TAKING STOCK

North American Pollutant Releases and Transfers 1996

COMMISSION FOR ENVIRONMENTAL COOPERATION

1999

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 this "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 April 1998 and the NPRI data set of July 1998 were used. The CEC is aware that changes have occurred to both data sets for the reporting year 1996 since this time that are not reflected in this report. These changes will be reflected in the next report, which will summarize the 1997 data and make year-to-year comparisons with previous years' data.

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For more information about this or other publications from the CEC, contact:

COMMISSION FOR ENVIRONMENTAL COOPERATION

393, rue St-Jacques Ouest, bureau 200

Montréal (Québec) Canada H2Y 1N9

Tel: (514) 350-4300 • Fax: (514) 350-4314

http://www.cec.org

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Chapter TAKING STOCK

Preface

Pollutant release and transfer registers (PRTRs) can provide important information on pollution management in a country and thus assist policymakers, industry and communities to set priorities and implement appropriate action. As the movement to establish PRTRs gains momentum globally, the North American countries are proud to be in the forefront of those that recognize the value of widespread dissemination of such information.

North Americans are fortunate that the Canadian and United States PRTR systems possess sufficient commonality to make comparative data gathering and analyses possible. This is because the two systems cover releases and transfers to all environmental media, require reporting on individual chemicals, collect data according to comparable industrial classifications, and cover at least the manufacturing sector as a reporting base. At the same time, it is also important to note that industrial facilities are not the only important sources of pollution. Sources that are not covered by the North American PRTRs include agriculture, transportation and small and medium-size enterprises. The information in this report provides us with part of the picture and encourages industry, communities and government to begin to assess their progress on a continental scale—a trend that will receive further impetus as the developing Mexican PRTR system begins to yield data.

This volume is the third such annual report in the Commission for Environmental Cooperation's (CEC) ongoing *Taking Stock* series, providing information on and comparing the North American PRTRs. As before, readers will notice significant changes in the latest report: analyses have been expanded and there is more discussion of the data context, of carcinogenic releases and transfers, and of metals. The CEC is committed to continually improving the *Taking Stock* report and making the North American pollutant data accessible and useful to more people. We can also expect to see further improvements in coming years as the US and Canadian PRTRs achieve more homogenous industrial coverage, particularly beginning with the 1998 reporting year, and as data from the developing Mexican PRTR system become available.

Officials from Environment Canada, INE and EPA have provided assistance and support vital to the development of this report. This past year we have worked with the following officials from these agencies: Canada—Steve McCauley, François Lavallée and Andy Bowcott; Mexico—Luis Sánchez and Arturo Morales; USA—Susan Hazen and John Harman.

The CEC would also like to thank the consultants who worked on the *Taking Stock* report: Hampshire Research Associates (USA)—Catherine Miller and Warren Muir, as well as Sharon Martin, John Howay and John Young; Environmental Economics International (Canada)—Sarah Rang; and Corporación Radian, S.A. de C.V. (Mexico)—José Antonio Ortega and Raphael Ramos.

I would also like to thank Lisa Nichols, CEC Program Manager for Technical Cooperation, for her efforts overseeing the CEC PRTR Program, and the CEC Publications staff for their efforts in bringing this volume to fruition.

Janine Ferretti
Executive Director

Executive Summary

North Americans are concerned about the effect of chemicals on their health, neighborhood and environment. Pollutant release and transfer registers (PRTRs) provide information on the amounts and types of chemicals being released into the air, land and water and transferred offsite from industrial facilities in North America.

The Commission for Environmental Cooperation (CEC) recognizes the importance of PRTRs, such as the Toxics Release Inventory in the United States, the National Pollutant Release Inventory in Canada, and the developing *Registro de Emisiones y Transferencia de Contaminantes* (RETC) in Mexico, for their potential to enhance the quality of the North American environment. This report, *Taking Stock 1996*, is the third of the CEC's annual studies of these programs and comparison of their data. It analyzes 1996 publicly available data from TRI and NPRI, compares 1995 and 1996 data and provides updates from the developing RETC program. As Mexico's RETC data become available, these will be incorporated into future *Taking Stock* reports.

The PRTR data used as the basis of the *Taking Stock* 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 the *Taking Stock* report. Likewise, small manufacturing companies which employee fewer than 10 employees or fall below the processing, manufactured or "otherwise used" thresholds are also not required to report to PRTRs. A limited number of chemicals are required to be reported to TRI (606) and NPRI (178)—far fewer than the tens of thousands estimated to be used in commerce. So while PRTR data can provide important information on releases and transfers of chemicals, this information needs to be seen as part of a larger pollution picture.

The report analyses the 165 chemicals and facilities in the industrial manufacturing sectors (US SIC codes 20 to 39) which are common to both TRI and NPRI data. This matched data set represents 60 percent of the total releases and transfers reported to the full NPRI database and 82 percent of those for TRI.

In the matched data set, over 1.23 billion kilograms of chemicals were released and transferred in North America in 1996. Releases were about two and one-half times larger than transfers in 1996 and, as in previous years, the largest releases occurred to air (**Figure 4–1**).

The United States, with 14 times the number of facilities reporting, continues to release and transfer more chemicals than Canada, contributing 90 percent of the North American total. Canada however, contributes more releases and transfers than would be expected given its size: with 7 percent of the facilities and forms, NPRI releases and transfers are 10 percent of the total matched database.

More than one-quarter of all North American releases in the matched data set come from four states and provinces: Texas, Louisiana, Ohio and Ontario. The same four areas also accounted for one-quarter of total releases and transfers, but in different rank order: Texas, Ontario, Louisiana, and Ohio (**Map 4–1** and **4–2**).

Among the more than 20,000 reporting facilities in North America, the 50 with the largest on-site releases contributed almost one-third of the total releases in North America. These facilities injected and released to land over 70 percent of the North American totals (**Figure 4–3**).

Not only are North American releases concentrated at a few facilities, a few chemicals account for most of the North American total. Five chemicals, methanol, zinc and its compounds, nitric acid and nitrate compounds, and toluene account for almost half of the total releases and transfers in North America (**Figure 4–7**).

One of every four forms submitted to TRI or NPRI was for a recognized or suspected carcinogen. This amounted to almost 189 million kilograms of carcinogens released or transferred in North America in 1996, about one-sixth of total North American releases and transfers for the year.

Two industrial sectors, the chemical industry and the primary metals industry, released or transferred larger amounts of chemicals than the other 19 industrial sectors combined. The chemical industry ranked first, releasing and transferring over 404 million kilograms, followed by the primary metals industry with 312 million kilograms.

Several differences, including off-site transfers and per form averages between TRI and NPRI, are explored in this report. Canadian facilities reported sending proportionately more (19 percent) matched chemicals off-site for disposal or containment than did US facilities (11 percent). On the other hand, Canadian facilities sent smaller quantities to sewage treatment plants than did US facilities (4 versus 8 percent).

NPRI facilities reported total releases and transfers per form that were one and one-half times larger than the average for TRI facilities. NPRI facilities averaged 28,881 kilograms of releases and transfers per form, while TRI averaged 19,019 kg per form. Larger average releases and transfers per form for NPRI facilities were seen in air releases (1.7 times larger per form in NPRI), transfers to treatment/destruction (1.6 times larger) and transfers to disposal/containment (2.5 times larger). For other types of releases, including releases to water, underground injection, land, and for transfers to sewage treatment plants, NPRI facilities reported slightly smaller average amounts than TRI facilities. Differences in reporting thresholds, chemical use or activity or industrial mix between NPRI and TRI were found not to account for the NPRI's larger average releases and transfers per form.

Analysis of changes in releases and transfers in NPRI and TRI over time highlight individual facilities, industrial sectors, or states and provinces reporting lower or higher releases and transfers.

Total releases and transfers reported to both NPRI and TRI decreased from 1995 to 1996. NPRI showed a 5 percent reduction, which is notable given the increased number of facilities and forms from 1995 to 1996. TRI showed a 2 percent reduction with decreasing number of facilities and forms. When total releases and transfers are separated, releases to both NPRI and TRI showed decreases (11 percent decrease for NPRI and 4 percent decrease for TRI). Transfers to both NPRI and TRI increased from 1995 to 1996 (10 percent for NPRI and 3 percent for TRI, see **Figure 6–1**).

Facilities also project their expected releases and transfers into the future in both systems. Both NPRI and TRI are projecting modest reductions in releases and transfers through 1998, with an 8 percent decrease for NPRI and a 6 percent decrease for TRI.

Pollution crosses boundaries. In 1996, TRI facilities transferred 71 million kilograms of pollutants out of the United States, with Canada being the main receiver (55 percent) closely followed by Mexico (42 percent). Most of the US transfers to Canada went to Ontario (30 million kilograms) and Quebec (10 million kilograms). Most of the US transfers to Mexico went to the city of Monterrey (29 million kilograms).

Facilities in Canada transferred about half the amount of chemicals (32 million kilograms) outside of Canada that US facilities did. Almost 99 percent of Canadian transfers went to the United States, primarily to sites in Ohio (10 million kilograms) and Michigan (9 million kilograms). Reporting of transfers to recycling and energy recovery is voluntary in NPRI for 1996, so these numbers are lower estimates of actual quantities.

Transfers to treatment/destruction and disposal/containment must be reported in both TRI and NPRI. If just these two categories of transfers are compared, then US facilities sent half the amount of transfers that Canadian facilities did (2 million versus 4 million kg). Most of the transfers occurs at the Ontario-Michigan border.

The border area—100 kilometers on either side of the Canadian-US border—contains 74 percent of NPRI facilities and 19 percent of TRI facilities. Overall, the border area is dominated by the Great Lakes region; here TRI facilities reported 70 percent of the total releases and transfers for the region. In the Eastern region, the opposite pattern occurred, with NPRI facilities reporting 87 percent of all releases and transfers for that region.

Communities across North American have created a number of tools that use PRTR data to increase understanding of releases and transfers, to reduce them, and to build a regional picture. These tools include community advisory panels, good neighbor agreements, new web sites, briefing books and company mentoring. A separate chapter (**Chapter 9**) describes several specific examples of the development and use of such tools.

Acronym	Meaning
ACCE	Allen County Citizens for the Environment (in Lima, Ohio, United States)
ARET	Accelerated Reduction/Elimination of Toxics
BP	British Petroleum Company
CAP	Community advisory panel
CEC	Commission for Environmental Cooperation
CIESAS	*Centro de Investigaciones y Estudios Superiores en Antropología Social* (Center for Research and Further Study of Social Anthropology)
CMAP	*Clasificación Mexicana de Actividades y Productos* (Mexican Activities and Products Classification)
COA	*Cédula de Operación Anual* (Annual Certificate of Operation: replaces the former *Cédula de Operación para Establecimientos Industriales de Jurisdicción Federal*)
EDF	Environmental Defense Fund
EMS	Environmental management system
EPA	US Environmental Protection Agency
IARC	International Agency for Research on Cancer
INE	*Instituto Nacional de Ecología* (Mexican National Institute of Ecology)
INEGI	*Instituto Nacional de Estadística Geografía e Informática* (Mexican National Instutute of Geographical and Information Statistics)
ISO	International Organization for Standardization
kg	kilograms
LEAN	Louisiana Environmental Action Network (in the United States)
LGEEPA	*Ley General del Equilibrio Ecológico y la Protección al Ambiente* (General Law of Ecological Equilibrium and Environmental Protection)
NAAEC	North American Agreement on Environmental Cooperation
NAFTA	North American Free Trade Agreement
NAICS	North American Industry Classification System
NGO	Nongovernmental organization
NPRI	National Pollutant Release Inventory (PRTR for Canada)
NTP	US National Toxicological Program
OSHA	US Occupational Safety and Health Administration

PBT	Persistent bioaccumulative toxicant
PCS	US Permit Compliance System
POTW	US publicly owned treatment works
PRTR	Pollutant release and transfer register
RCRA	US Resource Conservation and Recovery Act
RETC	*Registro de Emisiones y Transferencia de Contaminantes* (PRTR for Mexico)
Semarnap	*Secretaría de Medio Ambiente, Recursos Naturales y Pesca* (Mexican Secretariat of the Environment, Natural Resources and Fisheries)
SIC	Standard Industrial Classification
SIDS	Screening information data set
SVP	*Societé pour Vaincre la Pollution* (Society to End Pollution, in Quebec)
TRI	Toxics Release Inventory (PRTR for US)
UNEP	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
VOC	Volatile organic compound

33/50 Program
A voluntary program of the US EPA encouraging reductions of TRI releases and transfers of 17 chemicals by 33 percent from 1988 to 1992 and by 50 percent from 1988 to 1995 through pollution prevention and other means.

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. Forty-five chemicals in the matched data set have been designated as known or suspect carcinogens by one or both agencies.

Census Divisions (Canadian) and Counties (US)
Census divisions in Canada are designated by provincial law or, in the absence of provincial action, by Statistics Canada. They represent counties, regional districts, regional municipalities and united counties. There are 288 census divisions. US states are divided into counties (called parishes in the state of Louisiana) or, in a few cases, county equivalents such as townships in some New England states and independent cities in some states, such as Virginia. There are 3,141 US counties, including the District of Columbia.

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.

Counties (US)
See Census Divisions and Counties.

Destruction
A variety of processes that change the chemical in waste into another substance. Destruction also includes physical or mechanical processes that reduce the environmental impact of the waste. This is the term used in the NPRI report of 1993 data to summarize chemical, physical, biological treatment and incineration. (See "treatment" as the term used to cover these activities in the TRI summary reports.)

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 (pollution prevention at the source), followed by recycling, energy recovery, treatment, and finally disposal as the least desirable option.

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.

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 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.

On-site
A substance, process or transfer occurring within the boundaries of the reporting facility, including areas where wastes may be stored. This may involve treatment or disposal separate from the production processes but must be within facility boundaries.

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

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

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.

Releases
Chemicals in waste released on-site to air, water, underground injection, or land.

Source reduction
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.

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.

Tonne
A metric ton, equaling 1,000 kilograms, 1.1023 short tons or 0.9842 long tons.

Transfers
Chemicals in waste that are sent from the reporting facility to a facility that treats or disposes of the chemical. Transfers also include chemicals sent off-site for recycling and energy recovery under the TRI definition of transfers, but reporting of such transfers is optional under NPRI.

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. (See “destruction” as the term used to cover these activities in NPRI.)

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 material destined for recycling, reuse, or energy recovery are included or not included in their definition of waste.

1 Introduction

North Americans are concerned about the effect of chemicals on their health, and environment. Many companies have responded with programs to prevent and reduce chemical releases and transfers, often in response to government programs mandating their identification and reduction. One such program, the pollutant release and transfer register (PRTR), is a cornerstone to these efforts. PRTRs are designed to track the quantities of substances of concern that are released into the air, water or land. Results are fed into a national, publicly available database, allowing information on these substances to be made available quickly to the public.

The Commission for Environmental Cooperation (CEC) recognizes the importance of these pollutant release and transfer registers—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* (RETC) now being implemented in Mexico—for their potential to enhance the quality of the North American environment. The CEC, mandated under the terms of the North American Agreement on Environmental Cooperation, facilitates cooperation and public participation in fostering the conservation, protection and enhancement of the North American environment for the benefit of present and future generations, in the context of increasing economic, trade and social links between Canada, the United States and Mexico.

At the Second Annual Regular Session of the CEC in 1995, the Environment Ministers of the three North American countries (the Council) noted in the Communiqué:

> *This past year, the NAFTA partners began to examine their common need for an inventory of polluting emissions. We have decided to create a North American Pollutant Release Inventory that will bring together, for the first time, existing national public information about emissions and long-range transportation of pollutants. This vital tool for improving the quality of the environment will be the result of harmonized methods of reporting on pollutant emissions of mutual concern.*

At the Third Annual Regular Session in Toronto, Canada (August 1996) the Ministers noted in the Communiqué:

> *The Council announced that the intention to produce the first annual North American Pollutant Release Inventory (NAPRI) will be published…as part of an effort to provide the public with information on pollutant sources and risks. This inventory will bring together for the first time existing national public information from the three countries about emissions. In the long run, the NAPRI will help improve the quality of the environment by providing the public with information to assess North American pollutant sources and risks. It also serves as a model for similar efforts in other parts of the world because North America represents the largest landmass ever to be subjected to compatible methods of reporting on pollutant emissions of mutual concern.*

At the Fourth Annual Regular Session of the CEC in Pittsburgh, Pennsylvania, USA (June 1997), the Ministers passed Resolution 97-04 "Promoting Comparability of Pollutant Release and Transfer Registers (PRTRs)." This resolution commits the three governments to work toward adopting more comparable PRTRs, to collaborate on the development of an Internet site to present a matched subset of data from the three North American PRTRs, as well as to cooperate with the CEC in the preparation of the annual CEC North American PRTR report. While recognizing that a higher degree of comparability among the PRTRs is desirable, the resolution specifically notes that each national PRTR program has developed a unique process for the collection and manipulation of environmental data sets.

1.1 What Are Pollutant Release and Transfer Registers?

Pollutant release and transfer registers like TRI and NPRI provide detailed data on types, locations and amounts of substances of concern released on-site and transferred off-site by industrial facilities. The federal governments then provide annual reports that are released to the public; the database is also made publicly accessible. Many corporations also use the data to report on their environmental performance. PRTRs are a new and innovative tool that can be used for a variety of purposes.

Tracking environmental substances of concern through pollutant release and transfer registers is essential to:

- enhance environmental quality;
- increase public and industry understanding of the types and quantities of substances of concern released into the environment and transferred off-site as waste;
- encourage industry to prevent pollution, reduce waste generation, decrease releases and transfers and assume responsibility for chemical use;
- track environmental progress; and
- assist governments in identifying priorities.

While there are many different environmental reporting databases, characteristic that all PRTRs share are:

- providing an overview of pollutant releases and transfers,
- reporting on individual chemicals,
- reporting by individual facilities,
- covering all environmental media,
- periodic reporting,
- defined and structured reporting,
- using computerized data management,
- limiting trade secrecy,
- indicating what is being held as a trade secret, and
- resulting in information actively disseminated to the public.

PRTRs are based on reports about individual pollutants because this is the only meaningful way to compare information on releases to air with those to water and land and with various off-site transfers. Such chemical-specific data may be supplemented with additional parameters that are relevant to only one environmental medium (e.g., biological oxygen demand for water, total particulates for air, and amount of spent solvent waste transferred for treatment).

Reporting by facility is key to locating where releases occur and who or what generated them. This allows interested persons and groups to identify local industrial sources for releases of substances of concern. It also supports regional and other geographically based analyses of the data. Facility-specific information may be supplemented with data about more diffused sources of such releases (the discussion of nonpoint sources in **Chapter 3**, **Section 3.3.2**, supplies one example).

Concerns about pollutants may arise in connection with any environmental medium. In addition, releases to one environmental medium may be transported to others. Volatile chemicals in water releases, for example, may vaporize into the air. Therefore, the reporting of releases and transfers to all environmental media is important.

To determine the status and trends of releases and transfers, reports must be made periodically and cover the same period of time for all facilities reporting.

The ability to compile, sort, rank, and otherwise analyze the data depends upon their structure. A clearly defined and highly structured database allows for a wide range of analyses.

Similarly, the ability to analyze quickly and easily a large number of reports on chemical releases and transfers depends upon the submissions being managed in a computer database.

Much of the power of a PRTR comes from the public disclosure of its contents. Active dissemination is important. For a PRTR to be effective, impediments to public availability of facility-specific information must be limited. In addition, users of a PRTR must know what types of data are being held back from disclosure (for instance, if a facility substituted a generic name for a substance emitted to air, obfuscating its chemical identity).

1.2 Integrating North American PRTR Data

Governments can use PRTR data to shift program priorities. New programs or enforcement measures can be tailored to accomplish specific goals, such as reducing specific substances or targeting releases in a particular region. Companies have responded to PRTR results by conducting an internal environmental review and setting goals for waste reduction.

The CEC wishes to assist citizens in understanding and using the existing data from North American PRTRs. Helpful information can be found in pollutant release and transfer reports from Canada and the United States. But these systems have important differences between them, so superficial comparisons can be very deceptive. (**Chapter 2** describes these differences and how this report accounts for them.) *Taking Stock 1996* attempts to increase the value of the national inventories by presenting an analysis of the types and amounts of releases and transfers of substances of concern across North America.

Taking Stock 1996 summarizes PRTR database on reports that industrial facilities filed for the 1996 operating year, the latest data available at the time this report was written. These PRTR reports were due to be submitted by the facilities during the summer of 1997. The US EPA released the TRI data to the public in a report dated May 1998 and Environment Canada released the NPRI data in July 1998.

1.3 Guide to *Taking Stock 1996*

The first chapters provide an overview of North American PRTR programs and their context and limitations. In addition, **Chapter 3** presents the data reported by facilities in Canada and in the US to their respective PRTRs. No nationwide reporting for 1996 was done by Mexican facilities. **Chapter 3** also demonstrates how a "matched" set of data was derived, compiling industries and chemicals that must be reported to the PRTRs of both Canada and the United States.

Chapter 4 analyzes this matched data from the two PRTRs and provides an overall summary of PRTR data for North America as reported for 1996. **Chapter 5** compares the data from the two PRTRs, again using the 1996 matched data set of common chemicals and industries, for each country individually. In **Chapter 6**, data for 1995 and 1996 from the matched dataset are compared for both countries.

Chapter 7 provides some special analyses using both the entire data from a PRTR, in order to illustrate some of the types of analyses that are specific to the different types of reporting under each PRTR, and the matched data. **Chapter 8** examines two cross-border issues: off-site transfers across national borders of the substances in wastes and releases and transfers from facilities located within 100 km of the Canadian-US border. **Chapter 9** presents case studies of several ways in which PRTR data are used at the local level by community groups to help in their understanding of local facilities.

2 Overview of Existing Programs in North America

Both Canada and the United States have established the type of data to be collected under their PRTRs. The Canadian and US data are publicly available in the form of reports, and the entire database is electronically available. The Mexican PRTR program is underway, but awaiting further development. By consulting the Canadian or US databases, a person can quickly gather information on a facility's releases and transfers. The CEC's goals in producing this report include:

- providing an overview of North American pollutant releases and transfers that can give a better understanding of sources and the handling of industrial pollution;
- allowing national, state and provincial governments as well as industry and citizens to set priorities for pollution reduction;
- inviting reductions in North American pollutant releases and transfers through information comparison;
- assisting citizens in integrating and understanding the ramifications of North American PRTR data; and
- encouraging enhanced comparability of North American PRTR systems.

This chapter provides an overview of the existing PRTR systems in North America, including recent developments in all three countries, and supplies contacts for additional information.

2.1 Description of the Three North American PRTRs

The two inventories in Canada and the United States have many basic similarities since they stem from the same primary purpose—to provide publicly available information on a facility's releases and transfers to air, water and land. However, each inventory also has its unique aspects, which result from its historical development and special industrial characteristics of the country. The Mexican system has been initiated but awaits further development.

The first of the North American databases to be established was the Toxics Release Inventory (TRI) in the United States, which began collecting information for the year 1987. Canada's facilities first reported their releases and transfers to the National Pollutant Release Inventory (NPRI) for the year 1993. Mexico, in 1996, completed a successful case study demonstrating its proposed inventory. National implementation of this inventory, the *Registro de Emisiones y Transferencia de Contaminantes* (RETC), started in 1998 with data for the reporting year 1997.

2.1.1 Changes to the US TRI

For the 1996 reporting year, reporting on underground injection and releases to landfills changed in the details required, while the list of chemicals and industries required to report remained the same as for the 1995 reporting year. EPA also changed the way it presents TRI data to include transfers off-site to disposal in the "release" category. Beginning with the 1998 reporting year, seven industry groups not previously covered by TRI will begin reporting. Also, a "Chemical Right-to-Know" initiative was launched, which will provide basic

toxicity information on high production volume chemicals, over 200 of which are on the TRI list. Additional issues under discussion are additions and deletions to the TRI list of substances, lower reporting thresholds for persistent, bioaccumulative substances, and providing information on chemical use in TRI reporting.

Beginning with the 1996 reporting year, EPA has expanded TRI's collection of data on certain types of releases, underground wells and on-site landfills. For underground wells, the amounts sent to Class I wells are reported separately from those going to other wells. Class I wells are industrial, municipal and manufacturing wells where fluids are injected into deep, confined and isolated formations below potable water supplies. More than 99 percent of reported TRI releases to underground injection wells in 1996 went into Class I wells. Similarly, facilities separately report amounts released to RCRA Subtitle C landfills from amounts released to other on-site landfills. RCRA Subtitle C landfills are permitted to receive hazardous wastes under the US Resource Conservation and Recovery Act (RCRA). About one-quarter of the amounts of TRI substances disposed of in on-site landfills went to RCRA Subtitle C landfills in 1996.

The EPA presents its summary of the TRI reporting in an annual report. The 1996 TRI Public Data Release presented the TRI data in a new manner. Previously, releases and transfers were summarized as in the CEC report, that is, releases were composed of on-site releases, and transfers were all transfers off-site. Beginning with the 1996 TRI report, a category of "total releases" comprising on-site releases and off-site transfers to disposal was presented, along with off-site transfers for further waste management (which included transfers to treatment and to sewage). This change enables the public to obtain information on total releases separate from off-site transfers for further waste management activities, such as treatment or recycling. As a result, the change also corresponds more closely with the part of the TRI reporting form (called Section 8) that collects information on a facility's total waste generation and subsequent waste management activities, with separate data elements for total releases, amounts treated on-site and off-site, amounts recycled on-site and off-site, and amounts used for energy recovery on-site and on-site.

Beginning with the 1998 reporting year, several additional industrial sectors will be required to report to TRI. Currently, reporting is only required of manufacturing sectors. The added industrial sectors are metal mining, coal mining, electric utilities, commercial hazardous waste treatment, wholesale chemical product distributors, petroleum bulk stations, and solvent recovery services. With these, EPA has focused on industries that provide energy or raw materials to manufacturers (for example, mining) and those that receive or take away materials from the manufacturing sector (for example, petroleum bulk terminals). Because these industries already report to NPRI, the addition of these industry sectors will increase the amount of the data that is comparable between the two countries. EPA expects this will increase the number of facilities reporting to TRI by 30 percent.

Beginning with the 1997 reporting year, two chemicals have been deleted from the TRI list: 2-bromo-2-nitropropane (bronopol) and 2,6-dimethylphenol. Neither of these substances is on the NPRI or proposed RETC list. Other changes to the list of TRI chemicals include the possible addition of chemicals on which EPA deferred action when it added more than 250 substances in the 1995 reporting year.

Other developments under consideration include lower reporting thresholds for mercury, dioxin, and other persistent bioaccumulative toxicants (PBTs). EPA published a proposed rule lowering reporting thresholds for PBTs on 5 January 1999. The proposed rule sets three thresholds depending on the substances and their persistence and bioaccumulation properties. Dioxin and dioxin-like substances, produced on-site, would be added to the TRI list of substances with a threshold of 0.1 gram. Other PBTs would be reportable with a 10 or 100 pound (4.5 or 45 kilograms) threshold, depending on the persistence and bioaccumulation of each substance. In addition to PBTs already on the TRI list, EPA's proposed rule identifies other PBTs for addition to the TRI list. The current threshold for reporting a substance to TRI is 25,000 pounds (11.34 tonnes) if manufactured or processed and 10,000 pounds (4.54 tonnes) if otherwise used on-site. The proposed rule can be found online through the TRI site at <http://www.epa.gov/opptintr/tri> or directly at <http://www.epa.gov/fedrgstr/EPA-TRI/1999/January/Day-05/tri34835.htm>.

For Phase III expansion of TRI, EPA has proposed collecting data on chemical use, also referred to as materials accounting. These data would track the amounts of a listed chemical substance entering a facility, transformed into products and waste, and leaving the facility in products and waste. Similar data are currently collected by the states of New Jersey and Massachusetts. EPA has plans to further evaluate the issues, request comments and information on issues where additional assessment is needed, solicit actual assessments that have been performed using materials use data, and initiate public input concerning the development of regulations on this issue.

In April 1998, EPA announced a cooperative program with industry and environmental groups to collect more complete toxicity information on high production volume (HPV) chemicals. HPV chemicals are substances that are produced or imported in excess of 1 million pounds (453 tonnes) per year. A primary objective of this program is to make the toxicity information available to the public, especially through the Internet.

The voluntary program uses six internationally recognized testing protocols that together provide a basic picture of the toxicity of a chemical. Of the nearly 3,000 HPV chemicals in the United States, 203 are TRI chemicals. While only 7 percent of all HPV chemicals have the full complement of testing protocols, 55 percent of the TRI chemicals that are HPVs have the full set. Further information on the program can be found on the Internet at <http://www.epa.gov/chemrtk>.

2.1.2 Developments in Canada's NPRI

The 1996 data are the fourth set reported to NPRI. For that reporting year, Environment Canada made a few changes to the reporting requirements:

- the threshold pH for the nitrate ion in solution was changed from 6.5 to 6.0;
- the portion of pollutant released to each lake, river or stream must be reported, whereas previously only the total quantity of pollutant released to all water bodies was required;
- the portion of the pollutant transferred off-site to each receiving facility must be reported, whereas previously only the total quantity of pollutant transferred off-site to all receiving facilities was required.

The 1996 reporting requirements continue with a major change made for the 1995 NPRI data. In 1995 and subsequent NPRI databases, the weight of a by-product must be included in the calculation of the reporting threshold, regardless of the concentration of the by-product. Previously, such by-products with concentrations less than one percent were not included in the calculation of the reporting threshold. This change was made to capture large sources of some pollutants, which normally

generate pollutants in concentrations below one percent, such as aluminum smelters, utilities, and pulp and paper mills. The 1996 NPRI guidance manual clarifies that the by-product rule does not apply to transfers off-site for recovery, recycling or reuse. Additional guidance is also given on salts of weak acids and bases and to distinguish among by-products, impurities and articles. Annual NPRI guidance manuals can be downloaded from the national NPRI web site in French and English at <http://www.ec.gc.ca/pdb/npri>.

Many facilities noted that the by-product reporting change resulted in significant increases in their 1995 NPRI reported releases and transfers. Many of the reported increases may not reflect actual increases in releases to the environment, but newly required reporting of a continuation of the same level of releases. Without contacting all facilities and asking each one to determine the effect of this reporting change on its data, it is not possible to quantify the overall effect on the 1995 or the 1996 NPRI data. Environment Canada identified several pollutants and sectors as likely to be affected by the by-product rule change, including methanol from pulp and paper mills, hydrochloric acid and sulfuric acid from utilities, carbon disulfide, and hydrogen fluoride from aluminum smelters. Two industrial sectors, utilities and aluminum smelters, are not part of the matched or multi-year data sets used for this report, and so will reduce the effect of the by-product change on analysis using these data sets. Nevertheless, readers are urged to keep the probable importance of this reporting change in mind when reviewing 1996 NPRI data or when comparing 1995 and 1996 NPRI data to 1994 NPRI data.

Changes that have previously been discussed and that will come into effect for the 1997 reporting year are: requiring a reason for transfer off-site for disposal, supplying an expanded set of reasons for why changes in releases/transfers were reported, qualitatively tracking pollution prevention activities, and voluntarily reporting a production ratio and an activity index that compares the current year's production level to that of the previous year. For the 1998 reporting year, the current voluntary reporting of reuse, recovery and recycling will become mandatory.

In 1998, Environment Canada invited a multistakeholder group to identify additions and deletions to the NPRI list, to identify substances warranting alternative reporting thresholds, and to develop an ongoing process for adding and deleting substances. In December 1998, the group released a draft report for public comment that proposed lists of substances to be added for the 1999 NPRI reporting year, a set of decision factors for additions, a process for deletions, and steps to add the inventory of criteria air pollutants to NPRI.

Of the 88 substances proposed for addition, approximately half are reported under TRI, which will increase the comparability between TRI and NPRI in future *Taking Stock* reports. Final decisions on substances to be added are expected in spring 1999.

In the future, the multistakeholder group will review alternate thresholds that may be appropriate for some chemicals, and the process for future additions and deletions. The group's report and other recent reports are available at Environment Canada's web site at <http://www.ec.gc.ca/pdb/npri>.

2.1.3 Current Status of the RETC in Mexico

Significant changes occurred in the development of the RETC program in 1998. For the 1997 reporting year, only releases to the air of six categories of criteria air pollutants (sulfur dioxide, nitrous oxides, particulates, carbon monoxide, carbon dioxide, and total hydrocarbons) from industries under federal jurisdiction were required to be reported. While the industries are manufacturing industries, criteria air pollutants and total hydrocarbons are not on the NPRI or the TRI list of substances. Reporting by a facility was further limited to only those substances regulated under existing individual permits.

About 500 facilities submitted a *Cédula de Operación* (Annual Certificate of Operation—COA) by the July 1998 deadline to the *Instituto Nacional de Ecología* (National Institute of Ecology—INE). Of these 500 facilities, approximately 10 percent submitted a voluntary section of the COA form (see **Section V** of **Appendix D**) with reports on other substances and/or releases and transfers to land and water.

A summary of the pilot project run in the state of Querétaro in 1996 in which industries volunteered to participate in reporting releases and transfers of the proposed RETC list of 178 substances was published. The results were presented in *Taking Stock 1995*. An English version of the final report on the pilot project provides data on releases of a number of chemicals and is available online from INE at <http://www.ine.gob.mx/retc/ingles/pilot.html>.

There are barriers to the implementation of the RETC. These include the lack of a consistent environmental policy for the management of hazardous substances (that is, different reporting requirements for substances) and the lack of a legal list of chemicals required to be reported. To achieve this legal list, a new process for defining criteria to select chemicals was started. Most of the previous work selecting chemicals on the basis of persistence, bioaccumulation and toxicity, which resulted in a list of 178 chemicals, was considered. In August 1998, INE presented a new proposal, *Procedures and Criteria for the Elaboration and Update of the List of Substances to Report in the RETC*. This is being reviewed by the National Committee on Standardization but this body lacks, at present, a legal framework from which it could issue a *Norma Oficial Mexicana* (Mexican Official Standard) making the list of RETC substances mandatory. Other areas still under discussion include the type of public access to the information with the data currently available only on an aggregated regional/municipal basis, rather than at the facility level.

To achieve greater compliance, a series of guidance manuals are being developed and workshops are being conducted to increase and improve the level of reporting. The manuals provide guidance on how to estimate releases. Previous environmental regulations under permitting programs required direct monitoring of releases whereas now estimation can be used as a cost saving measure for industry. Estimation is also available as an option under NPRI and TRI. Private companies are conducting workshops to train plant personnel on how to estimate and fill out the forms. A web site designed as support for industry has the forms, the estimation manuals, and a schedule for the training workshops (see <http://www.ine.gob.mx/retc/coa/indexcoa.html>).

2.2 Basic Similarities of PRTRs

As indicated in **Chapter 1**, the two North American PRTRs have the following basic similarities. PRTRs:

- provide an overview of releases and transfers of listed pollutants,
- report on individual chemicals,
- report by individual facilities,
- cover all environmental media,
- require periodic reporting,

- depend on defined and structured reporting,
- use computerized data management,
- limit trade secrecy,
- indicate what is being held as a trade secret, and
- result in the information actively disseminated to the public.

However, the Mexican RETC system, still under development, may have many but not all of these elements. For example, publicly available RETC information will be aggregated at the municipal, state and national levels, but not currently at the facility level, and the section of the reporting comparable to Canadian and US PRTR systems is currently voluntary.

2.2.1 Individual Chemicals

Each country in North America has developed its own list of substances, reflecting local conditions, scientific assessments and chemicals commonly in commerce. The TRI list for 1996 reporting consists of 608 chemicals, including 28 categories, compared to 176 including 16 categories on the NPRI list. A total of 165 substances, including 16 categories, are common to both lists. There are 178 substances, including 17 categories on the original RETC list that is now under review. A total of 78 of these, including 11 categories, are common to all three lists. For a detailed comparison of the chemical lists in the three countries, see **Appendix A**, "A Comparison of Chemicals Listed under the 1996 TRI, NPRI and proposed RETC."

TRI facilities report separately for certain chemicals and their compounds, while in NPRI, a chemical and its compounds count as one category. For example, TRI lists both lead and lead compounds, counting them as two separate substances, while NPRI lists the single category, lead and its compounds. All the analyses in *Taking Stock 1996* add the TRI amount reported for the given chemical to the amount reported for its compounds, to correspond with NPRI practice. The proposed RETC list also has nine substances that would be reported as the substance along with its compounds, as in NPRI.

2.2.2 Individual Facilities

Each country has different requirements that make a facility eligible for reporting. In the United States, all manufacturing and federal facilities that meet the threshold (see **Section 2.3.2**) must report; some additional industries will begin reporting for the 1998 reporting year. In Canada, any facility that meets the threshold must report. Canada exempts certain facilities, such as those involved with the distribution, storage or retail sale of fuels; agriculture, mining and oil and gas well drilling, if these facilities do not process or otherwise use the substances; research and training institutions; and transportation vehicle repair facilities. Mexico proposes to require any facility under federal jurisdiction to report. These include the following 15 industrial sectors: petroleum, petrochemical, chemical, paints and dyes, iron and steel, metal, automotive, cellulose, paper, cement, lime, asbestos, glass, electrical energy generation, and hazardous waste treatment.

2.2.3 Releases and Transfers

In their reports, facilities provide estimates of their on-site releases of the listed substances to the air, water and land and also by underground injection (except in Mexico, which does not employ this method of disposal). Facilities also estimate the amounts of the listed substance in waste that they transfer off-site. A transfer is the shipment of the substance in waste to a municipal sewage treatment plant or to another site for treatment or disposal or (in the case of the US TRI and the Mexican RETC) for recycling/recovery (see **Figure 2–1** and the box on p. 10). Tracking both releases and transfers is necessary to provide a full picture of the movements of chemicals. Each country has slightly different categories for releases and transfers, outlined in **Table 2–1** (pp. 11–12).

2.2.4 Trade Secrecy

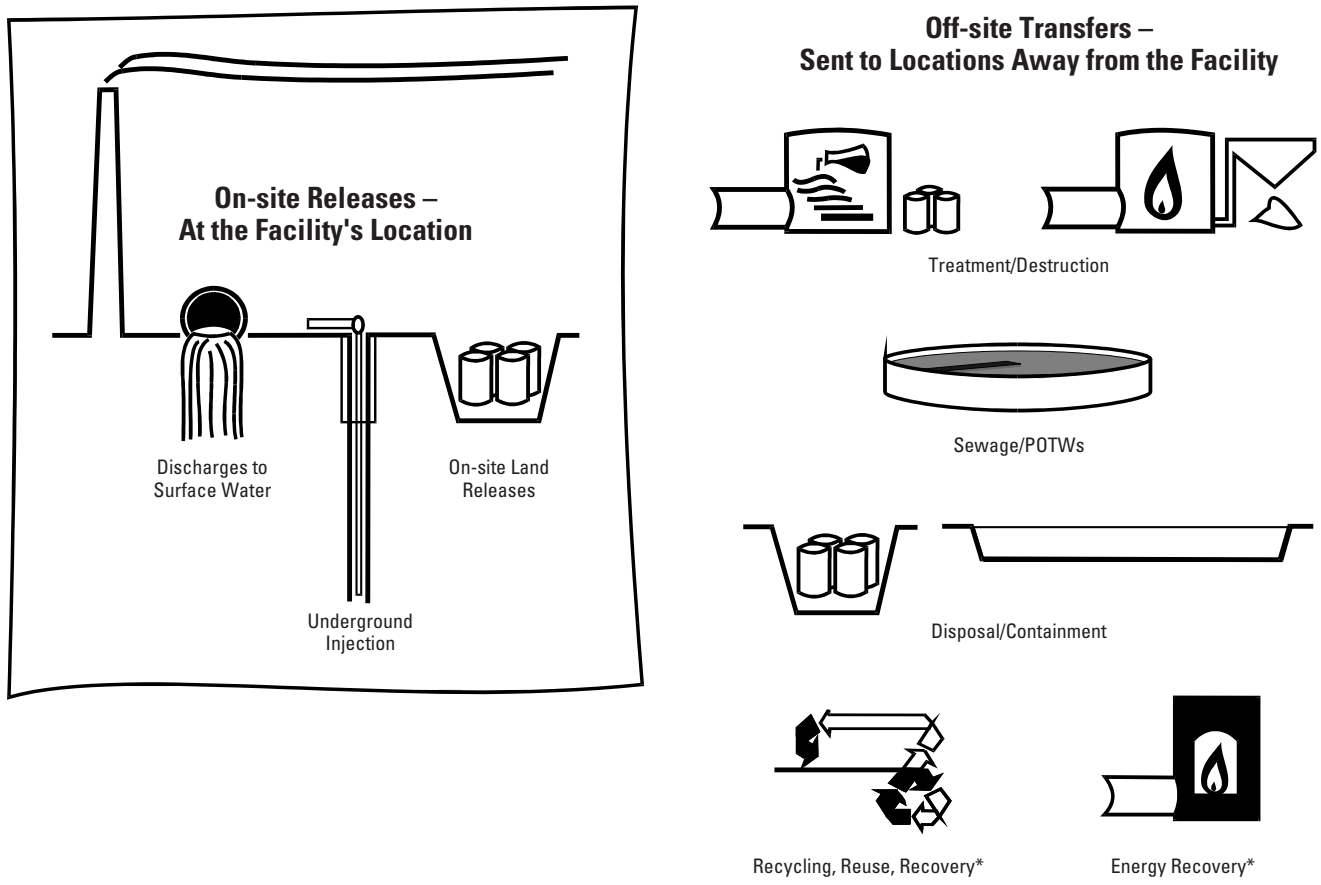
The purpose of the Canadian and US databases is to provide the public with data about chemicals in the environment, so in general, both databases limit the type of information that facilities can claim as secret and withhold from public information. In the United States, the only claim of trade secrecy that can be made is for the identity of the chemical. All data on release and transfer amounts are part of the database. Claiming trade secrecy is not widespread: only 13 TRI forms from 12 facilities, out of 71,381 submitted for 1996, contained such claims. The trade secrecy claims constitute 755 pounds (342 kg) of releases and 3,129 pounds (1,419 kg) of transfers. In Canada, all information in a report may be held confidential if it conforms to the criteria under the Federal Access to Information Act. According to the NPRI summary report, six facilities and 19 forms out of the national total of 6,635 forms were given confidential status for the 1996 NPRI reporting year. This represented 157,000 kg of releases and 3,217,000 kg of off-site transfers. Mexico is currently discussing criteria for trade secrecy.

2.2.5 Public Dissemination

As one of the purposes of the databases is to provide this information to the public, both TRI and NPRI are available in a variety of formats: annual summary reports, detailed data in hard and electronic form, and over the Internet (see **Section 2.4**). The level and detail of the information to be made public under the Mexican RETC is still under discussion. In the first annual report (1997 data), summary data on releases and transfers by industrial sector at the national, state and municipal level will be published. When data might be available to the public at the facility level has not been decided.

Figure 2–1
1996

On-site Releases and Off-site Transfers



* On-site recycling and energy recovery reported to TRI only.
Off-site recycling and energy recovery reporting voluntary in NPRI and mandatory in TRI.

On-site Releases and Off-site Transfers

(See also **Figure 2–1**, p. 9**)**

On-site Releases

On-site releases are the discharge of a pollutant to the environment at the site of the reporting facility. They include emissions to air, discharges to surface waters, releases to land and deep-well underground injection within the boundaries of the reporting facility.

On-site releases to air include emission from stacks, vents, ducts or pipes. Such emissions are often called point sources. Air emissions also occur as fugitive sources from equipment leaks, evaporative losses from surface impoundments and spills, and releases from building ventilation systems.

Surface water discharges include direct discharges to streams, rivers, lakes, oceans and other bodies of water. These are releases from contained sources such as industrial process outflow pipes or open trenches. Discharges due to runoff from the facility's boundaries, including storm water runoff, are also included.

Underground injection is the injection of fluids into known geological formations, generally at great depths.

On-site releases to land include disposal of wastes in landfills in which wastes are buried, land treatment (also called application farming) whereby a waste is applied to or incorporated into soil for biological degradation, and disposal in surface impoundments which are uncovered holding areas used to evaporate or settle waste materials.

These on-site release and disposal methods are regulated by the local municipality, state/provincial or federal agencies in each country.

Off-site Transfers

Off-site transfers consist of shipments of a listed pollutant in waste to an off-site location. The waste is sent for treatment prior to final disposal (this includes wastes sent to municipal sewage treatment plants) or for disposal at the off-site facility receiving the waste. Only the quantity of the listed chemical in the waste is reported to the PRTR. The amount sent to each site along with the name and address of the receiving facility is reported.

Off-site transfers to treatment may be treated in a variety of ways. Treatment methods include physical treatments such as separation or encapsulation, chemical treatment such as stabilization or neutralization, biological treatment such as bio-oxidation, incineration.

Transfers to municipal sewage treatment plants or publicly owned treatment works (POTWs) are wastewaters transferred through pipes or sewers to the facility owned by a municipality or other public body. The treatment or removal of the pollutant from the wastewater depends on the nature of the pollutant as well as the treatment methods present at the sewage treatment facility.

Transfers receiving off-site treatment do not necessarily constitute a release to the environment because the pollutant may be chemically or physically altered. The PRTR reports do not indicate how much, if any, of the pollutant is ultimately released.

Off-site transfers to disposal, however, include some of the same methods found on-site: disposal in landfills, land application farming, surface impoundments and underground injection.

Off-site transfers in waste are reported separately from on-site releases because their ultimate disposal will be in a different geographic location than that of the reporting facility and the waste becomes the responsibility of the receiving facility. They are reported to provide more complete information on the waste generated by the facility and the fate of the pollutant.

Table 2–1
1996

Comparison of Mandatory Reporting in North American PRTRs

Major Data Elements	US Toxics Release Inventory (TRI)	Canadian National Pollutant Release Inventory (NPRI)	Mexican *Registro de Emisiones y Transferencia de Contaminantes* (RETC)
Identification			
Type of facilities reporting	Manufacturing and federal facilities. (Additional sectors beginning 1998.)	Any facility manufacturing or using a listed chemical, except research, repair and retail sales. Also, agriculture, mining, well drilling excepted, but not if process or otherwise use the substance.	Any facility under federal jurisdiction.
Industry classification	All US SIC codes applicable to facility operations.	One primary SIC code per facility. Facility reports both Canadian and US SIC code.	One CMAP code per facility.
List of chemicals	Chemicals manufactured or processed or used in manufacturing (606 substances and 28 chemical categories).	Chemicals used or manufactured in sufficient quantities (176 substances includes 16 categories).	Six criteria air pollutants, for which a facility has a permit, are mandatory.
Reporting Threshold			
Number of employees	10 or more.	10 or more.	No threshold.
Activity/use of chemicals	Manufacture/process more than 25,000 pounds (11,338 kg) or use more than 10,000 pounds (4,535 kg).	Manufacture, process or use10 tonnes (10,000 kg) or more.	No threshold. However, only substances for which a facility has a permit for air emissions must be reported.
Concentration of chemicals in mixtures	Concentrations equal to or greater than 1 percent (0.1 percent for carcinogens) count toward activity/use threshold.	Concentrations equal to or greater than 1 percent plus total weight of by-products count toward activity/use threshold.	No threshold.
Type of Data Reported			
Units	Pounds reported; based on estimates.	Tonnes reported; based on estimates.	Facilities may report in their own units. RETC will convert to tonnes.
Small quantity reporting	Amounts for releases/transfers less than 1,000 pounds (502 kg) may be reported by range code; no amounts need be reported if total production-related waste does not exceed 500 pounds (227 kg) and manufacture, process or use does not exceed 1 million (502 tonnes).	Total releases less than 1 tonne (1,000 kg) reported as total releases only. Releases to each medium less than 1 tonne (1,000 kg) reported by range code.	No different provisions for small-quantity reporting.
Releases			
Air emissions	Fugitive and point source emissions reported separately; includes spills and leaks.	Fugitive, point source, storage/handling, spills, or other emissions reported separately.	Air emissions from production processes and from non-production-related processes reported separately by emission point. Amount from spills not included. Only air emissions permit substances reported.
Surface water discharges	Amount to each water body reported (includes spills and leaks in amount). Percentage due to stormwater reported.	Amount of discharge, spills, and leaks to each water body. (Reporting of amounts separately for each water body began with 1996 reporting year.)	Not mandatory.

[Table continues on next page.]

Table 2–1 (cont.)
1996

Comparison of Mandatory Reporting in North American PRTRs

Major Data Elements	US Toxics Release Inventory (TRI)	Canadian National Pollutant Release Inventory (NPRI)	Mexican *Registro de Emisiones y Transferencia de Contaminantes* (RETC)
Releases, cont.			
On-site land releases	Amount to hazardous waste landfills, other on-site landfills, land treatment/application, surface impoundments reported separately. Spills and leaks included. (Reporting of categories for landfills—hazardous waste and all other—began with 1996 reporting year.)	Amount to landfills, land treatment/ application, spills, leaks; other reported separately.	Not mandatory.
Underground injection	Amount to on-site Class I wells and all other wells. Amount from spills included. (Amount to Class I wells reported separately from amount to all other wells began with 1996 reporting year.)	Amount to on-site wells. Amount from spills included.	Underground injection not practiced in Mexico.
Accidental spills	Included in release and transfer amounts. In different section of form reported as one amount.	Reported separately under air, water and on-site land releases. Included in underground injection and transfer amounts.	Not mandatory.
Transfers			
Transfers to municipal sewage	Total amount reported. List name/address of each municipal sewage treatment plant.	Total amount reported to each sewage treatment plant along with name/address of each municipal sewage treatment plant. (Reporting of separate amounts to each sewage plant began with 1996 reporting year.)	Not mandatory.
Other off-site transfers	Amount reported by method of treatment/ disposal; amount reported for each transfer location with name/address.	Amount reported by method of treatment/ disposal; amount reported for each transfer location with name/address. (Reporting of separate amounts to each transfer location began with 1996 reporting year.)	Not mandatory.
Chemicals in Waste			
Waste management by treatment/ disposal	Amount managed on-site and off-site by type of management.	Off-site transfers only.	Not mandatory.
Recycling/reuse/recovery	Amount managed on-site and off-site by type of waste management.	Not mandatory. (Mandatory reporting of off-site transfers only starting in1998 reporting year.)	Not mandatory.
Other Data Elements			
Type of on-site waste treatment	Type for each method used by type of wastestream (separate amounts not reported).	Not reported.	Not mandatory.
Projections	Two years following, amounts for on-site and off-site waste management.	Three years following, additional two years optional, for total releases and total transfers.	Not mandatory.
Source reduction	Type of source reduction activities (21 categories).	Not reported.	Not mandatory.

2.3 Differences in the PRTR Databases

The three PRTR systems also have important differences. They differ in:

- substances reported,
- types of facilities covered,
- release and transfer categories,
- reporting thresholds,
- industrial classification system,
- classification of small releases,
- requirements for reporting on source reduction,
- requirement for mandatory reporting, and
- public access to information.

Appendix A lists the chemicals in each PRTR, and **Table 2–1** (pp. 11–12) indicates the major differences in the types of facilities required to report and in the categories of releases and transfers. These differences also affect the way the data are presented. When data from the PRTRs are compiled for comparison, these differences are addressed by selecting subsets of data that are comparable across the PRTRs, as explained below. Other differences cannot readily be resolved in this manner, and further details about them are provided here, as they must be kept in mind when interpreting the data presented in this report.

2.3.1 Matching Data across PRTRs

To compare data from PRTRs with different requirements, this report relies on selecting the comparable elements. The data are from Canada and the United States; the Mexican system is being implemented and data are not available for 1996. **Chapter 3** presents summary tables for 1996 and 1995–1996 to demonstrate the method used to select comparable data sets.

In practice, a matched data set limits the analysis to the manufacturing sector, because non-manufacturing facilities were not required to report to TRI. Chemicals may also be reportable in both systems, but defined differently. For sulfuric acid and hydrochloric acid, for example, the TRI definition has changed so that only aerosol forms are reportable; these are released only to air. All forms of these acids are still reportable to NPRI. For comparing TRI and NPRI data, then, the matched data set includes only air emissions of these two chemicals.

In addition, while ammonia and isopropyl alcohol appear on both lists, they are not included in the matched data set because the definition for these substances differs. Total ammonia is reportable to NPRI, while only 10 percent of aqueous forms of ammonia, along with all anhydrous forms, are reportable to TRI. Only forms of isopropyl alcohol manufactured by the strong acid process are reportable to TRI, while all forms are reportable to NPRI. The matched data set also excludes any substance on one list but not the other.

Environment Canada considers 1995 as a base year for NPRI, and EPA considers 1988 as a base year for TRI. Therefore, **Chapter 6**, which compares PRTR across the years, looks at 1995 and 1996 data. The chemicals and industries matched for 1995–1996 are the same as those used for 1996 only.

To help clarify the differences in the matched data set and the entire set of data as reported to each country, **Chapter 3** presents summary tables from the 1996 matched data set, the 1996 complete databases, and the 1995–1996 matched data set. Throughout *Taking Stock 1996*, letters (M = matched chemicals/industries for 1995 and 1996 or A = all chemicals/industries) on the left sides of the tables and figures, state which data set is in use. Only tables and figures based on the same data set can be meaningfully compared with one another.

2.3.2 Thresholds

One of the major differences among the databases is the reporting threshold: the amount of a given substance that can be manufactured or used in the facility before reporting is required. If the threshold is met or exceeded, then all releases and transfers must be reported. In the United States, if more than 25,000 pounds (11.34 tonnes) of a chemical is manufactured or processed or if more than 10,000 pounds (4.54 tonnes) is "otherwise used," then releases and transfers must be reported. In Canada, if 10 tonnes (22,050 pounds) or more of the substance is manufactured, processed or "otherwise used," then releases and transfers must be reported. Both systems require reporting for facilities that employ the equivalent of 10 or more full-time employees.

As explained in **Section 2.1.2** above, for the 1995 and subsequent reporting years, Canada, as does the United States, requires that the total weight of the by-product, regardless of concentration, be included in the calculation of the reporting threshold, eliminating one difference between the two systems.

The other major difference in threshold requirements between TRI and NPRI is the amount of the substance in a mixture. Both countries require reporting if this amount equals or exceeds one percent by weight. However, the United States has an additional lower threshold for carcinogenic chemicals: chemicals identified as carcinogens by the Occupational Safety and Health Administration (OSHA) standard must be reported at levels of 0.1 percent.

The net effect of these differences in threshold is that, in general, US facilities will meet the threshold at slightly lower levels of chemical activity/use than Canadian ones. The Mexican RETC does not have reporting thresholds by amount of substance, number of employees or any other kind.

2.3.3 Industrial Classification System

Facilities are classified according to the type of industrial operations they carry out. This allows both the determination that they are required to report as well as comparisons among industrial sectors. All three countries require that facilities report using a type of industrial classification system, but these systems differ among the countries. Both the United States and Canada use a "Standard Industrial Classification" system, such that industries are identified by their "SIC code." These systems, however, are not the same. The Mexican RETC uses the Mexican Activities and Products Classification (CMAP code—*Clasificación Mexicana de Actividades y Productos*), which is different yet again.

Fortunately for comparison purposes, Canada supplies facilities with a table that correlates Canadian SIC codes to their US equivalents and requires each facility to report both the Canadian and the US SIC code that characterizes the majority of its operations. This is essential to comparing the NPRI and TRI data, because otherwise, there is no direct correspondence between the two SIC code systems.

The United States, Canada and Mexico are working together to develop a common North American Industry Classification System (NAICS) that, if used, will

allow more far-reaching comparisons in the future. In reporting year 1998, NPRI facilities will begin reporting their NAICS code, along with the Canadian and US SIC codes. TRI is expected to to implement the NAICS for reporting year 2000. The Mexican RETC will use the NAICS code starting for the reporting 1998. Information on NAICS is available from Statistics Canada on the Internet at <http://www.statcan.ca/english/Subjects/Standard/index.htm>. The US government has information on NAICS at <http://www.ntis.gov/yellowbk/1nty205.htm>. For information on NAICS in English, see the INEGI English-language web site at <http://www.inegi.gob.mx/homeing/estadistica/scian/scian.html>.

2.3.4 Reporting of Small Releases

For releases of a substance that total less than one tonne, NPRI allows a facility to report just the total amount released and not the amounts in individual release categories by environmental medium. Therefore, in summary tables in this report, total releases will be more than the sum of the separate release categories. In contrast, the amounts of the individual releases for each medium are reported in TRI. Both NPRI and TRI require reporting of the amounts of individual types of transfers.

Beginning in 1995, EPA added a reduced reporting option for facilities that meet the reporting thresholds, but whose total "reportable amount" for the year does not exceed 500 pounds (227 kilograms) in production-related waste. This amount includes releases and transfers, plus waste that is managed on site. A further restriction is that the facility may not manufacture, process or otherwise use one million pounds (453 tonnes) or more of the substance during the year. These facilities may submit a "certification" form (called Form A) that identifies the chemical reported, but contains no information on amounts. These forms are counted in the database with releases and transfers set to zero.

Finally, both NPRI and TRI offer the option to report a range for the smallest releases. In this report, the midpoint of the range is used as the estimate for the amount of release in these cases.

2.3.5 Source Reduction

The United States requires facilities to identify the types of source reduction activities they have undertaken during the reporting year. Following consultations in 1996, qualitative reporting of pollution prevention activities to NPRI will be required for the 1997 and subsequent reporting years. Facilities must select one or more of nine possible actions to describe any source reduction activities taking place at the facility. The Mexican RETC does not have reporting on this information.

2.4 PRTR Contacts for Further Information

PRTR data and summaries are available free of charge. Boxes on the next page give contact telephone numbers and Internet sites for obtaining PRTR information in the three countries.

Public Access to NPRI Data and Information

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

Headquarters: 819-953-1656 819-994-3266 (fax)

Environment Canada on the Internet:
<http://www.ec.gc.ca>

NPRI data on the Internet:
<http://www.ec.gc.ca/pdb/npri>

e-mail: npri@ec.gc.ca

Additional Information on Mexican RETC

Luis Sánchez Cataño
Director de Gestión Ambiental
Instituto Nacional de Ecología
Avenida Revolución 1425-9
Col. Tlacopac
01040 México, D.F.
525-624-3570 525-624-3584 (fax)
lsanchez@chajul.ine.gob.mx

Semarnap on the Internet:
<http://www.semarnap.gob.mx>

INE's web page site for RETC on the Internet:
<http://www.ine.gob.mx/retc/retc.html>

Other web sites address RETC activities, including:
1) <http://www.laneta.apc.org/emis/sustanci/retc/retc.htm> by the nongovernmental organization LaNeta, and
2) <http://www.cespedes.org.mx/sistemas/industria/retc.html> by the industrial organization Enterprises Coordination Council

Public Access to TRI 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.

EPA on the Internet:
<http://www.epa.gov>

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

Online Data Access

1) EPA's Envirofacts:
<http:/www.epa.gov/enviro/html/tris/tris_overview.html>

2) Right-to-Know Network (RTK-NET):
<http://www.rtk.net> for Internet access
202-234-8570 for free on-line access to TRI data, or
202-234-8494 for information.

3) National Library of Medicine's Toxnet computer system:
<toxnet@tox.nlm.nih.gov>
<http://www.nlm.nih.gov/pubs/factsheets/trifs.html> for information

4) Environmental Defense Fund Scorecard on the Internet:
<http://www.scorecard.org>

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

3 Overview of PRTR Data for *Taking Stock 1996*

Figures

Tables

Key Findings

- The NPRI and TRI databases must be "matched" in order to compare the PRTR data. The data reported on forms for chemicals and industry categories common to both NPRI and TRI represent 60 percent of the total releases and transfers in the NPRI database and 82 percent of those in TRI.
- This report analyzes publicly available data submitted by specific Canadian and US facilities on a selected list of chemicals whose use meets or exceeds specific thresholds.
- PRTR data are limited in what information they can provide. For example, information is not included on non-industrial and smaller industrial sources of the listed substances and on pollution from other substances of concern. In particular, nonpoint sources such as paints and solvents used in homes, offices and industry can be significant sources of these pollutants.
- Comparing year-to-year changes or the performance of facilities must also be done with due regard for the limitations of the PRTR databases. PRTRs do not fully explain why year-to-year changes in the data have occurred, and there is no general agreement on methods to "normalize" facility performance to take into account factors of size or operations or environmental conditions.
- An important point to remember in interpreting the analyses in this report is that PRTR data do not address exposure or risk from the releases and transfers of these substances.

3.1 Introduction

This chapter describes the NPRI and TRI data used to prepare this report and the methods applied to match comparable data from the two PRTR systems. Summary tables of the complete NPRI and TRI databases for 1996 and for the matched data sets are presented here, to make clear the differences in the data sets that are examined in various sections of the book. Analyses of these data appear in **Chapters 4, 5** and **6**. This chapter concludes with a description of the limitations of PRTR data and the context within which these data should be viewed.

3.2 Data Used in *Taking Stock 1996*

3.2.1 NPRI and TRI Databases

The data for Canada are based on NPRI data as released to the public on the Internet at <http://www.ec.gc.ca/pdb/npri/> in July 1998. The data for the United States are based on TRI data as released to the public in *1996 Toxics Release Inventory: Public Data Release,* US Environmental Protection Agency, Washington, DC, May 1998.

The 1996 TRI required reporting of a list of 608 chemicals and chemical categories, while NPRI covered 176. TRI applied only to manufacturing and federal facilities, while, with a few exceptions, NPRI covered facilities in any industry. These chemicals are listed in Appendix A.

North American PRTR Data—All Chemicals and Industries

In 1996, 23,482 facilities in North America submitted 78,135 reports to the Canadian National Pollutant Release Inventory or the US Toxics Release Inventory. Releases and transfers of pollutant substances listed on the respective inventories totaled 1.55 billion kilograms. Transfers to recycling/reuse and to energy recovery are not included in this total because reporting of these amounts was voluntary in Canada in 1996 (**Table 3–1**, p. 22).

The NPRI and TRI databases used in this report contain updated information for previous years. Facilities in both countries may revise their PRTR reporting at any time, for any year. A facility may, for example, discover errors in its previous submissions, or a facility may change its methods for estimating releases, revising data for prior years for consistency. Some facilities may also submit forms after the reporting deadline. Because of this, the 1995 totals presented in *Taking Stock 1996* differ from those in last year's report (**Table 3–2**, p. 22).

3.2.2 Matching Chemicals and Industries

To analyze NPRI and TRI reporting on a common basis requires matching the common elements in the two PRTRs. This means omitting from both databases the industrial groups and the pollutant substances that appear only in NPRI or TRI, but not both. One process of elimination removes all reporting forms submitted by non-manufacturing facilities (those that reported US SIC codes outside the range of 20 to 39) because through 1996 TRI covered only manufacturing (plus federal facilities). In contrast, NPRI requires any facility that handles an NPRI chemical (with a few exceptions) to report.

A second process of elimination is required to remove all reporting forms for chemicals that are on the NPRI list but not on that of TRI, and vice versa. In addition, there are four chemicals that are listed by both NPRI and TRI but in different forms or physical states. These are ammonia, hydrochloric acid, isopropyl alcohol, and sulfuric acid. Whereas any release or transfer of hydrochloric or sulfuric acid is reportable to NPRI, only air emissions of these acids are reportable to TRI; therefore, only air emissions of these substances are included in the matched data set. Isopropyl alcohol and ammonia are not included in the matched data set but for different reasons. For isopropyl alcohol, only the substance as manufactured by the strong acid method is included in TRI, while all forms are included in NPRI. It is thus not possible to know which records for isopropyl alcohol in NPRI would match those in TRI. For ammonia, total ammonia is reportable to NPRI while only 10 percent of aqueous forms, along with all forms of anhydrous ammonia, are reportable to TRI. TRI facilities with total ammonia wastestreams equivalent to those of NPRI facilities that do report, would not report to TRI because the "10 percent" rule would cause them to fall below the reporting threshold. Thus, ammonia is not included in the matched data set. A total of 165 "matched" chemicals appear on both lists in 1996. (See **Appendix A** for a list of these chemicals compared to the list of all chemicals on both the NPRI and TRI lists.)

Hydrochloric acid, sulfuric acid and ammonia are released in large quantities by US and Canadian facilities, and the exclusion of complete or partial reporting on these chemicals widens the differences between the matched data set analyzed for *Taking Stock 1996* and the complete NPRI and TRI databases. This methodology also differs from that used to derive the 1995 *Taking Stock* report.

North American PRTR Data for 1995 and 1996—Matched Chemicals and Industries

Both PRTRs have also made changes in their reporting requirements over time. Comparisons that cover more than one year must also take these changes into account. Because of reporting changes for 1993 and 1994 (the first two years of NPRI reporting) that are not easily taken into account by either removing an industrial sector or a chemical, this *Taking Stock* report uses the reporting year 1995 as a base year for multi-year comparisons. (See **Section 2.1.2** for a description of the reporting changes.) The matched set of industries and chemicals is the same for 1995 as for 1996.

For the chemicals and industries that are common to both NRPI and TRI, the matched data set for 1996 contains information from 62,225 forms, submitted by 20,534 facilities in North America. These 1996 data, based on comparable information from both PRTRs, are analyzed in **Chapters 4** and **5**. Neither Canada nor the United States made changes in the chemicals and industries covered in their respective PRTRs for 1996. Therefore, the matched data set for 1995–1996 reflects the same matched chemical list and the same reporting industries as the 1996 data set. The 1995–1996 data are analyzed in **Chapter 6**. Releases and transfers for this matched data set totaled 1.26 billion kilograms in 1995 and 1.23 billion kilograms in 1996 (**Table 3–3**, p. 23).

North American releases and transfers totaling 323 million kilograms were thus excluded in compiling the matched data set of comparable information from NPRI and TRI for 1996. The "matched" data set represents 60 percent of the total releases and transfers in the full NPRI database and 82 percent of those in TRI. Differences in the two PRTRs' chemical lists alone eliminated 22 percent of NPRI releases and transfers and 18 percent of TRI releases and transfers from the matched analyses. By far the greatest effect of the differing chemical list was the difference in how ammonia is reported. Excluding ammonia from the matched data set excluded 14 percent of NPRI releases and transfers and 7 percent of TRI releases and transfers (**Table 3–4**, p. 24 and **Figure 3–1**).

Industry differences have a greater effect on the matching of NPRI data because Canada collects data from all industries while the US collects data only from manufacturing industries. Almost 16 percent of NPRI total releases and transfers were reported by industries that do not report to TRI. TRI does have a small number of facilities reporting that are non-manufacturing facilities; they are primarily federal facilities Also excluded are all data for transfers to recycling/reuse and to energy recovery, categories that must be reported in the United States but were voluntary in Canada in 1996.

[Text continues on p. 25.]

Figure 3–1
M 1996

Effects of Matching NPRI and TRI for Chemicals and Industries

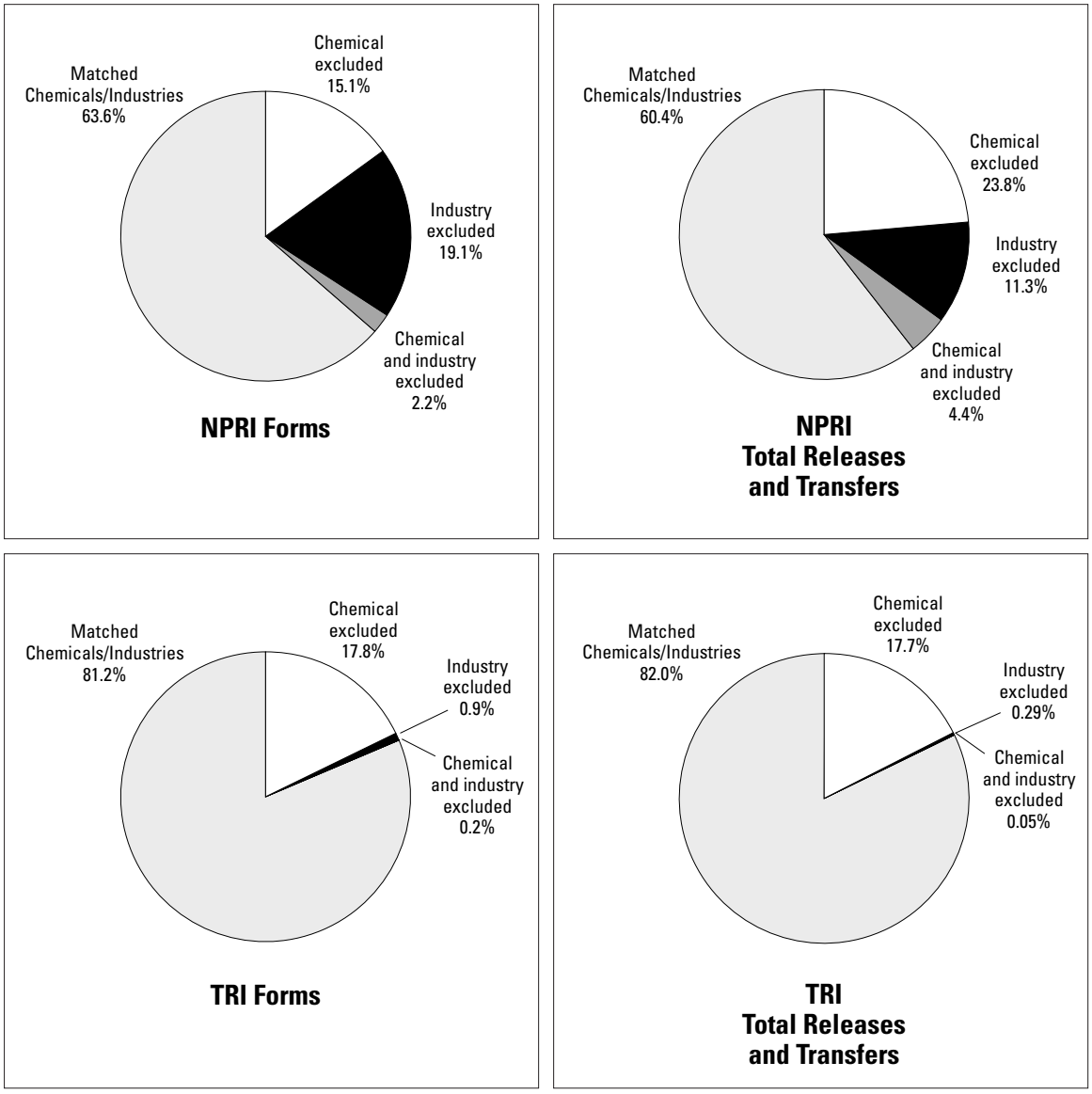


Table 3–1 A 1996 — North American Total Releases and Transfers, NPRI and TRI

	North America Number	Canadian NPRI Number	US TRI Number
Total Facilities	23,482	1,856	21,626
Total Forms	78,135	6,754	71,381
Releases	**kg**	**kg**	**kg**
Total Air Emissions	756,659,343	98,115,143	658,544,200
Surface Water Discharges	91,602,523	13,013,766	78,588,757
Underground Injection	110,487,006	17,820,743	92,666,263
On-site Land Releases	154,033,294	13,868,575	140,164,719
Total Releases	**1,112,989,534**	**143,025,595**	**969,963,939**
Transfers			
Treatment/Destruction	152,239,870	20,676,683	131,563,187
Sewage/POTWs	114,493,393	7,548,491	106,944,902
Disposal/Containment	169,304,015	34,137,359	135,166,656
Total Transfers	**436,037,278**	**62,362,533**	**373,674,745**
Total Releases and Transfers	**1,549,026,812**	**205,388,128**	**1,343,638,684**
Transfers to Recycling/Reuse*		98,492,683	975,326,074
Transfers to Energy Recovery*		4,262,115	216,352,186

* Optional reporting for NPRI, required for TRI.

➤ Canada and US data only. Mexico data not collected for 1996.

Table 3–2 A 1995 — North American Total Releases and Transfers, NPRI and TRI

	North America Number	Canadian NPRI Number	US TRI Number
1995 Data, Reported in Taking Stock 1995			
Total Facilities	23,709	1,758	21,951
Total Forms	79,605	6,294	73,311
Releases	**kg**	**kg**	**kg**
Total Air Emissions	811,073,607	102,537,501	708,536,106
Surface Water Discharges	96,230,607	34,409,462	61,821,145
Underground Injection	122,652,243	16,085,482	106,566,761
On-site Land Releases	140,598,536	15,822,135	124,776,401
Total Releases	**1,170,770,356**	**169,069,943**	**1,001,700,413**
Transfers			
Treatment/Destruction	146,968,533	16,548,187	130,420,346
Sewage/POTWs	114,894,506	6,125,111	108,769,395
Disposal/Containment	165,482,360	37,748,366	127,733,994
Total Transfers	**427,345,399**	**60,421,664**	**366,923,735**
Total Releases and Transfers	**1,598,115,755**	**229,491,607**	**1,368,624,148**
1995 Data, with Revisions Submitted since 1995 Report			
Total Facilities	23,415	1,789	21,626
Total Forms	77,768	6,387	71,381
Releases	**kg**	**kg**	**kg**
Total Air Emissions	759,121,530	100,577,330	658,544,200
Surface Water Discharges	112,918,221	34,329,464	78,588,757
Underground Injection	108,475,745	15,809,482	92,666,263
On-site Land Releases	154,130,258	13,965,539	140,164,719
Total Releases	**1,134,860,356**	**164,896,417**	**969,963,939**
Transfers			
Treatment/Destruction	148,113,711	16,550,524	131,563,187
Sewage/POTWs	113,234,409	6,289,507	106,944,902
Disposal/Containment	164,545,521	29,378,865	135,166,656
Total Transfers	**425,893,631**	**52,218,886**	**373,674,745**
Total Releases and Transfers	**1,560,753,987**	**217,115,303**	**1,343,638,684**

➤ Canada and US data only. Mexico data not collected for 1995 and 1996. These data are for all 1995 chemicals/industries reported in 1995 and revised since 1995 Taking Stock.

Table 3–3
M 1996

North American Releases and Transfers

	1995			1996		
	North America Number	**Canadian NPRI Number**	**US TRI Number**	**North America Number**	**Canadian NPRI Number**	**US TRI Number**
Total Facilities	21,063	1,302	19,761	20,534	1,344	19,190
Total Forms	64,221	4,164	60,057	62,225	4,298	57,927
	kg	**kg**	**kg**	**kg**	**kg**	**kg**
Total Air Emissions	603,803,814	67,039,370	536,764,444	563,269,177	63,590,706	499,678,471
Surface Water Discharges	79,560,902	12,330,846	67,230,056	78,742,497	5,128,134	73,614,363
Underground Injection	87,805,470	3,556,927	84,248,543	75,239,943	4,812,379	70,427,564
On-site Land Releases	133,857,666	9,607,743	124,249,923	145,838,045	8,936,491	136,901,554
Matched Releases	**905,164,732**	**92,671,766**	**812,492,966**	**863,218,412**	**82,596,460**	**780,621,952**
Treatment/Destruction	115,504,975	12,204,318	103,300,657	124,473,070	13,571,799	110,901,271
Sewage/POTWs	94,336,194	4,216,987	90,119,207	91,073,897	4,943,234	86,130,663
Disposal/Containment	139,019,418	21,327,700	117,691,718	147,065,311	23,017,654	124,047,657
Matched Transfers	**348,860,587**	**37,749,005**	**311,111,582**	**362,612,278**	**41,532,687**	**321,079,591**
Matched Releases and Transfers	**1,254,025,319**	**130,420,771**	**1,123,604,548**	**1,225,830,690**	**124,129,147**	**1,101,701,543**

➤ Does not include ammonia, isopropyl alcohol, non-air emissions of hydrochloric acid and sulfuric acid, and chemicals not reported to both NPRI and TRI.
➤ Canada and US data only. Mexico data not collected for 1995 and 1996. See **Chapter 6** for further analyses of 1995–1996 data.

Table 3–4
M 1996

Effects of Matching NPRI and TRI for Chemicals and Industries

	NPRI		TRI	
	Number of Forms	Total Releases and Transfers (kg)	Number of Forms	Total Releases and Transfers (kg)
All Chemicals and Industries	6,754	205,388,115	71,381	1,343,638,684
Excluded due to Industry	1,439	35,176,082	779	4,673,698
Excluded due to chemical and industry	146	9,032,416	153	728,117
Excluded to industry only	1,293	23,298,110	626	3,945,581
Excluded due to chemical only	1,017	48,928,455	12,675	237,263,443
Hydrochloric and sulfuric acid: non-air releases	390	10,856,897	661	2,779,099
Isopropyl alcohol	184	3,143,313	68	569,949
Ammonia	213	29,536,951	2,749	43,001,993
Other chemicals	230	5,391,294	9,197	190,912,402
Matched Chemicals/Industries	**4,298**	**124,129,134**	**57,927**	**1,101,701,543**
	%	%	%	%
All Chemicals and Industries	100.0	100.0	100.0	100.0
Excluded due to industry	21.3	17.1	1.1	0.3
Excluded due to chemical and industry	2.2	4.4	0.2	0.1
Excluded to industry only	19.1	11.3	0.9	0.3
Excluded due to chemical only	15.1	23.8	17.8	17.7
Hydrochloric and sulfuric acid: non-air releases	5.8	5.3	0.9	0.2
Isopropyl alcohol	2.7	1.5	0.1	0.0
Ammonia	3.2	14.4	3.9	3.2
Other chemicals	3.4	2.6	12.9	14.2
Matched Chemicals/Industries	**63.6**	**60.4**	**81.2**	**81.0**

3.3 Context of Report and Limitations of Data

Taking Stock 1996 analyzes publicly available data submitted by specific US and Canadian facilities on a selected list of chemicals or substances whose use meets or exceeds specific thresholds. Effective use of PRTR data—and therefore of this report—requires attention to context and limitations. PRTR data have many limitations, all of which influence this report. For one thing, important information often lies beyond the bounds of what can be known from existing PRTR data. Chemicals of concern may move into the environment from uses not addressed by PRTR reporting requirements, and no PRTR chemical list includes all the substances that may cause harm. PRTRs also offer no direct perspective on the ultimate environmental fate of chemical substances that reporting facilities release or ship off-site for disposal or other disposition. The North American PRTRs now in existence or in development do not cover:

- the full range of facilities that may manufacture, process or use listed chemicals;
- small sources (gasoline service stations, dry cleaners), mobile sources (motor vehicles), area sources (farms, parking lots) or natural sources;
- all releases and transfers from a facility; or
- all substances of concern.

These PRTRs also do not collect all the kinds of information that would improve the interpretation of facilities' reports. Such information would include:

- factors responsible for changes in releases and transfers from year to year,
- reliable basis for normalizing data from year to year,
- information on the health or environmental significance of the chemicals, and
- exposure to or risk from substances of concern.

While much can be learned directly from NPRI, TRI and the forthcoming RETC, each exhibits some or all of these limits. None supplies a complete view of any listed chemical within a country's borders. Similarly, a North American compilation of data reflects the limits of its constituent databases. This report therefore reflects these limitations, which are described in more detail in the following sections.

3.3.1 Accounting for Sources of Releases and Transfers

The North American PRTRs differ in the facilities they require to report. With few exceptions, Canada's NPRI covers all facilities that manufacture, process or use a listed pollutant above threshold limits. As established in 1987, the US TRI covered only manufacturing facilities. Federal facilities were added in 1994, and beginning in 1998, TRI coverage will expand to include mining, electrical utilities and other industries, as discussed above (in **Section 2.1.1**). The matched data set that forms a large part of this report includes only those industries that are common to both reporting systems.

PRTR data do not account for all sources of releases and transfers, an important limitation in considering information in this report. Threshold limits exempt small sources from reporting. Dry cleaning establishments and automotive service stations are typical examples. In a particular locale, one or more of these small sources may represent a large source of a listed chemical. Taken as a whole, they may also constitute a large source for particular substances. Also, nonpoint sources are not fully estimated in North American PRTRs. Among these, agricultural sources are important; pesticides from such sources, for example, may raise concerns both locally and globally. Mobile sources (such as automobiles, trucks, aircraft, and boats) are also particularly significant. Published TRI and NPRI reports supply an estimate of releases from some of these nonpoint sources, as part of the context for the PRTR data. Mexico plans to provide estimates of nonpoint sources (See **Section 3.3.2**, below, for a further discussion of nonpoint sources). Transfers of listed pollutants as (or in) products are not presently addressed by any of the North American PRTRs.

Individual PRTRs also may not require reporting of all types of releases and transfers. In Canada, for example, reporting of transfers off-site for recycling or energy recovery is optional. US facilities report not only the off-site transfers, but also the amounts treated or recycled on-site or used there for energy recovery. Because of the voluntary reporting of the recycling, reuse, recovery amounts in Canada, transfers to recycling, reuse, recovery are not included in the matched and multi-year matched chemical/industries data sets, and this may exclude large amounts of substances.

3.3.2 Nonpoint Sources

Some people commented during the development of the *Taking Stock* report on the need to provide readers with a sense that there are other sources of chemical releases, besides industry. Readers also need to understand clearly that not all sources of pollutants are covered in PRTR systems and, hence, in this report.

The CEC has begun an activity to define and estimate non-point sources of pollution in the three countries. Information from this activity is expected to be available to complement future *Taking Stock* reports.

In the interim, to demonstrate the role of other sources of chemical releases, the approach used in the NPRI and TRI summary reports was adapted for North America. The NPRI and TRI summary reports use emission estimates to quantify releases from other sources.

The 1996 NPRI summary report provides pollutant release information from other sources, including architectural surface coatings, commercial and consumer solvent use, dry cleaning and solvent degreasing. The 1995 NPRI summary report provided estimates on releases from dry cleaners, solvent degreasers, fuel distribution and mobile sources, and other emissions inventories of criteria air contaminants and greenhouse gases. The 1996 TRI report includes a new section on diffuse sources to " help the public understand the relative role of industrial releases (those reported to TRI) versus those releases not reported to TRI." Three sources are described: fertilizer use, pesticide use and VOCs (volatile organic compounds).

Two of these examples, architectural surface coatings (paints) and solvents, are based on EPA emission factors that were in use in all three countries. This permits a common factor to be used to calculate these emissions. These calculations should be seen as estimates designed to give a sense of other sources of PRTR substances only. Because of the many assumptions that have to be made, these estimates serve only to show relative proportions of these sources.

Surface Coatings for Architectural Structures (Paints)

Paints, stains and other coatings are applied to the inside and outside of buildings and can release VOCs. The amount and type of VOC released from paints is described in an EPA guidance manual (US EPA. *Emission Inventory Improvement Program. Preferred and Alternative Methods for Estimating Air Emissions,* Vol. III, **Chapter 3**, "Architectural Surface Coating," November 1995).

According to the 1996 NPRI summary report, the technology for processing paints that are used for protecting architectural structures is generally very similar in the United States and Canada, and thus the same [US] methodology for determining release estimates from these applications can be applied in Canada. These emission factors were applied to information provided by Statistics Canada on the quantity and types of coatings used in 1995 to yield pollutant data on a provincial and national basis. While this generated estimates for releases of 16 chemicals, only 12 of these were on the matched list of chemicals (**Table 3–5**, p. 31).

This example illustrates how one source, paints, can be a minor contributor for some pollutants, such as benzene and methanol, compared to industrial facilities reporting to NPRI and TRI. However, for other pollutants, such as ethylbenzene, paints can release amounts similar to industrial facilities reporting to NPRI (**Figure 3–2**).

Solvents

Solvents are found in numerous products used in the home, office and industry. Some of these products include adhesives and sealers, automotive after-market products (parts sold for vehicle repair rather than for their original manufacture), coatings and related products, household products, personal care products, and miscellaneous products such as arts and crafts supplies. The US EPA has developed emission factors per capita for each of these solvent categories (US EPA. *Emission Inventory Improvement Program. Preferred and Alternative Methods for Estimating Air Emissions*. Volume III, **Chapter 5**, "Consumer and Commercial Solvent Use." November 1995). In the 1996 NPRI summary report, Environment Canada combined these emission factors with population data to generate estimates of releases of 12 NPRI pollutants from these products (**Table 3–6**, p. 31). All of these chemicals are on the list of matched chemicals.

Commercial and consumer products can release significant amounts of some pollutants. For example, releases of toluene and tetrachloroethylene in commercial and consumer product solvents about equaled on-site releases reported by industrial facilities. However, for the other 10 pollutants, industrial facilities reported releasing more of these pollutants than are released though product use (**Figure 3–3**).

These two examples, paints and solvents, demonstrate how releases from these products can be a significant source of certain pollutants even though industrial facilities generally report larger releases to NPRI or TRI for the other pollutants examined. They also illustrate how additional data can provide information complementary to PRTR data.

3.3.3 Tracking Reductions in Releases and Transfers

Because North American PRTRs are built on annual reporting, their data reveal year-to-year changes and can be used to track long-term trends. Current PRTR reporting, however, does not explain these changes. Reductions in releases and transfers may result from source reduction (pollution prevention) activities, implementation of pollution control, changes in production level, and changes in estimation methods. A particular reduction may arise from a combination of these events, but PRTR data do not tell how much of the change was due to which factor. The benefits of reductions in releases are also difficult to quantify.

Several methods can be used to investigate changes, depending on the information a PRTR collects. TRI, for example, requires facilities to indicate whether they undertook source reduction activities during the year and, if so, what these activities were. Although no reduction amount can be attributed to a particular cause, TRI forms that indicate source reduction activities can be compared to those that do not to suggest the extent to which facilities' pollution prevention actions may be helping to reduce releases. In another example, meteorological records for a local area subject to flooding might be used with NPRI data to explore correlation between rainfall and surface water discharges. In TRI, facilities indicate this as the percentage of surface water discharges attributable to storm water run-off.

Some reductions in releases reported to PRTRs do not, in fact, represent smaller quantities of substances released to the environment. Generally, facilities estimate, rather than measure, their releases. PRTRs do not require precise measurement, as a way to reduce the cost to industry of preparing their PRTR reports. A facility may choose one of several reasonable methods for estimating its releases, basing them on monitoring data, materials balance calculations, or best engineering judgment. Changing from one estimation method to another may cause variation in the amounts reported without any change in actual releases. Facilities in a particular industry may rely on estimation methods (typically, "emission factors") supplied by a trade association or by manufacturers of equipment widely used in that industry. When these emission factors are revised, reported releases for an entire industry may change.

A recent study of TRI facilities that had reported large reductions in production-related waste found that just one type of "paper" change—that is, a reporting change that does not reflect any actual difference in amounts released, transferred or managed in waste—accounted for half of the apparent reductions. Facility decisions to redefine certain activities, especially on-site recycling, meant that the amounts associated with those activities were no longer reportable to TRI. (In other research, such as *Toxics Watch 1995* [INFORM, Inc. 1995], such redefinitions have also explained some of the large increases in TRI reporting.) However, when this study focused on TRI's release/disposal category rather than total production-related waste, reductions proved much more likely to be real. Facilities cited actual changes, including source reduction (pollution prevention) actions, as the reason for more than 90 percent of the reported decreases in release/disposal amounts. (See T.E. Natan, Jr. and C.G. Miller. "Are Toxics Release Inventory Reductions Real? Is Source Reduction the Cause?" *Environmental Science &Technology*, Vol. 32/15, 1 August 1998.)

NPRI does require facilities to report reasons for changes, using general categories: changes in production levels, changes in estimation methods, other (including accidents or spills), or no significant change. NPRI facilities indicate the appropriate category for change in total releases and again for change in total transfers. They can also provide a comment on the reason for year-to-year differences. TRI does not require facilities to identify reasons for changes, although facilities report the kind of estimation method used for each individual release and transfer amount; these can be compared from year to year. NPRI facilities also report the kind of estimation method used for each individual release and transfer amount. In addition, TRI requires facilities to calculate an index indicating changes in production levels. NPRI will add this on a voluntary basis in the 1997 reporting year. The proposed Mexican RETC would also include this information on a voluntary basis. The index can indicate relative production changes from year to year, but not the amount of reduction (or increase) in PRTR releases and transfers associated with changes in production.

Figure 3–2
M 1996

Releases of 12 Listed Substances in Canada and the United States: Uses in Surface Coatings versus Manufacturing

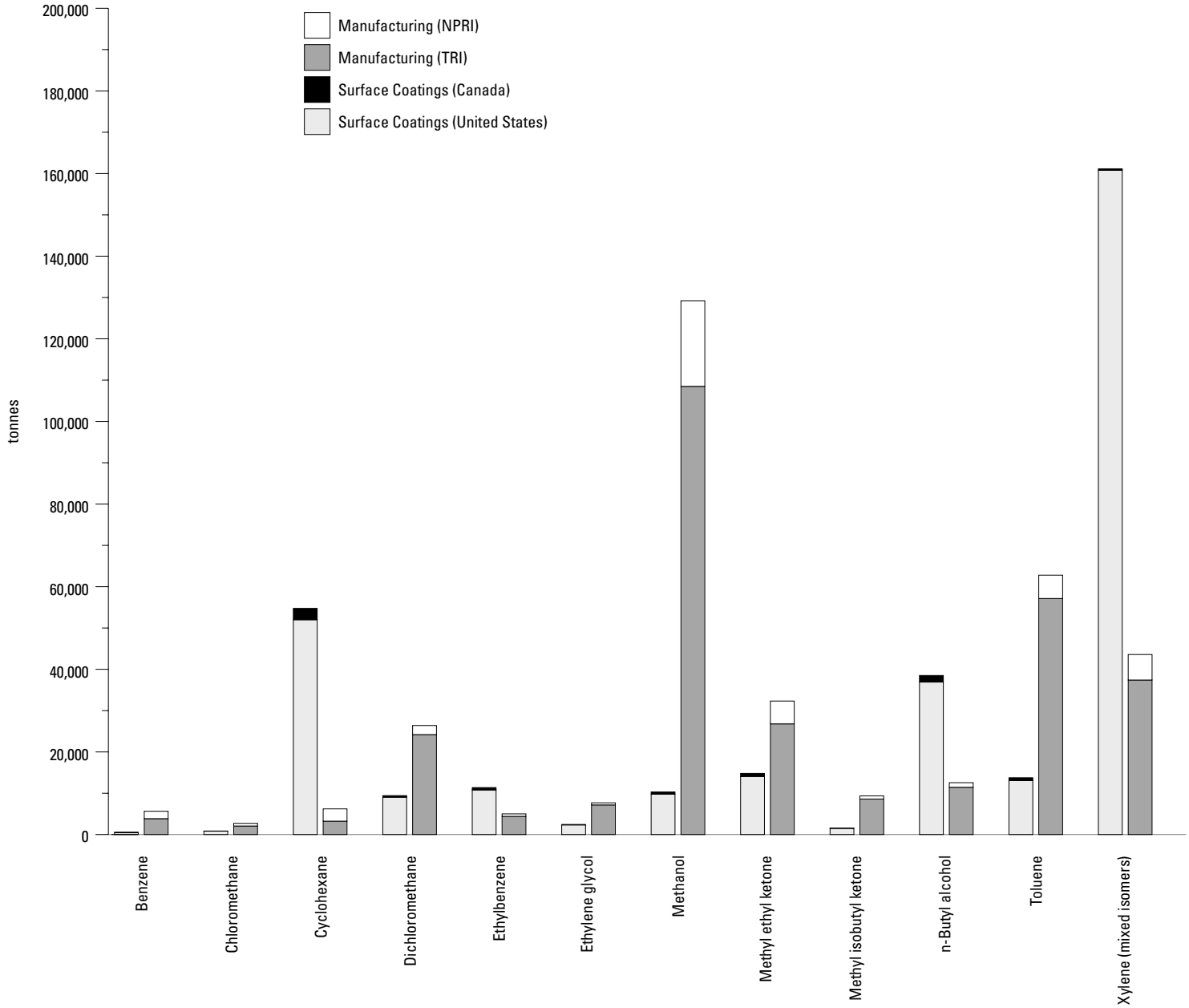
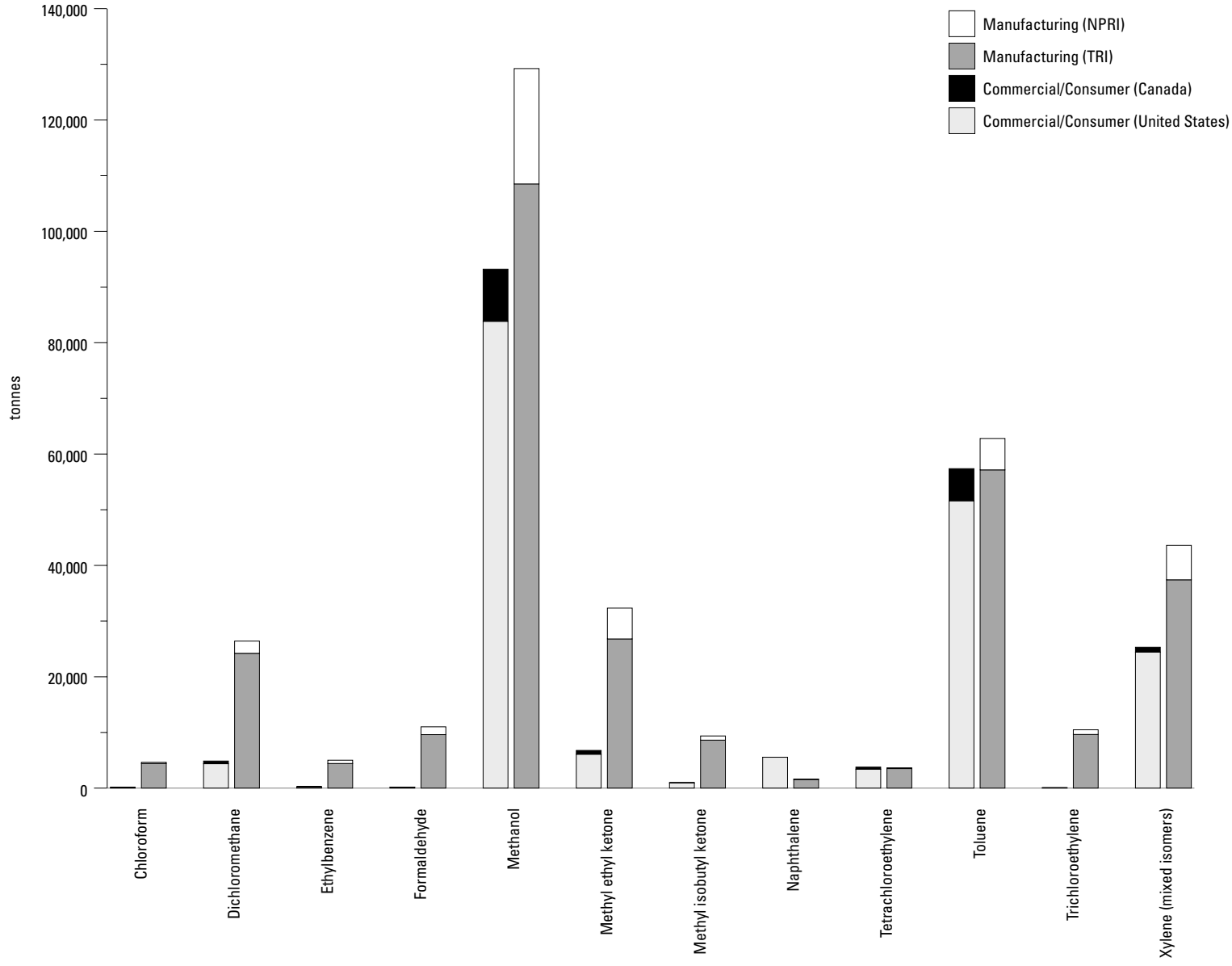


Figure 3–3
M 1996

Releases of 12 Solvents in Canada and the United States: Commercial/Consumer Sources versus Manufacturing Sources



3.3.4 Normalization

Some approaches have been suggested for normalizing PRTR data to account for conditions that vary among reporting facilities. Proposed normalizing measures include total amounts of chemicals per unit of production, per unit of energy consumption, or per job. Every normalization method has an underlying set of assumptions and limitations. For example, normalizing the release data on the basis of employees assumes that there is a relationship between the amount of releases and the number of employees, such that a facility that has more employees will have larger releases and a facility with fewer employees will have smaller releases. Many facilities do not find such a direct relationship. Releases may be smaller at one facility because of production processes used, differences in raw materials, or the installation of pollution control devices than at another facility in the same industrial sector with the same number of employees. In addition, factors influencing the size of the workforce at a facility from year to year are numerous, and therefore year-to-year comparisons based on normalizing by number of employees may not provide an accurate picture of releases. Other facilities note the difficulty in obtaining accurate employment figures on a per facility basis. If a facility has its head office and production staff at the same location, what is the appropriate number of employees to correspond to the release data? NPRI facilities report the number of employees, but TRI facilities do not. Other information sources can give an estimate of employees per TRI company, but this may not be accurate at the facility level. Because of these difficulties and likelihood of introducing errors, this report has not normalized NPRI and TRI data on the basis of employee size.

