction sector accounted for 43 percent of volatile organic compounds air emissions, followed by the paper products industry with 19 percent.
- In Mexico, chemical manufacturers accounted for 30 percent, followed by facilities making transportation

Figure 13. North American Air Releases of Criteria Air Contaminants, by Country, 2002: Volatile Organic Compounds

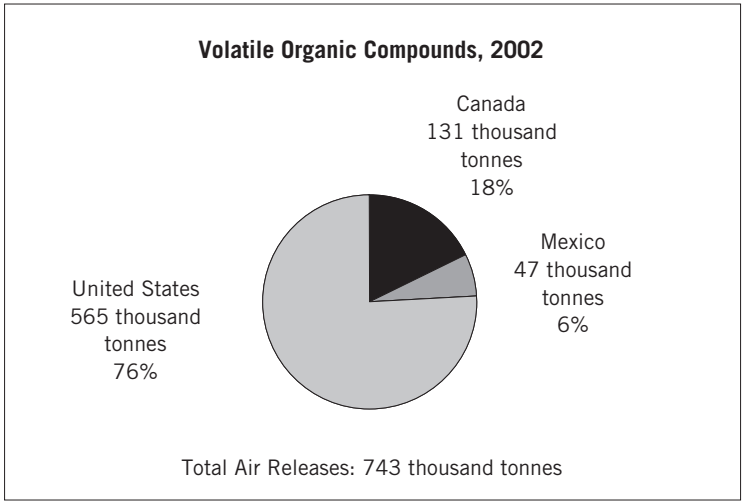
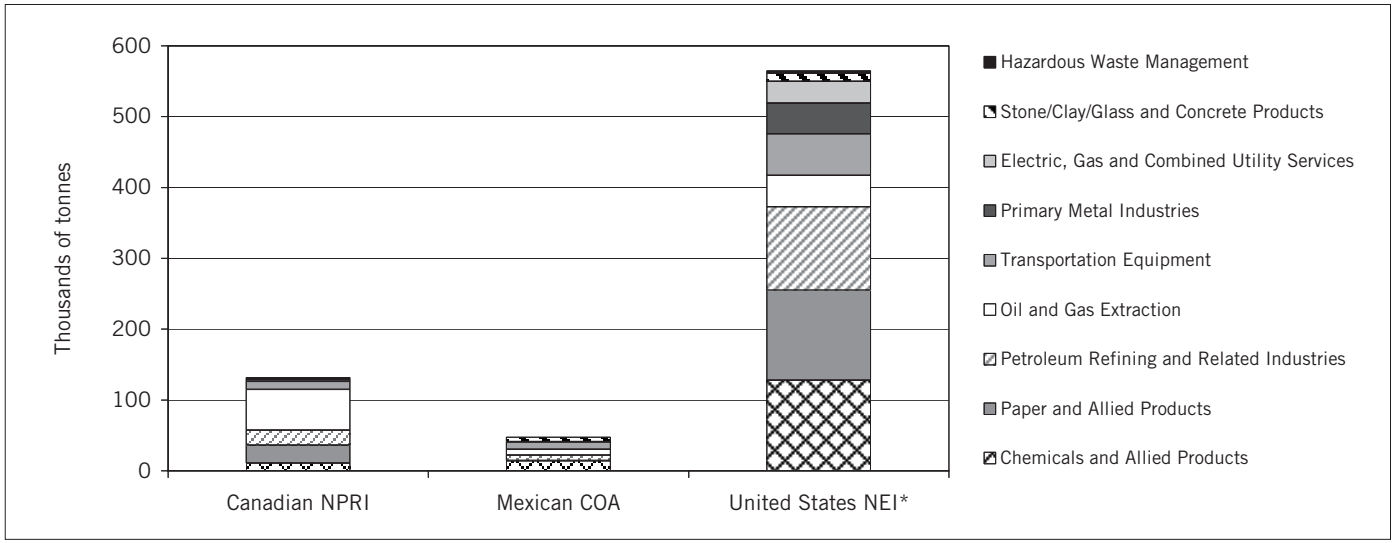


Figure 14. North American Air Releases of Criteria Air Contaminants, by Industry, 2002: Volatile Organic Compounds



* Preliminary draft data from US National Emissions Inventory as of February 2005.

equipment with 22 percent and the oil and gas extraction sector with 17 percent.
- In the United States, chemical manufacturers accounted for 23 percent of volatile organic compounds air releases, followed by the paper products industry with 22 percent and petroleum refiners with 21 percent.

Other Criteria Air Contaminants

Carbon monoxide and particulates (PM_{10} and $PM_{2.5}$) are also reported to the Canadian NPRI and can be matched to reporting under the US NEI, but not under the Mexican COA.

Carbon Monoxide

Carbon monoxide is a colorless, odorless and poisonous gas. When fuel is burned incompletely, carbon monoxide often results. Exposure to high levels of carbon monoxide has been linked to impaired vision, decreased work capacity, decreased learning ability and decreased performance of difficult tasks. Carbon monoxide can also contribute to the formation of smog.

The majority of carbon monoxide is emitted from vehicles (including cars, trucks and construction equipment), with smaller amounts from fuel combustion, wood burning stoves and industrial processes such as metal and chemical manufacturing.

A total of 673 facilities in Canada and the United States reported releases of carbon monoxide above the higher US NEI threshold. The 143 matched Canadian NPRI facilities reported almost 836,200 tonnes, and the 530 matched US NEI facilities 2.5 million tonnes.

- In NPRI, primary metals facilities, mainly aluminum smelters, reported 51 percent of the total, the lumber and wood products sector reported 14 percent and the paper products sector reported 12 percent.
- In the US NEI, primary metals facilities also represented the largest air releases of carbon monoxide, with 38 percent, followed by electric utilities, with 16 percent, and chemical manufacturers, with 14 percent.

Particulates

Particulate matter is all airborne solid and liquid particles, except pure water, that are microscopic in size. Particulates can contain many different types of chemicals such as sulfates, nitrates, ammonia, trace metals and carbon compounds.

Particulates vary in size. In general, the size of particulate matter is inversely proportional to its effect on human health because the smaller the particulate, the more likely it is to be carried deep into the lungs. Numerous studies have linked particulate matter to cardiac and respiratory problems such as asthma, bronchitis and emphysema.

Particulates can also reduce visibility by scattering and absorbing light. This reduced visibility or regional haze is becoming a significant problem in many areas in North America. Much of the haze is due to secondary particulate matter, which is formed when gases, especially sulfur oxides, convert into particulate matter in the atmosphere.

Particulates emitted directly into the air can come from such sources as cars, trucks and buses, industrial facilities, construction sites, unpaved roads, stone crushing and wood burning. Particles formed in the air from the chemical change of gases can result from fuel combustion in motor vehicles, at power plants, and in other industrial processes.

A total of 629 facilities in Canada and the United States reported on particulates less than 10 microns above the US NEI threshold. These facilities reported almost 268,100 tonnes of air releases of particulates less than 10 microns for 2002. However, these sources are dwarfed by other sources such as unpaved roads, agricultural areas and open burning, which accounted for 17.4 million tonnes in the United States in 2002 and 4.6 million tonnes in Canada in 2000.

A total of 384 facilities reported on particulates less than 2.5 microns above the US NEI threshold to NPRI and the US NEI. These facilities reported over 128,900 tonnes of air releases of particulates less than 2.5 microns for 2002.