Other methods of normalization include normalizing releases on the basis of production level. The underlying assumption here is that as production increases, releases increase proportionately, and as production decreases, releases decrease. Again, production may increase without a corresponding increase in releases due to a host of reasons, such as raw material substitution, changes in production processes, improved spill management and pollution prevention activities. On the other hand, some industrial sectors, such as the chemical industry, have reported reductions in releases with increases in production. Another challenge is trying to define a measure of production that is appropriate to vastly different industrial sectors and applicable over time. Some observers argue that normalizing by production would provide a more accurate basis to compare facilities and jurisdictions, noting that if a facility is "bigger" than another, then it stands to reason that its releases and transfers would also be larger. Only TRI requires reporting of production-related information and that is an index of relative production from one year to the next. Such a measure, at best, is suited only to interpreting changes in PRTR data for a single facility from year to year. It cannot be used to compare across facilities.

Normalization could also be undertaken from the point of view of potential exposure. What is the population surrounding a facility? What are the uses of water bodies into which pollutants are discharged? Again, such data are not part of the PRTRs.

Some efforts have been made to establish methodologies for normalizing PRTR data. For example, the National Round Table on the Environment and Economy is an independent agency of the Canadian federal government set up to identify, explain and promote the principles and practices of sustainable development. One of the Round Table's program areas has been "Measuring Eco-Efficiency." In April 1997, experts in eco-efficiency indicators from around the world gathered to discuss the development of three eco-efficiency indicators, one for toxics, one for materials and one for energy. Eight multinational companies agreed to test the indicators. Two proposed pollutant dispersion or toxics indicators were: (1) mass of pollutant releases per unit of output, where unit of output is a unit of production measure or a unit of revenue, and (2) mass of pollutants common to NPRI and ARET per unit of output. The second indicator was developed to account for the environmental relevance of the pollutant release.

Indicators for materials and energy were refined but, despite intensive work, the multi-stakeholder subcommittee working on the development of a toxics indicator concluded that no such indicator could be developed. No agreement was reached on which chemicals to include, nor could any measure proposed be applicable to all industrial sectors. The committee agreed to refocus work into specific categories of chemicals and on specific environmental issues (See the Round Table's web site <http://www.nrtee-trnee.ca> for more information).

The Canadian Chemical Producers' Association, in its annual *Reducing Emissions Report*, summarizes releases of over 250 substances from their member companies (the report is available on the web at <http://www.ccpa.ca>). In addition to reporting releases by medium, by province, by carcinogen and by environmental issue, the report compares releases to value of shipments (in millions of constant dollars). The TRI annual summary report has also, in the past, included a table comparing total releases and transfers with value of shipments. Its summary report for 1996 (*1996 Toxics Release Inventory*, May 1998) includes a table of production level changes by industry sector and compares percent change in manufacturing production to the percent change in TRI releases and transfers since 1989. Neither of these reports uses the economic data as an index to normalize the PRTR data, however.

Normalizing data can provide additional perspectives on the environmental performance of reporting facilities. However, every normalization method has its own underlying sets of assumptions and limitations. Moreover, the TRI, NPRI and proposed RETC do not collect any common data for use in normalizing. This report adds only limited data on population and geographic area to the release-and-transfer data provided by the PRTRs.

3.3.5 Ranking Facilities, Provinces and States

In addition to normalization, another issue raised in comments on this series of reports relates to the ranking of facilities and provinces/states. Underlying these two interrelated topics is the problematic question of how best to measure environmental performance.

The CEC received comments relating concerns that the rankings in the report were simplistic and/or misleading. Other comments, however, supported the rankings used and pointed out that they were consistent with practices employed by the existing national PRTR programs. The CEC has attempted to respond to both views by providing different presentations of ranking as a way of balancing differing approaches.

This report includes rankings of facilities based upon their total on-site releases collectively for all listed substances. This approach aggregates releases to different environmental media, which may have different impacts. It also aggregates substances with differing chemical and toxicological properties. Finally, it does not take into account any differences in the proximity of people and sensitive environments to the releases. On the other hand, it aggregates only some chemicals of concern—and

these are just one percent of chemicals in commerce in Canada and the United States. In addition, some tables sum only carcinogens or only metals among the listed substances.

These rankings are done exclusively on the basis of reported quantities and are not risk-based. They present the largest sources of releases to the environment of the reported chemicals from the covered facilities and provinces/states. While crude, rankings of the largest polluters in PRTR databases provide some perspective and have served to stimulate actions by industry and government to reduce pollution of substances of concern.

None of the rankings is meant to imply that any facility is not living up to its environmental obligations under the law, nor that any province's or state's environmental program is inadequate. Such rankings, instead, document some of the largest sources of the listed pollutants to the environment.

Some tables include both on-site releases and off-site transfers and rank reporting facilities and provinces/states based upon their totals. Some transfers are sent for treatment, others for disposal. Some transfers are largely destroyed in treatment or managed at disposal sites. Other transfers result in large amounts of substances of concern entering the environment at off-site locations (at varying distances from the facility). As a result, such rankings are not based upon what enters the environment, particularly at the site of the facility. The combination of release and transfers, instead, sums the amounts of the listed pollutants being released to the environment on-site and sent off-site in wastes.

Other approaches suggested for environmental performance measurement include the "normalization" methods described above. The CEC welcomes such suggestions and continues to explore methods that can be included in its North American PRTR reports.

3.3.6 Data on Exposure and Risk

Substances listed in PRTRs differ in their toxicity, persistence and ability to accumulate in organisms such as fish and humans. Some chemicals reported to NPRI and TRI are known carcinogens; others break down rapidly in water. Chemicals can have different impacts in water or air or in mixtures.

There are notable differences of opinion on some of the health and environmental characteristics of chemicals on the NPRI and TRI lists. There is also a broad range of health endpoints (potentially measurable effects on human health) and an even broader range of factors that determine health and environmental impacts. For these reasons, *Taking Stock 1996* does not directly address the health and environmental characteristics of the releases and transfers analyzed here, although it does include a table of reported effects for substances reported in the largest amounts (see **Chapter 4**). To provide a full overview of effects for all chemicals would be too voluminous for the report. This report also presents data on releases and transfers of carcinogens and metals (see **Chapters 4, 5** and **6**).

Readers wishing to learn more about the health and environmental characteristics of the chemicals reported to NPRI, TRI and RETC can get information from these sources:

- Canadian Centre for Occupational Health and Safety—<http://www.ccohs.ca/oshanswers>; e-mail: inquiries@ccohs.ca
- US National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances, available from the National Library of Medicine—<http://www.nlm.nih. gov/pubs/factsheets/rtecsfs.html>
- National Library of Medicine's Hazardous Substances Data Bank (HSDB)—<http://www.nlm.nih. gov/pubs/factsheets/hsdbfs.html>
- State of New Jersey, Department of Health, Right-to-Know Hazardous Substances Fact Sheets—<http://www.state.nj.us/health/eoh/rtkweb/rtkhsfs.htm>
- National Safety Council, *Crossroads* on Chemical Databases and MSDSs—<http://www.nsc.org/xroads/chem.htm>
- Environmental Defense Fund's Chemical Scorecard—<http://www.scorecard.org> (See **Chapter 9** for a description of this web site).
- *Sistema Internacional de Monitoreo Ambiental,* which also supplies hourly information on Mexico City's air quality under the General Direction for Pollution Prevention and Control—<http://www.imeca.com.mx>
- *Sistema Nacional de Información Ambiental*—<http://www.ine.gob.mx/indicadores/espanol/i_ca6.htm>
- *Contaminación Industrial con Solventes Orgánicos como Causa de Teratogénesis* (*Salud Pública Mex 1996*), *Instituto Nacional de Salud Pública*—<http://www.insp.mx/salud/38/381-12s.html>

PRTRs do not collect data on exposure or risk associated with the releases they report. Exposure and risk assessment depend on site-specific geographic and population characteristics, and the data they require can range from prevailing wind patterns to inhalation rates of children playing in schoolyards. Toxicity indices, sometimes recommended for evaluating PRTR data, do not reflect these local details. On the other hand, PRTR data can contribute to estimates of local exposure or risk. Public health authorities, for example, can use release data from local facilities as one element needed to compile a profile of local exposure.

Taking Stock 1996 adds together information on chemicals that differ in their toxicity, persistence, and ability to bioaccumulate. The total amount of the substances released or transferred from a facility may not necessarily represent the environmental and health risks from this facility. Any evaluation of the relative health and environmental impacts of a facility's releases and transfers must take into account a wide range of factors, including the toxicity of the chemicals released, local climatic and environmental conditions, the proximity of people and the ecological sensitivity of the area.

Table 3–5
M 1996

Releases of Chemicals Used in Surface Coatings for Architectural Structures, Canada and United States

CAS Number	Chemical	Estimates of Releases from Surface Coatings: Canada, 1995 (tonnes)	Estimates of Releases from Surface Coatings: US, 1996 (tonnes)	Total On-site Releases from Facilities Reporting to: Canada NPRI, 1996 (tonnes)	Total On-site Releases from Facilities Reporting to: US TRI, 1996 (tonnes)
71-43-2	Benzene	21	493	1,797	3,849
74-87-3	Chloromethane	35	822	649	2,067
110-82-7	Cyclohexane	2,750	52,003	2,975	3,242
75-09-2	Dichloromethane	381	9,046	2,198	24,200
100-41-4	Ethylbenzene	571	10,803	591	4,416
107-21-1	Ethylene glycol	114	2,330	518	7,165
67-56-1	Methanol	517	9,798	20,729	108,499
78-93-3	Methyl ethyl ketone	743	14,068	5,527	26,795
108-10-1	Methyl isobutyl ketone	79	1,507	750	8,613
71-36-3	n-Butyl alcohol	1,597	36,916	1,108	11,452
108-88-3	Toluene	691	13,064	5,647	57,149
1330-20-7	Xylene (mixed isomers)	345	160,825	6,173	37,410

Table 3–6
M 1996

Releases of Chemicals Used as Solvents in Commercial and Consumer Products, Canada and United States

CAS Number	Chemical	Estimates of Releases of Solvents: Canada, 1995 (tonnes)	Estimates of Releases of Solvents: US, 1996 (tonnes)	Total On-site Releases from Facilities Reporting to: Canada NPRI, 1996 (tonnes)	Total On-site Releases from Facilities Reporting to: US TRI, 1996 (tonnes)
67-66-3	Chloroform	13	119	208	4,417
75-09-2	Dichloromethane	480	4,378	2,198	24,200
100-41-4	Ethylbenzene	10	249	591	4,416
50-00-0	Formaldehyde	12	152	1,399	9,607
67-56-1	Methanol	9,359	83,838	20,729	108,499
78-93-3	Methyl ethyl ketone	680	6,086	5,527	26,795
108-10-1	Methyl isobutyl ketone	101	911	750	8,613
91-20-3	Naphthalene	1	5,545	61	1,556
127-18-4	Tetrachloroethylene	377	3,392	132	3,508
108-88-3	Toluene	5,769	51,603	5,647	57,149
79-01-6	Trichloroethylene	7	58	838	9,634
1330-20-7	Xylene (mixed isomers)	887	24,418	6,173	37,410

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

4 North American Pollutant Releases and Transfers, 1996

Figures

Maps

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

Tables

Key Findings

- Results in the matched 1996 data set show that facilities in the United States dominated releases and transfers of listed pollutants reported to North American PRTRs. Given the relative size of the two systems, however, Canadian reporting represented a larger percentage of the releases and transfers—specifically for emissions to air, transfers to treatment/destruction, and transfers to disposal/containment.
- Releases to air, surface water, underground injection and land disposal at the facility accounted for 67 percent of NPRI releases and transfers and 71 percent of those in TRI.
- Four states and provinces—Texas, Louisiana, Ohio, and Ontario—accounted for more than one-quarter of the North American releases reported in 1996. These four also accounted for more than one-quarter of the total releases and transfers reported in 1996, but ranked differently: Texas, Ontario, Louisiana, and Ohio.
- Fifty facilities reporting the largest amounts contributed one-third of total North American releases. They were responsible for more than 70 percent of the underground injection and on-site land releases reported. The 50 facilities with the largest total releases and transfers contributed one-quarter of the North American total. More of their transfers off-site were sent to disposal/containment than was the case for all other facilities in the matched data set.
- Methanol, used in many industrial processes and generated as a byproduct in others, topped the list of 164 chemical substances and groups in the matched data set, with 186 million kg of releases and transfers. One of every four PRTR forms submitted in 1996 was for a substance designated as a known or suspected carcinogen by the International Agency for Research on Cancer or by the US National Toxicological Program. Releases and transfers of these substances amounted to 189 million kg, about one-sixth of the total. Facilities reported 317 million kg of releases and transfers of metals—40 percent of this total was for zinc and its compounds.
- The chemical industry (US SIC code 28) ranked first for total releases and transfers with 404 million kg, followed by primary metal industries (US SIC code 33) with 312 million kg. Together, they accounted for more of the total releases and transfers than the other 19 industry groups combined.

4.1 Introduction

This chapter summarizes PRTR data for North America, using publicly available data collected by Canada and the United States for 1996. As explained in **Chapter 3**, it analyzes the data for industries and chemicals that must be reported in both countries (a matched data set).

In 1996, more than 20,000 North American facilities in industries covered by both the US TRI and the Canadian NPRI filed reports on the substances that are common to both PRTRs. On average, they reported on three substances each (**Table 4–1**, p. 38).

4.2 Overview, 1996

Releases and transfers in North America totaled 1.23 billion kg in 1996 for the matched data set. On-site releases to air, water, underground injection wells and land were 70 percent of this total (**Table 4–1**, p. 38).

Releases in North America were about two and one-half times larger than transfers in 1996, and the largest releases occurred to air (**Figure 4–1**). This has been the pattern throughout the history of the Canadian and US PRTRs.

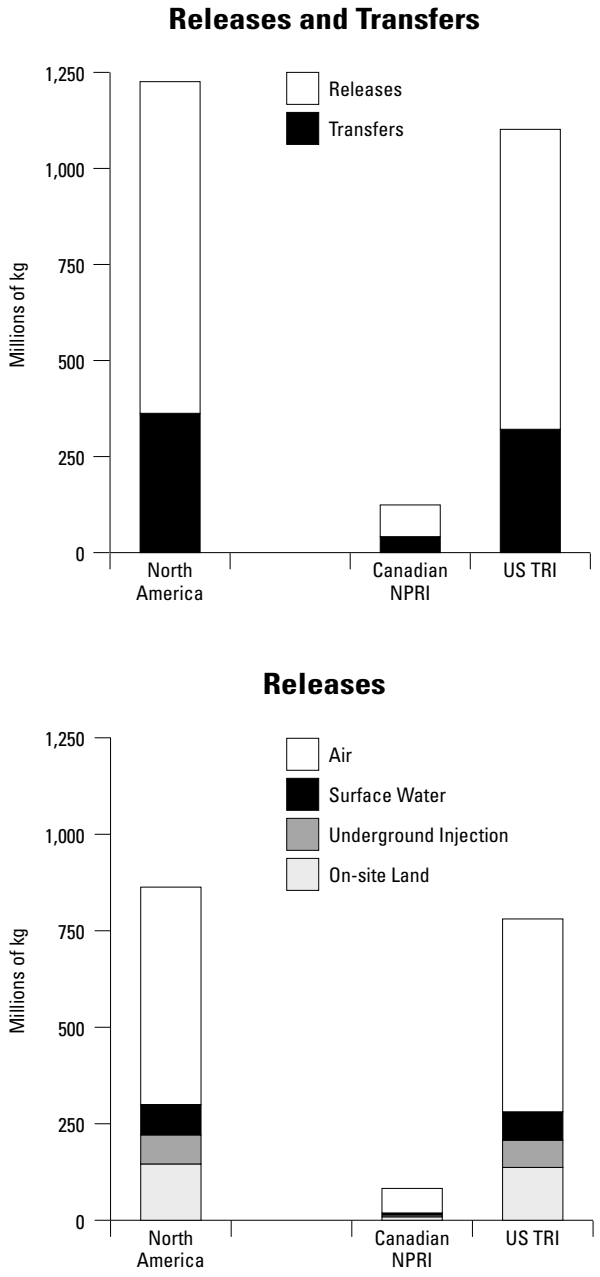
Most of the North American reporting occurs in the United States, because of its larger industrial base. Thus, 93 percent of the North American facilities and forms in 1996 came from the US TRI and 7 percent from Canada's NPRI. Canadian facilities, however, reported a relatively larger percentage of the actual quantities of releases and transfers—10 percent of the total.

Emissions to air totaled 563 million kg, almost half of all releases and transfers reported. The percentage of air emissions was somewhat higher in Canada (51 percent) than in the United States (45 percent). Despite this, releases represented a larger proportion of reporting in TRI (71 percent) than in NPRI (67 percent). Disposal/containment received the largest transfers in both PRTRs, although the percentage in NPRI (19 percent) was considerably higher than in TRI (11 percent, see **Table 4–1**, p. 38 and **Figure 4–2**).

More of North American transfers to disposal/containment came from NPRI reporting (16 percent) than any other release or transfer category. At the same time, TRI reporting accounted for a larger percentage of transfers to sewage treatment plants (95 percent) than any other release or transfer type.

Figure 4–1 **M** **1996**

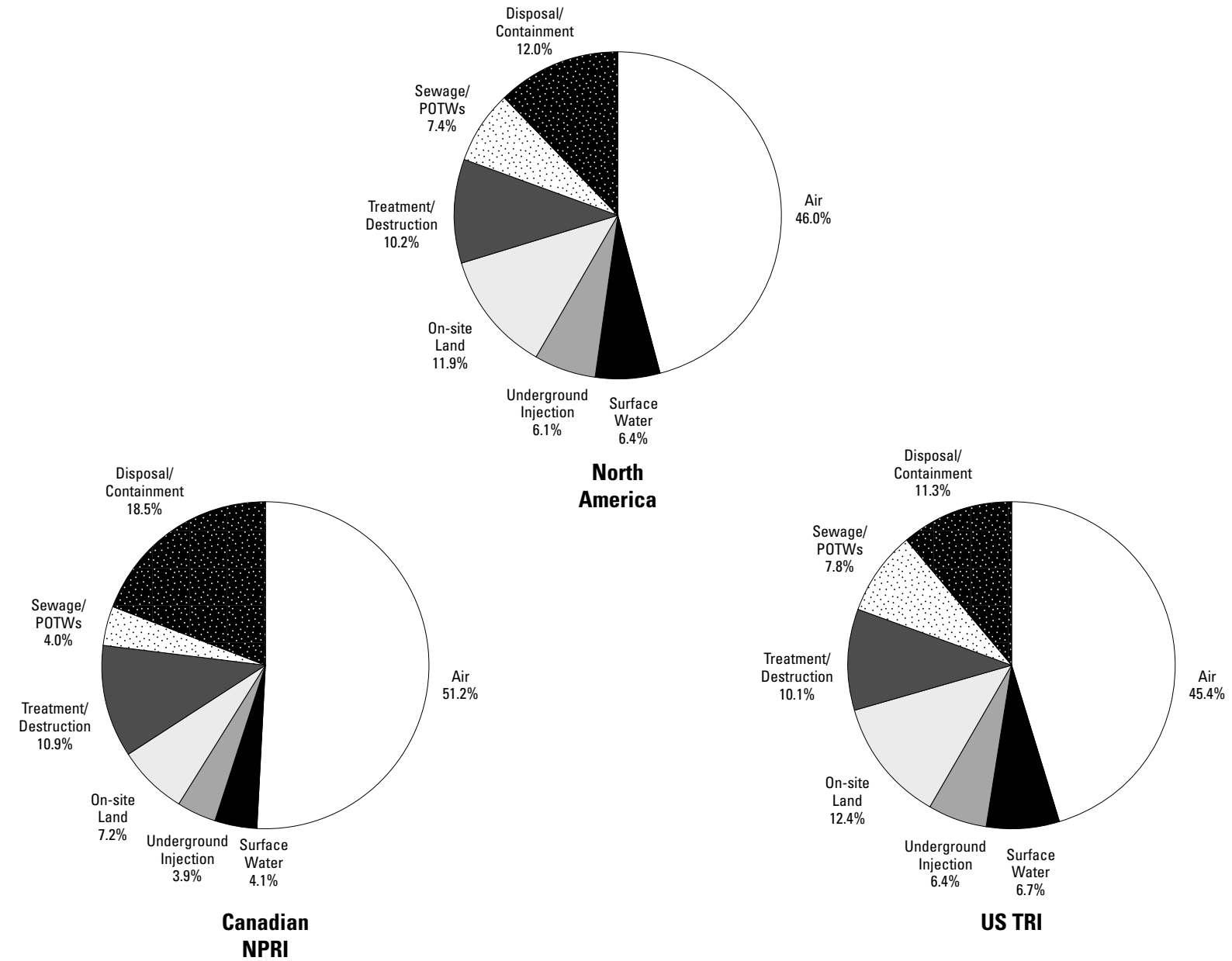
North American Releases and Transfers, NPRI and TRI



➤ Canada and US data only, Mexico data not collected for 1996.

Figure 4–2
M 1996

North American Releases and Transfers by Type, NPRI and TRI



➤ Canada and US data only, Mexico data not collected for 1996.

Table 4–1
M 1996

North American Releases and Transfers, NPRI and TRI

	North America		Canadian NPRI		US TRI		NPRI as % of North American Total	TRI as % of North American Total
	Number		Number		Number			
Total Facilities	20,534		1,344		19,190		6.5	93.5
Total Forms	62,225		4,298		57,927		6.9	93.1
	kg	%	kg	%	kg	%		
Total Air Emissions	563,269,177	45.9	63,590,706	51.2	499,678,471	45.4	11.3	88.7
Surface Water Discharges	78,742,497	6.4	5,128,134	4.1	73,614,363	6.7	6.5	93.5
Underground Injection	75,239,943	6.1	4,812,379	3.9	70,427,564	6.4	6.4	93.6
On-site Land Releases	145,838,045	11.9	8,936,491	7.2	136,901,554	12.4	6.1	93.9
Matched Releases	**863,218,412**	**70.4**	**82,596,460**	**66.5**	**780,621,952**	**70.9**	**9.6**	**90.4**
Treatment/Destruction	124,473,070	10.2	13,571,799	10.9	110,901,271	10.1	10.9	89.1
Sewage/POTWs	91,073,897	7.4	4,943,234	3.0	86,130,663	7.8	5.4	94.6
Disposal/Containment	147,065,311	11.0	23,017,654	18.5	124,047,657	11.3	15.7	84.3
Matched Transfers	**362,612,278**	**29.6**	**41,532,687**	**33.5**	**321,079,591**	**29.1**	**11.5**	**88.5**
Total Releases and Transfers	**1,225,830,690**	**100.0**	**124,129,147**	**100.0**	**1,101,701,543**	**100.0**	**10.1**	**89.9**

➤ Canada and US data only, Mexico data not collected for 1996.

4.3 Geographic Distribution

4.3.1 Releases

More than one-quarter of all North American releases in the matched data set originated in four states and provinces: Texas, Louisiana, Ohio, and Ontario (**Map 4–1**). The largest releases came from the two states on the Gulf of Mexico with significant oil and chemical production. Facilities in Texas reported more emissions to air, more underground injection and more total releases than any other state or province. Releases in Texas were far larger than those in other states and provinces—half again as much as in second-ranked Louisiana. However, Louisiana led all states and provinces for surface water discharges and also reported substantial underground injection (**Table 4–2**, p. 46).

Although it did not lead in any release category, Ohio ranked third for total releases, followed by Ontario, which had the second largest air emissions.

Air emissions, the largest single type of release or transfer, were reported in the largest amounts through the east and south (**Map 4–1a**).

Other release types were more concentrated. Three-quarters of each release type other than air occurred in a handful of US states and (for surface water discharges) one province. Drawing upon the data in **Table 4–2** (p. 46), these states/province can be listed alphabetically as follows:

- For surface water discharges—California, Georgia, Illinois, Louisiana, Mississippi, New Brunswick, New Jersey, New York, Ohio, Pennsylvania, Texas, South Dakota and West Virginia.
- For underground injection—Florida, Louisiana and Texas.
- For on-site land releases—Arizona, Florida, Idaho, Illinois, Missouri, Montana, New Mexico, North Carolina, Ohio, Texas and Utah.

Underground injection received the smallest amount of releases in both countries, but was more common in the United States than in Canada. Chemical manufacturers, including the large petrochemical industry in Louisiana and Texas, reported the great majority of underground injection. Geographically, surface water discharges and on-site land releases were more widely dispersed (**Maps 4–1b** through **4–1d**).

4.3.2 Releases and Transfers

States and provinces with large releases and transfers encircle the Great Lakes and extend through the eastern United States down to the Gulf of Mexico. A few are on the Southwestern plains (**Maps 4–2** and **4–2a**).

Primarily because of its releases, Texas also ranked first for total releases and transfers, with 10 percent of the total. Large off-site transfers influenced the ranking of some states and provinces. This is true for Ontario, which had the third-largest transfers and ranked second overall. In third-ranked Louisiana, releases accounted for almost all of its total releases and transfers. Transfers were larger than releases in only nine US states and territories (including the District of Columbia) and in no Canadian province (**Table 4–3**, p. 47).

Because releases, especially air emissions, dominate North American PRTR reporting, the geographic distribution of releases and transfers (**Map 4–2**) resembles the distribution of releases alone, especially in the east (**Map 4–1**).

[Text continues on p. 49.]

Map 4–1
M 1996

Largest Sources of North American Releases: States and Provinces

Each shade = one-quarter of total releases

- 4 states/provinces
- 7 states/provinces
- 11 states/provinces
- 41 states/provinces

Range in kilograms

- 37.0 to 93.0 million kg
- 26.6 to 37.0 million kg
- 13.0 to 26.6 million kg
- 0 to 13.0 million kg

Map 4–1a

M 1996

Largest Sources of North American Releases to Air: States and Provinces

Each shade = one-quarter of total releases

- 4 states/provinces
- 7 states/provinces
- 11 states/provinces
- 41 states/provinces

Range in kilograms

- 31.0 to 48.0 million kg
- 18.0 to 31.0 million kg
- 9.5 to 18.0 million kg
- 0 to 9.5 million kg

Map 4–1b
M 1996

Largest Sources of North American Discharges to Surface Waters: States and Provinces

Each shade = one-quarter of total releases

- 2 states/provinces
- 5 states/provinces
- 13 states/provinces
- 43 states/provinces

Range in kilograms

- 10.0 to 18.0 million kg
- 2.4 to 10.0 million kg
- 1.0 to 2.4 million kg
- 0 to 1.0 million kg

Map 4–1c
M 1996

Largest Sources of North American Underground Injection: States and Provinces

Each shade = one-quarter of total releases

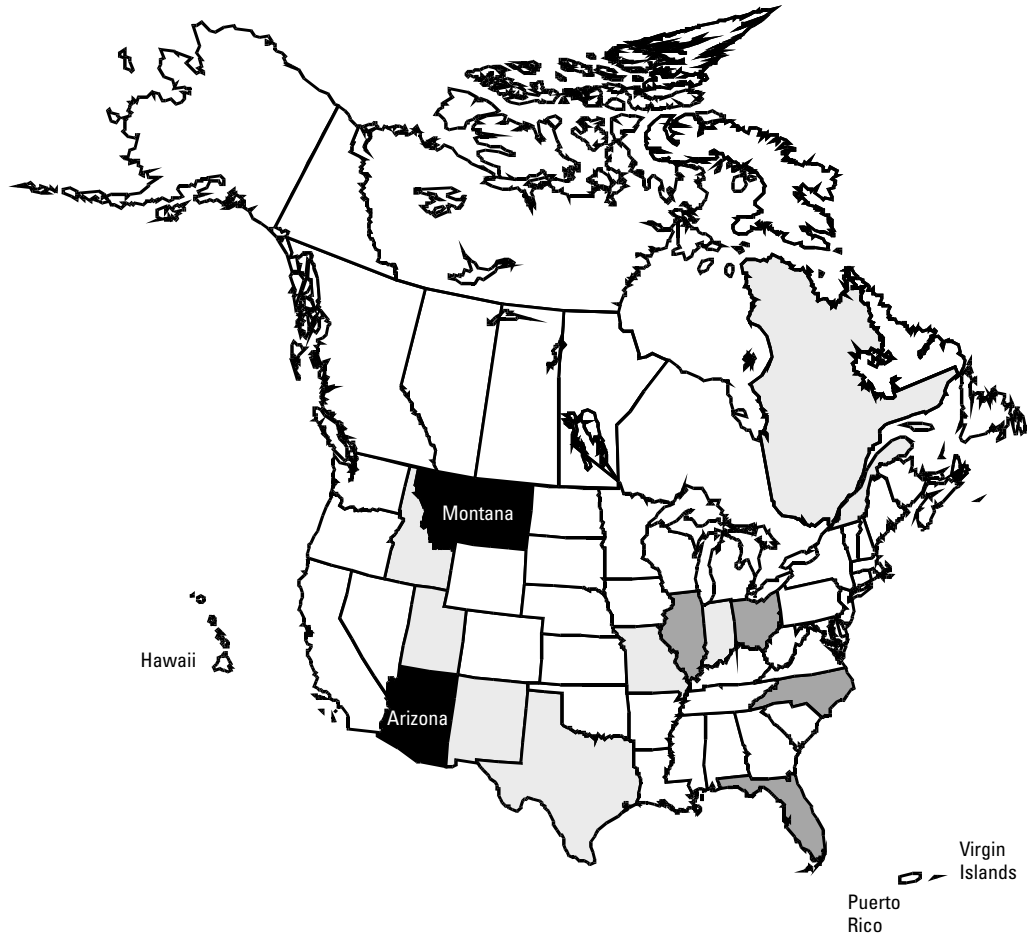
- 1 states/provinces
- 1 states/provinces
- 4 states/provinces
- 57 states/provinces

Range in kilograms

- 25.0 to 30.0 million kg
- 15.0 to 25.0 million kg
- 2.5 to 15.0 million kg
- 0 to 2.5 million kg

Map 4–1d
M 1996

Largest Sources of North American Releases On-site Land: States and Provinces



Each shade = one-quarter of total releases

- 2 states/provinces
- 4 states/provinces
- 7 states/provinces
- 50 states/provinces

Range in kilograms

- 15.0 to 21.0 million kg
- 8.4 to 15.0 million kg
- 3.5 to 8.4 million kg
- 0 to 3.5 million kg

Map 4–2
M 1996

Largest Sources of North American Releases and Transfers: States and Provinces

Each shade = one-quarter of total releases and transfers

- 4 states/provinces
- 7 states/provinces
- 12 states/provinces
- 40 states/provinces

Range in kilograms

- 65.0 to 123.0 million kg
- 39.0 to 65.0 million kg
- 20.0 to 39.0 million kg
- 0 to 20.0 million kg

Map 4–2a
M 1996

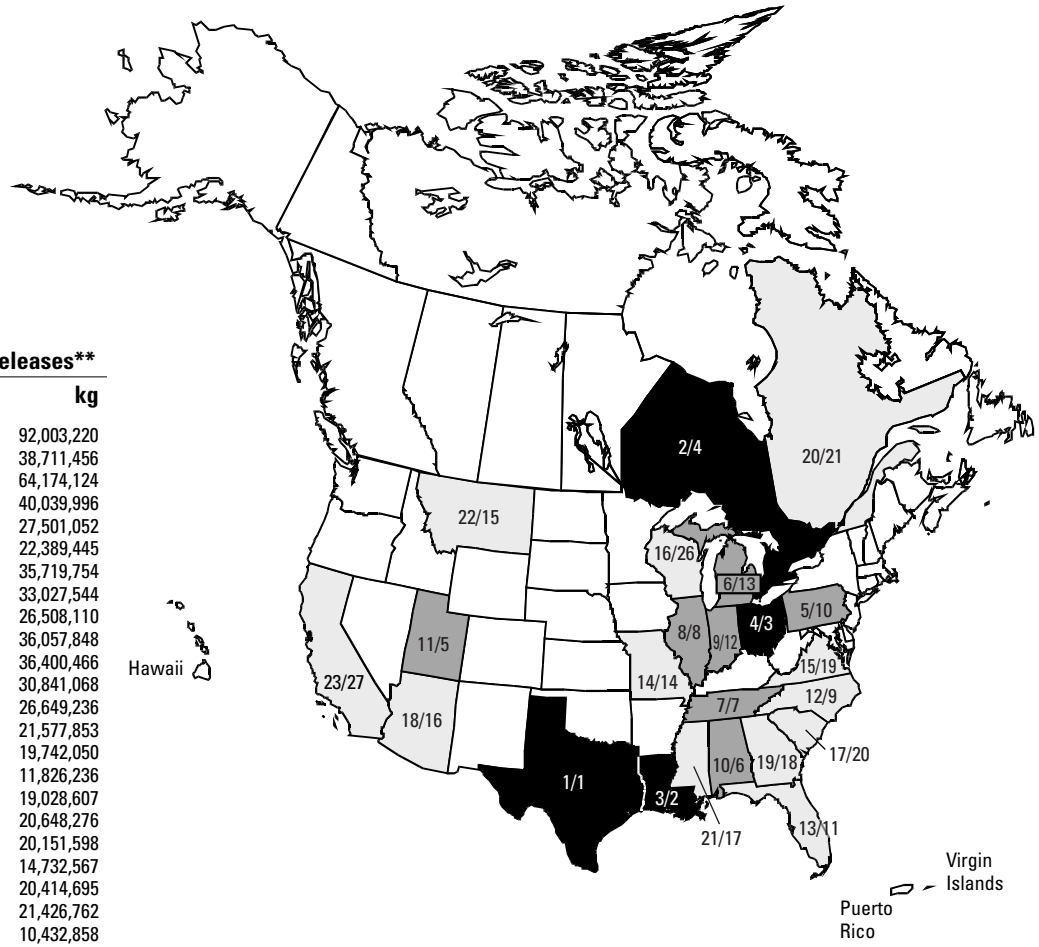
Largest Sources of North American Releases and Transfers: States and Provinces

Total Releases and Transfers*

Rank	Province/State	kg
1	Texas	122,292,324
2	Ontario	68,763,262
3	Louisiana	67,921,157
4	Ohio	65,938,375
5	Pennsylvania	61,451,832
6	Michigan	50,084,864
7	Tennessee	46,502,196
8	Illinois	45,852,410
9	Indiana	45,448,692
10	Alabama	44,698,332
11	Utah	39,127,123
12	North Carolina	36,794,390
13	Florida	34,623,617
14	Missouri	28,183,720
15	Virginia	27,126,134
16	Wisconsin	26,292,731
17	South Carolina	26,106,525
18	Arizona	24,789,458
19	Georgia	24,543,082
20	Quebec	22,940,209
21	Mississippi	21,956,131
22	Montana	21,451,550
23	California	20,263,904

Total Releases**

Rank	kg
1	92,003,220
4	38,711,456
2	64,174,124
3	40,039,996
10	27,501,052
13	22,389,445
7	35,719,754
8	33,027,544
12	26,508,110
6	36,057,848
5	36,400,466
9	30,841,068
11	26,649,236
14	21,577,853
19	19,742,050
26	11,826,236
20	19,028,607
16	20,648,276
18	20,151,598
21	14,732,567
17	20,414,695
15	21,426,762
27	10,432,858



Rankings

5/6 = Rank for Total Releases and Transfers/ Rank for Total Releases

Range in kilograms

- 65.0 to 123.0 million kg
- 39.0 to 65.0 million kg
- 20.0 to 39.0 million kg
- 0 to 20.0 million kg

* See **Table 4–3**
** See **Table 4–2**

Table 4–2

M 1996

North American Releases, by Province and State

Province/State	Total Air Emissions kg	%	Surface Water Discharges kg	%	Underground Injection kg	%	On-site Land Releases kg	%	Total Releases kg	%
Texas	47,593,046	8.4	8,314,441	10.6	29,226,586	38.8	6,869,147	4.7	92,003,220	10.7
Louisiana	23,936,541	4.2	17,017,179	21.6	20,685,610	27.5	2,534,794	1.7	64,174,124	7.4
Ohio	19,693,509	3.5	2,403,667	3.1	5,103,458	6.8	12,839,362	8.8	40,039,996	4.6
Ontario	35,222,244	6.3	1,310,462	1.7	0	0.0	2,099,445	1.4	38,711,456	4.5
Utah	30,786,938	5.5	6,583	0.0	0	0.0	5,606,945	3.8	36,400,466	4.2
Alabama	31,455,659	5.6	1,318,413	1.7	5	0.0	3,283,771	2.3	36,057,848	4.2
Tennessee	31,700,778	5.6	503,816	0.6	572,198	0.8	2,942,962	2.0	35,719,754	4.1
Illinois	19,968,668	3.5	2,263,340	2.9	350	0.0	10,795,186	7.4	33,027,544	3.8
North Carolina	21,784,191	3.9	626,917	0.8	0	0.0	8,429,960	5.8	30,841,068	3.6
Pennsylvania	16,208,407	2.9	10,132,580	12.9	0	0.0	1,160,065	0.8	27,501,052	3.2
Florida	9,483,892	1.7	202,991	0.3	7,885,535	10.5	9,076,818	6.2	26,649,236	3.1
Indiana	21,756,464	3.9	998,925	1.3	92,181	0.1	3,660,540	2.5	26,508,110	3.1
Michigan	17,494,151	3.1	835,446	1.1	2,441,460	3.2	1,618,388	1.1	22,389,445	2.6
Missouri	12,924,617	2.3	1,138,571	1.4	0	0.0	7,514,665	5.2	21,577,853	2.5
Montana	1,276,821	0.2	35,561	0.1	0	0.0	20,114,380	13.8	21,426,762	2.5
Arizona	3,948,840	0.7	159	0.0	2	0.0	16,699,275	11.5	20,648,276	2.4
Mississippi	14,615,845	2.6	3,264,420	4.1	34,751	0.1	2,499,679	1.7	20,414,695	2.4
Georgia	16,082,307	2.9	2,989,514	3.8	0	0.0	1,079,777	0.7	20,151,598	2.3
Virginia	18,861,490	3.3	427,916	0.5	5	0.0	452,639	0.3	19,742,050	2.3
South Carolina	17,884,704	3.2	842,451	1.1	0	0.0	301,452	0.2	19,028,607	2.2
Quebec	9,938,248	1.8	1,142,110	1.5	0	0.0	3,633,536	2.5	14,732,567	1.7
Alberta	8,769,955	1.6	302,619	0.4	4,807,393	6.4	733,895	0.5	14,621,572	1.7
Kentucky	11,286,339	2.0	610,612	0.8	0	0.0	816,812	0.6	12,713,763	1.5
New York	10,120,889	1.8	1,684,244	2.1	1,166	0.0	489,946	0.3	12,296,245	1.4
Oregon	9,679,802	1.7	1,120,834	1.4	0	0.0	1,072,653	0.7	11,873,289	1.4
Wisconsin	10,412,187	1.8	1,228,610	1.6	0	0.0	185,439	0.1	11,826,236	1.4
California	7,479,859	1.3	2,413,569	3.1	1,247	0.0	538,183	0.4	10,432,858	1.2
Arkansas	8,184,598	1.5	555,704	0.7	721,849	0.0	521,356	0.4	9,983,507	1.2
West Virginia	5,940,424	1.1	3,725,510	4.7	0	0.0	232,510	0.2	9,898,444	1.1
Washington	8,121,176	1.4	926,607	1.2	0	0.0	60,561	0.0	9,108,344	1.1
New Mexico	766,890	0.1	5	0.0	0	0.0	8,150,220	5.6	8,917,115	1.0
Iowa	6,518,923	1.2	1,185,518	1.5	0	0.0	716,587	0.5	8,421,028	0.0
Kansas	5,562,502	0.0	173,898	0.2	447,675	0.6	391,048	0.3	6,575,123	0.8
Minnesota	6,256,417	1.1	22,680	0.0	0	0.0	33,228	0.0	6,312,325	0.7
Oklahoma	5,193,399	0.9	236,690	0.3	442,021	0.6	41,190	0.0	5,913,300	0.7
British Columbia	5,315,182	0.9	289,035	0.4	0	0.0	95,564	0.1	5,710,382	0.7
New Jersey	3,502,921	0.6	1,772,559	2.3	2	0.0	166,347	0.1	5,441,829	0.6
Idaho	905,932	0.2	468,450	0.6	0	0.0	3,884,991	2.7	5,259,373	0.6
Maryland	2,599,111	0.5	735,594	0.9	0	0.0	833,560	0.6	4,168,265	0.5
Wyoming	528,210	0.1	203	0.0	2,771,338	3.7	15,238	0.0	3,314,989	0.4
New Brunswick	1,298,472	0.2	1,976,038	2.5	0	0.0	0	0.0	3,277,331	0.4
Maine	2,787,043	0.5	255,305	0.3	0	0.0	87,337	0.1	3,129,685	0.4
Manitoba	999,785	0.2	32,584	0.0	0	0.0	2,024,670	1.4	3,062,727	0.4
Puerto Rico	2,994,729	0.5	31,368	0.0	0	0.0	1,517	0.0	3,027,614	0.4
Connecticut	2,326,895	0.4	285,137	0.4	0	0.0	26,871	0.0	2,638,903	0.3
Massachusetts	2,399,396	0.4	28,498	0.0	0	0.0	6,913	0.0	2,434,807	0.3
Nebraska	2,179,434	0.4	119,579	0.2	0	0.0	20,987	0.0	2,320,000	0.3
South Dakota	551,672	0.1	1,541,952	1.0	0	0.0	454	0.0	2,094,078	0.2
Nevada	405,791	0.1	0	0.0	0	0.0	1,058,623	0.7	1,464,414	0.2
Colorado	997,727	0.2	402,636	0.5	0	0.0	45,499	0.0	1,445,862	0.2
Nova Scotia	889,150	0.2	43,272	0.1	0	0.0	343,551	0.2	1,278,806	0.1
Delaware	939,119	0.2	100,452	0.1	0	0.0	11,902	0.0	1,051,473	0.1
Alaska	579,358	0.1	458,168	0.6	122	0.0	2,237	0.0	1,039,885	0.1
Rhode Island	967,628	0.2	3,910	0.0	0	0.0	9	0.0	971,547	0.1
New Hampshire	862,005	0.2	7,612	0.0	0	0.0	4,805	0.0	874,422	0.1
Saskatchewan	749,501	0.1	22,230	0.0	4,986	0.0	5,830	0.0	783,366	0.1
Virgin Islands	555,685	0.1	3,121	0.0	0	0.0	2,960	0.0	561,766	0.1
North Dakota	314,729	0.1	137,566	0.2	0	0.0	4	0.0	452,299	0.1
Newfoundland	399,628	0.1	772	0.0	0	0.0	0	0.0	400,700	0.1
Vermont	132,770	0.0	54,424	0.1	0	0.0	613	0.0	187,807	0.0
Hawaii	168,043	0.0	458	0.0	3	0.0	1,152	0.0	169,656	0.0
Prince Edward Island	8,541	0.0	9,012	0.0	0	0.0	0	0.0	17,553	0.0
District of Columbia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	**563,269,177**	**100.0**	**78,742,497**	**100.0**	**75,239,943**	**100.0**	**145,838,045**	**100.0**	**863,218,412**	**100.0**

➤ Canada and US data only. Mexico data not collected for 1996.

Table 4–3
M 1996

North American Releases and Transfers, by Province and State

Province/State	1996 Population	Land Area (sq km)	Facilities Number	Facilities Rank	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers kg	Total Releases and Transfers Rank	Total Releases and Transfers Per Capita kg	Total Releases and Transfers Per Capita Rank	Total Releases and Transfers Per Sq Km kg	Total Releases and Transfers Per Sq Km Rank
Texas	19,091,207	691,031	1,074	5	92,003,220	30,289,104	122,292,324	1	5.9	15	615.0	4
Ontario	10,753,573	916,734	733	10	38,711,456	30,051,806	68,763,262	2	3.9	31	314.2	16
Louisiana	4,340,818	123,675	269	28	64,174,124	3,747,033	67,921,157	3	0.6	59	49.3	40
Ohio	11,162,797	107,045	1,462	1	40,039,996	25,898,379	65,938,375	4	5.1	24	523.7	6
Pennsylvania	12,040,084	117,348	1,083	4	27,501,052	33,950,780	61,451,832	5	6.4	13	176.0	25
Michigan	9,730,925	151,585	795	8	22,389,445	27,695,419	50,084,864	6	7.8	7	484.9	8
Tennessee	5,307,381	109,153	574	13	35,719,754	10,782,442	46,502,196	7	5.1	23	180.8	22
Illinois	11,845,316	145,934	1,165	2	33,027,544	12,824,866	45,852,410	8	5.1	22	330.4	14
Indiana	5,828,090	93,719	936	6	26,508,110	18,940,582	45,448,692	9	5.0	25	269.7	18
Alabama	4,287,178	133,916	443	17	36,057,848	8,640,484	44,698,332	10	6.4	14	75.0	33
Utah	2,017,573	219,889	128	38	36,400,466	2,726,657	39,127,123	11	3.3	34	160.9	27
North Carolina	7,309,055	136,413	769	9	30,841,068	5,953,322	36,794,390	12	1.1	53	156.3	28
Florida	14,418,917	151,940	447	16	26,649,236	7,974,381	34,623,617	13	8.8	5	426.0	11
Missouri	5,363,669	180,515	499	15	21,577,853	6,605,867	28,183,720	14	2.1	42	842.1	2
Virginia	6,666,167	105,587	395	21	19,742,050	7,384,084	27,126,134	15	5.3	21	156.1	29
Wisconsin	5,146,199	145,436	801	7	11,826,236	14,466,495	26,292,731	16	2.4	40	227.9	20
South Carolina	3,716,645	80,583	439	18	19,028,607	7,077,918	26,106,525	17	10.4	4	333.8	13
Arizona	4,434,340	295,260	172	33	20,648,276	4,141,182	24,789,458	18	7.0	10	323.0	15
Georgia	7,334,274	152,577	623	11	20,151,598	4,391,484	24,543,082	19	2.2	41	46.0	41
Quebec	7,138,795	1,357,812	336	24	14,732,567	8,207,642	22,940,209	20	1.3	51	379.3	12
Mississippi	2,710,750	123,515	274	27	20,414,695	1,541,436	21,956,131	21	4.1	30	256.9	19
Montana	876,684	380,850	21	55	21,426,762	24,788	21,451,550	22	4.4	28	164.8	26
California	31,857,646	411,049	1,137	3	10,432,858	9,831,046	20,263,904	23	4.6	26	89.7	31
New York	18,134,226	127,190	614	12	12,296,245	7,581,903	19,878,148	24	3.2	35	16.9	49
Oregon	3,196,313	251,419	222	32	11,873,289	6,527,813	18,401,102	25	5.3	20	96.3	30
Kentucky	3,882,071	104,659	380	22	12,713,763	4,533,978	17,247,741	26	1.9	44	465.3	9
New Jersey	8,001,850	20,168	514	14	5,441,829	11,541,705	16,983,534	27	8.1	6	177.8	24
Alberta	2,696,826	638,233	96	42	14,621,572	553,277	15,174,849	28	15.6	3	549.2	5
Arkansas	2,506,293	137,754	334	25	9,983,507	3,277,183	13,260,690	29	2.4	39	44.2	43
Iowa	2,848,033	145,752	353	23	8,421,028	4,658,833	13,079,861	30	4.1	29	50.1	39
West Virginia	1,820,407	62,758	121	40	9,898,444	3,094,407	12,992,851	31	1.0	43	61.1	36
Washington	5,519,525	176,478	249	31	9,108,344	1,670,102	10,778,446	32	5.8	16	73.2	34
Kansas	2,579,149	213,098	253	30	6,575,123	4,109,899	10,685,022	33	5.6	18	83.0	32
Minnesota	4,648,596	218,601	434	19	6,312,325	3,751,120	10,063,445	34	1.5	49	274.9	17
New Mexico	1,711,256	314,926	31	51	8,917,115	209,399	9,126,514	35	0.7	58	9.6	54
Massachusetts	6,085,395	21,456	428	20	2,434,807	5,703,905	8,138,712	36	1.7	47	711.4	3
Oklahoma	3,295,315	181,186	261	29	5,913,300	2,093,362	8,006,662	37	2.6	38	20.0	48
Maryland	5,060,296	27,091	162	34	4,168,265	3,279,374	7,447,639	38	19.4	2	177.9	23
Puerto Rico	3,782,862	9,104	140	36	3,027,614	3,448,516	6,476,130	39	1.4	50	430.5	10
British Columbia	3,724,500	892,677	70	44	5,710,382	561,021	6,271,403	40	7.1	9	207.0	21
Connecticut	3,267,293	12,997	285	26	2,638,903	3,407,867	6,046,770	41	1.1	52	53.6	38
Idaho	1,187,597	216,431	49	47	5,259,373	133,666	5,393,039	42	5.6	17	23.8	47
New Brunswick	738,133	71,569	21	56	3,277,331	1,575,434	4,852,765	43	3.1	36	44.4	42
Nebraska	1,648,696	200,350	137	37	2,320,000	1,884,339	4,204,339	44	1.7	48	7.0	55
Maine	1,238,566	86,156	73	43	3,129,685	691,665	3,821,350	45	3.7	33	502.1	7
Wyoming	480,011	253,326	25	53	3,314,989	15,193	3,330,182	46	3.7	32	13.6	50
Manitoba	1,113,898	547,704	39	49	3,062,727	245,373	3,308,100	47	4.5	27	24.9	46
South Dakota	737,561	199,731	60	46	2,094,078	627,189	2,721,267	48	0.9	54	5.3	57
Delaware	723,475	5,294	62	45	1,051,473	1,606,538	2,658,011	49	2.0	37	6.0	56
Colorado	3,816,179	269,596	151	35	1,445,862	1,148,379	2,594,241	50	0.5	60	12.5	52
Nova Scotia	909,282	52,841	25	54	1,278,806	322,158	1,600,964	51	5.3	19	28.0	45
Nevada	1,600,810	286,353	42	48	1,464,414	46,679	1,511,093	52	0.8	56	2.8	59
Rhode Island	988,283	3,139	125	39	971,547	379,877	1,351,424	53	6.9	11	13.1	51
New Hampshire	1,160,213	24,033	98	41	874,422	412,532	1,286,954	54	1.8	45	30.3	44
Alaska	604,966	1,530,702	8	59	1,039,885	60	1,039,945	55	24.5	1	56.3	37
Saskatchewan	990,237	570,113	15	57	783,366	15,955	799,321	56	6.6	12	67.8	35
Virgin Islands	101,809	342	2	61	561,766	171,183	732,949	57	0.8	55	1.4	60
North Dakota	642,633	183,121	29	52	452,299	58,958	511,257	58	0.1	61	10.3	53
Newfoundland	551,792	371,635	7	60	400,700	8	400,708	59	1.7	46	0.7	63
Vermont	586,461	24,900	32	50	187,807	122,568	310,375	60	0.7	57	1.1	61
Hawaii	1,182,948	16,760	9	58	169,656	3,535	173,191	61	7.2	8	2,143.9	1
Prince Edward Island	134,557	5,660	2	62	17,553	0	17,553	62	0.1	62	3.1	58
District of Columbia	539,279	163	1	63	0	115	115	63	0.0	63	0.7	62
Total	**297,815,675**	**14,807,032**	**20,534**	**100.0**	**863,218,412**	**362,612,278**	**1,225,830,690**	**100.0**	**4.1**		**82.8**	

➤ Canada and US data only. Mexico data not collected for 1996.

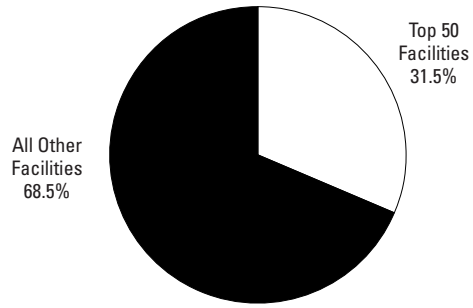
4.4 Top Facilities

Among more than 20,000 reporting facilities, 50 contributed almost one-third of the North American releases (**Figure 4–3** and **Table 4–4**, pp. 52–53). For the top facilities, air emissions were markedly smaller, and underground injection and on-site land releases larger, than for all other facilities. Air emissions from the top 50 facilities represented 14 percent of the total while underground injection and on-site land releases represented more than 70 percent of those totals. Underground injection is practiced in limited geographical areas by relatively few facilities, most of which are among the top 50 facilities (**Figure 4–4**).

The 50 facilities with the largest total releases and transfers contributed one-quarter of the total North American releases and transfers in 1996 (**Figure 4–5** and **Table 4–5**, pp. 54–55). Here, too, air emissions were relatively smaller and underground injection and on-site land releases larger than for all facilities. Transfers of PRTR-listed substances to other sites for waste management also showed striking differences for the top facilities and other facilities. In particular, the top 50 facilities sent more of their substances in waste off-site to disposal/containment than did all other facilities (**Figure 4–6**). The facilities with the largest totals tended to be located in the Great Lakes and Gulf Coast areas; however, three of the top four facilities were located in western states (Utah, Montana and Arizona, see **Map 4–3**).

[Text continues on p. 56.]

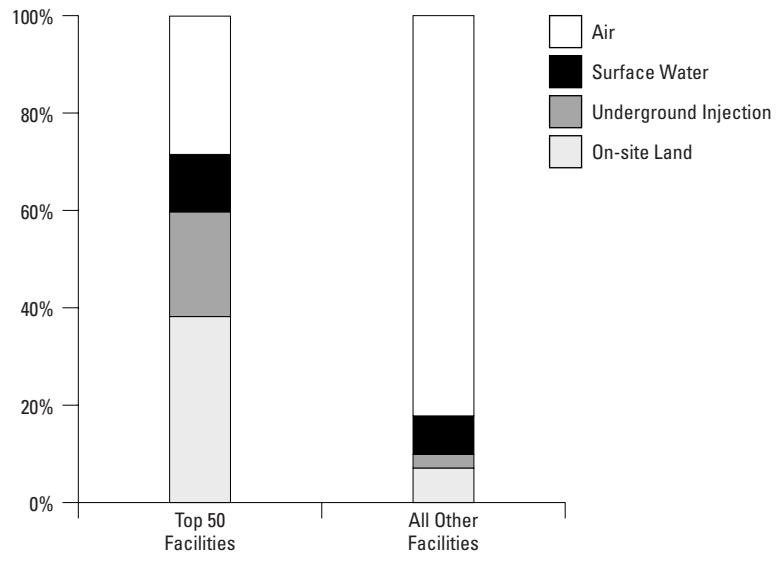
Figure 4–3
M 1996
North American Releases, Top 50 Facilities and All Others



Total Facilities: 20,534

➤ Canada and US data only, Mexico data not collected for 1996.

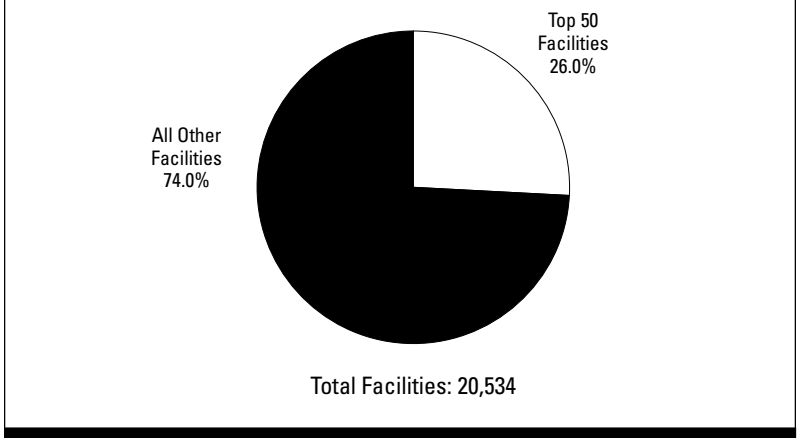
Figure 4–4
M 1996
North American Releases by Type, Top 50 Facilities and All Others



➤ Canada and US data only, Mexico data not collected for 1996.

Figure 4–5
M 1996

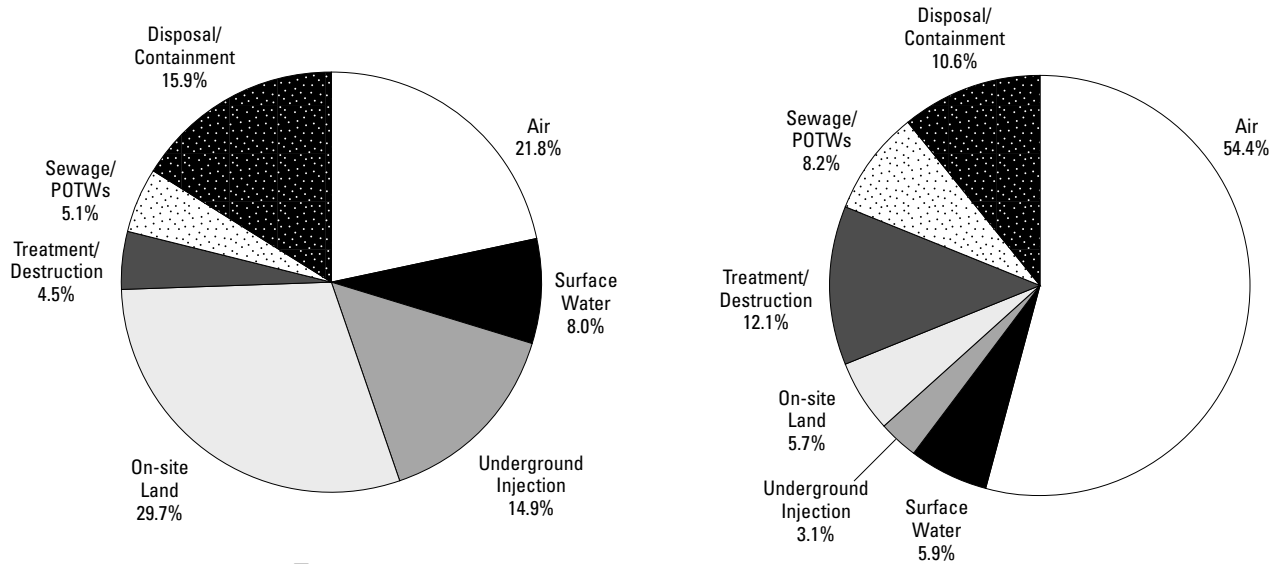
North American Releases and Transfers, Top 50 Facilities and All Others



➤ Canada and US data only, Mexico data not collected for 1996.

Figure 4–6
M 1996

North American Releases and Transfers by Type, Top 50 Facilities and All Others

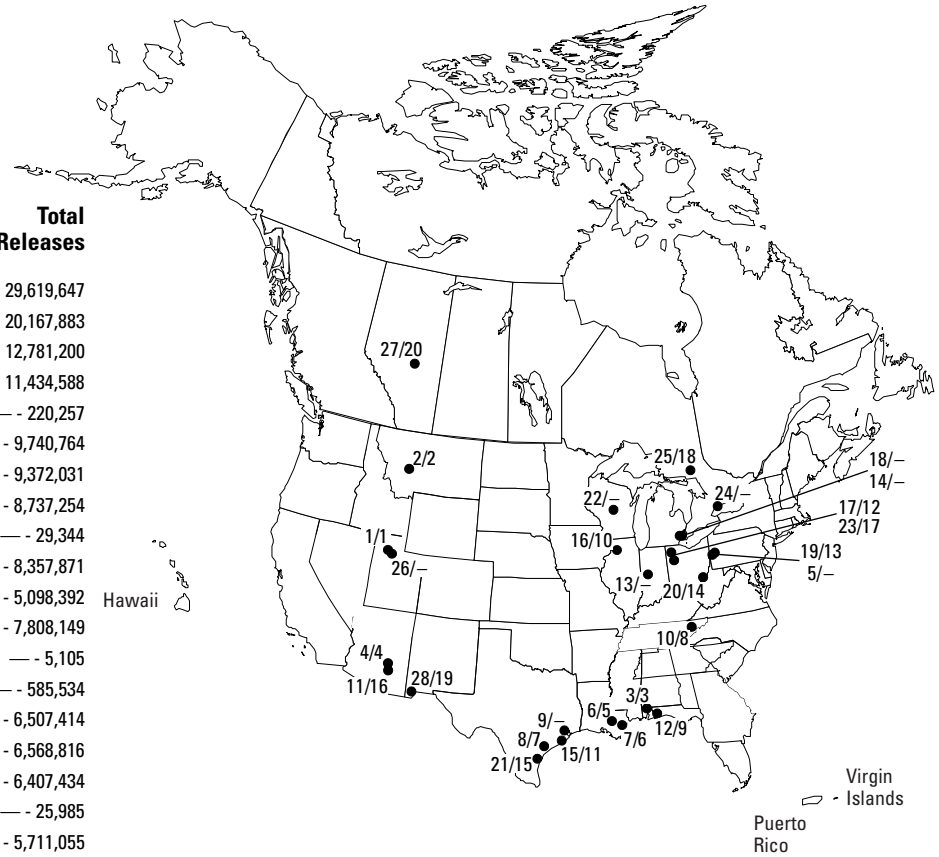


➤ Canada and US data only, Mexico data not collected for 1996.

Map 4–3
M 1996

Largest Sources of North American Releases and Transfers: Facilities
(Total Releases and Transfers of more than 4.5 million kg; Total Releases of more than 4 million kg)

	Facility	Total Releases and Transfers	Total Releases
1	Magnesium Corp. of America, Rowley, UT	29,619,647	1 - 29,619,647
2	ASARCO Inc., East Helena, MT	20,167,898	2 - 20,167,883
3	Courtaulds Fibers Inc., Axis, AL	12,781,200	3 - 12,781,200
4	Cyprus Miami Mining Corp., Claypool, AZ	11,434,588	4 - 11,434,588
5	Zinc Corp. of America, Monaca, PA	10,693,789	— - 220,257
6	PCS Nitrogen Fertilizer L.P., Geismar, LA	9,741,288	5 - 9,740,764
7	Cytec Industries Inc., Westwego, LA	9,382,053	6 - 9,372,031
8	DuPont, Victoria, TX	9,215,769	7 - 8,737,254
9	Air Products & Chemicals Inc., Pasadena, TX	8,373,980	— - 29,344
10	Lenzing Fibers Corp., Lowland, TN	8,357,871	8 - 8,357,871
11	ASARCO Inc., Hayden, AZ	8,131,927	16 - 5,098,392
12	Monsanto Co., Gonzalez, FL	7,810,317	9 - 7,808,149
13	Nucor Steel, Crawfordsville, IN	7,664,563	— - 5,105
14	National Steel Corp., Ecorse, MI	6,959,810	— - 585,534
15	BASF Corp., Freeport, TX	6,639,026	11 - 6,507,414
16	Northwestern Steel & Wire Co., Sterling, IL	6,633,986	10 - 6,568,816
17	General Motors Powertrain, Defiance, OH	6,411,050	12 - 6,407,434
18	Rouge Steel Co., Dearborn, MI	5,959,573	— - 25,985
19	Armco Inc., Butler, PA	5,711,055	13 - 5,711,055
20	Elkem Metals Co., Marietta, OH	5,352,625	14 - 5,309,087
21	American Chrome & Chemicals, Corpus Christi, TX	5,154,768	15 - 5,127,603
22	CPI, Consolidated Papers Inc., Wisconsin Rapids, WI	4,922,619	— - 1,167,326
23	BP Chemicals Inc., Lima, OH	4,886,965	17 - 4,875,406
24	Co-Steel Lasco, Whitby, ON	4,833,403	— - 1,254,893
25	Inco Limited, Copper Cliff, ON	4,773,818	18 - 4,773,818
26	Kennecott Utah Copper, Magna, UT	4,586,985	23 - 4,239,682
27	Celanese Canada Inc., Edmonton, AB	4,541,668	20 - 4,492,813
28	Phelps Dodge Hidalgo Inc., Playas, NM	4,537,040	19 - 4,537,040



Rankings

5/6 = Rank for Total Releases and Transfers
Rank for Total Releases (if reported more than 4.5 million kg total releases)

Facility List = Rank for Total Releases and Transfers; Facility, City, State or Province; Amount of Total Releases and Transfers
Rank for Total Releases (if more than 4.5 million kg); Amount of Total Releases

Table 4–4

M 1996

The 50 North American Facilities with the Largest Total Releases

Rank	Facility	City, State	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Magnesium Corp. of America, Renco Group	Rowley, UT		33	6	29,619,647	0	0	0
2	ASARCO Inc.	East Helena, MT		33	10	53,133	926	0	20,113,824
3	Courtaulds Fibers Inc., Courtaulds Finance U.S. Inc.	Axis, AL		28	4	12,559,013	16,155	0	206,032
4	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	13	135,775	113	0	11,298,700
5	PCS Nitrogen Fertilizer L.P., Potash Corp. of Saskatchewan	Geismar, LA		28	11	62,872	9,430,274	0	247,618
6	Cytec Industries Inc.	Westwego, LA		28	23	61,923	3,318	9,306,790	0
7	DuPont	Victoria, TX		28	29	163,006	625	8,568,203	5,420
8	Lenzing Fibers Corp.	Lowland, TN		28	5	8,208,665	3,129	0	146,077
9	Monsanto Co.	Gonzalez, FL		28	18	36,432	653	7,771,064	0
10	Northwestern Steel & Wire Co.	Sterling, IL		33	7	70,984	1,224	0	6,496,608
11	BASF Corp.	Freeport, TX		28	24	149,217	6,352,981	5,216	0
12	General Motors Corp., Powertrain Defiance	Defiance, OH		33	17	331,912	6,461	0	6,069,061
13	Armco Inc.	Butler, PA		33	14	112,906	5,444,361	0	153,788
14	Elkem Metals Co.	Marietta, OH		33	6	218,375	326,987	0	4,763,725
15	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	2	2,176	703	0	5,124,724
16	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	9	542,461	0	0	4,555,931
17	BP Chemicals Inc.	Lima, OH		28	27	115,258	0	4,760,148	0
18	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	7	4,773,818	0	0	0
19	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	2	275,871	0	0	4,261,169
20	Celanese Canada Inc.	Edmonton, AB	37	28	10	395,362	0	4,081,300	16,150
21	PCS Phosphate Co. Inc., Potash Corp. of Saskatchewan	Aurora, NC		28	6	164,776	3	0	4,196,711
22	Huntsman Petrochemical Corp., Huntsman Corp.	Port Arthur, TX		28	19	4,256,988	0	0	0
23	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	14	97,945	2,151	0	4,139,586
24	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	2	2,969	15	0	4,081,774
25	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,968
26	DuPont	Beaumont, TX		28	19	183,382	184	3,716,892	0
27	Hoechst-Celanese Chemical, Hoechst Corp., Clear Lake Plant	Pasadena, TX		28	20	350,749	0	3,479,003	0
28	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	10	106,458	149	0	3,467,234
29	FMC Corp.	Pocatello, ID		28	12	31,050	351	0	3,539,427
30	Chino Mines Co.	Hurley, NM		33	2	81,697	0	0	3,457,668
31	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	16	88,605	331	3,385,759	3,675
32	US Steel Gary Works, USX Corp.	Gary, IN		33	34	774,919	14,068	0	2,600,141
33	Eastman Kodak Co., Kodak Park	Rochester, NY		38	50	2,981,026	261,484	0	167
34	Bayer Corp.	New Martinsville, WV		28	29	120,104	3,016,805	0	317
35	Sterling Chemicals Inc.	Texas City, TX		28	36	476,419	558	2,595,334	0
36	Rubicon Inc.	Geismar, LA		28	24	135,663	72	2,903,039	0
37	PCS Phosphate, Potash Corp. of Saskatchewan	White Springs, FL		28	4	49,892	0	0	2,947,850
38	Angus Chemical Co.	Sterlington, LA		28	11	70,561	80,632	2,684,452	0
39	Coastal Chem Inc., Coastal Corp.	Cheyenne, WY		28	12	16,485	0	2,771,339	0
40	Vicksburg Chemical Co.	Vicksburg, MS		28	3	33,986	2,713,007	0	0
41	Granite City Steel, National Steel Corp.	Granite City, IL		33	22	114,722	5,616	0	2,593,382
42	IMC-Agrico Co., IMC Global Inc., Faustina Plant	Saint James, LA		28	9	79,702	2,428,338	0	178,037
43	Monsanto Co.	Luling, LA		28	13	20,699	73,261	2,579,638	0
44	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	7	1,787,997	0	0	774,034
45	International Paper	Hampton, SC		30	11	2,462,176	45	0	0
46	Tennessee Eastman, Eastman Chemical	Kingsport, TN		28	56	2,316,748	73,219	0	38,450
47	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS		Mult.	5	5,217	11,211	0	2,335,785
48	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
49	Nova Chemicals Ltd., St. Clair Site	Corunna, ON	37	28	8	2,186,200	820	0	0
50	Irving Pulp & Paper Ltd./Irving Tissue Co.	Saint John, NB	27	26	4	249,591	1,933,834	0	0
	Subtotal				**713**	**77,353,162**	**32,204,284**	**58,608,177**	**103,948,433**
	% of Total				**1.1**	**13.7**	**40.9**	**77.9**	**71.3**
	Total				**62,225**	**563,269,177**	**78,742,497**	**75,239,943**	**145,838,045**

* Chemicals accounting for more than 70% of the total releases from the facility.

➤ One TRI facility reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese in error. This facility has been omitted from this table. Canada and US data only. Mexico data not collected for 1996.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	29,619,647	Chlorine (air)
2	20,167,883	Zinc and compounds (land)
3	12,781,200	Carbon disulfide (air)
4	11,434,588	Copper and compounds, Zinc and compounds (land)
5	9,740,764	Phosphoric acid (water)
6	9,372,031	Acetonitrile, Acrylic acid (UIJ)
7	8,737,254	Nitric acid and nitrate compounds (UIJ)
8	8,357,871	Carbon disulfide (air)
9	7,808,149	Nitric acid and nitrate compounds (UIJ)
10	6,568,816	Zinc and compounds, Manganese and compounds (land)
11	6,507,414	Nitric acid and nitrate compounds (water)
12	6,407,434	Zinc and compounds (land)
13	5,711,055	Nitric acid and nitrate compounds (water)
14	5,309,087	Manganese and compounds (land)
15	5,127,603	Chromium and compounds (land)
16	5,098,392	Copper and compounds, Zinc and compounds (land)
17	4,875,406	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
18	4,773,818	Sulfuric acid (air)
19	4,537,040	Copper and compounds (land)
20	4,492,813	Methanol, Methyl ethyl ketone (UIJ)
21	4,361,490	Phosphoric acid (land)
22	4,256,988	Propylene (air)
23	4,239,682	Copper and compounds, Zinc and compounds (land)
24	4,084,758	Chromium and compounds (land)
25	4,030,233	Zinc and compounds, Lead and compounds (land)
26	3,900,458	Nitric acid and nitrate compounds (UIJ)
27	3,829,752	Ethylene glycol (UIJ)
28	3,573,841	Zinc and compounds (land)
29	3,570,828	Zinc and compounds, Phosphorus (land)
30	3,539,365	Copper and compounds (land)
31	3,478,370	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
32	3,389,128	Zinc and compounds, Manganese and compounds (land)
33	3,242,677	Dichloromethane, Hydrochloric acid, Methanol (air)
34	3,137,226	Nitric acid and nitrate compounds (water)
35	3,072,311	Acetonitrile, Nitric acid and nitrate compounds, Methanol, Acrylamide (UIJ)
36	3,038,774	Nitric acid and nitrate compounds, Methanol (UIJ)
37	2,997,742	Phosphoric acid (land)
38	2,835,645	Nitric acid and nitrate compounds, Formaldehyde (UIJ)
39	2,787,824	Nitric acid and nitrate compounds (UIJ)
40	2,746,993	Nitric acid and nitrate compounds (water)
41	2,713,720	Zinc and compounds (land)
42	2,686,077	Phosphoric acid (water)
43	2,673,598	Formaldehyde (UIJ)
44	2,562,031	Copper and compounds (air)
45	2,462,221	Methanol, Phenol (air)
46	2,428,417	Hydrochloric acid, Methanol, Toluene, Bromomethane, Hydrogen fluoride (air)
47	2,352,213	Manganese and compounds (land)
48	2,322,985	Zinc and compounds (land)
49	2,187,020	Cyclohexane (air)
50	2,183,425	Methanol (water)
	272,114,057	
	31.5	
	863,218,412	

Table 4–5

M 1996

Top 50 North American Facilities with the Largest Total Releases and Transfers

Rank	Facility	City, State	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Magnesium Corp. of America, Renco Group	Rowley, UT		33	6	29,619,647	0	0	0
2	ASARCO Inc.	East Helena, MT		33	10	53,133	926	0	20,113,824
3	Courtaulds Fibers Inc., Courtaulds Finance U.S. Inc.	Axis, AL		28	4	12,559,013	16,155	0	206,032
4	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	13	135,775	113	0	11,298,700
5	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	9	219,985	272	0	0
6	PCS Nitrogen Fertilizer L.P., Potash Corp. of Saskatchewan	Geismar, LA		28	11	62,872	9,430,274	0	247,618
7	Cytec Industries Inc.	Westwego, LA		28	23	61,923	3,318	9,306,790	0
8	DuPont	Victoria, TX		28	29	163,006	625	8,568,203	5,420
9	Air Products & Chemicals Inc.	Pasadena, TX		28	10	29,344	0	0	0
10	Lenzing Fibers Corp.	Lowland, TN		28	5	8,208,665	3,129	0	146,077
11	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	9	542,461	0	0	4,555,931
12	Monsanto Co.	Gonzalez, FL		28	18	36,432	653	7,771,064	0
13	Nucor Steel, Nucor Corp.	Crawfordsville, IN		33	9	5,069	26	0	10
14	National Steel Corp., Great Lakes Div.	Ecorse, MI		33	17	85,676	499,858	0	0
15	BASF Corp.	Freeport, TX		28	24	149,217	6,352,981	5,216	0
16	Northwestern Steel & Wire Co.	Sterling, IL		33	7	70,984	1,224	0	6,496,608
17	General Motors Corp., Powertrain Defiance	Defiance, OH		33	17	331,912	6,461	0	6,069,061
18	Rouge Steel Co.	Dearborn, MI		33	7	23,355	2,630	0	0
19	Armco Inc.	Butler, PA		33	14	112,906	5,444,361	0	153,788
20	Elkem Metals Co.	Marietta, OH		33	6	218,375	326,987	0	4,763,725
21	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	2	2,176	703	0	5,124,724
22	CPI, Consolidated Papers Inc.	Wisconsin Rapids, WI		26	12	1,167,213	113	0	0
23	BP Chemicals Inc.	Lima, OH		28	27	115,258	0	4,760,148	0
24	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
25	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	7	4,773,818	0	0	0
26	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	14	97,945	2,151	0	4,139,586
27	Celanese Canada Inc.	Edmonton, AB	37	28	10	395,362	0	4,081,300	16,150
28	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	2	275,871	0	0	4,261,169
29	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	19	99,734	40,762	0	462,800
30	PCS Phosphate Co. Inc., Potash Corp. of Saskatchewan	Aurora, NC		28	6	164,776	3	0	4,196,711
31	Huntsman Petrochemical Corp., Huntsman Corp.	Port Arthur, TX		28	19	4,256,988	0	0	0
32	DuPont	Beaumont, TX		28	19	183,382	184	3,716,892	0
33	Pharmacia & Upjohn Co.	Portage, MI		28	23	141,111	67,803	1,565,804	0
34	Dominion Colour Corporation	Ajax, ON	37	28	6	0	0	0	0
35	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	2	2,969	15	0	4,081,774
36	Hoechst-Celanese Chemical, Hoechst Corp., Clear Lake Plant	Pasadena, TX		28	20	350,749	0	3,479,003	0
37	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,968
38	Warner-Lambert Co., Parke-Davis Div.	Holland, MI		28	12	80,292	0	875,518	0
39	Regal Ware Inc.	Kewaskum, WI		34	6	474	0	0	0
40	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	10	106,458	149	0	3,467,234
41	FMC Corp.	Pocatello, ID		28	12	31,050	351	0	3,539,427
42	Chino Mines Co.	Hurley, NM		33	2	81,697	0	0	3,457,668
43	Boise Cascade Corp.	Saint Helens, OR		26	8	227,512	0	0	0
44	Ameristeel Corp., Jacksonville Mill Div.	Baldwin, FL		33	6	8,662	0	0	0
45	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	16	88,605	331	3,385,759	3,675
46	Cerro Wire & Cable Co. Inc.	Hartselle, AL		33	3	120	6	0	0
47	US Steel Gary Works, USX Corp.	Gary, IN		33	34	774,919	14,068	0	2,600,141
48	Eastman Kodak Co., Kodak Park	Rochester, NY		38	50	2,981,026	261,484	0	167
49	USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock, PA		33	7	15,004	971	0	0
50	Bayer Corp.	New Martinsville, WV		28	29	120,104	3,016,805	0	317
	Subtotal				**643**	**69,403,950**	**25,496,225**	**47,515,697**	**94,522,205**
	% of Total				**1.0**	**12.3**	**32.4**	**63.2**	**64.8**
	Total				**62,225**	**563,269,177**	**78,742,497**	**75,239,943**	**145,838,045**

* Chemicals accounting for more than 70% of the total releases and transfers from the facility.

➤ Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds in error. The facility has been omitted from this table. Canada and US data only. Mexico data not collected for 1996.

➤ UIJ=underground Injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	29,619,647	0	0	0	0	29,619,647	Chlorine (air)
2	20,167,883	0	15	0	15	20,167,898	Zinc and compounds (land)
3	12,781,200	0	0	0	0	12,781,200	Carbon disulfide (air)
4	11,434,588	0	0	0	0	11,434,588	Copper and compounds, Zinc and compounds (land)
5	220,257	48,557	0	10,424,975	10,473,532	10,693,789	Zinc and compounds, Manganese and compounds (transfers to disposal)
6	9,740,764	0	0	524	524	9,741,288	Phosphoric acid (water)
7	9,372,031	3,469	0	6,553	10,022	9,382,053	Acetonitrile, Acrylic acid (UIJ)
8	8,737,254	478,515	0	0	478,515	9,215,769	Nitric acid and nitrate compounds (UIJ)
9	29,344	6,499	8,338,137	0	8,344,636	8,373,980	Nitric acid and nitrate compounds (transfers to sewage)
10	8,357,871	0	0	0	0	8,357,871	Carbon disulfide (air)
11	5,098,392	3,033,408	127	0	3,033,535	8,131,927	Lead and compounds (transfers to treatment), Copper/Zinc and compounds (land)
12	7,808,149	0	0	2,168	2,168	7,810,317	Nitric acid and nitrate compounds (UIJ)
13	5,105	392	0	7,659,066	7,659,458	7,664,563	Zinc and compounds (transfers to disposal)
14	585,534	64,010	10,955	6,299,311	6,374,276	6,959,810	Zinc and compounds (transfers to disposal)
15	6,507,414	120,545	0	11,067	131,612	6,639,026	Nitric acid and nitrate compounds (water)
16	6,568,816	65,170	0	0	65,170	6,633,986	Zinc and compounds, Manganese and compounds (land)
17	6,407,434	2,350	1,266	0	3,616	6,411,050	Zinc and compounds (land)
18	25,985	0	0	5,933,588	5,933,588	5,959,573	Zinc and compounds (transfers to disposal)
19	5,711,055	0	0	0	0	5,711,055	Nitric acid and nitrate compounds (water)
20	5,309,087	0	0	43,538	43,538	5,352,625	Manganese and compounds (land)
21	5,127,603	24,036	0	3,129	27,165	5,154,768	Chromium and compounds (land)
22	1,167,326	3,755,293	0	0	3,755,293	4,922,619	Methanol (transfers to treatment)
23	4,875,406	10,929	0	630	11,559	4,886,965	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
24	1,254,893	0	10	3,578,500	3,578,510	4,833,403	Zinc and compounds (transfers to disposal)
25	4,773,818	0	0	0	0	4,773,818	Sulfuric acid (air)
26	4,239,682	0	0	347,303	347,303	4,586,985	Copper and compounds, Zinc and compounds (land)
27	4,492,813	0	0	48,855	48,855	4,541,668	Methanol, Methyl ethyl ketone (UIJ)
28	4,537,040	0	0	0	0	4,537,040	Copper and compounds (land)
29	603,307	0	0	3,814,700	3,814,700	4,418,007	Manganese and compounds (transfers to disposal)
30	4,361,490	0	0	0	0	4,361,490	Phosphoric acid (land)
31	4,256,988	20,581	0	11,517	32,098	4,289,086	Propylene (air)
32	3,900,458	271,136	0	12,890	284,026	4,184,484	Nitric acid and nitrate compounds (UIJ)
33	1,774,718	1,739,283	603,207	6,937	2,349,427	4,124,145	Methanol (UIJ), Dichloromethane (transfers to treatment)
34	50	0	3,870,000	229,400	4,099,400	4,099,450	Nitric acid and nitrate compounds (transfers to sewage)
35	4,084,758	4,535	0	0	4,535	4,089,293	Chromium and compounds (land)
36	3,829,752	15,328	200,266	41,544	257,138	4,086,890	Ethylene glycol (UIJ)
37	4,030,233	0	0	0	0	4,030,233	Zinc/Lead and compounds (land)
38	955,810	2,784,589	0	5	2,784,594	3,740,404	Methanol, Toluene (transfers to treatment, UIJ)
39	474	0	0	3,646,276	3,646,276	3,646,750	Aluminum oxide (transfers to disposal)
40	3,573,841	0	451	0	451	3,574,292	Zinc and compounds (land)
41	3,570,828	0	3	792	795	3,571,623	Zinc and compounds, Phosphorus (land)
42	3,539,365	0	0	0	0	3,539,365	Copper and compounds (land)
43	227,512	0	3,295,111	1,682	3,296,793	3,524,305	Methanol (transfers to sewage)
44	8,662	1,756,108	0	1,756,111	3,512,219	3,520,881	Zinc and compounds (transfers to treatment and to disposal)
45	3,478,370	12,310	0	0	12,310	3,490,680	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
46	126	0	0	3,440,012	3,440,012	3,440,138	Copper and compounds (transfers to disposal)
47	3,389,128	0	0	45,387	45,387	3,434,515	Zinc and compounds, Manganese and compounds (land)
48	3,242,677	137,186	571	11,545	149,302	3,391,979	Dichloromethane, Hydrochloric acid, Methanol (air)
49	15,975	0	0	3,260,898	3,260,898	3,276,873	Zinc and compounds (transfers to disposal)
50	3,137,226	1,397	0	19,860	21,257	3,158,483	Nitric acid and nitrate compounds (water)
	236,938,139	**14,355,626**	**16,320,119**	**50,658,763**	**81,334,508**	**318,272,647**	
	27.4	**15.8**	**11.1**	**13.0**	**6.6**	**15.2**	
	863,218,412	**91,073,897**	**147,065,311**	**362,612,278**	**1,225,830,690**	**2,089,049,102**	

4.5 Chemical Distribution

Out of 164 chemical substances and groups on the matched list of NPRI and TRI chemicals, almost three-quarters of all reporting forms submitted were for the top 25 chemicals and the top five of these accounted for almost half of all releases and transfers reported in 1996 (**Figure 4–7**).

The chemical with the largest releases and transfers reported in North America was methanol, with 186 million kg. Two other chemicals also had more than 100 million kg each: zinc and its compounds and nitric acid and nitrate compounds (**Table 4–6**, p. 58).

Large methanol releases and transfers result primarily because the chemical is used in many industrial processes and generated as a byproduct in others. Because it is volatile, most methanol releases occur as emissions to air. Methanol rapidly oxidizes in the air to form formaldehyde, another PRTR-listed chemical and one that is also a designated carcinogen (discussed later in this chapter) and a contributor to smog formation.

Much of the methanol produced is used in the production of formaldehyde. In the United States, another large use is in the synthesis of methyl tert-butyl ether (MTBE), which in some countries is added to gasoline to boost octane levels and reduce hydrocarbons and carbon monoxide in combustion. Methanol also has many applications as a solvent and is used in coating wood and paper, in producing synthetic fibers (acetate and triacetate), and in manufacturing pharmaceuticals.

A variety of processes generate methanol as a byproduct. Chemical pulping in paper manufacture is one example; production of anhydrous ammonia is another.

More zinc and zinc compounds were transferred off-site than any other chemical in the matched data set, chiefly to disposal or containment. The most common use of zinc is in coating metals, for example, galvanized steel. Zinc is also used in dry cell batteries and in alloys such as brass and bronze. Zinc compounds are widely used in paint, rubber, dye, wood preservatives, and ointments.

Table 4–7 (pp. 59–61) presents information on potential effects of these and other substances with large releases and transfers reported to the North American PRTRs, from the US Agency for Toxic Substances and Disease Registry, the US EPA's Office of Pollution Prevention and Toxics, and the New Jersey Department of Health and Senior Services.

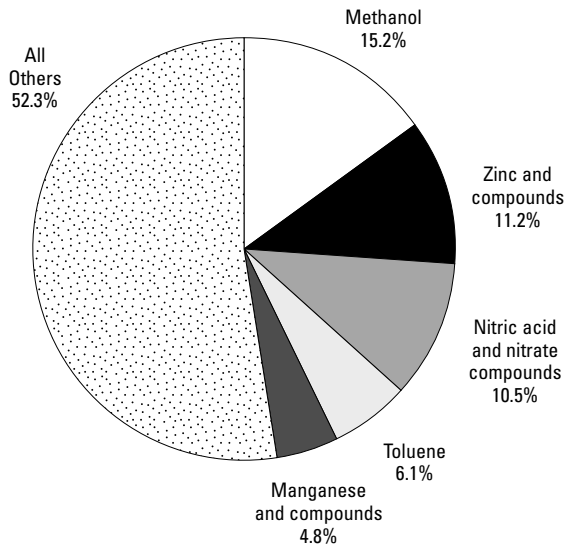
Top Chemicals for Releases

The same 25 chemicals also had the largest releases in the matched data set. Most of the rankings varied, but methanol was first for releases, as for total releases and transfers (**Table 4–8**, pp. 62–63).

The ways in which these 25 chemicals were released differed significantly from the release types predominating for other PRTR substances in the matched data set. Air emissions and underground injection were smaller for the top 25 chemicals than for the others; surface water discharges and on-site land releases were larger (**Figure 4–8**).

Figure 4–7 M 1996

North American Top Five Chemicals for Total Releases and Transfers

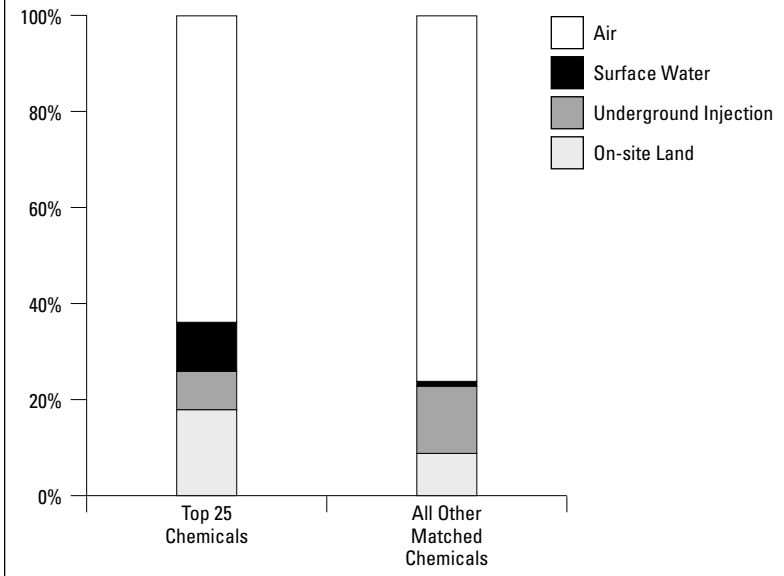


Total Releases and Transfers: 1,225,830,690 kg

➤ Canada and US data only, Mexico data not collected for 1996.

Figure 4–8 M 1996

North American Releases by Type, Top 25 Chemicals and All Others



➤ Canada and US data only, Mexico data not collected for 1996.

The two chemicals most responsible for these differences were nitric acid and nitrate compounds, with large surface water discharges, and zinc and its compounds, with large on-site land releases.

Nearly 71 percent of all surface water discharges reported in North America consisted of nitric acid and nitrate compounds. These releases were more than four times those of the next-to-largest surface water discharges (phosphoric acid). TRI facilities reported most of the releases of nitric acid and nitrate compounds—97 percent for this chemical compared to 90 percent for all chemicals on the matched PRTR list. The chief use of nitric acid is in producing ammonium nitrate fertilizer. Nitric acid is also used in the manufacture of cyclohexanone and as a raw material for adipic acid and caprolactam, both used in making nylon. Nitrates have long been used in producing explosives, including gunpowder. Phosphoric acid is used in fertilizers, phosphates (salts, soaps, detergents), yeasts, fire control agents, waxes and polishes, gelatin and soft drinks. It also is used in chemical production (of ethylbenzene, propylene and cumene) and as an antioxidant, acidulant and flavor agent in food products.

On-site land releases of zinc and its compounds amounted to 35 percent of the North American total in that release type, or twice as much as the next largest land releases (manganese and its compounds). The principal use of manganese is in steel production. Most manganese is used to produce ferromanganese, which improves hardness, stiffness, and strength in many types of steel. Manganese dioxide is commonly used in production of dry-cell batteries, matches, fireworks, porcelain and glass-bonding materials.

More than 99 percent of the releases of carbon disulfide (largely in air emissions), phosphoric acid (water and land releases) and acetonitrile (underground injection) originated with TRI facilities. The chemical with the greatest proportion of releases from NPRI reporting was sulfuric acid (entirely in air emissions), with 36 percent of the North American releases.

The largest use of carbon disulfide is in making rayon. Other uses include metal cleaning as well as production of agricultural fumigants, rubber chemicals, and cellulose. One principal use has been as a feedstock in the production of carbon tetrachloride, an ozone-depleting chemical. Under the Montreal Protocol, production and consumption of carbon tetrachloride and other ozone depleters were to be phased out by January 1996, except for uses deemed “essential.”

The largest use for acetonitrile is in extracting organic and inorganic chemicals, especially butadiene. It is also used in pesticide manufacture. Sulfuric acid is used prdominantly in producing phosphate fertilizers. This acid is also employed in leaching copper from ore, purifying petroleum, pickling metal and electroplating. It is used in manufacturing lead-acid batteries for automobiles, explosives, other acids, and dyestuffs.

Top Chemicals for Transfers

Of the top 25 chemicals transferred off-site for treatment, to sewage, or for disposal, 17 were also among the top chemicals for total releases and transfers, including all of the top 10. Thus, the chemicals transferred in the largest amounts were essentially the same as those released in the largest amounts (**Table 4–9**, p. 64).

As with releases, the types of transfers reported for these chemicals differed substantially from the pattern for other PRTR substances on the matched list. The top 25 chemicals were three times more likely to be sent off-site for disposal/containment than were the other chemicals (**Figure 4–9**).

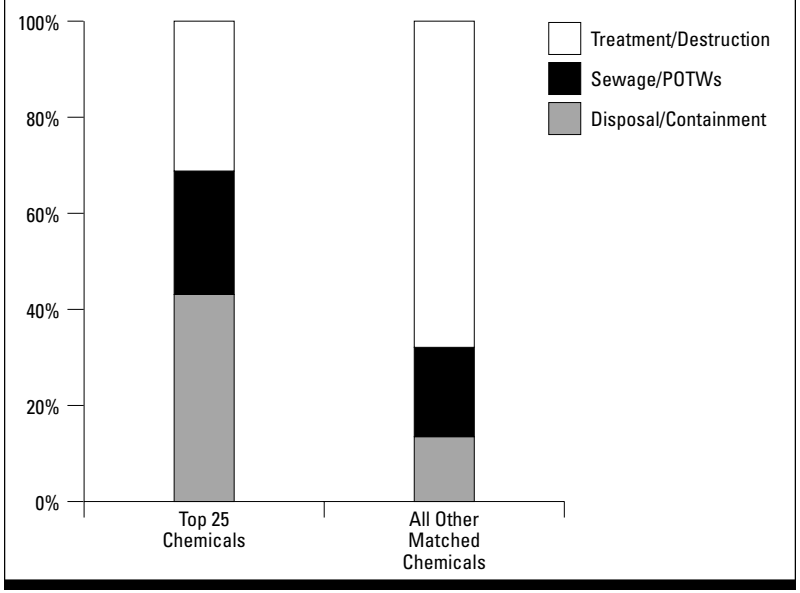
The chemical with the largest total transfers, zinc and its compounds, was also the chemical sent in the largest amount to disposal/containment—more than twice that of the chemical with the next largest transfers to disposal (manganese and its compounds).

For some of the top chemicals, all or nearly all the off-site transfers came from TRI facilities. These included dichloromethane, antimony and its compounds, and hydrogen fluoride. Dichloromethane is a solvent and degreasing agent and is widely used in paint strippers. It is also used as a blowing agent and metal-cleaning agent, as a propellant in aerosols, and as a process solvent in pharmaceutical manufacture. Antimony, a byproduct of smelting lead and other metals, is used in alloys for lead storage batteries, solder, sheet and pipe metal, bearings, castings and pewter. Antimony oxide is added as a fire retardant in textiles and plastics. It is also employed in paints, ceramics and fireworks, and in enameling plastics, metal and glass. Hydrogen fluoride is primarily used in the manufacture of aluminum and chlorofluorocarbons (CFCs), although production of the ozone-depleting CFCs has been curtailed under the Montreal Protocol.

NPRI facilities reported 30 percent or more of the transfers of xylene and asbestos. Xylene, a petroleum product, is used as a solvent and cleaning agent, as a paint thinner, and in producing paints and varnishes. Principal industrial users are the printing, rubber, and leather industries. The largest use of asbestos is in asbestos cement products. Resistant to heat and most chemicals, asbestos fibers are used in roofing shingles, ceiling and floor tiles, paper products, and friction products (automobile clutch, brake, and transmission parts).

[Text continues on p. 65.]

Figure 4–9
M 1996
North American Transfers by Type, Top 25 Chemicals and All Others



➤ Canada and US data only, Mexico data not collected for 1996.

Table 4–6

M 1996

The 25 Chemicals with the Largest Total Releases and Transfers in North America

CAS Number	Chemical	Forms Number	Forms %	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	NPRI/TRI as % of North American Total: Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)
67-56-1	Methanol	2,540	4.1	129,227,278	56,839,199	186,066,477	9.6 / 90.4	16.0 / 84.0	4.0 / 96.0	12.4 / 87.6
—	Zinc (and its compounds)	3,239	5.2	55,678,321	81,023,127	136,701,448	9.5 / 90.5	10.1 / 89.9	15.4 / 84.6	13.3 / 86.7
—	Nitric acid and nitrate compounds	2,648	4.3	85,430,122	43,021,311	128,451,433	4.7 / 95.3	3.3 / 96.7	11.0 / 89.0	5.9 / 94.1
108-88-3	Toluene	3,384	5.4	62,796,504	12,495,662	75,292,166	6.8 / 93.2	9.0 / 91.0	14.0 / 86.0	9.8 / 90.2
—	Manganese (and its compounds)	2,787	4.5	29,632,346	28,671,571	58,303,917	8.4 / 91.6	6.4 / 93.6	23.0 / 77.0	14.5 / 85.5
1330-20-7	Xylene (mixed isomers)	3,243	5.2	43,582,986	6,089,399	49,672,385	7.0 / 93.0	14.2 / 85.8	33.3 / 66.7	16.5 / 83.5
—	Copper (and its compounds)	4,286	6.9	27,327,917	12,113,697	39,441,614	5.2 / 94.8	2.5 / 97.5	6.2 / 93.8	3.6 / 96.4
78-93-3	Methyl ethyl ketone	2,191	3.5	32,322,559	3,418,027	35,740,586	5.9 / 94.1	17.1 / 82.9	24.2 / 75.8	17.8 / 82.2
75-15-0	Carbon disulfide	99	0.2	33,058,434	162,431	33,220,865	6.1 / 93.9	0.1 / 99.9	6.1 / 93.9	0.1 / 99.9
75-09-2	Dichloromethane	938	1.5	26,398,100	6,593,372	32,991,472	5.3 / 94.7	8.3 / 91.7	1.4 / 98.6	6.9 / 93.1
7782-50-5	Chlorine	1,386	2.2	31,367,791	680,364	32,048,155	8.7 / 91.3	2.9 / 97.1	0.0 / 100.0	2.8 / 97.2
7664-38-2	Phosphoric acid	2,869	4.6	27,686,395	3,511,961	31,198,356	7.0 / 93.0	0.3 / 99.7	11.4 / 88.6	1.5 / 98.5
7647-01-0	Hydrochloric acid	961	1.5	29,973,355	0	29,973,355	7.4 / 92.6	4.4 / 95.6	— / —	4.4 / 95.6
—	Lead (and its compounds)	1,770	2.8	9,030,613	19,501,982	28,532,595	7.3 / 92.7	15.4 / 84.6	11.6 / 88.4	12.8 / 87.2
—	Chromium (and its compounds)	3,367	5.4	13,436,133	11,742,588	25,178,721	6.3 / 93.7	3.7 / 96.3	19.2 / 80.8	10.9 / 89.1
100-42-5	Styrene	1,538	2.5	20,032,280	3,089,326	23,121,606	4.7 / 95.3	4.3 / 95.7	8.3 / 91.7	4.9 / 95.1
107-21-1	Ethylene glycol	1,381	2.2	7,682,522	11,872,615	19,555,137	10.2 / 89.8	6.7 / 93.3	4.4 / 95.6	5.3 / 94.7
74-85-1	Ethylene	331	0.5	18,448,717	506,071	18,954,788	11.8 / 88.2	12.2 / 87.8	0.0 / 100.0	11.9 / 88.1
71-36-3	n-Butyl alcohol	1,105	1.8	12,560,495	1,925,282	14,485,777	7.0 / 93.0	8.8 / 91.2	20.2 / 79.8	10.3 / 89.7
7664-93-9	Sulfuric acid	688	1.1	13,731,314	0	13,731,314	10.2 / 89.8	35.9 / 64.1	— / —	35.9 / 64.1
75-05-8	Acetonitrile	102	0.2	10,840,070	2,460,128	13,300,198	2.0 / 98.0	0.2 / 99.8	4.5 / 95.5	1.0 / 99.0
115-07-1	Propylene	372	0.6	12,961,972	127,269	13,089,241	9.1 / 90.9	7.7 / 92.3	0.0 / 100.0	7.6 / 92.4
50-00-0	Formaldehyde	849	1.4	11,006,783	1,626,831	12,633,614	9.9 / 90.1	12.7 / 87.3	18.6 / 81.4	13.5 / 86.5
79-01-6	Trichloroethylene	693	1.1	10,472,026	817,946	11,289,972	5.2 / 94.8	8.0 / 92.0	3.1 / 96.9	7.6 / 92.4
108-10-1	Methyl isobutyl ketone	955	1.5	9,362,174	790,362	10,152,536	6.1 / 93.9	8.0 / 92.0	10.3 / 89.7	8.2 / 91.8
	Subtotal	**43,722**	**70.3**	**764,047,207**	**309,080,521**	**1,073,127,732**	**7.1 / 92.9**	**9.1 / 90.9**	**12.4 / 87.6**	**10.0 / 90.0**
	% of Total	**70.3**		**88.5**	**85.2**	**87.5**				
	Total for All Matched Chemicals	**62,225**	**100.0**	**863,218,412**	**362,612,278**	**1,225,830,690**	**6.9 / 93.1**	**9.6 / 90.4**	**11.5 / 88.5**	**10.1 / 89.9**

➤ Canada and US data only. Mexico data not collected for 1996.

Table 4–7
1996

Human Health Effects of Chemicals on the "Top 25" Lists for Releases, Transfers, or Both

Note 1: Chemicals can have a variety of health and environmental effects, and the fact that a chemical is reported to NPRI or TRI does not mean that it is considered to pose toxic risks to humans. Sometimes of greater concern may be its effects on ecosystems. For example, a relatively non-toxic chemical may serve as an excess nutrient in aquatic systems, leading to an algae buildup that can deplete oxygen and kill fish and other aquatic life (eutrophication). Other chemicals may be of concern because of their contribution to acidic precipitation ("acid rain") or their role in the formation of tropospheric ozone (photochemical smog). Further, all effects are dose-dependent and may not occur at levels found in the environment or associated with PRTR releases. Effects shown in workers are likely to reflect exposures significantly higher than ambient levels. PRTRs do not collect data on exposure or risk associated with the releases they report.

Note 2: The health effects information in this table has been drawn from three sources:

- *ToxFAQs* distributed by the US Agency for Toxic Substances and Disease Registry (ATSDR)
- *Chemical Fact Sheets* distributed by the Office of Pollution Prevention and Toxics of the US Environmental Protection Agency
- *Hazardous Substance Fact Sheets* distributed by the New Jersey Department of Health and Senior Services

Information on exposure effects from these sources was extracted in the above order, such that if more than one source documented toxic effects, ATSDR information was taken as a first preference, followed by US EPA and then New Jersey information.

CAS Number	Name	Source	High Exposure Effects	Longer and Lower Exposure Effects
75-05-8	Acetonitrile	EPA	Range from abnormal salivation, vomiting, confusion, rapid breathing and heart rate to coma and death. Contact with liquid or vapor is irritating to skin, eyes, nose and throat.	Adverse effects on blood, nervous system, lungs, liver and thymus, as well as fetal toxicity in laboratory studies.
7429-90-5	Aluminum (fume or dust)	ATSDR	Inhalation effects include coughing and asthma. Large doses in medical settings have led to bone disease.	Delays in skeletal and neurological development in laboratory studies. Association with Alzheimer's disease uncertain.
1344-28-1	Aluminum oxide (fibrous forms)	NJDOH	Inhalation can irritate the lungs, can also irritate eyes, nose and throat.	Same as acute.
—	Antimony (and its compounds)	ATSDR	Inhalation effects include irritation (eyes and lung), heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers. Ingestion can cause vomiting.	Eye irritation, hair loss, lung damage, heart problems, and fertility problems in laboratory studies; liver and kidney damage and death at higher exposures. Skin irritation with prolonged contact.
—	Arsenic (and its compounds)	ATSDR	Ingestion of high levels can be fatal; damages nerves, digestive system, and skin. Inhalation effects include sore throat and irritated lungs.	May lead to pigmentation changes and appearance of small "warts" or "corns." A *known carcinogen* by inhalation (lung) and ingestion (skin, bladder, kidney, liver, and lung).
1332-21-4	Asbestos (friable)	ATSDR	Inhalation leads to asbestosis (scar tissue buildup in lungs and surrounding tissue).	A known carcinogen by inhalation: Lung cancer and mesothelioma (cancer of the tissues lining the chest cavity). Some evidence for *cancer* of stomach, intestines, esophagus, pancreas, and kidneys. Risks from ingestion unclear.
71-36-3	n-Butyl alcohol	EPA	Inhalation leads to headaches. Contact with liquid or vapor irritates eyes, nose, throat. Contact with liquid irritates skin.	Adverse eye effects and hearing loss in exposed workers. Adverse effects on thyroid, blood, lungs, intestine, liver, kidneys and nervous system in laboratory studies.
75-15-0	Carbon disulfide	ATSDR	Inhalation effects include headache, fatigue, sleep disturbance, breathing changes, and chest pains. Skin burns from dermal contact.	Nerve changes in workers. Effects on brain, liver, and heart, as well as fetal toxicity in laboratory studies.
7782-50-5	Chlorine	EPA	Effects range from coughing and chest pain to water retention in the lungs; irritation to skin, eyes, and respiratory system.	Adverse effects on immune system, blood, heart, and respiratory system in laboratory studies.

[Table continues on next page.]

Table 4–7 (cont.)

1996

Human Health Effects of Chemicals on the "Top 25" Lists for Releases, Transfers, or Both

CAS Number	Name	Source	High Exposure Effects	Longer and Lower Exposure Effects
—	Chromium (and its compounds)	ATSDR	Hexavalent forms (Cr VI) are more toxic than trivalent (Cr III). Inhalation effects include irritation/damage to nose, lungs, stomach, and intestines. Some persons are allergic and high exposure may trigger asthma. Ingestion effects include stomach upset and ulcers, convulsions, damage to kidneys and liver, and death.	Some Chromium VI compounds are *known human carcinogens*, based on both exposed workers and laboratory studies. Animal studies indicate reproductive effects and fetal toxicity.
—	Copper (and its compounds)	N/A	Report not available.	Report not available.
75-09-2	Dichloromethane	ATSDR	Inhalation effects include slower reaction time, loss of fine motor control, dizziness, nausea, tingling or numbness in fingers and toes, increasing up to unconsciousness or death. Dermal contact causes burning sensation and skin reddening; contact with eyes can burn cornea.	Impairment of hearing and vision. Causes *cancer* in laboratory studies.
74-85-1	Ethylene	NJDOH	Report not retrievable.	Report not retrievable.
107-21-1	Ethylene glycol	ATSDR	Ingestion can lead to nausea, convulsions, slurred speech, disorientation, heart and kidney problems, or death. Increased acidity of body tissues (metabolic acidosis).	Fetal toxicity at large doses in laboratory studies.
50-00-0	Formaldehyde	N/A	Report not available.	Report not available.
7647-01-0	Hydrochloric acid	NJDOH	Inhalation can irritate the lungs, as well as mouth, nose and throat; higher exposures can lead to fluid buildup (pulmonary edema), a medical emergency. Dermal contact can cause severe, permanent eye and skin damage.	Repeated inhalation can lead to bronchitis. Exposure to vapor may cause erosion of teeth. Some evidence of increased lung *cancer* in exposed workers.
7664-39-3	Hydrogen fluoride	ATSDR	Inhalation effects include damage to lungs and heart, death. Dermal contact will burn skin and eyes.	Irritation of eyes, skin, and lungs.
—	Lead (and its compounds)	ATSDR	Exposure can affect almost every organ and system; most sensitive is central nervous system, particularly in children. Kidneys and immune system also affected. Premature births, stunted growth and mental impairment in offspring of exposed mothers.	Effects are more commonly observed after higher exposures; effects of low levels in adults are uncertain.
—	Manganese (and its compounds)	N/A	Report not available.	Report not available.
67-56-1	Methanol	EPA	Ingestion effects range from headache and impaired coordination to severe pain in abdomen, legs, and back, and blindness following inebriation.	Headaches, sleep disorders, and gastrointestinal problems, ranging up to optic nerve damage in workers and in laboratory studies.
78-93-3	Methyl ethyl ketone	ATSDR	Inhalation effects include irritation of nose, throat, skin, and eyes. Laboratory studies have shown birth defects, unconsciousness, and death; neural impairment at lower levels.	Studies not reported.
108-10-1	Methyl isobutyl ketone	EPA	Range from headaches, dizziness, nausea and numbness in fingers and toes to unconsciousness and death. Vapor irritates eyes, nose and throat. Liquid irritates eyes and skin.	Nausea, headaches, weakness, and adverse liver effects in workers. Kidney and liver effects, as well as fetal toxicity, in laboratory studies.
—	Nickel (and its compounds)	ATSDR	Inhalation effects include bronchitis and reduced lung function. Ingestion leads to stomach problems, blood, and kidney effects, as well as liver, immune system, and reproductive effects in laboratory studies	Small amounts are essential for animal nutrition, maybe for humans. Allergic skin rashes. *Cancer* of lung and nasal passages seen in nickel workers, inhalation of insoluble nickel compounds caused cancer in laboratory studies.

Table 4–7 (cont.)

1996

Human Health Effects of Chemicals on the "Top 25" Lists for Releases, Transfers, or Both

CAS Number	Name	Source	High Exposure Effects	Longer and Lower Exposure Effects
—	Nitric acid and nitrate compounds	NJDOH	Inhalation of nitric acid can irritate the lungs, as well as mouth, nose and throat; higher exposures can lead to fluid buildup (pulmonary edema), a medical injury. Dermal contact can cause severe, permanent eye and skin damage.	Exposure to vapor may cause erosion of teeth.
108-95-2	Phenol	NJDOH	Can cause headaches, dizziness, fatigue, fainting, weakness, nausea, vomiting and lack of appetite; at high levels may lead to collapse and death. Inhalation can irritate mouth, nose, throat and lungs. Can irritate the skin, causing deep damage without immediate pain; even gangrene may result.	May damage liver, kidneys, and heart, is a mutagen (causes cell mutations) and may therefore be *carcinogenic*. May cause nervous system damage.
7664-38-2	Phosphoric acid	N/A	Report not available.	Report not available.
115-07-1	Propylene	NJDOH	May cause dizziness, unconsciousness or death (due to lack of oxygen).	Long-term exposure may cause liver damage and irregular heartbeat.
100-42-5	Styrene	ATSDR	Inhalation effects include depression, trouble concentrating, muscle weakness, fatigue, and nausea; possibly irritation of eye, nose, and throat. Laboratory studies show damage to nose and liver, reproductive and fetal toxicity. Ingestion has led to liver, kidney, brain, and lung damage in laboratory studies.	Studies not reported.
7664-93-9	Sulfuric acid	NJDOH	Inhalation can irritate the lungs; higher exposures can lead to fluid buildup (pulmonary edema), a medical injury. Contact with skin and eyes can cause third-degree burns and blindness.	Repeated inhalation can lead to bronchitis, and possibly emphysema. Exposure to vapor may cause chronic runny nose, tearing of the eyes, nose-bleed and stomach upset, as well as erosion and pitting of teeth. Some evidence of increased lung *cancer* in exposed workers.
108-88-3	Toluene	ATSDR	Dizziness, fatigue, unconsciousness and death. Permanent brain and nervous system damage from repeated high-level exposure, including speech damage, vision and hearing problems, loss of muscle control and poor balance. Also affects kidneys and leads to fetal toxicity.	Fatigue, confusion, weakness, appearance of intoxication, memory loss, nausea, loss of appetite, hearing loss.
79-01-6	Trichloroethylene	ATSDR	Inhalation leads to impaired heart function, coma, and death; prolonged exposure can cause nerve, lung, kidney and liver damage. Ingestion may cause nausea, liver and kidney damage, convulsions, impaired heart function, coma and death.	For even short durations, small amounts by inhalation can cause headaches, lung irritation, dizziness, poor coordination and difficulty concentrating. Ingestion can cause liver and kidney damage, nervous system effects, impaired immune function, and impaired fetal development. Some (inconclusive) evidence of *carcinogenicity*.
1330-20-7	Xylene (mixed isomers)	ATSDR	Effects include headaches, lack of coordination, dizziness, confusion, and changes in balance. Short high levels can also cause irritation of skin, eyes, nose, and throat, difficulty breathing, lung problems, delayed reaction time, memory difficulties, stomach discomfort, and possibly liver and kidney changes; highest levels produce unconsciousness and death.	Prolonged exposure can lead to headaches, lack of coordination, dizziness, confusion, and changes in balance. Fetal toxicity observed in high-dose laboratory studies.
—	Zinc (and its compounds)	ATSDR	Ingestion can lead to stomach cramps, nausea, and vomiting. Inhalation can cause "metal fume fever," probably an immune reaction of lungs and body temperature. Dermal exposure causes skin irritation in laboratory studies.	An essential element in the human diet. Prolonged ingestion of excessive levels, though, can cause anemia, damage to pancreas, and reduction of beneficial cholesterol. Laboratory studies indicate effects on fertility and fetal size.

Table 4–8

M 1996

The 25 Chemicals with the Largest Releases in North America

CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
67-56-1	Methanol	109,482,376	5,504,970	13,314,152	918,505	129,227,278
—	Nitric acid and nitrate compounds	1,655,394	55,595,793	26,399,648	1,777,546	85,430,122
108-88-3	Toluene	62,286,206	37,653	169,117	295,347	62,796,504
—	Zinc (and its compounds)	4,003,690	593,575	59,063	51,014,759	55,678,321
1330-20-7	Xylene (mixed isomers)	43,437,633	19,608	71,209	45,932	43,582,986
75-15-0	Carbon disulfide	33,026,310	30,184	1,718	122	33,058,434
78-93-3	Methyl ethyl ketone	30,919,639	34,195	1,296,268	65,491	32,322,559
7782-50-5	Chlorine	30,997,078	190,054	33,649	141,784	31,367,791
7647-01-0	Hydrochloric acid	29,973,355	0	0	0	29,973,355
—	Manganese (and its compounds)	4,128,747	1,147,327	8,025	24,339,392	29,632,346
7664-38-2	Phosphoric acid	535,729	12,874,958	4,406	14,268,801	27,686,395
—	Copper (and its compounds)	3,554,017	63,244	154,080	23,552,101	27,327,917
75-09-2	Dichloromethane	26,048,839	4,558	339,912	2,170	26,398,100
100-42-5	Styrene	19,796,427	5,864	104,013	120,197	20,032,280
74-85-1	Ethylene	18,434,687	11,441	484	127	18,448,717
7664-93-9	Sulfuric acid	13,731,314	0	0	0	13,731,314
—	Chromium (and its compounds)	420,094	339,375	17,176	12,653,586	13,436,133
115-07-1	Propylene	12,956,749	3,235	484	775	12,961,972
71-36-3	n-Butyl alcohol	11,412,030	28,110	1,112,021	2,812	12,560,495
50-00-0	Formaldehyde	6,256,589	378,379	4,317,104	52,035	11,006,783
75-05-8	Acetonitrile	482,401	5,397	10,352,250	22	10,840,070
79-01-6	Trichloroethylene	10,461,789	291	585	8,227	10,472,026
108-10-1	Methyl isobutyl ketone	9,275,032	10,282	73,469	2,232	9,362,174
—	Lead (and its compounds)	1,378,293	34,169	405	7,612,198	9,030,614
107-21-1	Ethylene glycol	3,147,789	841,838	3,492,357	196,868	7,682,522
	Subtotal	**487,802,207**	**77,754,500**	**61,321,595**	**137,071,029**	**764,047,208**
	% of Total	**86.6**	**98.7**	**81.5**	**94.0**	**88.5**
	Total	**563,269,177**	**78,742,497**	**75,239,943**	**145,838,045**	**863,218,412**

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of Total				
Total Air Emissions (%)	Surface Water Discharges (%)	Underground Injection (%)	On-site Land Releases (%)	Total Releases (%)
14.6 / 85.4	39.5 / 60.5	18.9 / 81.1	4.7 / 95.3	16.0 / 84.0
6.1 / 93.9	3.8 / 96.2	2.3 / 97.7	2.3 / 97.7	3.3 / 96.7
8.9 / 91.1	17.6 / 82.4	11.8 / 88.2	15.2 / 84.8	9.0 / 91.0
15.4 / 84.6	17.7 / 82.3	0.6 / 99.4	9.6 / 90.4	10.1 / 89.9
14.1 / 85.9	8.3 / 91.7	16.7 / 83.3	49.9 / 50.1	14.2 / 85.8
0.1 / 99.9	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.1 / 99.9
14.3 / 85.7	0.9 / 99.1	84.9 / 15.1	3.3 / 96.7	17.1 / 82.9
2.8 / 97.2	9.4 / 90.6	0.0 / 100.0	0.0 / 100.0	2.9 / 97.1
4.4 / 95.6	— / —	— / —	— / —	4.4 / 95.6
1.5 / 98.5	20.2 / 79.8	0.0 / 100.0	6.5 / 93.5	6.4 / 93.6
11.3 / 88.7	0.1 / 99.9	0.0 / 100.0	0.0 / 100.0	0.3 / 99.7
12.1 / 87.9	22.6 / 77.4	0.0 / 100.0	1.0 / 99.0	2.5 / 97.5
8.4 / 91.6	0.0 / 100.0	0.0 / 100.0	2.3 / 97.7	8.3 / 91.7
4.3 / 95.7	0.5 / 99.5	0.4 / 99.6	0.2 / 99.8	4.3 / 95.7
12.2 / 87.8	0.0 / 100.0	100.0 / 0.0	0.0 / 100.0	12.2 / 87.8
35.9 / 64.1	— / —	— / —	— / —	35.9 / 64.1
3.9 / 96.1	5.0 / 95.0	1.2 / 98.8	3.6 / 96.4	3.7 / 96.3
7.7 / 92.3	0.0 / 100.0	100.0 / 0.0	0.0 / 100.0	7.7 / 92.3
9.7 / 90.3	0.1 / 99.9	0.0 / 100.0	1.1 / 98.9	8.8 / 91.2
17.8 / 82.2	61.6 / 38.4	1.2 / 98.8	0.3 / 99.7	12.7 / 87.3
4.9 / 95.1	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.2 / 99.8
8.0 / 92.0	15.8 / 84.2	0.0 / 100.0	0.0 / 100.0	8.0 / 92.0
8.1 / 91.9	0.5 / 99.5	0.0 / 100.0	1.3 / 98.7	8.0 / 92.0
40.7 / 59.3	17.9 / 82.1	11.1 / 88.9	10.8 / 89.2	15.4 / 84.6
14.0 / 86.0	7.4 / 92.6	0.0 / 100.0	5.8 / 94.2	6.7 / 93.3
10.6 / 89.4	**6.4 / 93.6**	**7.0 / 93.0**	**6.0 / 94.0**	**9.1 / 90.9**
11.3 / 88.7	**6.5 / 93.5**	**6.4 / 93.6**	**6.1 / 93.9**	**9.6 / 90.4**

Table 4–9
M 1996

The 25 Chemicals with the Largest Transfers in North America

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of Total: Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
—	Zinc (and its compounds)	22,322,324	205,190	58,495,617	81,023,131	12.6 / 87.4	5.4 / 94.6	16.6 / 83.4	15.4 / 84.6
67-56-1	Methanol	18,965,786	37,064,266	809,147	56,839,199	11.0 / 89.0	0.1 / 99.9	20.9 / 79.1	4.0 / 96.0
—	Nitric acid and nitrate compounds	7,682,953	33,363,546	1,974,813	43,021,311	0.6 / 99.4	13.7 / 86.3	6.0 / 94.0	11.0 / 89.0
—	Manganese (and its compounds)	3,991,694	183,570	24,496,307	28,671,571	12.9 / 87.1	2.3 / 97.7	24.8 / 75.2	23.0 / 77.0
—	Lead (and its compounds)	6,580,010	23,918	12,898,055	19,501,983	3.0 / 97.0	9.9 / 90.1	15.9 / 84.1	11.6 / 88.4
108-88-3	Toluene	11,715,697	273,292	506,674	12,495,662	14.8 / 85.2	0.5 / 99.5	4.7 / 95.3	14.0 / 86.0
—	Copper (and its compounds)	1,498,714	242,840	10,372,143	12,113,697	5.9 / 94.1	1.9 / 98.1	6.3 / 93.7	6.2 / 93.8
107-21-1	Ethylene glycol	3,078,467	7,579,136	1,215,013	11,872,615	12.5 / 87.5	0.7 / 99.3	6.6 / 93.4	4.4 / 95.6
—	Chromium (and its compounds)	2,367,651	141,783	9,233,154	11,742,588	24.3 / 75.7	5.2 / 94.8	18.1 / 81.9	19.2 / 80.8
75-09-2	Dichloromethane	5,429,483	295,180	868,708	6,593,372	1.6 / 98.4	1.6 / 98.4	0.0 / 100.0	1.4 / 98.6
1330-20-7	Xylene (mixed isomers)	5,597,285	221,340	270,773	6,089,399	35.4 / 64.6	0.0 / 100.0	16.8 / 83.2	33.3 / 66.7
—	Nickel (and its compounds)	1,543,336	92,835	3,996,361	5,632,532	14.1 / 85.9	12.3 / 87.7	6.8 / 93.2	8.9 / 91.1
1344-28-1	Aluminum oxide (fibrous forms)	16,497	602	4,360,558	4,377,657	0.2 / 99.8	0.0 / 100.0	2.7 / 97.3	2.7 / 97.3
108-95-2	Phenol	1,886,467	1,588,466	744,171	4,219,104	14.6 / 85.4	6.4 / 93.6	38.4 / 61.6	15.7 / 84.3
7429-90-5	Aluminum (fume or dust)	68,763	7,144	3,730,689	3,806,596	0.0 / 100.0	19.0 / 81.0	5.8 / 94.2	5.7 / 94.3
7664-38-2	Phosphoric acid	870,808	1,267,497	1,373,656	3,511,961	5.5 / 94.5	1.8 / 98.2	24.0 / 76.0	11.4 / 88.6
78-93-3	Methyl ethyl ketone	3,005,394	271,419	141,214	3,418,027	27.3 / 72.7	0.0 / 100.0	4.7 / 95.3	24.2 / 75.8
100-42-5	Styrene	1,436,201	120,179	1,532,946	3,089,326	13.4 / 86.6	0.2 / 99.8	4.1 / 95.9	8.3 / 91.7
—	Antimony (and its compounds)	409,226	53,111	2,012,381	2,474,718	0.0 / 100.0	0.1 / 99.9	0.4 / 99.6	0.3 / 99.7
75-05-8	Acetonitrile	1,802,105	409,410	248,614	2,460,128	6.1 / 93.9	0.0 / 100.0	0.0 / 100.0	4.5 / 95.5
1332-21-4	Asbestos (friable)	34	341	2,420,922	2,421,297	0.0 / 100.0	0.0 / 100.0	37.9 / 62.1	37.9 / 62.1
71-36-3	n-Butyl alcohol	923,215	855,106	146,962	1,925,282	40.5 / 59.5	1.2 / 98.8	2.6 / 97.4	20.2 / 79.8
50-00-0	Formaldehyde	535,427	908,585	182,819	1,626,831	40.6 / 59.4	5.7 / 94.3	18.3 / 81.7	18.6 / 81.4
—	Arsenic (and its compounds)	824,168	402	610,201	1,434,771	0.2 / 99.8	40.0 / 60.0	7.6 / 92.4	3.3 / 96.7
7664-39-3	Hydrogen fluoride	936,059	152,593	250,816	1,339,469	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
	Subtotal	**103,487,764**	**85,321,751**	**142,892,714**	**331,702,229**	**12.3 / 87.7**	**5.8 / 94.2**	**16.0 / 84.0**	**12.2 / 87.8**
	% of Total	**83.1**	**93.7**	**97.2**	**91.5**				
	Total for All Matched Chemicals	**124,473,070**	**91,073,897**	**147,065,311**	**362,612,278**	**10.9 / 89.1**	**5.4 / 94.6**	**15.7 / 84.3**	**11.5 / 88.5**

➤ Canada and US data only. Mexico data not collected for 1996.

4.5.1 Carcinogens

In the matched data set for 1996, one of every four PRTR reports that facilities submitted was for a substance designated as a known or suspected carcinogen by either the International Agency for Research on Cancer (IARC) <http://www.iarc.fr> or the US National Toxicological Program (NTP) <http://ntp-server.niehs.nih.gov>. The majority of the designated carcinogens appear on both agencies' lists, although the IARC list is the longer of the two. Of the 45 carcinogenic substances on the matched NPRI-TRI data set, 35 met the criteria of both IARC and NTP.

Facilities reported on 44 of the 45 carcinogens in the matched data set; only Michler's ketone had no reports. Releases and transfers reported for these substances amounted to 189 million kg, about one-sixth of the total (**Table 4–10**, p. 67). Thus, facilities generally reported smaller amounts of these potentially cancer-causing chemicals (average of 11,300 kg per reporting form) than the average for chemical reporting to the matched data set (19,700 kg per form). However, six of the carcinogens were also among the top 25 chemicals for total releases and transfers: chromium and its compounds, dichloromethane, formaldehyde, lead and its compounds, styrene and trichloroethylene (see **Table 4–6**, p. 58).

Chromium is used in making steel and other alloys, refractory bricks, and dyes and pigments. Other applications include chrome plating, leather tanning, and wood preserving. Chromium and its compounds are also used as cleaning agents in electroplating, as mordants in textile manufacture, and in other processes. The largest use of formaldehyde is in the production of resins (especially for foam insulations, adhesives in particleboard and plywood, and textile treatment). It is widely produced as a chemical intermediary in reactions, serves as a preservative in medical laboratories, and is used as an embalming fluid and sterilizer.

The most important use of lead is in producing batteries. Uses in gasoline, paint, and pipe solder have dramatically decreased in recent years. Lead compounds appear in dyes, explosives, asbestos brake linings, insecticides and rodenticides, ointments, and many other products. They are also used as catalysts, cathode materials, flame retardants, metal and wire coatings, agents or constituents in glass manufacture, and as agents for recovering precious metals, notably gold. Styrene is used in the production of plastics, synthetic rubber, resins, and insulators. ABS (acrylonitrile-butadiene-styrene) plastics are used in business machines, luggage, and construction materials; AS (acrylonitrile-styrene) plastics are used in automotive and household goods and packaging material. Most of these products contain polystyrene (styrene linked in a long chain polymer) along with some unlinked styrene. The primary use of trichloroethylene is to degrease metal parts. As a solvent, trichloroethylene is used with adhesives, lubricants, paints, varnishes, and pesticides. It is used in extraction (of greases, oils, fats, etc), in textile processing, and in chemical manufacture (for pharmaceuticals, polychlorinated aliphatic chemicals, flame retardants, and insecticides).

The reported carcinogens also included an ozone-depleting chemical, carbon tetrachloride, whose manufacture has been phased out under the Montreal Protocol. This chemical was used in producing refrigerants and aerosol propellants and was also widely applied, in industry and by consumers, as a cleaning fluid.

Releases of Carcinogens

Carcinogens reported to NPRI and TRI were more likely to be emitted to air than were other reportable substances. Surface water discharges were much smaller, however, making up just one percent of carcinogenic releases (**Figure 4–10**).

Dichloromethane and styrene had the largest releases, and almost all of these were air emissions. On-site land releases of third-ranked chromium and its compounds contributed to a larger role for land releases among carcinogens than among other PRTR substances (**Table 4–11**, pp. 68–69).

Transfers of Carcinogens

When facilities reported transferring carcinogens in waste off-site for further handling, the substances were much more likely to be sent to disposal/containment than was the case for other PRTR substances (**Figure 4–11**).

In part, this reflects a prevalence of metals among the carcinogenic substances with the largest transfers: lead, chromium and nickel and their compounds were three of the top four (**Table 4–12**, p. 71). Land disposal is the common disposition of metal-bearing waste. For these three metals and their compounds, however, North American facilities also reported transferring more than 10 million kg to treatment/destruction. This transfer type, however, represents processes that do not transform metals and must result in some type of release of these substances.

In alloys, nickel is used in making coins, jewelry, and metal parts. Nickel compounds are used in electroplating, in nickel-cadmium battery manufacture, as coloring agents for ceramics, and as catalysts.

Top Facilities for Releases and Transfers of Carcinogens

Releases and transfers of substances designated as known or suspected carcinogens were concentrated among a few facilities.

The 50 facilities with the largest releases of these substances reported 42 million kg of releases, 33 percent of the total (**Figure 4–12**). Air emissions and surface water discharges from the top 50 facilities were 15 percent and 13 percent, respectively, of such releases of carcinogens, while underground injection and on-site land releases were much larger, 92 percent and 78 percent, respectively (**Table 4–13**, pp. 72–73).

Many of the top 50 facilities were chemical manufacturers (19 facilities; US SIC code 28), which is consistent with that industry's role in North American PRTR reporting. Another 13 facilities produce rubber and plastics products (US SIC code 30). Twelve of the top 50 facilities for carcinogen releases reported in the primary metals sector (US SIC code 33).

Facilities in the chemical manufacturing and primary metals sectors also ranked high for total releases and transfers of the carcinogenic substances. The top 50 facilities totaled 53 million kg, 28 percent of the total (**Figure 4–13**). They reported less than 10 percent of air emissions, surface water discharges and transfers to sewage of all carcinogens, but more than 75 percent of underground injection and on-site land releases. They also reported 35 percent of transfers to treatment/destruction of all carcinogens (**Table 4–14**, pp. 74–75).

[Text continues on p. 76.}

Figure 4–10 **M 1996**

North American Releases by Type, Known or Suspected Carcinogens† and All Other Matched Chemicals

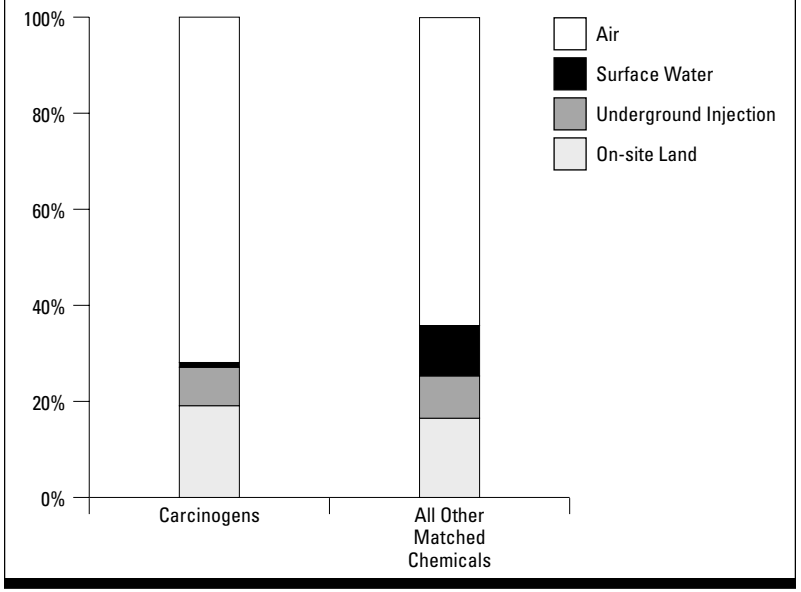
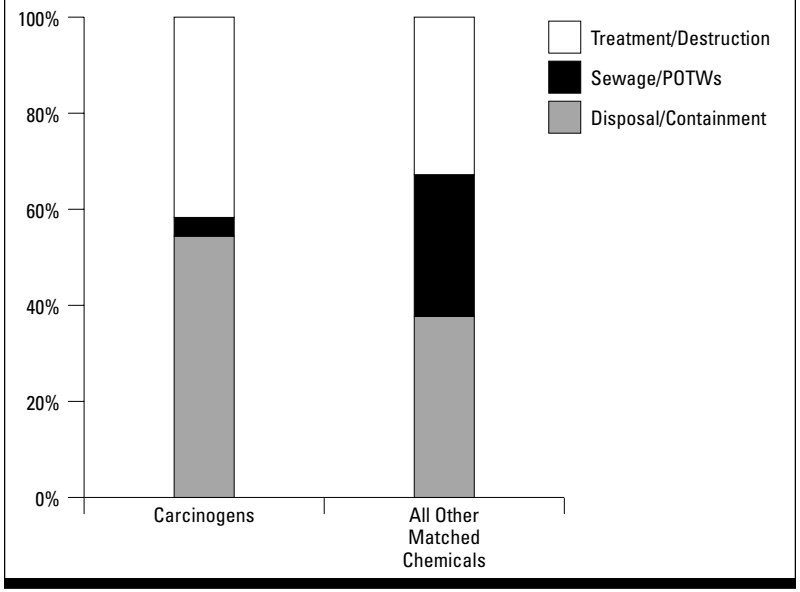


Figure 4–11 **M 1996**

North American Transfers by Type, Known or Suspected Carcinogens† and All Other Matched Chemicals



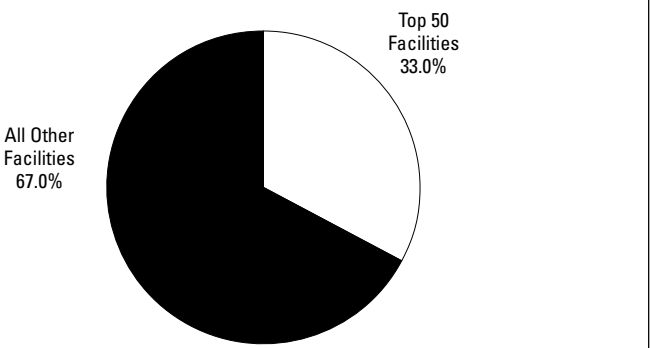
† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

➤ Canada and US data only. Mexico data not collected for 1996.

Figure 4–12 **M 1996**

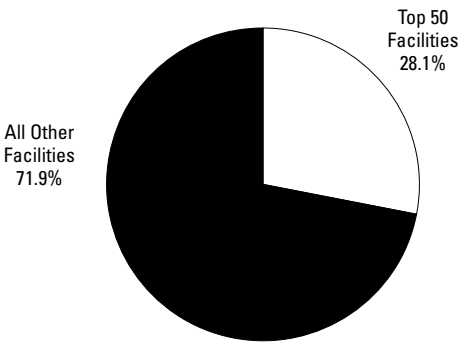
North American Releases of Known or Suspected Carcinogens†, Top 50 Facilities and All Others



Total Facilities: 20,534

Figure 4–13 **M 1996**

North American Releases and Transfers of Known or Suspected Carcinogens†, Top 50 Facilities and All Others



Total Facilities: 20,534

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

➤ Canada and US data only. Mexico data not collected for 1996.

Table 4–10
M 1996

North American Releases and Transfers of Known or Suspected Carcinogens†

CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	NPRI/TRI as % of Total			
		Number	%				Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)
75-09-2	Dichloromethane	938	1.5	26,398,100	6,593,372	32,991,472	5.3 / 94.7	8.3 / 91.7	1.4 / 98.6	6.9 / 93.1
—	Lead (and its compounds)	1,770	2.8	9,030,614	19,501,983	28,532,597	7.3 / 92.7	15.4 / 84.6	11.6 / 88.4	12.8 / 87.2
—	Chromium (and its compounds)	3,367	5.4	13,436,133	11,742,588	25,178,721	6.3 / 93.7	3.7 / 96.3	19.2 / 80.8	10.9 / 89.1
100-42-5	Styrene	1,538	2.5	20,032,280	3,089,326	23,121,606	4.7 / 95.3	4.3 / 95.7	8.3 / 91.7	4.9 / 95.1
50-00-0	Formaldehyde	849	1.4	11,006,783	1,626,831	12,633,614	9.9 / 90.1	12.7 / 87.3	18.6 / 81.4	13.5 / 86.5
79-01-6	Trichloroethylene	693	1.1	10,472,026	817,946	11,289,973	5.2 / 94.8	8.0 / 92.0	3.1 / 96.9	7.6 / 92.4
—	Nickel (and its compounds)	2,897	4.7	2,591,316	5,632,532	8,223,848	4.7 / 95.3	15.3 / 84.7	8.9 / 91.1	10.9 / 89.1
75-07-0	Acetaldehyde	262	0.4	6,440,973	306,371	6,747,344	5.7 / 94.3	6.6 / 93.4	2.2 / 97.8	6.4 / 93.6
71-43-2	Benzene	496	0.8	5,645,658	876,423	6,522,081	8.7 / 91.3	31.8 / 68.2	8.5 / 91.5	28.7 / 71.3
67-66-3	Chloroform	167	0.3	4,625,354	1,015,045	5,640,399	6.6 / 93.4	4.5 / 95.5	0.4 / 99.6	3.8 / 96.2
127-18-4	Tetrachloroethylene	406	0.7	3,639,805	620,820	4,260,625	6.2 / 93.8	3.6 / 96.4	10.7 / 89.3	4.7 / 95.3
108-05-4	Vinyl acetate	188	0.3	2,187,614	967,768	3,155,382	5.3 / 94.7	14.8 / 85.2	0.7 / 99.3	10.4 / 89.6
79-06-1	Acrylamide	78	0.1	2,682,566	178,913	2,861,479	7.7 / 92.3	0.0 / 100.0	0.1 / 99.9	0.0 / 100.0
1332-21-4	Asbestos (friable)	104	0.2	373,933	2,421,297	2,795,229	30.8 / 69.2	41.5 / 58.5	37.9 / 62.1	38.4 / 61.6
107-13-1	Acrylonitrile	117	0.2	2,229,176	520,260	2,749,436	7.7 / 92.3	0.5 / 99.5	3.4 / 96.6	1.0 / 99.0
—	Arsenic (and its compounds)	425	0.7	1,064,108	1,434,771	2,498,879	7.8 / 92.2	11.8 / 88.2	3.3 / 96.7	6.9 / 93.1
106-99-0	1,3-Butadiene	195	0.3	1,366,431	49,285	1,415,716	5.1 / 94.9	9.1 / 90.9	10.3 / 89.7	9.1 / 90.9
117-81-7	Di(2-ethylhexyl) phthalate	337	0.5	271,536	952,973	1,224,509	8.9 / 91.1	10.6 / 89.4	4.4 / 95.6	5.8 / 94.2
107-06-2	1,2-Dichloroethane	83	0.1	505,659	464,496	970,155	4.8 / 95.2	3.4 / 96.6	0.0 / 100.0	1.8 / 98.2
56-23-5	Carbon tetrachloride	68	0.1	179,890	737,788	917,678	5.9 / 94.1	0.3 / 99.7	1.0 / 99.0	0.9 / 99.1
—	Cadmium (and its compounds)	154	0.2	292,338	533,083	825,421	7.1 / 92.9	6.5 / 93.5	0.5 / 99.5	2.6 / 97.4
106-89-8	Epichlorohydrin	71	0.1	160,655	661,801	822,456	2.8 / 97.2	0.1 / 99.9	0.0 / 100.0	0.0 / 100.0
—	Cobalt (and its compounds)	503	0.8	206,512	412,890	619,402	4.6 / 95.4	12.4 / 87.6	2.6 / 97.4	5.9 / 94.1
75-01-4	Vinyl chloride	55	0.1	483,219	35,256	518,475	14.5 / 85.5	4.2 / 95.8	0.0 / 100.0	3.9 / 96.1
123-91-1	1,4-Dioxane	48	0.1	165,856	300,206	466,062	4.2 / 95.8	3.7 / 96.3	0.0 / 100.0	1.3 / 98.7
75-56-9	Propylene oxide	122	0.2	301,121	112,393	413,514	3.3 / 96.7	3.8 / 96.2	0.0 / 100.0	2.8 / 97.2
75-21-8	Ethylene oxide	161	0.3	353,622	54,076	407,699	6.2 / 93.8	6.5 / 93.5	0.0 / 100.0	5.7 / 94.3
106-46-7	1,4-Dichlorobenzene	29	0.0	118,435	231,322	349,757	13.8 / 86.2	7.8 / 92.2	0.2 / 99.8	2.7 / 97.3
26471-62-5	Toluenediisocyanate (mixed isomers)	211	0.3	21,639	272,747	294,386	13.7 / 86.3	4.3 / 95.7	2.9 / 97.1	3.0 / 97.0
140-88-5	Ethyl acrylate	101	0.2	85,157	175,134	260,291	6.9 / 93.1	0.3 / 99.7	0.1 / 99.9	0.2 / 99.8
101-77-9	4,4'-Methylenedianiline	23	0.0	23,086	34,832	57,918	4.3 / 95.7	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
79-46-9	2-Nitropropane	5	0.0	16,940	5,654	22,594	20.0 / 80.0	0.7 / 99.3	0.0 / 100.0	0.6 / 99.4
302-01-2	Hydrazine	45	0.1	4,633	10,992	15,625	4.4 / 95.6	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
91-08-7	Toluene-2,6-diisocyanate	34	0.1	6,220	5,465	11,684	2.9 / 97.1	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
584-84-9	Toluene-2,4-diisocyanate	63	0.1	3,384	7,881	11,265	4.8 / 95.2	0.1 / 99.9	6.3 / 93.7	4.5 / 95.5
139-13-9	Nitrilotriacetic acid	23	0.0	1,366	9,722	11,088	65.2 / 34.8	47.3 / 52.7	16.0 / 84.0	19.9 / 80.1
62-56-6	Thiourea	25	0.0	3,084	6,312	9,396	4.0 / 96.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	24	0.0	575	5,129	5,703	4.2 / 95.8	0.9 / 99.1	0.0 / 100.0	0.1 / 99.9
64-67-5	Diethyl sulfate	32	0.1	1,455	2,651	4,106	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
96-45-7	Ethylene thiourea	10	0.0	122	3,123	3,245	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
77-78-1	Dimethyl sulfate	35	0.1	2,640	2	2,642	2.9 / 97.1	0.4 / 99.6	0.0 / 100.0	0.4 / 99.6
95-80-7	2,4-Diaminotoluene	1	0.0	714	127	841	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
96-09-3	Styrene oxide	9	0.0	551	0	551	44.4 / 55.6	97.5 / 2.5	— / —	97.5 / 2.5
94-59-7	Safrole	2	0.0	229	61	290	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
	Subtotal	**16,764**	**26.9**	**126,433,507**	**62,431,647**	**188,865,154**	**6.5 / 93.5**	**8.7 / 91.3**	**11.1 / 88.9**	**9.5 / 90.5**
	% of Total	**26.9**		**14.6**	**17.2**	**15.4**				
	Total for all Matched Chemicals	**62,225**	**100.0**	**863,218,412**	**362,612,278**	**1,225,830,690**	**6.9 / 93.1**	**9.6 / 90.4**	**11.5 / 88.5**	**10.1 / 89.9**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

➤ Canada and US data only. Mexico data not collected for 1996.

Table 4–11
M 1996

Releases in North America of Known or Suspected Carcinogens†

CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
75-09-2	Dichloromethane	26,048,839	4,558	339,912	2,170	26,398,100
100-42-5	Styrene	19,796,427	5,864	104,013	120,197	20,032,280
—	Chromium (and its compounds)	420,094	339,375	17,176	12,653,586	13,436,133
50-00-0	Formaldehyde	6,256,589	378,379	4,317,104	52,035	11,006,783
79-01-6	Trichloroethylene	10,461,789	291	585	8,227	10,472,026
—	Lead (and its compounds)	1,378,293	34,169	405	7,612,198	9,030,614
75-07-0	Acetaldehyde	5,977,467	93,342	362,545	7,619	6,440,973
71-43-2	Benzene	5,386,231	13,245	184,702	61,480	5,645,658
67-66-3	Chloroform	4,428,653	161,283	20,584	14,834	4,625,354
127-18-4	Tetrachloroethylene	3,618,341	561	6,093	13,880	3,639,805
79-06-1	Acrylamide	5,662	2,187	2,606,873	67,644	2,682,566
—	Nickel (and its compounds)	594,413	89,894	41,053	1,863,407	2,591,316
107-13-1	Acrylonitrile	597,894	268	1,630,493	137	2,229,176
108-05-4	Vinyl acetate	1,857,465	1,085	326,403	1,385	2,187,614
106-99-0	1,3-Butadiene	1,360,730	4,989	454	131	1,366,431
—	Arsenic (and its compounds)	193,474	3,607	27,791	838,905	1,064,108
107-06-2	1,2-Dichloroethane	490,394	879	2,325	12,061	505,659
75-01-4	Vinyl chloride	482,541	301	151	0	483,219
1332-21-4	Asbestos (friable)	1,438	1	0	372,494	373,933
75-21-8	Ethylene oxide	341,010	2,029	10,068	250	353,622
75-56-9	Propylene oxide	274,777	20,586	5,506	152	301,121
—	Cadmium (and its compounds)	38,006	2,619	37	250,996	292,338
117-81-7	Di(2-ethylhexyl) phthalate	239,455	124	0	31,923	271,536
—	Cobalt (and its compounds)	38,874	16,484	7,219	143,636	206,512
56-23-5	Carbon tetrachloride	159,577	126	20,188	0	179,890
123-91-1	1,4-Dioxane	55,356	108,047	0	2,453	165,856
106-89-8	Epichlorohydrin	150,124	9,404	0	1,000	160,655
106-46-7	1,4-Dichlorobenzene	116,357	853	907	218	118,435
140-88-5	Ethyl acrylate	84,652	90	0	234	85,157
101-77-9	4,4'-Methylenedianiline	4,427	10	18,649	0	23,086
26471-62-5	Toluenediisocyanate (mixed isomers)	20,635	0	0	160	21,639
79-46-9	2-Nitropropane	15,550	1,265	0	0	16,940
91-08-7	Toluene-2,6-diisocyanate	6,198	0	0	22	6,220
302-01-2	Hydrazine	4,509	10	0	113	4,633
584-84-9	Toluene-2,4-diisocyanate	3,295	0	0	87	3,384
62-56-6	Thiourea	550	154	2,268	113	3,084
77-78-1	Dimethyl sulfate	2,640	0	0	0	2,640
64-67-5	Diethyl sulfate	1,455	0	0	0	1,455
139-13-9	Nitrilotriacetic acid	30	35	680	0	1,366
95-80-7	2,4-Diaminotoluene	714	0	0	0	714
101-14-4	4,4'-Methylenebis(2-chloroaniline)	229	0	0	340	575
96-09-3	Styrene oxide	14	0	0	0	551
94-59-7	Safrole	229	0	0	0	229
96-45-7	Ethylene thiourea	122	0	0	0	122
	Subtotal	**90,915,519**	**1,296,114**	**10,054,184**	**24,134,087**	**126,433,507**
	% of Total	**16.1**	**1.6**	**13.4**	**16.5**	**14.6**
	Total	**563,269,177**	**78,742,497**	**75,239,943**	**145,838,045**	**863,218,412**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total										
Total Air Emissions (%)		Surface Water Discharges (%)		Underground Injection (%)		On-site Land Releases (%)		Total Releases (%)	
8.4	91.6	0.0	100.0	0.0	100.0	2.3	97.7	8.3	91.7
4.3	95.7	0.5	99.5	0.4	99.6	0.2	99.8	4.3	95.7
3.9	96.1	4.0	95.0	1.2	98.8	3.6	96.4	3.7	96.3
17.8	82.2	61.6	38.4	1.2	98.8	0.3	99.7	12.7	87.3
7.0	92.0	15.8	84.2	0.0	100.0	0.0	100.0	7.0	92.0
40.7	59.3	17.9	82.1	11.1	88.9	10.8	89.2	15.4	84.6
4.6	95.4	3.6	96.4	41.4	58.6	0.0	100.0	6.6	93.4
32.0	67.0	7.1	92.9	23.3	76.7	47.4	52.6	31.8	68.2
4.5	95.5	4.3	95.7	0.0	100.0	0.0	100.0	4.5	95.5
3.6	96.4	14.3	85.7	0.0	100.0	0.5	99.5	3.6	96.4
6.3	93.7	24.2	75.8	0.0	100.0	0.0	100.0	0.0	99.0
46.4	53.6	55.6	44.4	0.0	99.0	3.6	96.4	15.3	84.7
1.7	98.3	0.0	100.0	0.0	100.0	0.0	100.0	0.5	99.5
7.1	92.9	0.0	100.0	58.2	41.8	7.2	92.8	14.8	85.2
9.1	90.9	0.0	100.0	0.0	100.0	9.2	90.8	9.1	90.9
63.7	36.3	43.8	56.2	0.0	100.0	0.0	100.0	11.8	88.2
3.4	96.6	4.7	95.3	0.0	100.0	5.1	94.9	3.4	96.6
4.2	95.8	46.5	53.5	0.0	100.0	—	—	4.2	95.8
12.9	87.1	0.0	100.0	—	—	41.6	58.4	41.5	58.5
6.7	93.3	0.0	100.0	0.0	100.0	0.0	100.0	6.5	93.5
4.1	95.9	0.0	100.0	0.0	100.0	0.0	100.0	3.8	96.2
46.7	53.3	19.9	80.1	0.0	100.0	0.0	100.0	6.5	93.5
12.0	87.0	0.0	100.0	—	—	0.1	99.9	10.6	89.4
26.2	73.8	11.2	88.8	0.0	100.0	9.3	90.7	12.4	87.6
0.3	99.7	22.2	77.8	0.0	100.0	—	—	0.3	99.7
1.7	98.3	4.7	95.3	—	—	0.0	100.0	3.7	96.3
0.0	100.0	0.0	100.0	—	—	0.0	100.0	0.1	99.9
7.8	92.2	0.0	100.0	0.0	100.0	0.0	100.0	7.8	92.2
0.1	99.9	0.0	100.0	—	—	0.0	100.0	0.3	99.7
0.0	100.0	0.0	100.0	0.0	100.0	—	—	0.0	100.0
0.4	99.6	—	—	—	—	0.0	100.0	4.3	95.7
0.0	100.0	0.0	100.0	—	—	—	—	0.7	99.3
0.0	100.0	—	—	—	—	0.0	100.0	0.0	100.0
0.0	100.0	0.0	100.0	—	—	0.0	100.0	0.0	100.0
0.0	100.0	—	—	—	—	0.0	100.0	0.1	99.9
0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
0.4	99.6	—	—	—	—	0.4	99.6	—	—
0.0	100.0	—	—	—	—	0.0	100.0	—	—
83.3	16.7	0.0	100.0	0.0	100.0	—	—	47.3	52.7
0.0	100.0	—	—	—	—	0.0	100.0	—	—
0.0	100.0	—	—	—	—	0.0	100.0	0.9	99.1
0.0	100.0	—	—	—	—	97.5	2.5	—	—
0.0	100.0	—	—	—	—	0.0	100.0	—	—
0.0	100.0	—	—	—	—	0.0	100.0	—	—
9.6	**90.4**	**25.3**	**74.7**	**4.3**	**95.7**	**6.4**	**93.6**	**8.7**	**91.3**
11.3	**88.7**	**6.5**	**93.5**	**6.4**	**93.6**	**6.1**	**93.9**	**9.6**	**90.4**

Table 4–12
M 1996

Transfers in North America of Known or Suspected Carcinogens†

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of Total: Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
—	Lead (and its compounds)	6,580,010	23,918	12,898,055	19,501,983	3.0 / 97.0	9.9 / 90.1	15.9 / 84.1	11.6 / 88.4
—	Chromium (and its compounds)	2,367,651	141,783	9,233,154	11,742,588	24.3 / 75.7	5.2 / 94.8	18.1 / 81.9	19.2 / 80.8
75-09-2	Dichloromethane	5,429,483	295,180	868,708	6,593,372	1.6 / 98.4	1.6 / 98.4	0.0 / 100.0	1.4 / 98.6
—	Nickel (and its compounds)	1,543,336	92,835	3,996,361	5,632,532	14.1 / 85.9	12.3 / 87.7	6.8 / 93.2	8.9 / 91.1
100-42-5	Styrene	1,436,201	120,179	1,532,946	3,089,326	13.4 / 86.6	0.2 / 99.8	4.1 / 95.9	8.3 / 91.7
1332-21-4	Asbestos (friable)	34	341	2,420,922	2,421,297	0.0 / 100.0	0.0 / 100.0	37.9 / 62.1	37.9 / 62.1
50-00-0	Formaldehyde	535,427	908,585	182,819	1,626,831	40.6 / 59.4	5.7 / 94.3	18.3 / 81.7	18.6 / 81.4
—	Arsenic (and its compounds)	824,168	402	610,201	1,434,771	0.2 / 99.8	40.0 / 60.0	7.6 / 92.4	3.3 / 96.7
67-66-3	Chloroform	847,839	149,448	17,758	1,015,045	0.5 / 99.5	0.0 / 100.0	0.7 / 99.3	0.4 / 99.6
108-05-4	Vinyl acetate	885,122	66,808	15,837	967,768	0.2 / 99.8	1.6 / 98.4	22.5 / 77.5	0.7 / 99.3
117-81-7	Di(2-ethylhexyl) phthalate	109,404	9,633	833,936	952,973	6.5 / 93.5	0.7 / 99.3	4.1 / 95.9	4.4 / 95.6
71-43-2	Benzene	750,222	97,387	28,813	876,423	9.9 / 90.1	0.0 / 100.0	2.5 / 97.5	8.5 / 91.5
79-01-6	Trichloroethylene	744,151	39,180	34,615	817,946	3.4 / 96.6	0.0 / 100.0	0.0 / 100.0	3.1 / 96.9
56-23-5	Carbon tetrachloride	733,377	218	4,193	737,788	1.0 / 99.0	0.0 / 100.0	0.0 / 100.0	1.0 / 99.0
106-89-8	Epichlorohydrin	654,723	5,202	1,876	661,801	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
127-18-4	Tetrachloroethylene	611,253	838	8,729	620,820	10.8 / 89.2	0.0 / 100.0	10.0 / 90.0	10.7 / 89.3
—	Cadmium (and its compounds)	103,225	1,435	428,423	533,083	0.0 / 100.0	0.6 / 99.4	0.6 / 99.4	0.5 / 99.5
107-13-1	Acrylonitrile	477,062	40,187	3,011	520,260	3.6 / 96.4	0.5 / 99.5	0.0 / 100.0	3.4 / 96.6
107-06-2	1,2-Dichloroethane	420,225	2,888	41,383	464,496	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
—	Cobalt (and its compounds)	59,707	6,344	346,839	412,890	4.0 / 96.0	0.2 / 99.8	2.4 / 97.6	2.6 / 97.4
75-07-0	Acetaldehyde	148,011	157,233	1,127	306,371	4.5 / 95.5	0.0 / 100.0	0.9 / 99.1	2.2 / 97.8
123-91-1	1,4-Dioxane	10,009	72,788	217,410	300,206	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
26471-62-5	Toluenediisocyanate (mixed isomers)	257,612	0	15,135	272,747	3.1 / 96.9	— / —	0.1 / 99.9	2.9 / 97.1
106-46-7	1,4-Dichlorobenzene	230,887	36	400	231,322	0.0 / 100.0	0.0 / 100.0	100.0 / 0.0	0.2 / 99.8
79-06-1	Acrylamide	12,402	29,664	136,847	178,913	0.0 / 100.0	0.2 / 99.8	0.1 / 99.9	0.1 / 99.9
140-88-5	Ethyl acrylate	149,364	10,925	14,845	175,134	0.1 / 99.9	0.0 / 100.0	0.0 / 100.0	0.1 / 99.9
75-56-9	Propylene oxide	849	93,753	17,791	112,393	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
75-21-8	Ethylene oxide	437	53,164	475	54,076	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
106-99-0	1,3-Butadiene	46,808	304	2,172	49,285	10.8 / 89.2	0.0 / 100.0	0.0 / 100.0	10.3 / 89.7
75-01-4	Vinyl chloride	26,027	333	8,896	35,256	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
101-77-9	4,4'-Methylenedianiline	25,030	917	8,885	34,832	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
302-01-2	Hydrazine	887	1,693	8,412	10,992	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
139-13-9	Nitrilotriacetic acid	122	9,600	0	9,722	100.0 / 0.0	15.0 / 85.0	— / —	16.0 / 84.0
584-84-9	Toluene-2,4-diisocyanate	6,005	0	1,876	7,881	4.2 / 95.8	— / —	13.3 / 86.7	6.3 / 93.7
62-56-6	Thiourea	5,022	115	1,175	6,312	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
79-46-9	2-Nitropropane	5,654	0	0	5,654	0.0 / 100.0	— / —	— / —	0.0 / 100.0
91-08-7	Toluene-2,6-diisocyanate	5,058	0	407	5,465	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	5,124	2	2	5,129	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
96-45-7	Ethylene thiourea	1,277	0	1,846	3,123	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
64-67-5	Diethyl sulfate	685	1,945	21	2,651	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
95-80-7	2,4-Diaminotoluene	127	0	0	127	0.0 / 100.0	— / —	— / —	0.0 / 100.0
94-59-7	Safrole	0	61	0	61	— / —	0.0 / 100.0	— / —	0.0 / 100.0
77-78-1	Dimethyl sulfate	0	2	0	2	— / —	0.0 / 100.0	— / —	0.0 / 100.0
96-09-3	Styrene oxide	0	0	0	0	— / —	— / —	— / —	— / —
	Subtotal	**26,050,017**	**2,435,326**	**33,946,301**	**62,431,647**	**6.6 / 93.4**	**3.3 / 96.7**	**15.1 / 84.9**	**11.1 / 88.9**
	% of Total	**20.9**	**2.7**	**23.1**	**17.2**				
	Total for All Matched Chemicals	**124,473,070**	**91,073,897**	**147,065,311**	**362,612,278**	**10.9 / 89.1**	**5.4 / 94.6**	**15.7 / 84.3**	**11.5 / 88.5**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

➤ Canada and US data only. Mexico data not collected for 1996.

Table 4–13

M 1996

The 50 North American Facilities with the Largest Total Releases of Known or Suspected Carcinogens†

Rank	Facility	City, State/Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717
2	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769
3	Monsanto Co.	Luling, LA		28	2	8,753	0	2,540,363	0
4	ASARCO Inc.	East Helena, MT		33	4	29,062	596	0	1,866,876
5	ASARCO Inc., Glover Plant	Annapolis, MO		33	4	150,576	14	0	1,295,185
6	Angus Chemical Co.	Sterlington, LA		28	4	13,698	2,040	1,361,431	0
7	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	7	13,197	0	0	1,294,240
8	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	5	21,386	0	1,222,494	3
9	BP Chemicals Inc.	Lima, OH		28	10	43,701	0	1,151,760	0
10	Eastman Kodak Co., Kodak Park	Rochester, NY		38	9	1,119,503	22,802	0	39
11	Aquaglass Corp., Masco Corp.	Adamsville, TN		30	1	1,046,797	0	0	0
12	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	4	95,508	0	0	929,049
13	Cytec Industries Inc.	Westwego, LA		28	5	8,040	592	987,664	0
14	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR		33	1	17,061	7	0	905,522
15	Foamex L.P., Div. of Kihi	Corry, PA		30	2	756,420	0	0	0
16	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	5	9,776	454	0	731,642
17	Carpenter Co., Tupelo Div.	Verona, MS		30	2	689,399	0	0	0
18	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	6	92,688	75	0	596,449
19	Monsanto Co., Chocolate Bayou	Alvin, TX		28	3	12,307	0	645,125	0
20	FMC Corp.	Pocatello, ID		28	4	1,410	0	0	617,211
21	Abbott Chemicals Inc.	Barceloneta, PR		Mult.	1	585,261	0	0	0
22	Celanese Canada Inc.	Edmonton, AB	37	28	5	184,472	0	386,300	0
23	GE Plastics Co., General Electric Co.	Mount Vernon, IN		28	6	569,148	259	0	0
24	Northwestern Steel & Wire Co.	Sterling, IL		33	3	4,998	299	0	528,345
25	Elkem Metals Co.	Marietta, OH		33	4	14,521	5,896	0	441,723
26	General Electric Co.	Ottawa, IL		28	4	460,365	39	0	0
27	Dofasco Inc.	Hamilton, ON	29	33	5	456,937	542	0	51
28	Sterling Chemicals Inc.	Texas City, TX		28	10	69,611	0	387,913	0
29	Foamex International Inc.	Milan, TN		30	1	457,282	0	0	0
30	Upjohn Mfg. Co., Pharmacia & Upjohn Inc.	Arecibo, PR		28	2	455,125	0	0	0
31	Dow Chemical Co.	Freeport, TX		28	21	349,937	47,669	0	46,408
32	Nu-Foam Products, Ohio Decorative Products Inc.	Chattanooga, TN		30	2	420,896	0	0	0
33	Weyerhaeuser Co.	Longview, WA		Mult.	6	340,485	62,013	0	0
34	Aqua Glass West Inc., Masco Corp.	Klamath Falls, OR		30	1	395,697	0	0	0
35	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	5	389,700	4,000	0	0
36	Celanese Eng. Resins Inc., Hoechst Corp.	Bishop, TX		28	5	152,853	3,980	228,580	113
37	General Foam Corp., PMC Inc.	West Hazelton, PA		30	3	376,544	0	0	0
38	Carpenter Co.	Russellville, KY		Mult.	3	374,128	0	0	0
39	Novopharm Limited	Scarborough, ON	37	28	1	366,565	0	0	0
40	Tomkins Ind. Inc., Lasco Bathware Div.	Three Rivers, MI		30	1	362,998	0	0	0
41	General Electric Co.	Burkville, AL		28	2	358,731	1	0	0
42	Olympic Products Co., Cone Mills Corp.	Tupelo, MS		30	3	352,259	0	0	0
43	Boeing Co.	Wichita, KS		Mult.	6	350,141	231	0	0
44	Flexible Foam Products, Ohio Decorative Products	Elkhart, IN		30	2	339,873	0	0	0
45	Kimberly-Clark Corp.	Mobile, AL		26	2	320,181	12,698	0	0
46	General Foam Corp., PMC Inc.	Bridgeview, IL		30	3	322,330	0	0	0
47	Foamex L.P.	Morristown, TN		30	2	319,771	0	0	0
48	Tomkins Ind. Inc., Lasco Bathware Div.	Cordele, GA		30	1	309,375	0	0	0
49	Great Lakes Chemical Corp., Central Plant	El Dorado, AR		28	2	11,460	0	287,599	0
50	American Steel Foundries, Amsted Industries Inc.	Granite City, IL		33	2	3,302	0	0	293,424
	Subtotal				**194**	**13,609,254**	**164,335**	**9,199,230**	**18,752,767**
	% of Total				**1.2**	**15.0**	**12.7**	**91.5**	**77.7**
	Total for All Matched Carcinogens				**16,764**	**90,915,519**	**1,296,114**	**10,054,184**	**24,134,087**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

* Chemicals accounting for more than 70% of total releases of carcinogens from the facility.

➤ Canada and US data only, Mexico data not collected for 1996

➤ UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	5,126,893	Chromium and compounds (land)
2	4,084,751	Chromium and compounds (land)
3	2,549,116	Formaldehyde (UIJ)
4	1,896,534	Lead and compounds (land)
5	1,445,775	Lead and compounds (land)
6	1,377,169	Formaldehyde (UIJ)
7	1,307,438	Lead/Chromium and compounds (land)
8	1,243,883	Acrylamide, Acrylonitrile (UIJ)
9	1,195,460	Acrylamide, Acrylonitrile (UIJ)
10	1,142,344	Dichloromethane (air)
11	1,046,797	Styrene (air)
12	1,024,557	Lead and compounds (land)
13	996,296	Acrylamide (UIJ)
14	922,590	Nickel and compounds (land)
15	756,420	Dichloromethane (air)
16	741,871	Lead/Arsenic and compounds (land)
17	689,399	Dichloromethane (air)
18	689,212	Lead and compounds (land)
19	657,431	Acrylonitrile (UIJ)
20	618,621	Chromium/Cadmium and compounds (land)
21	585,261	Dichloromethane (air)
22	570,772	Acetaldehyde (UIJ, air), Vinyl acetate (UIJ)
23	569,407	Dichloromethane (air)
24	533,642	Lead/Chromium and compounds (land)
25	462,140	Chromium and compounds (land)
26	460,404	Styrene, Acrylonitrile (air)
27	457,530	Benzene (air)
28	457,524	Acrylamide (UIJ)
29	457,282	Dichloromethane (air)
30	455,125	Dichloromethane (air)
31	444,015	Epichlorohydrin, 1,2-Dichloroethane, Dichloromethane, Benzene, Propylene oxide, 1,3-Butadiene (air)
32	420,896	Dichloromethane (air)
33	402,498	Acetaldehyde, Chloroform (air)
34	395,697	Styrene (air)
35	393,700	Lead and compounds (air)
36	385,526	Formaldehyde (UIJ, air)
37	376,544	Dichloromethane (air)
38	374,128	Dichloromethane (air)
39	366,565	Dichloromethane (air)
40	362,998	Styrene (air)
41	358,732	Dichloromethane (air)
42	352,259	Dichloromethane (air)
43	350,372	Tetrachloroethylene (air)
44	339,873	Dichloromethane (air)
45	332,880	Chloroform (air)
46	322,330	Dichloromethane (air)
47	319,771	Dichloromethane (air)
48	309,375	Styrene (air)
49	299,059	Dichloromethane (UIJ)
50	296,726	Chromium and compounds (land)
	41,725,586	
	33.0	
	126,433,506	

Table 4–14

M 1996

Top 50 North American Facilities with the Largest Total Releases and Transfers of Known or Suspected Carcinogens†

Rank	Facility	City, State	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717
2	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769
3	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	4	95,508	0	0	929,049
4	Monsanto Co.	Luling, LA		28	2	8,753	0	2,540,363	0
5	Pharmacia & Upjohn Co.	Portage, MI		28	4	91,912	116	22,789	0
6	ASARCO Inc.	East Helena, MT		33	4	29,062	596	0	1,866,876
7	ASARCO Inc., Glover Plant	Annapolis, MO		33	4	150,576	14	0	1,295,185
8	Angus Chemical Co.	Sterlington, LA		28	4	13,698	2,040	1,361,431	0
9	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	7	13,197	0	0	1,294,240
10	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	4	5,879	15	0	0
11	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	5	21,386	0	1,222,494	3
12	BP Chemicals Inc.	Lima, OH		28	10	43,701	0	1,151,760	0
13	Eastman Kodak Co., Kodak Park	Rochester, NY		38	9	1,119,503	22,802	0	39
14	Aquaglass Corp., Masco Corp.	Adamsville, TN		30	1	1,046,797	0	0	0
15	General Battery Corp., Exide Corp.	Reading, PA		33	3	926	878	0	0
16	Cytec Industries Inc.	Westwego, LA		28	5	8,040	592	987,664	0
17	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR		33	1	17,061	7	0	905,522
18	Dominion Castings Ltd.	Hamilton, ON	29	33	2	6,291	100	0	0
19	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	5	9,776	454	0	731,642
20	Quemetco Inc., RSR Corp.	City of Industry, CA		33	3	837	10	0	0
21	Xerox Corp.	Webster, NY		35	3	21,698	0	0	0
22	Upjohn Mfg. Co., Pharmacia & Upjohn Inc.	Arecibo, PR		28	2	455,125	0	0	0
23	Foamex L.P., Div. of Kihi	Corry, PA		30	2	756,420	0	0	0
24	DuPont Sabine River Works	Orange, TX		28	9	207,105	414	45,737	0
25	Quemetco Inc., RSR Corp.	Indianapolis, IN		33	3	1,879	0	0	0
26	Shell Oil Co.	Deer Park, TX		28	17	85,043	3	0	207
27	Sequentia Inc.	Grand Junction, TN		30	1	40,710	0	0	0
28	Carpenter Co., Tupelo Div.	Verona, MS		30	2	689,399	0	0	0
29	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	6	92,688	75	0	596,449
30	Monsanto Co., Chocolate Bayou	Alvin, TX		28	3	12,307	0	645,125	0
31	Co-Steel Lasco	Whitby, ON	29	33	3	1,408	53	0	231,800
32	Celanese Canada Inc.	Edmonton, AB	37	28	5	184,472	0	386,300	0
33	FMC Corp.	Pocatello, ID		28	4	1,410	0	0	617,211
34	Thomson Consumer Electronics Inc.	Circleville, OH		32	2	1,104	35	0	0
35	GE Plastics Co., General Electric Co.	Mount Vernon, IN		28	6	569,148	259	0	0
36	Abbott Chemicals Inc.	Barceloneta, PR		Mult.	1	585,261	0	0	0
37	Dofasco Inc.	Hamilton, ON	29	33	5	456,937	542	0	51
38	Noltex L.L.C., Mitsubishi Chemical America Inc.	La Porte, TX		28	1	4,036	0	0	0
39	American Bumper & Mfg. Co.	Ionia, MI		34	3	1,844	0	0	0
40	Northwestern Steel & Wire Co.	Sterling, IL		33	3	4,998	299	0	528,345
41	Boeing Co.	Wichita, KS		Mult.	6	350,141	231	0	0
42	Allegheny Ludlum Corp.	New Castle, IN		33	2	231	227	0	0
43	Elkem Metals Co.	Marietta, OH		33	4	14,521	5,896	0	441,723
44	Southwire Co.	Carrollton, GA		Mult.	14	4,473	106	0	0
45	Quality Chemicals Inc., Chemfirst Corp.	Tyrone, PA		28	1	1,503	0	0	0
46	Hydrite Chemical Co.	Cottage Grove, WI		28	4	2,363	0	0	0
47	Sterling Chemicals Inc.	Texas City, TX		28	10	69,611	0	387,913	0
48	Stelco Inc., Hilton Works	Hamilton, ON	29	33	6	228,340	4,975	0	0
49	General Electric Co.	Ottawa, IL		28	4	460,365	39	0	0
50	Foamex International Inc.	Milan, TN		30	1	457,282	0	0	0
	Subtotal				**212**	**8,449,752**	**40,905**	**8,751,576**	**18,644,828**
	% of Total				**1.3**	**9.3**	**3.2**	**87.0**	**77.3**
	Total of All Matched Carcinogens				**16,764**	**90,915,519**	**1,296,114**	**10,054,184**	**24,134,087**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

* Chemicals accounting for more than 70% of total releases and transfers of carcinogens from the facility.

➤ One TRI facility reported in error. Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds. It has been omitted from this table.

➤ Canada and US data only. Mexico data not collected for 1996.

➤ UIJ = underground injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	5,126,893	24,036	0	3,129	27,166	5,154,059	Chromium and compounds (land)
2	4,084,751	4,535	0	0	4,535	4,089,286	Chromium and compounds (land)
3	1,024,557	2,593,802	9	0	2,593,811	3,618,368	Lead and compounds (transfers to treatment)
4	2,549,116	5,442	0	0	5,442	2,554,558	Formaldehyde (UIJ)
5	114,816	1,708,572	148,186	4,748	1,861,506	1,976,322	Dichloromethane (transfers to treatment)
6	1,896,534	0	7	0	7	1,896,541	Lead and compounds (land)
7	1,445,775	0	0	0	0	1,445,775	Lead and compounds (land)
8	1,377,169	33,046	0	0	33,046	1,410,215	Formaldehyde (UIJ)
9	1,307,438	0	0	0	0	1,307,438	Lead/Chromium and compounds (land)
10	5,894	3,935	0	1,261,751	1,265,686	1,271,580	Lead/Nickel and compounds (transfers to disposal)
11	1,243,883	328	0	0	328	1,244,211	Acrylamide, Acrylonitrile (UIJ)
12	1,195,460	5,018	0	290	5,308	1,200,769	Acrylamide, Acrylonitrile (UIJ)
13	1,142,344	4,537	0	58	4,595	1,146,940	Dichloromethane (air)
14	1,046,797	0	0	0	0	1,046,797	Styrene (air)
15	1,803	704,322	0	327,065	1,031,388	1,033,191	Lead and compounds (transfers to treatment, disposal)
16	996,296	625	0	2	628	996,924	Acrylamide (UIJ)
17	922,590	0	0	0	0	922,590	Nickel and compounds (land)
18	6,491	0	0	888,042	888,042	894,533	Chromium and compounds (transfers to disposal)
19	741,871	0	0	119,252	119,252	861,122	Lead/Arsenic and compounds (land)
20	847	0	72	847,166	847,238	848,084	Lead and compounds (transfers to disposal)
21	21,698	5,481	20	818,954	824,455	846,153	Dichloromethane (transfers to disposal)
22	455,125	340,136	21,814	0	361,950	817,075	Dichloromethane (air, transfers to treatment)
23	756,420	1,813	0	0	1,813	758,233	Dichloromethane (air)
24	253,255	105,937	0	388,305	494,242	747,497	Nickel and compounds (transfers to disposal), Vinyl acetate (air)
25	1,879	0	55	743,311	743,366	745,245	Lead and compounds (transfers to disposal)
26	85,253	634,932	0	177	635,109	720,362	Epichlorohydrin (transfers to treatment)
27	40,710	0	0	657,275	657,275	697,985	Styrene (transfers to disposal)
28	689,399	752	0	0	752	690,151	Dichloromethane (air)
29	689,212	0	369	0	369	689,581	Lead and compounds (land)
30	657,431	0	0	0	0	657,431	Acrylonitrile (UIJ)
31	233,261	0	8	397,200	397,208	630,469	Lead and compounds (transfers to disposal, land)
32	570,772	0	0	48,061	48,061	618,833	Acetaldehyde (UIJ, air), Vinyl acetate (UIJ)
33	618,621	0	0	24	24	618,645	Chromium/Cadmium and compounds (land)
34	1,139	168,317	0	439,312	607,629	608,768	Lead and compounds (transfers to disposal)
35	569,407	19,368	0	7,125	26,493	595,900	Dichloromethane (air)
36	585,261	1,533	16	0	1,549	586,810	Dichloromethane (air)
37	457,530	0	333	108,926	109,259	566,789	Benzene (air)
38	4,036	547,834	317	0	548,152	552,188	Vinyl acetate (transfers to treatment)
39	1,844	545,574	1,838	0	547,412	549,256	Nickel and compounds (transfers to treatment)
40	533,642	1,224	0	0	1,224	534,866	Lead/Chromium and compounds (land)
41	350,372	128,578	118	44,104	172,800	523,172	Tetrachloroethylene, Trichloroethylene (air)
42	458	0	0	512,472	512,472	512,930	Chromium/Nickel and compounds (transfers to disposal)
43	462,140	0	0	43,537	43,537	505,678	Chromium and compounds (land)
44	4,579	401,032	18	95,841	496,890	501,469	Lead and compounds (transfers to treatment)
45	1,503	497,742	0	0	497,742	499,245	Carbon tetrachloride (transfers to treatment)
46	2,363	476,259	0	0	476,259	478,621	Trichloroethylene, Dichloromethane (transfers to treatment)
47	457,524	10,657	61	9,311	20,029	477,553	Acrylamide, Acrylonitrile (UIJ)
48	234,615	0	0	238,340	238,340	472,955	Asbestos (transfers to disposal), Benzene (air)
49	460,404	0	0	116	116	460,520	Styrene, Acrylonitrile (air)
50	457,282	150	0	0	150	457,432	Dichloromethane (air)
	35,888,462	**8,975,520**	**173,243**	**8,003,891**	**17,152,654**	**53,041,116**	
	28.4	**34.5**	**7.1**	**23.6**	**27.5**	**28.1**	
	126,433,506	**26,050,017**	**2,435,326**	**33,946,301**	**62,431,643**	**188,865,151**	

4.5.2 Metals

Nineteen metals reportable to both NPRI and TRI accounted for one-third of the reporting forms and one-quarter of total releases and transfers in 1996. Predominant among them was zinc and its compounds. This substance had the largest releases and the largest transfers of the metals (**Table 4–15**, pp. 78–79). As seen earlier (**Table 4–6**, p. 58), zinc and its compounds ranked second among all matched chemicals for total releases and transfers.

A few metals are reported in Canada or in the United States to a greater extent than the average for all substances. Notably, more than 90 percent of vanadium was reported to NPRI, along with 27 percent of mercury and its compounds. TRI facilities accounted for nearly all the reporting of antimony and its compounds and titanium tetrachloride. Vanadium compounds are constituents of specialty steels used principally in automobile parts. Vanadium is also used in rubber, plastics and ceramics production. Mercury is used in making chlorine gas and caustic soda and in thermometers, batteries, mercury lamps and fluorescent lamps, and other products. Mercury salts are used in ointments. Mercury is also a catalyst for production of vinyl chloride monomer, urethane foam, and anthraquinone. Uses of titanium tetrachloride include manufacture of titanium metal and other titanium compounds. Among the latter is titanium dioxide, used as a white pigment and in the production of other chemicals.

Releases of Metals

By far the largest release of metals was the 126 million kg to on-site land disposal. For 13 of the 19 metals, this release type accounted for 70 percent or more of total releases (**Table 4–16**, pp. 80–81). It also accounted for 15 percent of all releases of all substances in the matched data set—a distinctly different pattern from that obtained for releases of non-metal substances (**Figure 4–14**).

Transfers of Metals

Disposal/containment was the largest type of off-site transfer for metals. Such transfers are generally made to landfills or other forms of land disposal, corresponding to on-site land releases. The 131 million kg of metals and their compounds sent off-site for disposal amounted to 36 percent of all transfers of all substances in the matched data set. Another 40 million kg, however, were reported as transfers for treatment or destruction. As noted above, treatment processes may modify metals, but do not destroy them or convert them to other substances. These transfers therefore result in some type of release of the metal. More than half the amount of metals sent for treatment/destruction consisted of zinc and its compounds (**Table 4–17**, p. 83).

As with releases, the disposition of metals sent off-site differed distinctly from the overall pattern of transfers (**Figure 4–15**). In particular, very little was reported as transferred to sewage, which is not surprising as metals generally cannot be treated by sewage treatment plants.

Top Facilities for Releases and Transfers of Metals

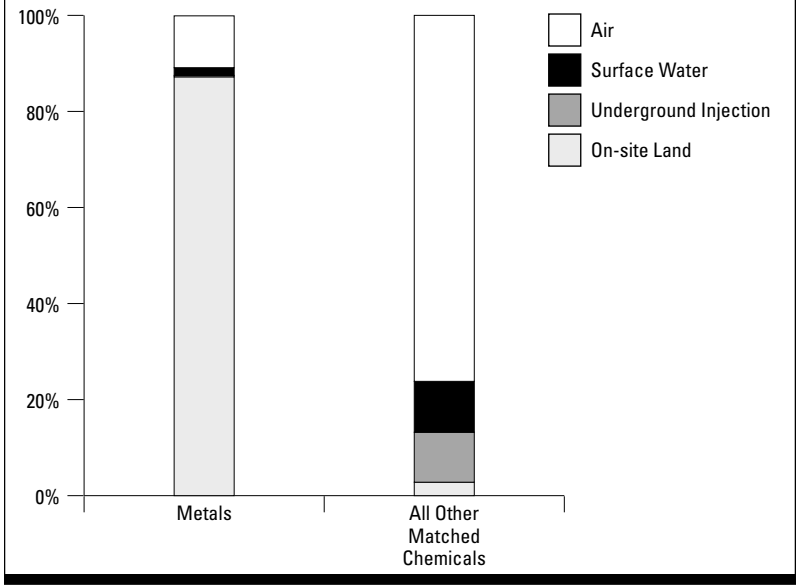
Fifty facilities reported the bulk of the releases of metals and their compounds, totaling 84 percent of all such releases (**Figure 4–16**). These facilities submitted only one percent of the forms for metals and their compounds; however, their reporting represented 91 percent of all on-site land releases of the metals and their compounds reported in North America. This is a much greater concentration of releases in few facilities than occurred with other listed substances (**Table 4–18**, pp. 84–85).

For total releases and transfers of metals and their compounds, the top 50 facilities reported 61 percent of all such releases and transfers, representing 82 percent of on-site land releases of metals and their compounds (**Figure 4–17**). In addition, these facilities reported about half of the amounts for metals in transfers, except transfers to sewage. As might be expected, 43 of the 50 facilities with the largest totals were primary metals producers (US SIC code 33, see **Table 4–19**, pp. 86–87).

[Text continues on p. 89.]

Figure 4–14 M 1996

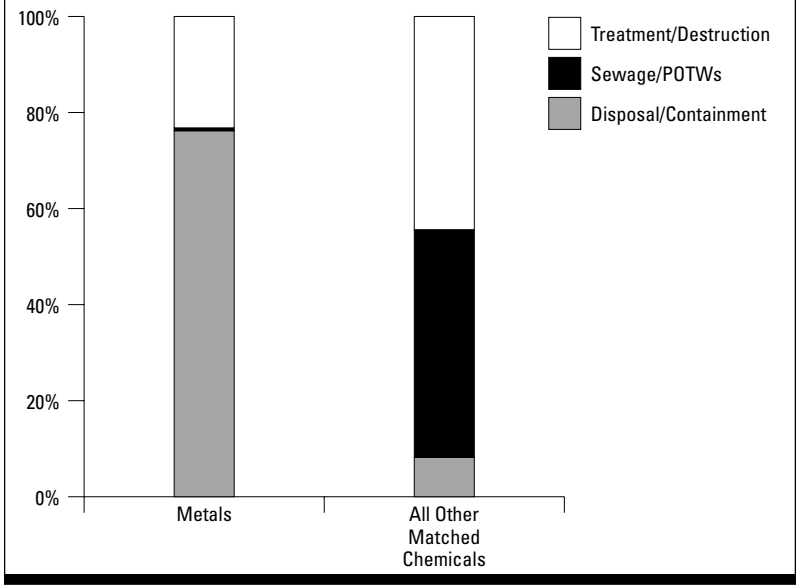
North American Releases by Type, Metals and All Other Matched Chemicals



➤ Canada and US data only, Mexico data not collected for 1996.

Figure 4–15 M 1996

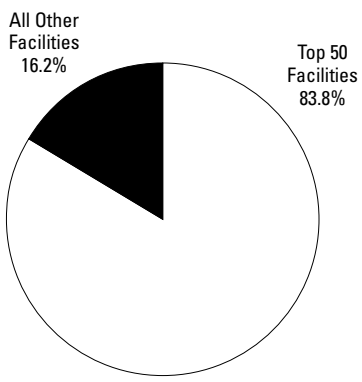
North American Transfers by Type, Metals and All Other Matched Chemicals



➤ Canada and US data only, Mexico data not collected for 1996.

Figure 4–16 M 1996

North American Releases of Metals and their Compounds, Top 50 Facilities and All Others

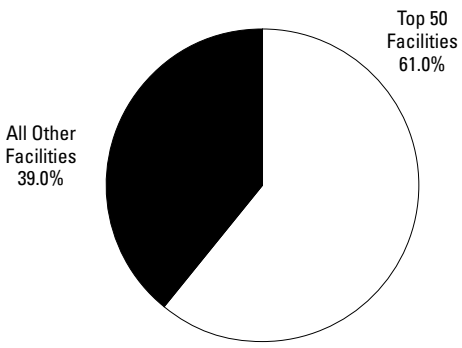


Total Facilities: 20,534

➤ Canada and US data only, Mexico data not collected for 1996.

Figure 4–17 M 1996

North American Releases and Transfers of Metals and their Compounds, Top 50 Facilities and All Others



Total Facilities: 20,534

➤ Canada and US data only, Mexico data not collected for 1996.

Table 4–15
M 1996

North American Releases and Transfers of Metals and their Compounds

CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
		Number	%			
—	Zinc (and its compounds)	3,239	5.2	55,678,321	81,023,131	136,701,452
—	Manganese (and its compounds)	2,787	4.5	29,632,346	28,671,571	58,303,917
—	Copper (and its compounds)	4,286	6.9	27,327,917	12,113,697	39,441,614
—	Lead (and its compounds)	1,770	2.8	9,030,614	19,501,983	28,532,597
—	Chromium (and its compounds)	3,367	5.4	13,436,133	11,742,588	25,178,721
—	Nickel (and its compounds)	2,897	4.6	2,591,316	5,632,532	8,223,848
7429-90-5	Aluminum (fume or dust)	346	0.6	3,041,103	3,806,596	6,847,699
1344-28-1	Aluminum oxide (fibrous forms)	58	0.1	211,221	4,377,657	4,588,878
—	Antimony (and its compounds)	699	1.1	983,308	2,474,718	3,458,026
—	Arsenic (and its compounds)	425	0.7	1,064,108	1,434,771	2,498,879
—	Cadmium (and its compounds)	154	0.2	292,338	533,083	825,421
1313-27-5	Molybdenum trioxide	170	0.3	231,176	495,463	726,639
—	Cobalt (and its compounds)	503	0.8	206,512	412,890	619,402
—	Selenium (and its compounds)	51	0.1	125,297	87,260	212,558
7440-62-2	Vanadium (fume or dust)	26	0.0	190,306	18,389	208,696
7550-45-0	Titanium tetrachloride	38	0.1	14,077	91,040	105,118
—	Silver (and its compounds)	145	0.2	39,871	32,127	71,998
—	Mercury (and its compounds)	36	0.1	8,281	27,908	36,189
1314-20-1	Thorium dioxide	1	0.0	0	998	998
	Subtotal	**20,998**	**33.6**	**144,104,245**	**172,478,402**	**316,582,647**
	% of Total	**33.7**		**16.7**	**47.6**	**25.8**
	Total for All Matched Chemicals	**62,225**	**100.0**	**863,218,412**	**362,612,278**	**1,225,830,690**

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of Total			
Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)
9.5 / 90.5	10.1 / 89.9	15.4 / 84.6	13.3 / 86.7
8.4 / 91.6	6.4 / 93.6	23.0 / 77.0	14.5 / 85.5
5.2 / 94.8	2.5 / 97.5	6.2 / 93.8	3.6 / 96.4
7.3 / 92.7	15.4 / 84.6	11.6 / 88.4	12.8 / 87.2
6.3 / 93.7	3.7 / 96.3	19.2 / 80.8	10.9 / 89.1
4.7 / 95.3	15.3 / 84.7	8.9 / 91.1	10.9 / 89.1
10.4 / 89.6	16.4 / 83.6	5.7 / 94.3	10.5 / 89.5
17.2 / 82.8	0.2 / 99.8	2.7 / 97.3	2.6 / 97.4
3.7 / 96.3	1.0 / 99.0	0.3 / 99.7	0.5 / 99.5
7.8 / 92.2	11.8 / 88.2	3.3 / 96.7	6.9 / 93.1
7.1 / 92.9	6.5 / 93.5	0.5 / 99.5	2.6 / 97.4
7.1 / 92.9	0.8 / 99.2	3.6 / 96.4	2.7 / 97.3
4.6 / 95.4	12.4 / 87.6	2.6 / 97.4	5.9 / 94.1
7.8 / 92.2	4.4 / 95.6	39.6 / 60.4	18.8 / 81.2
46.2 / 53.8	99.6 / 0.4	0.0 / 100.0	90.8 / 9.2
10.5 / 89.5	0.6 / 99.4	0.0 / 100.0	0.1 / 99.9
4.8 / 95.2	3.0 / 97.0	0.7 / 99.3	2.0 / 98.0
5.6 / 94.4	0.4 / 99.6	34.4 / 65.6	26.7 / 73.3
0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
6.8 / 93.2	**7.9 / 92.1**	**14.7 / 85.3**	**11.6 / 88.4**
6.9 / 93.1	**9.6 / 90.4**	**11.5 / 88.5**	**10.1 / 89.9**

Table 4–16
M 1996

Releases in North America of Metals and their Compounds

CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
—	Zinc (and its compounds)	4,003,690	593,575	59,063	51,014,759	55,678,321
—	Manganese (and its compounds)	4,128,747	1,147,327	8,025	24,339,392	29,632,346
—	Copper (and its compounds)	3,554,017	63,244	154,080	23,552,101	27,327,917
—	Chromium (and its compounds)	420,094	339,375	17,176	12,653,586	13,436,133
—	Lead (and its compounds)	1,378,293	34,169	405	7,612,198	9,030,614
7429-90-5	Aluminum (fume or dust)	781,985	22,217	0	2,233,720	3,041,103
—	Nickel (and its compounds)	594,413	89,894	41,053	1,863,407	2,591,316
—	Arsenic (and its compounds)	193,474	3,607	27,791	838,905	1,064,108
—	Antimony (and its compounds)	59,386	18,272	6,307	898,317	983,308
—	Cadmium (and its compounds)	38,006	2,619	37	250,996	292,338
1313-27-5	Molybdenum trioxide	90,567	12,700	95,193	32,496	231,176
1344-28-1	Aluminum oxide (fibrous forms)	48,667	229	0	162,201	211,221
—	Cobalt (and its compounds)	38,874	16,484	7,219	143,636	206,512
7440-62-2	Vanadium (fume or dust)	188,466	102	0	1,186	190,306
—	Selenium (and its compounds)	24,755	3,112	1,406	95,812	125,297
—	Silver (and its compounds)	12,166	3,788	168	23,592	39,871
7550-45-0	Titanium tetrachloride	14,077	0	0	0	14,077
—	Mercury (and its compounds)	7,780	251	4	244	8,281
1314-20-1	Thorium dioxide	0	0	0	0	0
	Subtotal	**15,577,457**	**2,350,965**	**417,927**	**125,716,548**	**144,104,245**
	% of Total	**2.8**	**3.0**	**0.6**	**86.2**	**16.7**
	Total for All Matched Chemicals	**563,269,177**	**78,742,497**	**75,239,943**	**145,838,045**	**863,218,412**

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total				
Total Air Emissions (%)	Surface Water Discharges (%)	Underground Injection (%)	On-site Land Releases (%)	Total Releases (%)
15.4 / 84.6	17.7 / 82.3	0.6 / 99.4	9.6 / 90.4	10.1 / 89.9
1.5 / 98.5	20.2 / 79.8	0.0 / 100.0	6.5 / 93.5	6.4 / 93.6
12.1 / 87.9	22.6 / 77.4	0.0 / 100.0	1.0 / 99.0	2.5 / 97.5
3.9 / 96.1	5.0 / 95.0	1.2 / 98.8	3.6 / 96.4	3.7 / 96.3
40.7 / 59.3	17.9 / 82.1	11.1 / 88.9	10.8 / 89.2	15.4 / 84.6
2.4 / 97.6	0.0 / 100.0	— / —	21.4 / 78.6	16.4 / 83.6
46.4 / 53.6	55.6 / 44.4	0.0 / 100.0	3.6 / 96.4	15.3 / 84.7
63.7 / 36.3	43.8 / 56.2	0.0 / 100.0	0.0 / 100.0	11.8 / 88.2
13.7 / 86.3	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	1.0 / 99.0
46.7 / 53.3	19.9 / 80.1	0.0 / 100.0	0.0 / 100.0	6.5 / 93.5
1.7 / 98.3	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.8 / 99.2
0.4 / 99.6	0.0 / 100.0	— / —	0.0 / 100.0	0.2 / 99.8
26.2 / 73.8	11.2 / 88.8	0.0 / 100.0	9.3 / 90.7	12.4 / 87.6
99.6 / 0.4	98.0 / 2.0	— / —	99.4 / 0.6	99.6 / 0.4
13.3 / 86.7	63.6 / 36.4	0.0 / 100.0	0.0 / 100.0	4.4 / 95.6
8.3 / 91.7	0.7 / 99.3	0.0 / 100.0	0.0 / 100.0	3.0 / 97.0
0.6 / 99.4	— / —	— / —	— / —	0.6 / 99.4
0.3 / 99.7	2.4 / 97.6	0.0 / 100.0	0.0 / 100.0	0.4 / 99.6
— / —	— / —	— / —	— / —	— / —
15.0 / 85.0	**18.3 / 81.7**	**0.1 / 99.9**	**6.8 / 93.2**	**7.9 / 92.1**
11.3 / 88.7	**6.5 / 93.5**	**6.4 / 93.6**	**6.1 / 93.9**	**9.6 / 90.4**

Table 4–17

M 1996

Transfers in North America of Metals and their Compounds

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of North American Total: Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
—	Zinc (and its compounds)	22,322,324	205,190	58,495,616	81,023,131	12.6 / 87.4	5.4 / 94.6	16.6 / 83.4	15.4 / 84.6
—	Manganese (and its compounds)	3,991,694	183,570	24,496,307	28,671,571	12.9 / 87.1	2.3 / 97.7	24.8 / 75.2	23.0 / 77.0
—	Lead (and its compounds)	6,580,010	23,918	12,898,055	19,501,983	3.0 / 97.0	9.9 / 90.1	15.9 / 84.1	11.6 / 88.4
—	Copper (and its compounds)	1,498,714	242,840	10,372,143	12,113,697	5.9 / 94.1	1.9 / 98.1	6.3 / 93.7	6.2 / 93.8
—	Chromium (and its compounds)	2,367,651	141,783	9,233,154	11,742,588	24.3 / 75.7	5.2 / 94.8	18.1 / 81.9	19.2 / 80.8
—	Nickel (and its compounds)	1,543,336	92,835	3,996,361	5,632,532	14.1 / 85.9	12.3 / 87.7	6.8 / 93.2	8.9 / 91.1
1344-28-1	Aluminum oxide (fibrous forms)	16,497	602	4,360,558	4,377,657	0.2 / 99.8	0.0 / 100.0	2.7 / 97.3	2.7 / 97.3
7429-90-5	Aluminum (fume or dust)	68,763	7,144	3,730,689	3,806,596	0.0 / 100.0	19.0 / 81.0	5.8 / 94.2	5.7 / 94.3
—	Antimony (and its compounds)	409,226	53,111	2,012,381	2,474,718	0.0 / 100.0	0.1 / 99.9	0.4 / 99.6	0.3 / 99.7
—	Arsenic (and its compounds)	824,168	402	610,201	1,434,771	0.2 / 99.8	40.0 / 60.0	7.6 / 92.4	3.3 / 96.7
—	Cadmium (and its compounds)	103,225	1,435	428,423	533,083	0.0 / 100.0	0.6 / 99.4	0.6 / 99.4	0.5 / 99.5
1313-27-5	Molybdenum trioxide	178,954	29,569	286,940	495,463	8.5 / 91.5	1.9 / 98.1	0.6 / 99.4	3.6 / 96.4
—	Cobalt (and its compounds)	59,707	6,344	346,839	412,890	4.0 / 96.0	0.2 / 99.8	2.4 / 97.6	2.6 / 97.4
7550-45-0	Titanium tetrachloride	75,615	0	15,425	91,040	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
—	Selenium (and its compounds)	20,453	10,014	56,793	87,260	0.0 / 100.0	98.1 / 1.9	43.5 / 56.5	39.6 / 60.4
—	Silver (and its compounds)	16,128	1,389	14,610	32,127	0.0 / 100.0	13.5 / 86.5	0.3 / 99.7	0.7 / 99.3
—	Mercury (and its compounds)	10,989	7	16,912	27,908	40.4 / 59.6	0.0 / 100.0	30.6 / 69.4	34.4 / 65.6
7440-62-2	Vanadium (fume or dust)	773	91	17,525	18,389	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
1314-20-1	Thorium dioxide	0	998	0	998	— / —	0.0 / 100.0	— / —	0.0 / 100.0
	Subtotal	**40,088,227**	**1,001,242**	**131,388,932**	**172,478,402**	**11.0 / 89.0**	**5.3 / 94.7**	**15.9 / 84.1**	**14.7 / 85.3**
	% of Total	**32.2**	**1.1**	**89.3**	**47.6**				
	Total for All Matched Chemicals	**124,473,070**	**91,073,897**	**147,065,311**	**362,612,278**	**10.9 / 89.1**	**5.4 / 94.6**	**15.7 / 84.3**	**11.5 / 88.5**

➤ Canada and US data only. Mexico data not collected for 1996.

Table 4–18

M 1996

The 50 North American Facilities with the Largest Total Releases of Metals and their Compounds

Rank	Facility	City, State/Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	ASARCO Inc.	East Helena, MT		33	9	45,844	927	0	20,113,797
2	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	11	21,941	113	0	11,298,685
3	Northwestern Steel & Wire Co.	Sterling, IL		33	4	47,510	1,224	0	6,496,599
4	General Motors Corp., Powertrain Defiance	Defiance, OH		33	6	35,786	734	0	6,006,304
5	Elkem Metals Co.	Marietta, OH		33	5	218,149	326,984	0	4,763,719
6	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717
7	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	8	484,619	0	0	4,555,926
8	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	1	117,531	0	0	4,261,163
9	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	8	64,265	1,927	0	4,121,891
10	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769
11	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,963
12	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	9	106,342	149	0	3,467,229
13	Chino Mines Co.	Hurley, NM		33	1	18,380	0	0	3,457,663
14	US Steel Gary Works, USX Corp.	Gary, IN		33	12	131,202	7,900	0	2,599,909
15	Granite City Steel, National Steel Corp.	Granite City, IL		33	6	21,822	5,397	0	2,592,722
16	FMC Corp.	Pocatello, ID		28	9	2,139	351	0	2,586,124
17	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	5	1,787,997	0	0	774,034
18	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS		33	3	3,583	11,211	0	2,335,782
19	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
20	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	4	22,367	0	0	2,008,700
21	USS Fairfield Works, USX Corp.	Fairfield, AL		33	8	6,323	2,681	0	1,859,434
22	Chemetals Inc., Comilog	New Johnsonville, TN		28	1	38,983	759	0	1,645,950
23	Louisiana Pigment Co. L.P., Kronos Louisiana Inc.	Westlake, LA		28	2	375	110	0	1,269,841
24	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
25	General Motors Corp., GMTG Saginaw Metal Casting	Saginaw, MI		33	6	19,257	1	0	999,955
26	Kerr-McGee Chemical Corp.	Henderson, NV		28	2	6,259	0	0	949,116
27	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR		33	1	17,061	7	0	905,522
28	Geneva Steel	Vineyard, UT		33	8	1,720	667	0	811,276
29	Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria, IL		33	3	597,497	542	0	165,402
30	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	10	657,650	18,900	0	0
31	Austeel Lemont Co. Inc.	Lemont, IL		33	5	23,420	227	0	644,666
32	Griffin Wheel Co. Columbus Plant, Amsted Ind. Inc.	Groveport, OH		33	2	8,163	0	0	639,904
33	Imco Recycling Inc.	Morgantown, KY		33	5	5,490	0	0	615,964
34	AltaSteel Ltd.	Edmonton, AB	29	33	5	11,216	37	0	597,088
35	Bethlehem Steel Corp.	Sparrows Point, MD		33	6	7,937	21,638	0	514,104
36	American Steel Foundries, Amsted Industries Inc.	Granite City, IL		33	5	27,628	0	0	474,376
37	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	8	15,660	2,769	0	462,800
38	Griffin Wheel Co., Amsted Industries Inc.	Keokuk, IA		33	2	8,163	0	0	461,723
39	Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur, QC	29	33	5	0	0	0	457,180
40	General Electric Co., Silicone Products	Waterford, NY		28	2	680	4,762	0	430,844
41	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	6	427,818	0	0	0
42	Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon, MB	29	33	5	413,595	3,327	0	0
43	AK Steel Corp., AK Steel Holding	Middletown, OH		33	11	25,737	148	0	359,819
44	Griffin Wheel Co., Amsted Industries Inc.	Bessemer, AL		33	2	3,583	0	0	359,274
45	LTV Steel Co. Inc.	Cleveland, OH		33	5	8,039	2,187	0	350,753
46	Gulf States Steel Inc., GSS Holding Corp.	Gadsden, AL		33	7	19,549	13,673	0	304,308
47	Sydney Steel Corporation	Sydney, NS	29	33	8	0	300	0	330,200
48	WCI Steel Inc.	Warren, OH		33	5	4,404	358	0	324,649
49	Griffin Wheel Co., Amsted Industries Inc.	Kansas City, KS		33	2	3,583	0	0	315,904
50	Metal Mark Inc., Imco Recycling Inc.	Chicago Heights, IL		33	6	5,108	0	0	282,976
	Subtotal				**263**	**5,729,733**	**430,657**	**0**	**114,557,025**
	% of Total				**1.3**	**36.8**	**18.3**	**0.0**	**91.1**
	Total for All Matched Metals				**20,998**	**15,577,457**	**2,350,965**	**417,927**	**125,716,548**

* Chemicals accounting for more than 70% of total releases of metals from the facility.

➤ Two TRI facilities reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese and Tennessee Aluminum Processor Inc., Maury, PA, reported 720,000 kg of on-site releases to land of aluminum. They have been omitted from this table.

➤ Canada and US data only, Mexico data not collected for 1996.

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	20,160,568	Zinc and compounds (land)
2	11,320,739	Copper/Zinc and compounds (land)
3	6,545,333	Zinc/Manganese and compounds (land)
4	6,042,824	Zinc and compounds (land)
5	5,308,852	Manganese and compounds (land)
6	5,126,893	Chromium and compounds (land)
7	5,040,544	Copper/Zinc and compounds (land)
8	4,378,694	Copper and compounds (land)
9	4,188,084	Copper/Zinc and compounds (land)
10	4,084,751	Chromium and compounds (land)
11	4,030,228	Zinc/Lead and compounds (land)
12	3,573,720	Zinc and compounds (land)
13	3,476,044	Copper and compounds (land)
14	2,739,011	Zinc/Manganese and compounds (land)
15	2,619,941	Zinc and compounds (land)
16	2,588,615	Zinc and compounds (land)
17	2,562,031	Copper and compounds (air)
18	2,350,576	Manganese and compounds (land)
19	2,322,985	Zinc and compounds (land)
20	2,031,067	Zinc and compounds (land)
21	1,868,437	Zinc and compounds (land)
22	1,685,692	Manganese and compounds (land)
23	1,270,326	Manganese and compounds (land)
24	1,254,893	Zinc/Lead and compounds (land)
25	1,019,212	Zinc/Manganese and compounds (land)
26	955,374	Manganese and compounds (land)
27	922,590	Nickel and compounds (land)
28	813,663	Manganese/Zinc and compounds (land)
29	763,441	Zinc and compounds (air)
30	676,550	Lead/Copper/Zinc and compounds (air)
31	668,313	Zinc and compounds (land)
32	648,068	Manganese and compounds (land)
33	621,454	Aluminum (land)
34	608,341	Zinc/Manganese and compounds (land)
35	543,678	Manganese and compounds (land)
36	502,005	Chromium and compounds/Aluminum (land)
37	481,240	Manganese and compounds (land)
38	469,887	Manganese and compounds (land)
39	457,180	Zinc/Lead and compounds (land)
40	436,286	Copper and compounds (land)
41	427,818	Copper/Nickel and compounds (air)
42	416,922	Zinc/Lead and compounds (air)
43	385,704	Manganese and compounds (land)
44	362,857	Manganese and compounds (land)
45	360,980	Zinc/Manganese and compounds (land)
46	337,531	Zinc/Manganese and compounds (land)
47	331,280	Zinc/Manganese and compounds (land)
48	329,411	Manganese and compounds (land)
49	319,487	Manganese and compounds (land)
50	288,085	Aluminum (land)
	120,718,206	
	83.8	
	144,104,244	

Table 4–19
M 1996

Top 50 North American Facilities with Largest Total Releases and Transfers of Metals and their Compounds

Rank	Facility	City, State/Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	ASARCO Inc.	East Helena, MT		33	9	45,844	927	0	20,113,797
2	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	11	21,941	113	0	11,298,685
3	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	9	219,985	272	0	0
4	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	8	484,619	0	0	4,555,926
5	Nucor Steel, Nucor Corp.	Crawfordsville, IN		33	6	959	26	0	11
6	Northwestern Steel & Wire Co.	Sterling, IL		33	4	47,510	1,224	0	6,496,599
7	National Steel Corp., Great Lakes Div.	Ecorse, MI		33	4	53,904	766	0	0
8	General Motors Corp., Powertrain Defiance	Defiance, OH		33	6	35,786	734	0	6,006,304
9	Rouge Steel Co.	Dearborn, MI		33	7	23,356	2,630	0	0
10	Elkem Metals Co.	Marietta, OH		33	5	218,149	326,984	0	4,763,719
11	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717
12	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
13	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	8	64,265	1,927	0	4,121,891
14	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	1	117,531	0	0	4,261,163
15	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	8	15,660	2,769	0	462,800
16	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769
17	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,963
18	Regal Ware Inc.	Kewaskum, WI		34	6	472	0	0	0
19	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	9	106,342	149	0	3,467,229
20	Ameristeel Corp., Jacksonville Mill Div.	Baldwin, FL		33	6	8,663	0	0	0
21	Chino Mines Co.	Hurley, NM		33	1	18,380	0	0	3,457,663
22	Cerro Wire & Cable Co. Inc.	Hartselle, AL		33	3	120	7	0	0
23	USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock, PA		33	5	4,732	971	0	0
24	Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria, IL		33	3	597,497	542	0	165,402
25	Stelco McMaster Ltée	Contrecoeur, QC	29	33	5	16,280	0	0	0
26	US Steel Gary Works, USX Corp.	Gary, IN		33	12	131,202	7,900	0	2,599,909
27	Granite City Steel, National Steel Corp.	Granite City, IL		33	6	21,822	5,397	0	2,592,722
28	FMC Corp.	Pocatello, ID		28	9	2,139	351	0	2,586,124
29	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	5	1,787,997	0	0	774,034
30	Dofasco Inc.	Hamilton, ON	29	33	7	8,360	7,549	0	0
31	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS		33	3	3,583	11,211	0	2,335,782
32	Sidbec-Dosco (Ispat) Inc. Acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
33	Nucor-Yamato Steel Co., Nucor Corp.	Blytheville, AR		33	6	13,870	0	0	0
34	Steel Dynamics Inc.	Butler, IN		33	4	2,415	0	0	0
35	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	4	22,367	0	0	2,008,700
36	Oregon Steel Mills Inc.	Portland, OR		33	6	3,461	108	0	0
37	Nucor Steel, Nucor Corp.	Plymouth, UT		33	7	5,388	0	0	4,838
38	USS Fairfield Works, USX Corp.	Fairfield, AL		33	8	6,323	2,681	0	1,859,434
39	Nucor Steel, Nucor Corp.	Darlington, SC		33	7	49,219	342	0	2,354
40	Chemetals Inc., Comilog	New Johnsonville, TN		28	1	38,983	759	0	1,645,950
41	Ameristeel Corp.	Jackson, TN		33	7	11,625	1,014	0	0
42	Ivaco Rolling Mills	L'Orignal, ON	29	33	7	10,087	2	0	0
43	Ameristeel Corp.	Charlotte, NC		33	6	19,637	0	0	0
44	ASARCO Inc.	Omaha, NE		33	5	19,665	1,842	0	1,136
45	Louisiana Pigment Co. L.P., Kronos Louisiana Inc.	Westlake, LA		28	2	375	110	0	1,269,841
46	Slater Steels, Hamilton Specialty Bar Division	Hamilton, ON	29	33	9	8,728	0	0	200
47	SCM Chemicals Americas Plant II, SCM Chemicals Inc.	Ashtabula, OH		28	2	10	68,481	0	0
48	Quemetco Inc., RSR Corp.	Indianapolis, IN		33	6	2,197	0	0	0
49	General Battery Corp., Exide Corp.	Reading, PA		33	6	954	1,306	0	0
50	Quemetco Inc., RSR Crop.	City of Industry, CA		33	5	989	12	0	0
	Subtotal				**283**	**4,508,747**	**449,753**	**0**	**103,435,962**
	% of Total				**1.3**	**28.9**	**19.1**	**0.0**	**82.3**
	Total for All Matched Metals				**20,998**	**15,577,457**	**2,350,965**	**417,927**	**125,716,548**

* Chemicals accounting for more than 70% of total releases and transfers from the facility.

➤ Three TRI facilities reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese and Tennessee Aluminum Processor Inc., Maury, PA, reported 720,000 kg of on-site releases to land and 165,000 kg of transfers to disposal of aluminum and Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds. They have been omitted from this table.

➤ Canada and US data only. Mexico data not collected for 1996.

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	20,160,568	0	17	0	17	20,160,585	Zinc and compounds (land)
2	11,320,739	0	0	0	0	11,320,739	Copper/, Zinc and compounds (land)
3	220,257	48,556	0	10,424,925	10,473,482	10,693,738	Zinc/Manganese and compounds (transfers to disposal)
4	5,040,544	3,033,400	129	0	3,033,529	8,074,073	Lead and compounds (transfers to treatment), Copper/Zinc and compounds (land)
5	996	392	0	7,659,029	7,659,422	7,660,418	Zinc and compounds (transfers to disposal)
6	6,545,333	65,170	0	0	65,170	6,610,503	Zinc/Manganese and compounds (land)
7	54,670	46,776	425	6,299,280	6,346,480	6,401,151	Zinc and compounds (transfers to disposal)
8	6,042,824	0	410	0	410	6,043,234	Zinc and compounds (land)
9	25,986	0	0	5,933,560	5,933,560	5,959,546	Zinc and compounds (transfers to disposal)
10	5,308,852	0	0	43,537	43,537	5,352,390	Manganese and compounds (land)
11	5,126,893	24,036	0	3,129	27,166	5,154,059	Chromium and compounds (land)
12	1,254,893	0	10	3,578,500	3,578,510	4,833,403	Zinc and compounds (transfers to disposal)
13	4,188,084	0	0	347,302	347,302	4,535,385	Copper/Zinc and compounds (land)
14	4,378,694	0	0	0	0	4,378,694	Copper and compounds (land)
15	481,240	0	0	3,814,700	3,814,700	4,295,940	Manganese and compounds (transfers to disposal)
16	4,084,751	4,535	0	0	4,535	4,089,286	Chromium and compounds (land)
17	4,030,228	0	0	0	0	4,030,228	Zinc/Lead and compounds (land)
18	472	0	0	3,646,259	3,646,259	3,646,730	Aluminum oxide (transfers to disposal)
19	3,573,720	0	452	0	452	3,574,172	Zinc and compounds (land)
20	8,663	1,756,102	0	1,756,102	3,512,205	3,520,868	Zinc and compounds (transfers to treatment, disposal)
21	3,476,044	0	0	0	0	3,476,044	Copper and compounds (land)
22	127	0	0	3,439,996	3,439,996	3,440,123	Copper and compounds (transfers to disposal)
23	5,703	0	0	3,260,882	3,260,882	3,266,585	Zinc and compounds (transfers to disposal)
24	763,441	2,351,084	0	0	2,351,084	3,114,526	Zinc and compounds (transfers to treatment)
25	17,410	3,054,700	0	0	3,054,700	3,072,110	Zinc and compounds (transfers to treatment)
26	2,739,011	0	0	45,387	45,387	2,784,398	Zinc/Manganese and compounds (land)
27	2,619,941	544	0	0	544	2,620,484	Zinc and compounds (land)
28	2,588,615	0	3	793	795	2,589,410	Zinc and compounds (land)
29	2,562,031	0	0	816	816	2,562,847	Copper and compounds (air)
30	15,909	0	1,677	2,539,176	2,540,853	2,556,762	Zinc/Manganese and compounds (transfers to disposal)
31	2,350,576	0	0	0	0	2,350,576	Manganese and compounds (land)
32	2,322,985	0	0	0	0	2,322,985	Zinc and compounds (land)
33	13,870	2,096,133	0	1,172	2,097,305	2,111,176	Zinc and compounds (transfers to treatment)
34	2,415	0	2	2,055,950	2,055,952	2,058,367	Zinc and compounds (transfers to disposal)
35	2,031,067	0	0	0	0	2,031,067	Zinc and compounds (land)
36	3,569	1,932,004	0	96	1,932,100	1,935,668	Zinc and compounds (transfers to treatment)
37	10,226	1,893,347	0	1	1,893,348	1,903,574	Zinc and compounds (transfers to treatment)
38	1,868,437	0	0	0	0	1,868,437	Zinc and compounds (land)
39	51,915	0	0	1,645,528	1,645,528	1,697,443	Zinc and compounds (transfers to disposal)
40	1,685,692	0	0	0	0	1,685,692	Manganese and compounds (land)
41	12,639	1,601,938	0	0	1,601,938	1,614,576	Zinc and compounds (transfers to treatment)
42	11,020	0	0	1,559,360	1,559,360	1,570,380	Zinc and compounds (transfers to disposal)
43	19,637	1,430,806	0	0	1,430,806	1,450,444	Zinc and compounds (transfers to treatment)
44	22,643	0	26	1,329,875	1,329,901	1,352,544	Zinc/Lead and compounds (transfers to disposal)
45	1,270,326	68	0	169	237	1,270,563	Manganese and compounds (land)
46	10,428	542	1,036	1,256,701	1,258,279	1,268,707	Zinc/Lead and compounds (transfers to disposal)
47	68,491	0	0	1,170,941	1,170,941	1,239,431	Manganese and compounds (transfers to disposal)
48	2,197	0	357	1,234,014	1,234,371	1,236,567	Lead/Antimony and compounds (transfers to disposal)
49	2,260	852,044	0	368,927	1,220,971	1,223,231	Lead and compounds (transfers to treatment, disposal)
50	1,001	0	254	1,196,372	1,196,626	1,197,627	Lead/Antimony and compounds (transfers to disposal)
	108,398,034	**20,192,179**	**4,799**	**64,612,478**	**84,809,456**	**193,207,490**	
	75.2	**50.4**	**0.5**	**49.2**	**49.2**	**61.0**	
	144,104,244	**40,088,227**	**1,011,242**	**131,388,932**	**172,478,394**	**316,582,638**	

4.6 Industry Distribution

North American PRTR reporting was dominated by chemical manufacturing, followed by primary metal industries. Chemical manufacturing facilities reported 404 million kg of total releases and transfers in the matched data set for 1996 and the primary metal industry 312 million kg, one-third and one-quarter, respectively, of the total. These two sectors accounted for more of the total releases and transfers than the other 19 industry groups combined. Releases and transfers totaled more than 100 million kg in one other sector—pulp and paper products with 138 million kg (**Table 4–20**, pp. 90–91 and **Figure 4–18**). (Industry groups are designated in the tables by US Standard Industrial Classification [SIC] codes, which are reported in both countries.)

Both primary metals and paper products had percentages of total releases and transfers that were two and one-half to three times higher than these industries' percentages of all forms submitted. Primary metals producers, for example, submitted 11 percent of all forms, but reported 26 percent of the releases and transfers. This indicates that the industry reported larger amounts of each substance on average than was the case with other industries, such as chemical manufacturing or rubber and plastics products manufacturing.

Facilities that report more than one SIC code to describe their operations are designated "Multiple Codes 20–39" in the tables. This group, responsible for the fourth-largest amount of total releases and transfers, consists entirely of US facilities, as Canadian facilities report only one SIC code each.

The prominent role of two industries in North American PRTR reporting arose from relatively few dominant facilities. Of the 50 facilities with the largest total releases and transfers, 24 reported in primary metals and 22 in chemical manufacturing (**Table 4–5**, pp. 54–55).

Releases by Industry

For all but three industries, emissions to air constituted 80 percent or more of all releases. The exceptions were chemical manufacturing, primary metals, and food products. For chemical manufacturing, air emissions amounted to about one-half of total releases, largely because the industry also reported substantial amounts of underground injection. For primary metals and food products, air emissions amounted to one-third of the releases. For primary metals producers, on-site land releases were the largest release type. For food processors, discharges to surface waters were the largest release type (**Table 4–21**, pp. 92–93).

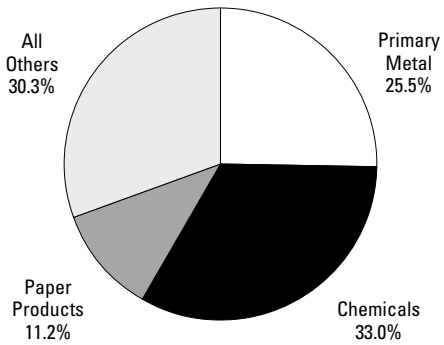
Transfers by Industry

Transfers in the industrial sectors were less dominated by one type, as was true of the matched data set as a whole. For example, chemical manufacturing, ranking second among industries for total transfers, sent large amounts off-site to both treatment/destruction services and sewage treatment plants. Although most of the transfers by top-ranked primary metal industries went to disposal/containment, that sector also sent substantial amounts to treatment/destruction (**Table 4–22**, p. 94).

Information on chemical uses from:

- Air CHIEF, ver. 4.0. US EPA, EFIG/EMAD/OAQPS, July 1995.
- Chemical Backgrounders, Environment Writer, US National Safety Council Environmental Health Center, <http://www.nsc.org>.
- Chemical Substances, US Department of Labor, Occupational Safety and Health Administration <http://www.osha-slc.gov/SLTC/chemicals.html>.
- *Kirk-Othmer Concise Encyclopedia of Chemical Technology.* New York and Toronto: John Wiley & Sons, 1985.
- OPPT Chemical Fact Sheets, Office of Pollution Prevention and Toxics, US EPA, <http://www.epa.gov/opptintr/chemfact>.
- *Profile of the Pulp and Paper Industry,* Sector Notebook Project, US EPA, Office of Enforcement and Compliance Assurance, office of Compliance, EPA/310-R-95-015, September 1995, <http://es.epa.gov/oeca/sector/index.html>.
- ToxFAQs, US Agency for Toxic Substances and Disease Registry, <http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html>.

Figure 4–18
M 1996
North American Top Three Industries for Total Releases and Transfers



Total Releases and Transfers: 1,225,830,690 kg

➤ Canada and US data only, Mexico data not collected for 1996.

Table 4–20

M 1996

Total Releases and Transfers in North America by Industry (US SIC Code)

Rank	US SIC Code	Industry	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers	
			Number	%			kg	%
1	28	Chemicals	17,594	28.3	282,390,621	121,865,854	404,256,475	33.0
2	33	Primary Metal Industries	6,505	10.5	182,857,523	129,118,893	311,976,416	25.5
3	26	Paper Products	2,295	3.7	112,806,059	24,784,749	137,590,808	11.2
4		Multiple Codes 20–39*	3,816	6.1	41,605,997	15,106,395	56,712,392	4.6
5	30	Rubber and Plastics Products	3,318	5.3	48,103,260	7,660,134	55,763,394	4.5
6	37	Transportation Equipment	4,062	6.5	46,784,366	7,247,183	54,031,549	4.4
7	34	Fabricated Metal Products	6,954	11.2	24,265,367	16,844,254	41,109,621	3.4
8	29	Petroleum and Coal Products	3,057	4.9	28,147,865	4,434,109	32,581,974	2.7
9	36	Electronic/Electrical Equipment	2,638	4.2	8,353,174	13,081,288	21,434,462	1.7
10	20	Food Products	2,700	4.3	8,009,675	8,437,294	16,446,969	1.3
11	25	Furniture and Fixtures	1,177	1.9	15,952,765	374,423	16,327,188	1.3
12	32	Stone/Clay/Glass Products	1,513	2.4	11,479,230	4,129,742	15,608,972	1.3
13	24	Lumber and Wood Products	1,738	2.8	13,674,521	231,345	13,905,866	1.1
14	27	Printing and Publishing	393	0.6	12,752,205	443,274	13,195,479	1.1
15	35	Industrial Machinery	2,475	4.0	7,193,825	4,104,585	11,298,410	0.9
16	22	Textiles Mill Products	502	0.8	7,162,676	1,121,924	8,284,600	0.7
17	38	Measurement/Photographic Instruments	564	0.9	5,466,011	1,749,468	7,215,479	0.6
18	39	Misc. Manufacturing Industries	742	1.2	4,425,191	996,714	5,421,905	0.4
19	31	Leather Products	127	0.2	542,790	851,561	1,394,351	0.1
20	23	Apparel and Other Textile Products	37	0.1	649,281	28,897	678,178	0.1
21	21	Tobacco Products	18	0.0	596,013	181	596,194	0.0
		Total for All Matched Industries	**62,225**	**100.0**	**863,218,412**	**362,612,278**	**1,225,830,690**	**100.0**

* Multiple SIC codes reported only in US data.

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total			
Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)
7.8 / 92.2	7.5 / 92.5	9.6 / 90.4	8.2 / 91.8
9.1 / 90.9	10.5 / 89.5	16.8 / 83.2	13.1 / 86.9
13.8 / 86.2	15.5 / 84.5	8.1 / 91.9	14.1 / 85.9
— / 100.0	— / 100.0	— / 100.0	— / 100.0
8.1 / 91.9	12.4 / 87.6	14.5 / 85.5	12.7 / 87.3
8.7 / 91.3	13.7 / 86.3	15.1 / 84.9	13.8 / 86.2
5.5 / 94.5	8.4 / 91.6	10.5 / 89.5	9.2 / 90.8
10.9 / 89.1	16.7 / 83.3	11.7 / 88.3	16.0 / 84.0
3.6 / 96.4	1.0 / 99.0	2.8 / 97.2	2.1 / 97.9
4.3 / 95.7	4.6 / 95.4	4.4 / 95.6	4.5 / 95.5
2.1 / 97.9	3.0 / 97.0	2.5 / 97.5	3.0 / 97.0
6.1 / 93.9	8.0 / 92.0	5.9 / 94.1	7.4 / 92.6
8.2 / 91.8	12.7 / 87.3	24.5 / 75.5	12.9 / 87.1
5.9 / 94.1	5.3 / 94.7	41.5 / 58.5	6.5 / 93.5
2.6 / 97.4	5.8 / 94.2	4.2 / 95.8	5.3 / 94.7
3.2 / 96.8	4.6 / 95.4	0.5 / 99.5	4.1 / 95.9
0.2 / 99.8	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
14.4 / 85.6	12.1 / 87.9	20.3 / 79.7	13.6 / 86.4
1.6 / 98.4	1.1 / 98.9	0.9 / 99.1	1.0 / 99.0
2.7 / 97.3	0.1 / 99.9	0.0 / 100.0	0.1 / 99.9
0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
6.9 / 93.1	**9.6 / 90.4**	**11.5 / 88.5**	**10.1 / 89.9**

Table 4–21

M 1996

Releases in North America by Industry

Rank	SIC Code	Industry	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
1	28	Chemicals	136,657,633	39,694,377	74,517,585	31,454,404	282,390,621
2	33	Primary Metal Industries	62,602,168	14,828,923	207,075	105,199,782	182,857,523
3	26	Paper Products	101,265,705	9,260,386	0	2,278,037	112,806,059
4	30	Rubber and Plastics Products	47,905,261	10,255	0	180,739	48,103,260
5	37	Transportation Equipment	46,383,172	87,963	0	306,704	46,784,366
6		Multiple Codes 20–39*	34,472,473	4,597,117	231	2,536,176	41,605,997
7	29	Petroleum and Coal Products	22,574,694	4,405,682	514,200	650,416	28,147,865
8	34	Fabricated Metals Products	23,772,192	145,204	259	334,612	24,265,367
9	25	Furniture and Fixtures	15,947,409	20	0	4,826	15,952,765
10	24	Lumber and Wood Products	13,642,966	26,549	0	4,462	13,674,521
11	27	Printing and Publishing	12,739,272	6,243	0	6,190	12,752,205
12	32	Stone/Clay/Glass Products	10,404,929	27,975	454	1,044,215	11,479,230
13	36	Electronic/Electrical Equipment	7,538,917	651,767	12	160,438	8,353,174
14	20	Food Products	2,571,614	4,170,693	118	1,267,250	8,009,675
15	35	Industrial Machinery	6,874,207	5,038	0	312,462	7,193,825
16	22	Textile Mill Products	6,930,701	152,862	0	78,813	7,162,676
17	38	Measurement/Photographic Instr.	4,900,649	564,214	0	1,148	5,466,011
18	39	Misc. Manufacturing Industries	4,406,421	893	9	14,420	4,425,191
19	23	Apparel and Other Textile Products	646,672	2,367	0	242	649,281
20	21	Tobacco Products	514,743	81,270	0	0	596,013
21	31	Leather Products	517,378	22,701	0	2,711	542,790
		Total for All Matched Industries	**563,269,177**	**78,742,497**	**75,239,943**	**145,838,045**	**863,218,412**

* Multiple SIC codes reported only in US data.

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total				
Total Air Emissions (%)	Surface Water Discharges (%)	Underground Injection (%)	On-site Land Releases (%)	Total Releases (%)
11.1 / 88.9	2.8 / 97.2	6.4 / 93.6	0.7 / 99.3	7.5 / 92.5
16.5 / 83.5	5.3 / 94.7	0.0 / 100.0	7.7 / 92.3	10.5 / 89.5
14.2 / 85.8	31.2 / 68.8	— / —	7.2 / 92.8	15.5 / 84.5
12.4 / 87.6	6.1 / 93.9	— / —	8.1 / 91.9	12.4 / 87.6
13.8 / 86.2	0.3 / 99.7	— / —	0.9 / 99.1	13.7 / 86.3
0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
19.9 / 80.1	0.5 / 99.5	13.4 / 86.6	16.7 / 83.3	16.7 / 83.3
8.5 / 91.5	0.3 / 99.7	0.0 / 100.0	3.1 / 96.9	8.4 / 91.6
3.0 / 97.0	0.0 / 100.0	— / —	0.0 / 100.0	3.0 / 97.0
12.6 / 87.4	73.0 / 27.0	— / —	3.4 / 96.6	12.7 / 87.3
5.2 / 94.8	89.8 / 10.2	— / —	0.0 / 100.0	5.3 / 94.7
8.7 / 91.3	33.8 / 66.2	0.0 / 100.0	0.5 / 99.5	8.0 / 92.0
1.0 / 99.0	0.5 / 99.5	0.0 / 100.0	2.8 / 97.2	1.0 / 99.0
2.2 / 97.8	7.0 / 93.0	0.0 / 100.0	1.6 / 98.4	4.6 / 95.4
2.4 / 97.6	0.5 / 99.5	— / —	81.9 / 18.1	5.8 / 94.2
4.8 / 95.2	0.0 / 100.0	— / —	0.1 / 99.9	4.6 / 95.4
0.0 / 100.0	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
12.0 / 88.0	0.0 / 100.0	100.0 / 0.0	37.5 / 62.5	12.1 / 87.9
0.1 / 99.9	0.0 / 100.0	— / —	0.0 / 100.0	0.1 / 99.9
0.0 / 100.0	0.0 / 100.0	— / —	— / —	0.0 / 100.0
1.1 / 98.9	0.0 / 100.0	— / —	0.0 / 100.0	1.1 / 98.9
11.3 / 88.7	**6.5 / 93.5**	**6.4 / 93.6**	**6.1 / 93.9**	**9.6 / 90.4**

Table 4–22

M 1996

Transfers in North America by Industry

Rank	US SIC Code	Industry	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of North American Total: Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
1	33	Primary Metal Industries	31,982,219	3,177,377	93,959,298	129,118,893	11.7 / 88.3	7.1 / 92.9	18.9 / 81.1	16.8 / 83.2
2	28	Chemicals	63,218,229	45,049,955	13,597,676	121,865,854	9.1 / 90.9	8.8 / 91.2	15.0 / 85.0	9.6 / 90.4
3	26	Paper Products	5,967,061	17,153,251	1,664,437	24,784,749	26.3 / 73.7	0.0 / 100.0	26.3 / 73.7	8.1 / 91.9
4	34	Fabricated Metals Products	5,267,737	1,563,593	10,012,926	16,844,254	11.4 / 88.6	8.3 / 91.7	10.3 / 89.7	10.5 / 89.5
5		Multiple Codes 20–39*	5,767,650	5,090,165	4,248,580	15,106,395	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
6	36	Electronic/Electrical Equipment	2,185,387	3,619,677	7,276,224	13,081,288	3.4 / 96.6	0.3 / 99.7	3.9 / 96.1	2.8 / 97.2
7	20	Food Products	387,715	7,876,628	172,951	8,437,294	6.9 / 93.1	4.4 / 95.6	0.2 / 99.8	4.4 / 95.6
8	30	Rubber and Plastics Products	1,910,444	805,716	4,943,976	7,660,134	30.6 / 69.4	4.3 / 95.7	10.0 / 90.0	14.5 / 85.5
9	37	Transportation Equipment	2,680,767	1,376,258	3,190,160	7,247,183	24.6 / 75.4	7.5 / 92.5	10.4 / 89.6	15.1 / 84.9
10	29	Petroleum and Coal Products	1,088,708	1,958,139	1,387,262	4,434,109	17.9 / 82.1	0.9 / 99.1	22.3 / 77.7	11.7 / 88.3
11	32	Stone/Clay/Glass Products	1,225,458	324,351	2,579,933	4,129,742	4.3 / 95.7	6.8 / 93.2	6.5 / 93.5	5.9 / 94.1
12	35	Industrial Machinery	507,599	1,362,138	2,234,848	4,104,585	10.4 / 89.6	0.0 / 100.0	5.4 / 94.6	4.2 / 95.8
13	38	Measurement/Photographic Instr.	1,064,029	403,328	282,111	1,749,468	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
14	22	Textile Mill Products	237,233	697,111	187,580	1,121,924	2.3 / 97.7	0.0 / 100.0	0.3 / 99.7	0.5 / 99.5
15	39	Misc. Manufacturing Industries	252,401	322,731	421,582	996,714	14.6 / 85.4	30.4 / 69.6	15.9 / 84.1	20.3 / 79.7
16	31	Leather Products	7,964	180,733	662,864	851,561	54.0 / 46.0	1.8 / 98.2	0.0 / 100.0	0.9 / 99.1
17	27	Printing and Publishing	336,219	69,745	37,310	443,274	54.6 / 45.4	0.0 / 100.0	0.0 / 100.0	41.5 / 58.5
18	25	Furniture and Fixtures	280,247	41,434	52,742	374,423	3.3 / 96.7	0.0 / 100.0	0.3 / 99.7	2.5 / 97.5
19	24	Lumber and Wood Products	105,580	1,452	124,313	231,345	34.2 / 65.8	3.0 / 97.0	16.6 / 83.4	24.5 / 75.5
20	23	Apparel and Other Textile Products	243	116	28,538	28,897	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
21	21	Tobacco Products	181	0	0	181	0.0 / 100.0	— / —	— / —	0.0 / —
Total for All Matched Industries			**124,473,070**	**91,073,897**	**147,065,311**	**362,612,278**	**10.9 / 89.1**	**5.4 / 94.6**	**15.7 / 84.3**	**11.5 / 88.5**

* Multiple SIC codes reported only in US data.

➤ Canada and US data only. Mexico data not collected for 1996.

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

5 Canada and US Data Compared, 1996

Figures

Maps

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

Tables

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

Key Findings

- In both countries, the relatively few facilities reporting the largest amounts accounted for a major portion of the releases in the matched data set for 1996. The top 50 facilities in NPRI represented less than 4 percent of all NPRI facilities, but reported 58 percent of releases. The top 50 facilities in TRI, representing 0.3 percent of the TRI facilities, reported 34 percent of releases. A similar pattern prevailed in releases and transfers.
- In both NPRI and TRI, 25 chemicals with the largest amounts represented approximately nine-tenths of the releases and transfers reported. Nineteen chemicals ranked among the top 25 for total releases and transfers in both PRTRs.
- Of the 45 matched substances designated as known or suspected carcinogens, chromium and its compounds, dichloromethane and lead and its compounds ranked highest for releases and transfers in both PRTRs, although not in the same order. For releases only, dichloromethane ranked first in both NPRI and TRI, accounting for about 20 percent of carcinogen releases reported in both PRTRs.
- About one-third of the forms submitted in both PRTRs were for metals and their compounds. These substances accounted for 30 percent of all releases and transfers reported in NPRI and 25 percent in TRI. The 19 metals and their compounds accounted for a higher proportion of TRI releases (17 percent) than NPRI releases (14 percent). A larger proportion of NPRI transfers (61 percent) consisted of metals and their compounds than was the case in TRI (46 percent). In both PRTRs, zinc and manganese and their compounds ranked first and second for both releases and transfers.
- Industries reporting the largest NPRI releases and transfers were primary metals, chemical manufacturing, and paper products. In TRI, the chemical industry ranked first, followed by primary metals and paper products. Primary metal industries reported one-third of NPRI's total releases and transfers and chemical manufacturing one-third of those in TRI. The chemical industry submitted the most reporting forms (three times as many as any other industry sector) in both PRTRs.
- In 1996, NPRI facilities averaged 28,881 kg of releases and transfers per reporting form, one and one-half times the average per form in TRI of 19,019 kg.

5.1 Introduction

This chapter compares the Canadian and US data for 1996 from the matched data set. It notes significant differences and similarities between the two PRTRs, when comparable chemicals and industries are viewed for both systems.

5.2 Overview, NPRI and TRI, 1996

In both countries, releases were about twice the size of transfers in 1996. Releases were a somewhat smaller percentage of the total in NPRI (67 percent) than in TRI (71 percent), even though emissions to air—the largest type of release or transfer in both systems—were a larger percentage in NPRI (51 percent) than in TRI (45 percent). On-site land releases, however, constituted a larger portion of TRI releases and transfers (12 percent) than in NPRI (7 percent, see **Table 5–1**, p. 101 and **Figure 5–1**).

The largest differences between the two PRTRs occurred in off-site transfers. Canadian facilities reported sending much more (19 percent) of their reportable substances off-site for disposal or containment than did US facilities (11 percent). Although it is sent off-site, this material will also generally be released, usually in disposal to land. At the same time, NPRI transfers to sewage/POTWs were much lower (4 percent) than in TRI (8 percent). Thus, in part, the larger role that off-site disposal played for Canadian facilities reflected a much smaller usage of municipal sewage plants or POTWs than among US facilities. The amount of treatment that sewage plants provide for toxic substances depends on the chemical substances themselves, as well as on the treatment methods available at the sewage plant. Some portion of the PRTR chemicals in these transfers is also released (discharged to surface waters), although the release occurs off-site.

5.2.1 Top Facilities for Releases

The 50 NPRI facilities with the largest releases in the matched data set reported well above half (58 percent) of all releases in Canada. In NPRI, the top 50 facilities represented 3.7 percent of all reporting facilities, while in TRI, the top 50 represented 0.3 percent of all reporting facilities. In the United States, the top 50 TRI facilities reported one-third (34 percent) of all releases (**Figure 5–2** and **Tables 5–2**, pp. 104–5 and **5–3**, pp. 106–7).

The top NPRI facilities were much more likely to release listed substances to air than their TRI counterparts. Air emissions constituted 68 percent of releases reported by the top 50 NPRI facilities and 28 percent of releases reported by the top 50 TRI facilities. In contrast, on-site land releases were much larger for these facilities in TRI—40 percent versus 16 percent in NPRI (**Figure 5–3**).

5.2.2 Top Facilities for Releases and Transfers

Comparing total releases and transfers with large releases, releases and transfers were slightly more concentrated in the top 50 NPRI facilities but somewhat less so in the top 50 TRI facilities (compare **Figure 5–4**, drawing upon **Tables 5–4**, pp. 108–9 and **5–5**, pp. 110–11, with **Figure 5–2**). The top 50 NPRI facilities reported 59 percent of all Canadian releases and transfers, while the top 50 TRI facilities reported 28 percent of the US total.

The top NPRI facilities submitted from 2 to 23 forms (each form representing one chemical substance or group). The top TRI facilities submitted 2 to 50 forms, suggesting that some of these facilities conducted larger or more diverse operations than their Canadian counterparts.

[Text continues on p. 112.]

Figure 5–1
M 1996
Releases and Transfers by Type, NPRI and TRI

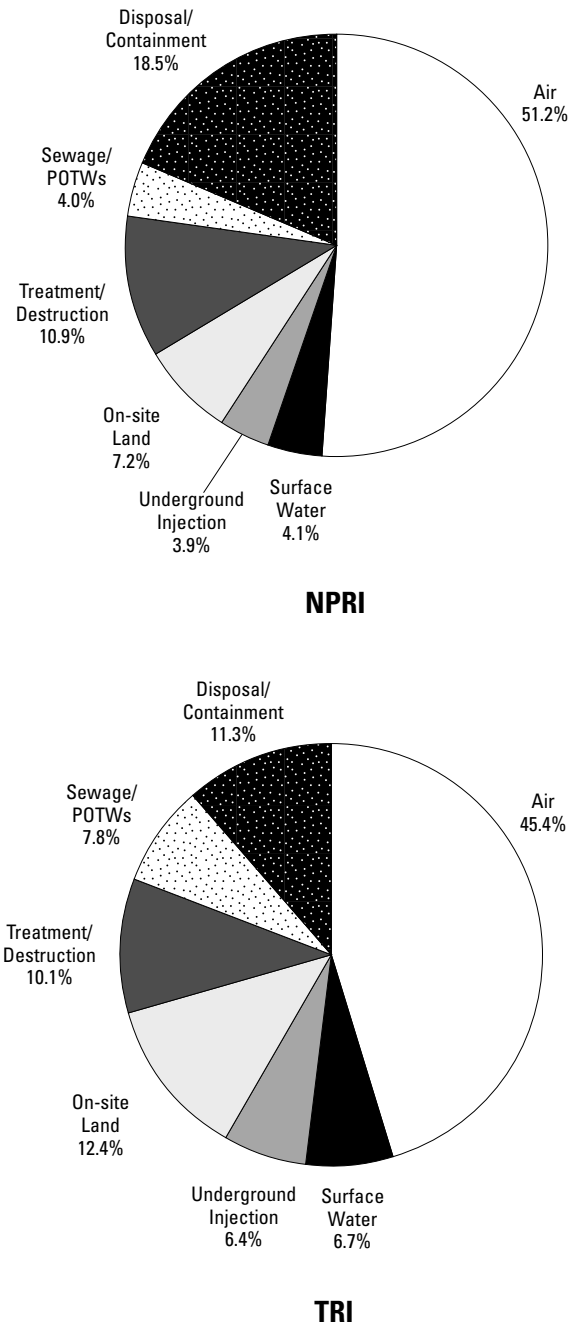


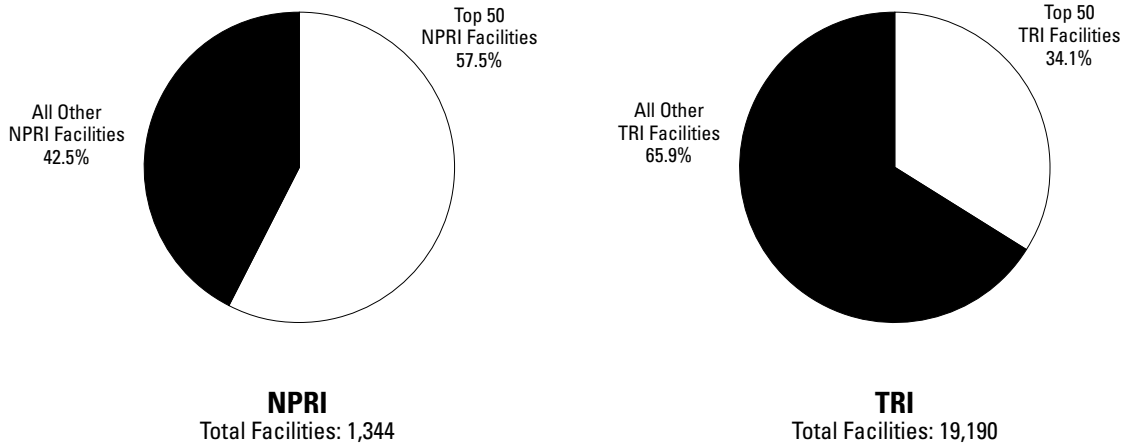
Table 5–1
M 1996

Releases and Transfers, NPRI and TRI

	NPRI		TRI	
	Number		Number	
Total Facilities	1,344		19,190	
Total Forms	4,298		57,927	
	kg	**%**	**kg**	**%**
Total Air Emissions	63,590,706	51.2	499,678,471	45.4
Surface Water Discharges	5,128,134	4.1	73,614,363	6.7
Underground Injection	4,812,379	3.9	70,427,564	6.4
On-site Land Releases	8,936,491	7.2	136,901,554	12.4
Matched Releases	**82,596,460**	**66.5**	**780,621,952**	**70.9**
Treatment/Destruction	13,571,799	10.9	110,901,271	10.1
Sewage/POTWs	4,943,234	4.0	86,130,663	7.8
Disposal/Containment	23,017,654	18.5	124,047,657	11.3
Matched Transfers	**41,532,687**	**33.5**	**321,079,591**	**29.1**
Total Releases and Transfers	**124,129,147**	**100.0**	**1,101,701,543**	**100.0**

Figure 5–2
M 1996

NPRI and TRI Total Releases, Top 50 Facilities and All Others



NPRI
Total Facilities: 1,344

TRI
Total Facilities: 19,190

Figure 5–3
M 1996

Top 50 Facilities for Total Releases, NPRI and TRI

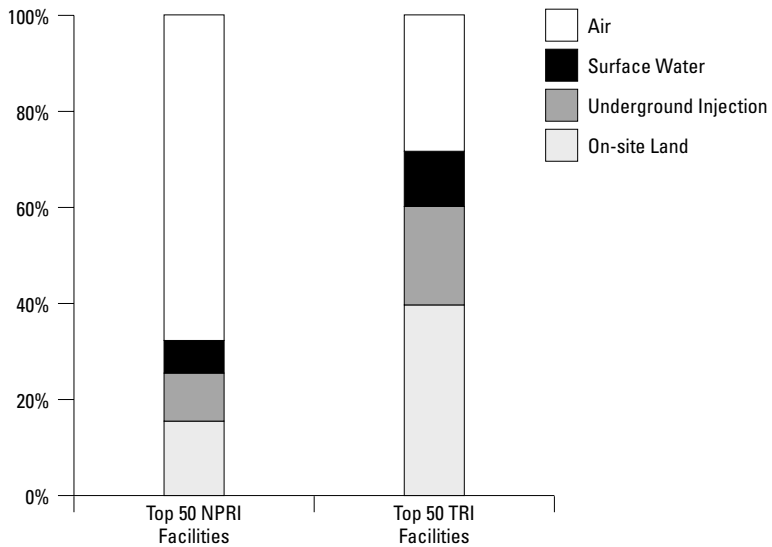


Figure 5–4
M 1996

NPRI and TRI Total Releases and Transfers, Top 50 Facilities and All Others

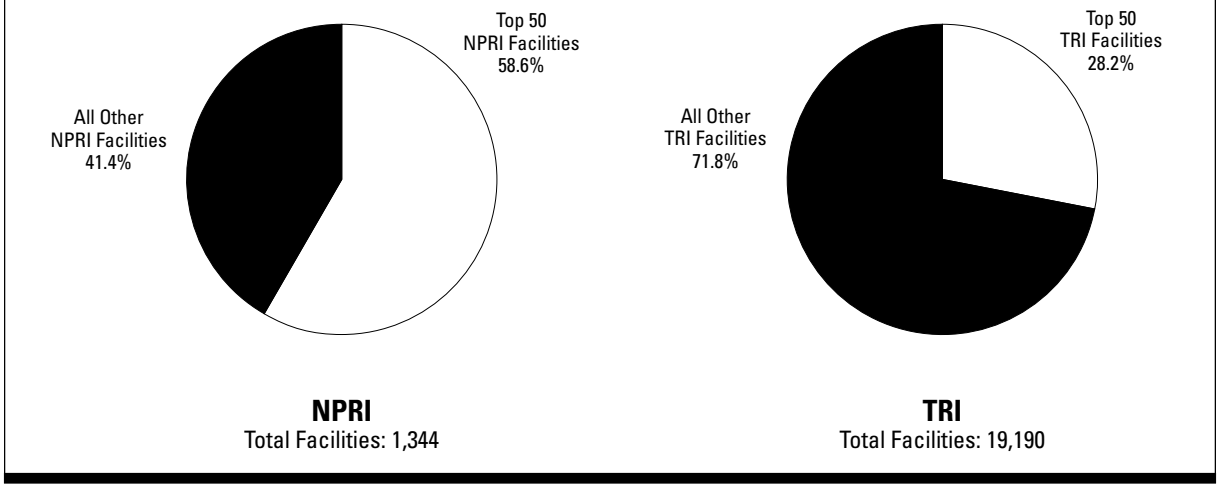


Table 5–2

M 1996

The 50 NPRI Facilities with the Largest Total Releases

Rank	Facility	City, Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	7	4,773,818	0	0	0
2	Celanese Canada Inc.	Edmonton, AB	37	28	10	395,362	0	4,081,300	16,150
3	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
4	Nova Chemicals Ltd., St. Clair Site	Corunna, ON	37	28	8	2,186,200	820	0	0
5	Irving Pulp & Paper Ltd./Irving Tissue Co.	Saint John, NB	27	26	4	249,591	1,933,834	0	0
6	Agrium Products Inc.	Fort Saskatchewan, AB	37	28	10	2,121,980	0	0	0
7	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	5	22,367	0	0	2,008,700
8	Bayer Rubber Inc.	Sarnia, ON	37	28	16	1,697,761	28,065	0	0
9	Methanex Corporation	Medicine Hat, AB	37	28	3	1,453,740	0	0	340
10	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
11	General Motors of Canada Limited, Car Plant-Autoplex	Oshawa, ON	32	37	11	1,215,563	0	0	0
12	Canadian General-Tower Ltd.	Cambridge, ON	16	30	10	998,528	0	0	0
13	Agrium Products Inc.	Redwater, AB	37	28	15	200,470	105,210	650,480	540
14	Fletcher Challenge Canada, Elk Falls Mill	Campbell River, BC	27	26	4	884,500	0	0	0
15	Daishowa Marubeni International, Peace River Div.	Peace River, AB	27	26	8	837,960	7,820	0	0
16	Avenor Inc.	Thunder Bay, ON	27	26	8	761,850	5,220	0	0
17	Morbern Incorporated	Cornwall, ON	16	30	3	746,600	0	0	0
18	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	12	674,650	18,900	0	0
19	Borden Co., Sunworthy Wallcoverings	Brampton, ON	27	26	5	635,850	0	0	0
20	Skeena Cellulose Inc., Skeena Pulp Operations	Skeena, BC	27	26	4	616,600	0	0	0
21	General Motors of Canada Limited, Truck Plant-Autoplex	Oshawa, ON	32	37	11	610,549	0	0	0
22	AltaSteel Ltd.	Edmonton, AB	29	33	6	11,216	1,513	0	597,172
23	Union Carbide Canada Inc., Prentiss Ethylene Glycol Plant	Lacombe County, AB	37	28	5	605,923	0	0	0
24	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	19	99,734	40,762	0	462,800
25	Dofasco Inc.	Hamilton, ON	29	33	18	578,783	7,559	0	99
26	Alcan Smelters and Chemicals Ltd.	Kitimat, BC	29	33	4	583,200	0	0	0
27	Standard Products (Canada) Ltd., Rubber Plant 1	Stratford, ON	15	30	3	582,700	0	0	0
28	DuPont Canada Inc.	Maitland, ON	37	28	16	180,588	395,062	0	4,000
29	Sammi Atlas Inc., Aciers inoxydables Atlas	Tracy, QC	29	33	11	24,037	539,750	0	0
30	Ford Motor Company, St. Thomas Assembly Plant	St. Thomas, ON	32	37	11	543,648	230	0	0
31	St. Anne-Nackawic Pulp Company Ltd.	Nackawic, NB	27	26	4	507,000	14,000	0	0
32	Avenor Inc., Dryden Mill	Dryden, ON	27	26	7	487,770	8,100	0	2,010
33	Imperial Oil, IOL Sarnia Refinery	Sarnia, ON	36	29	22	474,524	326	0	1,976
34	Witco Canada Inc., West Hill Plant	Scarborough, ON	36	29	2	471,000	0	0	0
35	Imperial Oil, Sarnia Chemical Plant	Sarnia, ON	37	28	23	460,062	173	0	0
36	Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur, QC	29	33	5	0	0	0	457,180
37	Chrysler Canada, Ltd., Windsor Assembly Plant	Windsor, ON	32	37	14	453,795	0	0	0
38	Paintplas Inc.	Ajax, ON	32	30	9	447,160	0	0	0
39	Ford Motor Company, Oakville Assembly Plant	Oakville, ON	32	37	11	443,226	0	0	0
40	Weyerhaeuser Saskatchewan Ltd., Prince Albert Pulp & Paper	Prince Albert, SK	27	26	6	415,206	22,200	0	0
41	Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon, MB	29	33	6	433,765	3,327	0	0
42	Produits forestiers Donohue Inc., usine de pâte Kraft	St-Félicien, QC	27	26	7	203,700	68,800	0	145,800
43	International Wallcoverings Ltd	Brampton, ON	27	26	4	416,300	0	0	0
44	Dow Chemical Canada Inc.	Sarnia, ON	37	28	20	262,263	55	0	148,007
45	Chrysler Canada, Ltd., Bramalea Assembly Plant	Brampton, ON	32	37	12	407,240	0	0	0
46	Cartons St-Laurent Inc.	Latuque, QC	27	26	8	367,818	34,275	0	0
47	Dow Chemical Canada Inc., Western Canada Operations	Fort Saskatchewan, AB	37	28	24	398,050	1	0	2,287
48	Canfor, Prince George Pulp & Paper Mills	Prince George, BC	27	26	4	397,400	0	0	300
49	Emballages Stone Canada, Division Pontiac	Portage-du-Fort, QC	27	26	5	395,510	0	0	641
50	Canadian Fertilizers Limited	Medicine Hat, AB	37	28	3	387,735	0	0	0
	Subtotal				**454**	**32,195,387**	**3,236,485**	**4,731,780**	**7,353,302**
	% of Total				**10.6**	**50.6**	**63.1**	**98.3**	**82.3**
	Total				**4,298**	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**

* Chemicals accounting for more than 70% of total releases from the facility.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	4,773,818	Sulfuric acid (air)
2	4,492,813	Methanol, Methyl ethyl ketone (UIJ)
3	2,322,985	Zinc and compounds (land)
4	2,187,020	Cyclohexane (air)
5	2,183,425	Methanol (water)
6	2,121,980	Methanol (air)
7	2,031,067	Zinc and compounds (land)
8	1,725,826	Chloromethane, Cyclohexane, Hydrochloric acid (air)
9	1,454,080	Methanol (air)
10	1,254,893	Zinc/Lead and compounds (land)
11	1,216,263	Xylene, Toluene (air)
12	998,783	Methyl ethyl ketone (air)
13	956,800	Nitric acid and nitrate compounds (UIJ)
14	884,500	Methanol (air)
15	845,780	Methanol (air)
16	767,070	Methanol (air)
17	746,600	Methyl ethyl ketone (air)
18	693,550	Lead/Copper/Zinc and compounds (air)
19	635,850	Methyl ethyl ketone, Toluene (air)
20	616,600	Methanol, Chlorine (air)
21	610,855	Xylene, Toluene (air)
22	609,901	Zinc/Manganese and compounds (land)
23	605,923	Ethylene glycol, Ethylene (air)
24	603,307	Manganese and compounds (land)
25	586,441	Benzene (air)
26	583,200	Hydrogen fluoride (air)
27	582,700	Xylene (air)
28	579,650	Nitric acid and nitrate compounds (water), Cyclohexane (air)
29	563,787	Nitric acid and nitrate compounds (water)
30	543,878	Xylene, Methyl isobutyl ketone, Ethylbenzene (air)
31	521,000	Methanol, Chlorine, Chlorine dioxide (air)
32	497,880	Methanol (air)
33	476,826	Methyl isobutyl ketone, Vanadium, Methyl ethyl ketone, Toluene, Xylene, Ethylene (air)
34	471,000	Methanol (air)
35	460,674	Ethylene, Hydrochloric acid, Benzene (air)
36	457,180	Zinc/Lead and compounds (land)
37	453,795	Methyl ethyl ketone, Xylene, Toluene (air)
38	447,160	Xylene, Toluene (air)
39	443,226	Xylene, Methyl isobutyl ketone (air)
40	437,406	Methanol (air)
41	437,092	Zinc/Lead and compounds (air)
42	418,300	Manganese and compounds (land, water), Methanol (air)
43	416,300	Methyl ethyl ketone, Toluene (air)
44	411,891	Ethylene (air), Asbestos (land)
45	407,240	Methyl ethyl ketone, Toluene, Xylene (air)
46	402,093	Methanol (air)
47	400,338	Ethylene, Chloroethane (air)
48	397,700	Methanol (air)
49	396,151	Methanol (air)
50	387,835	Methanol (air)
	47,520,432	
	57.5	
	82,596,460	

Table 5–3

M 1996

The 50 TRI Facilities with the Largest Total Releases

Rank	Facility	City, State	SIC Code	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Magnesium Corp. of America, Renco Group	Rowley, UT	33	6	29,619,647	0	0	0
2	ASARCO Inc.	East Helena, MT	33	10	53,133	926	0	20,113,824
3	Courtaulds Fibers Inc., Courtaulds Finance U.S. Inc.	Axis, AL	28	4	12,559,013	16,155	0	206,032
4	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ	33	13	135,775	113	0	11,298,700
5	PCS Nitrogen Fertilizer L.P., Potash Corp. of Saskatchewan	Geismar, LA	28	11	62,872	9,430,274	0	247,618
6	Cytec Industries Inc.	Westwego, LA	28	23	61,923	3,318	9,306,790	0
7	DuPont	Victoria, TX	28	29	163,006	625	8,568,203	5,420
8	Lenzing Fibers Corp.	Lowland, TN	28	5	8,208,665	3,129	0	146,077
9	Monsanto Co.	Gonzalez, FL	28	18	36,432	653	7,771,064	0
10	Northwestern Steel & Wire Co.	Sterling, IL	33	7	70,984	1,224	0	6,496,608
11	BASF Corp.	Freeport, TX	28	24	149,217	6,352,981	5,216	0
12	General Motors Corp., Powertrain Defiance	Defiance, OH	33	17	331,912	6,461	0	6,069,061
13	Armco Inc.	Butler, PA	33	14	112,906	5,444,361	0	153,788
14	Elkem Metals Co.	Marietta, OH	33	6	218,375	326,987	0	4,763,725
15	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX	28	2	2,176	703	0	5,124,724
16	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ	33	9	542,461	0	0	4,555,931
17	BP Chemicals Inc.	Lima, OH	28	27	115,258	0	4,760,148	0
18	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM	33	2	275,871	0	0	4,261,169
19	PCS Phosphate Co. Inc., Potash Corp. of Saskatchewan	Aurora, NC	28	6	164,776	3	0	4,196,711
20	Huntsman Petrochemical Corp., Huntsman Corp.	Port Arthur, TX	28	19	4,256,988	0	0	0
21	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT	33	14	97,945	2,151	0	4,139,586
22	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC	28	2	2,969	15	0	4,081,774
23	ASARCO Inc., Glover Plant	Annapolis, MO	33	6	158,230	35	0	3,871,968
24	DuPont	Beaumont, TX	28	19	183,382	184	3,716,892	0
25	Hoechst-Celanese Chemical, Hoechst Corp., Clear Lake Plant	Pasadena, TX	28	20	350,749	0	3,479,003	0
26	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO	33	10	106,458	149	0	3,467,234
27	FMC Corp.	Pocatello, ID	28	12	31,050	351	0	3,539,427
28	Chino Mines Co.	Hurley, NM	33	2	81,697	0	0	3,457,668
29	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX	28	16	88,605	331	3,385,759	3,675
30	US Steel Gary Works, USX Corp.	Gary, IN	33	34	774,919	14,068	0	2,600,141
31	Eastman Kodak Co., Kodak Park	Rochester, NY	38	50	2,981,026	261,484	0	167
32	Bayer Corp.	New Martinsville, WV	28	29	120,104	3,016,805	0	317
33	Sterling Chemicals Inc.	Texas City, TX	28	36	476,419	558	2,595,334	0
34	Rubicon Inc.	Geismar, LA	28	24	135,663	72	2,903,039	0
35	PCS Phosphate, Potash Corp. of Saskatchewan	White Springs, FL	28	4	49,892	0	0	2,947,850
36	Angus Chemical Co.	Sterlington, LA	28	11	70,561	80,632	2,684,452	0
37	Coastal Chem Inc., Coastal Corp.	Cheyenne, WY	28	12	16,485	0	2,771,339	0
38	Vicksburg Chemical Co.	Vicksburg, MS	28	3	33,986	2,713,007	0	0
39	Granite City Steel, National Steel Corp.	Granite City, IL	33	22	114,722	5,616	0	2,593,382
40	IMC-Agrico Co., IMC Global Inc., Faustina Plant	Saint James, LA	28	9	79,702	2,428,338	0	178,037
41	Monsanto Co.	Luling, LA	28	13	20,699	73,261	2,579,638	0
42	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ	33	7	1,787,997	0	0	774,034
43	International Paper	Hampton, SC	30	11	2,462,176	45	0	0
44	Tennessee Eastman, Eastman Chemical	Kingsport, TN	28	56	2,316,748	73,219	0	38,450
45	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS	Mult.	5	5,217	11,211	0	2,335,785
46	IMC-Agrico Co., New Wales Plant	Mulberry, FL	Mult.	2	61,224	0	0	1,995,468
47	Dow Chemical Co.	Freeport, TX	28	69	1,837,901	91,781	0	82,878
48	USS Fairfield Works, USX Corp.	Fairfield, AL	33	12	136,959	2,681	0	1,859,435
49	Westvaco Corp., Bleached Board Div.	Covington, VA	26	15	1,919,192	15,276	0	55,122
50	Weyerhaeuser Co.	Longview, WA	Mult.	19	1,840,777	147,261	0	0
	Subtotal			**796**	**75,484,844**	**30,526,444**	**54,526,877**	**105,661,786**
	% of Total			**1.4**	**15.1**	**41.5**	**77.4**	**77.2**
	Total			**57,927**	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**

* Chemicals accounting for more than 70% of the total releases from the facility.

➤ Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese in error. This facility has been omitted from this table.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	29,619,647	Chlorine (air)
2	20,167,883	Zinc and compounds (land)
3	12,781,200	Carbon disulfide (air)
4	11,434,588	Copper and compounds, Zinc and compounds (land)
5	9,740,764	Phosphoric acid (water)
6	9,372,031	Acetonitrile, Acrylic acid (UIJ)
7	8,737,254	Nitric acid and nitrate compounds (UIJ)
8	8,357,871	Carbon disulfide (air)
9	7,808,149	Nitric acid and nitrate compounds (UIJ)
10	6,568,816	Zinc and compounds, Manganese and compounds (land)
11	6,507,414	Nitric acid and nitrate compounds (water)
12	6,407,434	Zinc and compounds (land)
13	5,711,055	Nitric acid and nitrate compounds (water)
14	5,309,087	Manganese and compounds (land)
15	5,127,603	Chromium and compounds (land)
16	5,098,392	Copper and compounds, Zinc and compounds (land)
17	4,875,406	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
18	4,537,040	Copper and compounds (land)
19	4,361,490	Phosphoric acid (land)
20	4,256,988	Propylene (air)
21	4,239,682	Copper and compounds, Zinc and compounds (land)
22	4,084,758	Chromium and compounds (land)
23	4,030,233	Zinc and compounds, Lead and compounds (land)
24	3,900,458	Nitric acid and nitrate compounds (UIJ)
25	3,829,752	Ethylene glycol (UIJ)
26	3,573,841	Zinc and compounds (land)
27	3,570,828	Zinc and compounds, Phosphorus (land)
28	3,539,365	Copper and compounds (land)
29	3,478,370	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
30	3,389,128	Zinc and compounds, Manganese and compounds (land)
31	3,242,677	Dichloromethane, Hydrochloric acid, Methanol (air)
32	3,137,226	Nitric acid and nitrate compounds (water)
33	3,072,311	Acetonitrile, Nitric acid and nitrate compounds, Methanol, Acrylamide (UIJ)
34	3,038,774	Nitric acid and nitrate compounds, Methanol (UIJ)
35	2,997,742	Phosphoric acid (land)
36	2,835,645	Nitric acid and nitrate compounds, Formaldehyde (UIJ)
37	2,787,824	Nitric acid and nitrate compounds (UIJ)
38	2,746,993	Nitric acid and nitrate compounds (water)
39	2,713,720	Zinc and compounds (land)
40	2,686,077	Phosphoric acid (water)
41	2,673,598	Formaldehyde (UIJ)
42	2,562,031	Copper and compounds (air)
43	2,462,221	Methanol, Phenol (air)
44	2,428,417	Hydrochloric acid, Methanol, Toluene, Bromomethane, Hydrogen fluoride (air)
45	2,352,213	Manganese and compounds (land)
46	2,056,692	Phosphoric acid (land)
47	2,012,560	Ethylene, Hydrochloric acid, Propylene, Chlorine, Epichlorohydrin, 1,2-Dichloroethane (air)
48	1,999,075	Zinc and compounds (land)
49	1,989,590	Methanol, Hydrochloric acid (air)
50	1,988,038	Methanol, Acetaldehyde (air)
	266,199,951	
	34.1	
	780,621,952	

Table 5–4

M 1996

Top 50 NPRI Facilities with Largest Total Releases and Transfers

Rank	Facility	City, Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
2	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	7	4,773,818	0	0	0
3	Celanese Canada Inc.	Edmonton, AB	37	28	10	395,362	0	4,081,300	16,150
4	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	19	99,734	40,762	0	462,800
5	Dominion Colour Corporation	Ajax, ON	37	28	6	0	0	0	0
6	Dofasco Inc.	Hamilton, ON	29	33	18	578,783	7,559	0	99
7	Stelco McMaster Ltée	Contrecoeur, QC	29	33	5	16,280	0	0	0
8	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
9	Nova Chemicals Ltd., St. Clair Site	Corunna, ON	37	28	8	2,186,200	820	0	0
10	Irving Pulp & Paper Ltd./Irving Tissue Co.	Saint John, NB	27	26	4	249,591	1,933,834	0	0
11	Agrium Products Inc.	Fort Saskatchewan, AB	37	28	10	2,121,980	0	0	0
12	Aimco Solrec Ltd.	Milton, ON	37	28	6	33,708	0	0	0
13	Bayer Rubber Inc.	Sarnia, ON	37	28	16	1,697,761	28,065	0	0
14	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	5	22,367	0	0	2,008,700
15	Fraser Papers Inc (Canada)	Edmundston, NB	27	26	9	174,150	0	0	0
16	Ivaco Rolling Mills	L'Orignal, ON	29	33	7	10,087	2	0	0
17	Methanex Corporation	Medicine Hat, AB	37	28	3	1,453,740	0	0	340
18	Slater Steels, Hamilton Specialty Bar Division	Hamilton, ON	29	33	10	8,728	0	0	200
19	General Motors of Canada Limited, Car Plant-Autoplex	Oshawa, ON	32	37	11	1,215,563	0	0	0
20	Sammi Atlas Inc., Aciers inoxydables Atlas	Tracy, QC	29	33	11	24,037	539,750	0	0
21	Agrium Products Inc.	Redwater, AB	37	28	15	200,470	105,210	650,480	540
22	Canadian General-Tower Ltd.	Cambridge, ON	16	30	10	998,528	0	0	0
23	Dominion Castings Ltd.	Hamilton, ON	29	33	4	6,291	100	0	0
24	Kronos Canada, Inc.	Varennes, QC	37	28	8	23,196	45,350	0	0
25	Fletcher Challenge Canada, Elk Falls Mill	Campbell River, BC	27	26	4	884,500	0	0	0
26	Zalev Brothers Limited	Windsor, ON	29	33	7	449	7	0	0
27	Daishowa Marubeni International, Peace River Div.	Peace River, AB	27	26	8	837,960	7,820	0	0
28	Gerdau Courtice Steel Inc., Courtice Steel Inc.	Cambridge, ON	29	33	7	12,030	0	0	0
29	Avenor Inc.	Thunder Bay, ON	27	26	8	761,850	5,220	0	0
30	Stelco Inc., Hilton Works	Hamilton, ON	29	33	21	309,840	40,875	0	690
31	Morbern Incorporated	Cornwall, ON	16	30	3	746,600	0	0	0
32	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	12	674,650	18,900	0	0
33	AltaSteel Ltd.	Edmonton, AB	29	33	6	11,216	1,513	0	597,172
34	General Motors of Canada Limited, Truck Plant-Autoplex	Oshawa, ON	32	37	11	610,549	0	0	0
35	Borden Co., Sunworthy Wallcoverings	Brampton, ON	27	26	5	635,850	0	0	0
36	Les Produits chimiques Delmar Inc.	LaSalle, QC	37	28	5	63,800	0	0	0
37	Skeena Cellulose Inc., Skeena Pulp Operations	Skeena, BC	27	26	4	616,600	0	0	0
38	Union Carbide Canada Inc., Prentiss Ethylene Glycol Plant	Lacombe County, AB	37	28	5	605,923	0	0	0
39	Standard Products (Canada) Ltd., Rubber Plant 1	Stratford, ON	15	30	3	582,700	0	0	0
40	Alcan Smelters and Chemicals Ltd.	Kitimat, BC	29	33	4	583,200	0	0	0
41	DuPont Canada Inc.	Maitland, ON	37	28	16	180,588	395,062	0	4,000
42	Ford Motor Company, St. Thomas Assembly Plant	St. Thomas, ON	32	37	11	543,648	230	0	0
43	Dow Chemical Canada Inc.	Sarnia, ON	37	28	20	262,263	55	0	148,007
44	Imperial Oil, Sarnia Chemical Plant	Sarnia, ON	37	28	23	460,062	173	0	0
45	St. Anne-Nackawic Pulp Company Ltd.	Nackawic, NB	27	26	4	507,000	14,000	0	0
46	Chrysler Canada, Ltd., Windsor Assembly Plant	Windsor, ON	32	37	14	453,795	0	0	0
47	Avenor Inc., Dryden Mill	Dryden, ON	27	26	7	487,770	8,100	0	2,010
48	Imperial Oil, IOL Sarnia Refinery	Sarnia, ON	36	29	22	474,524	326	0	1,976
49	Witco Canada Inc., West Hill Plant	Scarborough, ON	36	29	2	471,000	0	0	0
50	Sammi Atlas Inc., Atlas Specialty Steels	Welland, ON	29	33	5	232	1,523	0	121,845
	Subtotal				**450**	**28,141,068**	**3,195,739**	**4,731,780**	**6,869,829**
	% of Total				**10.5**	**44.3**	**62.3**	**98.3**	**76.9**
	Total				**4,298**	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**

* Chemicals accounting for more than 70% of total releases and transfers from the facility.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	1,254,893	0	10	3,578,500	3,578,510	4,833,403	Zinc and compounds (transfers to disposal)
2	4,773,818	0	0	0	0	4,773,818	Sulfuric acid (air)
3	4,492,813	0	0	48,855	48,855	4,541,668	Methanol, Methyl ethyl ketone (UIJ)
4	603,307	0	0	3,814,700	3,814,700	4,418,007	Manganese and compounds (transfers to disposal)
5	50	0	3,870,000	229,400	4,099,400	4,099,450	Nitric acid and nitrate compounds (transfers to sewage)
6	586,441	6,000	1,692	2,539,200	2,546,892	3,133,333	Zinc/Manganese and compounds (transfers to disposal)
7	17,410	3,054,700	0	0	3,054,700	3,072,110	Zinc and compounds (transfers to treatment)
8	2,322,985	0	0	0	0	2,322,985	Zinc and compounds (land)
9	2,187,020	21,450	0	7,650	29,100	2,216,120	Cyclohexane (air)
10	2,183,425	0	0	0	0	2,183,425	Methanol (water)
11	2,121,980	20,114	0	2,200	22,314	2,144,294	Methanol (air)
12	33,708	2,100,316	0	0	2,100,316	2,134,024	Xylene, Toluene (transfers to treatment)
13	1,725,826	320,517	0	79,723	400,240	2,126,066	Cyclohexane, Chloromethane, Hydrochloric acid (air)
14	2,031,067	0	0	0	0	2,031,067	Zinc and compounds (land)
15	174,150	1,388,969	0	160,181	1,549,150	1,723,300	Methanol (transfers to treatment)
16	11,020	0	0	1,559,360	1,559,360	1,570,380	Zinc and compounds (transfers to disposal)
17	1,454,080	0	3,920	0	3,920	1,458,000	Methanol (air)
18	10,528	542	12,365	1,256,701	1,269,608	1,280,136	Zinc/, Lead and compounds (transfers to disposal)
19	1,216,263	4,423	35	3,952	8,410	1,224,673	Xylene, Toluene (air)
20	563,787	513,110	0	0	513,110	1,076,897	Nitric acid and nitrate compounds (water), Chromium and compounds (transfers to treatment)
21	956,800	20,200	0	34,810	55,010	1,011,810	Nitric acid and nitrate compounds (UIJ)
22	998,783	117	0	83	200	998,983	Methyl ethyl ketone (air)
23	6,591	0	0	906,005	906,005	912,596	Chromium and compounds (transfers to disposal)
24	68,546	0	0	836,000	836,000	904,546	Manganese and compounds (transfers to disposal)
25	884,500	0	0	0	0	884,500	Methanol (air)
26	456	0	0	877,606	877,606	878,062	Zinc/Copper and compounds (transfers to disposal)
27	845,780	0	0	0	0	845,780	Methanol (air)
28	12,030	0	10,750	776,670	787,420	799,450	Zinc/Lead and compounds (transfers to disposal)
29	767,070	0	0	0	0	767,070	Methanol (air)
30	352,705	37,000	88,000	272,640	397,640	750,345	Asbestos (transfers to disposal), Benzene (air), Phenol (transfers to sewage)
31	746,600	0	0	0	0	746,600	Methyl ethyl ketone (air)
32	693,550	0	0	0	0	693,550	Lead/Copper/Zinc and compounds (air)
33	609,901	0	1,476	67,244	68,720	678,621	Zinc/Manganese and compounds (land)
34	610,855	0	22,302	6,740	29,042	639,897	Xylene, Toluene, Methyl isobutyl ketone (air)
35	635,850	0	2,700	0	2,700	638,550	Methyl ethyl ketone, Toluene (air)
36	63,800	572,400	0	0	572,400	636,200	Toluene, Isopropyl alcohol (transfers to treatment)
37	616,600	0	0	0	0	616,600	Methanol, Chlorine (air)
38	605,923	0	0	2,100	2,100	608,023	Ethylene glycol, Ethylene (air)
39	582,700	2,200	0	14,900	17,100	599,800	Xylene (air)
40	583,200	0	0	0	0	583,200	Hydrogen fluoride (air)
41	579,650	0	0	0	0	579,650	Nitric acid and nitrate compounds (water), Cyclohexane (air)
42	543,878	5,130	0	11,106	16,236	560,114	Xylene, Methyl isobutyl ketone, Ethylbenzene, n-Butyl alcohol (air)
43	411,891	131,155	0	0	131,155	543,046	Ethylene (air), Asbestos, Benzene (land)
44	460,674	0	0	75,798	75,798	536,472	Ethylene, Hydrochloric acid (air), Asbestos (transfers to disposal)
45	521,000	0	0	0	0	521,000	Methanol, Chlorine, Chlorine dioxide (air)
46	453,795	0	24,656	21,725	46,381	500,176	Methyl ethyl ketone, Xylene, Toluene (air)
47	497,880	0	0	0	0	497,880	Methanol (air)
48	476,826	2,043	0	17,095	19,138	495,964	Methyl isobutyl ketone, Vanadium, Methyl ethyl ketone, Toluene, Xylene, Ethylene, Propylene (air)
49	471,000	0	15,000	0	15,000	486,000	Methanol (air)
50	123,600	8,348	0	353,753	362,100	485,700	Chromium and compounds (transfers to disposal, land), Zinc and compounds (transfers to disposal)
	42,947,005	**8,208,734**	**4,052,906**	**17,554,697**	**29,816,336**	**72,763,341**	
	52.0	**60.5**	**82.0**	**76.3**	**71.8**	**58.6**	
	82,596,460	**13,571,799**	**4,943,234**	**23,017,654**	**41,532,687**	**124,129,147**	

Table 5–5

M 1996

Top 50 TRI Facilities with Largest Total Releases and Transfers

Rank	Facility	City, State	SIC Code	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Magnesium Corp. of America, Renco Group	Rowley, UT	33	6	29,619,647	0	0	0
2	ASARCO Inc.	East Helena, MT	33	10	53,133	926	0	20,113,824
3	Courtaulds Fibers Inc., Courtaulds Finance U.S. Inc.	Axis, AL	28	4	12,559,013	16,155	0	206,032
4	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ	33	13	135,775	113	0	11,298,700
5	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA	33	9	219,985	272	0	0
6	PCS Nitrogen Fertilizer L.P., Potash Corp. of Saskatchewan	Geismar, LA	28	11	62,872	9,430,274	0	247,618
7	Cytec Industries Inc.	Westwego, LA	28	23	61,923	3,318	9,306,790	0
8	DuPont	Victoria, TX	28	29	163,006	625	8,568,203	5,420
9	Air Products & Chemicals Inc.	Pasadena, TX	28	10	29,344	0	0	0
10	Lenzing Fibers Corp.	Lowland, TN	28	5	8,208,665	3,129	0	146,077
11	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ	33	9	542,461	0	0	4,555,931
12	Monsanto Co.	Gonzalez, FL	28	18	36,432	653	7,771,064	0
13	Nucor Steel, Nucor Corp.	Crawfordsville, IN	33	9	5,069	26	0	10
14	National Steel Corp., Great Lakes Div.	Ecorse, MI	33	17	85,676	499,858	0	0
15	BASF Corp.	Freeport, TX	28	24	149,217	6,352,981	5,216	0
16	Northwestern Steel & Wire Co.	Sterling, IL	33	7	70,984	1,224	0	6,496,608
17	General Motors Corp., Powertrain Defiance	Defiance, OH	33	17	331,912	6,461	0	6,069,061
18	Rouge Steel Co.	Dearborn, MI	33	7	23,355	2,630	0	0
19	Armco Inc.	Butler, PA	33	14	112,906	5,444,361	0	153,788
20	Elkem Metals Co.	Marietta, OH	33	6	218,375	326,987	0	4,763,725
21	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX	28	2	2,176	703	0	5,124,724
22	CPI, Consolidated Papers Inc.	Wisconsin Rapids, WI	26	12	1,167,213	113	0	0
23	BP Chemicals Inc.	Lima, OH	28	27	115,258	0	4,760,148	0
24	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT	33	14	97,945	2,151	0	4,139,586
25	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM	33	2	275,871	0	0	4,261,169
26	PCS Phosphate Co. Inc., Potash Corp. of Saskatchewan	Aurora, NC	28	6	164,776	3	0	4,196,711
27	Huntsman Petrochemical Corp., Huntsman Corp.	Port Arthur, TX	28	19	4,256,988	0	0	0
28	DuPont	Beaumont, TX	28	19	183,382	184	3,716,892	0
29	Pharmacia & Upjohn Co.	Portage, MI	28	23	141,111	67,803	1,565,804	0
30	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC	28	2	2,969	15	0	4,081,774
31	Hoechst-Celanese Chemical, Hoechst Corp., Clear Lake Plant	Pasadena, TX	28	20	350,749	0	3,479,003	0
32	ASARCO Inc., Glover Plant	Annapolis, MO	33	6	158,230	35	0	3,871,968
33	Warner-Lambert Co., Parke-Davis Div.	Holland, MI	28	12	80,292	0	875,518	0
34	Regal Ware Inc.	Kewaskum, WI	34	6	474	0	0	0
35	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO	33	10	106,458	149	0	3,467,234
36	FMC Corp.	Pocatello, ID	28	12	31,050	351	0	3,539,427
37	Chino Mines Co.	Hurley, NM	33	2	81,697	0	0	3,457,668
38	Boise Cascade Corp.	Saint Helens, OR	26	8	227,512	0	0	0
39	Ameristeel Corp., Jacksonville Mill Div.	Baldwin, FL	33	6	8,662	0	0	0
40	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX	28	16	88,605	331	3,385,759	3,675
41	Cerro Wire & Cable Co. Inc.	Hartselle, AL	33	3	120	6	0	0
42	U.S. Steel Gary Works, USX Corp.	Gary, IN	33	34	774,919	14,068	0	2,600,141
43	Eastman Kodak Co., Kodak Park	Rochester, NY	38	50	2,981,026	261,484	0	167
44	USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock, PA	33	7	15,004	971	0	0
45	Bayer Corp.	New Martinsville, WV	28	29	120,104	3,016,805	0	317
46	Hercules Inc.	Hopewell, VA	28	12	317,461	0	0	0
47	Sterling Chemicals Inc.	Texas City, TX	28	36	476,419	558	2,595,334	0
48	Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria, IL	33	4	607,486	542	0	165,402
49	Rubicon Inc.	Geismar, LA	28	24	135,663	72	2,903,039	0
50	Stone Container Corp.	Panama City, FL	26	10	736,833	0	0	53,416
	Subtotal			**681**	**66,396,203**	**25,456,337**	**48,932,770**	**93,020,173**
	% of Total			**1.2**	**13.3**	**34.6**	**69.5**	**67.9**
	Total			**57,927**	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**

* Chemicals accounting for more than 70% of the total releases and transfers from the facility.

➤ Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds in error. The facility has been omitted from this table.

➤ UIJ=underground Injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	29,619,647	0	0	0	0	29,619,647	Chlorine (air)
2	20,167,883	0	15	0	15	20,167,898	Zinc and compounds (land)
3	12,781,200	0	0	0	0	12,781,200	Carbon disulfide (air)
4	11,434,588	0	0	0	0	11,434,588	Copper and compounds, Zinc and compounds (land)
5	220,257	48,557	0	10,424,975	10,473,532	10,693,789	Zinc and compounds, Manganese and compounds (transfers to disposal)
6	9,740,764	0	0	524	524	9,741,288	Phosphoric acid (water)
7	9,372,031	3,469	0	6,553	10,022	9,382,053	Acetonitrile, Acrylic acid (UIJ)
8	8,737,254	478,515	0	0	478,515	9,215,769	Nitric acid and nitrate compounds (UIJ)
9	29,344	6,499	8,338,137	0	8,344,636	8,373,980	Nitric acid and nitrate compounds (transfers to sewage)
10	8,357,871	0	0	0	0	8,357,871	Carbon disulfide (air)
11	5,098,392	3,033,408	127	0	3,033,535	8,131,927	Lead and compounds (transfers to treatment), Copper/Zinc and compounds (land)
12	7,808,149	0	0	2,168	2,168	7,810,317	Nitric acid and nitrate compounds (UIJ)
13	5,105	392	0	7,659,066	7,659,458	7,664,563	Zinc and compounds (transfers to disposal)
14	585,534	64,010	10,955	6,299,311	6,374,276	6,959,810	Zinc and compounds (transfers to disposal)
15	6,507,414	120,545	0	11,067	131,612	6,639,026	Nitric acid and nitrate compounds (water)
16	6,568,816	65,170	0	0	65,170	6,633,986	Zinc and compounds, Manganese and compounds (land)
17	6,407,434	2,350	1,266	0	3,616	6,411,050	Zinc and compounds (land)
18	25,985	0	0	5,933,588	5,933,588	5,959,573	Zinc and compounds (transfers to disposal)
19	5,711,055	0	0	0	0	5,711,055	Nitric acid and nitrate compounds (water)
20	5,309,087	0	0	43,538	43,538	5,352,625	Manganese and compounds (land)
21	5,127,603	24,036	0	3,129	27,165	5,154,768	Chromium and compounds (land)
22	1,167,326	3,755,293	0	0	3,755,293	4,922,619	Methanol (transfers to treatment)
23	4,875,406	10,929	0	630	11,559	4,886,965	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
24	4,239,682	0	0	347,303	347,303	4,586,985	Copper and compounds, Zinc and compounds (land)
25	4,537,040	0	0	0	0	4,537,040	Copper and compounds (land)
26	4,361,490	0	0	0	0	4,361,490	Phosphoric acid (land)
27	4,256,988	20,581	0	11,517	32,098	4,289,086	Propylene (air)
28	3,900,458	271,136	0	12,890	284,026	4,184,484	Nitric acid and nitrate compounds (UIJ)
29	1,774,718	1,739,283	603,207	6,937	2,349,427	4,124,145	Methanol (UIJ), Dichloromethane (transfers to treatment)
30	4,084,758	4,535	0	0	4,535	4,089,293	Chromium and compounds (land)
31	3,829,752	15,328	200,266	41,544	257,138	4,086,890	Ethylene glycol (UIJ)
32	4,030,233	0	0	0	0	4,030,233	Zinc/Lead and compounds (land)
33	955,810	2,784,589	0	5	2,784,594	3,740,404	Methanol, Toluene (transfers to treatment, UIJ)
34	474	0	0	3,646,276	3,646,276	3,646,750	Aluminum oxide (transfers to disposal)
35	3,573,841	0	451	0	451	3,574,292	Zinc and compounds (land)
36	3,570,828	0	3	792	795	3,571,623	Zinc and compounds, Phosphorus (land)
37	3,539,365	0	0	0	0	3,539,365	Copper and compounds (land)
38	227,512	0	3,295,111	1,682	3,296,793	3,524,305	Methanol (transfers to sewage)
39	8,662	1,756,108	0	1,756,111	3,512,219	3,520,881	Zinc and compounds (transfers to treatment and to disposal)
40	3,478,370	12,310	0	0	12,310	3,490,680	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
41	126	0	0	3,440,012	3,440,012	3,440,138	Copper and compounds (transfers to disposal)
42	3,389,128	0	0	45,387	45,387	3,434,515	Zinc and compounds, Manganese and compounds (land)
43	3,242,677	137,186	571	11,545	149,302	3,391,979	Dichloromethane, Hydrochloric acid, Methanol (air)
44	15,975	0	0	3,260,898	3,260,898	3,276,873	Zinc and compounds (transfers to disposal)
45	3,137,226	1,397	0	19,860	21,257	3,158,483	Nitric acid and nitrate compounds (water)
46	317,461	0	2,839,848	0	2,839,848	3,157,309	Nitric acid and nitrate compounds, Ethylene glycol (transfers to sewage)
47	3,072,311	43,013	397	9,320	52,730	3,125,041	Acetonitrile, Nitric acid and nitrate compounds, Methanol, Acrylamide (UIJ)
48	773,430	2,351,091	0	0	2,351,091	3,124,521	Zinc and compounds (transfers to treatment)
49	3,038,774	9,453	0	12,606	22,059	3,060,833	Nitric acid and nitrate compounds, Methanol (UIJ)
50	790,249	0	2,268,082	0	2,268,082	3,058,331	Methanol (transfers to sewage)
	233,805,483	**16,759,183**	**17,558,436**	**43,009,234**	**77,326,853**	**311,132,336**	
	30.0	**15.1**	**20.4**	**34.7**	**24.1**	**28.2**	
	780,621,952	**110,901,271**	**86,130,663**	**124,047,657**	**321,079,591**	**1,101,701,543**	

5.3 Geographic Distribution

In both Canada and the United States, 50 facilities accounted for a large portion of the releases and 50 for a large portion of releases and transfers reported in 1996 to their respective PRTRs. Seven of the 10 Canadian provinces and 23 of the 53 US states and territories contained at least one of these facilities (**Maps 5–1** and **5–2**).

5.3.1 Top Facilities for Releases

Twenty-five of the top 50 NPRI facilities for releases were located in the province of Ontario, and they reported 58 percent of the province's releases. In three provinces—Alberta, Manitoba and New Brunswick—the top facilities reported more than 80 percent of all releases in the province (**Table 5–6**, p. 115).

The top 50 facilities for releases in the United States were less concentrated geographically than those in Canada. The state of Texas had nine of the top US facilities, and neighboring Louisiana had six. Both states are located on the Gulf of Mexico. Another 21 states also had one or more of the top facilities for releases. In five western states—Arizona, Montana, New Mexico, Utah and Wyoming—the facilities ranking among the top 50 nationally accounted for 80 percent or more of all releases from those states (**Tables 5–3**, pp. 106–7 and **5–7**, p. 116, **Map 5–1**).

5.3.2 Top Facilities for Releases and Transfers

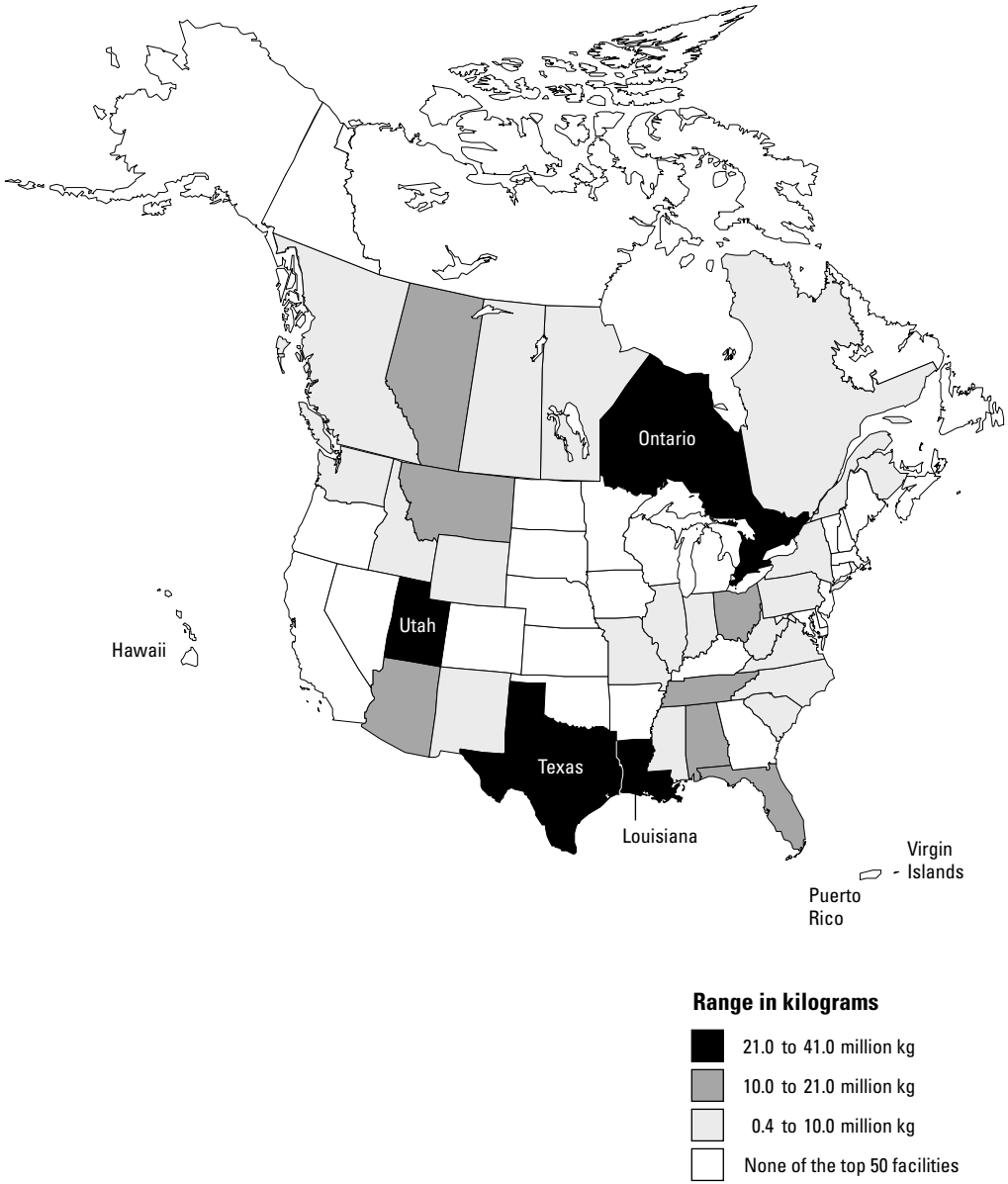
More than half of the top 50 facilities with the largest releases and transfers in Canada were located in Ontario: 30 of the top 50, out of a total of 733 Ontario facilities in the matched data set. These 30 facilities reported nearly two-thirds of the province's total releases and transfers. In contrast, six of Quebec's 336 facilities ranked among the top 50, and their NPRI reports amounted to 38 percent of Quebec's releases and transfers (**Tables 5–4**, pp. 108–9 and **5–8**, p. 117, **Map 5–2**).

Texas had nine of the top 50 TRI facilities for total releases and transfers (all but one were the same facilities as for total releases). Because of their relatively large transfers, four of the top 50 facilities for total releases and transfers were located in Michigan, a state with none of the top 50 facilities for total releases alone (**Table 5–9**, p. 118 and **Map 5–2**).

[Text continues on p. 119.]

Map 5–1
M 1996

States and Provinces with Top 50 Facilities for North American Releases



Map 5–2
M 1996

States and Provinces with Top 50 Facilities for North American Releases and Transfers

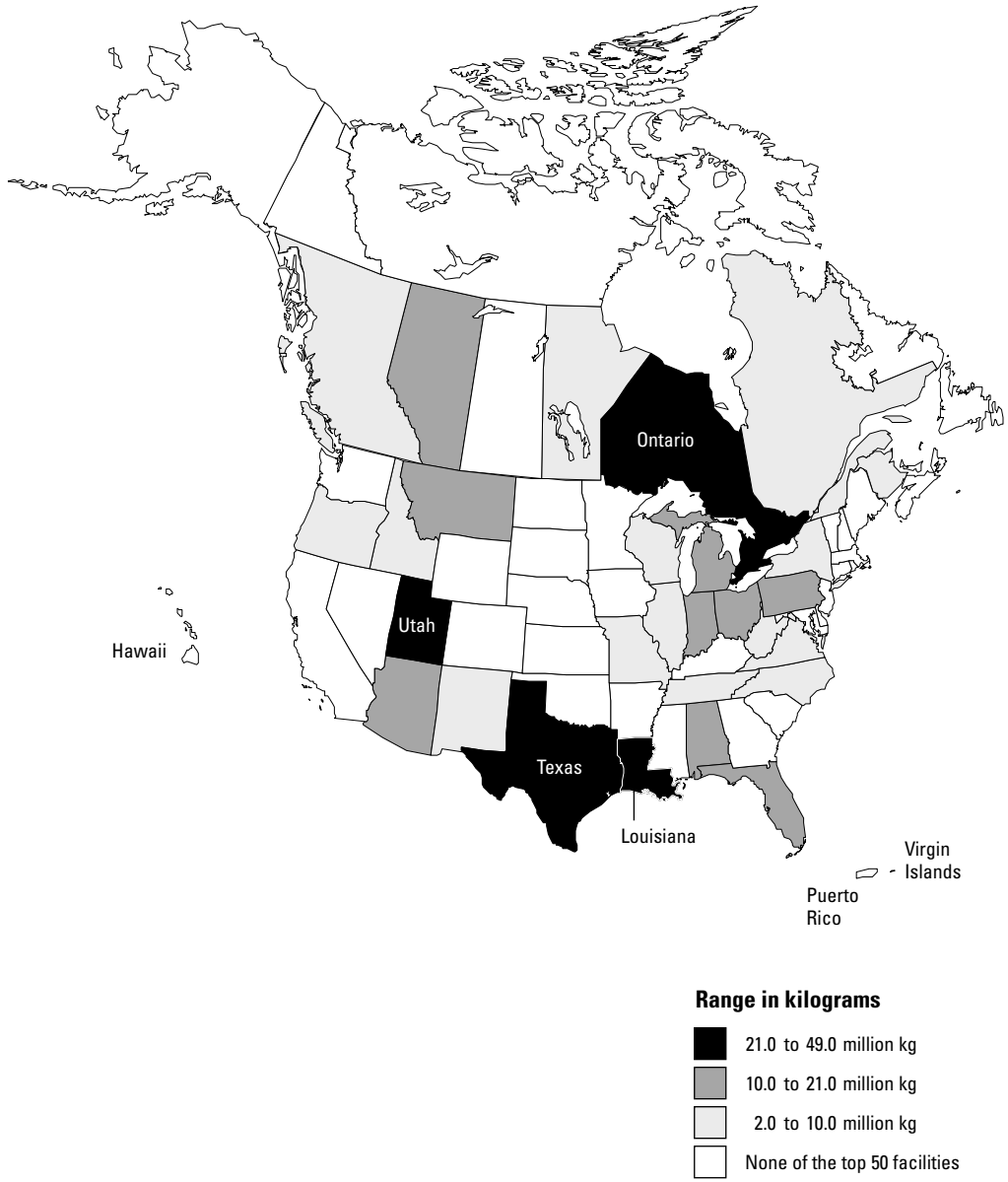


Table 5–6

M 1996

The 50 NPRI Facilities with the Largest Total Releases, by Province

		All NPRI Facilities		Top 50 Facilities		Top 50 Facilities as % All Facilities	
Rank	Province	Number of Facilities	Total Releases (kg)	Number of Facilities	Total Releases (kg)	Facilities (%)	Total Releases (%)
1	Ontario	733	38,711,456	25	22,298,946	3.4	57.6
2	Quebec	336	14,732,567	7	5,254,046	2.1	35.7
3	Alberta	96	14,621,572	9	11,875,450	9.4	81.2
4	British Columbia	70	5,710,382	4	2,482,000	5.7	43.5
5	New Brunswick	21	3,277,331	2	2,704,425	9.5	82.5
6	Manitoba	39	3,062,727	2	2,468,159	5.1	80.6
7	Nova Scotia	25	1,278,806	0	0	0.0	0.0
8	Saskatchewan	15	783,366	1	437,406	6.7	55.8
9	Newfoundland	7	400,700	0	0	0.0	0.0
10	Prince Edward Island	2	17,553	0	0	0.0	0.0
	Total	**1,344**	**82,596,460**	**50**	**47,520,432**	**3.7**	**57.5**

Table 5–7

M 1996

Top 50 TRI Facilities with Largest Releases, by State

State	All TRI Facilities		Top 50 Facilities		Top 50 Facilities as % All Facilities	
	Number of Facilities	Total Releases (kg)	Number of Facilities	Total Releases (kg)	Facilities (%)	Total Releases (%)
Texas	1,074	92,003,220	9	40,922,646	0.8	44.5
Louisiana	269	64,174,124	6	30,346,774	2.2	47.3
Ohio	1,462	40,039,996	3	16,591,914	0.2	41.4
Utah	128	36,400,466	2	33,859,344	1.6	93.0
Alabama	443	36,057,848	2	14,780,280	0.5	41.0
Tennessee	574	35,719,754	2	10,786,299	0.3	30.2
Illinois	1,165	33,027,544	2	9,282,522	0.2	28.1
North Carolina	769	30,841,068	2	8,446,238	0.3	27.4
Pennsylvania	1,083	27,501,052	1	5,711,006	0.1	20.8
Florida	447	26,649,236	3	12,862,574	0.7	48.3
Indiana	936	26,508,110	1	3,389,128	0.1	12.8
Michigan	795	22,389,445	0	0	0.0	0.0
Missouri	499	21,577,853	2	7,604,064	0.4	35.2
Montana	21	21,426,762	1	20,167,858	4.8	94.1
Arizona	172	20,648,276	3	19,094,990	1.7	92.5
Mississippi	274	20,414,695	2	5,099,177	0.7	25.0
Georgia	623	20,151,598	0	0	0.0	0.0
Virginia	395	19,742,050	1	1,989,589	0.3	10.1
South Carolina	439	19,028,607	1	2,462,222	0.2	12.9
Kentucky	380	12,713,763	0	0	0.0	0.0
New York	614	12,296,245	1	3,242,679	0.2	26.4
Oregon	222	11,873,289	0	0	0.0	0.0
Wisconsin	801	11,826,236	0	0	0.0	0.0
California	1,137	10,432,858	0	0	0.0	0.0
Arkansas	334	9,983,507	0	0	0.0	0.0
West Virginia	121	9,898,444	1	3,137,201	0.8	31.7
Washington	249	9,108,344	1	1,988,038	0.4	21.8
New Mexico	31	8,917,115	2	8,076,396	6.5	90.6
Iowa	353	8,421,028	0	0	0.0	0.0
Kansas	253	6,575,123	0	0	0.0	0.0
Minnesota	434	6,312,325	0	0	0.0	0.0
Oklahoma	261	5,913,300	0	0	0.0	0.0
New Jersey	514	5,441,829	0	0	0.0	0.0
Idaho	49	5,259,373	1	3,570,824	2.0	67.9
Maryland	162	4,168,265	0	0	0.0	0.0
Wyoming	25	3,314,989	1	2,787,823	4.0	84.1
Maine	73	3,129,685	0	0	0.0	0.0
Puerto Rico	140	3,027,614	0	0	0.0	0.0
Connecticut	285	2,638,903	0	0	0.0	0.0
Massachusetts	428	2,434,807	0	0	0.0	0.0
Nebraska	137	2,320,000	0	0	0.0	0.0
South Dakota	60	2,094,078	0	0	0.0	0.0
Nevada	42	1,464,414	0	0	0.0	0.0
Colorado	151	1,445,862	0	0	0.0	0.0
Delaware	62	1,051,473	0	0	0.0	0.0
Alaska	8	1,039,885	0	0	0.0	0.0
Rhode Island	125	971,547	0	0	0.0	0.0
New Hampshire	98	874,422	0	0	0.0	0.0
Virgin Islands	2	561,766	0	0	0.0	0.0
North Dakota	29	452,299	0	0	0.0	0.0
Vermont	32	187,807	0	0	0.0	0.0
Hawaii	9	169,656	0	0	0.0	0.0
District of Columbia	1	0	0	0	0.0	—
Total	**19,190**	**780,621,952**	**50**	**266,199,585**	**0.3**	**34.1**

Table 5–8
M 1996

The 50 NPRI Facilities with the Largest Total Releases and Transfers, by Province

		All NPRI Facilities		Top 50 Facilities		Top 50 Facilities as % All Facilities	
Rank	Province	Number of Facilities	Total Releases and Transfers (kg)	Number of Facilities	Total Releases and Transfers (kg)	Facilities (%)	Total Releases and Transfers (%)
1	Ontario	733	68,763,262	30	44,225,765	4.1	64.3
2	Quebec	336	22,940,209	6	8,706,288	1.8	38.0
3	Alberta	96	15,174,849	7	11,288,196	7.3	74.4
4	British Columbia	70	6,271,403	3	2,084,300	4.3	33.2
5	New Brunswick	21	4,852,765	3	4,427,725	14.3	91.2
6	Manitoba	39	3,308,100	1	2,031,067	2.6	61.4
7	Nova Scotia	25	1,600,964	0	0	0.0	0.0
8	Saskatchewan	15	799,321	0	0	0.0	0.0
9	Newfoundland	7	400,708	0	0	0.0	0.0
10	Prince Edward Island	2	17,553	0	0	0.0	0.0
	Total	**1,344**	**124,129,147**	**50**	**72,763,341**	**3.7**	**58.6**

Table 5–9

M 1996

Top 50 TRI Facilities with Largest Releases and Transfers, by State

State	All TRI Facilities		Top 50 Facilities		Top 50 Facilities as % All Facilities	
	Number of Facilities	Total Releases and Transfers (kg)	Number of Facilities	Total Releases and Transfers (kg)	Facilities (%)	Total Releases and Transfers (%)
Texas	1,074	122,292,324	9	48,559,509	0.8	39.7
Louisiana	269	67,921,157	3	22,184,090	1.1	32.7
Ohio	1,462	65,938,375	3	16,650,629	0.2	25.3
Pennsylvania	1,083	61,451,832	3	19,681,601	0.3	32.0
Michigan	795	50,084,864	4	20,783,844	0.5	41.5
Tennessee	574	46,502,196	1	8,357,878	0.2	18.0
Illinois	1,165	45,852,410	2	9,758,493	0.2	21.3
Indiana	936	45,448,692	2	11,099,041	0.2	24.4
Alabama	443	44,698,332	2	16,221,330	0.5	36.3
Utah	128	39,127,123	2	34,206,646	1.6	87.4
North Carolina	769	36,794,390	2	8,450,773	0.3	23.0
Florida	447	34,623,617	3	14,389,476	0.7	41.6
Missouri	499	28,183,720	2	7,604,516	0.4	27.0
Virginia	395	27,126,134	1	3,157,262	0.3	11.6
Wisconsin	801	26,292,731	2	8,569,340	0.2	32.6
South Carolina	439	26,106,525	0	0	0.0	0.0
Arizona	172	24,789,458	2	19,566,488	1.2	78.9
Georgia	623	24,543,082	0	0	0.0	0.0
Mississippi	274	21,956,131	0	0	0.0	0.0
Montana	21	21,451,550	1	20,167,875	4.8	94.0
California	1,137	20,263,904	0	0	0.0	0.0
New York	614	19,878,148	1	3,391,982	0.2	17.1
Oregon	222	18,401,102	1	3,524,251	0.5	19.2
Kentucky	380	17,247,741	0	0	0.0	0.0
New Jersey	514	16,983,534	0	0	0.0	0.0
Arkansas	334	13,260,690	0	0	0.0	0.0
Iowa	353	13,079,861	0	0	0.0	0.0
West Virginia	121	12,992,851	1	3,158,459	0.8	24.3
Washington	249	10,778,446	0	0	0.0	0.0
Kansas	253	10,685,022	0	0	0.0	0.0
Minnesota	434	10,063,445	0	0	0.0	0.0
New Mexico	31	9,126,514	2	8,076,396	6.5	88.5
Massachusetts	428	8,138,712	0	0	0.0	0.0
Oklahoma	261	8,006,662	0	0	0.0	0.0
Maryland	162	7,447,639	0	0	0.0	0.0
Puerto Rico	140	6,476,130	0	0	0.0	0.0
Connecticut	285	6,046,770	0	0	0.0	0.0
Idaho	49	5,393,039	1	3,571,620	2.0	66.2
Nebraska	137	4,204,339	0	0	0.0	0.0
Maine	73	3,821,350	0	0	0.0	0.0
Wyoming	25	3,330,182	0	0	0.0	0.0
South Dakota	60	2,721,267	0	0	0.0	0.0
Delaware	62	2,658,011	0	0	0.0	0.0
Colorado	151	2,594,241	0	0	0.0	0.0
Nevada	42	1,511,093	0	0	0.0	0.0
Rhode Island	125	1,351,424	0	0	0.0	0.0
New Hampshire	98	1,286,954	0	0	0.0	0.0
Alaska	8	1,039,945	0	0	0.0	0.0
Virgin Islands	2	732,949	0	0	0.0	0.0
North Dakota	29	511,257	0	0	0.0	0.0
Vermont	32	310,375	0	0	0.0	0.0
Hawaii	9	173,191	0	0	0.0	0.0
District of Columbia	1	115	0	0	0.0	0.0
Total	**19,190**	**1,101,701,543**	**50**	**311,131,499**	**0.3**	**28.2**

5.4 Chemical Distribution

In both countries, two dozen chemicals constituted the great majority of releases and transfers in the matched data set for 1996.

Top Chemicals for Releases

The top 25 chemicals for total releases in NPRI and the analogous group in TRI represented about nine-tenths of the respective PRTRs' releases in the matched data set (**Tables 5–10**, p. 122 and **5–11**, p. 123).

In both countries, the top 25 chemicals represented a higher percentage of surface water discharges than of other environmental releases. In NPRI, the top chemicals amounted to 96 percent of the releases to surface waters. In TRI, the percentage for the top chemicals was even higher: 99 percent. The top 25 chemicals were least dominant in underground injection in the United States (81 percent of all underground injection) and in on-site land releases in Canada (87 percent of all on-site land releases).

Twenty of the top 25 chemicals for total releases were the same in both systems, including four of the top five chemicals. Methanol ranked first in both NPRI and TRI. Methanol was more dominant in NPRI reporting, with about 25 percent of both total releases and releases to air. In TRI, methanol accounted for 14 percent of total releases and 19 percent of air emissions. Other chemicals that appeared in the top five in both lists were toluene, xylene, and zinc and its compounds (**Figure 5–5**).

The NPRI and TRI top chemicals generally determined the pattern of releases in each PRTR, as well as the differences between the two. For the other chemical substances and groups in the matched data set, the distribution of releases was quite different, both within NPRI and TRI and between them. For example, NPRI facilities reported a smaller percentage of air emissions for the chemicals that were not in the top 25, while TRI facilities reported a larger percentage (**Figure 5–6**, see also **Tables 5–10**, p. 122 and **5–11**, p. 123).

Top Chemicals for Transfers

The top 25 chemicals for total transfers represented 98 percent of all transfers reported to NPRI in the 1996 matched data set. In TRI, the top 25 chemicals amounted to 91 percent of all transfers. NPRI's top chemicals accounted for more than 96 percent of all three types of transfers. TRI reporting showed a somewhat greater range, from 83 percent of transfers to treatment/destruction to 97 percent of transfers to disposal/containment (**Tables 5–12**, p. 124 and **5–13**, p. 125).

Twenty-one of the top 25 chemicals for total transfers were the same in NPRI and TRI, including the top five in both PRTRs. Zinc and its compounds led both lists, accounting for 30 percent of all NPRI transfers and 21 percent of those in TRI (**Figure 5–7**).

In both countries, facilities transferred the largest amounts of the top 25 chemicals to disposal/containment. The top 25 chemicals for transfers in NPRI were more likely to be sent to disposal/containment than those in TRI. In NPRI, 56 percent of the top chemicals were transferred to disposal/containment, compared to 41 percent in TRI. NPRI facilities were much less likely than TRI facilities to transfer the top chemicals to sewage treatment plants (sewage/POTWs); these destinations received 12 percent of NPRI transfers and 27 percent of TRI transfers of the top chemicals (**Figure 5–8**).

Top Chemicals for Releases and Transfers

The top 25 chemicals for total releases and transfers represented 92 percent of all releases and transfers reported in NPRI and 88 percent of those in TRI in the 1996 matched data set, although the two lists of top chemicals differ somewhat. Nineteen chemicals ranked among the top 25 in both PRTRs (**Tables 5–14**, p. 126 and **5–15**, p. 127).

Considerable overlap characterizes the ranking of chemicals for individual types of releases or transfers. The top 10 chemicals in each of the seven release and transfer categories added to a total of 30 chemicals in NPRI and 35 in TRI (of a possible maximum of 70 chemicals in each case). In NPRI, methanol and zinc and its compounds each ranked first in three of the release/transfer types. In TRI, zinc and its compounds ranked first in three categories, while methanol and nitric acid and nitrate compounds each ranked first in two categories (**Tables 5–16**, p. 132 and **5–17**, p. 133).

[Text continues on p. 129.]

Figure 5–5
M 1996
Top Five Chemicals for Total Releases, NPRI and/or TRI

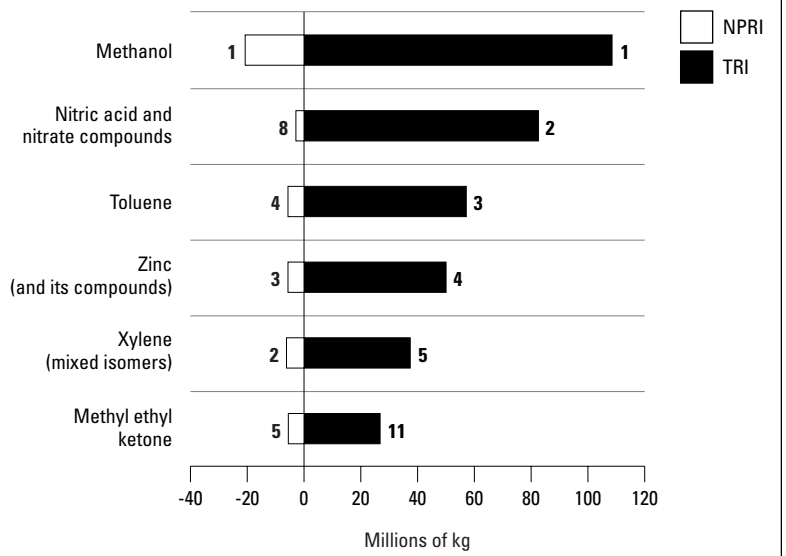


Figure 5–6
M 1996

NPRI and TRI Total Releases, Top 25 Chemicals and All Others

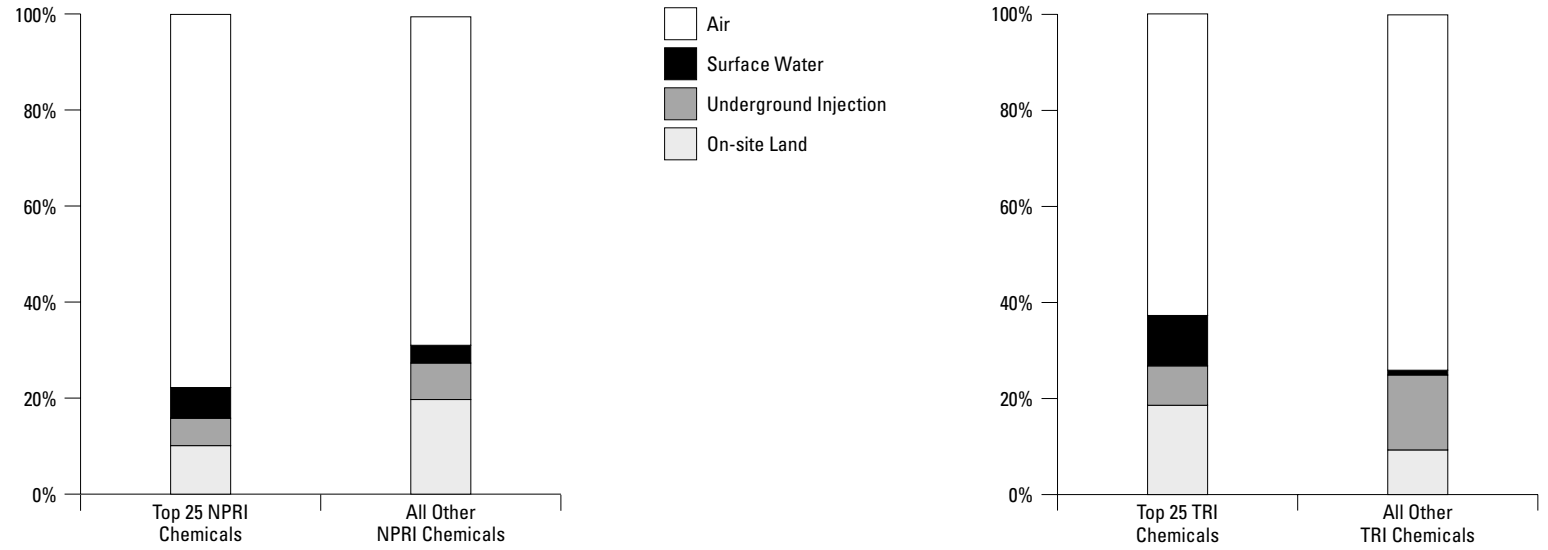


Figure 5–7
M 1996

Top Five Chemicals for Total Transfers, NPRI and/or TRI

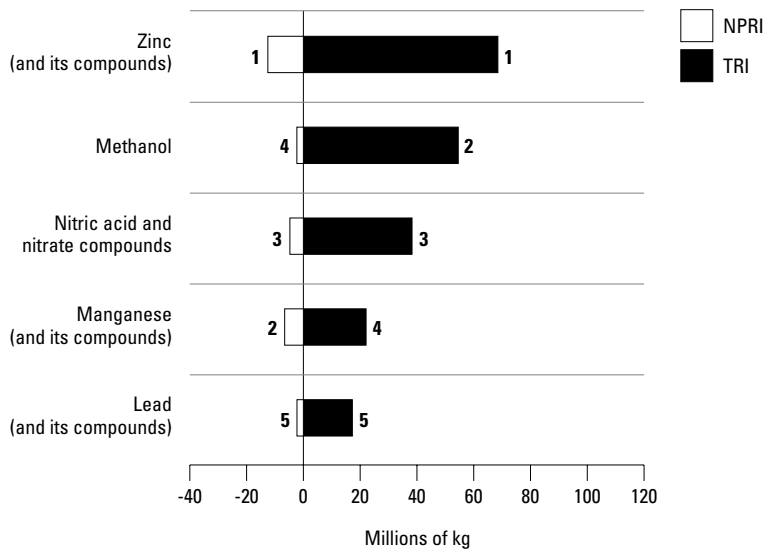


Figure 5–8
M 1996

NPRI and TRI Total Transfers, Top 25 Chemicals and All Others

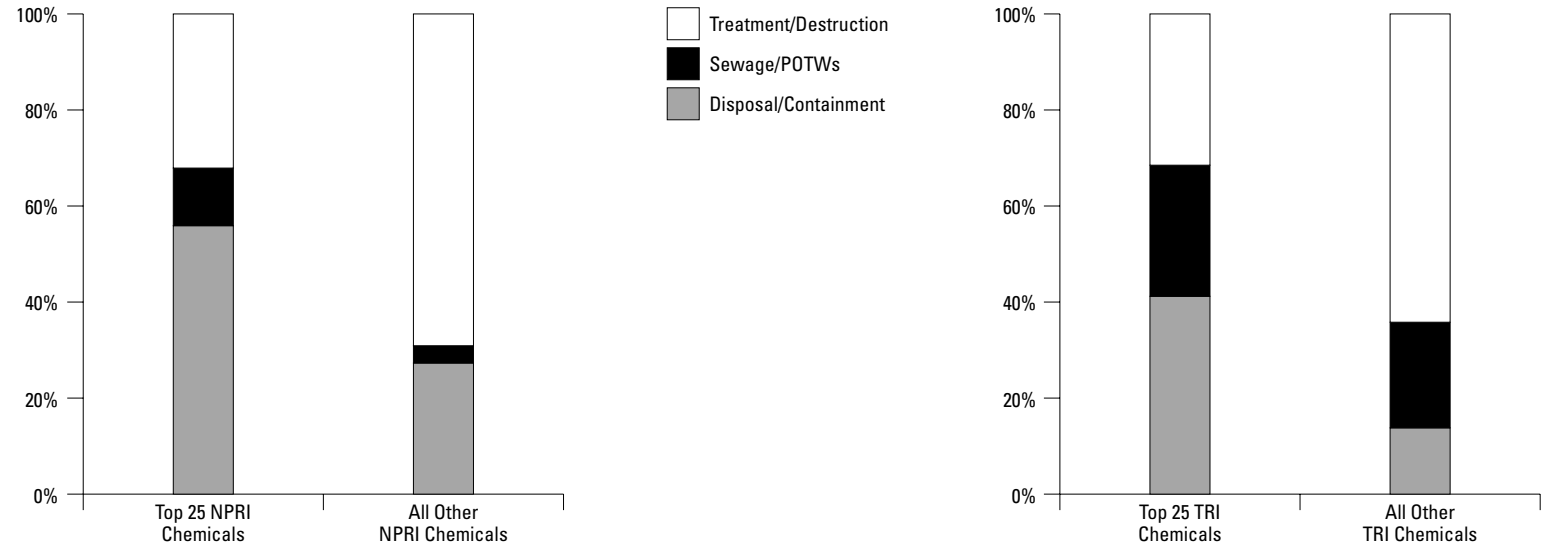


Table 5–10

M 1996

The 25 NPRI Chemicals with the Largest Total Releases

Rank	CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total
1	67-56-1	Methanol	15,986,271	2,171,829	2,520,000	43,206	20,728,580	25.1
2	1330-20-7	Xylene (mixed isomers)	6,128,003	1,625	11,866	22,938	6,173,036	7.5
3	—	Zinc (and its compounds)	616,629	105,297	334	4,918,575	5,648,068	6.8
4	108-88-3	Toluene	5,567,523	6,612	19,899	44,912	5,647,128	6.8
5	78-93-3	Methyl ethyl ketone	4,417,901	300	1,100,000	2,181	5,527,348	6.7
6	7664-93-9	Sulfuric acid	4,925,552	0	0	0	4,925,552	6.0
7	110-82-7	Cyclohexane	2,972,491	1,009	10	988	2,974,623	3.6
8	—	Nitric acid and nitrate compounds	100,994	2,113,407	602,580	40,712	2,859,435	3.5
9	74-85-1	Ethylene	2,243,568	0	484	0	2,246,030	2.7
10	75-09-2	Dichloromethane	2,195,732	0	0	49	2,198,402	2.7
11	—	Manganese (and its compounds)	63,939	231,904	0	1,577,548	1,882,245	2.3
12	7664-39-3	Hydrogen fluoride	1,819,963	0	0	540	1,820,510	2.2
13	71-43-2	Benzene	1,723,715	943	42,971	29,119	1,796,748	2.2
14	50-00-0	Formaldehyde	1,110,808	233,253	52,580	150	1,399,467	1.7
15	—	Lead (and its compounds)	560,640	6,124	45	820,693	1,393,051	1.7
16	7647-01-0	Hydrochloric acid	1,312,809	0	0	0	1,312,809	1.6
17	10049-04-4	Chlorine dioxide	1,169,215	0	0	0	1,169,215	1.4
18	71-36-3	n-Butyl alcohol	1,102,434	21	0	30	1,108,007	1.3
19	115-07-1	Propylene	993,949	0	484	0	995,162	1.2
20	7782-50-5	Chlorine	881,704	17,853	0	0	904,783	1.1
21	100-42-5	Styrene	859,930	30	468	202	866,408	1.0
22	79-01-6	Trichloroethylene	836,512	46	0	0	837,692	1.0
23	108-10-1	Methyl isobutyl ketone	748,383	47	0	29	749,618	0.9
24	—	Copper (and its compounds)	431,233	14,263	10	234,312	684,293	0.8
25	74-87-3	Chloromethane	648,500	5	0	0	648,505	0.8
		Subtotal	**59,418,398**	**4,904,568**	**4,351,731**	**7,736,184**	**76,496,715**	**92.6**
		% of Total NPRI Releases	**93.4**	**95.6**	**90.4**	**86.6**	**92.6**	
		Total NPRI Releases	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**	**100.0**

Table 5–11

M 1996

The 25 TRI Chemicals with the Largest Total Releases

Rank	CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total
1	67-56-1	Methanol	93,496,105	3,333,141	10,794,152	875,299	108,498,698	13.9
2	—	Nitric acid and nitrate compounds	1,554,400	53,482,386	25,797,068	1,736,834	82,570,687	10.6
3	108-88-3	Toluene	56,718,683	31,041	149,218	250,435	57,149,376	7.3
4	—	Zinc (and its compounds)	3,387,061	488,278	58,729	46,096,185	50,030,253	6.4
5	1330-20-7	Xylene (mixed isomers)	37,309,630	17,983	59,343	22,994	37,409,950	4.8
6	75-15-0	Carbon disulfide	33,007,810	30,184	1,718	122	33,039,834	4.2
7	7782-50-5	Chlorine	30,115,374	172,201	33,649	141,784	30,463,008	3.9
8	7647-01-0	Hydrochloric acid	28,660,546	0	0	0	28,660,546	3.7
9	—	Manganese (and its compounds)	4,064,808	915,423	8,025	22,761,845	27,750,101	3.6
10	7664-38-2	Phosphoric acid	475,185	12,864,958	4,406	14,267,901	27,612,450	3.5
11	78-93-3	Methyl ethyl ketone	26,501,738	33,895	196,268	63,310	26,795,211	3.4
12	—	Copper (and its compounds)	3,122,784	48,981	154,070	23,317,789	26,643,624	3.4
13	75-09-2	Dichloromethane	23,853,107	4,558	339,912	2,121	24,199,698	3.1
14	100-42-5	Styrene	18,936,497	5,834	103,545	119,995	19,165,872	2.5
15	74-85-1	Ethylene	16,191,119	11,441	0	127	16,202,687	2.1
16	—	Chromium (and its compounds)	403,529	322,479	16,976	12,199,556	12,942,540	1.7
17	115-07-1	Propylene	11,962,800	3,235	0	775	11,966,810	1.5
18	71-36-3	n-Butyl alcohol	10,309,596	28,089	1,112,021	2,782	11,452,488	1.5
19	75-05-8	Acetonitrile	458,701	5,397	10,352,250	22	10,816,370	1.4
20	79-01-6	Trichloroethylene	9,625,277	245	585	8,227	9,634,334	1.2
21	50-00-0	Formaldehyde	5,145,781	145,126	4,264,524	51,885	9,607,316	1.2
22	7664-93-9	Sulfuric acid	8,805,762	0	0	0	8,805,762	1.1
23	108-10-1	Methyl isobutyl ketone	8,526,649	10,235	73,469	2,203	8,612,556	1.1
24	—	Lead (and its compounds)	817,653	28,045	360	6,791,505	7,637,563	1.0
25	107-21-1	Ethylene glycol	2,708,590	779,183	3,491,415	185,375	7,164,563	0.9
		Subtotal	**436,159,184**	**72,762,340**	**57,011,705**	**128,899,067**	**694,832,296**	**89.0**
		% of TRI Total	**87.3**	**98.8**	**81.0**	**94.2**	**89.0**	
		Total TRI Releases	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**	**780,621,952**	**100.0**

Table 5–12

M 1996

The 25 NPRI Chemicals with the Largest Transfers

Rank	CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total
1	—	Zinc (and its compounds)	2,809,386	11,090	9,694,801	12,515,277	30.1
2	—	Manganese (and its compounds)	515,746	4,147	6,070,014	6,589,907	15.9
3	—	Nitric acid and nitrate compounds	49,304	4,585,037	118,754	4,753,095	11.4
4	67-56-1	Methanol	2,084,674	43,104	168,856	2,296,634	5.5
5	—	Lead (and its compounds)	196,217	2,376	2,057,027	2,255,620	5.4
6	—	Chromium (and its compounds)	575,785	7,318	1,670,586	2,253,689	5.4
7	1330-20-7	Xylene (mixed isomers)	1,984,173	96	45,409	2,029,678	4.9
8	108-88-3	Toluene	1,728,768	1,270	24,011	1,754,049	4.2
9	1332-21-4	Asbestos (friable)	0	0	917,016	917,016	2.2
10	78-93-3	Methyl ethyl ketone	821,930	72	6,687	828,689	2.0
11	—	Copper (and its compounds)	88,681	4,495	658,035	751,211	1.8
12	108-95-2	Phenol	276,018	101,260	285,493	662,771	1.6
13	107-21-1	Ethylene glycol	384,848	56,750	80,276	521,874	1.3
14	—	Nickel (and its compounds)	216,967	11,427	272,761	501,155	1.2
15	7664-38-2	Phosphoric acid	47,537	22,357	330,110	400,004	1.0
16	71-36-3	n-Butyl alcohol	374,201	10,309	3,841	388,351	0.9
17	50-00-0	Formaldehyde	217,333	51,999	33,382	302,714	0.7
18	100-42-5	Styrene	192,604	237	62,264	255,105	0.6
19	7429-90-5	Aluminum (fume or dust)	0	1,360	216,873	218,233	0.5
20	110-82-7	Cyclohexane	198,973	0	52	199,025	0.5
21	1344-28-1	Aluminum oxide (fibrous forms)	28	0	118,472	118,500	0.3
22	75-05-8	Acetonitrile	110,700	0	0	110,700	0.3
23	75-09-2	Dichloromethane	85,222	4,800	300	90,322	0.2
24	108-10-1	Methyl isobutyl ketone	80,461	0	1,171	81,632	0.2
25	71-43-2	Benzene	74,026	21	724	74,771	0.2
		Subtotal	**13,113,582**	**4,919,525**	**22,836,915**	**40,870,022**	**98.4**
		% of NPRI Total	**96.6**	**99.5**	**99.2**	**98.4**	
		Total NPRI Transfers	**13,571,799**	**4,943,234**	**23,017,654**	**41,532,687**	**100.0**

Table 5–13
M 1996

The 25 TRI Chemicals with the Largest Transfers

Rank	CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total
1	—	Zinc (and its compounds)	19,512,938	194,100	48,800,815	68,507,854	21.3
2	67-56-1	Methanol	16,881,112	37,021,162	640,291	54,542,565	17.0
3	—	Nitric acid and nitrate compounds	7,633,649	28,778,509	1,856,059	38,268,216	11.9
4	—	Manganese (and its compounds)	3,475,948	179,423	18,426,293	22,081,664	6.9
5	—	Lead (and its compounds)	6,383,793	21,542	10,841,028	17,246,363	5.4
6	—	Copper (and its compounds)	1,410,033	238,345	9,714,108	11,362,486	3.5
7	107-21-1	Ethylene glycol	2,693,619	7,522,386	1,134,737	11,350,741	3.5
8	108-88-3	Toluene	9,986,929	272,022	482,663	10,741,614	3.3
9	—	Chromium (and its compounds)	1,791,866	134,465	7,562,568	9,488,899	3.0
10	75-09-2	Dichloromethane	5,344,261	290,380	868,408	6,503,050	2.0
11	—	Nickel (and its compounds)	1,326,369	81,408	3,723,600	5,131,377	1.6
12	1344-28-1	Aluminum oxide (fibrous forms)	16,469	602	4,242,086	4,259,157	1.3
13	1330-20-7	Xylene (mixed isomers)	3,613,112	221,244	225,364	4,059,721	1.3
14	7429-90-5	Aluminum (fume or dust)	68,763	5,784	3,513,816	3,588,363	1.1
15	108-95-2	Phenol	1,610,449	1,487,206	458,678	3,556,333	1.1
16	7664-38-2	Phosphoric acid	823,271	1,245,140	1,043,546	3,111,958	1.0
17	100-42-5	Styrene	1,243,597	119,942	1,470,682	2,834,221	0.9
18	78-93-3	Methyl ethyl ketone	2,183,464	271,347	134,527	2,589,338	0.8
19	—	Antimony (and its compounds)	409,215	53,041	2,004,228	2,466,484	0.8
20	75-05-8	Acetonitrile	1,691,405	409,410	248,614	2,349,428	0.7
21	71-36-3	n-Butyl alcohol	549,014	844,797	143,121	1,536,932	0.5
22	1332-21-4	Asbestos (friable)	34	341	1,503,906	1,504,281	0.5
23	—	Arsenic (and its compounds)	822,904	241	563,941	1,387,086	0.4
24	7664-39-3	Hydrogen fluoride	935,985	152,593	250,816	1,339,395	0.4
25	108-90-7	Chlorobenzene	1,271,215	3,691	58,202	1,333,108	0.4
		Subtotal	**91,679,415**	**79,549,122**	**119,912,098**	**291,140,634**	**90.7**
		% of TRI Total	**82.7**	**92.4**	**96.7**	**90.7**	
		Total TRI Transfers	**110,901,271**	**86,130,663**	**124,047,657**	**321,079,591**	**100.0**

Table 5–14

M 1996

The 25 NPRI Chemicals with the Largest Total Releases and Transfers

Rank	CAS Number	Chemical	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total
1	67-56-1	Methanol	244	20,728,580	2,296,634	23,025,214	18.5
2	—	Zinc (and its compounds)	307	5,648,068	12,515,277	18,163,345	14.6
3	—	Manganese (and its compounds)	233	1,882,245	6,589,907	8,472,152	6.8
4	1330-20-7	Xylene (mixed isomers)	228	6,173,036	2,029,678	8,202,714	6.6
5	—	Nitric acid and nitrate compounds	124	2,859,435	4,753,095	7,612,530	6.1
6	108-88-3	Toluene	229	5,647,128	1,754,048	7,401,176	6.0
7	78-93-3	Methyl ethyl ketone	129	5,527,348	828,689	6,356,037	5.1
8	7664-93-9	Sulfuric acid	70	4,925,552	0	4,925,552	4.0
9	—	Lead (and its compounds)	130	1,393,051	2,255,620	3,648,671	2.9
10	110-82-7	Cyclohexane	32	2,974,623	199,025	3,173,648	2.6
11	—	Chromium (and its compounds)	213	493,593	2,253,689	2,747,282	2.2
12	75-09-2	Dichloromethane	50	2,198,402	90,322	2,288,724	1.8
13	74-85-1	Ethylene	39	2,246,030	179	2,246,209	1.8
14	71-43-2	Benzene	43	1,796,748	74,771	1,871,519	1.5
15	7664-39-3	Hydrogen fluoride	30	1,820,510	74	1,820,584	1.5
16	50-00-0	Formaldehyde	84	1,399,467	302,714	1,702,181	1.4
17	71-36-3	n-Butyl alcohol	77	1,108,007	388,350	1,496,357	1.2
18	—	Copper (and its compounds)	225	684,293	751,211	1,435,504	1.2
19	7647-01-0	Hydrochloric acid	71	1,312,809	0	1,312,809	1.1
20	10049-04-4	Chlorine dioxide	42	1,169,215	0	1,169,215	0.9
21	100-42-5	Styrene	73	866,408	255,105	1,121,513	0.9
22	1332-21-4	Asbestos (friable)	32	155,193	917,016	1,072,209	0.9
23	107-21-1	Ethylene glycol	141	517,959	521,874	1,039,833	0.8
24	115-07-1	Propylene	34	995,162	0	995,162	0.8
25	108-95-2	Phenol	59	320,882	662,771	983,653	0.8
		Subtotal	**2,939**	**74,843,744**	**39,440,049**	**114,283,793**	**92.1**
		% of Total	**68.4**	**90.6**	**95.0**	**92.1**	
		Total NPRI Releases and Transfers	**4,298**	**82,596,460**	**41,532,687**	**124,129,147**	

Table 5–15
M 1996

The 25 TRI Chemicals with the Largest Total Releases and Transfers

Rank	CAS Number	Chemical	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total
1	67-56-1	Methanol	2,296	108,498,698	54,542,565	163,041,263	14.8
2	—	Nitric acid and nitrate compounds	2,524	82,570,687	38,268,216	120,838,902	11.0
3	—	Zinc (and its compounds)	2,932	50,030,253	68,507,854	118,538,107	10.8
4	108-88-3	Toluene	3,155	57,149,376	10,741,614	67,890,990	6.2
5	—	Manganese (and its compounds)	2,554	27,750,101	22,081,664	49,831,765	4.5
6	1330-20-7	Xylene (mixed isomers)	3,015	37,409,950	4,059,721	41,469,671	3.8
7	—	Copper (and its compounds)	4,061	26,643,624	11,362,486	38,006,110	3.4
8	75-15-0	Carbon disulfide	93	33,039,834	152,506	33,192,340	3.0
9	7782-50-5	Chlorine	1,266	30,463,008	680,364	31,143,372	2.8
10	7664-38-2	Phosphoric acid	2,669	27,612,450	3,111,958	30,724,408	2.8
11	75-09-2	Dichloromethane	888	24,199,698	6,503,050	30,702,748	2.8
12	78-93-3	Methyl ethyl ketone	2,062	26,795,211	2,589,338	29,384,550	2.7
13	7647-01-0	Hydrochloric acid	890	28,660,546	0	28,660,546	2.6
14	—	Lead (and its compounds)	1,640	7,637,562	17,246,363	24,883,926	2.3
15	—	Chromium (and its compounds)	3,154	12,942,540	9,488,899	22,431,439	2.0
16	100-42-5	Styrene	1,465	19,165,872	2,834,221	22,000,093	2.0
17	107-21-1	Ethylene glycol	1,240	7,164,563	11,350,741	18,515,305	1.7
18	74-85-1	Ethylene	292	16,202,687	505,892	16,708,579	1.5
19	75-05-8	Acetonitrile	100	10,816,370	2,349,428	13,165,798	1.2
20	71-36-3	n-Butyl alcohol	1,028	11,452,488	1,536,932	12,989,420	1.2
21	115-07-1	Propylene	338	11,966,810	127,269	12,094,079	1.1
22	50-00-0	Formaldehyde	765	9,607,316	1,324,117	10,931,433	1.0
23	79-01-6	Trichloroethylene	657	9,634,334	792,953	10,427,288	0.9
24	108-10-1	Methyl isobutyl ketone	897	8,612,556	708,730	9,321,287	0.8
25	108-95-2	Phenol	743	5,323,154	3,556,333	8,879,487	0.8
		Subtotal	**40,724**	**691,349,688**	**274,423,214**	**965,772,906**	**87.7**
		% of Total	**70.3**	**88.6**	**85.5**	**87.7**	
		Total TRI Releases and Transfers	**57,927**	**780,621,952**	**321,079,591**	**1,101,701,543**	**100.0**

5.4.1 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. Forty-five substances in the matched data set have been designated as known or suspected carcinogens by one or both of these agencies.

Releases of Carcinogens

In 1996, NPRI facilities reported releasing 11 million kg of substances designated as known or suspected carcinogens, while TRI facilities reported 115 million kg of such releases. These represented comparable percentages of total releases—13 percent of all releases in NPRI and 15 percent in TRI. In both NPRI and TRI, dichloromethane ranked first for carcinogen releases (principally air emissions), accounting for about 20 percent of carcinogen releases reported in both PRTRs (**Tables 5–18**, p. 134 and **5–19**, p. 135).

Emissions to air were the most common release of designated carcinogens in both PRTRs—79 percent of the NPRI releases and 71 percent of the TRI releases (**Figure 5–9**).

Transfers of Carcinogens

In 1996, NPRI transfers of substances designated as known or suspected carcinogens totaled 7 million kg, and TRI transfers of these substances totaled 56 million kg. As with carcinogen releases, the transfers represented comparable percentages of total transfers in the two PRTRs—17 percent of all transfers. Lead and its compounds ranked first for carcinogen transfers in both NPRI and TRI, and the largest amounts were transferred to disposal/containment. Lead and its compounds accounted for nearly one-third of the carcinogen transfers in both PRTRs (**Tables 5–20**, p. 136 and **5–21**, p. 137).

Disposal/containment was the most common disposition of carcinogen transfers in both PRTRs. This was especially true in NPRI, where 74 percent of the transfers of carcinogens were sent for disposal/containment. In TRI, 52 percent of the carcinogen transfers were directed to disposal/containment (**Figure 5–10**).

Releases and Transfers of Carcinogens

Releases and transfers of known or suspected carcinogens totaled 18 million kg in NPRI and 171 million kg in TRI for the matched data set for 1996. NPRI facilities reported 40 of the 45 designated carcinogens, and TRI facilities reported 44 of these substances. Chromium and its compounds, dichloromethane and lead and its compounds ranked highest for releases and transfers of carcinogens in both PRTRs, although in different order (**Tables 5–22**, p. 138 and **5–23**, p. 139).

Although one-fourth of the forms submitted in both NPRI and TRI were for the designated carcinogens, releases and transfers of these substances amounted to approximately 15 percent of all releases and transfers reported in each PRTR.

Figure 5–9
M 1996
NPRI and TRI Releases of Known or Suspected Carcinogens†

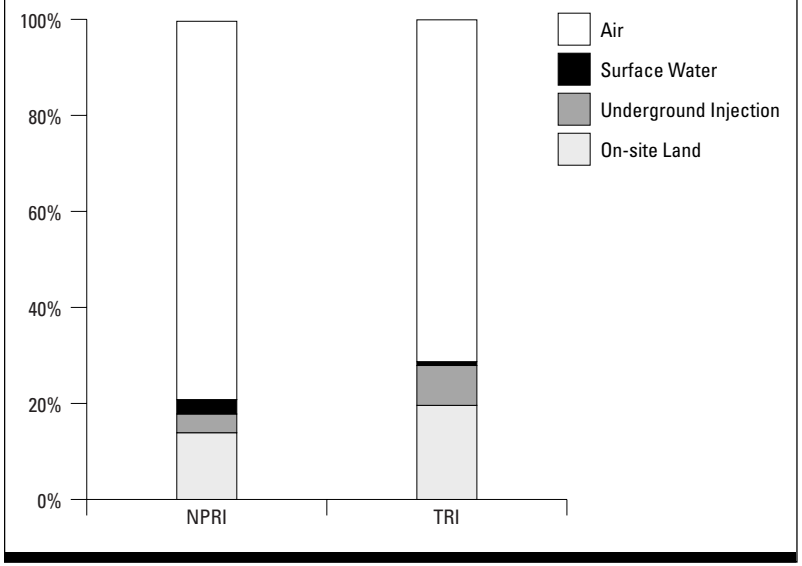
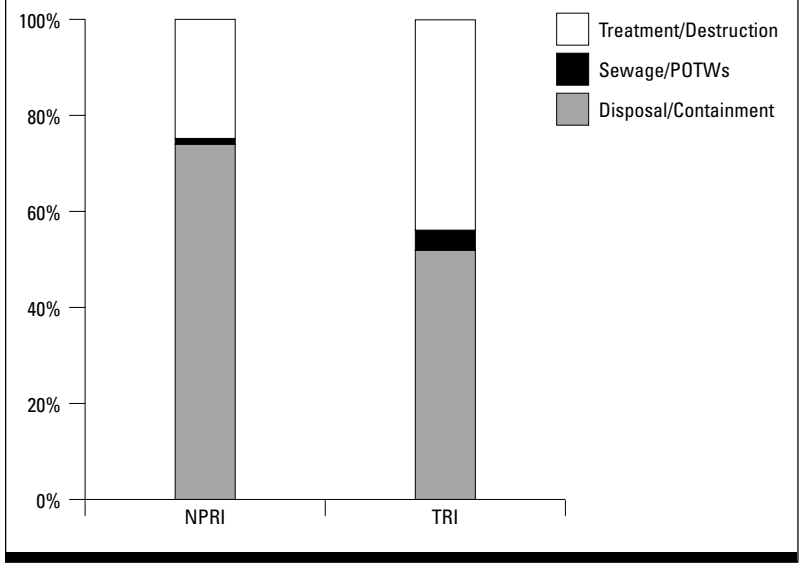


Figure 5–10
M 1996
NPRI and TRI Transfers of Known or Suspected Carcinogens†



† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Top Facilities for Releases and Transfers of Carcinogens

Releases. The top 50 NPRI facilities for total releases of substances designated as known or suspected carcinogens submitted 11 percent of the NPRI forms for carcinogens and reported 73 percent of the NPRI releases of these substances. In TRI, the top 50 facilities for total releases of designated carcinogens submitted one percent of the forms for such substances and reported 36 percent of the releases (**Figure 5–11** and **Tables 5–24**, pp. 140–41 and **5–25**, pp. 142–43).

The greatest difference appeared in the proportion of carcinogen releases to air and surface waters in the two countries. In NPRI, the top 50 facilities reported 69 percent of the air emissions and 78 percent of the surface water discharges of designated carcinogens. In TRI, the top 50 facilities accounted for approximately 16 percent of both types of carcinogen releases.

Releases and Transfers. Total releases and transfers of designated carcinogens were also highly concentrated among the NPRI and TRI facilities reporting the largest amounts. The top 50 NPRI facilities reported two-thirds of all NPRI releases and transfers of these substances. The top 50 TRI facilities reported nearly one-third of the TRI releases and transfers of the designated carcinogens (**Figure 5–12** and **Tables 5–26**, pp. 144–45 and **5–27**, pp. 146–47).

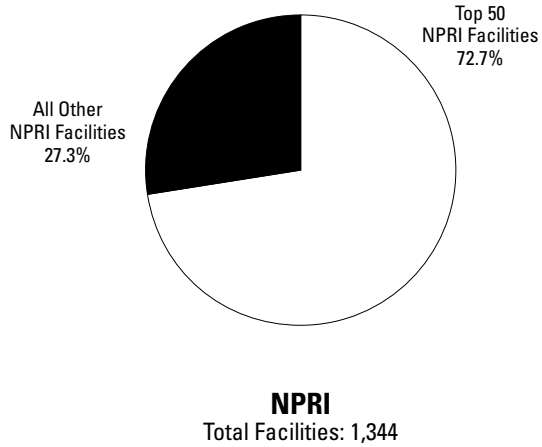
The top NPRI facilities reported more than half of the NPRI releases and transfers of these chemicals in all categories except transfers to sewage/POTWs, the smallest type of release or transfer for carcinogens. The top TRI facilities reported the majority of TRI releases of carcinogens in two release categories only (underground injection and on-site land releases).

Among these 50 NPRI facilities, 22 reported in the primary metals sector (US SIC code 33) and 8 in chemical manufacturing (US SIC code 28). In TRI, this order was reversed: 21 facilities reported in chemical manufacturing, while 14 reported in primary metals. Six facilities in both NPRI and TRI were rubber and plastics products manufacturers (US SIC code 30).

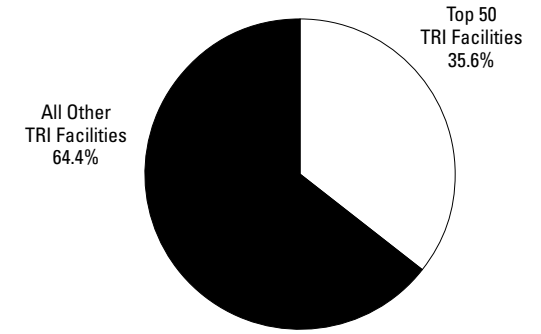
[Text continues on p. 148.]

Figure 5–11 M 1996

NPRI and TRI Total Releases of Known or Suspected Carcinogens,† Top 50 Facilities and All Others



NPRI
Total Facilities: 1,344



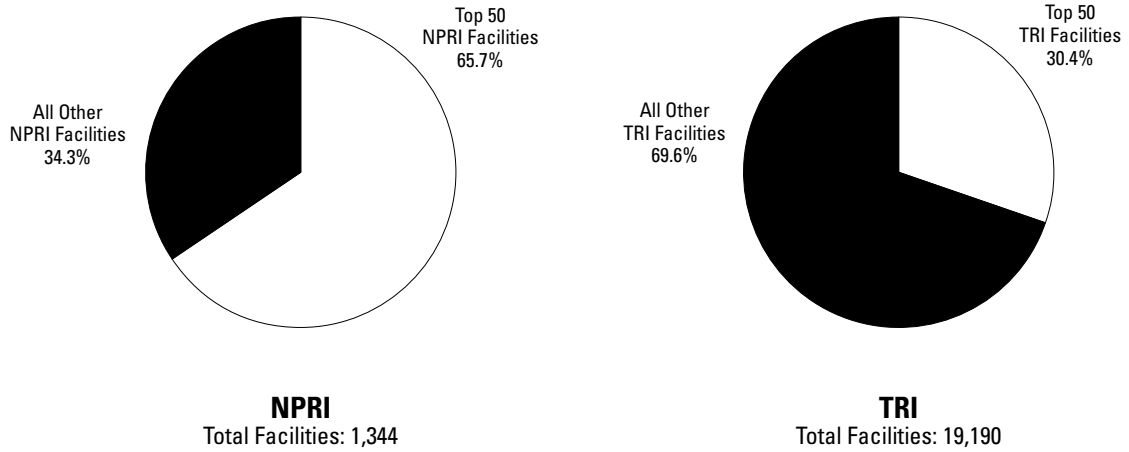
TRI
Total Facilities: 19,190

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Figure 5–12
M 1996

NPRI and TRI Total Releases and Transfers of Known or Suspected Carcinogens,† Top 50 Facilities and All Others



† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Table 5–16

M 1996

Top 10 NPRI Chemicals for Release/Transfer Categories

CAS Number	Chemical	Total Air Emissions	Surface Water Discharges	Underground Injection	On-site Land Releases	Treatment/ Destruction	Sewage/ POTWs	Disposal/ Containment
67-56-1	Methanol	1	1	1	10	2	5	—
—	Zinc (and its compounds)	—	5	—	1	1	8	1
—	Manganese (and its compounds)	—	4	—	2	7	—	2
1330-20-7	Xylene (mixed isomers)	2	—	—	—	3	—	—
—	Nitric acid and nitrate compounds	—	2	3	—	—	1	—
108-88-3	Toluene	3	—	9	9	4	—	—
78-93-3	Methyl ethyl ketone	5	—	2	—	5	—	—
7664-93-9	Sulphuric acid	4	—	—	—	—	—	—
—	Lead (and its compounds)	—	—	—	3	—	—	3
110-82-7	Cyclohexane	6	—	—	—	—	—	—
—	Chromium (and its compounds)	—	10	—	5	6	—	4
75-09-2	Dichloromethane	8	—	—	—	—	—	—
74-85-1	Ethylene	7	—	—	—	—	—	—
71-43-2	Benzene	10	—	8	—	—	—	—
7664-39-3	Hydrogen fluoride	9	—	—	—	—	—	—
50-00-0	Formaldehyde	—	3	7	—	—	4	—
71-36-3	n-Butyl alcohol	—	—	—	—	9	9	—
—	Copper (and its compounds)	—	—	—	6	—	—	6
1332-21-4	Asbestos (friable form)	—	—	—	7	—	—	5
107-21-1	Ethylene glycol	—	6	—	—	8	3	—
108-95-2	Phenol (and its salts)	—	8	—	—	10	2	8
7782-50-5	Chlorine	—	9	—	—	—	—	—
—	Nickel (and its compounds)	—	7	—	8	—	7	9
7429-90-5	Aluminum (fume or dust)	—	—	—	4	—	—	10
7664-38-2	Phosphoric acid	—	—	—	—	—	6	7
75-07-0	Acetaldehyde	—	—	5	—	—	—	—
108-05-4	Vinyl acetate	—	—	4	—	—	—	—
75-65-0	tert-Butyl alcohol	—	—	6	—	—	—	—
111-42-2	Diethanolamine (and its salts)	—	—	10	—	—	—	—
—	Selenium (and its compounds)	—	—	—	—	—	10	—

➤ Chemicals listed in descending order of total releases and transfers.

Table 5–17
M 1996

Top 10 TRI Chemicals for Release/Transfer Categories

CAS Number	Chemical	Total Air Emissions	Surface Water Discharges	Underground Injection	On-site Land Releases	Treatment/ Destruction	Sewage/ POTWs	Disposal/ Containment
67-56-1	Methanol	1	3	2	—	2	1	—
—	Nitric acid and nitrate compounds	—	1	1	9	4	2	10
—	Zinc (and its compounds)	—	6	—	1	1	—	1
108-88-3	Toluene	2	—	—	—	3	—	—
—	Manganese (and its compounds)	—	4	—	3	8	—	2
1330-20-7	Xylene (mixed isomers)	3	—	—	—	7	—	—
—	Copper (and its compounds)	—	—	—	2	—	—	4
75-15-0	Carbon disulfide	4	—	—	—	—	—	—
7782-50-5	Chlorine	5	8	—	—	—	—	—
7664-38-2	Phosphoric acid	—	2	—	4	—	5	—
75-09-2	Dichloromethane	8	—	—	—	6	—	—
78-93-3	Methyl ethyl ketone	7	—	—	—	10	—	—
7647-01-0	Hydrochloric acid	6	—	—	—	—	—	—
—	Lead (and its compounds)	—	—	—	6	5	—	3
—	Chromium (and its compounds)	—	7	—	5	—	—	5
100-42-5	Styrene	9	—	—	—	—	—	—
107-21-1	Ethylene glycol	—	5	5	—	9	3	—
74-85-1	Ethylene	10	—	—	—	—	—	—
75-05-8	Acetonitrile	—	—	3	—	—	—	—
71-36-3	n-Butyl alcohol	—	—	10	—	—	7	—
50-00-0	Formaldehyde	—	10	4	—	—	6	—
108-95-2	Phenol	—	—	—	—	—	4	—
—	Nickel (and its compounds)	—	—	—	7	—	—	7
7429-90-5	Aluminum (fume or dust)	—	—	—	8	—	—	8
67-66-3	Chloroform	—	9	—	—	—	—	—
1344-28-1	Aluminum oxide (fibrous forms)	—	—	—	—	—	—	6
—	Antimony (and its compounds)	—	—	—	—	—	—	9
79-10-7	Acrylic acid	—	—	7	—	—	—	—
79-06-1	Acrylamide	—	—	6	—	—	—	—
107-13-1	Acrylonitrile	—	—	8	—	—	—	—
—	Cyanides	—	—	9	—	—	—	—
75-65-0	tert-Butyl alcohol	—	—	—	—	—	9	—
111-42-2	Diethanolamine	—	—	—	—	—	8	—
62-53-3	Aniline	—	—	—	—	—	10	—
7723-14-0	Phosphorus (yellow or white)	—	—	—	10	—	—	—

➤ Chemicals listed in descending order of total releases and transfers.

Table 5–18

M 1996

NPRI Releases of Known or Suspected Carcinogens†

CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total for Carcinogens
75-09-2	Dichloromethane	2,195,732	0	0	49	2,198,402	19.9
71-43-2	Benzene	1,723,715	943	42,971	29,119	1,796,748	16.3
50-00-0	Formaldehyde	1,110,808	233,253	52,580	150	1,399,467	12.7
—	Lead (and its compounds)	560,640	6,124	45	820,693	1,393,051	12.6
100-42-5	Styrene	859,930	30	468	202	866,408	7.8
79-01-6	Trichloroethylene	836,512	46	0	0	837,692	7.6
—	Chromium (and its compounds)	16,565	16,896	200	454,030	493,593	4.5
75-07-0	Acetaldehyde	274,068	3,326	150,000	0	427,394	3.9
—	Nickel (and its compounds)	275,954	49,972	9	67,675	396,159	3.6
108-05-4	Vinyl acetate	131,364	0	190,000	100	322,740	2.9
67-66-3	Chloroform	201,253	6,908	0	0	208,161	1.9
1332-21-4	Asbestos (friable)	186	0	0	155,007	155,193	1.4
127-18-4	Tetrachloroethylene	130,906	80	0	74	131,990	1.2
—	Arsenic (and its compounds)	123,216	1,581	0	0	125,128	1.1
106-99-0	1,3-Butadiene	124,315	0	0	12	124,455	1.1
117-81-7	Di(2-ethylhexyl) phthalate	28,830	0	0	36	28,899	0.3
—	Cobalt (and its compounds)	10,197	1,840	0	13,309	25,646	0.2
75-21-8	Ethylene oxide	22,829	0	0	0	23,094	0.2
75-01-4	Vinyl chloride	20,043	140	0	0	20,408	0.2
—	Cadmium (and its compounds)	17,750	522	0	0	18,952	0.2
107-06-2	1,2-Dichloroethane	16,665	41	0	610	17,316	0.2
75-56-9	Propylene oxide	11,348	0	0	0	11,448	0.1
107-13-1	Acrylonitrile	10,390	0	0	0	10,775	0.1
106-46-7	1,4-Dichlorobenzene	9,100	0	0	0	9,200	0.1
123-91-1	1,4-Dioxane	954	5,100	0	0	6,054	0.1
79-06-1	Acrylamide	356	530	0	0	1,086	0.0
26471-62-5	Toluenediisocyanate (mixed isomers)	85	0	0	0	929	0.0
139-13-9	Nitrilotriacetic acid	25	0	0	0	646	0.0
96-09-3	Styrene oxide	0	0	0	0	537	0.0
56-23-5	Carbon tetrachloride	461	28	0	0	489	0.0
140-88-5	Ethyl acrylate	100	0	0	0	280	0.0
106-89-8	Epichlorohydrin	0	0	0	0	127	0.0
79-46-9	2-Nitropropane	0	0	0	0	125	0.0
77-78-1	Dimethyl sulfate	11	0	0	0	11	0.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	0	0	0	0	5	0.0
584-84-9	Toluene-2,4-diisocyanate	0	0	0	0	2	0.0
	Subtotal	**8,714,308**	**327,360**	**436,273**	**1,541,066**	**11,052,610**	**100.0**
	% of the Following Totals	**13.7**	**6.4**	**9.1**	**17.2**	**13.4**	
	Total for All Matched NPRI Chemicals	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**	

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Table 5–19

M 1996

TRI Releases of Known or Suspected Carcinogens†

CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total for Carcinogens
75-09-2	Dichloromethane	23,853,107	4,558	339,912	2,121	24,199,698	21.0
100-42-5	Styrene	18,936,497	5,834	103,545	119,995	19,165,871	16.6
—	Chromium (and its compounds)	403,529	322,479	16,976	12,199,556	12,942,540	11.2
79-01-6	Trichloroethylene	9,625,277	245	585	8,227	9,634,334	8.4
50-00-0	Formaldehyde	5,145,781	145,126	4,264,524	51,885	9,607,316	8.3
—	Lead (and its compounds)	817,653	28,045	360	6,791,505	7,637,563	6.6
75-07-0	Acetaldehyde	5,703,399	90,016	212,545	7,619	6,013,579	5.2
67-66-3	Chloroform	4,227,400	154,375	20,584	14,834	4,417,193	3.8
71-43-2	Benzene	3,662,516	12,302	141,731	32,361	3,848,910	3.3
127-18-4	Tetrachloroethylene	3,487,435	481	6,093	13,806	3,507,815	3.0
79-06-1	Acrylamide	5,306	1,657	2,606,873	67,644	2,681,480	2.3
107-13-1	Acrylonitrile	587,504	268	1,630,493	137	2,218,402	1.9
—	Nickel (and its compounds)	318,459	39,922	41,044	1,795,732	2,195,157	1.9
108-05-4	Vinyl acetate	1,726,101	1,085	136,403	1,285	1,864,874	1.6
106-99-0	1,3-Butadiene	1,236,415	4,989	454	119	1,241,977	1.1
—	Arsenic (and its compounds)	70,258	2,026	27,791	838,905	938,980	0.8
107-06-2	1,2-Dichloroethane	473,729	838	2,325	11,451	488,343	0.4
75-01-4	Vinyl chloride	462,498	161	151	0	462,810	0.4
75-21-8	Ethylene oxide	318,181	2,029	10,068	250	330,528	0.3
75-56-9	Propylene oxide	263,429	20,586	5,506	152	289,673	0.3
—	Cadmium (and its compounds)	20,256	2,097	37	250,996	273,386	0.2
117-81-7	Di(2-ethylhexyl) phthalate	210,625	124	0	31,887	242,636	0.2
1332-21-4	Asbestos (friable)	1,252	1	0	217,487	218,740	0.2
—	Cobalt (and its compounds)	28,677	14,644	7,219	130,326	180,866	0.2
56-23-5	Carbon tetrachloride	159,116	98	20,188	0	179,402	0.2
106-89-8	Epichlorohydrin	150,124	9,404	0	1,000	160,528	0.1
123-91-1	1,4-Dioxane	54,402	102,947	0	2,453	159,802	0.1
106-46-7	1,4-Dichlorobenzene	107,257	853	907	218	109,235	0.1
140-88-5	Ethyl acrylate	84,552	90	0	234	84,876	0.1
101-77-9	4,4'-Methylenedianiline	4,427	10	18,649	0	23,086	0.0
26471-62-5	Toluenediisocyanate (mixed isomers)	20,550	0	0	160	20,710	0.0
79-46-9	2-Nitropropane	15,550	1,265	0	0	16,815	0.0
91-08-7	Toluene-2,6-diisocyanate	6,198	0	0	22	6,220	0.0
302-01-2	Hydrazine	4,509	10	0	113	4,632	0.0
584-84-9	Toluene-2,4-diisocyanate	3,295	0	0	87	3,382	0.0
62-56-6	Thiourea	550	154	2,268	113	3,085	0.0
77-78-1	Dimethyl sulfate	2,629	0	0	0	2,629	0.0
64-67-5	Diethyl sulfate	1,455	0	0	0	1,455	0.0
139-13-9	Nitrilotriacetic acid	5	35	680	0	720	0.0
95-80-7	2,4-Diaminotoluene	714	0	0	0	714	0.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	229	0	0	340	569	0.0
94-59-7	Safrole	229	0	0	0	229	0.0
96-45-7	Ethylene thiourea	122	0	0	0	122	0.0
96-09-3	Styrene oxide	14	0	0	0	14	0.0
	Subtotal	**82,201,211**	**968,754**	**9,617,911**	**22,593,021**	**115,380,897**	**100.0**
	% of the Following Totals	**16.5**	**1.3**	**13.7**	**16.5**	**14.8**	
	Total for All Matched TRI Chemicals	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**	**780,621,952**	

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Table 5–20

M 1996

NPRI Transfers of Known or Suspected Carcinogens†

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total for Carcinogens
—	Lead (and its compounds)	196,217	2,376	2,057,027	2,255,620	32.7
—	Chromium (and its compounds)	575,785	7,318	1,670,586	2,253,689	32.6
1332-21-4	Asbestos (friable)	0	0	917,016	917,016	13.3
—	Nickel (and its compounds)	216,967	11,427	272,761	501,155	7.3
50-00-0	Formaldehyde	217,333	51,999	33,382	302,714	4.4
100-42-5	Styrene	192,604	237	62,264	255,105	3.7
75-09-2	Dichloromethane	85,222	4,800	300	90,322	1.3
71-43-2	Benzene	74,026	21	724	74,771	1.1
127-18-4	Tetrachloroethylene	65,852	0	869	66,721	1.0
—	Arsenic (and its compounds)	1,264	161	46,260	47,685	0.7
117-81-7	Di(2-ethylhexyl) phthalate	7,125	71	34,461	41,657	0.6
79-01-6	Trichloroethylene	24,993	0	0	24,993	0.4
107-13-1	Acrylonitrile	17,262	214	0	17,476	0.3
—	Cobalt (and its compounds)	2,370	10	8,477	10,857	0.2
26471-62-5	Toluenediisocyanate (mixed isomers)	8,012	0	20	8,032	0.1
56-23-5	Carbon tetrachloride	7,384	0	0	7,384	0.1
75-07-0	Acetaldehyde	6,630	0	10	6,640	0.1
108-05-4	Vinyl acetate	1,910	1,100	3,563	6,573	0.1
106-99-0	1,3-Butadiene	5,076	0	0	5,076	0.1
67-66-3	Chloroform	4,125	0	131	4,256	0.1
—	Cadmium (and its compounds)	0	8	2,775	2,783	0.0
139-13-9	Nitrilotriacetic acid	122	1,437	0	1,559	0.0
584-84-9	Toluene-2,4-diisocyanate	250	0	250	500	0.0
106-46-7	1,4-Dichlorobenzene	0	0	400	400	0.0
107-06-2	1,2-Dichloroethane	160	0	0	160	0.0
140-88-5	Ethyl acrylate	160	0	0	160	0.0
79-06-1	Acrylamide	0	59	78	137	0.0
75-01-4	Vinyl chloride	0	0	1	1	0.0
91-08-7	Toluene-2,6-diisocyanate	1	0	0	1	0.0
	Subtotal	**1,710,850**	**81,238**	**5,111,355**	**6,903,443**	**100.0**
	% of the Following Totals	**12.6**	**1.6**	**22.2**	**16.6**	
	Total for All Matched NPRI Chemicals	**13,571,799**	**4,943,234**	**23,017,654**	**41,532,687**	

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Table 5–21

M 1996

TRI Transfers of Known or Suspected Carcinogens†

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total for Carcinogens
—	Lead (and its compounds)	6,383,793	21,542	10,841,028	17,246,363	31.1
—	Chromium (and its compounds)	1,791,866	134,465	7,562,568	9,488,899	17.1
75-09-2	Dichloromethane	5,344,261	290,380	868,408	6,503,049	11.7
—	Nickel (and its compounds)	1,326,369	81,408	3,723,600	5,131,377	9.2
100-42-5	Styrene	1,243,597	119,942	1,470,682	2,834,221	5.1
1332-21-4	Asbestos (friable)	34	341	1,503,906	1,504,281	2.7
—	Arsenic (and its compounds)	822,904	241	563,941	1,387,086	2.5
50-00-0	Formaldehyde	318,094	856,586	149,437	1,324,117	2.4
67-66-3	Chloroform	843,714	149,448	17,627	1,010,789	1.8
108-05-4	Vinyl acetate	883,212	65,708	12,274	961,194	1.7
117-81-7	Di(2-ethylhexyl) phthalate	102,279	9,562	799,475	911,316	1.6
71-43-2	Benzene	676,196	97,366	28,089	801,651	1.4
79-01-6	Trichloroethylene	719,158	39,180	34,615	792,953	1.4
56-23-5	Carbon tetrachloride	725,993	218	4,193	730,404	1.3
106-89-8	Epichlorohydrin	654,723	5,202	1,876	661,801	1.2
127-18-4	Tetrachloroethylene	545,401	838	7,860	554,099	1.0
—	Cadmium (and its compounds)	103,225	1,427	425,648	530,300	1.0
107-13-1	Acrylonitrile	459,800	39,973	3,011	502,784	0.9
107-06-2	1,2-Dichloroethane	420,065	2,888	41,383	464,336	0.8
—	Cobalt (and its compounds)	57,337	6,334	338,362	402,033	0.7
123-91-1	1,4-Dioxane	10,009	72,788	217,410	300,207	0.5
75-07-0	Acetaldehyde	141,381	157,233	1,117	299,731	0.5
26471-62-5	Toluenediisocyanate (mixed isomers)	249,600	0	15,115	264,715	0.5
106-46-7	1,4-Dichlorobenzene	230,887	36	0	230,923	0.4
79-06-1	Acrylamide	12,402	29,605	136,769	178,776	0.3
140-88-5	Ethyl acrylate	149,204	10,925	14,845	174,974	0.3
75-56-9	Propylene oxide	849	93,753	17,791	112,393	0.2
75-21-8	Ethylene oxide	437	53,164	475	54,076	0.1
106-99-0	1,3-Butadiene	41,732	304	2,172	44,208	0.1
75-01-4	Vinyl chloride	26,027	333	8,895	35,255	0.1
101-77-9	4,4'-Methylenedianiline	25,030	917	8,885	34,832	0.1
302-01-2	Hydrazine	887	1,693	8,412	10,992	0.0
139-13-9	Nitrilotriacetic acid	0	8,163	0	8,163	0.0
584-84-9	Toluene-2,4-diisocyanate	5,755	0	1,626	7,381	0.0
62-56-6	Thiourea	5,022	115	1,175	6,312	0.0
79-46-9	2-Nitropropane	5,654	0	0	5,654	0.0
91-08-7	Toluene-2,6-diisocyanate	5,057	0	407	5,464	0.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	5,124	2	2	5,128	0.0
96-45-7	Ethylene thiourea	1,277	0	1,846	3,123	0.0
64-67-5	Diethyl sulfate	685	1,945	21	2,651	0.0
95-80-7	2,4-Diaminotoluene	127	0	0	127	0.0
94-59-7	Safrole	0	61	0	61	0.0
77-78-1	Dimethyl sulfate	0	2	0	2	0.0
	Subtotal	**24,339,167**	**2,354,088**	**28,834,946**	**55,528,201**	**100.0**
	% of the Following Totals	**21.9**	**2.7**	**23.2**	**17.3**	
	Total for All Matched TRI Chemicals	**110,901,271**	**86,130,663**	**124,047,657**	**321,079,591**	

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Table 5–22

M 1996

NPRI Releases and Transfers of Known or Suspected Carcinogens†

CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total for Carcinogens
		Number	%				
—	Lead (and its compounds)	130	12.0	1,393,051	2,255,620	3,648,671	20.3
—	Chromium (and its compounds)	213	19.6	493,593	2,253,689	2,747,282	15.3
75-09-2	Dichloromethane	50	4.6	2,198,402	90,322	2,288,724	12.7
71-43-2	Benzene	43	4.0	1,796,748	74,771	1,871,519	10.4
50-00-0	Formaldehyde	84	7.7	1,399,467	302,714	1,702,181	9.5
100-42-5	Styrene	73	6.7	866,408	255,105	1,121,513	6.2
1332-21-4	Asbestos (friable)	32	2.9	155,193	917,016	1,072,209	6.0
—	Nickel (and its compounds)	137	12.6	396,159	501,155	897,314	5.0
79-01-6	Trichloroethylene	36	3.3	837,692	24,993	862,685	4.8
75-07-0	Acetaldehyde	15	1.4	427,394	6,640	434,034	2.4
108-05-4	Vinyl acetate	10	0.9	322,740	6,573	329,313	1.8
67-66-3	Chloroform	11	1.0	208,161	4,256	212,417	1.2
127-18-4	Tetrachloroethylene	25	2.3	131,990	66,721	198,711	1.1
—	Arsenic (and its compounds)	33	3.0	125,128	47,685	172,813	1.0
106-99-0	1,3-Butadiene	10	0.9	124,455	5,076	129,531	0.7
117-81-7	Di(2-ethylhexyl) phthalate	30	2.8	28,899	41,657	70,556	0.4
—	Cobalt (and its compounds)	23	2.1	25,646	10,857	36,503	0.2
107-13-1	Acrylonitrile	9	0.8	10,775	17,476	28,251	0.2
75-21-8	Ethylene oxide	10	0.9	23,094	0	23,094	0.1
—	Cadmium (and its compounds)	11	1.0	18,952	2,783	21,735	0.1
75-01-4	Vinyl chloride	8	0.7	20,408	1	20,409	0.1
107-06-2	1,2-Dichloroethane	4	0.4	17,316	160	17,476	0.1
75-56-9	Propylene oxide	4	0.4	11,448	0	11,448	0.1
106-46-7	1,4-Dichlorobenzene	4	0.4	9,200	400	9,600	0.1
26471-62-5	Toluenediisocyanate (mixed isomers)	29	2.7	929	8,032	8,961	0.0
56-23-5	Carbon tetrachloride	4	0.4	489	7,384	7,873	0.0
123-91-1	1,4-Dioxane	2	0.2	6,054	0	6,054	0.0
139-13-9	Nitrilotriacetic acid	15	1.4	646	1,559	2,205	0.0
79-06-1	Acrylamide	6	0.6	1,086	137	1,223	0.0
96-09-3	Styrene oxide	4	0.4	537	0	537	0.0
584-84-9	Toluene-2,4-diisocyanate	3	0.3	2	500	502	0.0
140-88-5	Ethyl acrylate	7	0.6	280	160	440	0.0
106-89-8	Epichlorohydrin	2	0.2	127	0	127	0.0
79-46-9	2-Nitropropane	1	0.1	125	0	125	0.0
77-78-1	Dimethyl sulfate	1	0.1	11	0	11	0.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	1	0.1	5	0	5	0.0
91-08-7	Toluene-2,6-diisocyanate	1	0.1	0	1	1	0.0
302-01-2	Hydrazine	2	0.2	0	0	0	0.0
101-77-9	4,4'-Methylenedianiline	1	0.1	0	0	0	0.0
62-56-6	Thiourea	1	0.1	0	0	0	0.0
	Subtotal	**1,085**	**100.0**	**11,052,610**	**6,903,443**	**17,956,053**	**100.0**
	% of the Following Totals	**25.2**		**13.4**	**16.6**	**14.5**	
	Total for All Matched NPRI Chemicals	**4,298**		**82,596,460**	**41,532,687**	**124,129,147**	

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Table 5–23

M 1996

TRI Releases and Transfers of Known or Suspected Carcinogens†

CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total for Carcinogens
		Number	%				
75-09-2	Dichloromethane	888	5.7	24,199,698	6,503,049	30,702,747	18.0
—	Lead (and its compounds)	1,640	10.5	7,637,563	17,246,363	24,883,926	14.6
—	Chromium (and its compounds)	3,154	20.1	12,942,540	9,488,899	22,431,439	13.1
100-42-5	Styrene	1,465	9.3	19,165,871	2,834,221	22,000,092	12.9
50-00-0	Formaldehyde	765	4.9	9,607,316	1,324,117	10,931,433	6.4
79-01-6	Trichloroethylene	657	4.2	9,634,334	792,953	10,427,287	6.1
—	Nickel (and its compounds)	2,760	17.6	2,195,157	5,131,377	7,326,534	4.3
75-07-0	Acetaldehyde	247	1.6	6,013,579	299,731	6,313,310	3.7
67-66-3	Chloroform	156	1.0	4,417,193	1,010,789	5,427,982	3.2
71-43-2	Benzene	453	2.9	3,848,910	801,651	4,650,561	2.7
127-18-4	Tetrachloroethylene	381	2.4	3,507,815	554,099	4,061,914	2.4
79-06-1	Acrylamide	72	0.5	2,681,480	178,776	2,860,256	1.7
108-05-4	Vinyl acetate	178	1.1	1,864,874	961,194	2,826,068	1.7
107-13-1	Acrylonitrile	108	0.7	2,218,402	502,784	2,721,186	1.6
—	Arsenic (and its compounds)	392	2.5	938,980	1,387,086	2,326,066	1.4
1332-21-4	Asbestos (friable)	72	0.5	218,740	1,504,281	1,723,021	1.0
106-99-0	1,3-Butadiene	185	1.2	1,241,977	44,208	1,286,185	0.8
117-81-7	Di(2-ethylhexyl) phthalate	307	2.0	242,636	911,316	1,153,952	0.7
107-06-2	1,2-Dichloroethane	79	0.5	488,343	464,336	952,679	0.6
56-23-5	Carbon tetrachloride	64	0.4	179,402	730,404	909,806	0.5
106-89-8	Epichlorohydrin	69	0.4	160,528	661,801	822,329	0.5
—	Cadmium (and its compounds)	143	0.9	273,386	530,300	803,686	0.5
—	Cobalt (and its compounds)	480	3.1	180,866	402,033	582,899	0.3
75-01-4	Vinyl chloride	47	0.3	462,810	35,255	498,065	0.3
123-91-1	1,4-Dioxane	46	0.3	159,802	300,207	460,009	0.3
75-56-9	Propylene oxide	118	0.8	289,673	112,393	402,066	0.2
75-21-8	Ethylene oxide	151	1.0	330,528	54,076	384,604	0.2
106-46-7	1,4-Dichlorobenzene	25	0.2	109,235	230,923	340,158	0.2
26471-62-5	Toluenediisocyanate (mixed isomers)	182	1.2	20,710	264,715	285,425	0.2
140-88-5	Ethyl acrylate	94	0.6	84,876	174,974	259,850	0.2
101-77-9	4,4'-Methylenedianiline	22	0.1	23,086	34,832	57,918	0.0
79-46-9	2-Nitropropane	4	0.0	16,815	5,654	22,469	0.0
302-01-2	Hydrazine	43	0.3	4,632	10,992	15,624	0.0
91-08-7	Toluene-2,6-diisocyanate	33	0.2	6,220	5,464	11,684	0.0
584-84-9	Toluene-2,4-diisocyanate	60	0.4	3,382	7,381	10,763	0.0
62-56-6	Thiourea	24	0.2	3,085	6,312	9,397	0.0
139-13-9	Nitrilotriacetic acid	8	0.1	720	8,163	8,883	0.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	23	0.1	569	5,128	5,697	0.0
64-67-5	Diethyl sulfate	32	0.2	1,455	2,651	4,106	0.0
96-45-7	Ethylene thiourea	10	0.1	122	3,123	3,245	0.0
77-78-1	Dimethyl sulfate	34	0.2	2,629	2	2,631	0.0
95-80-7	2,4-Diaminotoluene	1	0.0	714	127	841	0.0
94-59-7	Safrole	2	0.0	229	61	290	0.0
96-09-3	Styrene oxide	5	0.0	14	0	14	0.0
	Subtotal	**15,679**	**100.0**	**115,380,897**	**55,528,201**	**170,909,098**	**100.0**
	% of the Following Totals	**27.1**		**14.8**	**17.3**	**15.5**	
	Total for All Matched TRI Chemicals	**57,927**		**780,621,952**	**321,079,591**	**1,101,701,543**	

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

Table 5–24

M 1996

The 50 NPRI Facilities with the Largest Total Releases of Known or Suspected Carcinogens†

Rank	Facility	City, Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Celanese Canada Inc.	Edmonton, AB	37	28	5	184,472	0	386,300	0
2	Dofasco Inc.	Hamilton, ON	29	33	5	456,937	542	0	51
3	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	5	389,700	4,000	0	0
4	Novopharm Limited	Scarborough, ON	37	28	1	366,565	0	0	0
5	Fonderies canadiennes d'acier Ltée	Montréal, QC	31	35	2	100	0	0	251,500
6	Sandvik Steel Canada	Arnprior, ON	29	33	1	246,420	0	0	0
7	Carpenter Canada Limited	Woodbridge, ON	16	30	2	238,850	0	0	0
8	Stelco Inc., Hilton Works	Hamilton, ON	29	33	6	228,340	4,975	0	0
9	Co-Steel Lasco	Whitby, ON	29	33	3	1,408	53	0	231,800
10	Domfoam International Inc.	St-Léonard, QC	16	30	2	230,760	0	0	0
11	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	2	4,540	0	0	226,000
12	Abitibi-Consolidated Inc., Division Port-Alfred	La Baie, QC	27	26	1	900	228,100	0	0
13	Valle Foam Industries Inc., Valle 1	Brampton, ON	16	30	2	218,660	0	0	0
14	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	1	2,640	0	0	214,800
15	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	4	215,858	0	0	0
16	Dow Chemical Canada Inc.	Sarnia, ON	37	28	8	66,012	2	0	148,007
17	Vitafoam Products Canada Ltd., Toronto Facility	Downsview, ON	16	30	3	209,597	0	0	0
18	Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon, MB	29	33	3	165,930	714	0	0
19	Algoma Steel Inc., Main Works	Sault Ste. Marie, ON	29	33	4	164,237	40	0	100
20	Bayer Rubber Inc.	Sarnia, ON	37	28	5	162,340	60	0	0
21	René Matériaux Composites Ltée	St-Éphrem-de-Beauce, QC	32	37	2	144,000	0	0	0
22	Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur, QC	29	33	3	0	0	0	142,420
23	Weyerhaeuser Canada Ltd., Drayton Valley OSB Mill	Drayton Valley, AB	25	24	2	138,930	0	0	0
24	Foamex Canada Inc.	Toronto, ON	16	30	2	137,895	0	0	0
25	Wolverine Tube (Canada) Inc.	London, ON	29	33	1	133,212	0	0	0
26	Weyerhaeuser Canada Ltd., Edson OSB Mill	Edson, AB	25	24	2	114,740	0	0	0
27	Sammi Atlas Inc., Atlas Specialty Steels	Welland, ON	29	33	2	165	796	0	113,596
28	Mirolin Industries	Toronto, ON	16	30	2	104,980	0	0	0
29	Domtar Papers, Cornwall Business Unit	Cornwall, ON	27	26	1	104,409	2	0	0
30	Valle Foam Industries Inc., Valle 2	Brampton, ON	16	30	2	102,000	0	0	0
31	Inco Limited, Manitoba Division	Thompson, MB	29	33	3	79,129	13,715	0	0
32	Carpenter Canada Ltd.	Calgary, AB	16	30	2	92,700	0	0	0
33	Daishowa Marubeni International, Peace River Div.	Peace River, AB	27	26	1	90,000	2,420	0	0
34	Advanced Monobloc Manufacturing	Penetanguishene, ON	30	34	1	87,240	0	0	0
35	Weyerhaeuser Canada Ltd., Slave Lake OSB Mill	Slave Lake, AB	25	24	2	85,930	0	0	0
36	AT Plastics Inc.	Edmonton, AB	37	28	1	85,914	0	0	0
37	Nova Chemicals (Canada) Ltd.	Corunna, ON	36	29	3	84,763	0	0	35
38	Bombardier Inc., Division Jet Boat	St-Antoine-de-Tilly, QC	16	30	1	82,000	0	0	0
39	Grant Forest Products Corp.	Englehart, ON	25	24	1	81,800	0	0	0
40	Shell Canada Products Ltd., Sarnia Manufacturing Centre	Corunna, ON	36	29	4	78,193	55	0	145
41	AltaSteel Ltd.	Edmonton, AB	29	33	3	1,530	5	0	76,147
42	Blount Canada Ltd.	Guelph, ON	30	34	3	74,616	0	0	0
43	Uniboard Canada Inc.	Mont-Laurier, QC	25	24	1	71,386	0	0	0
44	Camoplast Inc., Div. Roski I	Roxton Falls, QC	32	37	1	69,000	0	0	0
45	Vitafoam Products Canada Ltd.	Calgary, AB	16	30	3	68,753	0	0	0
46	Imperial Oil, Sarnia Chemical Plant	Sarnia, ON	37	28	5	66,541	157	0	0
47	Uniboard Canada Inc.	Val-d'Or, QC	25	24	1	64,800	0	0	0
48	Petro-Canada, raffinerie de Montréal	Montréal, QC	36	29	2	63,600	249	0	0
49	Novopharm Limited	Markham, ON	37	28	1	61,955	0	0	0
50	Suzorite Mica Products Inc., Mica Plant	Boucherville, QC	35	32	1	60,000	0	0	0
	Subtotal				**124**	**5,984,447**	**255,885**	**386,300**	**1,404,601**
	% of the Following Totals				**11.4**	**68.7**	**78.2**	**88.5**	**91.1**
	Total for All Matched NPRI Carcinogens				**1,085**	**8,714,308**	**327,360**	**436,273**	**1,541,066**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens. A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

* Chemicals accounting for more than 70% of total releases of carcinogens from the facility.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	570,772	Acetaldehyde (UIJ, air), Vinyl acetate (UIJ)
2	457,530	Benzene (air)
3	393,700	Lead and compounds (air)
4	366,565	Dichloromethane (air)
5	251,600	Chromium and compounds (land)
6	246,420	Trichloroethylene (air)
7	238,953	Dichloromethane (air)
8	234,615	Benzene (air)
9	233,261	Lead and compounds (land)
10	230,802	Dichloromethane (air)
11	230,540	Lead and compounds (land)
12	229,000	Formaldehyde (water)
13	218,707	Dichloromethane (air)
14	217,440	Lead and compounds (land)
15	215,858	Nickel/Lead and compounds (air)
16	214,262	Asbestos (land), Benzene (air)
17	209,711	Dichloromethane (air)
18	166,644	Lead and compounds (air)
19	165,277	Benzene (air)
20	162,400	1,3-Butadiene, Benzene (air)
21	144,000	Styrene, Dichloromethane (air)
22	142,420	Lead and compounds (land)
23	138,930	Formaldehyde (air)
24	137,960	Dichloromethane (air)
25	133,212	Trichloroethylene (air)
26	114,740	Formaldehyde (air)
27	114,557	Chromium and compounds (land)
28	104,980	Dichloromethane, Styrene (air)
29	104,411	Benzene (air)
30	102,021	Dichloromethane (air)
31	92,844	Nickel and compounds (air)
32	92,783	Dichloromethane (air)
33	92,420	Chloroform (air)
34	87,240	Tetrachloroethylene (air)
35	85,930	Formaldehyde (air)
36	85,914	Vinyl acetate (air)
37	84,798	Benzene (air)
38	82,000	Styrene (air)
39	81,800	Formaldehyde (air)
40	78,614	Benzene (air)
41	77,682	Lead and compounds (land)
42	74,616	Trichloroethylene (air)
43	71,386	Formaldehyde (air)
44	69,000	Styrene (air)
45	68,753	Dichloromethane (air)
46	66,737	Benzene (air)
47	64,800	Formaldehyde (air)
48	63,938	Benzene (air)
49	61,955	Dichloromethane (air)
50	60,000	Dichloromethane (air)
	8,034,498	
	72.7	
	11,052,610	

Table 5–25

M 1996

The 50 TRI Facilities with the Largest Total Releases of Known or Suspected Carcinogens†

Rank	Facility	City, State	SIC Code	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX	28	1	2,063	113	0	5,124,717
2	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC	28	1	2,967	15	0	4,081,769
3	Monsanto Co.	Luling, LA	28	2	8,753	0	2,540,363	0
4	ASARCO Inc.	East Helena, MT	33	4	29,062	596	0	1,866,876
5	ASARCO Inc., Glover Plant	Annapolis, MO	33	4	150,576	14	0	1,295,185
6	Angus Chemical Co.	Sterlington, LA	28	4	13,698	2,040	1,361,431	0
7	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ	33	7	13,197	0	0	1,294,240
8	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX	28	5	21,386	0	1,222,494	3
9	BP Chemicals Inc.	Lima, OH	28	10	43,701	0	1,151,760	0
10	Eastman Kodak Co., Kodak Park	Rochester, NY	38	9	1,119,503	22,802	0	39
11	Aquaglass Corp., Masco Corp.	Adamsville, TN	30	1	1,046,797	0	0	0
12	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ	33	4	95,508	0	0	929,049
13	Cytec Industries Inc.	Westwego, LA	28	5	8,040	592	987,664	0
14	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR	33	1	17,061	7	0	905,522
15	Foamex L.P., Div. of Kihi	Corry, PA	30	2	756,420	0	0	0
16	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT	33	5	9,776	454	0	731,642
17	Carpenter Co., Tupelo Div.	Verona, MS	30	2	689,399	0	0	0
18	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO	33	6	92,688	75	0	596,449
19	Monsanto Co., Chocolate Bayou	Alvin, TX	28	3	12,307	0	645,125	0
20	FMC Corp.	Pocatello, ID	28	4	1,410	0	0	617,211
21	Abbott Chemicals Inc.	Barceloneta, PR	Mult.	1	585,261	0	0	0
22	GE Plastics Co., General Electric Co.	Mount Vernon, IN	28	6	569,148	259	0	0
23	Northwestern Steel & Wire Co.	Sterling, IL	33	3	4,998	299	0	528,345
24	Elkem Metals Co.	Marietta, OH	33	4	14,521	5,896	0	441,723
25	General Electric Co.	Ottawa, IL	28	4	460,365	39	0	0
26	Sterling Chemicals Inc.	Texas City, TX	28	10	69,611	0	387,913	0
27	Foamex International Inc.	Milan, TN	30	1	457,282	0	0	0
28	Upjohn Mfg. Co., Pharmacia & Upjohn Inc.	Arecibo, PR	28	2	455,125	0	0	0
29	Dow Chemical Co.	Freeport, TX	28	21	349,937	47,669	0	46,408
30	Nu-Foam Products, Ohio Decorative Products Inc.	Chattanooga, TN	30	2	420,896	0	0	0
31	Weyerhaeuser Co.	Longview, WA	Mult.	6	340,485	62,013	0	0
32	Aqua Glass West Inc., Masco Corp.	Klamath Falls, OR	30	1	395,697	0	0	0
33	Celanese Eng. Resins Inc., Hoechst Corp.	Bishop, TX	28	5	152,853	3,980	228,580	113
34	General Foam Corp., PMC Inc.	West Hazelton, PA	30	3	376,544	0	0	0
35	Carpenter Co.	Russellville, KY	Mult.	3	374,128	0	0	0
36	Tomkins Ind. Inc., Lasco Bathware Div.	Three Rivers, MI	30	1	362,998	0	0	0
37	General Electric Co.	Burkville, AL	28	2	358,731	1	0	0
38	Olympic Products Co., Cone Mills Corp.	Tupelo, MS	30	3	352,259	0	0	0
39	Boeing Co.	Wichita, KS	Mult.	6	350,141	231	0	0
40	Flexible Foam Products, Ohio Decorative Products	Elkhart, IN	30	2	339,873	0	0	0
41	Kimberly-Clark Corp.	Mobile, AL	26	2	320,181	12,698	0	0
42	General Foam Corp., PMC Inc.	Bridgeview, IL	30	3	322,330	0	0	0
43	Foamex L.P.	Morristown, TN	30	2	319,771	0	0	0
44	Tomkins Ind. Inc., Lasco Bathware Div.	Cordele, GA	30	1	309,375	0	0	0
45	Great Lakes Chemical Corp., Central Plant	El Dorado, AR	28	2	11,460	0	287,599	0
46	American Steel Foundries, Amsted Industries Inc.	Granite City, IL	33	2	3,302	0	0	293,424
47	Carpenter Co.	Elkhart, IN	30	3	293,377	0	0	0
48	Cleveland Laminating Corp.	Cleveland, OH	26	1	292,063	0	0	0
49	Federal Paper Board Co. Inc.	Riegelwood, NC	26	3	289,342	544	0	0
50	Metal Impact Corp.	Rosemont, IL	34	1	288,203	0	0	0
	Subtotal			**186**	**13,374,566**	**160,337**	**8,812,930**	**18,752,716**
	% of the Following Totals			**1.2**	**16.3**	**16.6**	**91.6**	**83.0**
	Total for All Matched TRI Carcinogens			**15,679**	**82,201,211**	**968,754**	**9,617,911**	**22,593,021**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens. A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

* Chemicals accounting for more than 70% of total releases of carcinogens from the facility.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	5,126,893	Chromium and compounds (land)
2	4,084,751	Chromium and compounds (land)
3	2,549,116	Formaldehyde (UIJ)
4	1,896,534	Lead and compounds (land)
5	1,445,775	Lead and compounds (land)
6	1,377,169	Formaldehyde (UIJ)
7	1,307,438	Lead/Chromium and compounds (land)
8	1,243,883	Acrylamide, Acrylonitrile (UIJ)
9	1,195,460	Acrylamide, Acrylonitrile (UIJ)
10	1,142,344	Dichloromethane (air)
11	1,046,797	Styrene (air)
12	1,024,557	Lead and compounds (land)
13	996,296	Acrylamide (UIJ)
14	922,590	Nickel and compounds (land)
15	756,420	Dichloromethane (air)
16	741,871	Lead/Arsenic and compounds (land)
17	689,399	Dichloromethane (air)
18	689,212	Lead and compounds (land)
19	657,431	Acrylonitrile (UIJ)
20	618,621	Chromium/Cadmium and compounds (land)
21	585,261	Dichloromethane (air)
22	569,407	Dichloromethane (air)
23	533,642	Lead/Chromium and compounds (land)
24	462,140	Chromium and compounds (land)
25	460,404	Styrene, Acrylonitrile (air)
26	457,524	Acrylamide (UIJ)
27	457,282	Dichloromethane (air)
28	455,125	Dichloromethane (air)
29	444,015	Epichlorohydrin, 1,2-Dichloroethane, Dichloromethane, Benzene, Propylene oxide, 1,3-Butadiene (air)
30	420,896	Dichloromethane (air)
31	402,498	Acetaldehyde, Chloroform (air)
32	395,697	Styrene (air)
33	385,526	Formaldehyde (UIJ, air)
34	376,544	Dichloromethane (air)
35	374,128	Dichloromethane (air)
36	362,998	Styrene (air)
37	358,732	Dichloromethane (air)
38	352,259	Dichloromethane (air)
39	350,372	Tetrachloroethylene (air)
40	339,873	Dichloromethane (air)
41	332,880	Chloroform (air)
42	322,330	Dichloromethane (air)
43	319,771	Dichloromethane (air)
44	309,375	Styrene (air)
45	299,059	Dichloromethane (UIJ)
46	296,726	Chromium and compounds (land)
47	293,377	Dichloromethane (air)
48	292,063	Dichloromethane (air)
49	289,887	Chloroform (air)
50	288,203	Tetrachloroethylene (air)
	41,100,549	
	35.6	
	115,380,897	

Table 5–26
M 1996

Top 50 NPRI Facilities with Largest Total Releases and Transfers of Known or Suspected Carcinogens†

Rank	Facility	City, Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Dominion Castings Ltd.	Hamilton, ON	29	33	2	6,291	100	0	0
2	Co-Steel Lasco	Whitby, ON	29	33	3	1,408	53	0	231,800
3	Celanese Canada Inc.	Edmonton, AB	37	28	5	184,472	0	386,300	0
4	Dofasco Inc.	Hamilton, ON	29	33	5	456,937	542	0	51
5	Stelco Inc., Hilton Works	Hamilton, ON	29	33	6	228,340	4,975	0	0
6	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	5	389,700	4,000	0	0
7	Tonolli Canada Limited	Mississauga, ON	29	33	1	2,307	50	0	0
8	Sammi Atlas Inc., Aciers inoxydables Atlas	Tracy, QC	29	33	3	22,840	350	0	0
9	Novopharm Limited	Scarborough, ON	37	28	1	366,565	0	0	0
10	Sammi Atlas Inc., Atlas Specialty Steels	Welland, ON	29	33	2	165	796	0	113,596
11	Dow Chemical Canada Inc.	Sarnia, ON	37	28	8	66,012	2	0	148,007
12	Slater Steels, Hamilton Specialty Bar Division	Hamilton, ON	29	33	5	1,959	0	0	100
13	Bayer Rubber Inc.	Sarnia, ON	37	28	5	162,340	60	0	0
14	Fonderies canadiennes d'acier Ltée	Montréal, QC	31	35	2	100	0	0	251,500
15	Sandvik Steel Canada	Arnprior, ON	29	33	1	246,420	0	0	0
16	Carpenter Canada Limited	Woodbridge, ON	16	30	2	238,850	0	0	0
17	Domfoam International Inc.	St-Léonard, QC	16	30	2	230,760	0	0	0
18	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	2	4,540	0	0	226,000
19	Abitibi-Consolidated Inc., Division Port-Alfred	La Baie, QC	27	26	1	900	228,100	0	0
20	Dominion Colour Corporation	Ajax, ON	37	28	2	0	0	0	0
21	Metalex Products Ltd.	Richmond, BC	29	33	2	78	0	0	10,360
22	Valle Foam Industries Inc., Valle 1	Brampton, ON	16	30	2	218,660	0	0	0
23	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	1	2,640	0	0	214,800
24	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	4	215,858	0	0	0
25	Vitafoam Products Canada Ltd., Toronto Facility	Downsview, ON	16	30	3	209,597	0	0	0
26	Stelco McMaster Ltée	Contrecoeur, QC	29	33	2	0	0	0	0
27	Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon, MB	29	33	3	165,930	714	0	0
28	Algoma Steel Inc., Main Works	Sault Ste. Marie, ON	29	33	4	164,237	40	0	100
29	René Matériaux Composites Ltée	St-Éphrem-de-Beauce, QC	32	37	2	144,000	0	0	0
30	Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur, QC	29	33	3	0	0	0	142,420
31	Doorhandle Systems	Brampton, ON	55	37	2	0	0	0	0
32	Weyerhaeuser Canada Ltd., Drayton Valley OSB Mill	Drayton Valley, AB	25	24	2	138,930	0	0	0
33	Foamex Canada Inc.	Toronto, ON	16	30	2	137,895	0	0	0
34	Les Forges de Sorel Inc.	St-Joseph-de-Sorel, QC	30	34	2	204	0	0	0
35	Wolverine Tube (Canada) Inc.	London, ON	29	33	1	133,212	0	0	0
36	Ivaco Rolling Mills	L'Orignal, ON	29	33	3	0	0	0	0
37	Imperial Oil, Sarnia Chemical Plant	Sarnia, ON	37	28	5	66,541	157	0	0
38	A.G.Simpson Co Ltd.	Oshawa, ON	32	34	3	0	0	0	0
39	Gerdau Courtice Steel Inc., Courtice Steel Inc.	Cambridge, ON	29	33	2	1,929	0	0	0
40	Mitsubishi Electronics Industries Canada Inc.	Midland, ON	33	36	2	12,277	146	0	0
41	Weyerhaeuser Canada Ltd., Edson OSB Mill	Edson, AB	25	24	2	114,740	0	0	0
42	Dow Chemical Canada Inc., Western Canada Operations	Fort Saskatchewan, AB	37	28	12	38,153	1	0	610
43	Shell Canada Products Ltd., Sarnia Manufacturing Centre	Corunna, ON	36	29	4	78,193	55	0	145
44	National-Standard Co. of Canada Ltd., Guelph Plant (70)	Guelph, ON	30	33	1	0	0	0	0
45	Fraser Papers Inc (Canada)	Edmundston, NB	27	26	4	7,340	0	0	0
46	Uniboard Canada Inc., Unires	Val d'Or, QC	37	28	1	632	0	0	0
47	PPG Canada Inc., Works 84	Owen Sound, ON	35	32	1	0	0	0	0
48	Mirolin Industries	Toronto, ON	16	30	2	104,980	0	0	0
49	Domtar Papers, Cornwall Business Unit	Cornwall, ON	27	26	1	104,409	2	0	0
50	Uniboard Canada Inc.	Mont-Laurier, QC	25	24	1	71,386	0	0	0
	Subtotal				**142**	**4,742,727**	**240,143**	**386,300**	**1,339,489**
	% of the Following Totals				**13.1**	**54.4**	**73.4**	**88.5**	**86.9**
	Total of All Matched NPRI Carcinogens				**1,085**	**8,714,308**	**327,360**	**436,273**	**1,541,066**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens. A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

* Chemicals accounting for more than 70% of total releases and transfers of carcinogens from the facility.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	6,491	0	0	888,042	888,042	894,533	Chromium and compounds (transfers to disposal)
2	233,261	0	8	397,200	397,208	630,469	Lead and compounds (transfers to disposal, land)
3	570,772	0	0	48,061	48,061	618,833	Acetaldehyde (UIJ, air), Vinyl acetate (UIJ)
4	457,530	0	333	108,926	109,259	566,789	Benzene (air)
5	234,615	0	0	238,340	238,340	472,955	Asbestos (transfers to disposal), Benzene (air)
6	393,700	0	0	0	0	393,700	Lead and compounds (air)
7	2,357	0	80	376,370	376,450	378,807	Lead and compounds (transfers to disposal)
8	23,190	355,270	0	0	355,270	378,460	Chromium/Nickel and compounds (transfers to treatment)
9	366,565	0	0	0	0	366,565	Dichloromethane (air)
10	114,557	3,321	0	189,180	192,500	307,057	Chromium and compounds (transfers to disposal, land)
11	214,262	72,416	0	0	72,416	286,678	Asbestos, Benzene (land)
12	2,459	542	269	267,880	268,691	271,150	Lead and compounds (transfers to disposal)
13	162,400	36,500	0	68,000	104,500	266,900	1,3-Butadiene, Benzene (air), Asbestos (transfers to disposal)
14	251,600	400	0	0	400	252,000	Chromium and compounds (land)
15	246,420	0	0	0	0	246,420	Trichloroethylene (air)
16	238,953	0	0	0	0	238,953	Dichloromethane (air)
17	230,802	0	0	0	0	230,802	Dichloromethane (air)
18	230,540	0	0	0	0	230,540	Lead and compounds (land)
19	229,000	0	0	0	0	229,000	Formaldehyde (water)
20	0	0	0	228,000	228,000	228,000	Lead and compounds (transfers to disposal)
21	10,488	0	0	213,670	213,670	224,158	Lead and compounds (transfers to disposal)
22	218,707	0	0	0	0	218,707	Dichloromethane (air)
23	217,440	0	0	0	0	217,440	Lead and compounds (land)
24	215,858	0	0	0	0	215,858	Nickel/Lead and compounds (air)
25	209,711	0	0	0	0	209,711	Dichloromethane (air)
26	970	194,500	0	0	194,500	195,470	Lead and compounds (transfers to treatment)
27	166,644	0	0	0	0	166,644	Lead and compounds (air)
28	165,277	0	0	0	0	165,277	Benzene (air)
29	144,000	0	0	0	0	144,000	Styrene, Dichloromethane (air)
30	142,420	0	0	0	0	142,420	Lead and compounds (land)
31	0	139,402	1,409	0	140,810	140,810	Chromium/Nickel and compounds (transfers to treatment)
32	138,930	0	0	0	0	138,930	Formaldehyde (air)
33	137,960	0	0	0	0	137,960	Dichloromethane (air)
34	204	125,020	0	10,040	135,060	135,264	Chromium and compounds (transfers to treatment)
35	133,212	0	0	0	0	133,212	Trichloroethylene (air)
36	684	0	0	132,440	132,440	133,124	Lead and compounds (transfers to disposal)
37	66,737	0	0	61,330	61,330	128,067	Asbestos (transfers to disposal), Benzene (air)
38	400	90	790	126,640	127,520	127,920	Nickel and compounds (transfers to disposal)
39	1,929	0	0	125,670	125,670	127,599	Lead and compounds (transfers to disposal)
40	12,423	0	0	106,657	106,657	119,080	Lead and compounds (transfers to disposal)
41	114,740	0	0	0	0	114,740	Formaldehyde (air)
42	38,764	160	0	73,000	73,160	111,924	Asbestos (transfers to disposal), 1,2-Dichloroethane (air)
43	78,614	0	0	31,610	31,610	110,224	Benzene (air), Asbestos (transfers to disposal)
44	0	0	0	110,000	110,000	110,000	Lead and compounds (transfers to disposal)
45	7,340	71,306	0	29,704	101,010	108,350	Formaldehyde (transfers to treatment), Asbestos (transfers to disposal)
46	632	105,000	0	0	105,000	105,632	Formaldehyde (transfers to treatment)
47	0	0	0	105,000	105,000	105,000	Chromium and compounds (transfers to disposal)
48	104,980	0	0	0	0	104,980	Dichloromethane, Styrene (air)
49	104,411	0	0	0	0	104,411	Benzene (air)
50	71,386	32,520	0	0	32,520	103,906	Formaldehyde (air, transfers to treatment)
	6,714,335	**1,136,447**	**2,889**	**3,935,760**	**5,075,094**	**11,789,429**	
	60.7	**66.4**	**3.6**	**77.0**	**73.5**	**65.7**	
	11,052,610	**1,710,850**	**81,238**	**5,111,355**	**6,903,443**	**17,956,053**	

Table 5–27

M 1996

Top 50 TRI Facilities with Largest Total Releases and Transfers of Known or Suspected Carcinogens†

Rank	Facility	City, State	US SIC Code	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX	28	1	2,063	113	0	5,124,717
2	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC	28	1	2,967	15	0	4,081,769
3	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ	33	4	95,508	0	0	929,049
4	Monsanto Co.	Luling, LA	28	2	8,753	0	2,540,363	0
5	Pharmacia & Upjohn Co.	Portage, MI	28	4	91,912	116	22,789	0
6	ASARCO Inc.	East Helena, MT	33	4	29,062	596	0	1,866,876
7	ASARCO Inc., Glover Plant	Annapolis, MO	33	4	150,576	14	0	1,295,185
8	Angus Chemical Co.	Sterlington, LA	28	4	13,698	2,040	1,361,431	0
9	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ	33	7	13,197	0	0	1,294,240
10	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA	33	4	5,879	15	0	0
11	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX	28	5	21,386	0	1,222,494	3
12	BP Chemicals Inc.	Lima, OH	28	10	43,701	0	1,151,760	0
13	Eastman Kodak Co., Kodak Park	Rochester, NY	38	9	1,119,503	22,802	0	39
14	Aquaglass Corp., Masco Corp.	Adamsville, TN	30	1	1,046,797	0	0	0
15	General Battery Corp., Exide Corp.	Reading, PA	33	3	926	878	0	0
16	Cytec Industries Inc.	Westwego, LA	28	5	8,040	592	987,664	0
17	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR	33	1	17,061	7	0	905,522
18	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT	33	5	9,776	454	0	731,642
19	Quemetco Inc., RSR Corp.	City of Industry, CA	33	3	837	10	0	0
20	Xerox Corp.	Webster, NY	35	3	21,698	0	0	0
21	Upjohn Mfg. Co., Pharmacia & Upjohn Inc.	Arecibo, PR	28	2	455,125	0	0	0
22	Foamex L.P., Div. of Kihi	Corry, PA	30	2	756,420	0	0	0
23	DuPont Sabine River Works	Orange, TX	28	9	207,105	414	45,737	0
24	Quemetco Inc., RSR Corp.	Indianapolis, IN	33	3	1,879	0	0	0
25	Shell Oil Co.	Deer Park, TX	28	17	85,043	3	0	207
26	Sequentia Inc.	Grand Junction, TN	30	1	40,710	0	0	0
27	Carpenter Co., Tupelo Div.	Verona, MS	30	2	689,399	0	0	0
28	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO	33	6	92,688	75	0	596,449
29	Monsanto Co., Chocolate Bayou	Alvin, TX	28	3	12,307	0	645,125	0
30	FMC Corp.	Pocatello, ID	28	4	1,410	0	0	617,211
31	Thomson Consumer Electronics Inc.	Circleville, OH	32	2	1,104	35	0	0
32	GE Plastics Co., General Electric Co.	Mount Vernon, IN	28	6	569,148	259	0	0
33	Abbott Chemicals Inc.	Barceloneta, PR	Mult.	1	585,261	0	0	0
34	Noltex L.L.C., Mitsubishi Chemical America Inc.	La Porte, TX	28	1	4,036	0	0	0
35	American Bumper & Mfg. Co.	Ionia, MI	34	3	1,844	0	0	0
36	Northwestern Steel & Wire Co.	Sterling, IL	33	3	4,998	299	0	528,345
37	Boeing Co.	Wichita, KS	Mult.	6	350,141	231	0	0
38	Allegheny Ludlum Corp.	New Castle, IN	33	2	231	227	0	0
39	Elkem Metals Co.	Marietta, OH	33	4	14,521	5,896	0	441,723
40	Southwire Co.	Carrollton, GA	Mult.	14	4,473	106	0	0
41	Quality Chemicals Inc., Chemfirst Corp.	Tyrone, PA	28	1	1,503	0	0	0
42	Hydrite Chemical Co.	Cottage Grove, WI	28	4	2,363	0	0	0
43	Sterling Chemicals Inc.	Texas City, TX	28	10	69,611	0	387,913	0
44	General Electric Co.	Ottawa, IL	28	4	460,365	39	0	0
45	Foamex International Inc.	Milan, TN	30	1	457,282	0	0	0
46	Dow Chemical Co.	Freeport, TX	28	21	349,937	47,669	0	46,408
47	C&D Powercom Inc., C&D Charter Power Sys. Inc.	Conyers, GA	36	1	535	0	0	0
48	Nu-Foam Products, Ohio Decorative Products Inc.	Chattanooga, TN	30	2	420,896	0	0	0
49	Albemarle Corp.	Orangeburg, SC	28	2	241,492	3,129	0	2,358
50	Weyerhaeuser Co.	Longview, WA	Mult.	6	340,485	62,013	0	0
	Subtotal			**223**	**8,925,649**	**148,047**	**8,365,276**	**18,461,743**
	% of the Following Totals			**1.4**	**10.9**	**15.3**	**87.0**	**81.7**
	Total of All Matched TRI Carcinogens			**15,679**	**82,201,211**	**968,754**	**9,617,911**	**22,593,021**

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens. A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.

* Chemicals accounting for more than 70% of total releases and transfers of carcinogens from the facility.

➤ One facility, Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds. It has been omitted from this table.

➤ UIJ=underground injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	5,126,893	24,036	0	3,129	27,166	5,154,059	Chromium and compounds (land)
2	4,084,751	4,535	0	0	4,535	4,089,286	Chromium and compounds (land)
3	1,024,557	2,593,802	9	0	2,593,811	3,618,368	Lead and compounds (transfers to treatment)
4	2,549,116	5,442	0	0	5,442	2,554,558	Formaldehyde (UIJ)
5	114,816	1,708,572	148,186	4,748	1,861,506	1,976,322	Dichloromethane (transfers to treatment)
6	1,896,534	0	7	0	7	1,896,541	Lead and compounds (land)
7	1,445,775	0	0	0	0	1,445,775	Lead and compounds (land)
8	1,377,169	33,046	0	0	33,046	1,410,215	Formaldehyde (UIJ)
9	1,307,438	0	0	0	0	1,307,438	Lead/Chromium and compounds (land)
10	5,894	3,935	0	1,261,751	1,265,686	1,271,580	Lead/Nickel and compounds (transfers to disposal)
11	1,243,883	328	0	0	328	1,244,211	Acrylamide, Acrylonitrile (UIJ)
12	1,195,460	5,018	0	290	5,308	1,200,769	Acrylamide, Acrylonitrile (UIJ)
13	1,142,344	4,537	0	58	4,595	1,146,940	Dichloromethane (air)
14	1,046,797	0	0	0	0	1,046,797	Styrene (air)
15	1,803	704,322	0	327,065	1,031,388	1,033,191	Lead and compounds (transfers to treatment, disposal)
16	996,296	625	0	2	628	996,924	Acrylamide (UIJ)
17	922,590	0	0	0	0	922,590	Nickel and compounds (land)
18	741,871	0	0	119,252	119,252	861,122	Lead/Arsenic and compounds (land)
19	847	0	72	847,166	847,238	848,084	Lead and compounds (transfers to disposal)
20	21,698	5,481	20	818,954	824,455	846,153	Dichloromethane (transfers to disposal)
21	455,125	340,136	21,814	0	361,950	817,075	Dichloromethane (air, transfers to treatment)
22	756,420	1,813	0	0	1,813	758,233	Dichloromethane (air)
23	253,255	105,937	0	388,305	494,242	747,497	Nickel and compounds (transfers to disposal), Vinyl acetate (air)
24	1,879	0	55	743,311	743,366	745,245	Lead and compounds (transfers to disposal)
25	85,253	634,932	0	177	635,109	720,362	Epichlorohydrin (transfers to treatment)
26	40,710	0	0	657,275	657,275	697,985	Styrene (transfers to disposal)
27	689,399	752	0	0	752	690,151	Dichloromethane (air)
28	689,212	0	369	0	369	689,581	Lead and compounds (land)
29	657,431	0	0	0	0	657,431	Acrylonitrile (UIJ)
30	618,621	0	0	24	24	618,645	Chromium/Cadmium and compounds (land)
31	1,139	168,317	0	439,312	607,629	608,768	Lead and compounds (transfers to disposal)
32	569,407	19,368	0	7,125	26,493	595,900	Dichloromethane (air)
33	585,261	1,533	16	0	1,549	586,810	Dichloromethane (air)
34	4,036	547,834	317	0	548,152	552,188	Vinyl acetate (transfers to treatment)
35	1,844	545,574	1,838	0	547,412	549,256	Nickel and compounds (transfers to treatment)
36	533,642	1,224	0	0	1,224	534,866	Lead/Chromium and compounds (land)
37	350,372	128,578	118	44,104	172,800	523,172	Tetrachloroethylene, Trichloroethylene (air)
38	458	0	0	512,472	512,472	512,930	Chromium/Nickel and compounds (transfers to disposal)
39	462,140	0	0	43,537	43,537	505,678	Chromium and compounds (land)
40	4,579	401,032	18	95,841	496,890	501,469	Lead and compounds (transfers to treatment)
41	1,503	497,742	0	0	497,742	499,245	Carbon tetrachloride (transfers to treatment)
42	2,363	476,259	0	0	476,259	478,621	Trichloroethylene, Dichloromethane (transfers to treatment)
43	457,524	10,657	61	9,311	20,029	477,553	Acrylamide, Acrylonitrile (UIJ)
44	460,404	0	0	116	116	460,520	Styrene, Acrylonitrile (air)
45	457,282	150	0	0	150	457,432	Dichloromethane (air)
46	444,015	7,436	0	0	7,436	451,451	1,2-Dichloroethane, Epichlorohydrin, Dichloromethane, Benzene, Propylene oxide, 1,3-Butadiene (air)
47	535	431,778	0	0	431,778	432,313	Lead and compounds (transfers to treatment)
48	420,896	0	0	0	0	420,896	Dichloromethane (air)
49	246,980	167,800	0	0	167,800	414,780	Dichloromethane (air, transfers to treatment)
50	402,498	113	0	8,728	8,842	411,339	Acetaldehyde, Chloroform (air)
	35,900,716	**9,582,648**	**172,902**	**6,332,050**	**16,087,600**	**51,988,316**	
	31.1	**39.4**	**7.3**	**22.0**	**29.0**	**30.4**	
	115,380,897	**24,339,167**	**2,354,088**	**28,834,946**	**55,528,201**	**170,909,098**	

5.4.2 Metals

Releases of Metals

The 19 metals and their compounds in the matched data set amounted to a higher proportion of TRI releases (17 percent) than of NPRI releases (14 percent). Zinc and manganese and their compounds ranked first and second for total releases in both NPRI and TRI (**Tables 5–28**, p. 150 and **5–29**, p. 151).

NPRI and TRI facilities reported similar patterns of releases of metals and their compounds. Most releases occurred as on-site land releases in both PRTRs, although NPRI facilities reported higher proportions of their releases of metals and compounds to air and surface waters (**Figure 5–13**).

Transfers of Metals

Unlike releases of metals, a larger proportion of NPRI transfers consisted of metals and their compounds (61 percent) than was the case in TRI (46 percent). As with releases, zinc and manganese and their compounds ranked first and second for total transfers in both PRTRs (**Tables 5–30**, p. 152 and **5–31**, p. 153).

The general pattern of metal transfers was also similar in the two systems, with the largest transfers occurring to disposal/containment, and nearly all of the rest sent to treatment/destruction (**Figure 5–14**).

Releases and Transfers of Metals

About one-third of the forms submitted in both NPRI and TRI, in the 1996 matched data set, were for metals and their compounds. Reporting of these substances accounted for 30 percent of all releases and transfers in NPRI and 25 percent in TRI. Releases and transfers of zinc and its compounds, ranking first among metals, totaled more than twice the amount of second-ranked manganese and its compounds in both PRTRs (**Tables 5–32**, p. 154 and **5–33**, p. 155).

Top Facilities for Releases and Transfers of Metals

Releases. Fifty facilities reported almost all the NPRI releases of metals and their compounds in the matched data set for 1996. These facilities reported 96 percent or more of the NPRI air emissions, surface water discharges, and on-site land releases of metals and their compounds. While the top TRI facilities also accounted for a large majority of total releases of metals, they reported a smaller proportion of the TRI air emissions (33 percent) and surface water discharges (37 percent, see **Figure 5–15** and **Tables 5–34**, pp. 156–57 and **5–35**, pp. 158–59).

Releases and Transfers. Fifty NPRI facilities reported the great majority (93 percent) of total releases and transfers of metals and their compounds in 1996. In TRI, reporting by the 50 facilities with the largest total releases and transfers of these substances accounted for 64 percent of the TRI total. Most of these facilities—32 of the NPRI top 50 and 38 of the TRI top 50—were primary metal producers (US SIC code 33, see **Figure 5–16** and **Tables 5–36**, pp. 160–61 and **5–37**, pp. 162–63).

[Text continues on p. 164.]

Figure 5–13
M 1996
NPRI and TRI Releases of Metals and their Compounds

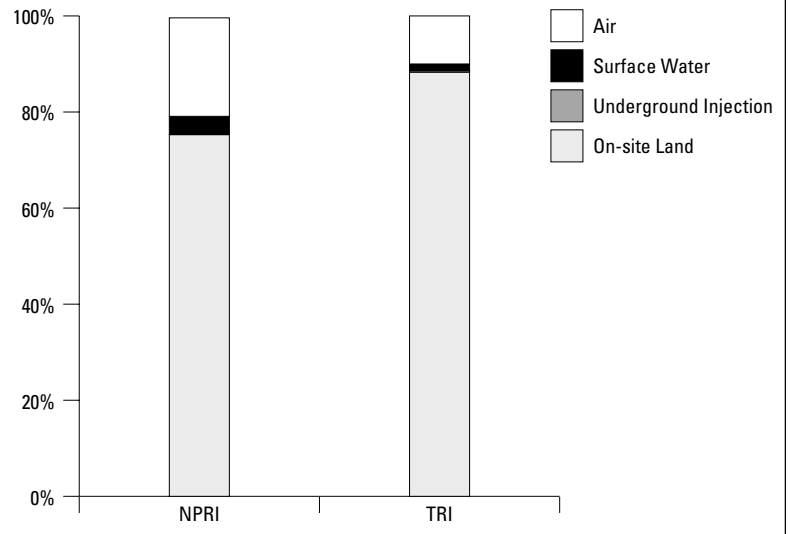


Figure 5–14
M 1996
NPRI and TRI Transfers of Metals and their Compounds

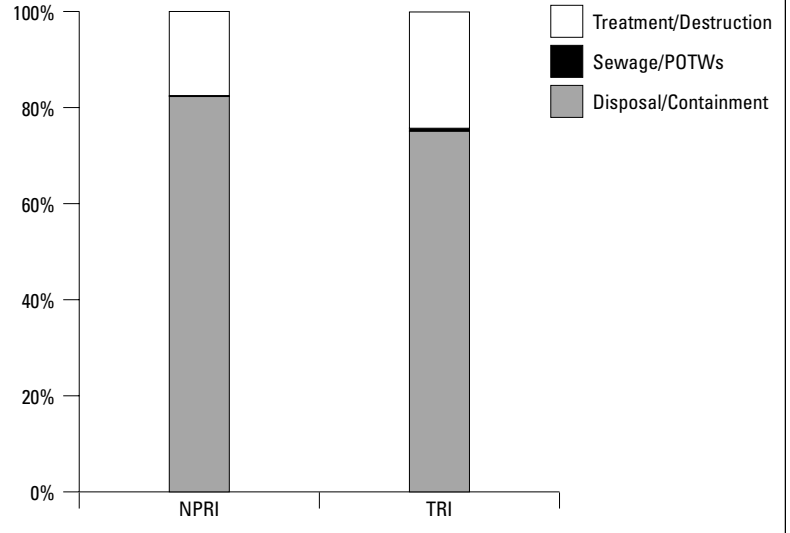
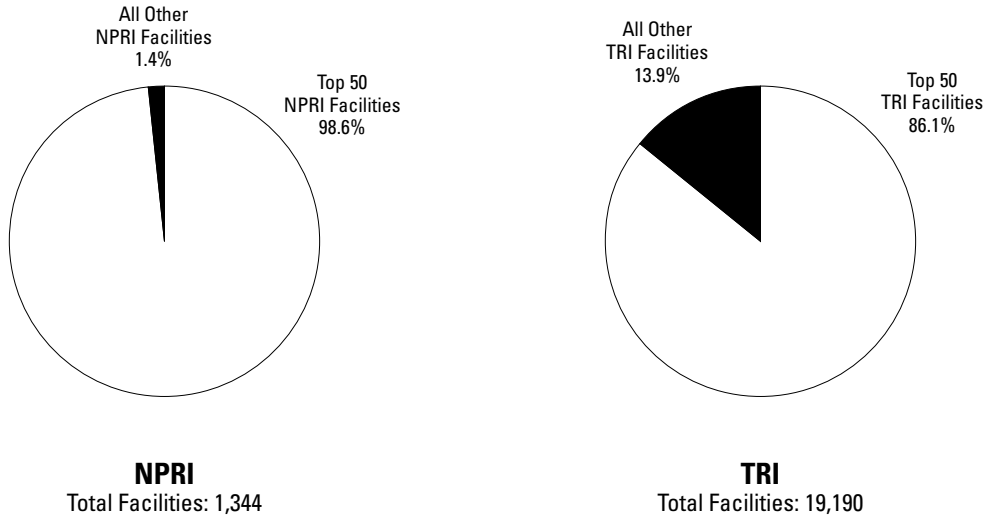


Figure 5–15
M 1996

NPRI and TRI Total Releases of Metals and their Compounds, Top 50 Facilities and All Others

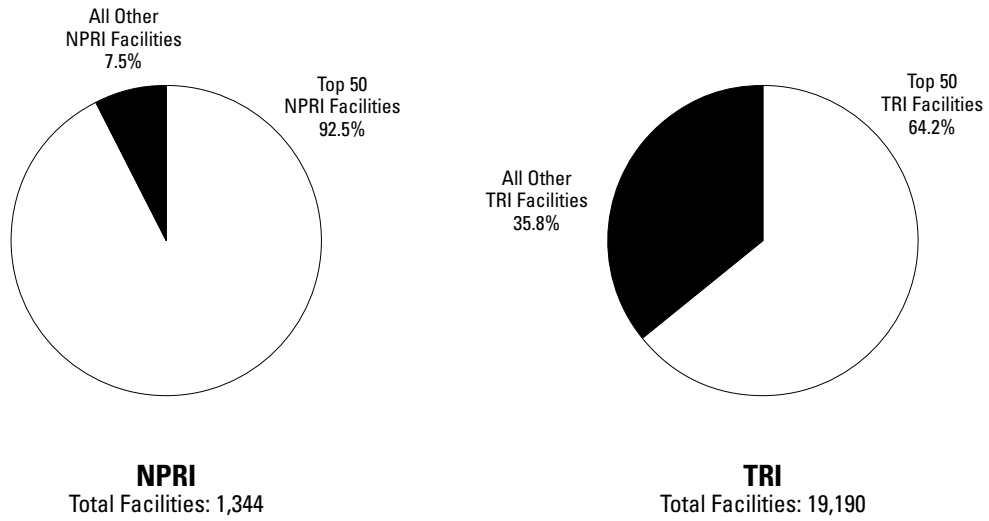


NPRI
Total Facilities: 1,344

TRI
Total Facilities: 19,190

Figure 5–16
M 1996

NPRI and TRI Total Releases and Transfers of Metals and their Compounds, Top 50 Facilities and All Others



NPRI
Total Facilities: 1,344

TRI
Total Facilities: 19,190

Table 5–28

M 1996

NPRI Releases of Metals and their Compounds

CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total for Metals
—	Zinc (and its compounds)	616,629	105,297	334	4,918,575	5,648,068	49.7
—	Manganese (and its compounds)	63,939	231,904	0	1,577,548	1,882,245	16.5
—	Lead (and its compounds)	560,640	6,124	45	820,693	1,393,051	12.2
—	Copper (and its compounds)	431,233	14,263	10	234,312	684,293	6.0
7429-90-5	Aluminum (fume or dust)	18,662	0	0	477,300	499,143	4.4
—	Chromium (and its compounds)	16,565	16,896	200	454,030	493,593	4.3
—	Nickel (and its compounds)	275,954	49,972	9	67,675	396,159	3.5
7440-62-2	Vanadium (fume or dust)	187,695	100	0	1,179	189,526	1.7
—	Arsenic (and its compounds)	123,216	1,581	0	0	125,128	1.1
—	Cobalt (and its compounds)	10,197	1,840	0	13,309	25,646	0.2
—	Cadmium (and its compounds)	17,750	522	0	0	18,952	0.2
—	Antimony (and its compounds)	8,162	7	0	321	9,516	0.1
—	Selenium (and its compounds)	3,300	1,978	0	0	5,490	0.0
1313-27-5	Molybdenum trioxide	1,516	0	0	0	1,736	0.0
—	Silver (and its compounds)	1,010	26	0	10	1,203	0.0
1344-28-1	Aluminum oxide (fibrous forms)	200	0	0	1	325	0.0
7550-45-0	Titanium tetrachloride	86	0	0	0	86	0.0
—	Mercury (and its compounds)	26	6	0	0	34	0.0
	Subtotal	**2,336,780**	**430,516**	**598**	**8,564,953**	**11,374,194**	**100.0**
	% of the Following Totals	**3.7**	**8.4**	**0.0**	**95.8**	**13.8**	
	Total for All Matched NPRI Chemicals	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**	

Table 5–29

M 1996

TRI Releases of Metals and their Compounds

CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total for Metals
—	Zinc (and its compounds)	3,387,061	488,278	58,729	46,096,185	50,030,253	37.7
—	Manganese (and its compounds)	4,064,808	915,423	8,025	22,761,845	27,750,101	20.9
—	Copper (and its compounds)	3,122,784	48,981	154,070	23,317,789	26,643,624	20.1
—	Chromium (and its compounds)	403,529	322,479	16,976	12,199,556	12,942,540	9.8
—	Lead (and its compounds)	817,653	28,045	360	6,791,505	7,637,563	5.8
7429-90-5	Aluminum (fume or dust)	763,323	22,217	0	1,756,420	2,541,960	1.9
—	Nickel (and its compounds)	318,459	39,922	41,044	1,795,732	2,195,157	1.7
—	Antimony (and its compounds)	51,224	18,265	6,307	897,996	973,792	0.7
—	Arsenic (and its compounds)	70,258	2,026	27,791	838,905	938,980	0.7
—	Cadmium (and its compounds)	20,256	2,097	37	250,996	273,386	0.2
1313-27-5	Molybdenum trioxide	89,051	12,700	95,193	32,496	229,440	0.2
1344-28-1	Aluminum oxide (fibrous forms)	48,467	229	0	162,200	210,896	0.2
—	Cobalt (and its compounds)	28,677	14,644	7,219	130,326	180,866	0.1
—	Selenium (and its compounds)	21,455	1,134	1,406	95,812	119,807	0.1
—	Silver (and its compounds)	11,156	3,762	168	23,582	38,668	0.0
7550-45-0	Titanium tetrachloride	13,991	0	0	0	13,991	0.0
—	Mercury (and its compounds)	7,754	245	4	244	8,247	0.0
7440-62-2	Vanadium (fume or dust)	771	2	0	7	780	0.0
1314-20-1	Thorium dioxide	0	0	0	0	0	0.0
	Subtotal	**13,240,677**	**1,920,449**	**417,329**	**117,151,596**	**132,730,051**	**100.0**
	% of the Following Totals	**2.6**	**2.6**	**0.6**	**85.6**	**17.0**	
	Total for All Matched TRI Chemicals	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**	**780,621,952**	

Table 5–30

M 1996

NPRI Transfers of Metals and their Compounds

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total for Metals
—	Zinc (and its compounds)	2,809,386	11,090	9,694,801	12,515,277	49.4
—	Manganese (and its compounds)	515,746	4,147	6,070,014	6,589,907	26.0
—	Lead (and its compounds)	196,217	2,376	2,057,027	2,255,620	8.9
—	Chromium (and its compounds)	575,785	7,318	1,670,586	2,253,689	8.9
—	Copper (and its compounds)	88,681	4,495	658,035	751,211	3.0
—	Nickel (and its compounds)	216,967	11,427	272,761	501,155	2.0
7429-90-5	Aluminum (fume or dust)	0	1,360	216,873	218,233	0.9
1344-28-1	Aluminum oxide (fibrous forms)	28	0	118,472	118,500	0.5
—	Arsenic (and its compounds)	1,264	161	46,260	47,685	0.2
—	Selenium (and its compounds)	0	9,821	24,712	34,533	0.1
1313-27-5	Molybdenum trioxide	15,290	566	1,841	17,697	0.1
—	Cobalt (and its compounds)	2,370	10	8,477	10,857	0.0
—	Mercury (and its compounds)	4,440	0	5,173	9,613	0.0
—	Antimony (and its compounds)	11	70	8,153	8,234	0.0
—	Cadmium (and its compounds)	0	8	2,775	2,783	0.0
—	Silver (and its compounds)	0	188	41	229	0.0
7550-45-0	Titanium tetrachloride	5	0	0	5	0.0
7440-62-2	Vanadium (fume or dust)	0	0	1	1	0.0
	Subtotal	**4,426,190**	**53,037**	**20,856,002**	**25,335,229**	**100.0**
	% of the Following Totals	**32.6**	**1.1**	**90.6**	**61.0**	
	Total for All Matched NPRI Chemicals	**13,571,799**	**4,943,234**	**23,017,654**	**41,532,687**	

Table 5–31

M 1996

TRI Transfers of Metals and their Compounds

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total for Metals
—	Zinc (and its compounds)	19,512,938	194,100	48,800,815	68,507,854	46.6
—	Manganese (and its compounds)	3,475,948	179,423	18,426,293	22,081,664	15.0
—	Lead (and its compounds)	6,383,793	21,542	10,841,028	17,246,363	11.7
—	Copper (and its compounds)	1,410,033	238,345	9,714,108	11,362,486	7.7
—	Chromium (and its compounds)	1,791,866	134,465	7,562,568	9,488,899	6.4
—	Nickel (and its compounds)	1,326,369	81,408	3,723,600	5,131,377	3.5
1344-28-1	Aluminum oxide (fibrous forms)	16,469	602	4,242,086	4,259,157	2.9
7429-90-5	Aluminum (fume or dust)	68,763	5,784	3,513,816	3,588,363	2.4
—	Antimony (and its compounds)	409,215	53,041	2,004,228	2,466,484	1.7
—	Arsenic (and its compounds)	822,904	241	563,941	1,387,086	0.9
—	Cadmium (and its compounds)	103,225	1,427	425,648	530,300	0.4
1313-27-5	Molybdenum trioxide	163,664	29,003	285,099	477,766	0.3
—	Cobalt (and its compounds)	57,337	6,334	338,362	402,033	0.3
7550-45-0	Titanium tetrachloride	75,610	0	15,425	91,035	0.1
—	Selenium (and its compounds)	20,453	193	32,081	52,727	0.0
—	Silver (and its compounds)	16,128	1,201	14,569	31,898	0.0
7440-62-2	Vanadium (fume or dust)	773	91	17,524	18,388	0.0
—	Mercury (and its compounds)	6,549	7	11,739	18,295	0.0
1314-20-1	Thorium dioxide	0	998	0	998	0.0
	Subtotal	**35,662,037**	**948,205**	**110,532,931**	**147,143,173**	**100.0**
	% of the Following Totals	**32.2**	**1.1**	**89.1**	**45.8**	
	Total for All Matched TRI Chemicals	**110,901,271**	**86,130,663**	**124,047,657**	**321,079,591**	

Table 5–32

M 1996

NPRI Releases and Transfers of Metals and their Compounds

CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total for Metals
		Number	%				
—	Zinc (and its compounds)	307	21.5	5,648,068	12,515,277	18,163,345	49.5
—	Manganese (and its compounds)	233	16.4	1,882,245	6,589,907	8,472,152	23.1
—	Lead (and its compounds)	130	9.1	1,393,051	2,255,620	3,648,671	9.9
—	Chromium (and its compounds)	213	14.9	493,593	2,253,689	2,747,282	7.5
—	Copper (and its compounds)	225	15.8	684,293	751,211	1,435,504	3.9
—	Nickel (and its compounds)	137	9.6	396,159	501,155	897,314	2.4
7429-90-5	Aluminum (fume or dust)	36	2.5	499,143	218,233	717,376	2.0
7440-62-2	Vanadium (fume or dust)	12	0.8	189,526	1	189,527	0.5
—	Arsenic (and its compounds)	33	2.3	125,128	47,685	172,813	0.5
1344-28-1	Aluminum oxide (fibrous forms)	10	0.7	325	118,500	118,825	0.3
—	Selenium (and its compounds)	4	0.3	5,490	34,533	40,023	0.1
—	Cobalt (and its compounds)	23	1.6	25,646	10,857	36,503	0.1
—	Cadmium (and its compounds)	11	0.8	18,952	2,783	21,735	0.1
1313-27-5	Molybdenum trioxide	12	0.8	1,736	17,697	19,433	0.1
—	Antimony (and its compounds)	26	1.8	9,516	8,234	17,750	0.0
—	Mercury (and its compounds)	2	0.1	34	9,613	9,647	0.0
—	Silver (and its compounds)	7	0.5	1,203	229	1,432	0.0
7550-45-0	Titanium tetrachloride	4	0.3	86	5	91	0.0
	Subtotal	**1,425**	**100.0**	**11,374,194**	**25,335,229**	**36,709,423**	**100.0**
	% of the Following Totals	**33.2**		**13.8**	**61.0**	**29.6**	
	Total for All Matched NPRI Chemicals	**4,298**		**82,596,460**	**41,532,687**	**124,129,147**	

Table 5–33

M 1996

TRI Releases and Transfers of Metals and their Compounds

CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total for Metals
		Number	%				
—	Zinc (and its compounds)	2,932	15.0	50,030,253	68,507,854	118,538,107	42.4
—	Manganese (and its compounds)	2,554	13.0	27,750,101	22,081,664	49,831,765	17.8
—	Copper (and its compounds)	4,061	20.7	26,643,624	11,362,486	38,006,110	13.6
—	Lead (and its compounds)	1,640	8.4	7,637,563	17,246,363	24,883,926	8.9
—	Chromium (and its compounds)	3,154	16.1	12,942,540	9,488,899	22,431,439	8.0
—	Nickel (and its compounds)	2,760	14.1	2,195,157	5,131,377	7,326,534	2.6
7429-90-5	Aluminum (fume or dust)	310	1.6	2,541,960	3,588,363	6,130,323	2.2
1344-28-1	Aluminum oxide (fibrous forms)	48	0.2	210,896	4,259,157	4,470,053	1.6
—	Antimony (and its compounds)	673	3.4	973,792	2,466,484	3,440,276	1.2
—	Arsenic (and its compounds)	392	2.0	938,980	1,387,086	2,326,066	0.8
—	Cadmium (and its compounds)	143	0.7	273,386	530,300	803,686	0.3
1313-27-5	Molybdenum trioxide	158	0.8	229,440	477,766	707,206	0.3
—	Cobalt (and its compounds)	480	2.5	180,866	402,033	582,899	0.2
—	Selenium (and its compounds)	47	0.2	119,807	52,727	172,535	0.1
7550-45-0	Titanium tetrachloride	34	0.2	13,991	91,035	105,027	0.0
—	Silver (and its compounds)	138	0.7	38,668	31,898	70,566	0.0
—	Mercury (and its compounds)	34	0.2	8,247	18,295	26,541	0.0
7440-62-2	Vanadium (fume or dust)	14	0.1	780	18,388	19,169	0.0
1314-20-1	Thorium dioxide	1	0.0	0	998	998	0.0
	Subtotal	**19,573**	**100.0**	**132,730,051**	**147,143,173**	**279,873,224**	**100.0**
	% of the Following Totals	**33.8**		**17.0**	**45.8**	**25.4**	
	Total for All Matched TRI Chemicals	**57,927**		**780,621,952**	**321,079,591**	**1,101,701,543**	

Table 5–34

M 1996

The 50 NPRI Facilities with the Largest Total Releases of Metals and their Compounds

Rank	Facility	City, Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
2	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	4	22,367	0	0	2,008,700
3	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
4	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	10	657,650	18,900	0	0
5	AltaSteel Ltd.	Edmonton, AB	29	33	5	11,216	37	0	597,088
6	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	8	15,660	2,769	0	462,800
7	Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur, QC	29	33	5	0	0	0	457,180
8	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	6	427,818	0	0	0
9	Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon, MB	29	33	5	413,595	3,327	0	0
10	Sydney Steel Corporation	Sydney, NS	29	33	8	0	300	0	330,200
11	Recyclage d'aluminium Québec Inc.	Bécancour, QC	29	33	1	0	0	0	275,000
12	Fonderies canadiennes d'acier Ltée	Montréal, QC	31	35	3	200	0	0	255,800
13	Produits forestiers Donohue Inc., usine de pâte Kraft	St-Félicien, QC	27	26	2	0	68,800	0	145,800
14	Recyclage d'aluminium Québec Inc., Ragueneau	Baie-Comeau, QC	29	33	1	0	0	0	185,000
15	North Atlantic Refining Ltd	Come By Chance, NF	36	29	5	130,533	0	0	0
16	Cezinc (Zinc électrolytique du Canada Limitée)	Salaberry-de-Valleyfield, QC	29	33	8	110,848	7,138	0	0
17	Sammi Atlas Inc., Atlas Specialty Steels	Welland, ON	29	33	4	232	1,523	0	113,596
18	Inco Limited, Manitoba Division	Thompson, MB	29	33	4	90,209	14,257	0	0
19	Imperial Oil, IOL Sarnia Refinery	Sarnia, ON	36	29	4	76,953	187	0	1,976
20	Esco Limited	Port Coquitlam, BC	29	33	3	311	0	0	65,409
21	Inco Limited, Port Colborne Refinery	Port Colborne, ON	29	33	5	1,002	1,070	0	55,325
22	Ford Motor Company, Windsor Casting Plant	Windsor, ON	29	33	5	1,830	51,700	0	0
23	Falconbridge Limited, Smelter Complex	Falconbridge, ON	29	33	8	42,385	3,347	0	39
24	Kronos Canada, Inc.	Varennes, QC	37	28	3	86	45,350	0	0
25	Stelco Inc., Hilton Works	Hamilton, ON	29	33	9	14,750	22,220	0	0
26	Inco Limited Central Mills	Copper Cliff, ON	29	33	2	0	36,430	0	0
27	Cartons St-Laurent Inc.	Latuque, QC	27	26	2	1,656	32,155	0	0
28	Weyerhaeuser Canada Ltd., Kamloops Pulp Division	Kamloops, BC	27	26	1	0	31,300	0	0
29	Shell Canada Products Ltd., Sarnia Manufacturing Centre	Corunna, ON	36	29	3	28,578	0	0	328
30	Metalex Products Ltd.	Richmond, BC	29	33	5	79	0	0	24,000
31	Weyerhaeuser Saskatchewan Ltd., Prince Albert Pulp & Paper	Prince Albert, SK	27	26	1	0	22,200	0	0
32	Noranda Mining and Exploration Inc., Brunswick Smelting Division	Belledune, NB	29	33	5	20,530	1,104	0	0
33	Weyerhaeuser Canada Ltd., Grande Prairie Operations	Grande Prairie, AB	04	24	1	0	19,370	0	0
34	Stelco McMaster Ltée	Contrecoeur, QC	29	33	5	16,280	0	0	0
35	Dofasco Inc.	Hamilton, ON	29	33	7	8,360	7,549	0	0
36	Wolverine Tube (Canada) Inc.	Fergus, ON	29	33	3	5,672	200	0	8,610
37	St. Anne-Nackawic Pulp Company Ltd.	Nackawic, NB	27	26	1	0	14,000	0	0
38	Riverside Brass Ltd.	New Hamburg, ON	29	33	3	13,000	0	0	0
39	QIT-Fer et Titane Inc.	Tracy, QC	29	33	3	12,900	0	0	0
40	Michelin North America (Canada) Inc.	Bridgewater, NS	15	30	2	0	100	0	12,612
41	Petro-Canada, raffinerie de Montréal	Montréal, QC	36	29	1	12,300	0	0	0
42	Gerdau Courtice Steel Inc., Courtice Steel Inc.	Cambridge, ON	29	33	6	11,940	0	0	0
43	Cobalt Refinery Company	Fort Saskatchewan, AB	29	33	4	370	0	0	10,890
44	Ivaco Rolling Mills	L'Orignal, ON	29	33	7	10,087	2	0	0
45	F.F. Soucy Inc.	Rivière-du-Loup, QC	27	26	2	0	10,600	0	0
46	Wabash Alloys	Toronto, ON	29	33	4	10,521	0	0	0
47	Spruce Falls Inc.	Kapuskasing/O'Brien, ON	27	26	1	1,705	996	0	7,800
48	Slater Steels, Hamilton Specialty Bar Division	Hamilton, ON	29	33	9	8,728	0	0	200
49	ICI Canada, ICI Explosifs	Brownsburg, QC	37	28	2	0	0	0	8,350
50	DuPont Canada Inc.	Maitland, ON	37	28	3	6,440	1,452	0	0
	Subtotal				**210**	**2,258,886**	**418,866**	**0**	**8,532,003**
	% of the Following Totals				**14.7**	**96.7**	**97.3**	**0.0**	**99.6**
	Total for All Matched NPRI Metals				**1,425**	**2,336,780**	**430,516**	**598**	**8,564,953**

* Chemicals accounting for more than 70% of total relases of metals from the facility.

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	2,322,985	Zinc and compounds (land)
2	2,031,067	Zinc and compounds (land)
3	1,254,893	Zinc/Lead and compounds (land)
4	676,550	Lead/Copper/Zinc and compounds (air)
5	608,341	Zinc/Manganese and compounds (land)
6	481,240	Manganese and compounds (land)
7	457,180	Zinc/Lead and compounds (land)
8	427,818	Copper/Nickel and compounds (air)
9	416,922	Zinc/Lead and compounds (air)
10	331,280	Zinc/Manganese and compounds (land)
11	275,000	Aluminum (land)
12	256,000	Chromium and compounds (land)
13	214,600	Manganese and compounds (land, water)
14	185,000	Aluminum (land)
15	130,533	Vanadium (air)
16	118,880	Zinc and compounds (air)
17	115,351	Chromium and compounds (land)
18	104,466	Nickel and compounds (air)
19	79,116	Vanadium (air)
20	65,743	Manganese and compounds (land)
21	57,397	Copper/Nickel and compounds (land)
22	53,530	Zinc and compounds (water)
23	45,771	Nickel/Zinc/Copper and compounds (air)
24	45,436	Manganese and compounds (water)
25	37,720	Zinc and compounds (water), Manganese and compounds (air)
26	36,430	Nickel and compounds (water)
27	33,811	Manganese and compounds (water)
28	31,300	Manganese and compounds (water)
29	28,925	Vanadium, Nickel and compounds (air)
30	24,229	Lead/Zinc and compounds (land)
31	22,200	Manganese and compounds (water)
32	21,634	Lead and compounds (air)
33	19,370	Manganese and compounds (water)
34	17,410	Zinc and compounds (air)
35	15,909	Zinc and compounds (water, air), Manganese and compounds (water)
36	14,495	Zinc and compounds (land, air)
37	14,000	Chromium and compounds (water)
38	13,000	Zinc/Lead and compounds (air)
39	12,900	Manganese and compounds, Aluminum (air)
40	12,712	Zinc and compounds (land)
41	12,300	Vanadium (air)
42	11,940	Zinc/Lead and compounds (air)
43	11,260	Nickel/Zinc and compounds (land)
44	11,020	Zinc/Manganese and compounds (air)
45	10,600	Manganese and compounds (water)
46	10,521	Aluminum (air)
47	10,501	Manganese and compounds (land)
48	10,428	Zinc/Lead and compounds (air)
49	8,350	Aluminum (land)
50	7,892	Cobalt/Copper and compounds (air)
	11,215,956	
	98.6	
	11,374,194	

Table 5–35

M 1996

The 50 TRI Facilities with the Largest Total Releases of Metals and their Compounds

Rank	Facility	City, State	US SIC Code	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	ASARCO Inc.	East Helena, MT	33	9	45,844	927	0	20,113,797
2	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ	33	11	21,941	113	0	11,298,685
3	Northwestern Steel & Wire Co.	Sterling, IL	33	4	47,510	1,224	0	6,496,599
4	General Motors Corp., Powertrain Defiance	Defiance, OH	33	6	35,786	734	0	6,006,304
5	Elkem Metals Co.	Marietta, OH	33	5	218,149	326,984	0	4,763,719
6	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX	28	1	2,063	113	0	5,124,717
7	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ	33	8	484,619	0	0	4,555,926
8	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM	33	1	117,531	0	0	4,261,163
9	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT	33	8	64,265	1,927	0	4,121,891
10	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC	28	1	2,967	15	0	4,081,769
11	ASARCO Inc., Glover Plant	Annapolis, MO	33	6	158,230	35	0	3,871,963
12	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO	33	9	106,342	149	0	3,467,229
13	Chino Mines Co.	Hurley, NM	33	1	18,380	0	0	3,457,663
14	US Steel Gary Works, USX Corp.	Gary, IN	33	12	131,202	7,900	0	2,599,909
15	Granite City Steel, National Steel Corp.	Granite City, IL	33	6	21,822	5,397	0	2,592,722
16	FMC Corp.	Pocatello, ID	28	9	2,139	351	0	2,586,124
17	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ	33	5	1,787,997	0	0	774,034
18	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS	33	3	3,583	11,211	0	2,335,782
19	USS Fairfield Works, USX Corp.	Fairfield, AL	33	8	6,323	2,681	0	1,859,434
20	Chemetals Inc., Comilog	New Johnsonville, TN	28	1	38,983	759	0	1,645,950
21	Louisiana Pigment Co. L.P., Kronos Louisiana Inc.	Westlake, LA	28	2	375	110	0	1,269,841
22	General Motors Corp., GMTG Saginaw Metal Casting	Saginaw, MI	33	6	19,257	1	0	999,955
23	Kerr-McGee Chemical Corp.	Henderson, NV	28	2	6,259	0	0	949,116
24	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR	33	1	17,061	7	0	905,522
25	Geneva Steel	Vineyard, UT	33	8	1,720	667	0	811,276
26	Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria, IL	33	3	597,497	542	0	165,402
27	Austeel Lemont Co. Inc.	Lemont, IL	33	5	23,420	227	0	644,666
28	Griffin Wheel Co. Columbus Plant, Amsted Ind. Inc.	Groveport, OH	33	2	8,163	0	0	639,904
29	Imco Recycling Inc.	Morgantown, KY	33	5	5,490	0	0	615,964
30	Bethlehem Steel Corp.	Sparrows Point, MD	33	6	7,937	21,638	0	514,104
31	American Steel Foundries, Amsted Industries Inc.	Granite City, IL	33	5	27,628	0	0	474,376
32	Griffin Wheel Co., Amsted Industries Inc.	Keokuk, IA	33	2	8,163	0	0	461,723
33	General Electric Co., Silicone Products	Waterford, NY	28	2	680	4,762	0	430,844
34	AK Steel Corp., AK Steel Holding	Middletown, OH	33	11	25,737	148	0	359,819
35	Griffin Wheel Co., Amsted Industries Inc.	Bessemer, AL	33	2	3,583	0	0	359,274
36	LTV Steel Co. Inc.	Cleveland, OH	33	5	8,039	2,187	0	350,753
37	Gulf States Steel Inc., GSS Holding Corp.	Gadsden, AL	33	7	19,549	13,673	0	304,308
38	WCI Steel Inc.	Warren, OH	33	5	4,404	358	0	324,649
39	Griffin Wheel Co., Amsted Industries Inc.	Kansas City, KS	33	2	3,583	0	0	315,904
40	Metal Mark Inc., Imco Recycling Inc.	Chicago Heights, IL	33	6	5,108	0	0	282,976
41	Caparo Steel, Caparo Inc.	Farrell, PA	33	5	5,036	277,698	0	0
42	LTV Steel Co. Inc.	East Chicago, IN	33	4	4,540	1,746	0	268,934
43	US Pipe & Foundry Co., Walter Industries Inc.	Birmingham, AL	33	1	454	0	0	272,109
44	Great Southern Paper Co., Georgia-Pacific Corp.	Cedar Springs, GA	26	1	39,002	2,177	0	222,222
45	Bethlehem Steel Corp.	Burns Harbor, IN	33	6	20,410	14,717	3,311	217,324
46	GNB Techs. Inc., Pacific Dunlop GNB Corp.	Frisco, TX	33	3	1,538	2	0	237,512
47	Hayes-Albion Corp., Harvard Industries Inc.	Albion, MI	33	3	11,146	6	0	225,705
48	Georgia-Pacific Paper Operations	Crossett, AR	26	1	142,383	506	0	93,236
49	Nucor Steel, Nucor Corp.	Jewett, TX	33	6	16,130	0	0	216,490
50	U.S. Vanadium Corp., Strategic Minerals Corp.	Hot Springs, AR	33	1	0	85	0	232,100
	Subtotal			**232**	**4,349,972**	**701,776**	**3,311**	**109,181,389**
	% of the Following Totals			**1.2**	**32.9**	**36.5**	**0.8**	**93.2**
	Total for All Matched TRI Metals			**19,573**	**13,240,677**	**1,920,449**	**417,329**	**117,151,595**

* Chemicals accounting for more than 70% of total releases of metals from the facility.

➤ Two TRI facilities reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese and Tennessee Aluminum Processor Inc., Maury, PA, reported 720,000 kg of on-site releases to land of aluminum. They have been omitted from this table.

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	20,160,568	Zinc and compounds (land)
2	11,320,739	Copper/Zinc and compounds (land)
3	6,545,333	Zinc/Manganese and compounds (land)
4	6,042,824	Zinc and compounds (land)
5	5,308,852	Manganese and compounds (land)
6	5,126,893	Chromium and compounds (land)
7	5,040,544	Copper/Zinc and compounds (land)
8	4,378,694	Copper and compounds (land)
9	4,188,084	Copper/Zinc and compounds (land)
10	4,084,751	Chromium and compounds (land)
11	4,030,228	Zinc/Lead and compounds (land)
12	3,573,720	Zinc and compounds (land)
13	3,476,044	Copper and compounds (land)
14	2,739,011	Zinc/Manganese and compounds (land)
15	2,619,941	Zinc and compounds (land)
16	2,588,615	Zinc and compounds (land)
17	2,562,031	Copper and compounds (air)
18	2,350,576	Manganese and compounds (land)
19	1,868,437	Zinc and compounds (land)
20	1,685,692	Manganese and compounds (land)
21	1,270,326	Manganese and compounds (land)
22	1,019,212	Zinc/Manganese and compounds (land)
23	955,374	Manganese and compounds (land)
24	922,590	Nickel and compounds (land)
25	813,663	Manganese/Zinc and compounds (land)
26	763,441	Zinc and compounds (air)
27	668,313	Zinc and compounds (land)
28	648,068	Manganese and compounds (land)
29	621,454	Aluminum (land)
30	543,678	Manganese and compounds (land)
31	502,005	Chromium and compounds/Aluminum (land)
32	469,887	Manganese and compounds (land)
33	436,286	Copper and compounds (land)
34	385,704	Manganese and compounds (land)
35	362,857	Manganese and compounds (land)
36	360,980	Zinc/Manganese and compounds (land)
37	337,531	Zinc/Manganese and compounds (land)
38	329,411	Manganese and compounds (land)
39	319,487	Manganese and compounds (land)
40	288,085	Aluminum (land)
41	282,734	Chromium and compounds (water)
42	275,220	Manganese and compounds (land)
43	272,562	Manganese and compounds (land)
44	263,401	Zinc and compounds (land)
45	255,762	Manganese and compounds (land)
46	239,052	Lead and compounds (land)
47	236,857	Manganese and compounds (land)
48	236,125	Zinc and compounds (air, land)
49	232,620	Zinc/Manganese and compounds (land)
50	232,185	Nickel and compounds (land)
	114,236,448	
	86.1	
	132,730,050	

Table 5–36

M 1996

Top 50 NPRI Facilities with Largest Total Releases and Transfers of Metals and their Compounds

Rank	Facility	City, Province	SIC Codes Canada	SIC Codes US	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
2	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	8	15,660	2,769	0	462,800
3	Stelco McMaster Ltée	Contrecoeur, QC	29	33	5	16,280	0	0	0
4	Dofasco Inc.	Hamilton, ON	29	33	7	8,360	7,549	0	0
5	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
6	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	4	22,367	0	0	2,008,700
7	Ivaco Rolling Mills	L'Orignal, ON	29	33	7	10,087	2	0	0
8	Slater Steels, Hamilton Specialty Bar Division	Hamilton, ON	29	33	9	8,728	0	0	200
9	Dominion Castings Ltd.	Hamilton, ON	29	33	3	6,291	100	0	0
10	Kronos Canada, Inc.	Varennes, QC	37	28	3	86	45,350	0	0
11	Zalev Brothers Limited	Windsor, ON	29	33	7	449	7	0	0
12	Gerdau Courtice Steel Inc., Courtice Steel Inc.	Cambridge, ON	29	33	6	11,940	0	0	0
13	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	10	657,650	18,900	0	0
14	AltaSteel Ltd.	Edmonton, AB	29	33	5	11,216	37	0	597,088
15	Sammi Atlas Inc., Aciers inoxydables Atlas	Tracy, QC	29	33	5	1,090	750	0	0
16	Sammi Atlas Inc., Atlas Specialty Steels	Welland, ON	29	33	4	232	1,523	0	113,596
17	Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur, QC	29	33	5	0	0	0	457,180
18	Ford Motor Company, Windsor Casting Plant	Windsor, ON	29	33	5	1,830	51,700	0	0
19	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	6	427,818	0	0	0
20	Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon, MB	29	33	5	413,595	3,327	0	0
21	Tonolli Canada Limited	Mississauga, ON	29	33	1	2,307	50	0	0
22	Sydney Steel Corporation	Sydney, NS	29	33	8	0	300	0	330,200
23	Metalex Products Ltd.	Richmond, BC	29	33	5	79	0	0	24,000
24	Recyclage d'aluminium Québec Inc.	Bécancour, QC	29	33	1	0	0	0	275,000
25	Fonderies canadiennes d'acier Ltée	Montréal, QC	31	35	3	200	0	0	255,800
26	Dominion Colour Corporation	Ajax, ON	37	28	4	0	0	0	0
27	Produits forestiers Donohue Inc., usine de pâte Kraft	St-Félicien, QC	27	26	2	0	68,800	0	145,800
28	Doorhandle Systems	Brampton, ON	55	37	4	0	0	0	0
29	Les Forges de Sorel Inc.	St-Joseph-de-Sorel, QC	30	34	4	333	0	0	0
30	Recyclage d'aluminium Québec Inc., Ragueneau	Baie-Comeau, QC	29	33	1	0	0	0	185,000
31	A.G.Simpson Co Ltd.	Oshawa, ON	32	34	5	0	0	0	0
32	Cezinc (Zinc électrolytique du Canada Limitée)	Salaberry-de-Valleyfield, QC	29	33	8	110,848	7,138	0	0
33	North Atlantic Refining Ltd.	Come By Chance, NF	36	29	5	130,533	0	0	0
34	Dana Canada Inc., Spicer Driveshaft Division	Thorold, ON	32	37	2	0	0	0	0
35	Stelwire Ltd., Parkdale Works	Hamilton, ON	30	34	3	750	346	0	0
36	Cartons St-Laurent Inc.	Latuque, QC	27	26	2	1,656	32,155	0	0
37	National-Standard Co. of Canada Ltd., Guelph Plant (70)	Guelph, ON	30	33	2	0	0	0	0
38	Mitsubishi Electronics Industries Canada Inc.	Midland, ON	33	36	2	40	247	0	0
39	PPG Canada Inc., Works 84	Owen Sound, ON	35	32	1	0	0	0	0
40	Inco Limited, Manitoba Division	Thompson, MB	29	33	4	90,209	14,257	0	0
41	F.F. Soucy Inc.	Rivière-du-Loup, QC	27	26	2	0	10,600	0	0
42	Métallurgie Noranda, Affinerie CCR	Montréal-Est, QC	29	33	9	4,968	0	0	0
43	Imperial Oil, IOL Sarnia Refinery	Sarnia, ON	36	29	4	76,953	187	0	1,976
44	Coatings 85 Ltd.	Mississauga, ON	30	34	1	0	0	0	0
45	Weyerhaeuser Canada Ltd., Kamloops Pulp Division	Kamloops, BC	27	26	1	0	31,300	0	0
46	Stelco Inc., Hilton Works	Hamilton, ON	29	33	9	14,750	22,220	0	0
47	Maritime Steel and Foundries Limited	New Glasgow, NS	39	39	5	0	0	0	0
48	Esco Limited	Port Coquitlam, BC	29	33	3	311	0	0	65,409
49	QIT-Fer et Titane Inc.	Tracy, QC	29	33	3	12,900	0	0	0
50	Varity/Kelsey-Hayes Canada Ltd., Eureka Foundry Division	Woodstock, ON	29	33	1	1,433	0	0	0
	Subtotal				**220**	**2,134,044**	**320,097**	**0**	**8,428,049**
	% of the Following Totals				**15.4**	**91.3**	**74.4**	**0.0**	**98.4**
	Total of All Matched NPRI Metals				**1,425**	**2,336,780**	**430,516**	**598**	**8,564,953**

* Chemicals accounting for more than 70% of total relases and transfers of metals from the facility.

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	1,254,893	0	10	3,578,500	3,578,510	4,833,403	Zinc and compounds (transfers to disposal)
2	481,240	0	0	3,814,700	3,814,700	4,295,940	Manganese and compounds (transfers to disposal)
3	17,410	3,054,700	0	0	3,054,700	3,072,110	Zinc and compounds (transfers to treatment)
4	15,909	0	1,677	2,539,176	2,540,853	2,556,762	Zinc/Manganese and compounds (transfers to disposal)
5	2,322,985	0	0	0	0	2,322,985	Zinc and compounds (land)
6	2,031,067	0	0	0	0	2,031,067	Zinc and compounds (land)
7	11,020	0	0	1,559,360	1,559,360	1,570,380	Zinc and compounds (transfers to disposal)
8	10,428	542	1,036	1,256,701	1,258,279	1,268,707	Zinc/Lead and compounds (transfers to disposal)
9	6,591	0	0	906,005	906,005	912,596	Chromium and compounds (transfers to disposal)
10	45,436	0	0	836,000	836,000	881,436	Manganese and compounds (transfers to disposal)
11	456	0	0	877,606	877,606	878,062	Zinc/Copper and compounds (transfers to disposal)
12	11,940	0	0	776,670	776,670	788,610	Zinc/Lead and compounds (transfers to disposal)
13	676,550	0	0	0	0	676,550	Lead/Copper/Zinc and compounds (air)
14	608,341	0	0	65,858	65,858	674,199	Zinc/Manganese and compounds (land)
15	1,840	481,110	0	0	481,110	482,950	Chromium/Nickel and compounds (transfers to treatment)
16	115,351	8,348	0	353,753	362,100	477,451	Chromium and compounds (transfer to disposal, land), Zinc and compounds (transfers to disposal)
17	457,180	0	0	0	0	457,180	Zinc/Lead and compounds (land)
18	53,530	0	0	383,900	383,900	437,430	Zinc/Manganese and compounds (transfers to disposal)
19	427,818	0	0	0	0	427,818	Copper/Nickel and compounds (air)
20	416,922	0	0	0	0	416,922	Zinc/Lead and compounds (air)
21	2,357	0	80	376,370	376,450	378,807	Lead and compounds (transfers to disposal)
22	331,280	0	0	0	0	331,280	Zinc/Manganese and compounds (land)
23	24,229	0	0	257,210	257,210	281,439	Lead and compounds (transfers to disposal)
24	275,000	0	0	0	0	275,000	Aluminum (land)
25	256,000	550	0	0	550	256,550	Chromium and compounds (land)
26	0	0	0	229,400	229,400	229,400	Lead and compounds (transfers to disposal)
27	214,600	0	0	0	0	214,600	Manganese and compounds (land, water)
28	0	207,367	2,095	0	209,461	209,461	Chromium/Nickel/Zinc and compounds (transfers to treatment)
29	333	184,210	0	16,944	201,154	201,487	Chromium/Manganese and compounds (transfers to treatment)
30	185,000	0	0	0	0	185,000	Aluminum (land)
31	400	90	1,060	153,410	154,560	154,960	Nickel/Chromium and compounds (transfers to disposal)
32	118,880	0	0	29,885	29,885	148,765	Zinc and compounds (air)
33	130,533	0	0	0	0	130,533	Vanadium (air)
34	0	0	0	121,540	121,540	121,540	Manganese and compounds (transfers to disposal)
35	1,178	0	3,118	110,863	113,981	115,159	Zinc and compounds (transfers to disposal)
36	33,811	0	0	80,834	80,834	114,645	Manganese and compounds (transfers to disposal)
37	0	0	0	111,156	111,156	111,156	Lead and compounds (transfers to disposal)
38	287	0	0	110,477	110,477	110,764	Lead and compounds (transfers to disposal)
39	0	0	0	105,000	105,000	105,000	Chromium and compounds (transfers to disposal)
40	104,466	0	0	0	0	104,466	Nickel and compounds (air)
41	10,600	0	0	76,000	76,000	86,600	Aluminum/Manganese and compounds (transfers to disposal)
42	5,440	0	11,983	63,278	75,261	80,701	Arsenic/Selenium/Copper and compounds (transfers to disposal)
43	79,116	0	0	43	43	79,159	Vanadium (air)
44	0	0	52	74,748	74,800	74,800	Zinc and compounds (transfers to disposal)
45	31,300	0	0	38,600	38,600	69,900	Manganese and compounds (transfers to disposal, water)
46	37,720	0	0	29,740	29,740	67,460	Zinc and compounds (water, transfers to disposal), Aluminum (transfers to disposal)
47	0	0	0	66,000	66,000	66,000	Aluminum oxide (transfers to disposal)
48	65,743	0	0	0	0	65,743	Manganese and compounds (land)
49	12,900	0	0	52,000	52,000	64,900	Manganese and compounds (transfers to disposal)
50	1,433	0	0	60,877	60,877	62,310	Manganese and compounds (transfers to disposal)
	10,889,513	**3,936,917**	**21,111**	**19,112,604**	**23,070,630**	**33,960,143**	
	95.7	**88.9**	**39.8**	**91.6**	**91.1**	**92.5**	
	11,374,194	**4,426,190**	**53,037**	**20,856,002**	**25,335,229**	**36,709,423**	

Table 5–37

M 1996

Top 50 TRI Facilities with Largest Total Releases and Transfers of Metals and their Compounds

Rank	Facility	City, State	US SIC Code	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
1	ASARCO Inc.	East Helena, MT	33	9	45,844	927	0	20,113,797
2	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ	33	11	21,941	113	0	11,298,685
3	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA	33	9	219,985	272	0	0
4	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ	33	8	484,619	0	0	4,555,926
5	Nucor Steel, Nucor Corp.	Crawfordsville, IN	33	6	959	26	0	11
6	Northwestern Steel & Wire Co.	Sterling, IL	33	4	47,510	1,224	0	6,496,599
7	National Steel Corp., Great Lakes Div.	Ecorse, MI	33	4	53,904	766	0	0
8	General Motors Corp., Powertrain Defiance	Defiance, OH	33	6	35,786	734	0	6,006,304
9	Rouge Steel Co.	Dearborn, MI	33	7	23,356	2,630	0	0
10	Elkem Metals Co.	Marietta, OH	33	5	218,149	326,984	0	4,763,719
11	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX	28	1	2,063	113	0	5,124,717
12	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT	33	8	64,265	1,927	0	4,121,891
13	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM	33	1	117,531	0	0	4,261,163
14	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC	28	1	2,967	15	0	4,081,769
15	ASARCO Inc., Glover Plant	Annapolis, MO	33	6	158,230	35	0	3,871,963
16	Regal Ware Inc.	Kewaskum, WI	34	6	472	0	0	0
17	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO	33	9	106,342	149	0	3,467,229
18	Ameristeel Corp., Jacksonville Mill Div.	Baldwin, FL	33	6	8,663	0	0	0
19	Chino Mines Co.	Hurley, NM	33	1	18,380	0	0	3,457,663
20	Cerro Wire & Cable Co. Inc.	Hartselle, AL	33	3	120	7	0	0
21	USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock, PA	33	5	4,732	971	0	0
22	Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria, IL	33	3	597,497	542	0	165,402
23	U.S. Steel Gary Works, USX Corp.	Gary, IN	33	12	131,202	7,900	0	2,599,909
24	Granite City Steel, National Steel Corp.	Granite City, IL	33	6	21,822	5,397	0	2,592,722
25	FMC Corp.	Pocatello, ID	28	9	2,139	351	0	2,586,124
26	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ	33	5	1,787,997	0	0	774,034
27	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS	33	3	3,583	11,211	0	2,335,782
28	Nucor-Yamato Steel Co., Nucor Corp.	Blytheville, AR	33	6	13,870	0	0	0
29	Steel Dynamics Inc.	Butler, IN	33	4	2,415	0	0	0
30	Oregon Steel Mills Inc.	Portland, OR	33	6	3,461	108	0	0
31	Nucor Steel, Nucor Corp.	Plymouth, UT	33	7	5,388	0	0	4,838
32	USS Fairfield Works, USX Corp.	Fairfield, AL	33	8	6,323	2,681	0	1,859,434
33	Nucor Steel, Nucor Corp.	Darlington, SC	33	7	49,219	342	0	2,354
34	Chemetals Inc., Comilog	New Johnsonville, TN	28	1	38,983	759	0	1,645,950
35	Ameristeel Corp.	Jackson, TN	33	7	11,625	1,014	0	0
36	Ameristeel Corp.	Charlotte, NC	33	6	19,637	0	0	0
37	ASARCO Inc.	Omaha, NE	33	5	19,665	1,842	0	1,136
38	Louisiana Pigment Co. L.P., Kronos Louisiana Inc.	Westlake, LA	28	2	375	110	0	1,269,841
39	SCM Chemicals Americas Plant II, SCM Chemicals Inc.	Ashtabula, OH	28	2	10	68,481	0	0
40	Quemetco Inc., RSR Corp.	Indianapolis, IN	33	6	2,197	0	0	0
41	General Battery Corp., Exide Corp.	Reading, PA	33	6	954	1,306	0	0
42	Quemetco Inc., RSR Corp.	City of Industry, CA	33	5	989	12	0	0
43	Southwire Co.	Carrollton, GA	Mult.	27	16,088	453	0	0
44	Eveready Battery Co. Inc., Ralston Purina Co.	Marietta, OH	28	1	4,898	181	0	0
45	American Insulated Wire, Leviton Mfg. Co. Inc.	Attleboro, MA	33	5	874	0	0	0
46	Koppel Steel Corp.	Koppel, PA	32	7	4,483	58	0	0
47	General Motors Corp., GMTG Saginaw Metal Casting	Saginaw, MI	33	6	19,257	1	0	999,955
48	Madison Ind. Inc.	Old Bridge, NJ	28	3	55	0	0	0
49	Kerr-McGee Chemical Corp.	Henderson, NV	28	2	6,259	0	0	949,116
50	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR	33	1	17,061	7	0	905,522
	Subtotal			**284**	**4,424,145**	**439,649**	**0**	**100,313,555**
	% of the Following Totals			**1.5**	**33.4**	**22.9**	**0.0**	**85.6**
	Total of All Matched TRI Metals			**19,573**	**13,240,677**	**1,920,449**	**417,329**	**117,151,595**

* Chemicals accounting for more than 70% of total releases and transfers of metals from the facility.

➤ Three TRI facilities reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese and Tennessee Aluminum Processor Inc., Maury, PA, reported 720,000 kg of on-site releases to land and 165,000 kg of transfers to disposal of aluminum and Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds. They have been omitted from this table.

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	20,160,568	0	17	0	17	20,160,585	Zinc and compounds (land)
2	11,320,739	0	0	0	0	11,320,739	Copper/Zinc and compounds (land)
3	220,257	48,556	0	10,424,925	10,473,482	10,693,738	Zinc/Manganese and compounds (transfers to disposal)
4	5,040,544	3,033,400	129	0	3,033,529	8,074,073	Lead and compounds (transfers to treatment), Copper/Zinc and compounds (land)
5	996	392	0	7,659,029	7,659,422	7,660,418	Zinc and compounds (transfers to disposal)
6	6,545,333	65,170	0	0	65,170	6,610,503	Zinc/Manganese and compounds (land)
7	54,670	46,776	425	6,299,280	6,346,480	6,401,151	Zinc and compounds (transfers to disposal)
8	6,042,824	0	410	0	410	6,043,234	Zinc and compounds (land)
9	25,986	0	0	5,933,560	5,933,560	5,959,546	Zinc and compounds (transfers to disposal)
10	5,308,852	0	0	43,537	43,537	5,352,390	Manganese and compounds (land)
11	5,126,893	24,036	0	3,129	27,166	5,154,059	Chromium and compounds (land)
12	4,188,084	0	0	347,302	347,302	4,535,385	Copper/Zinc and compounds (land)
13	4,378,694	0	0	0	0	4,378,694	Copper and compounds (land)
14	4,084,751	4,535	0	0	4,535	4,089,286	Chromium and compounds (land)
15	4,030,228	0	0	0	0	4,030,228	Zinc/Lead and compounds (land)
16	472	0	0	3,646,259	3,646,259	3,646,730	Aluminum oxide (transfers to disposal)
17	3,573,720	0	452	0	452	3,574,172	Zinc and compounds (land)
18	8,663	1,756,102	0	1,756,102	3,512,205	3,520,868	Zinc and compounds (transfers to treatment, disposal)
19	3,476,044	0	0	0	0	3,476,044	Copper and compounds (land)
20	127	0	0	3,439,996	3,439,996	3,440,123	Copper and compounds (transfers to disposal)
21	5,703	0	0	3,260,882	3,260,882	3,266,585	Zinc and compounds (transfers to disposal)
22	763,441	2,351,084	0	0	2,351,084	3,114,526	Zinc and compounds (transfers to treatment)
23	2,739,011	0	0	45,387	45,387	2,784,398	Zinc/Manganese and compounds (land)
24	2,619,941	544	0	0	544	2,620,484	Zinc and compounds (land)
25	2,588,615	0	3	793	795	2,589,410	Zinc and compounds (land)
26	2,562,031	0	0	816	816	2,562,847	Copper and compounds (air)
27	2,350,576	0	0	0	0	2,350,576	Manganese and compounds (land)
28	13,870	2,096,133	0	1,172	2,097,305	2,111,176	Zinc and compounds (transfers to treatment)
29	2,415	0	2	2,055,950	2,055,952	2,058,367	Zinc and compounds (transfers to disposal)
30	3,569	1,932,004	0	96	1,932,100	1,935,668	Zinc and compounds (transfers to treatment)
31	10,226	1,893,347	0	1	1,893,348	1,903,574	Zinc and compounds (transfers to treatment)
32	1,868,437	0	0	0	0	1,868,437	Zinc and compounds (land)
33	51,915	0	0	1,645,528	1,645,528	1,697,443	Zinc and compounds (transfers to disposal)
34	1,685,692	0	0	0	0	1,685,692	Manganese and compounds (land)
35	12,639	1,601,938	0	0	1,601,938	1,614,576	Zinc and compounds (transfers to treatment)
36	19,637	1,430,806	0	0	1,430,806	1,450,444	Zinc and compounds (transfers to treatment)
37	22,643	0	26	1,329,875	1,329,901	1,352,544	Zinc/Lead and compounds (transfers to disposal)
38	1,270,326	68	0	169	237	1,270,563	Manganese and compounds (land)
39	68,491	0	0	1,170,941	1,170,941	1,239,431	Manganese and compounds (transfers to disposal)
40	2,197	0	357	1,234,014	1,234,371	1,236,567	Lead/Antimony and compounds (transfers to disposal)
41	2,260	852,044	0	368,927	1,220,971	1,223,231	Lead and compounds (transfers to treatment, disposal)
42	1,001	0	254	1,196,372	1,196,626	1,197,627	Lead/Antimony and compounds (transfers to disposal)
43	16,541	1,083,903	27	96,446	1,180,376	1,196,917	Zinc/Lead and compounds (transfers to treatment)
44	5,079	1,043,084	0	104,308	1,147,392	1,152,472	Manganese and compounds (transfers to treatment)
45	874	0	0	1,082,450	1,082,450	1,083,324	Copper and compounds (transfers to disposal)
46	4,541	1	0	1,047,585	1,047,586	1,052,127	Zinc and compounds (transfers to disposal)
47	1,019,212	0	426	0	426	1,019,639	Zinc/Manganese and compounds (land)
48	55	995,383	54	0	995,438	995,493	Zinc and compounds (transfers to treatment)
49	955,374	1,288	0	0	1,288	956,662	Manganese and compounds (land)
50	922,590	0	0	0	0	922,590	Nickel and compounds (land)
	105,177,349	**20,260,596**	**2,583**	**54,194,831**	**74,458,011**	**179,635,360**	
	79.2	**56.8**	**0.3**	**49.0**	**50.6**	**64.2**	
	132,730,050	**35,662,037**	**948,205**	**110,532,930**	**147,143,172**	**279,873,222**	

5.5 Industry Distribution

Releases by Industry

The same three industries ranked at the top for total releases in both NPRI and TRI: chemical manufacturing, primary metals, and paper products. The chemical industry reported one-quarter of all NPRI releases in the matched data set and one-third of TRI releases (**Tables 5–38** and **5–39**, p. 166).

In NPRI, the chemical industry ranked first for emissions to air and injection to underground wells. Primary metal industries reported NPRI's largest on-site releases to land. The paper products sector reported the largest discharges to surface waters and the second largest emissions to air.

TRI's chemical manufacturing industry ranked first for air emissions, surface water discharges, and underground injection. The primary metal industries, ranking second, reported TRI's largest on-site land releases. TRI's paper products sector reported the second largest air emissions, ranking third for total releases.

Transfers by Industry

The pattern of off-site transfers differed considerably in NPRI and TRI. The primary metal industries reported more than half of NPRI's transfers. The chemical industry ranked second, reporting 28 percent of NPRI's total. In contrast, the chemical industry led TRI reporting of transfers, closely followed by primary metals, each accounting for one-third of the TRI total. The paper products industry ranked third in both PRTRs, with a much smaller share of the total (5 percent in NPRI and 7 percent in TRI—see **Tables 5–40**, p. 167 and **5–41**, p. 168).

In both PRTRs, the chemical industry reported the largest transfers to treatment/destruction and to sewage/POTWs, while the primary metals producers reported sending the largest amounts to disposal/containment. In NPRI, the primary metal industries ranked first for total transfers because its transfers to disposal/containment outweighed the chemical industry's transfers in the other categories.

Releases and Transfers by Industry

The same three industries ranked at the top for total releases and transfers in NPRI and in TRI, but not in the same rank order. Because of its large transfers, primary metals ranked first in NPRI, reporting one-third of all NPRI releases and transfers in the matched data set. Chemicals ranked second, and paper products third. In TRI, the chemical manufacturing industry reported the largest releases and transfers (one-third of the TRI total), followed by primary metals and paper products. The chemical industry submitted the most forms (more than twice as many as any other industrial sector) in both PRTRs (**Tables 5–42**, p. 169 and **5–43**, p. 170).

These three industries accounted for 75 percent of the releases and transfers reported to NPRI and 69 percent of those in TRI (**Figure 5–17**).

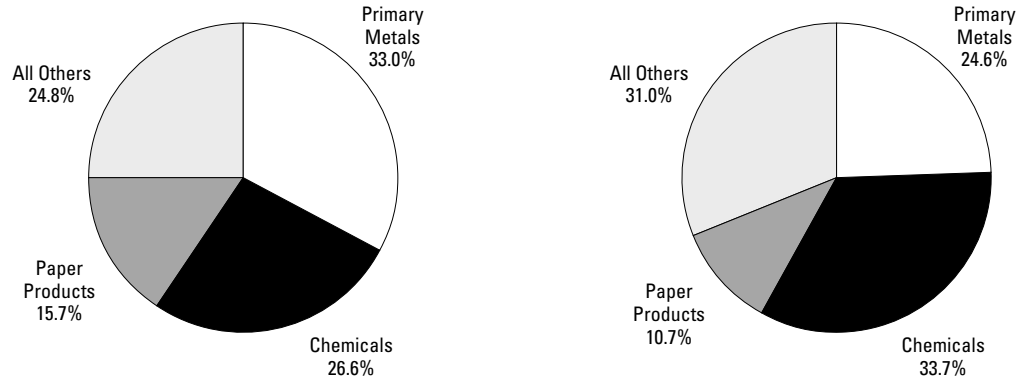
In TRI, the multiple codes category ranked fourth for total releases and transfers (**Table 5–43**, p. 170). This category consists of reporting forms that supply more than one SIC code to describe the facility's operations. The multiple-codes category exists only in TRI reporting; NPRI facilities report just one SIC code each.

Top Facilities for Releases and Transfers

Releases. The industrial distribution of the top 50 facilities for total releases differed strikingly between NPRI and TRI. In NPRI, the largest number of facilities (14 facilities) reported in the paper products industry, while 12 facilities reported in chemical manufacturing and another 12 in primary metals. More than half (27 facilities) of the top TRI facilities reported in the chemical industry, 17 reported in primary metals, but only one in the paper products industry (see **Tables 5–2**, pp. 104–5 and **5–3**, pp. 106–7, above).

Figure 5–17
M 1996

Industries with Largest Total Releases and Transfers, NPRI and TRI



Releases and Transfers. The same industries were represented among the top NPRI facilities for total releases and transfers as for total releases, but their distribution differed. Because of the larger role of off-site transfers for disposal/containment in the primary metal industries, a larger number (18 facilities) of primary metals facilities ranked among the top 50. Fourteen of the top NPRI facilities reported in the chemical industry, and nine in paper products. In TRI, 23 of the facilities with the largest total releases and transfers reported in chemical manufacturing, 22 in primary metals production, and three in paper products manufacturing. As in NPRI, off-site transfers by primary metals facilities placed more facilities in this industry among the top 50 for total releases and transfers than in the top 50 for total releases only (see **Tables 5–4**, pp. 108–9 and **5–5**, po. 110–11, above).

[Text continues on p. 171.]

Table 5–38
M 1996

NPRI Releases by Industry (US SIC Code)

Rank	US SIC Code	Industry	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total
1	28	Chemicals	15,127,066	1,096,143	4,743,637	234,604	21,268,072	25.7
2	33	Primary Metal Industries	10,340,809	790,847	0	8,112,326	19,263,557	23.3
3	26	Paper Products	14,382,612	2,886,534	0	163,051	17,434,128	21.1
4	37	Transportation Equipment	6,378,752	263	0	2,613	6,388,155	7.7
5	30	Rubber and Plastics Products	5,932,823	621	0	14,558	5,955,007	7.2
6	29	Petroleum and Coal Products	4,500,342	23,476	68,733	108,338	4,703,762	5.7
7	34	Fabricated Metals Products	2,010,202	503	0	10,234	2,034,039	2.5
8	24	Lumber and Wood Products	1,714,361	19,370	0	150	1,734,425	2.1
9	32	Stone/Clay/Glass Products	901,789	9,456	0	5,080	917,982	1.1
10	27	Printing and Publishing	665,248	5,604	0	0	671,352	0.8
11	39	Misc. Manufacturing Industries	528,663	0	9	5,404	537,524	0.7
12	25	Furniture and Fixtures	474,565	0	0	0	475,075	0.6
13	35	Industrial Machinery	161,909	24	0	255,800	419,851	0.5
14	20	Food Products	57,308	292,100	0	19,842	369,250	0.4
15	22	Textile Mill Products	331,277	0	0	74	331,651	0.4
16	36	Electronic/Electrical Equipment	76,335	3,193	0	4,417	85,985	0.1
17	31	Leather Products	5,900	0	0	0	5,900	0.0
18	23	Apparel and Other Textile Products	740	0	0	0	740	0.0
19	38	Measurement/Photographic Instruments	5	0	0	0	5	0.0
		Total NPRI Releases	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**	**100.0**

Table 5–39

M 1996

TRI Releases by Industry (US SIC Code)

Rank	US SIC Code	Industry	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	% of Total
1	28	Chemicals	121,530,567	38,598,234	69,773,948	31,219,800	261,122,549	33.5
2	33	Primary Metal Industries	52,261,359	14,038,076	207,075	97,087,456	163,593,966	21.0
3	26	Paper Products	86,883,093	6,373,852	0	2,114,986	95,371,931	12.2
4	30	Rubber and Plastics Products	41,972,438	9,634	0	166,181	42,148,253	5.4
5		Multiple Codes 20-39*	34,472,473	4,597,117	231	2,536,176	41,605,997	5.3
6	37	Transportation Equipment	40,004,420	87,700	0	304,091	40,396,211	5.2
7	29	Petroleum and Coal Products	18,074,352	4,382,206	445,467	542,078	23,444,103	3.0
8	34	Fabricated Metals Products	21,761,990	144,701	259	324,378	22,231,328	2.8
9	25	Furniture and Fixtures	15,472,844	20	0	4,826	15,477,690	2.0
10	27	Printing and Publishing	12,074,024	639	0	6,190	12,080,853	1.5
11	24	Lumber and Wood Products	11,928,605	7,179	0	4,312	11,940,096	1.5
12	32	Stone/Clay/Glass Products	9,503,140	18,519	454	1,039,135	10,561,248	1.4
13	36	Electronic/Electrical Equipment	7,462,582	648,574	12	156,021	8,267,189	1.1
14	20	Food Products	2,514,306	3,878,593	118	1,247,408	7,640,425	1.0
15	22	Textile Mill Products	6,599,424	152,862	0	78,739	6,831,025	0.9
16	35	Industrial Machinery	6,712,298	5,014	0	56,662	6,773,974	0.9
17	38	Measurement/Photographic Instruments	4,900,644	564,214	0	1,148	5,466,006	0.7
18	39	Misc. Manufacturing Industries	3,877,758	893	0	9,016	3,887,667	0.5
19	23	Apparel and Other Textile Products	645,932	2,367	0	242	648,541	0.1
20	21	Tobacco Products	514,743	81,270	0	0	596,013	0.1
21	31	Leather Products	511,478	22,701	0	2,711	536,890	0.1
		Total TRI Releases	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**	**780,621,952**	**100.0**

* Multiple SIC codes reported only in US data.

Table 5–40

M 1996

NPRI Transfers by Industry (US SIC Code)

Rank	US SIC Code	Industry	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total
1	33	Primary Metal Industries	3,747,868	227,110	17,714,674	21,689,651	52.2
2	28	Chemicals	5,734,635	3,949,304	2,037,975	11,721,908	28.2
3	26	Paper Products	1,566,999	4,834	437,184	2,009,017	4.8
4	34	Fabricated Metals Products	601,953	129,947	1,030,736	1,762,634	4.2
5	30	Rubber and Plastics Products	583,896	34,717	492,584	1,111,195	2.7
6	37	Transportation Equipment	659,952	102,986	330,863	1,093,799	2.6
7	29	Petroleum and Coal Products	194,473	16,930	309,484	520,887	1.3
8	36	Electronic/Electrical Equipment	73,383	10,449	286,657	370,489	0.9
9	20	Food Products	26,774	343,261	380	370,415	0.9
10	32	Stone/Clay/Glass Products	53,257	22,133	167,757	243,147	0.6
11	39	Misc. Manufacturing Industries	36,832	98,213	67,102	202,147	0.5
12	27	Printing and Publishing	183,738	0	0	183,738	0.4
13	35	Industrial Machinery	52,932	6	120,812	173,750	0.4
14	24	Lumber and Wood Products	36,092	44	20,648	56,784	0.1
15	25	Furniture and Fixtures	9,327	0	179	9,506	0.0
16	31	Leather Products	4,300	3,300	0	7,600	0.0
17	22	Textile Mill Products	5,388	0	569	5,957	0.0
18	38	Measurement/Photographic Instruments	0	0	50	50	0.0
19	23	Apparel and Other Textile Products	0	0	0	0	0.0
		Total NPRI Transfers	**13,571,799**	**4,943,234**	**23,017,654**	**41,532,687**	**100.0**

Table 5–41
M 1996

TRI Transfers by Industry (US SIC Code)

Rank	US SIC Code	Industry	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Total
1	28	Chemicals	57,483,594	41,100,651	11,559,701	110,143,946	34.3
2	33	Primary Metal Industries	28,234,351	2,950,267	76,244,624	107,429,242	33.5
3	26	Paper Products	4,400,062	17,148,417	1,227,253	22,775,732	7.1
4		Multiple Codes 20-39*	5,767,650	5,090,165	4,248,580	15,106,395	4.7
5	34	Fabricated Metals Products	4,665,784	1,433,646	8,982,190	15,081,620	4.7
6	36	Electronic/Electrical Equipment	2,112,004	3,609,228	6,989,567	12,710,799	4.0
7	20	Food Products	360,941	7,533,367	172,571	8,066,879	2.5
8	30	Rubber and Plastics Products	1,326,548	770,999	4,451,392	6,548,939	2.0
9	37	Transportation Equipment	2,020,815	1,273,272	2,859,297	6,153,384	1.9
10	35	Industrial Machinery	454,667	1,362,132	2,114,036	3,930,835	1.2
11	29	Petroleum and Coal Products	894,235	1,941,209	1,077,778	3,913,222	1.2
12	32	Stone/Clay/Glass Products	1,172,201	302,218	2,412,176	3,886,595	1.2
13	38	Measurement/Photographic Instruments	1,064,029	403,328	282,061	1,749,418	0.5
14	22	Textile Mill Products	231,845	697,111	187,011	1,115,967	0.3
15	31	Leather Products	3,664	177,433	662,864	843,961	0.3
16	39	Misc. Manufacturing Industries	215,569	224,518	354,480	794,567	0.2
17	25	Furniture and Fixtures	270,920	41,434	52,563	364,917	0.1
18	27	Printing and Publishing	152,481	69,745	37,310	259,536	0.1
19	24	Lumber and Wood Products	69,488	1,408	103,665	174,561	0.1
20	23	Apparel and Other Textile Products	243	116	28,538	28,897	0.0
21	21	Tobacco Products	181	0	0	181	0.0
		Total TRI Transfers	**110,901,271**	**86,130,663**	**124,047,657**	**321,079,591**	**100.0**

* Multiple SIC codes reported only in US data.

Table 5–42

M 1996

NPRI Releases and Transfers by Industry (US SIC Code)

Rank	US SIC Code	Industry	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total
1	33	Primary Metal Industries	589	19,263,557	21,689,651	40,953,208	33.0
2	28	Chemicals	1,367	21,268,072	11,721,908	32,989,980	26.6
3	26	Paper Products	317	17,434,128	2,009,017	19,443,145	15.7
4	37	Transportation Equipment	354	6,388,155	1,093,799	7,481,954	6.0
5	30	Rubber and Plastics Products	268	5,955,007	1,111,195	7,066,202	5.7
6	29	Petroleum and Coal Products	333	4,703,762	520,887	5,224,649	4.2
7	34	Fabricated Metals Products	384	2,034,039	1,762,634	3,796,673	3.1
8	24	Lumber and Wood Products	143	1,734,425	56,784	1,791,209	1.4
9	32	Stone/Clay/Glass Products	93	917,982	243,147	1,161,129	0.9
10	27	Printing and Publishing	23	671,352	183,738	855,090	0.7
11	39	Misc. Manufacturing Industries	107	537,524	202,147	739,671	0.6
12	20	Food Products	116	369,250	370,415	739,665	0.6
13	35	Industrial Machinery	64	419,851	173,750	593,601	0.5
14	25	Furniture and Fixtures	25	475,075	9,506	484,581	0.4
15	36	Electronic/Electrical Equipment	95	85,985	370,489	456,474	0.4
16	22	Textile Mill Products	16	331,651	5,957	337,608	0.3
17	31	Leather Products	2	5,900	7,600	13,500	0.0
18	23	Apparel and Other Textile Products	1	740	0	740	0.0
19	38	Measurement/Photographic Instruments	1	5	50	55	0.0
		Total NPRI Releases and Transfers	**4,298**	**82,596,460**	**41,532,687**	**124,129,147**	**100.0**

Table 5–43

M 1996

TRI Releases and Transfers by Industry (US SIC Code)

Rank	US SIC Code	Industry	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	% of Total
1	28	Chemicals	16,227	261,122,549	110,143,946	371,266,495	33.7
2	33	Primary Metal Industries	5,916	163,593,966	107,429,242	271,023,208	24.6
3	26	Paper Products	1,978	95,371,931	22,775,732	118,147,663	10.7
4		Multiple Codes 20-39*	3,816	41,605,997	15,106,395	56,712,392	5.1
5	30	Rubber and Plastics Products	3,050	42,148,253	6,548,939	48,697,192	4.4
6	37	Transportation Equipment	3,708	40,396,211	6,153,384	46,549,595	4.2
7	34	Fabricated Metal Products	6,570	22,231,328	15,081,620	37,312,948	3.4
8	29	Petroleum and Coal Products	2,724	23,444,103	3,913,222	27,357,325	2.5
9	36	Electronic/Electrical Equipment	2,543	8,267,189	12,710,799	20,977,988	1.9
10	25	Furniture and Fixtures	1,152	15,477,690	364,917	15,842,607	1.4
11	20	Food Products	2,584	7,640,425	8,066,879	15,707,304	1.4
12	32	Stone/Clay/Glass Products	1,420	10,561,248	3,886,595	14,447,843	1.3
13	27	Printing and Publishing	370	12,080,853	259,536	12,340,389	1.1
14	24	Lumber and Wood Products	1,595	11,940,096	174,561	12,114,657	1.1
15	35	Industrial Machinery	2,411	6,773,974	3,930,835	10,704,809	1.0
16	22	Textiles Mill Products	486	6,831,025	1,115,967	7,946,992	0.7
17	38	Measurement/Photographic Instruments	563	5,466,006	1,749,418	7,215,424	0.7
18	39	Misc. Manufacturing Industries	635	3,887,667	794,567	4,682,234	0.4
19	31	Leather Products	125	536,890	843,961	1,380,851	0.1
20	23	Apparel and Other Textile Products	36	648,541	28,897	677,438	0.1
21	21	Tobacco Products	18	596,013	181	596,194	0.1
		Total TRI Releases and Transfers	**57,927**	**780,621,952**	**321,079,591**	**1,101,701,543**	**100.0**

* Multiple SIC codes reported only in US data.

5.6 NPRI and TRI Averages for Releases and Transfers

On average, Canadian and US facilities reported on three chemical substances or groups each in 1996. NPRI facilities submitted an average of 3.2 forms, while TRI facilities submitted 3.0 forms. NPRI facilities reported larger total releases and transfers per facility than their TRI counterparts—more than one and one-half times larger. The difference was somewhat greater for transfers (**Table 5–44**).

Averages per reporting form compare reporting patterns on a chemical rather than a facility basis. This measure compensates for the small difference between NPRI and TRI in the average number of forms per facility. In 1996, NPRI facilities averaged 28,881 kg of releases and transfers per reporting form, while TRI facilities averaged 19,019 kg per reporting form. Thus, NPRI facilities reported total releases and transfers per form that were one and one-half times larger than the average for TRI facilities (**Table 5–45**).

Differences arose specifically in reporting of air emissions (1.7 times larger per form in NPRI), transfers to treatment/destruction (1.6 times larger), and transfers to disposal/containment (2.5 times larger). For the other release categories, surface water discharges, underground injection and on-site land releases, as well as transfers to sewage/POTWs, NPRI facilities reported slightly smaller amounts, on average, than TRI facilities.

Some PRTR information such as industrial mix or activities and uses of the chemicals can be examined to explore this difference between NPRI and TRI. Other factors that may influence facility averages—such as regulatory requirements—extend beyond information supplied in NPRI and TRI and cannot be examined using PRTR data.

Table 5–44
M 1996

Average Releases and Transfers per Facility, NPRI and TRI

	NPRI Number	TRI Number
Total Facilities	1,344	19,190
Total Forms	4,298	57,927
Average Forms per Facility	3.2	3.0
	kg	**kg**
Average Releases per Facility	61,456	40,679
Average Transfers per Facility	30,902	16,732
Average Releases and Transfers per Facility	92,358	57,410

Table 5–45
M 1996

Average Releases and Transfers per Form, NPRI and TRI

	NPRI Number		TRI Number		
Total Forms	4,298		57,927		
	kg	**kg/form**	**kg**	**kg/form**	**Ratio of Average per Form (NPRI/TRI)**
Total Air Emissions	63,590,706	14,795	499,678,471	8,626	1.7
Surface Water Discharges	5,128,134	1,193	73,614,363	1,271	0.9
Underground Injection	4,812,379	1,120	70,427,564	1,216	0.9
On-site Land Releases	8,936,491	2,079	136,901,554	2,363	0.9
Matched Releases	**82,596,460**	**19,217**	**780,621,952**	**13,476**	**1.4**
Treatment/Destruction	13,571,799	3,158	110,901,271	1,915	1.6
Sewage/POTWs	4,943,234	1,150	86,130,663	1,487	0.8
Disposal/Containment	23,017,654	5,355	124,047,657	2,141	2.5
Matched Transfers	**41,532,687**	**9,663**	**321,079,591**	**5,543**	**1.7**
Matched Releases and Transfers	**124,129,147**	**28,881**	**1,101,701,543**	**19,019**	**1.5**

5.6.1 Reporting Thresholds

Similar threshold amounts trigger facility reporting in both Canada and the United States. TRI, however, applies lower reporting thresholds for substances that are "otherwise used" (rather than manufactured or processed) and for substances identified as carcinogens by the US Occupational Safety and Health Administration (OSHA). While the reporting threshold for manufacturing or processing a chemical is 25,000 lbs (11,340 kg), TRI facilities must report if they "otherwise use" more than 10,000 lbs (4,536 kg). For OSHA-designated carcinogens, the TRI *de minimus* level for reporting is a concentration of 0.1 percent, rather than the 1.0 percent level that applies to all other TRI chemicals and to all NPRI chemicals. Eliminating from the matched data set all forms that report only in the "otherwise used" category and those that report OSHA carcinogens controls for these differences.

After adjusting for threshold differences, NPRI forms still averaged nearly one and one-half times (a ratio of 1.4) the total releases and transfers of those in TRI. These adjustments account for only about one-sixth of the difference between NPRI and TRI averages (**Table 5–46**, p. 173).

5.6.2 Chemical Use/Activity

NPRI and TRI facilities indicate whether they manufacture, process, or otherwise use the chemicals they report. They may report one or more of these activities for each substance. Differences in how facilities in Canada and the United States use these chemicals could account for differences in their average amounts of releases and transfers. In all but two cases, however, NPRI forms contained greater average total releases and transfers than those in TRI (**Table 5–47**, p. 173 and **Figure 5–18**).

The greatest difference appeared in forms reporting "other uses" only, with an average 1.7 times higher in NPRI than in TRI. This might be expected since the TRI threshold is lower for "other uses." Only in combinations of manufacturing with processing or with "other uses" were NPRI averages lower than in TRI.

Figure 5–18
M 1996

Total Releases and Transfers per Form by Use, NPRI and TRI

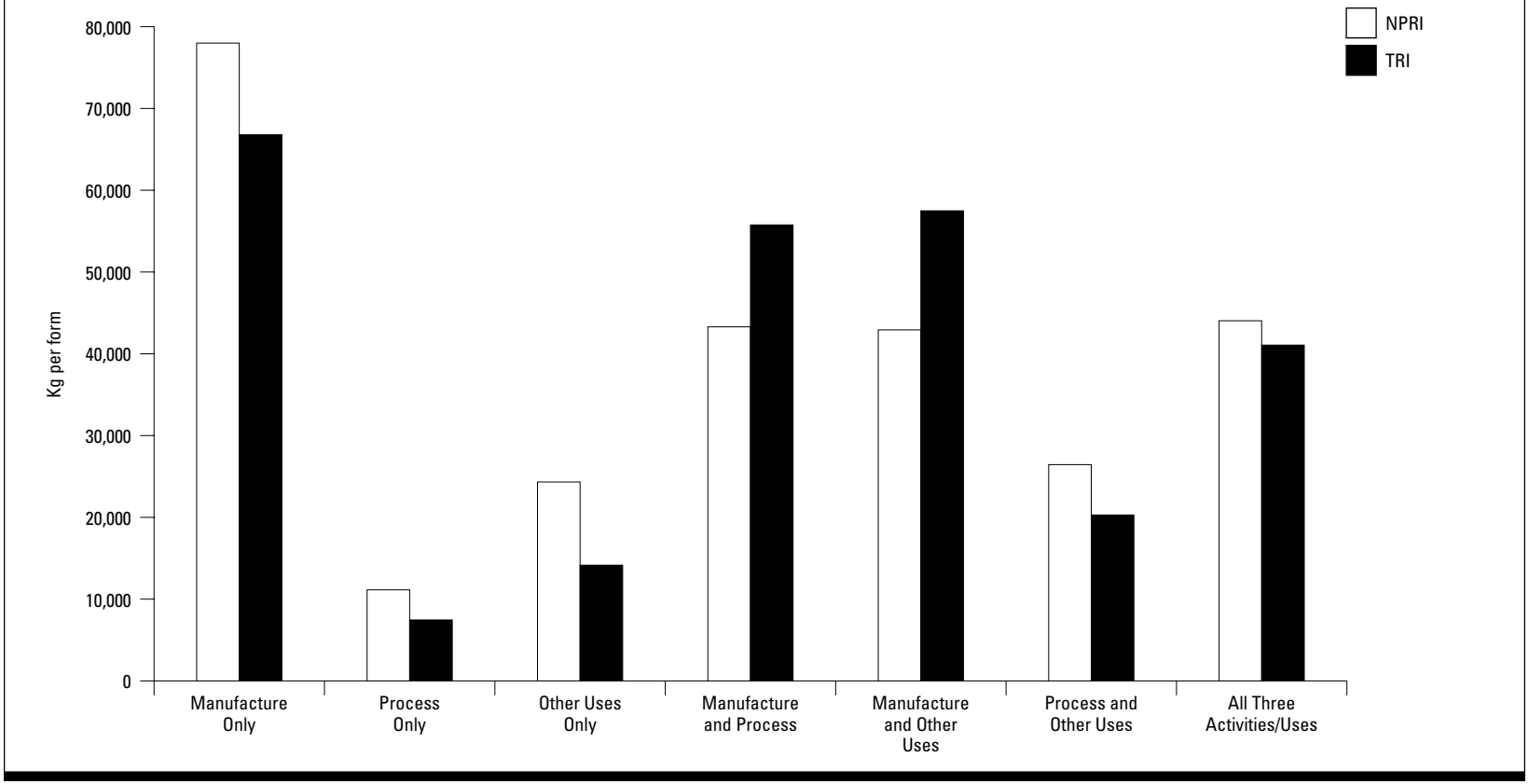


Table 5–46
M 1996

Matching NPRI and TRI Forms on Thresholds

	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Average per Form (kg)
NPRI Matched Chemicals/Industries	4,298	82,596,460	41,532,687	124,129,147	28,881
Minus "Other Uses" Only	863	16,367,602	4,627,977	20,995,579	24,329
Minus *de minimus* Chemicals	1,085	11,052,610	6,903,439	17,956,049	16,549
Plus *de minimus* and "Other Uses" Only Forms*	175	3,441,300	1,384,020	4,825,320	27,573
NPRI Matched Thresholds	**2,525**	**58,617,548**	**31,385,291**	**90,002,839**	**35,645**
TRI Matched Chemicals/Industries	57,927	780,621,952	321,079,591	1,101,701,543	19,019
Minus "Other Uses" Only Forms	15,814	166,407,594	57,504,041	223,911,635	14,159
Minus *de minimus* Chemicals Forms	15,679	115,380,897	55,528,201	170,909,098	10,901
Plus *de minimus* and "Other Uses" Only Forms*	2,490	30,655,427	11,307,325	41,962,752	16,853
TRI Matched Thresholds	**28,924**	**529,488,888**	**219,354,674**	**748,843,562**	**25,890**

* To avoid double subtraction, since these forms are in both of the first two categories.

Table 5–47
M 1996

NPRI and TRI Average Total Releases and Transfers per Form, by Activity/Use Type

	NPRI			TRI*			
Type of Activity/Use	Number of Forms	Forms as % of Total	kg/form	Number of Forms	Forms as % of Total	kg/form	Ratio of Average Total Releases and Transfers per Form (NPRI/TRI)
Manufacturing Only	595	13.8	77,997	4,224	8.1	66,799	1.2
Processing Only	1,920	44.7	11,139	22,184	42.3	7,460	1.5
Other Uses Only	863	20.1	24,329	15,814	30.2	14,159	1.7
Manufacturing and Processing	463	10.8	43,296	4,117	7.9	55,758	0.8
Manufacturing and Other Uses	76	1.8	42,920	1,429	2.7	57,486	0.7
Processing and Other Uses	270	6.3	26,450	3,570	6.8	20,291	1.3
All Three Activities/Uses	111	2.6	44,040	1,102	2.1	41,064	1.1
Total	**4,298**	**100.0**	**28,881**	**52,440**	**100.0**	**20,994**	**1.4**

* Ten percent of TRI forms did not have activity/use designation. They have been omitted from this analysis.

5.6.3 Facilities with Very Large or Very Small Releases

A potential explanation of the different averages could lie in a predominance of facilities with large or small releases and transfers in NPRI or TRI. In NPRI, 1.6 percontributed 43 percent of NPRI's releases and transfers, while in TRI, facilities in this category contributed 49 percent of the total. Two thirds (68 percent) of TRI's facilities reported less than 10,000 kg each. In NPRI, this group represented 58 percent of all facilities. These facilities with very small releases reported two percent of TRI's total releases and transfers and just one percent of NPRI's (**Figure 5–19** and **Table 5–48**, p. 176).

In all of the upper ranges of total release and transfer values, the NPRI facilities represented a greater percentage of the NPRI total than did the corresponding TRI facilities. Thus, there were relatively more facilities in NPRI reporting the largest total releases and transfers than there were in TRI, and more facilities in TRI reporting the smallest total releases and transfers than in NPRI.

5.6.4 Industrial Mix

Differences in the industrial mix of facilities reporting to the two PRTRs—within the matched set of industries—might account for some of the greater releases and transfers per facility in Canada. Primary metals producers, for example, submitted 14 percent of the forms in NPRI but only 10 percent of those in TRI. At the same time, chemical manufacturers submitted 32 percent of the forms in NPRI but only 28 percent of those to TRI (see **Tables 5–42**, p. 169 and **5–43**, p. 170, above). Had one or both of these industries tended to produce greater releases and transfers—in both countries—than other industries, then the relative prevalence of that industry in Canada would have contributed to NPRI's larger average of releases and transfers per form. In fact, this is not the case.

Major Industry Groups (Two-Digit SIC Codes)

In 14 industries, NPRI data indicate higher releases and transfers per form than TRI reporting by the same industries. Thus, differences in average releases and transfers between NPRI and TRI within industries outweigh the influence of the role of each industry within NPRI or TRI. In the primary metal industries, NPRI facilities reported releases and transfers averaging 69,530 kg per form, while TRI facilities averaged 45,812 kg per form. In the chemical industry, the difference between NPRI and TRI reporters is small, but the importance of this industry in both countries' PRTRs makes that small difference significant (**Table 5–49**, p. 178 and **Figure 5–20**).

Industrial Activities within Industry Groups (Three-Digit SIC Codes)

Differences in the Canadian and US mix of specific industrial activities within the major industrial groups also do not account for the larger NPRI averages for releases and transfers.

In the primary metal industries, NPRI releases and transfers per form were substantially higher for blast furnaces, iron and steel foundries and miscellaneous primary metal products. These industries accounted for nearly half of both NPRI and TRI forms in SIC code 33 in 1996. These more than offset the very large average in TRI for primary nonferrous metal production, along with higher TRI averages for other three-digit activities in the primary metals industry (**Table 5–50**, p. 179).

For chemical manufacturing, Canadian facilities reported higher releases and transfers per form in all industrial activities except the production of soap, cleaners and toilet goods and miscellaneous chemical products, which represented the smaller segments of chemical industry reporting in both countries (**Table 5–51**, p. 179).

In the paper products industry, Canadian pulp mills reported smaller releases and transfers, on average, than US pulp mills. However, pulpmaking constituted a larger portion of the paper products industry in Canada than in the United States. Substantial differences occurred in the averages for NPRI and TRI manufacturers of paperboard boxes and miscellaneous converted paper products. Even though these two activities represented relatively small portions of paper products manufacturing in both countries, the differences reduced the overall average for TRI in this industry (**Table 5–52**, p. 179).

In all three industries—chemicals, primary metals, and paper products—the larger NPRI averages occurred despite the influence in TRI of high average releases and transfers by the multiple-codes groups. These forms reported more than one SIC code within the major industry group (for example, more than one SIC code within SIC 33 for primary metals). Forms with multiple codes do not appear in NPRI because NPRI facilities report only one SIC code representing their primary industrial activity.

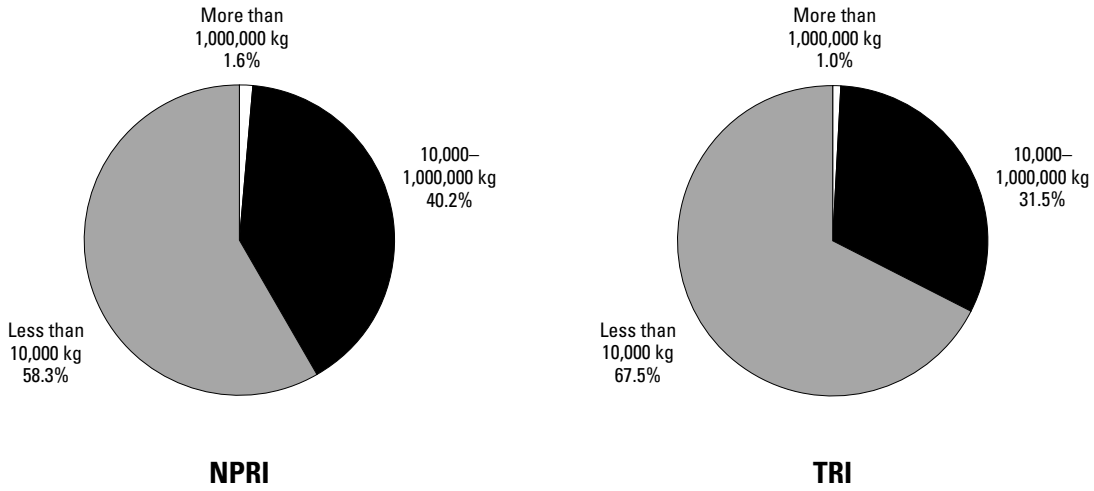
In both the chemical and paper industries, those facilities reporting multiple-codes to TRI submitted the most forms and contributed the largest total releases and transfers.

[Text continues on p. 180.]

Figure 5–19
M 1996

Distribution of NPRI and TRI Facilities and Total Releases and Transfers

Distribution of Facilities by Amount of Total Releases and Transfers



Distribution of Total Releases and Transfers According to Facility Output

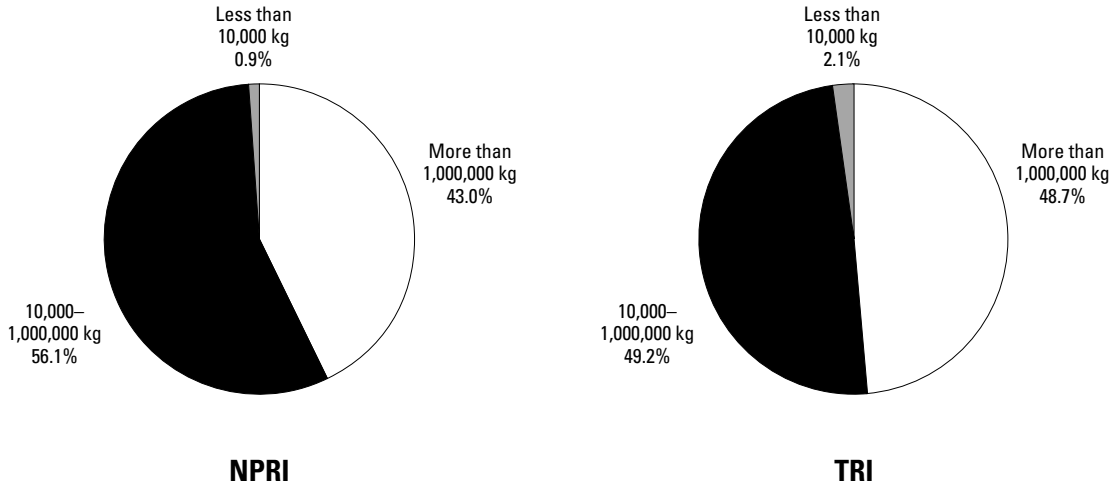


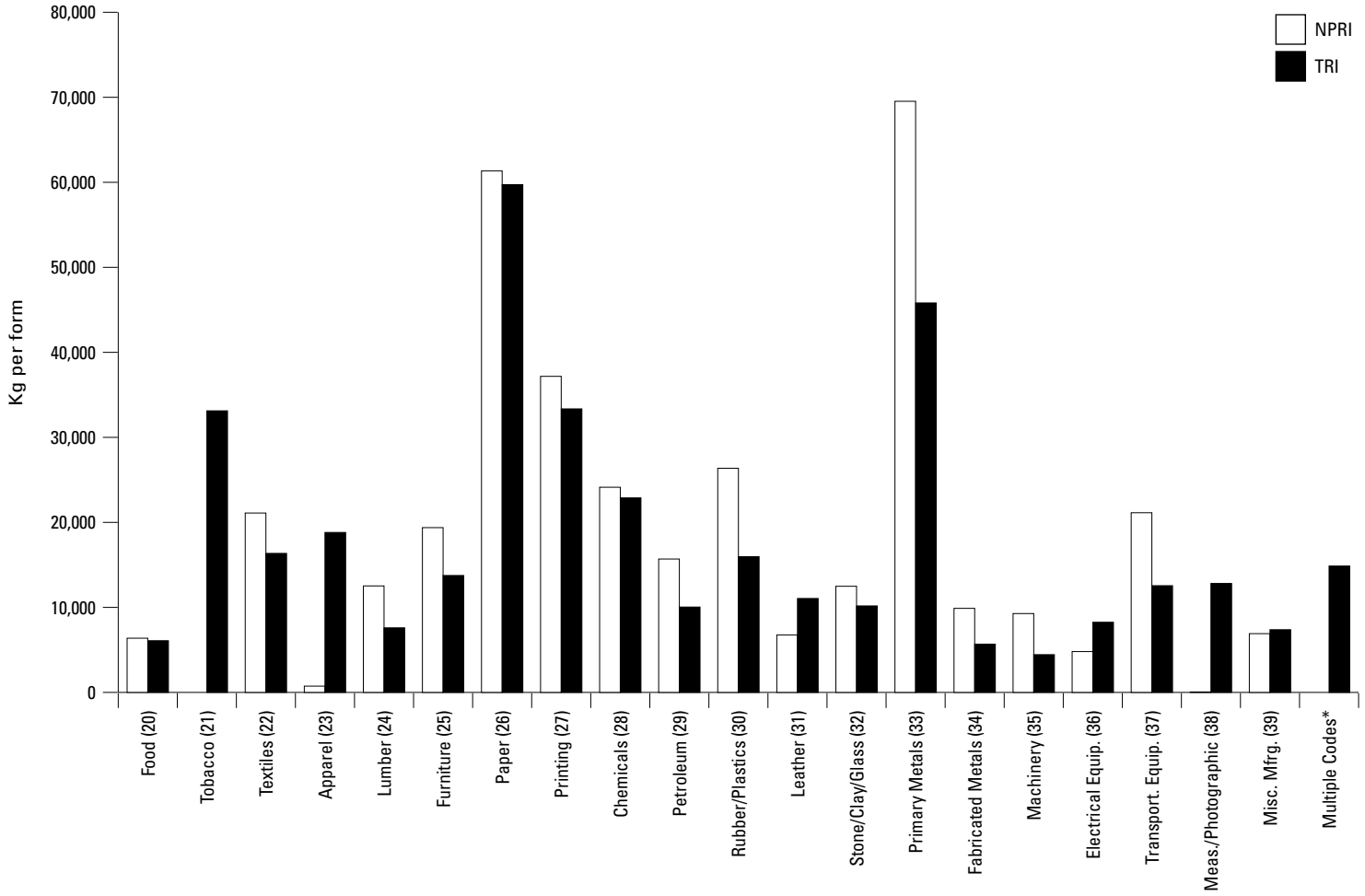
Table 5–48
M 1996

Distribution of NPRI and TRI Total Releases and Transfers and Facilities

	NPRI		TRI	
Quantity per Facility	Number of Facilities	Total Releases and Transfers (kg)	Number of Facilities	Total Releases and Transfers (kg)
Greater than 4,000,000 kg	5	22,666,346	32	250,295,422
From 1,000,000 kg to 4,000,000 kg	16	30,708,620	156	286,460,332
From 100,000 kg to 1,000,000 kg	196	57,289,273	1,287	383,045,898
From 10,000 kg to 100,000 kg	344	12,300,870	4,761	158,516,995
From 1,000 kg to 10,000 kg	243	1,064,977	4,933	22,054,747
From 1 kg to 1,000 kg	321	99,048	5,001	1,328,152
0 kg	219	0	3,020	0
Total	**1,344**	**124,129,147**	**19,190**	**1,101,701,543**
	% of Total	**% of Total**	**% of Total**	**% of Total**
Greater than 4,000,000 kg	0.4	18.3	0.2	22.7
From 1,000,000 kg to 4,000,000 kg	1.2	24.7	0.8	26.0
From 100,000 kg to 1,000,000 kg	14.6	46.2	6.7	34.8
From 10,000 kg to 100,000 kg	25.6	9.9	24.8	14.4
From 1,000 kg to 10,000 kg	18.1	0.9	25.7	2.0
From 1 kg to 1,000 kg	23.9	0.1	26.1	0.1
0 kg	16.3	0.0	15.7	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**

Figure 5–20
M 1996

Total Releases and Transfers per Form by Industry, NPRI and TRI



* Multiple SIC codes reported only in TRI data.

Table 5–49
M 1996

Average Total Releases and Transfers per Form, by Industry, NPRI and TRI

Rank	US SIC Code	Industry	NPRI (kg/form)	TRI (kg/form)	Ratio of Average per Form (NPRI/TRI)
1	35	Industrial Machinery	9,275	4,440	2.1
2	34	Fabricated Metals Products	9,887	5,679	1.7
3	37	Transportation Equipment	21,135	12,554	1.7
4	30	Rubber and Plastics Products	26,366	15,966	1.7
5	24	Lumber and Wood Products	12,526	7,595	1.6
6	29	Petroleum and Coal Products	15,690	10,043	1.6
7	33	Primary Metal Industries	69,530	45,812	1.5
8	25	Furniture and Fixtures	19,383	13,752	1.4
9	22	Textile Mill Products	21,101	16,352	1.3
10	32	Stone/Clay/Glass Products	12,485	10,175	1.2
11	27	Printing and Publishing	37,178	33,352	1.1
12	28	Chemicals	24,133	22,880	1.1
13	20	Food Products	6,376	6,079	1.0
14	26	Paper Products	61,335	59,731	1.0
15	39	Misc. Manufacturing Industries	6,913	7,374	0.9
16	31	Leather Products	6,750	11,047	0.6
17	36	Electronic/Electrical Equipment	4,805	8,249	0.6
18	23	Apparel and Other Textile Products	740	18,818	0.0
19	38	Measurement/Photographic Instruments	55	12,816	0.0
	21	Tobacco Products	—	33,122	—
		Multiple Codes 20-39*	—	14,862	—
		Total	**28,881**	**19,019**	**1.5**

* Multiple SIC codes reported only in TRI data.

Table 5–50
M 1996

Total Releases and Transfers for the Primary Metals Products Industry (US SIC Code 33)

US SIC Code	Industry	NPRI Number of Forms	NPRI % of All Forms	NPRI Total Releases and Transfers (kg)	NPRI % of All kg	NPRI Average per Form (kg/form)	TRI Number of Forms	TRI % of All Forms	TRI Total Releases and Transfers (kg)	TRI % of All kg	TRI Average per Form (kg/form)	Ratio of Average per Form (NPRI/TRI)
331	Blast furnace and basic steel products	194	32.9	25,496,521	62.3	131,425	1,680	28.4	102,878,034	38.0	61,237	2.1
332	Iron and steel foundries	61	10.4	4,180,957	10.2	68,540	1,111	18.8	22,276,436	8.2	20,051	3.4
333	Primary nonferrous metals	148	25.1	8,969,301	21.9	60,603	204	3.4	84,275,559	31.1	413,115	0.1
334	Secondary nonferrous metals	23	3.9	475,453	1.2	20,672	497	8.4	11,248,721	4.2	22,633	0.9
335	Nonferrous rolling and drawing	85	14.4	335,825	0.8	3,951	993	16.8	10,217,451	3.8	10,289	0.4
336	Nonferrous foundries	44	7.5	83,287	0.2	1,893	635	10.7	2,001,826	0.7	3,152	0.6
339	Miscellaneous primary metal products	34	5.8	1,411,864	3.4	41,525	310	5.2	1,747,190	0.6	5,636	7.4
	Multiple codes within SIC 28*	—	—	—	—	—	483	8.2	36,377,632	13.4	75,316	—
	SIC code not valid within SIC 28	—	—	—	—	—	3	0.1	361	0.0	120	—
	Total	**589**	**100.0**	**40,953,208**	**100.0**	**69,530**	**5,916**	**100.0**	**271,023,208**	**100.0**	**45,812**	**1.5**

* Multiple SIC codes reported only in TRI data.

Table 5–51
M 1996

Total Releases and Transfers for the Chemical Industry (US SIC Code 28)

US SIC Code	Industry	NPRI Number of Forms	NPRI % of All Forms	NPRI Total Releases and Transfers (kg)	NPRI % of All kg	NPRI Average per Form (kg/form)	TRI Number of Forms	TRI % of All Forms	TRI Total Releases and Transfers (kg)	TRI % of All kg	TRI Average per Form (kg/form)	Ratio of Average per Form (NPRI/TRI)
281	Industrial inorganic chemicals	211	15.4	7,927,242	24.0	37,570	1,035	6.4	29,104,760	7.8	28,121	1.3
282	Plastics materials and synthetics	193	14.1	6,668,615	20.2	34,552	1,762	10.9	33,811,159	9.1	19,189	1.8
283	Pharmaceuticals	31	2.3	1,381,316	4.2	44,559	539	3.3	21,243,497	5.7	39,413	1.1
284	Soap, cleaners and toilet goods	121	8.9	54,536	0.2	451	840	5.2	944,554	0.3	1,124	0.4
285	Paints and allied products	352	25.7	3,973,313	12.0	11,288	2,547	15.7	5,527,847	1.5	2,170	5.2
286	Industrial organic chemicals	217	15.9	9,253,052	28.0	42,641	2,707	16.7	88,590,755	23.9	32,727	1.3
287	Agricultural chemicals	61	4.5	2,819,028	8.5	46,214	742	4.6	15,080,854	4.1	20,325	2.3
289	Miscellaneous chemical products	181	13.2	912,878	2.8	5,044	1,642	10.1	12,757,188	3.4	7,769	0.6
	Multiple codes within SIC 28*	—	—	—	—	—	4,409	27.2	164,183,953	44.2	37,238	—
	SIC code not valid within SIC 28	—	—	—	—	—	4	0.0	21,928	0.0	5,482	—
	Total	**1,367**	**100.0**	**32,989,980**	**100.0**	**24,133**	**16,227**	**100.0**	**371,266,495**	**100.0**	**22,880**	**1.1**

* Multiple SIC codes reported only in TRI data.

Table 5–52
M 1996

Total Releases and Transfers for the Paper Products Industry (US SIC Code 26)

US SIC Code	Industry	NPRI Number of Forms	NPRI % of All Forms	NPRI Total Releases and Transfers (kg)	NPRI % of All kg	NPRI Average per Form (kg/form)	TRI Number of Forms	TRI % of All Forms	TRI Total Releases and Transfers (kg)	TRI % of All kg	TRI Average per Form (kg/form)	Ratio of Average per Form (NPRI/TRI)
261	Pulp mills	206	65.0	14,824,237	76.2	71,962	177	8.9	12,922,142	10.9	73,006	1.0
262*	Paper mills	63	19.9	1,199,582	6.2	19,041	389	19.7	18,407,550	15.6	47,320	0.4
263	Paperboard mills	10	3.2	501,934	2.6	50,193	252	12.7	18,649,691	15.8	74,007	0.7
265	Paperboard boxes	2	0.6	62,730	0.3	31,365	35	1.8	254,394	0.2	7,268	4.3
267**	Misc. converted paper products	36	11.4	2,854,662	14.7	79,296	341	17.2	10,101,883	8.6	29,624	2.7
	Multiple codes within SIC 26***	—	—	—	—	—	784	39.6	57,812,002	48.9	73,740	—
	Total	**317**	**100.0**	**19,443,145**	**100.0**	**61,335**	**1,978**	**100.0**	**118,147,663**	**100.0**	**59,731**	**1.0**

* Includes 266 which was changed to 262 in 1987.

** Includes 264 which was changed to 267 in 1987.

*** Multiple SIC codes reported only in TRI data.

Investigation of Differences in Average Releases and Transfers per Form

Tables in this report show that the NPRI average per form is 1.5 times greater than that in TRI. To examine the differences between these averages two chemicals—methanol and methyl ethyl ketone (MEK)—were examined as case studies.

These two chemicals were chosen because they are major commercial chemicals used in a variety of industrial processes and represent significant portions of the total releases and transfers reported in each country. Methanol is the chemical with the largest total releases and transfers in both NPRI and TRI and MEK ranks among the top ten in each. For both chemicals, the average total releases and transfers per form in NPRI are higher than in TRI.

Several factors that could influence the reported differences were investigated including industry characteristics and differences in reporting methods. Industry characteristics that may differ between the two countries are industrial sectors reporting the chemical, production capacity within industrial sectors, and pollution prevention and control systems in use at the industrial facilities. Differences in reporting methods include methods of preparing the estimates of the amounts and differences in thresholds for reporting.

The case studies found that the key factors contributing to the differences between the NPRI and TRI average releases and transfers per form are:

- industry structure differences and associated facility capacity differences, and
- levels of pollution prevention and controls under different regulatory requirements in different jurisdictions.

Not every industy sector reporting releases and transfers of methanol and MEK has larger averages per form in NPRI than in TRI. For those sectors that do, there are often a small number of facilities in the NPRI that account for a large portion of the total releases and transfers reported in the sector. For example, in the case of methanol releases and transfers for the chemical manufacturing sector, the study examined methanol manufacturing facilities, the largest contributing source. (In some of these facilities, methanol releases also come from integrated acetic acid operations). The three NPRI methanol manufacturing facilities (one of which has an integrated acetic acid operation) have an average methanol production capacity of 840,000 tonnes per facility. The 15 methanol facilities reporting to the TRI (some with integrated acetic acid operations) have an average methanol production capacity of 472,000 tonnes per facility. The largest total releases and transfers reported from an NPRI methanol facility were 2,600 tonnes, while none of the TRI methanol facilities reported total releases and transfers greater than 1,000 tonnes. In addition to the higher capacity of NPRI facilities, the case study also suggests that NPRI methanol facilities have higher methanol releases from storage and loading, since most Canadian methanol is exported. In contrast, there is a higher degree of pipeline integration between TRI methanol facilities and methanol derivative product manufacturing facilities. Another factor was that some US jurisdictions (states, counties) have VOC control regulations that require vapor control systems at TRI facilities. These types of differences were found in several other industrial subsectors. For methanol, these included: fertilizer production, petroleum refining, panelboard mills, and flat glass manufacturing. For MEK, these included: vinyl sheet manufacturing and wallpaper production.

Other factors investigated were:

- differences in the thresholds for reporting and
- methods used to estimate amounts of PRTR emissions.

These factors were found not to explain many of the differences or to contribute to a reverse ratio of average per form. Thresholds for reporting to TRI are somewhat lower than for reporting to NPRI. While there are proportionately more TRI facilities with the lowest (but non-zero) amounts of total releases and transfers, the distribution of total releases and transfers in NPRI is weighted toward more forms with zero total releases and transfers than in TRI, but the difference is slight. On the other hand, NPRI has a greater proportion of forms from facilities in the higher range (greater than 1,000 tonnes of releases and transfers on a form). Thus, NPRI tends to have relatively few facilities reporting the largest amounts, as explained in the above example.

One significant source of releases and transfers of methanol is the kraft paper mill sector. In this case, NPRI average total releases and transfers were lower than those from TRI (ratio of 0.6). Several factors were found to contribute to this exception to the pattern of higher NPRI averages. No TRI mill reported methanol releases of zero or less than 10 tonnes while one fourth of the NPRI kraft mills did. The factors seen to play a role in the differences for kraft paper mills were higher average kraft pulp mill capacity for TRI facilities and the emissions factors used by many TRI mills to estimate total releases and transfers were revised since 1994 with the resulting amounts generally increasing. Some of the NPRI facilities were still using the older emission factors.

The case studies of the two chemicals, methanol and methyl ethyl ketone, have helped to illuminate what factors may be operating in the two countries to contribute to the differences observed in this report. The case studies also show the need to keep in mind these factors and how they may vary depending on the facilities, industries and chemicals being compared.

Source: "Analysis of Differences between the Canadian NPRI and the United States TRI Releases and Transfers per Form: Case Studies on Reported NPRI and TRI Releases and Transfers of Methanol and Methyl Ethyl Ketone," prepared by Cheminfo Services, Inc. for the Commission for Environmental Cooperation, February 1999.

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

7 Special Analyses

Figures

Maps

Tables

LEGEND

M **Matched Chemicals/Industries**

A **All Chemicals/Industries**

Key Findings

- The 10 parent companies (companies that owned reporting facilities) with the largest total releases and transfers accounted for one-third of NPRI releases and transfers. In TRI, the 10 parent companies with the largest total releases and transfers accounted for one-fifth of the total.
- In the matched data set, NPRI facilities reported a 4 percent increase from 1995 to 1996 in total releases of substances targeted under Canada's Accelerated Reduction/Elimination of Toxics program that are on the NPRI list. TRI facilities reporting these substances increased 3 percent. (Of the 117 substances targeted by the program, 49 appear in the matched data set.)
- For US EPA's 33/50 Program, reductions in total releases and transfers of targeted chemicals have continued beyond the 1995 ending date of the program. From 1995 to 1996, TRI facilities reported a further decrease of 9 percent and NPRI facilities reported a decrease of 2 percent. (Sixteen of the 17 target substances of the program appear in the matched data set.)
- More facilities (129) in the matched data set reported in Ontario's Toronto Metropolitan Municipality (lying along the north shore of Lake Ontario) than in any other Canadian census division. The Montreal Urban Community, in the province of Quebec, ranked second with 91 facilities. However, the largest total releases and transfers were reported by facilities in Durham Regional Municipality, which is east of Toronto in Ontario (12 million kg), and the second largest by Alberta's Division No. 11 (the Edmonton area), with 10 million kg,
- A total of 481 facilities reported in Cook County, Illinois, which includes the city of Chicago and lies along the southwestern shore of Lake Michigan, making this the US county with the largest number of facilities. California's Los Angeles County ranked second with 403 facilities. Harris County in Texas (which includes Houston) had the largest total releases and transfers in the US with 40 million kg. Tooele County in Utah ranked second for total releases and transfers with 30 million kg.
- In the Great Lakes region, 272 manufacturing facilities reported surface water discharges to TRI. US permit data indicate that public sewage treatment plants, which do not report to TRI, outnumber TRI facilities in the region by three to two. Because NPRI also covers non-manufacturing industries, the complete NPRI database includes public sewage treatment plants that meet reporting thresholds. In Ontario, 28 such xfacilities reported to NPRI. Their releases included 90 times as much chlorine and four times as much nitric acid and nitrate compounds as were reported by the 48 manufacturing facilities in Ontario that submitted reports to NPRI.

7.1 Introduction

This chapter examines some of the data common to both Canadian and US PRTRs that can be refined for further comparisons: parent company reporting and chemical groups of particular interest. It also provides a brief look at the common PRTR data in comparison to basic geographic and demographic information.

This chapter also presents analyses supported by data specific to one country or the other, including information from sewage treatment plants that report only to NPRI and waste management information reported only to TRI.

Some analyses in this chapter draw on data from the complete NPRI and TRI databases (see **Chapter 3**, **Table 3–1**, p. 22). Others examine data from the matched data set, representing chemicals and industries covered in both PRTRs, as presented in **Chapters 4** through **6** (see **Chapter 3**, **Table 3–2**, p. 22).

7.2 Parent Company Reporting

Both NPRI and TRI require a facility to report parent company information. NPRI collects the parent company name and address. More than one parent company can be listed, if necessary, together with the percentage of ownership given. TRI collects the parent company name and its Dun and Bradstreet number (an identification number supplied by this corporate information service). Compiling facility reports by parent company requires the direct inspection of names, addresses and identification numbers. Complicating this is the fact that company names are not standardized in the databases. In TRI, for example, facilities belonging to the General Motors Corporation may identify their parent company by half a dozen or more variations, such as GMC or GM Corporation or Delco Div., GMC.

Releases

In 1996, the 10 parent companies with the largest total releases in NPRI accounted for 34 facilities and one-third of all releases reported in Canada in the matched data set of chemicals and industries common to both PRTRs. In the United States, the 10 with the largest releases reported about one-quarter of TRI's total releases from 362 facilities. Any evaluation of the relative health and environmental impact of facilities must also take into account the toxicity of the chemicals released, local climatic conditions, and the proximity of people and/or ecologically sensitive areas to the released waste streams (**Tables 7–1** and **7–2**).

One company, General Motors Corporation, appeared on both lists. It had 10 facilities reporting to NPRI and 90 reporting to TRI in 1996.

In NPRI, methanol accounted for a substantial portion of four companies' releases. For the facilities of four TRI parent companies, zinc and its compounds represented a substantial portion of their releases, and for three companies, methanol was commonly reported in large amounts.

Releases and Transfers

Facilities of the 10 NPRI parent companies with the largest total releases and transfers reported one-third of the NPRI total. However, half of these parent companies did not rank among the top 10 parent companies for releases only. In TRI, facilities of the 10 parent companies with the largest total releases and transfers reported one-fifth of the total. All but one of these companies also ranked among the 10 with the largest releases only. None of the 10 parent companies for the largest NPRI total releases and transfers appears on the TRI list of the 10 parent companies with the largest totals or vice versa (**Tables 7–3** and **7–4**, pp. 284–85).

Zinc and its compounds represented a substantial portion of releases and transfers by facilities of five NPRI and four TRI parent companies.

Because the matched data set includes only industries that are required to report in both databases—that is, manufacturing industries—NPRI parent companies in other industries do not appear in this analysis, although their facilities may report significant amounts of releases and transfers. Companies whose facilities engage in mining are one example.

[Text continues on p. 286-.]

Table 7–1
M 1996

The 10 Parent Companies with the Largest NPRI Releases

Parent Company	Number of Facilities	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
Inco Limited	4	23	4,890,745	51,757	0	55,325	4,997,827	Sulfuric acid (air)
Celanese Canada Inc.	2	16	441,192	9,370	4,081,300	16,529	4,548,392	Methanol, Methyl ethyl ketone (UIJ)
Nova Corporation	6	43	3,088,776	857	11,707	358	3,101,698	Cyclohexane, Ethylene (air)
Agrium Inc.	3	28	2,323,250	105,210	650,480	540	3,079,580	Methanol (air)
ISPAT Mexicana	4	13	59,430	386	0	2,720,580	2,780,396	Zinc and compounds (land)
Irving Forest Services	1	4	249,591	1,933,834	0	0	2,183,425	Methanol (water)
General Motors of Canada	10	59	2,158,437	22	0	0	2,159,705	Xylenes, Toluene (air)
Grupo Gerdau	1	5	22,367	0	0	2,008,700	2,031,067	Zinc and compounds (land)
Bayer AG	1	16	1,697,761	28,065	0	0	1,725,826	Chloromethane, Cyclohexane, Hydrochloric acid (air)
Methanex Corporation	2	8	1,698,496	6,600	0	340	1,705,436	Methanol (air)
Subtotal	**34**	**215**	**16,630,045**	**2,136,101**	**4,743,487**	**4,802,372**	**28,313,352**	
% of Total	**2.5**	**5.0**	**26.2**	**41.7**	**98.6**	**53.7**	**34.3**	
Total	**1,344**	**4,298**	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**	

* Chemicals accounting for more than 70% of the total releases and transfers from the facilities belonging to the parent company.

➤ UIJ=underground injection

Table 7–2
M 1996

The 10 Parent Companies with the Largest TRI Releases

Parent Company	Number of Facilities	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
Renco Group Inc.	9	32	29,856,553	270	0	3,467,234	33,324,057	Chlorine (air)
ASARCO Inc.	9	65	967,781	2,804	114,075	28,551,717	29,636,377	Zinc/Copper and compounds (land)
DuPont	56	522	6,919,992	1,232,564	13,601,047	11,226	21,764,829	Nitric acid and nitrate compounds, Methanol (UIJ), Hydrochloric acid (air)
Potash Corp. of Saskatchewan	15	72	531,810	9,736,111	0	7,394,216	17,662,137	Phosphoric acid (water, land)
International Paper Co.	57	274	15,363,489	364,308	0	34,165	15,761,962	Methanol (air)
General Motors Corp.	90	672	7,008,706	35,772	0	7,087,185	14,131,663	Zinc/Manganese and compounds (land), Xylene, n-Butyl alcohol (air)
Courtaulds United States Inc.	9	41	13,189,092	16,155	0	206,032	13,411,279	Carbon disulfide (air)
Monsanto Co.	27	173	471,477	191,390	11,874,739	32,003	12,569,609	Nitric acid and nitrate compounds, Formaldehyde (UIJ)
Cyprus Amax Minerals Co.	6	24	270,411	2,533	0	11,299,875	11,572,819	Copper/Zinc and compounds (land)
Georgia-Pacific Corp.	84	340	9,410,933	626,270	0	729,497	10,766,700	Methanol, Sulfuric acid (air), Zinc and compounds (land)
Subtotal	**362**	**2,215**	**83,990,244**	**12,208,177**	**25,589,861**	**58,813,150**	**180,601,432**	
% of Total	**1.9**	**3.8**	**16.8**	**16.6**	**36.3**	**43.0**	**23.1**	
Total	**19,190**	**57,927**	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**	**780,621,952**	

* Chemicals accounting for more than 70% of the total releases from the facilities belonging to the parent company.

➤ UIJ=underground injection

Table 7–3
M 1996

The 10 Parent Companies with the Largest NPRI Releases and Transfers

Parent Company	Number of Facilities	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
Stelco Inc.	12	72	439,610	84,190	0	1,060,662	1,587,006
Inco Limited	4	23	4,890,745	51,757	0	55,325	4,997,827
Co-Steel Inc.	1	6	12,695	298	0	1,241,900	1,254,893
Celanese Canada Inc.	2	16	441,192	9,370	4,081,300	16,529	4,548,392
Kikuchi Color & Chemicals Corp.	1	6	0	0	0	0	50
Nova Corporation	6	43	3,088,776	857	11,707	358	3,101,698
Agrium Inc.	3	28	2,323,250	105,210	650,480	540	3,079,580
Dofasco Inc.	2	19	578,783	7,559	0	99	586,441
Noranda Inc.	11	62	1,195,601	27,142	0	0	1,224,770
ISPAT Mexicana	4	13	59,430	386	0	2,720,580	2,780,396
Subtotal	**46**	**288**	**13,030,082**	**286,769**	**4,743,487**	**5,095,993**	**23,161,053**
% of Total	**3.4**	**6.7**	**20.5**	**5.6**	**98.6**	**57.0**	**28.0**
Total	**1,344**	**4,298**	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**

* Chemicals accounting for more than 70% of the total releases and transfers from the facilities belonging to the parent company.
➤ UIJ=underground injection.

Table 7–4
M 1996

The 10 Parent Companies with the Largest TRI Releases and Transfers

Parent Company	Number of Facilities	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
ASARCO Inc.	9	65	967,781	2,804	114,075	28,551,717	29,636,377
Renco Group Inc.	9	32	29,856,553	270	0	3,467,234	33,324,057
DuPont	56	522	6,919,992	1,232,564	13,601,047	11,226	21,764,829
International Paper Co.	57	274	15,363,489	364,308	0	34,165	15,761,962
Potash Corp. of Saskatchewan	15	72	531,810	9,736,111	0	7,394,216	17,662,137
General Motors Corp.	90	672	7,008,706	35,772	0	7,087,185	14,131,663
Monsanto Co.	27	173	471,477	191,390	11,874,739	32,003	12,569,609
Nucor Co.	18	77	155,779	623	0	225,738	382,140
Courtaulds United States Inc.	9	41	13,189,092	16,155	0	206,032	13,411,279
Cyprus Amax Minerals Co.	6	24	270,411	2,533	0	11,299,875	11,572,819
Subtotal	**296**	**1,952**	**74,735,090**	**11,582,530**	**25,589,861**	**58,309,391**	**170,216,872**
% of Total	**1.5**	**3.4**	**15.0**	**15.7**	**36.3**	**42.6**	**21.8**
Total	**19,190**	**57,927**	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**	**780,621,952**

* Chemicals accounting for more than 70% of the total releases and transfers from the facilities belonging to the parent company.
➤ UIJ=underground injection.

Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
3,151,642	100,879	4,267,982	7,520,503	9,107,509	Zinc and compounds (transfers to treatment, disposal), Manganese and compounds (transfers to disposal)
0	0	0	0	4,997,827	Sulfuric acid (air)
0	10	3,578,500	3,578,510	4,833,403	Zinc and compounds (transfers to disposal)
0	0	48,955	48,955	4,597,347	Methanol, Methyl ethyl ketone (UIJ)
0	3,870,000	229,400	4,099,400	4,099,450	Nitric acid and nitrate compounds (transfers to sewage)
80,044	0	35,824	115,868	3,217,566	Cyclohexane, Ethylene (air)
40,314	0	37,010	77,324	3,156,904	Methanol (air), Nitric acid and nitrate compounds (UIJ)
6,000	1,692	2,539,200	2,546,892	3,133,333	Zinc/Manganese and compounds (transfers to disposal)
1,388,969	11,983	258,744	1,659,696	2,884,466	Methanol (transfers to treatment), Lead/Zinc and compounds (air)
0	0	0	0	2,780,396	Zinc and compounds (land)
4,666,969	**3,984,564**	**10,995,615**	**19,647,148**	**42,808,201**	
34.4	**80.6**	**47.8**	**47.3**	**34.5**	
13,571,799	**4,943,234**	**23,017,654**	**41,532,687**	**124,129,147**	

Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
3,121,426	415	1,633,272	4,755,113	34,391,490	Zinc/Lead and compounds (land)
3,189	679	113	3,981	33,328,038	Chlorine (air)
3,174,298	448,520	666,005	4,288,823	26,053,652	Nitric acid and nitrate compounds, Methanol (UIJ), Hydrochloric acid (air), Ethylene glycol, Acetonitrile (transfers to treatment)
563,158	1,740,630	14,718	2,318,506	18,080,468	Methanol (air)
9,070	9,740	526	19,336	17,681,473	Phosphoric acid (water, land)
254,534	357,731	899,069	1,511,334	15,642,997	Zinc/Manganese and compounds (land), Xylene, n-Butyl alcohol (air)
346,617	1,708,200	27,927	2,082,744	14,652,353	Nitric acid and nitrate compounds, Formaldehyde (UIJ)
4,306,298	2	9,306,427	13,612,727	13,994,867	Zinc and compounds (transfers to disposal, treatment)
29,296	12,080	425	41,801	13,453,080	Carbon disulfide (air)
0	113	35	148	11,572,967	Copper/Zinc and compounds (land)
11,807,886	**4,278,110**	**12,548,517**	**28,634,513**	**198,851,385**	
10.6	**5.0**	**10.1**	**8.9**	**18.0**	
110,901,271	**86,130,663**	**124,047,657**	**321,079,591**	**1,101,701,543**	

7.3 Voluntary Reduction Programs

Both the United States and Canada have programs designed to encourage industry to achieve voluntary reductions of selected chemicals. The US effort was called the 33/50 Program (from the goal of a 33 percent reduction to be achieved by 1991 and a 50 percent reduction by 1995, based on amounts of releases and transfers reported to TRI in 1988). The 33/50 Program encompassed 17 chemicals. The Canadian program is called ARET (Accelerated Reduction/Elimination of Toxics). This program set its reduction goals of 90 percent for persistent, bioaccumulative and toxic substances released on-site to air, water and soil, and 50 percent for other toxic substances by the year 2000, from the base year 1993. ARET goals are not specifically tied to NPRI reporting categories. Of the 117 ARET target substances, 49 are on the NPRI list. Each program invites companies to join, but this is not mandatory. To show the overall progress in reducing the releases and/or transfers of the substances covered by the programs, however, the following analysis looks at all reporting for substances in the matched data set on the ARET or 33/50 Program lists, regardless of whether or not an individual company joined the program.

The 49 chemicals co-listed by NPRI and ARET are also covered by TRI. Of the seventeen 33/50 chemicals, 16 are listed in both NPRI and TRI (1,1,1-trichloroethane is reportable in TRI but not in NPRI). All but three of the 33/50 chemicals—methyl ethyl ketone, toluene and xylene—are on the ARET chemical list (see accompanying box).

7.3.1 Accelerated Reduction/Elimination of Toxics (ARET)

Discussions leading to the ARET program began in late 1990 among corporate executives and leading environmentalists to improve environmental decision-making by organizations. The ARET Stakeholders Committee was formed by the Canadian federal environment minister to establish criteria for defining toxicity, to compile a list of target substances based on these criteria, and to establish a means for encouraging industry to reduce environmental releases of the target substances. It identified criteria for persistence, bioaccumulation and toxicity and prepared a list of 117 chemicals meeting one or more of the criteria. The "ARET challenge," issued in March 1994, calls for industry to make voluntary reductions of 90 percent by the year 2000 of the target substances that meet all three criteria and 50 percent during the same time period for the other target substances. Reductions are measured against the 1993 base year. The goal of the ARET program is the reduction of environmental releases to the air, water and soil (not including landfills).

From 1995 to 1996, NPRI facilities reported a 4 percent increase in total on-site releases of the ARET substances that are also on the NPRI list (there had been a 14 percent decrease from 1994 to 1995—see *Taking Stock 1995*). Not all NPRI facilities are members of the ARET program. In 1996, less than 300 facilities submitted an action plan to the ARET program. Although surface water discharges declined 13 percent, NPRI facilities reported increases in air emissions (3 percent) and on-site land releases (5 percent). Underground injection, not targeted under the program, increased 24 percent. Total TRI releases of these substances also increased—by 3 percent. This included a 16 percent increase in surface water discharges and a 15 percent increase in on-site land releases. TRI air emissions of ARET substances decreased 7 percent, and underground injection declined 12 percent (**Table 7–5**, p. 288).

Transfers of ARET substances in the matched data set decreased in NPRI (9 percent) and increased in TRI (13 percent), so that total releases and transfers also decreased in NPRI (3 percent) and increased in TRI (7 percent).

Two facilities—one each in NPRI and TRI—reported a reduction of more than 1 million kg in releases of ARET substances from 1995 to 1996. One NPRI facility reported an increase of more than 1 million kg, while five TRI facilities did so (**Tables 7–6** and **7–7**, p. 289).

For total releases and transfers of ARET substances in the matched data set, two NPRI facilities and three TRI facilities reported large decreases (more than 1 million kg each). Four of these five facilities made all or most of their reductions in transfers. Increases of more than 1 million kg each were reported by three NPRI facilities and 15 TRI facilities. For two of the NPRI facilities and 10 of the TRI facilities, most or all of the increase occurred in reporting of transfers (**Tables 7–8**, pp. 290–91 and **7–9**, pp. 292–93).

These facilities' large reductions or large increases consisted principally of metals and their compounds, released on-site to land or transferred off-site to treatment or disposal. The metals and compounds most often involved were copper and zinc. However, one NPRI facility that reported transfers of asbestos to disposal in 1995 but not in 1996. The facility reported that it was a one-time transfer, resulting from the remediation of an inactive asbestos pit.

7.3.2 The 33/50 Program

The 33/50 Program, established by the US EPA in 1991, is also a call for voluntary reductions by industry. The 17 substances subject to the program are TRI chemicals chosen for their high toxicity and the large volume of their reported releases and transfers. The goals of the program were a 33 percent reduction in total releases and transfers by 1991 and a 50 percent reduction by 1995, from a base level of 1988 TRI reporting. The 33/50 Program achieved its ultimate goal by 1994, one year early, and further reductions continued in 1995. Nearly 1,300 parent companies, controlling more than 6,800 TRI facilities, have committed themselves to the program. This represents one-third of all TRI facilities reporting 33/50 Program chemicals, but two-thirds of the total releases and transfers reported in the base year 1988.

From 1995 to 1996, TRI facilities reported a further decrease of 9 percent in total releases and transfers of the substances targeted by the 33/50 Program. This consisted of an 11 percent decrease in releases, along with a small decrease (less than 1 percent) in transfers. The largest component of the year's reduction was a 28-million-kg decrease in air emissions (13 percent). NPRI facilities reported a smaller overall reduction—2 percent—in total releases and transfers of the seventeen 33/50 Program chemicals. NPRI releases decreased 8 percent, while transfers rose 19 percent. As in TRI, the largest factor in NPRI's overall reduction was a decrease in air emissions, which declined 2 million kg (9 percent, see **Table 7–10**, p. 295).

From 1995 to 1996, one NPRI facility and nine TRI facilities reported reductions of more than 750,000 kg each in total releases and transfers, as targeted by the 33/50 Program. The NPRI facility's reduction consisted of releases for xylene reported in 1995 but not in 1996. Seven of the nine TRI facilities reported the bulk of their reductions in transfers (**Table 7–11**, pp. 296–97).

One NPRI facility and five TRI facilities reported increases of more than 750,000 kg each in the 33/50 Program chemicals. The NPRI facility's increase consisted of forms submitted in 1996 only, predominantly reporting transfers. For three of the five TRI facilities, the increase was also attributable to reporting of transfers (**Table 7–12**, pp. 296–97).

ARET and 33/50 Chemicals on both NPRI and TRI lists

ARET Chemicals on both NPRI and TRI lists*

75-07-0	Acetaldehyde
79-06-1	Acrylamide
107-13-1	Acrylonitrile
62-53-3	Aniline
120-12-7	Anthracene
1332-21-4	Asbestos (friable)
71-43-2	Benzene
100-44-7	Benzyl chloride
106-99-0	1,3-Butadiene
56-23-5	Carbon tetrachloride
10049-04-4	Chlorine dioxide
67-66-3	Chloroform
106-46-7	1,4-Dichlorobenzene
107-06-2	1,2-Dichloroethane
75-09-2	Dichloromethane
120-83-2	2,4-Dichlorophenol
117-81-7	Di(2-ethylhexyl) phthalate
534-52-1	4,6-Dinitro-o-cresol
121-14-2	2,4-Dinitrotoluene
606-20-2	2,6-Dinitrotoluene
123-91-1	1,4-Dioxane
106-89-8	Epichlorohydrin
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
50-00-0	Formaldehyde
77-47-4	Hexachlorocyclopentadiene
302-01-2	Hydrazine
101-14-4	4,4'-Methylenebis(2-chloroaniline)
108-10-1	Methyl isobutyl ketone
79-46-9	2-Nitropropane
86-30-6	N-Nitrosodiphenylamine
108-95-2	Phenol
91-22-5	Quinoline
127-18-4	Tetrachloroethylene
62-56-6	Thiourea
26471-62-5	Toluenediisocyanate (mixed isomers)
79-01-6	Trichloroethylene
–	Arsenic (and its compounds)
–	Cadmium (and its compounds)
–	Chromium (and its compounds)
–	Cobalt (and its compounds)
–	Copper (and its compounds)
–	Cyanide compounds
–	Lead (and its compounds)
–	Mercury (and its compounds)
–	Nickel (and its compounds)
–	Silver (and its compounds)
–	Zinc (and its compounds)

33/50 Chemicals on both NPRI and TRI lists

71-43-2	Benzene
56-23-5	Carbon tetrachloride
67-66-3	Chloroform
75-09-2	Dichloromethane
78-93-3	Methyl ethyl ketone
108-10-1	Methyl isobutyl ketone
127-18-4	Tetrachloroethylene
108-88-3	Toluene
79-01-6	Trichloroethylene
–	Cadmium (and its compounds)
–	Chromium (and its compounds)
–	Cyanide compounds
–	Lead (and its compounds)
–	Mercury (and its compounds)
–	Nickel (and its compounds)
–	Xylenes

* Tetraethyl lead is listed as an ARET chemical separately from lead and lead compounds. It is included in lead and lead compounds in NPRI.

Chromium and its compounds were the principal substances in five of the facilities' large changes and toluene in four. For chromium and its compounds, these facilities reported transfers to treatment and disposal, along with on-site land releases. For toluene, the facilities reported air emissions and transfers to treatment.

[Text continues on p. 298.]

Table 7–5
M 1996

NPRI and TRI Releases and Transfers of ARET Chemicals

	NPRI				TRI			
	1995 Number	1996 Number	Change 1995–1996 Number	Change 1995–1996 %	1995 Number	1996 Number	Change 1995–1996 Number	Change 1995–1996 %
Total Facilities	840	875	35	4.2	11,976	11,772	-204	-1.7
Total Forms	1,648	1,682	34	2.1	23,425	22,954	-471	-2.0
	kg	**kg**	**kg**	**%**	**kg**	**kg**	**kg**	**%**
Total Air Emissions	10,618,036	10,941,005	322,969	3.0	86,869,467	81,154,559	-5,714,908	-6.6
Surface Water Discharges	564,511	491,165	-73,346	-13.0	1,368,320	1,581,543	213,223	15.6
Underground Injection	202,322	250,985	48,663	24.1	14,218,051	12,544,791	-1,673,260	-11.8
On-site Land Releases	6,357,533	6,694,305	336,772	5.3	80,042,102	92,017,978	11,975,876	15.0
Matched Releases	**17,790,180**	**18,419,611**	**629,431**	**3.5**	**182,497,940**	**187,298,871**	**4,800,931**	**2.6**
Treatment/Destruction	5,103,891	4,779,964	-323,927	-6.3	30,931,155	45,563,798	14,632,643	47.3
Sewage/POTWs	116,135	195,497	79,362	68.3	5,416,250	4,723,485	-692,765	-12.8
Disposal/Containment	17,403,664	15,700,302	-1,703,362	-9.8	84,323,518	86,407,233	2,083,715	2.5
Matched Transfers	**22,623,684**	**20,675,755**	**-1,947,929**	**-8.6**	**120,670,923**	**136,694,516**	**16,023,593**	**13.3**
Matched Releases and Transfers	**40,413,864**	**39,095,366**	**-1,318,498**	**-3.3**	**303,168,863**	**323,993,387**	**20,824,524**	**6.9**

Table 7–6
M 1996

NPRI and TRI Facilities with Decreases greater than 1,000,000 kg in Total Releases of ARET Chemicals

Facility	City, State/Province	SIC Codes		Number of Forms		Total Releases		Change 1995–1996 in Total Releases (kg)	Major Chemicals Reported (Primary Media with Decreases)*
		Canada	US	1995	1996	1995 (kg)	1996 (kg)		
NPRI Facility									
Co-Steel Lasco	Whitby, ON	29	33	5	5	2,410,763	1,158,981	-1,251,782	Copper and compounds (land)
TRI Facility									
ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	7	7	7,997,776	4,797,448	-3,200,328	Copper/Zinc and compounds (land)

* Chemicals accounting for more than 70% of the decrease in total releases from the facility.

Table 7–7
M 1996

NPRI and TRI Facilities with Increases greater than 1,000,000 kg in Total Releases of ARET Chemicals

Facility	City, State/Province	SIC Codes		Number of Forms		Total Releases		Change 1995–1996 in Total Releases (kg)	Major Chemicals Reported (Primary Media with Increases)*
		Canada	US	1995	1996	1995 (kg)	1996 (kg)		
NPRI Facility									
Gerdau MRM Steel Inc.	Selkirk, MB	29	33	2	3	634,000	1,736,707	1,102,707	Zinc and compounds (land)
TRI Facilities									
Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	4	10	4,873,577	11,063,340	6,189,763	Copper/Zinc and compounds (land)
BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	8	6	204,603	2,562,031	2,357,428	Copper and compounds (air)
ASARCO Inc.	East Helena, MT		33	7	7	16,820,143	18,573,164	1,753,021	Zinc and compounds (land)
Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	8	8	2,620,316	4,155,435	1,535,119	Copper and compounds (land)
ASARCO Inc., Glover Plant	Annapolis, MO		33	6	6	2,959,545	4,030,233	1,070,688	Lead/Zinc and compounds (land)
TRI Total				**33**	**37**	**27,478,184**	**40,384,203**	**12,906,019**	

* Chemicals accounting for more than 70% of the increase in total releases from the facility.

Table 7–8
M 1996

NPRI and TRI Facilities with Decreases greater than 1,000,000 kg in Total Releases and Transfers of ARET Chemicals

Facility	City, State/Province	SIC Codes		Number of Forms		Total Releases and Transfers	
		Canada	US	1995	1996	1995 (kg)	1996 (kg)
NPRI Facilities							
Co-Steel Lasco	Whitby, ON	29	33	5	5	8,146,583	4,408,490
CXY Chemicals-Nanaimo Plant	Nanaimo, BC	37	28	1	*	1,988,000	*
NPRI Total				**6**	**5**	**10,134,583**	**4,408,490**
TRI Facilities							
Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	8	7	14,515,703	9,637,453
ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	7	7	9,941,058	7,721,573
Electralloy Corp., G.O. Carlson Inc.	Oil City, PA		33	3	3	1,321,890	115,301
TRI Total				**18**	**17**	**25,778,651**	**17,474,327**

* Indicates facility did not report any ARET chemicals that year.

** Chemicals accounting for more than 70% of the decrease in total releases and transfers from the facility.

Change 1995–1996			
Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers with Decreases)**
-1,251,782	-2,486,311	-3,738,093	Zinc and compounds (transfers to disposal), Copper and compounds (land)
0	-1,988,000	-1,988,000	Asbestos (transfers to disposal)
-1,251,782	**-4,474,311**	**-5,726,093**	
-45,132	-4,833,119	-4,878,250	Zinc/Lead and compounds (transfers to disposal)
-3,200,328	980,843	-2,219,485	Copper/Zinc and compounds (land)
-64,015	-1,142,574	-1,206,589	Chromium (transfers to disposal)
-3,309,475	**-4,994,850**	**-8,304,324**	

Table 7–9
M 1996

NPRI and TRI Facilities with Increases greater than 1,000,000 kg in Total Releases and Transfers of ARET Chemicals

Facility	City, State/Province	SIC Codes		Number of Forms		Total Releases and Transfers	
		Canada	US	1995	1996	1995 (kg)	1996 (kg)
NPRI Facilities							
Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	6	6	113,183	1,236,341
Gerdau MRM Steel Inc.	Selkirk, MB	29	33	2	3	634,000	1,736,707
Stelco McMaster Ltée	Contrecoeur, QC	29	33	4	4	1,707,300	2,711,930
NPRI Total				**12**	**13**	**2,454,483**	**5,684,978**
TRI Facilities							
Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	4	10	4,873,577	11,063,340
Ameristeel Corp., Jacksonville Mill Div.	Baldwin, FL		33	*	5	*	3,322,329
Nucor Steel, Nucor Corp.	Crawfordsville, IN		33	5	5	4,879,654	7,328,427
BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	8	6	213,584	2,562,848
USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock, PA		33	4	5	947,807	2,934,154
Steel Dynamics Inc.	Butler, IN		33	1	3	6,117	1,984,614
Nucor-Yamato Steel Co., Nucor Corp.	Blytheville, AR		33	6	5	66,732	2,037,094
ASARCO Inc.	East Helena, MT		33	7	7	16,820,323	18,573,178
Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	8	8	2,790,024	4,501,491
Nucor Steel, Nucor Corp.	Plymouth, UT		33	5	6	159,261	1,759,251
Nucor Steel, Nucor Corp.	Darlington, SC		33	6	6	51,155	1,581,570
Ameristeel Corp.	Jackson, TN		33	6	6	22,486	1,491,734
Ameristeel Corp.	Charlotte, NC		33	5	5	19,257	1,393,583
American Insulated Wire, Leviton Mfg. Co. Inc.	Attleboro, MA		33	4	4	9,849	1,083,329
ASARCO Inc., Glover Plant	Annapolis, MO		33	6	6	2,959,545	4,030,233
TRI Total				**75**	**87**	**33,819,371**	**65,647,175**

* Indicates facility did not report any ARET chemicals in the matched set that year.

** Chemicals accounting for more than 70% of the increase in total releases and transfers from the facility.

➤ Thomson Consumer Electronics, Dunmore, PA, reported 6.8 million kg of transfers to disposal of lead compounds for 1996 in error. This facility has been omitted from this table.

Change 1995–1996			
Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers with Increases)**
-43,242	1,166,400	1,123,158	Zinc and compounds (transfers to disposal)
1,102,707	0	1,102,707	Zinc and compounds (land)
7,330	997,300	1,004,630	Zinc and compounds (transfers to treatment)
1,066,795	**2,163,700**	**3,230,495**	
6,189,763	0	6,189,763	Copper/Zinc and compounds (land)
8,194	3,314,135	3,322,329	Zinc and compounds (transfers to disposal, treatment)
-8,763	2,457,537	2,448,773	Zinc and compounds (transfers to disposal)
2,357,428	-8,165	2,349,264	Copper and compounds (air)
-24,705	2,011,052	1,986,347	Zinc and compounds (transfers to disposal)
1,371	1,977,126	1,978,497	Zinc and compounds (transfers to disposal)
-18,846	1,989,209	1,970,362	Zinc and compounds (transfers to treatment)
1,753,021	-165	1,752,855	Zinc and compounds (land)
1,535,119	176,352	1,711,467	Copper and compounds (land)
-5,659	1,605,650	1,599,990	Zinc and compounds (transfers to treatment)
13,446	1,516,969	1,530,415	Zinc and compounds (transfers to disposal)
-10,733	1,479,981	1,469,248	Zinc and compounds (transfers to treatment)
-407	1,374,733	1,374,326	Zinc and compounds (transfers to treatment)
757	1,072,723	1,073,480	Copper and compounds (transfers to disposal)
1,070,688	0	1,070,688	Lead/Zinc and compounds (land)
12,860,674	**18,967,137**	**31,827,804**	

Table 7–10
M 1996

NPRI and TRI Releases and Transfers of 33/50 Chemicals

	NPRI				TRI			
	1995 Number	1996 Number	Change 1995–1996 Number	Change 1995–1996 %	1995 Number	1996 Number	Change 1995–1996 Number	Change 1995–1996 %
Total Facilities	685	701	16	2.3	11,047	10,619	-428	-3.9
Total Forms	1,303	1,330	27	2.1	20,930	19,885	-1,045	-5.0
	kg	**kg**	**kg**	**%**	**kg**	**kg**	**kg**	**%**
Total Air Emissions	25,465,438	23,074,590	-2,390,848	-9.4	207,131,867	179,393,979	-27,737,888	-13.4
Surface Water Discharges	117,675	100,077	-17,598	-15.0	441,596	707,857	266,261	60.3
Underground Injection	983,756	1,174,990	191,234	19.4	3,598,787	2,905,671	-693,116	-19.3
On-site Land Releases	1,320,638	1,441,700	121,062	9.2	18,455,388	21,605,101	3,149,713	17.1
Matched Releases	**27,937,854**	**25,836,445**	**-2,101,409**	**-7.5**	**229,628,036**	**204,612,608**	**-25,015,428**	**-10.9**
Treatment/Destruction	4,516,132	5,871,699	1,355,567	30.0	35,027,952	35,321,835	293,883	0.8
Sewage/POTWs	16,539	28,537	11,998	72.5	2,260,850	2,013,759	-247,091	-10.9
Disposal/Containment	3,892,145	4,087,630	195,485	5.0	24,759,833	24,433,752	-326,081	-1.3
Matched Transfers	**8,424,812**	**9,987,861**	**1,563,049**	**18.6**	**62,049,387**	**61,769,346**	**-280,041**	**-0.5**
Matched Releases and Transfers	**36,362,666**	**35,824,306**	**-538,360**	**-1.5**	**291,677,423**	**266,381,954**	**-25,295,469**	**-8.7**

Table 7–11
M 1996

NPRI and TRI Facilities with Decreases greater than 750,000 kg in Total Releases and Transfers of 33/50 Chemicals

Facility	City, State/Province	SIC Codes		Number of Forms		Total Releases and Transfers	
		Canada	US	1995	1996	1995 (kg)	1996 (kg)
NPRI Facility							
Les Papiers Perkins Ltée	Candiac, QC	27	26	1	*	793,700	*
TRI Facilities							
Georgia-Pacific Resins Inc., Georgia-Pacific Corp.	Elk Grove, CA		28	3	4	2,558,539	38
Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	5	5	2,610,601	1,276,498
Electralloy Corp., G.O. Carlson Inc.	Oil City, PA		33	2	2	1,315,953	107,049
Reynolds Metals Co.	Sheffield, AL		34	5	5	1,116,759	212,186
DuPont	Louisville, KY		28	5	4	901,878	7,233
Avesta Sheffield Plate Inc., Avesta Sheffield N.A.	New Castle, IN		33	2	2	801,049	226
American Steel Foundries, Amsted Ind. Inc.	Alliance, OH		33	2	4	1,158,086	384,648
Allegheny Ludlum Corp.	Brackenridge, PA		33	3	3	1,030,839	265,396
Goodyear Tire & Rubber Co.	Lincoln, NE		30	2	2	1,024,898	263,157
TRI Total				**29**	**31**	**12,518,602**	**2,516,431**

* Indicates facility did not report any 33/50 chemicals that year.
** Chemicals accounting for more than 70% of the decrease in total releases and transfers from the facility.

Table 7–12
M 1996

NPRI and TRI Facilities with Increases greater than 750,000 kg in Total Releases and Transfers of 33/50 Chemicals

Facility	City, State/Province	SIC Codes		Number of Forms		Total Releases and Transfers	
		Canada	US	1995	1996	1995 (kg)	1996 (kg)
NPRI Facility							
Aimco Soltec Ltd.	Milton, ON	37	28	*	4	*	1,932,275
TRI Facilities							
Xerox Corp.	Webster, NY		38	4	4	43,906	907,356
American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	1	4,306,440	5,154,065
ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	3	3	1,979,573	2,799,645
Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	1	3,315,098	4,089,291
DuPont Dow Elastomers LLC	Louisville, KY		28	*	3	*	765,830
TRI Total				**9**	**12**	**9,645,017**	**13,716,187**

* Indicates facility did not report any 33/50 chemicals that year.
** Chemicals accounting for more than 70% of the increase in total releases and transfers from the facility.
➤ Thomson Consumer Electronics, Dunmore, PA, reported 6.8 million kg of transfers to disposal of lead compounds for 1996 in error. This facility has been omitted from this table.

Change 1995–1996			
Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers with Decreases)**
-793,700	0	-793,700	Xylene (air)
-44	-2,558,457	-2,558,501	Xylene (transfers to treatment)
180	-1,334,284	-1,334,103	Lead and compounds (transfers to disposal)
-63,765	-1,145,139	-1,208,904	Chromium and compounds (transfers to disposal)
-901,950	-2,623	-904,573	Methyl ethyl ketone, Toluene (air)
-28,926	-865,719	-894,645	Toluene (transfers to treatment)
0	-800,823	-800,823	Chromium and compounds (transfers to treatment)
-34,793	-738,645	-773,438	Chromium and compounds (transfers to disposal)
-16,623	-748,820	-765,443	Nickel/Lead and compounds (transfers to disposal)
-761,752	10	-761,741	Toluene (air)
-1,807,673	**-8,194,500**	**-10,002,171**	

Change 1995–1996			
Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers with Increases)**
31,988	1,900,287	1,932,275	Xylene, Toluene (transfers to treatment)
-19,331	882,783	863,450	Dichloromethane (transfers to disposal)
861,322	-13,697	847,625	Chromium and compounds (land)
-267,821	1,087,893	820,072	Lead and compounds (transfers to treatment)
771,381	2,812	774,193	Chromium and compounds (land)
30,256	735,574	765,830	Toluene (transfers to treatment)
1,375,807	**2,695,365**	**4,071,170**	

7.4 Geographic and Demographic Data

Information about releases and transfers reported to PRTRs can be linked with other kinds of data to support more wide-ranging analyses. Land area and population, for example, can be used to complement PRTR data. Detailed data are available in both fields—geography and demography—to enable more refined analyses, such as tracking ecological trends, estimating potential human and environmental risks, or prioritizing prevention and treatment plans.

Although Canada and the United States cover roughly equivalent land areas, the United States had nearly 10 times the population of Canada in 1996. The almost 19,200 facilities reporting to TRI in the matched data set represented half again as many facilities per person in the United States (72 facilities per 1 million population) as the more than 1,300 facilities in NPRI (45 facilities per 1 million population). However, releases and transfers reported in the two countries in 1996 represented comparable ratios to their populations: 4.14 kg per person in Canada and 4.15 kg per person in the United States (**Table 7–13**, p. 301).

Total releases and transfers in Canada averaged 12 kg per square kilometer, countrywide, in 1996. In the United States, total releases and transfers averaged 10 times that amount, 118 kg per square kilometer. Much more of the Canadian surface area of 10 million square kilometers remains sparsely populated than is the case across the United States' 9 million square kilometers. In the matched data set, no facilities reported in Canada's Yukon or Northwest Territories. As will be evident in the analyses presented in **Chapter 8**, most NPRI facilities are clustered in the more industrialized border regions, especially around the Great Lakes.

National data do little to suggest the density of human populations or the proximity of ecological systems near industrial facilities. Canadian census divisions and US counties offer the opportunity to examine PRTR data on a more localized basis than that afforded by the continent-wide, national, and state or provincial views presented elsewhere in *Taking Stock 1996*. Canada's 288 census divisions represent counties, regional districts, regional municipalities and united counties, and are designated by provincial law or, in the absence of provincial action, by Statistics Canada. Quebec has the most census divisions (99), while Prince Edward Island has only three and the Yukon, just one. The United States, on the other hand, is composed of 3,141 counties or county equivalents, including the District of Columbia. Texas has the most, with 254 (100 more than any other US state), while Delaware has the least, with three. The matched data set includes data from facilities in 197 Canadian census divisions and 2,195 US counties.

Canadian Census Divisions

More facilities in the matched data set reported in Ontario's Toronto Metropolitan Municipality (129 facilities) than in any other Canadian census division. The Montreal Urban Community in the province of Quebec ranked second with 91 facilities. Peel Regional Municipality in Ontario had the third-largest number of reporting facilities (85 facilities, see **Table 7–14**, p. 301 and **Map 7–1**).

Facilities in the Durham Regional Municipality, which lies east of Toronto in the province of Ontario, reported total releases and transfers of 12 million kg, the largest amount among census divisions. Off-site transfers represented about two-thirds of the Durham total. In Alberta's Division No. 11 (the Edmonton area), ranking second with 10 million kg, and Ontario's Lambton County (the Windsor area), ranking third with 8 million kg, most of the total consisted of releases (**Table 7–15**, p. 302 and **Map 7–2**).

United States Counties

A total of 481 facilities reported in Cook County, Illinois, which includes the city of Chicago, making this the US county with the largest number of facilities. California's Los Angeles County ranked second with 403 (**Table 7–16**, p. 303 and **Map 7–1**).

Harris County in Texas (which includes the city of Houston) had the third-largest number of facilities (254) and was the county with the United States' largest total releases and transfers. The 40 million kg reported in Harris County consisted equally of releases and transfers. Other counties with large releases and transfers included Tooele County in Utah, which ranked second with 30 million kg (entirely in releases), and Lewis and Clark County in Montana, which ranked third with 20 million kg (almost entirely in releases, see **Table 7–17**, p. 304 and **Map 7–2**).

[Text continues on p. 304.]

Map 7–1
M 1996

Canadian Census Divisions and US Counties with Largest Number of Facilities

Map 7–2
M 1996

Canadian Census Divisions and US Counties with Largest Total Releases and Transfers

Table 7–13
M 1996

Population and Land Area of Canada and United States

	1996 Population Number	Land Area (sq km)	Number of PRTR Facilities	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Facilities per Person	Total Releases per Person (kg)	Total Transfers per Person (kg)	Total Releases and Transfers per Person (kg)	Total Releases and Transfers per Sq Km (kg)
Canada	29,959,000	9,976,000	1,344	82,596,460	41,532,687	124,129,147	0.000045	2.76	1.39	4.14	12
United States	265,179,000	9,373,000	19,190	780,621,952	321,079,591	1,101,701,543	0.000072	2.94	1.21	4.15	118

➤ Land Area from "1997 Canada at a Glance," Statistics Canada
Other Canada data from data provided by Statistics Canada, September 1998.
Other United States data from US Census Bureau, extracted from <www.census.gov>, 22 June 1998.

Table 7–14
M 1996

The Canadian Census Divisions with the Largest Number of Facilities

Census Division	Province	Population Number	Land Area (sq km)	Number of Facilities	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
Toronto Metropolitan Municipality	Ontario	2,385,421	630	129	317	2,945,753	921,849	3,867,602
Communauté-Urbaine-de-Montréal	Quebec	1,775,846	494	91	262	2,540,377	1,496,527	4,036,904
Peel Regional Municipality	Ontario	852,526	1,225	85	272	2,684,710	1,229,510	3,914,220
York Regional Municipality	Ontario	592,445	1,756	56	162	1,388,395	125,766	1,514,161
Division No. 11 (Edmonton)	Alberta	898,888	15,890	46	238	9,875,823	428,387	10,304,210
Halton Regional Municipality	Ontario	339,875	959	42	150	1,221,058	2,428,752	3,649,810
Waterloo Regional Municipality	Ontario	405,435	1,360	38	113	1,370,572	941,028	2,311,600
Greater Vancouver Regional District	British Columbia	1,831,665	2,821	36	120	326,255	494,004	820,259
Niagara Regional Municipality	Ontario	403,504	1,851	34	94	374,224	848,551	1,222,775
Hamilton-Wentworth Regional Municipality	Ontario	467,799	1,113	33	127	1,070,754	5,317,529	6,388,283
Essex County	Ontario	350,329	1,861	29	101	764,143	1,760,791	2,524,934
Durham Regional Municipality	Ontario	458,616	2,490	27	114	3,988,189	8,186,771	12,174,960
Division No. 11 (Winnipeg)	Manitoba	620,064	572	23	49	410,215	157,650	567,865
Wellington County	Ontario	171,395	2,659	21	69	225,593	521,217	746,810
Simcoe County	Ontario	329,865	4,842	20	91	698,042	286,066	984,108
Division No. 6 (Calgary)	Alberta	880,859	12,423	19	45	211,897	45,982	257,879
Lambton County	Ontario	128,975	2,998	17	167	6,785,462	882,622	7,668,084
Lajemmerais	Quebec	95,618	414	17	65	3,429,502	3,967,656	7,397,158
Middlesex County	Ontario	389,616	3,357	16	52	354,169	91,152	445,321
Brant County	Ontario	114,564	1,091	16	55	379,653	59,395	439,048
Subtotal		**13,493,305**	**60,806**	**795**	**2,663**	**41,044,786**	**30,191,205**	**71,235,991**
% of Total		**45.0**	**0.6**	**59.2**	**62.0**	**49.7**	**72.7**	**57.4**
Total		**29,959,000**	**9,976,000**	**1,344**	**4,298**	**82,596,460**	**41,532,687**	**124,129,147**

Table 7–15
M 1996

The Canadian Census Divisions with the Largest Total Releases and Transfers

Census Division	Province	Population Number	Land Area (sq km)	Number of Facilities	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
Durham Regional Municipality	Ontario	458,616	2,490	27	114	3,988,189	8,186,771	12,174,960
Division No. 11 (Edmonton)	Alberta	898,888	15,890	46	238	9,875,823	428,387	10,304,210
Lambton County	Ontario	128,975	2,998	17	167	6,785,462	882,622	7,668,084
Lajemmerais	Quebec	95,618	414	17	65	3,429,502	3,967,656	7,397,158
Hamilton-Wentworth Regional Municipality	Ontario	467,799	1,113	33	127	1,070,754	5,317,529	6,388,283
Sudbury Regional Municipality	Ontario	164,049	2,607	3	18	4,882,252	0	4,882,252
Haldimand-Norfolk Regional Municipality	Ontario	102,575	2,911	10	54	811,136	3,819,014	4,630,150
Communauté-Urbaine-de-Montréal	Quebec	1,775,846	494	91	262	2,540,377	1,496,527	4,036,904
Peel Regional Municipality	Ontario	852,526	1,225	85	272	2,684,710	1,229,510	3,914,220
Toronto Metropolitan Municipality	Ontario	2,385,421	630	129	317	2,945,753	921,849	3,867,602
Halton Regional Municipality	Ontario	339,875	959	42	150	1,221,058	2,428,752	3,649,810
Essex County	Ontario	350,329	1,861	29	101	764,143	1,760,791	2,524,934
Waterloo Regional Municipality	Ontario	405,435	1,360	38	113	1,370,572	941,028	2,311,600
Saint John County	New Brunswick	79,302	1,559	5	21	2,216,434	1,120	2,217,554
Division No. 13 (Selkirk)	Manitoba	39,422	1,644	1	5	2,031,067	0	2,031,067
Stormont	Ontario	111,301	3,302	14	42	1,881,820	111,875	1,993,695
Division No. 1 (Medicine Hat)	Alberta	62,330	20,532	5	12	1,848,914	6,032	1,854,946
Madawaska County	New Brunswick	36,814	3,422	1	9	174,150	1,549,150	1,723,300
Thunder Bay District	Ontario	157,619	109,564	10	32	1,627,235	1,556	1,628,791
Prescott and Russell United Counties	Ontario	74,013	2,003	1	7	11,020	1,559,360	1,570,380
Subtotal		**8,986,753**	**176,978**	**604**	**2,126**	**52,160,371**	**34,609,529**	**86,769,900**
% of Total		**30.0**	**1.8**	**44.9**	**49.5**	**63.2**	**83.3**	**69.9**
Total		**29,959,000**	**9,976,000**	**1,344**	**4,298**	**82,596,460**	**41,532,687**	**124,129,147**

Table 7–16
M 1996

The US Counties with the Largest Number of Facilities

County	State	Population Number	Land Area (sq km)	Number of Facilities	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
Cook	Illinois	5,085,770	2,449	481	1,382	5,347,033	4,596,772	9,943,805
Los Angeles	California	9,083,596	10,515	403	1,138	3,005,013	4,128,620	7,133,633
Harris	Texas	3,114,799	4,478	254	1,444	19,855,220	19,986,360	39,841,580
Cuyahoga	Ohio	1,397,311	1,187	201	565	1,948,232	2,548,266	4,496,498
Orange	California	2,619,358	2,045	140	308	886,578	453,427	1,340,005
Wayne	Michigan	2,137,302	1,591	138	582	3,263,171	13,798,098	17,061,269
Milwaukee	Wisconsin	918,238	626	138	399	618,201	2,288,921	2,907,122
Dallas	Texas	1,994,222	2,279	116	285	731,181	366,497	1,097,678
Maricopa	Arizona	2,613,409	23,839	113	243	463,781	1,038,057	1,501,838
Hennepin	Minnesota	1,053,490	1,442	97	204	770,668	137,723	908,391
Elkhart	Indiana	168,811	1,201	96	200	2,439,317	158,232	2,597,549
Hamilton	Ohio	855,800	1,055	95	290	875,999	3,587,690	4,463,689
Middlesex	New Jersey	701,587	805	92	352	1,054,296	3,790,684	4,844,980
Santa Clara	California	1,588,282	3,344	91	183	468,514	704,049	1,172,563
Providence	Rhode Island	576,558	1,070	91	203	511,584	260,698	772,282
Middlesex	Massachusetts	1,410,044	2,133	89	222	505,116	810,278	1,315,394
Tarrant	Texas	1,300,157	2,237	86	216	673,253	231,959	905,212
Worcester	Massachusetts	718,847	3,919	85	209	250,319	1,123,658	1,373,977
Marion	Indiana	814,854	1,027	84	253	374,997	2,952,028	3,327,025
New Haven	Connecticut	792,420	1,569	84	245	887,311	535,428	1,422,739
Subtotal		**38,944,855**	**68,811**	**2,974**	**8,923**	**44,929,784**	**63,497,445**	**108,427,229**
% of Total		**14.7**	**0.7**	**15.5**	**15.4**	**5.8**	**19.8**	**9.8**
Total		**265,179,000**	**9,373,000**	**19,190**	**57,927**	**780,621,952**	**321,079,591**	**1,101,701,543**

Table 7–17
M 1996

The US Counties with the Largest Total Releases and Transfers

County	State	Population Number	Land Area (sq km)	Number of Facilities	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
Harris	Texas	3,114,799	4,478	254	1,444	19,855,220	19,986,360	39,841,580
Tooele	Utah	30,144	17,990	2	8	29,619,647	0	29,619,647
Lewis and Clark	Montana	53,262	8,964	3	16	20,172,918	241	20,173,159
Gila	Arizona	47,357	12,349	3	25	16,532,980	3,033,535	19,566,515
Wayne	Michigan	2,137,302	1,591	138	582	3,263,171	13,798,098	17,061,269
Ascension	Louisiana	67,778	755	18	182	16,337,883	482,509	16,820,392
Mobile	Alabama	396,573	3,194	37	192	15,202,602	548,858	15,751,460
Jefferson	Texas	242,664	2,340	41	355	13,558,210	779,287	14,337,497
Beaver	Pennsylvania	186,690	1,127	28	130	778,095	11,899,263	12,677,358
Brazoria	Texas	220,410	3,592	22	200	11,616,555	438,507	12,055,062
Jefferson	Louisiana	453,517	792	22	93	11,394,182	21,770	11,415,952
Cook	Illinois	5,085,770	2,449	481	1,382	5,347,033	4,596,772	9,943,805
Hamblen	Tennessee	53,280	417	19	47	9,303,124	100,010	9,403,134
Victoria	Texas	81,624	2,286	4	35	8,816,001	479,943	9,295,944
Escambia	Florida	277,615	1,719	11	62	8,383,937	903,164	9,287,101
Galveston	Texas	240,213	1,033	12	206	6,567,984	2,491,968	9,059,952
Washington	Ohio	63,808	1,645	13	62	6,377,464	1,614,717	7,992,181
Montgomery	Indiana	36,213	1,307	7	28	171,335	7,696,703	7,868,038
Butler	Pennsylvania	167,442	2,042	28	92	7,241,573	172,092	7,413,665
Hopewell City	Virginia	22,234	27	7	41	1,540,526	5,745,229	7,285,755
Subtotal		**12,978,695**	**70,097**	**1,150**	**5,182**	**212,080,440**	**74,789,026**	**286,869,466**
% of Total		**4.9**	**0.7**	**6.0**	**8.9**	**27.2**	**23.3**	**26.0**
Total		**265,179,000**	**9,373,000**	**19,190**	**57,927**	**780,621,952**	**321,079,591**	**1,101,701,543**

7.5 Data Specific to NPRI or to TRI

The specific data that must be reported to each country differ in several respects. In its additional data collection, NPRI expands its concentration on releases and transfers by requiring an estimate of the percentage of annual releases by quarter. NPRI also breaks down the major release categories into routine releases, storage or handling releases, and spills, leaks, and other non-routine releases. It also asks in general terms the reasons for changes in releases and/or transfers from the previous year. (Many facilities also offer explanations of changes in NPRI's voluntary comment option, cited throughout **Chapter 6** of this report.) NPRI is more thorough than TRI in characterizing the facility by asking for the number of employees and the address of the parent company.

For its part, TRI expanded reporting in 1991 to include on-site waste management and the types of source reduction activity undertaken at the facility (but not the amounts of any reductions produced—see "Source Reduction Activity," in **Section 7.5.2**, below). Neither sort of information is specifically collected by NPRI.

With the 1996 reporting year, NPRI began requiring facilities to specify the amount transferred to each off-site location, rather than a total amount covering one or more such destinations. This resolves a previous difference between the two databases and, as will be seen in **Chapter 8**, enhances the analysis of cross-border transfers.

7.5.1 Additional Data in NPRI

Other Industrial Sectors Required to Report to NPRI: Sewage Treatment Plants

With a few exceptions, NPRI requires all facilities that use its listed substances to report, while only manufacturing and federal facilities report to TRI. Thus, non-manufacturing facilities in NPRI are not included in the matched data set. Such facilities can be a significant source of releases and transfers. A case in point is provided by a consideration of releases to surface waters by public sewage treatment facilities in the Great Lakes region.

Releases to any environmental medium may adversely affect the quality of surface waters in a region. In many cases, for example, water quality problems can be traced back to the deposition of chemicals originally released to the air, sometimes following atmospheric transport of those chemicals over hundreds, if not thousands, of miles, as discussed in the Commission for Environmental Cooperation's *Continental Pollutant Pathways: An Agenda for Cooperation to Address Long-Range Transport of Air Pollution in North America*. Nevertheless, one index of stress on a watershed is the number and magnitude of direct discharges to surface waters within that watershed.

A review of facilities that discharge directly to surface waters in the vicinity of the Great Lakes illustrates some of the additional data collected by NPRI that can be used to assess potential water quality impacts. The 1996 matched data set for NPRI and TRI contains 320 manufacturing facilities, located within 100 kilometers of the Great Lakes, that report discharges to surface waters. Of these, 272 were in the eight US states that border the Great Lakes, and 48 were in the province of Ontario.

NPRI data, unlike TRI, include releases from publicly owned sewage treatment works (POTWs). Only those sewage treatment plants meeting reporting and employee thresholds report to NPRI. There were 28 such facilities reporting for 1996 in Ontario within 100 kilometers of the border, increasing the number of NPRI facilities to 76 (a 58 percent increase).

Sewage treatment plants do not report their releases to TRI. The locations of such facilities, however, are available from the US Permit Compliance System (PCS), used to track potential violations of conditions on permitted discharges to surface waters. A review of this system indicates that more than 2,000 facilities with permits for surface water discharges lie within 100 kilometers of the Great Lakes. Some may be included among the 272 TRI facilities noted above but, at a minimum, nearly 1,800 facilities with surface water discharges are not reporting data to TRI. (Precise matching of facilities across US databases requires considerable effort and leaves considerable uncertainty. In addition to non-manufacturing facilities, PCS includes facilities discharging substances not on the TRI list and facilities that do not reach the TRI reporting thresholds.)

In five Great Lakes states, the PCS facilities included 353 specifically designated as wastewater or sewage treatment plants: 63 facilities in Illinois, 31 in Indiana, 129 in Michigan, 127 in New York and 3 in Pennsylvania. In these five states alone, the number of POTWs within 100 kilometers of the Great Lakes exceeded the population of TRI facilities by 30 percent.

In the three remaining Great Lakes states, PCS facilities included 77 municipal facilities. Most are likely to be POTWs, although they may also represent drinking water supply utilities (in many US localities, a single authority undertakes both water supply and sewage treatment): six facilities in Minnesota, 14 in Ohio and 57 in Wisconsin.

Thus, the estimated total of 430 sewage treatment plants in US states bordering the Great Lakes outnumbers TRI facilities by three to two (**Maps 7–3** and **7–4**).

Although the United States' PCS does not provide amounts of discharges, Canada's NPRI does. The 28 Ontario sewage treatment plants discharged 90,600 kg of chlorine and 363,360 kg of nitric acid and nitrate compounds to surface waters within 100 kilometers of the Great Lakes. The NPRI manufacturing facilities in the matched data set in the Great Lakes region released 1,023 kg of chlorine and 84,000 kg of nitric acid and nitrate compounds to surface waters. Thus, sewage treatment plants were releasing 90 times the amount of chlorine and four times the amount of nitric acid and nitrate compounds of the NPRI manufacturing facilities (**Table 7–18**).

[Text continues on p. 308.]

Table 7–18
M 1996

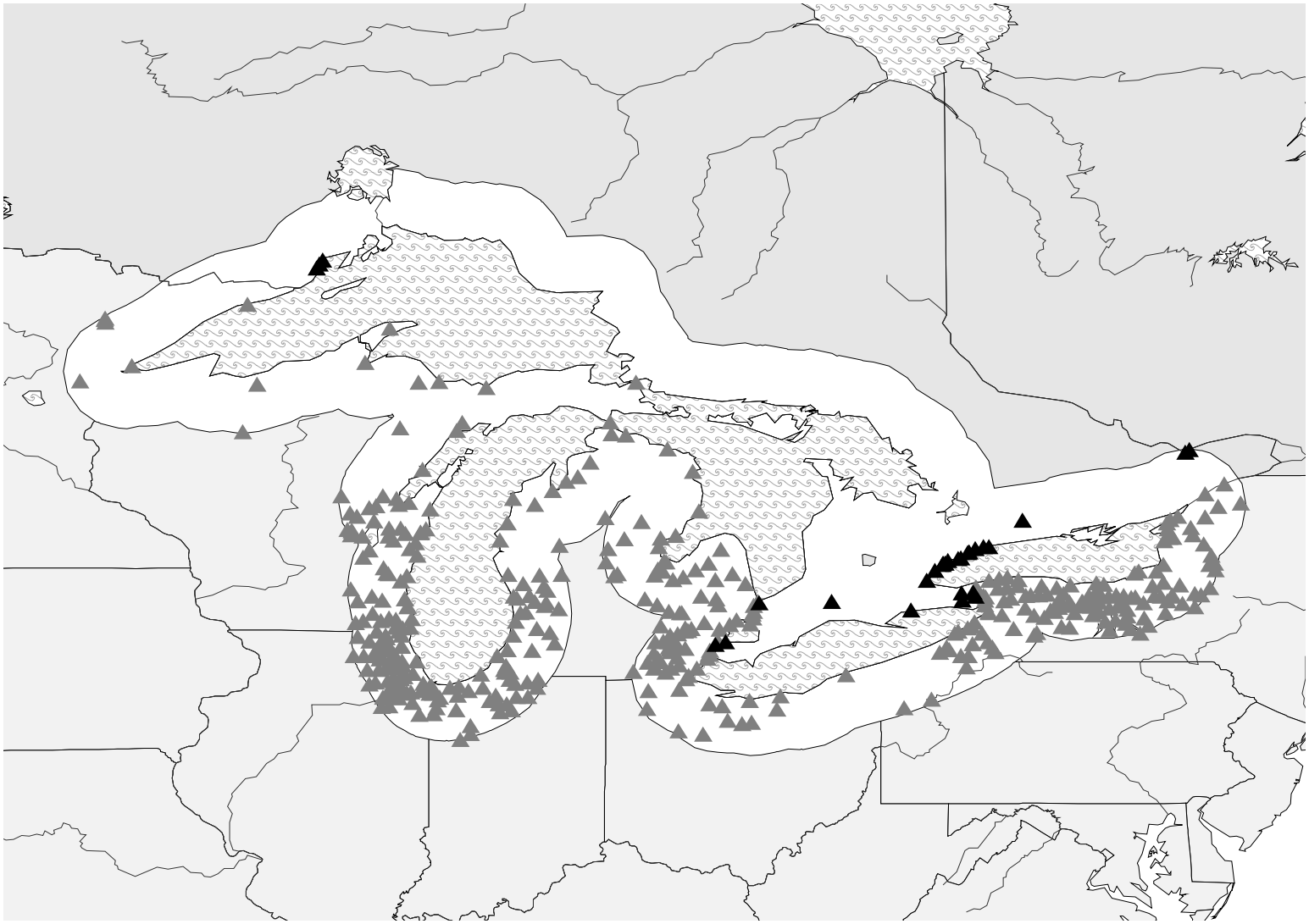
Manufacturing Facilities in the Great Lakes Region Reporting Surface Water Discharges and Sewage Treatment Plants

		Surface Water Discharges	
	Number of Facilities	Chlorine (kg)	Nitric Acid and Nitrate Compounds (kg)
NPRI Manufacturing Facilities	48	1,023	84,000
NPRI Sewage Treatment Plants	28	90,600	363,360
Total for NPRI	**76**	**91,623**	**447,360**
TRI Manufacturing Facilities	272	22,324	2,095,379
US Sewage Treatment Plants*	430	Unknown	Unknown
Total for United States	**702**	**Unknown**	**Unknown**

* Facilities found in US Permit Compliance System database.

Map 7–3
M 1996

Canadian and US Wastewater Treatment Plants within 100 kilometers of the Great Lakes

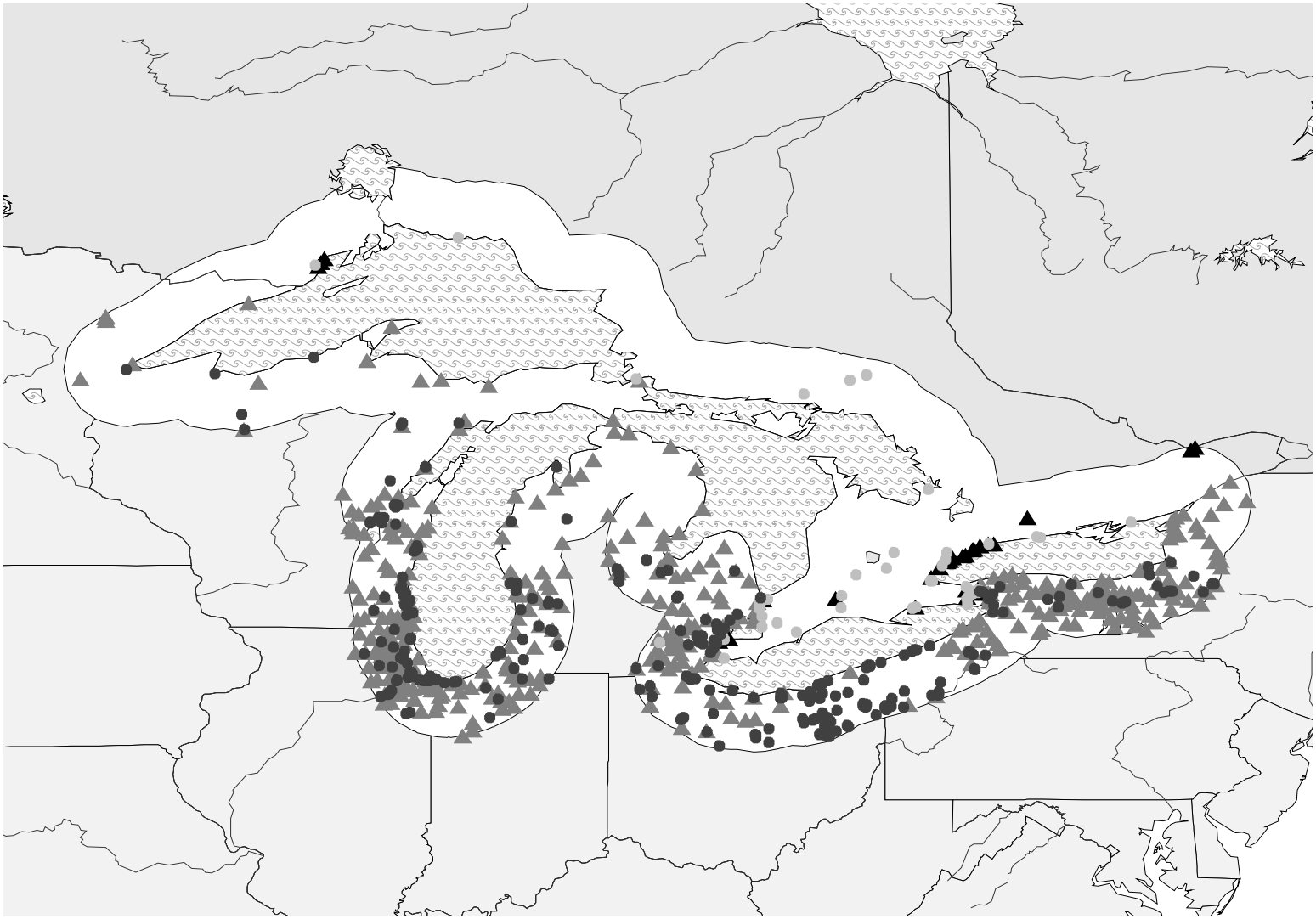


▲ Canadian wastewater treatment plants (in NPRI)

▲ US wastewater treatment plants (in PCS)

Map 7–4
M 1996

Canadian and US Manufacturing Facilities and Wastewater Treatment Plants within 100 kilometers of the Great Lakes



- Canadian wastewater treatment plants (in NPRI)
- Canadian manufacturing facilities (in NPRI)
- US wastewater treatment plants (in PCS)
- US manufacturing facilities (in PCS)

TRI Industry Expansion

In reporting year 1998, seven non-manufacturing industries will begin reporting to TRI for the first time: metal mining facilities, coal mining, oil- and coal-fired power plants, hazardous waste treatment facilities, chemical distributors, petroleum bulk storage facilities and solvent recovery services. These industries already report to NPRI, and the expansion of TRI's coverage will increase the comparability of the two PRTRs.

NPRI data for these industries offer some perspective on the value of the information to be gained from this expansion. The proportion of total releases and transfers that these industries will represent in TRI will undoubtedly differ from their proportion in NPRI, as is true of the manufacturing industries that now report in both PRTRs. However, NPRI data from facilities in these industries can suggest the extent to which the expansion will add to TRI's information base.

In 1996, a total of 109 facilities in these industries reported on matched chemicals to NPRI. Their releases and transfers totaled 7 million kg. Currently excluded from the matched data set, these facilities would represent, in NPRI, an 8 percent expansion of matched facilities and a 6 percent expansion of matched releases and transfers if the subject industries had been covered in both PRTRs in 1996 (**Table 7–19**, pp. 310–11).

Reasons for Change from Previous Year's Releases and Transfers

The NPRI form requires facilities to indicate generally why the amount of releases and transfers changed from the previous year. Facilities indicate whether changes in total releases and, separately, changes in total transfers arose from production-level changes, the use of different estimation methods, or other changes (including accidents, spills or breakdowns).

More than half of the 1996 forms (3,144 forms) indicated no significant change in releases since 1995, although they represented relatively small amounts. A total of 834 forms cited only "other" changes to explain the changes in their releases from 1995 to 1996. Their releases decreased by a greater percentage—32 percent—than any other group (**Table 7–20**, p. 312).

For transfers, no significant change was reported on two-thirds of the forms (3,880 forms). The 747 forms that attributed changes in transfers only to "other" reasons represented the bulk of the transfers reported. Their transfers increased by 17 percent from 1995 to 1996. The 710 forms that cited only production-level changes had a net increase of 29 percent (**Table 7–21**, p. 313).

An NPRI form may indicate one or more reasons for change. Generally, forms that cited production-level changes (whether alone or with other reasons) to explain their increases or decreases from 1995 reported somewhat higher releases (nearly 4 percent) and much higher transfers (25 percent). The group identifying the use of different estimation methods to explain changes in releases netted essentially no change (a 0.2 percent reduction). Those that identified changes in estimation methods to explain changes in transfers reported a larger percentage reduction (17 percent). Where "other" changes were cited—alone or with other reasons—releases decreased 28 percent. Similar forms for transfers, citing "other reasons" alone or in combination, showed a 14 percent increase (**Tables 7–20**, p. 312 and **7–21**, p. 313).

7.5.2 Additional Data in TRI

Waste Management Categories

Since 1991, TRI facilities have reported the amounts of listed substances in waste, on- and off-site, by waste management category: recycling, energy recovery, treatment, and release/disposal. (This last category includes all on-site releases plus transfers off-site to disposal.) Only the amount of the substance in production-related waste is included in these categories; any waste resulting from accidents or a facility's remedial actions is reported separately. NPRI invites, but does not require, facilities to report transfers off-site for energy recovery and recycling.

The quantity of waste that was released/disposed of, plus the quantity treated off-site, corresponds to the amount of total releases and transfers, as discussed in earlier chapters of this report, except that releases or transfers from accidents or remedial actions are not included. In 1996, these releases and transfers—as covered in other parts of the TRI form and reported in similar categories to NPRI—represented 13 percent of all production-related waste reported to TRI. The largest portions of production-related waste were the amount of TRI chemicals in waste recycled and treated on-site, neither of which is reported to NPRI. On-site recycling accounted for 34 percent of the total waste reported to TRI in 1996, and on-site treatment for another 31 percent. Off-site recycling and energy recovery—optionally reported to NPRI—together amounted to 12 percent of TRI production-related waste (**Table 7–22**, p. 314).

Year-to-Year Change

TRI also takes a different approach from NPRI's with regard to year-to-year changes. TRI facilities must report waste management data for the previous year as well as the current one, plus projections for the following two, while NPRI requires projections of releases and transfers (separately) for the next three years (with fourth and fifth years optional).

The goal of the Pollution Prevention Act of 1990 that added these reporting elements to TRI was to stress the importance of pollution prevention by making source reduction the first priority and focusing waste management, where source reduction was not feasible, on doing the least harm to the environment. After source reduction, the waste management categories are prioritized with recycling as the most desirable option, then energy recovery, then treatment, and finally releases and disposal as least desirable.

Changes that TRI facilities projected from 1996 to 1998 show that the quantity released or disposed of was expected to decrease as a percentage of total production-related waste (from 10 percent to 9 percent), while recycling on- and off-site increased (from 43 percent to 44 percent, see **Table 7–22**, p. 314). Although the projected increments are small, they represent progress consistent with the hierarchy of waste management options.

Source Reduction Activity

Although TRI captures actual and projected changes, facilities do not report reasons for these changes. One aspect, however, that is reflected in TRI data is source reduction activity. Each facility, for each TRI-listed chemical, reports what type of source reduction activity was undertaken during the year, if any. Facilities select specific activities from a list of 43 in eight categories.

While 27 percent of TRI facilities reported some source reduction activity during 1996, only 20 percent of the forms reflected this, as facilities did not necessarily engage in such activities for all chemicals they reported. The most commonly reported activities were improvements in operating practices and process modifications (**Table 7–23**, p. 314).

Facilities also indicate the methods they used to identify each source reduction activity, choosing from a list of 11. Participative team management and internal pollution prevention audits were the methods most often used to identify source reduction opportunities (**Table 7–24**, p. 315).

TRI facilities do not report the results of their source reduction activities—that is, the amounts of waste reduced. However, facilities' projections for total production-related waste can be evaluated for the forms that indicated source reduction activity, compared to those that did not. Projected changes in the various waste management options can also be evaluated between the two groups.

Overall, the projections of production-related waste through 1998 showed little difference between forms indicating source reduction activity in 1996 (a projected increase of 3.1 percent) and forms that did not indicate source reduction activity (a projected increase of 3.5 for change percent, see **Table 7–25**, p. 316).

Year-by-year projections, however, showed considerable differences: Forms that indicated source reduction activity projected no change from 1996 to 1997, compared to a 7 percent increase for forms indicating no source reduction activity. For the following year (1997 to 1998), forms indicating source reduction activity projected an increase of 3.5 percent, while forms indicating no such activity projected a decrease of 3.5 percent (**Figure 7–1**, p. 315).

Among types of waste management, the forms indicating source reduction activity projected releases decreasing, through 1998, at twice the rate of those with no source reduction activity—11 percent versus 5 percent (**Table 7–25**, p. 316).

Table 7–19

M 1996

NPRI Releases and Transfers from Industries Added to TRI Reporting

US SIC Code		Number of Facilities	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
10	Metal Mining	61	226	978,377	522,426	2,900,000	26,126	4,432,676
1021	Copper Ores	13	64	279,724	30,689	0	0	311,502
1031	Lead and Zinc Ores	7	37	413,878	252,956	0	6,527	673,361
1041	Gold Ores	28	84	99,701	222,400	2,900,000	5,000	3,229,323
1061	Ferroalloy Ores, except Vanadium	5	25	182,736	16,279	0	2,552	203,837
1081	Metal Mining Services	1	1	810	0	0	0	810
1094	Uranium-Radium-Vanadium Ores	6	14	1,528	102	0	12,047	13,843
1099	Metal Ores, not elsewhere classified	1	1	0	0	0	0	0
12	Coal Mining	1	1	0	0	0	0	0
1221	Bituminous Coal/Lignite Surface Mining	1	1	0	0	0	0	0
4911	Electric Generation, Transmission	29	67	751,019	30,618	0	104,233	885,870
4953	Refuse/Waste Disposal Systems	1	1	0	0	0	0	0
5169	Wholesale Trade of Chemicals	15	171	150,667	0	0	0	161,364
7389	Business Services (Solvent Recovery)	2	37	1,680	0	0	165,297	166,977
	Total in NPRI for TRI Expansion Industries	**109**	**503**	**1,881,743**	**553,044**	**2,900,000**	**295,656**	**5,646,887**
	Total in NPRI for Current TRI Industries/Matched Chemicals	**1,344**	**4,298**	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**
	TRI Expansion Industries as % of Current TRI Industries, in NPRI	**8.1**	**11.7**	**3.0**	**10.8**	**60.3**	**3.3**	**6.8**

➤ Others on TRI expansion list but with no NPRI reports:
- 4939 Combination Utilities (Electric, Gas, Other)
- 4931 Electric and Other Services Combined
- 5171 Petroleum Bulk Stations and Treminals

Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
1,000	0	0	1,000	4,433,676
0	0	0	0	311,502
0	0	0	0	673,361
1,000	0	0	1,000	3,230,323
0	0	0	0	203,837
0	0	0	0	810
0	0	0	0	13,843
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
40	0	565,065	565,105	1,450,975
0	0	234,180	234,180	234,180
132,391	0	721	133,112	294,476
0	0	339,000	339,000	505,977
133,431	**0**	**1,138,966**	**1,272,397**	**6,919,284**
13,571,799	**4,943,234**	**23,017,654**	**41,532,687**	**124,129,147**
1.0	**0.0**	**4.9**	**3.1**	**5.6**

Table 7–20
A 1996

Distribution of Reasons for Change in NPRI Releases, for Chemicals Reported in both 1995 and 1996

	Forms		Total Releases		
	Number	%	1995 (kg)	1996 (kg)	Change 1995–1996 (%)
Reason for Change in Releases as Indicated on 1996 Form					
Production Level	1,071	18.4	31,568,766	32,999,595	4.5
Production, Estimate	151	2.6	5,871,211	6,753,139	15.0
Production, Estimate, Other	50	0.9	315,812	221,228	-29.9
Production, Other	83	1.4	7,184,963	6,527,425	-9.2
Estimate	380	6.5	15,125,818	14,097,823	-6.8
Estimate, Other	58	1.0	1,215,271	1,400,426	15.2
Other	834	14.3	53,613,957	36,615,589	-31.7
No Significant Change	3,144	53.9	33,860,834	34,181,827	0.9
Not Applicable (NA)	60	1.0	775,289	707,846	-8.7
Total	**5,831**	**100.0**	**149,531,921**	**133,504,898**	**-10.7**
Reasons for Change Reported at Least Once on 1996 Form*					
Production Level Change	1,355	23.3	44,940,752	46,501,387	3.5
Estimation Method Change	639	11.0	22,528,112	22,472,616	-0.2
Other Change	1,025	17.6	62,330,003	44,764,668	-28.2
Total for Forms Counted*	**2,627**	**45.1**	**114,895,798**	**98,615,225**	**-14.2**
No Change Reported					
No Significant Change	3,144	53.9	33,860,834	34,181,827	0.9
Not Applicable (NA)	60	1.0	775,289	707,846	-8.7
Total for Forms Counted	**3,204**	**54.9**	**34,636,123**	**34,889,673**	**0.7**

* Data for forms that reported more than one reason for change are included in all applicable categories, but only once in the Total for Forms Counted.

Table 7–21 A 1996

Distribution of Reasons for Change in NPRI Transfers, for Chemicals Reported in both 1995 and 1996

	Forms		Total Transfers		
	Number	%	1995 (kg)	1996 (kg)	Change 1995–1996 (%)
Reason for Change in Transfers as Indicated on 1996 Form					
Production Level	710	12.2	10,730,480	13,802,962	28.6
Production, Estimate	71	1.2	974,716	842,350	-13.6
Production, Estimate, Other	5	0.1	11,619	11,663	0.4
Production, Other	58	1.0	580,864	724,375	24.7
Estimate	186	3.2	1,378,498	1,414,081	2.6
Estimate, Other	29	0.5	1,630,420	1,049,626	-35.6
Other	747	12.8	24,253,227	28,471,612	17.4
No Significant Change	3,880	66.5	9,526,720	9,652,718	1.3
Not Applicable (NA)	145	2.5	75,346	3,946	-94.8
Total	**5,831**	**100.0**	**49,161,890**	**55,973,333**	**13.9**
Reasons for Change Reported at Least Once on 1996 Form*					
Production Level Change	844	14.5	12,297,679	15,381,350	25.1
Estimation Method Change	291	5.0	3,995,253	3,317,720	-17.0
Other Change	839	14.4	26,476,130	30,257,276	14.3
Total for Forms Counted*	**1,806**	**31.0**	**39,559,824**	**46,316,669**	**17.1**
No Change Reported					
No Significant Change	3,880	66.5	9,526,720	9,652,718	1.3
Not Applicable (NA)	145	2.5	75,346	3,946	-94.8
Total for Forms Counted	**4,025**	**69.0**	**9,602,066**	**9,656,664**	**0.6**

* Data for forms that reported more than one reason for change are included in all applicable categories, but only once in the Total for Forms Counted.

Table 7–22
A 1996

Actual and Projected Quantities of TRI Chemicals in Waste, 1996–1998

Waste Management Activity	Actual 1996 (kg)	% of Total	Projected 1997 (kg)	% of Total	1998 (kg)	% of Total
Recycled On-site	3,556,732,491	33.5	4,107,959,291	36.9	3,863,508,833	35.2
Recycled Off-site	1,011,472,794	9.5	970,242,370	8.7	984,748,172	9.0
Energy Recovery On-site	1,252,489,544	11.8	1,285,684,292	11.6	1,282,384,060	11.7
Energy Recovery Off-site	231,414,028	2.2	212,973,980	1.9	211,636,800	1.9
Treated On-site	3,238,032,617	30.5	3,254,582,878	29.2	3,370,141,763	30.7
Total Releases and Transfers	**1,329,514,178**	**12.5**	**1,299,842,390**	**11.7**	**1,250,490,113**	**11.4**
Treated Off-site	234,313,840	2.2	233,158,581	2.1	230,470,242	2.1
Quantity Released/Disposed of	1,095,200,338	10.3	1,066,683,809	9.6	1,020,019,871	9.3
Total Production-related Waste	**10,619,655,652**	**100.0**	**11,131,285,200**	**100.0**	**10,962,909,741**	**100.0**

➤ All amounts are all taken from TRI Form R for 1996.

Table 7–23
A 1996

TRI Facilities and Forms Reporting Source Reduction Activity, by Category

Source Reduction Activity Categories	Facilities Reporting Source Reduction Activity: Number	Facilities Reporting Source Reduction Activity: As % of All Facilities	Forms Reporting Source Reduction Activity*: Number	Forms Reporting Source Reduction Activity*: As % of All TRI Forms
Good Operating Practices	2,652	12.3	6,145	8.6
Inventory Control	582	2.7	1,303	1.8
Spill and Leak Prevention	1,152	5.3	2,944	4.1
Raw Material Modifications	1,453	6.7	2,459	3.4
Process Modifications	2,001	9.3	4,254	6.0
Cleaning and Degreasing	638	3.0	958	1.3
Surface Preparation/Finishing	646	3.0	1,233	1.7
Product Modification	551	2.5	1,025	1.4
Any Source Reduction Activity**	5,899	27.3	13,988	19.6

* All source reduction activities on a form are counted in the corresponding category.

** The numerical totals do not equal the sum of the above categories because facilities and forms may report more than one source reduction activity.

Table 7–24
A 1996

TRI Source Reduction Activity Reporting

Source Reduction Activity Categories	Number of Occurrences* Number	As % of All Occurrences
Good Operating Practices	11,603	30.7
Inventory Control	2,622	6.9
Spill and Leak Prevention	5,862	15.5
Raw Material Modifications	4,117	10.9
Process Modifications	7,566	20.0
Cleaning and Degreasing	1,845	4.9
Surface Preparation/Finishing	2,506	6.6
Product Modifications	1,722	4.6
Total	**37,843**	**100.0**

Methods Used to Identify Source Reduction Activity	Number of Occurrences* Number	As % of All Occurrences
Pollution Prevention Opportunity Audit		
Internal	8,147	21.5
External	862	2.3
Materials Balance Audits	3,051	8.1
Participative Team Management	10,917	28.8
Employee Recommendation		
Informal	3,586	9.5
Formal	1,861	4.9
State Program	242	0.6
Federal Program	40	0.1
Trade/Industry Program	979	2.6
Vendor Assistance	4,358	11.5
Other	3,800	10.0
Total	**37,843**	**100.0**

* Each TRI form can report any number of the 43 activity categories or 11 methods.
➤ Occurrences count each time an activity or method was reported.

Figure 7–1
A 1996

TRI Source Reduction Activity Reporting and Projected Change in Chemicals in Waste

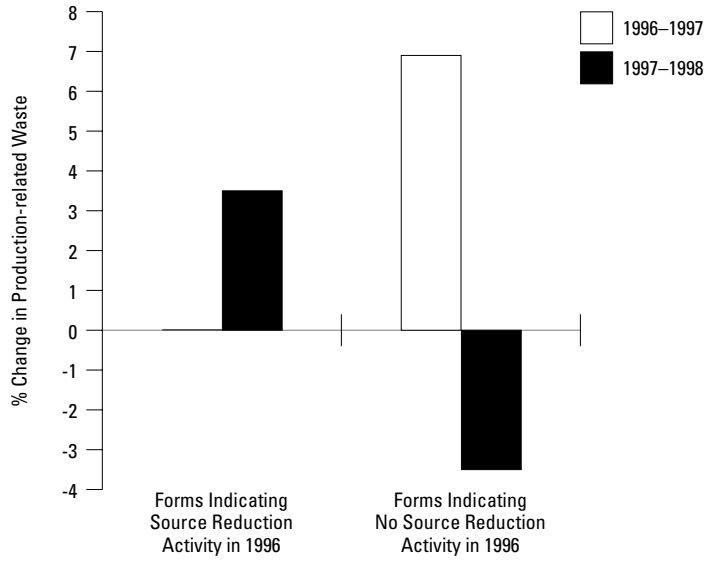


Table 7–25
A 1996

Actual and Projected Quantities of TRI Chemicals in Waste for Forms with and without Source Reduction Activity Reported, 1996–1998

Type of Waste Management	Actual 1996 (kg)	Projected 1997 (kg)	Projected 1998 (kg)	Projected Change 1996–1997 (%)	Projected Change 1997–1998 (%)	Projected Change 1996–1998 (%)
Forms Indicating Source Reduction Activity in 1996						
Recycled On-site	1,240,537,739	1,286,685,326	1,323,711,823	3.7	2.9	6.7
Recycled Off-site	243,514,670	228,707,231	230,479,163	-6.1	0.8	-5.4
Energy Recovery On-site	213,071,335	211,236,994	212,877,050	-0.9	0.8	-0.1
Energy Recovery Off-site	68,689,409	65,624,907	60,154,716	-4.5	-8.3	-12.4
Treated On-site	1,060,894,675	1,047,332,860	1,149,074,304	-1.3	9.7	8.3
Treated Off-site	62,300,379	59,010,319	57,652,698	-5.3	-2.3	-7.5
Quantity Released/Disposed of	303,092,264	294,082,797	269,571,824	-3.0	-8.3	-11.1
Total Production-related Waste	**3,192,100,471**	**3,192,680,434**	**3,303,521,577**	**0.0**	**3.5**	**3.5**
Forms Indicating No Source Reduction Activity in 1996						
Recycled On-site	2,316,194,752	2,821,273,965	2,539,797,010	21.8	-10.0	9.7
Recycled Off-site	767,958,124	741,535,139	754,269,009	-3.4	1.7	-1.8
Energy Recovery On-site	1,039,418,209	1,074,447,298	1,069,507,010	3.4	-0.5	2.9
Energy Recovery Off-site	162,724,619	147,349,073	151,482,084	-9.4	2.8	-6.9
Treated On-site	2,177,137,942	2,207,250,018	2,221,067,459	1.4	0.6	2.0
Treated Off-site	172,013,461	174,148,262	172,817,544	1.2	-0.8	0.5
Quantity Released/Disposed of	792,108,074	772,601,012	750,448,047	-2.5	-2.9	-5.3
Total Production-related Waste	**7,427,555,181**	**7,938,604,766**	**7,659,388,163**	**6.9**	**-3.5**	**3.1**

LEGEND

M Matched Chemicals/Industries

A All Chemicals/Industries

8 Border and Transborder Analyses

Figures

Maps

Tables

Key Findings

- More cross-border transfers were sent for recycling in 1996 than for any other waste management option: 97 percent of US transfers of TRI chemicals sent outside the country and 58 percent of NPRI substances sent outside the country from Canada. Beginning in reporting year 1996, NPRI facilities reported specific amounts of transfers to each destination, rather than a total amount sent to all destinations. This enabled a more comparable analysis of cross-border transfers between the United States and Canada.
- For transfers to treatment/destruction and disposal/containment in the matched data set, US facilities sent nearly 2 million kg in cross-boundary transfers to Canada in 1996 and Canadian facilities sent more than 4 million kg to the United States. Most of these transfers crossed between Ontario and Michigan. This analysis excludes transfers to sewage/POTWs, which are almost always local, and transfers to recycling or energy recovery, which are mandatory in TRI but voluntary in NPRI.
- The border area—100 kilometers on either side of the Canadian-US border—includes 74 percent of NPRI facilities and 19 percent of TRI facilities in the matched data set for 1996. Their total releases and transfers were smaller, however, than their numbers would suggest: 71 percent of NPRI's total and 14 percent of TRI's.
- The Great Lakes region dominates any border analysis: nine of every ten border facilities was located there. TRI facilities greatly outnumbered NPRI facilities in the Great Lakes region and reported 70 percent of the region's total releases and transfers. In the Eastern region, the opposite pattern prevailed, with NPRI facilities reporting 87 percent of all releases and transfers.
- Emissions to air constituted a larger percentage of releases in the border area than in Canada and the United States as a whole. All other release types—surface water discharges, underground injection, and on-site land releases—were a smaller percentage of releases reported within 100 kilometers of the border.

8.1 Introduction

Cross-boundary issues that can be examined with PRTR data include transfers of chemicals from facilities in one country to sites in another and releases and transfers reported by facilities located near borders. US TRI data supply information on transfers across the US-Mexican and US-Canadian borders. Beginning with the 1996 reporting year, Canadian NPRI data also specify clearly the amounts of pollutants in waste transferred into the United States.

In addition to these analyses of cross-border transfers, this chapter examines other characteristics of the US-Canadian border region, using data from facilities located within 100 kilometers on either side of the border.

8.2 Off-site Transfers across Borders

The amount of chemicals in waste transferred from reporting facilities to off-site locations is reported to both NPRI and TRI, along with the address of the site to which the chemical waste stream is shipped. Most reported transfers occurred to sites within a nation's borders, but listed substances can also be shipped to a North American neighbor or to other countries. Transfers to sewage/POTWs are not included in this analysis because they rarely cross national or even state/provincial boundaries (**Map 8–1**).

8.2.1 Cross-border Transfers from TRI Facilities

In 1996, TRI facilities reported transferring 71 million kg of listed substances out of the country (in the complete TRI database). The majority were sent to sites in Canada (55 percent) and Mexico (42 percent), primarily for recycling. Most transfers to Canada went to Ontario (30 million kg), followed by Quebec (10 million kg). Nearly all of the transfers to Mexico were to the city of Monterrey (29 million kg, see **Table 8–1**, p. 324).

Five percent of all US transfers were sent outside the country. Ninety-seven percent of the amounts that US facilities sent outside the country were for recycling, compared to 65 percent of transfers that took place within US borders (**Table 8–2**, p. 324 and **Figure 8–1**).

8.2.2 Cross-border Transfers from NPRI Facilities

NPRI facilities reported transfers of 32 million kg out of Canada (in the complete NPRI database), and 99 percent of that amount was sent to the United States. States receiving the largest amounts of NPRI listed substances were Ohio (10 million kg) and Michigan (9 million kg, see **Table 8–3**, p. 325). Because reporting off-site transfers to recycling and energy recovery is voluntary under NPRI, these numbers represent a lower-end estimate of off-site transfers.

Transfers outside Canada amounted to 21 percent of all NPRI transfers, four times the US percentage. Recycling was the largest transfer type, but fewer of the transfers outside Canada were to recycling (58 percent) than was the case for transfers within the country's borders (64 percent). However, these numbers also represent a lower-end estimate because of NPRI's voluntary reporting of transfers to recycling and energy recovery (**Table 8–4**, p. 326 and **Figure 8–2**).

8.2.3 Transfers between Canada and the United States

For transfers to treatment/destruction and disposal/containment, US facilities sent nearly 2 million kg of the matched chemicals in cross-boundary transfers to Canada in 1996 and Canadian facilities sent more than 4 million kg to the United States (see **Table 8–5**, p. 327 and **Map 8–2**). (This excludes transfers to sewage/POTWs, which are usually local, and transfers to recycling or energy recovery, which are mandatory in TRI but voluntary in NPRI.)

The majority of these transfers crossed between Ontario and Michigan. Facilities in Ontario shipped 95 percent of the Canada-to-US transfers, and 84 percent of that amount was sent to Michigan. At the same time, Michigan exported 56 percent of total US transfers, almost all of which went to Ontario.

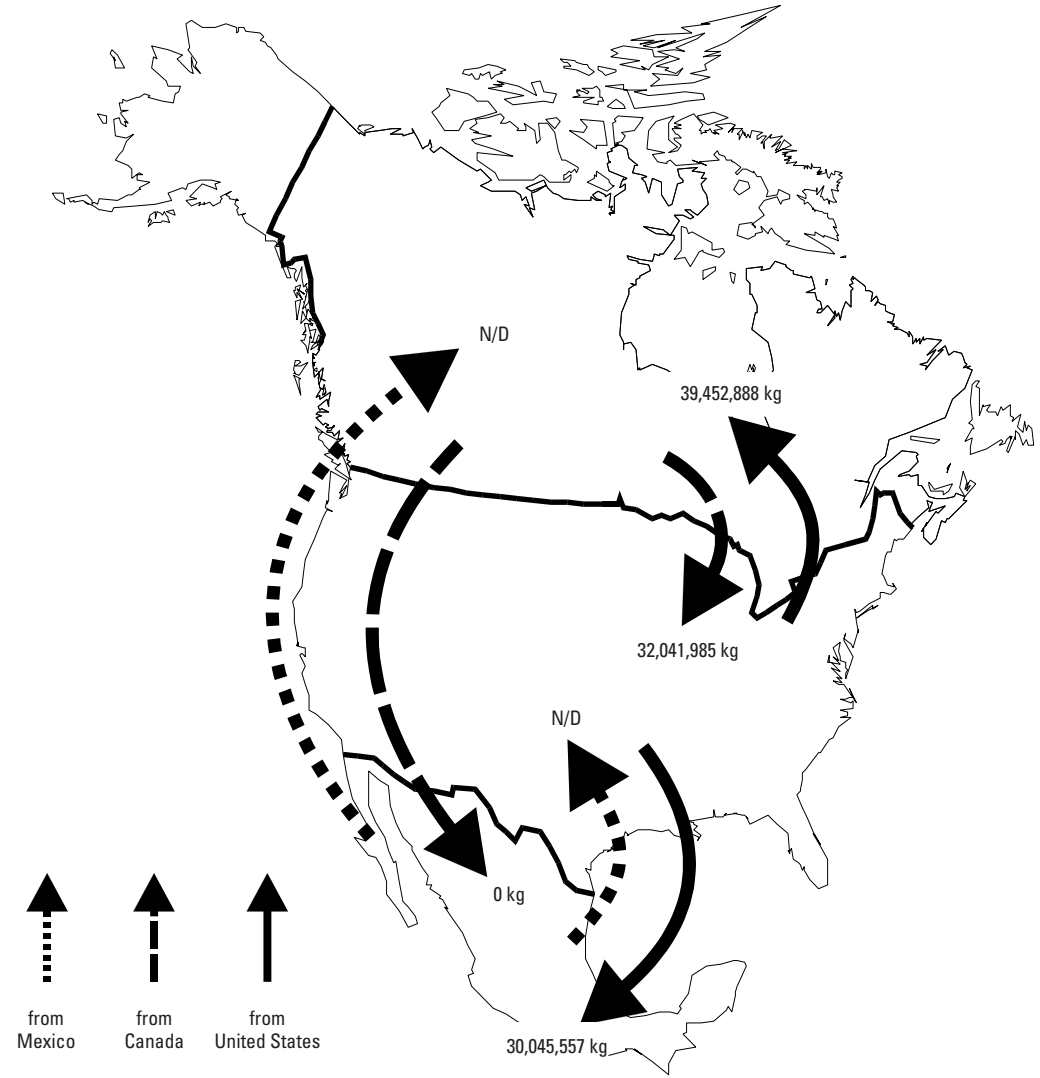
Quebec facilities sent and received the second-largest amounts of US-Canadian cross-border transfers among the Canadian provinces. Among US states, New York ranked second for transfers sent to Canada and Ohio ranked second for transfers received from Canada.

Three Canadian facilities, all in Ontario, reported sending cross-border transfers of more than 750,000 kg each in 1996. Two facilities reported transfers of 1.3 million kg and 877,000 kg, respectively, to sites in Michigan and New York for land disposal. Another NPRI facility reported 1.3 million kg of transfers to Michigan and Ohio for incineration. The US facility with the largest transfers to Canada reported 485,000 kg sent to Ontario for incineration/thermal treatment (**Table 8–6**, p. 328).

[Text continues on p. 329.]

Map 8–1
A 1996

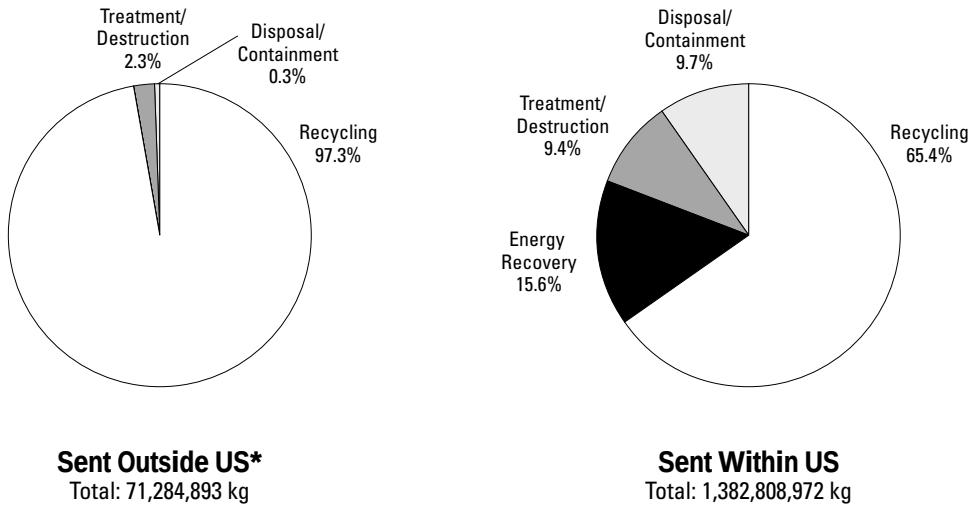
Off-site Transfers across North American Borders



- Reporting of transfers to recycling and to energy recovery is voluntary in Canada; amounts given may not represent all such transfers from Canada.
- Amounts appear in receiving countries.
- Mexico data not collected for 1996.

Figure 8–1
A 1996

TRI Off-site Transfers within the United States and to Other Countries



Sent Outside US*
Total: 71,284,893 kg

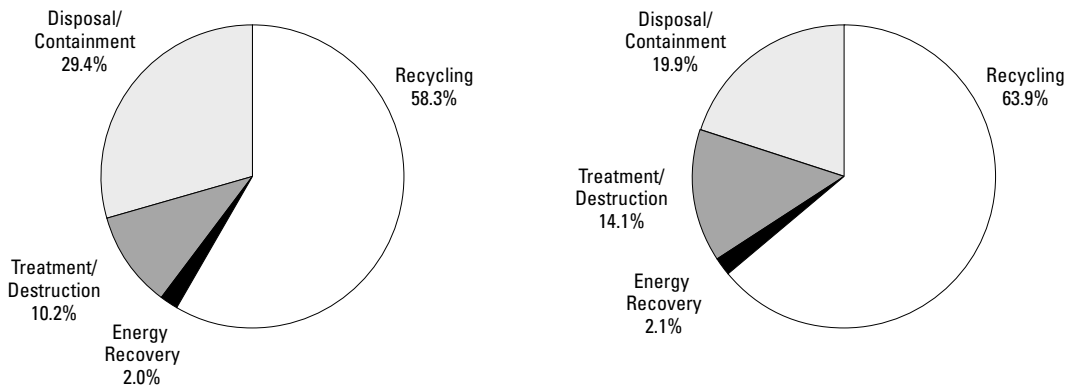
Sent Within US
Total: 1,382,808,972 kg

* 0.1% for Energy Recovery does not appear.

➤ Does not include transfers to sewage/POTWs. Does not include transfers to unknown destinations (0.3% of total).

Figure 8–2
A 1996

NPRI Off-site Transfers within Canada and to Other Countries



Sent Outside Canada
Total: 32,263,419 kg

Sent Within Canada
Total: 123,605,114 kg

➤ Does not include transfers to sewage/POTWs. Does not include transfers to unknown destinations (1.1% of total).

➤ Reporting of transfers to recycling and to energy recovery is voluntary; amounts given may not represent all such transfers.

Map 8–2
M 1996

Off-site Transfers between the United States and Canada

	Sent	Received
Alabama	113	0
Arizona	583	0
Connecticut	77,891	0
Indiana	113	0
Kansas	1,385	0
Kentucky	340	0
Louisiana	21	0
Maine	106,433	0
Massachusetts	118,138	55,900
Michigan	842,612	3,417,752
New Hampshire	113	0
New Jersey	55,978	0
New York	184,368	175,136
North Carolina	4,054	0
North Dakota	0	2,841
Ohio	33,961	382,713
Oregon	0	740
Pennsylvania	55,734	238,000
Rhode Island	5,800	0
Texas	0	3
Vermont	347	0
Washington	590	0
West Virginia	22,526	0
British Columbia	740	0
Ontario	4,072,245	939,793
Quebec	197,259	571,306
Saskatchewan	2,841	0

➤ Does not include transfers to sewage/POTWs, recycling or energy recovery.

Table 8–1
A 1996

TRI Off-site Transfers to Other Countries from the United States

Receiving Country	Transfers to Recycling (kg)	Transfers to Energy Recovery (kg)	Treatment/ Destruction (kg)	Disposal/ Containment (kg)	Total Transfers Received (kg)	% of Transfers Outside US
Belgium	197,113	0	0	0	197,113	0.3
Canada	37,787,173	68,211	1,391,031	206,473	39,452,888	55.3
Ontario	28,462,882	52,317	913,864	111,165	29,540,229	41.4
Quebec	9,218,466	15,893	477,166	95,308	9,806,834	13.8
British Columbia	44,234	0	0	0	44,234	0.1
Alberta	40,194	0	0	0	40,194	0.1
Manitoba	21,397	0	0	0	21,397	0
China	14,054	0	0	0	14,054	0
Finland	8,209	0	0	0	8,209	0
France	103,481	0	0	0	103,481	0.1
Germany	711,544	0	0	0	711,544	1.0
Italy	926	0	0	0	926	0
Japan	270,018	0	0	0	270,018	0.4
Mexico	29,799,781	0	245,776	0	30,045,557	42.1
Monterrey	28,926,769	0	237,136	0	29,163,905	40.9
Other Cities	873,012	0	8,639	0	881,652	1.2
Singapore	45,263	0	0	0	45,263	0.1
United Arab Emirates	345,012	0	0	0	345,012	0.5
United Kingdom	90,822	0	6	0	90,828	0.1
Total Transferred Outside US	**69,373,396**	**68,211**	**1,636,813**	**206,473**	**71,284,893**	**100.0**

Table 8–2
A 1996

TRI Off-site Transfers within the United States and to Other Countries

	Outside US		Within US		Total Off-site Transfers	
	kg	%	kg	%	kg	%
Transfers to:						
Recycling	69,373,396	97.3	904,091,608	65.4	973,465,101	66.9
Energy Recovery	68,211	0.1	215,577,734	15.6	215,645,945	14.8
Treatment/Destruction	1,636,813	2.3	129,421,377	9.4	131,058,192	9.0
Disposal/Containment	206,473	0.3	133,718,253	9.7	133,924,726	9.2
Total Transfers	**71,284,893**	**100.0**	**1,382,808,972**	**100.0**	**1,454,093,965**	**100.0**
% of Total	**4.9**		**95.1**		**100.0**	

➤ Does not include transfers to sewage/POTWs. Does not include transfers to unknown destinations (0.3% of total).

Table 8–3
A 1996

NPRI Off-site Transfers to Other Countries from Canada

Receiving Country	Transfers to Recycling (kg)	Transfers to Energy Recovery (kg)	Treatment/ Destruction (kg)	Disposal/ Containment (kg)	Total Transfers Received (kg)	% of Transfers Outside Canada
Germany	12,934	0	0	0	12,934	0
Japan	191,000	0	0	0	191,000	0.6
United Kingdom	17,500	0	0	0	17,500	0.1
United States	18,597,493	655,917	3,291,099	9,497,476	32,041,985	99.3
Ohio	2,775,937	37,152	377,831	6,902,720	10,093,640	31.3
Michigan	4,763,858	301,700	2,262,380	2,165,544	9,493,482	29.4
New York	4,122,657	19,700	410	187,588	4,330,355	13.4
Illinois	2,874,912	0	149,528	0	3,024,440	9.4
Pennsylvania	625,053	0	370,000	238,000	1,233,053	3.8
Tennessee	1,015,000	0	0	0	1,015,000	3.1
Louisiana	877,750	0	0	0	877,750	2.7
Indiana	474,419	275,608	0	0	750,027	2.3
New Jersey	494,213	0	0	0	494,213	1.5
Texas	269,280	0	0	3	269,283	0.8
California	136,510	0	0	0	136,510	0.4
Mississippi	90,980	0	0	0	90,980	0.3
Washington	0	222	75,050	0	75,272	0.2
South Carolina	67,265	0	0	0	67,265	0.2
Massachusetts	0	0	55,900	0	55,900	0.2
Kansas	0	21,200	0	0	21,200	0.1
Maryland	5,415	0	0	0	5,415	0
North Dakota	0	0	0	2,841	2,841	0
North Carolina	2,300	0	0	0	2,300	0
Wisconsin	1,944	0	0	0	1,944	0
Oregon	0	335	0	740	1,075	0
Idaho	0	0	0	40	40	0
Total Transferred Outside Canada	**18,818,927**	**655,917**	**3,291,099**	**9,497,476**	**32,263,419**	**100.0**

➤ Reporting of transfers to recycling and to energy recovery is voluntary; amounts given may not represent all such transfers.

Table 8–4
A 1996

NPRI Off-site Transfers within Canada and to Other Countries

	Outside Canada		Within Canada		Total Off-site Transfers	
	kg	%	kg	%	kg	%
Transfers to:						
Recycling	18,818,927	58.3	78,998,260	63.9	97,817,187	62.8
Energy Recovery	655,917	2.0	2,597,730	2.1	3,253,647	2.1
Treatment/Destruction	3,291,099	10.2	17,375,193	14.1	20,666,292	13.3
Disposal/Containment	9,497,476	29.4	24,633,931	19.9	34,131,407	21.9
Total Transfers	**32,263,419**	**100.0**	**123,605,114**	**100.0**	**155,868,533**	**100.0**
% of Total	**20.7**		**79.3**		**100.0**	

➤ Does not include transfers to sewage/POTWs. Does not include transfers to unknown destinations (1.1% of total).
➤ Reporting of transfers to recycling and to energy recovery is voluntary; amounts given may not represent all such transfers.

Table 8–5
M 1996

Off-site Transfers across National Boundaries, between Canada and the United States

US State	British Columbia From B. C. (kg)	Ontario To Ontario (kg)	Ontario From Ontario (kg)	Quebec To Quebec (kg)	Quebec From Quebec (kg)	Saskatchewan From Saskatchewan (kg)	Total Cross-boundary Transfers To Canada (kg)	Total Cross-boundary Transfers From Canada (kg)
Alabama	0	113	0	0	0	0	113	0
Arizona	0	583	0	0	0	0	583	0
Connecticut	0	0	0	77,891	0	0	77,891	0
Indiana	0	113	0	0	0	0	113	0
Kansas	0	0	0	1,385	0	0	1,385	0
Kentucky	0	0	0	340	0	0	340	0
Louisiana	0	0	0	21	0	0	21	0
Maine	0	0	0	106,433	0	0	106,433	0
Massachusetts	0	4,558	0	113,580	55,900	0	118,138	55,900
Michigan	0	841,836	3,410,193	776	7,559	0	842,612	3,417,752
New Hampshire	0	0	0	113	0	0	113	0
New Jersey	0	3,069	0	52,909	0	0	55,978	0
New York	0	4,818	175,136	179,550	0	0	184,368	175,136
North Carolina	0	0	0	4,054	0	0	4,054	0
North Dakota	0	0	0	0	0	2,841	0	2,841
Ohio	0	32,763	248,913	1,197	133,800	0	33,960	382,713
Oregon	740	0	0	0	0	0	0	740
Pennsylvania	0	48,900	238,000	6,834	0	0	55,734	238,000
Rhode Island	0	0	0	5,800	0	0	5,800	0
Texas	0	0	3	0	0	0	0	3
Vermont	0	0	0	347	0	0	347	0
Washington	0	0	0	590	0	0	590	0
West Virginia	0	3,039	0	19,487	0	0	22,526	0
Total	**740**	**939,792**	**4,072,245**	**571,307**	**197,259**	**2,841**	**1,511,099**	**4,273,085**

➤ Does not include transfers to sewage/POTWs, recycling or energy recovery.

Table 8–6
M 1996

Largest North American Off-site Transfers to Treatment or Disposal across Canada-US Border

Sending Facility	Receiving Site	Chemical	Amount Transferred (kg)	Type of Treatment or Disposal
Lake Erie Steel Company, Ltd., Nanticoke, ON	Pinetree Landfill, Lennox, MI	Zinc (and its compounds)	1,166,400	Land Disposal
	Santarosa Group, Niagara Falls, NY	Manganese (and its compounds)	174,788	Land Disposal
		Total	**1,341,188**	
Aimco Solrec Ltd., Milton, ON	Systech Corp., Alpena, MI	Xylene (mixed isomers)	705,134	Incineration
		Toluene	185,562	Incineration
		Methyl ethyl ketone	148,449	Incineration
		Methanol	92,781	Incineration
		Methyl isobutyl ketone	18,555	Incineration
		n-Butyl alcohol	18,555	Incineration
	Systech Corp., Paulding, OH	Xylene (mixed isomers)	89,820	Incineration
		Toluene	23,637	Incineration
		Methyl ethyl ketone	18,910	Incineration
		Methanol	11,818	Incineration
		Methyl isobutyl ketone	2,364	Incineration
		n-Butyl alcohol	2,364	Incineration
		Total	**1,317,949**	
Zalev Brothers Limited, Windsor, ON	Browning-Ferris Industries, Northville, MI	Zinc (and its compounds)	368,621	Land Disposal
		Copper (and its compounds)	260,740	Land Disposal
		Manganese (and its compounds)	75,011	Land Disposal
		Lead (and its compounds)	43,493	Land Disposal
		Nickel (and its compounds)	11,745	Land Disposal
		Cobalt (and its compounds)	2,913	Land Disposal
		Cadmium (and its compounds)	1,587	Land Disposal
	Wayne Disposal-Canton Inc., Canton, MI	Zinc (and its compounds)	54,692	Land Disposal
		Copper (and its compounds)	38,686	Land Disposal
		Manganese (and its compounds)	11,129	Land Disposal
		Lead (and its compounds)	6,453	Land Disposal
		Nickel (and its compounds)	1,743	Land Disposal
		Cobalt (and its compounds)	432	Land Disposal
		Cadmium (and its compounds)	236	Land Disposal
		Total	**877,481**	
Dow Corning Corp., Midland Site, Midland, MI	Laidlaw Environmental Services, Corunna, ON	Methanol	161,223	Incineration/Thermal Treatment
		Toluene	152,582	Incineration/Thermal Treatment
		Xylene (mixed isomers)	131,428	Incineration/Thermal Treatment
		Ethylbenzene	34,937	Incineration/Thermal Treatment
		Chloroethane	4,648	Incineration/Thermal Treatment
		Chloromethane	94	Incineration/Thermal Treatment
		Benzene	88	Incineration/Thermal Treatment
		Biphenyl	23	Incineration/Thermal Treatment
		Total	**485,021**	

8.3 Canada-US Border Regions

Seventy-four percent of NPRI facilities and 19 percent of those in TRI in the 1996 matched data set were located within 100 kilometers of the Canadian-US border (**Table 8–7**, p. 334). This analysis uses the latitude and longitude that facilities reported to TRI or NPRI, or the Universal Transverse Mercator coordinates reported to NPRI, to determine facility locations. Where geographic coordinates were not given a facility's postal code or city was used.

These facilities reported 71 percent of NPRI total releases and transfers in the border area and 14 percent of those in TRI, smaller percentages than suggested by the number of border facilities in the two PRTRs. Thus, although NPRI facilities generally cluster near the border, for both NPRI and TRI, the facilities reporting the largest amounts of releases and transfers were not necessarily located in the border area.

8.3.1 Releases and Transfers in the Border Regions

For the purposes of this analysis, the border area is divided into five regions from west to east: the Northwestern region, composed of the Alaskan panhandle and northern British Columbia; the Western region, extending from the Pacific coast to the continental divide; the Plains and northern Mississippi basin; the Great Lakes and Lake of the Woods area; and the eastern region, encompassing the Saint Lawrence River to the Atlantic (**Map 8–3**).

The five border regions vary substantially (**Map 8–4**). The 4,201 facilities in the Great Lakes region amounted to 89 percent of all border facilities, and this region contained almost six times as many TRI facilities as NPRI facilities. In the Eastern and Plains regions, the ratio was reversed—NPRI facilities outnumbered TRI facilities by a margin of five to one (**Figure 8–3**).

The pattern of total releases and transfers in the five regions roughly paralleled the distribution of facilities (compare **Figures 8–3** and **8–4**). TRI facilities reported 142 million kg or 70 percent of the total for the Great Lakes region (compared to its population of 85 percent of all reporting facilities in that region). In the Eastern region, NPRI facilities reported 24 million kg, or 87 percent of the region's total (with 83 percent of the facilities). However, the NPRI portion of releases and transfers exceeded NPRI's share of facilities in the Plains, Great Lakes, and Eastern regions.

Emissions to air were more prominent in the border regions than in Canada and the US as a whole, especially on the US side of the border area. US border facilities reported 76 percent of their releases as air emissions, compared to 64 percent for all of the United States. In NPRI, air emissions in the border area amounted to 82 percent of total releases, compared to 77 percent for all of Canada. Underground injection, on the other hand, is not widely practiced in the border regions; only TRI facilities in the Great Lakes region reported this release (**Table 8–8**, p. 335).

[Text continues on p. 332.]

Figure 8–3 M 1996
Distribution of NPRI and TRI Facilities in the Border Regions

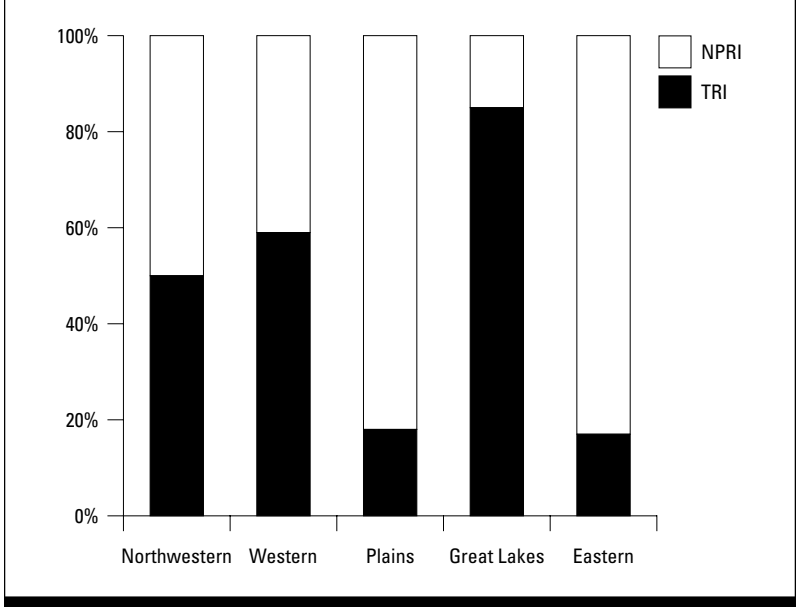
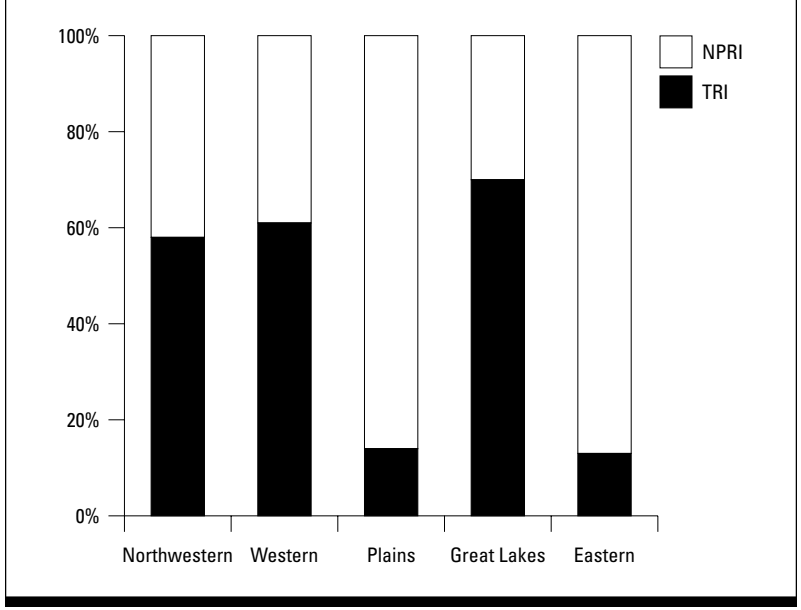


Figure 8–4 M 1996
Distribution of NPRI and TRI Total Releases and Transfers in the Border Regions

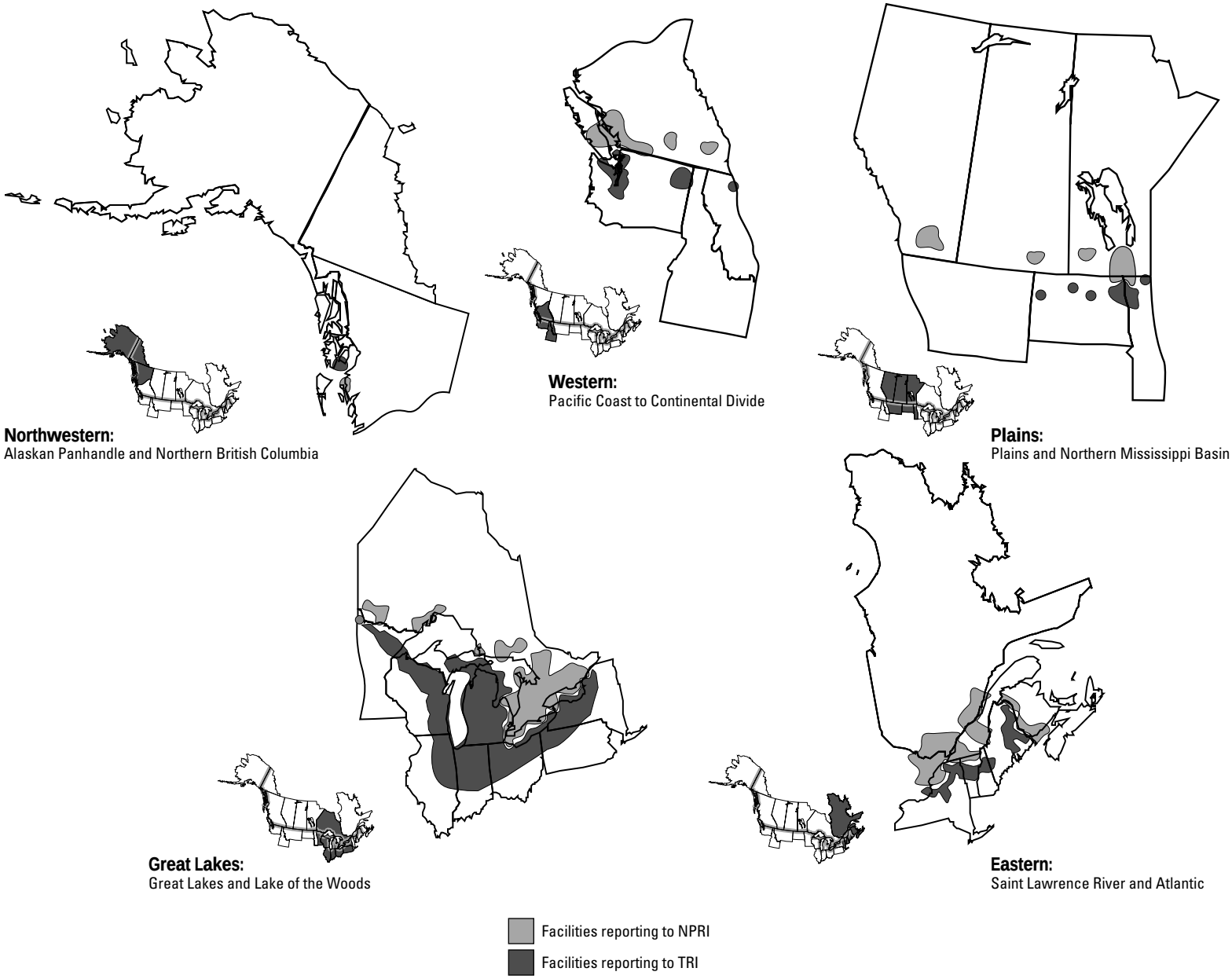


Map 8–3
M 1996

The 100-Kilometer Zone and the Five Geographical Regions of the Canada-US Border Area

Map 8–4
M 1996

NPRI and TRI Facilities in the Canada-US Border Regions



Patterns of releases also varied between the NPRI facilities and TRI facilities in each region. In the Eastern region, for example, on-site land releases amounted to about one-fifth of NPRI releases, but were negligible in TRI. In the Great Lakes region, however, on-site land releases constituted a larger proportion of the TRI total (17 percent) than that of NPRI (6 percent, see **Figure 8–5**).

More than half the transfers in the entire border area were made to disposal/containment in 1996. This was true for both NPRI facilities (55 percent of all transfers) and TRI facilities (52 percent of all transfers). In NPRI, the pattern of transfers in the border area resembles the Canada-wide pattern. In the United States, however, the percentage of transfers to disposal/containment from border facilities (52 percent) greatly exceeded the national average (39 percent, see **Table 8–9**, p. 336).

In the five border regions, NPRI facilities sent more of their transfers to disposal/containment, compared to TRI facilities, in all border regions except the Eastern (no transfers were reported in the Northwest). Facilities in the Western and Plains regions exhibited strikingly different patterns across the border. In the Western region, 92 percent of NPRI transfers were reported as sent to disposal/containment, while 61 percent of TRI transfers were to treatment/destruction. In the Plains, treatment/destruction accounted for 76 percent of NPRI transfers, while 88 percent of TRI transfers were to sewage/POTWs (**Figure 8–6**).

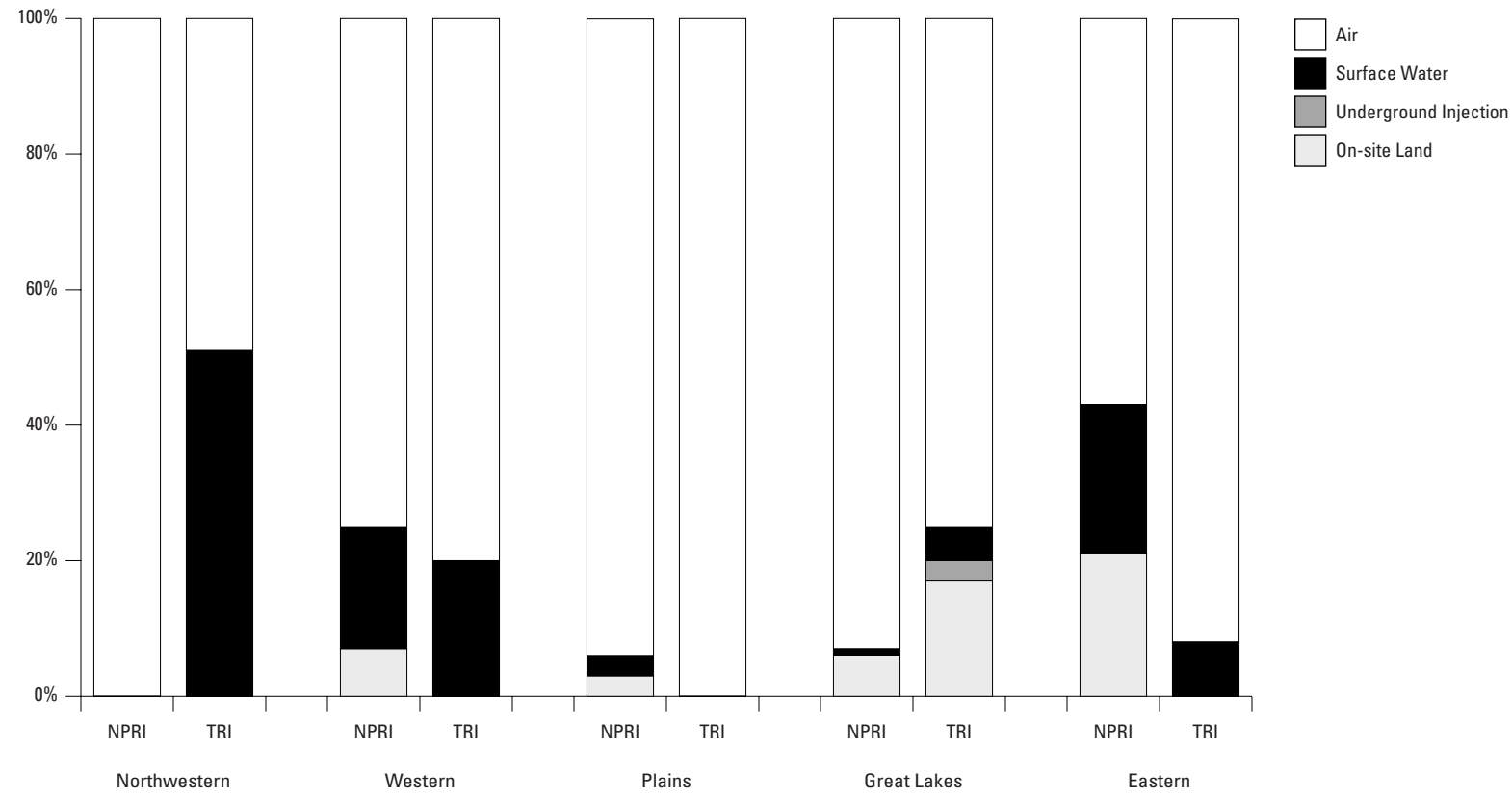
8.3.2 Top Chemicals in the Border Regions

Zinc and its compounds ranked first for total releases and transfers, and methanol second, on both sides of the border area in 1996. NPRI border facilities reported 16 million kg of zinc and its compounds and 9 million kg of methanol. The two chemicals accounted for 28 percent of the border area's releases and transfers in NPRI. TRI border facilities reported 27 million kg of zinc and its compounds and 20 million kg of methanol. Together, they accounted for 31 percent of TRI releases and transfers in the border area (**Table 8–10**, p. 337).

Zinc and its compounds ranked first in both NPRI and TRI reporting in the Great Lakes region and in NPRI reporting in the Eastern region. Methanol ranked first or second in NPRI and TRI reporting in the Eastern, Western, and Northwestern regions, as well as second for TRI facilities in the Great Lakes region.

Figure 8–5
M 1996

NPRI and TRI Releases for Border Regions



8.3.3 Top Industries in the Border Regions

In most cases throughout the border area, a combination of two industries accounted for half or more of total releases and transfers. These were seldom the same industries, either from one border region to another or for both NPRI and TRI. In the border area as a whole, the primary metal and chemical industries reported the largest total releases and transfers—59 percent of the NPRI total and 47 percent of the TRI total. This principally reflects the importance of the two industries in the Great Lakes region. Primary metals was also a top industry in NPRI reporting in the Eastern and Western regions, while chemical manufacturing also ranked first in the Plains. The paper products industry was a leading industry in both NPRI and TRI reporting in the Eastern, Western, and Northwestern regions (**Table 8–11**, p. 338).

Figure 8–6
M 1996

NPRI and TRI Transfers for Border Regions

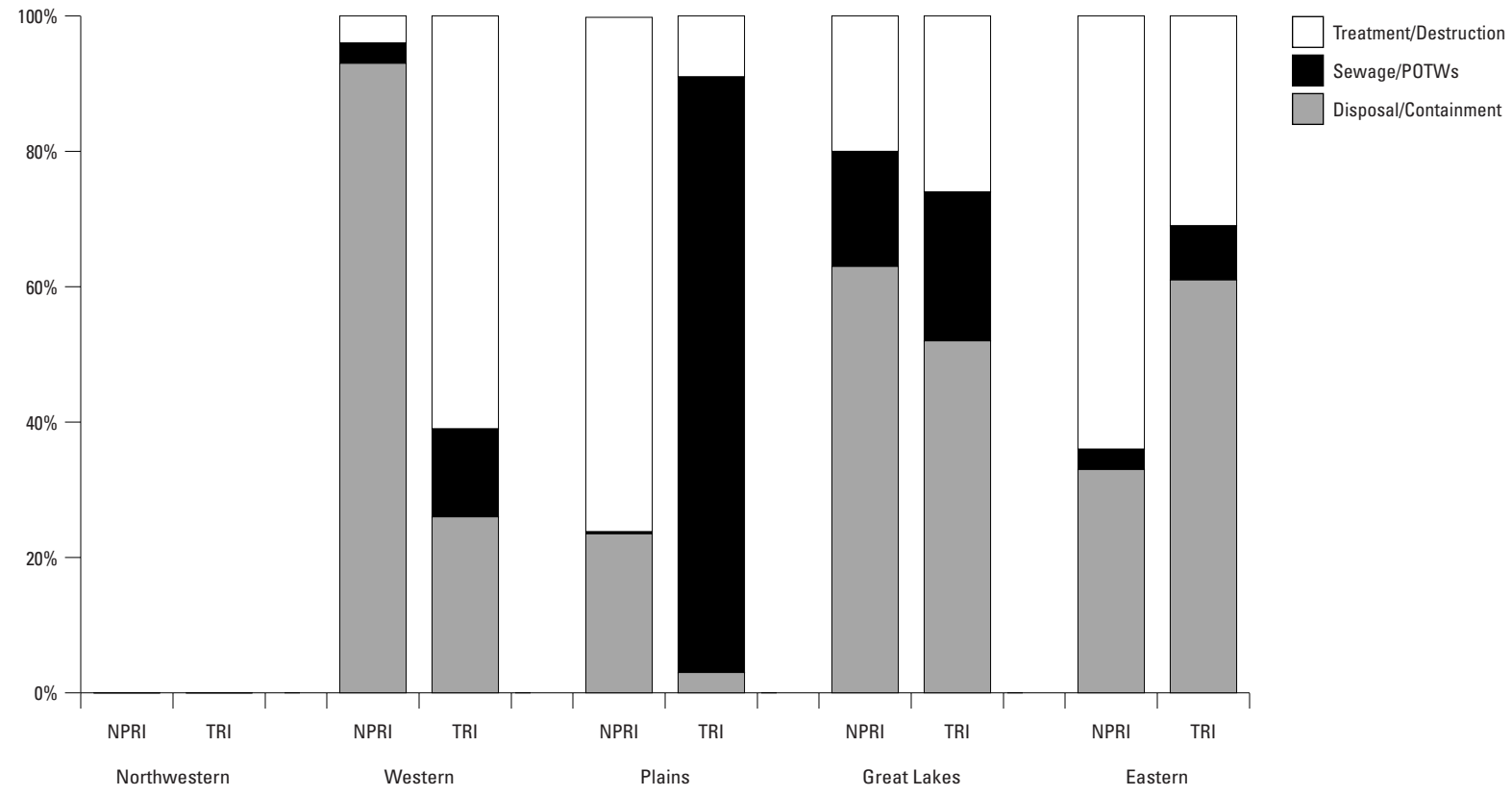


Table 8–7
M 1996

Releases and Transfers for Border Regions

	Facilities		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers	
	Number	%			kg	%
NPRI-Canadian Facilities						
Eastern	285	21.2	14,106,563	10,110,352	24,216,915	19.5
Great Lakes	630	46.9	33,856,450	27,275,947	61,132,397	49.2
Plains	32	2.4	485,010	292,572	777,582	0.6
Western	46	3.4	1,276,650	521,941	1,798,591	1.4
Northwestern	1	0.1	616,600	0	616,600	0.5
Subtotal	**994**	**74.0**	**50,341,273**	**38,200,812**	**88,542,085**	**71.3**
Total for All Canada	**1,344**	**100.0**	**82,596,460**	**41,532,687**	**124,129,147**	**100.0**
TRI-US Facilities						
Eastern	57	0.3	2,980,831	620,267	3,601,098	0.3
Great Lakes	3,571	18.6	75,565,590	66,346,964	141,912,554	12.9
Plains	7	0	110,132	11,811	121,943	0
Western	66	0.3	2,717,272	78,134	2,795,406	0.3
Northwestern	1	0	851,211	0	851,211	0.1
Subtotal	**3,702**	**19.3**	**82,225,036**	**67,057,176**	**149,282,212**	**13.6**
Total for All US	**19,190**	**100.0**	**780,621,952**	**321,079,591**	**1,101,701,543**	**100.0**
Totals for US and Canadian Facilities						
Eastern	342	1.7	17,087,394	10,730,619	27,818,013	2.3
Great Lakes	4,201	20.5	109,422,040	93,622,911	203,044,951	16.6
Plains	39	0.2	595,142	304,383	899,525	0.1
Western	112	0.5	3,993,922	600,075	4,593,997	0.4
Northwestern	2	0	1,467,811	0	1,467,811	0.1
Subtotal	**4,696**	**22.9**	**132,566,309**	**105,257,988**	**237,824,297**	**19.4**
Total for All Canada and US	**20,534**	**100.0**	**863,218,412**	**362,612,278**	**1,225,830,690**	**100.0**

Table 8–8
M 1996

Releases for Border Regions

Border Region	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
NPRI-Canadian Facilities					
Eastern	7,996,275	3,061,872	0	3,028,934	14,106,563
Great Lakes	31,389,385	317,843	0	2,079,570	33,856,450
Plains	449,152	14,700	0	15,970	485,010
Western	951,580	226,674	0	89,434	1,276,650
Northwestern	616,600	0	0	0	616,600
Subtotal	**41,402,992**	**3,621,089**	**0**	**5,213,908**	**50,341,273**
% of Subtotal	**82.2**	**7.2**	**0.0**	**10.4**	**100.0**
Total for All Canada	**63,590,706**	**5,128,134**	**4,812,379**	**8,936,491**	**82,596,460**
% of Total	**77.0**	**6.2**	**5.8**	**10.8**	**100.0**
TRI-US Facilities					
Eastern	2,719,976	250,510	0	10,345	2,980,831
Great Lakes	56,744,998	3,437,355	2,534,581	12,848,656	75,565,590
Plains	110,132	0	0	0	110,132
Western	2,166,095	549,177	0	2,000	2,717,272
Northwestern	416,739	434,471	0	1	851,211
Subtotal	**62,157,940**	**4,671,513**	**2,534,581**	**12,861,002**	**82,225,036**
% of Subtotal	**75.6**	**5.7**	**3.1**	**15.6**	**100.0**
Total for All US	**499,678,471**	**73,614,363**	**70,427,564**	**136,901,554**	**780,621,952**
% of Total	**64.0**	**9.4**	**9.0**	**17.5**	**100.0**
Totals for US and Canadian Facilities					
Eastern	10,716,251	3,312,382	0	3,039,279	17,087,394
Great Lakes	88,134,383	3,755,198	2,534,581	14,928,226	109,422,040
Plains	559,284	14,700	0	15,970	595,142
Western	3,117,675	775,851	0	91,434	3,993,922
Northwestern	1,033,339	434,471	0	1	1,467,811
Subtotal	**103,560,932**	**8,292,602**	**2,534,581**	**18,074,910**	**132,566,309**
% of Subtotal	**78.1**	**6.3**	**1.9**	**13.6**	**100.0**
Total for All Canada and US	**563,269,177**	**78,742,497**	**75,239,943**	**145,838,045**	**863,218,412**
% of Total	**65.3**	**9.1**	**8.7**	**16.9**	**100.0**

Table 8–9
M 1996

Transfers for Border Regions

Border Region	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)
NPRI-Canadian Facilities				
Eastern	6,494,085	286,391	3,329,881	10,110,352
Great Lakes	5,457,875	4,599,472	17,218,607	27,275,947
Plains	222,765	1,100	68,707	292,572
Western	23,013	16,134	482,794	521,941
Northwestern	0	0	0	0
Subtotal	**12,197,738**	**4,903,097**	**21,099,989**	**38,200,812**
% of Subtotal	**31.9**	**12.8**	**55.2**	**100.0**
Total for All Canada	**13,571,799**	**4,943,234**	**23,017,654**	**41,532,687**
% of Total	**32.7**	**11.9**	**55.4**	**100.0**
TRI-US Facilities				
Eastern	192,423	49,253	378,591	620,267
Great Lakes	16,974,576	14,885,460	34,486,928	66,346,964
Plains	1,111	10,361	339	11,811
Western	47,287	10,255	20,592	78,134
Northwestern	0	0	0	0
Subtotal	**17,215,397**	**14,955,329**	**34,886,450**	**67,057,176**
% of Subtotal	**25.7**	**22.3**	**52.0**	**100.0**
Total for All US	**110,901,271**	**86,130,663**	**124,047,657**	**321,079,591**
% of Total	**34.5**	**26.8**	**38.6**	**100.0**
Totals for US and Canadian Facilities				
Eastern	6,686,508	335,644	3,708,472	10,730,619
Great Lakes	22,432,451	19,484,932	51,705,535	93,622,911
Plains	223,876	11,461	69,046	304,383
Western	70,300	26,389	503,386	600,075
Northwestern	0	0	0	0
Subtotal	**29,413,135**	**19,858,426**	**55,986,439**	**105,257,988**
% of Subtotal	**27.9**	**18.9**	**53.2**	**100.0**
Total for All Canada and US	**124,473,070**	**91,073,897**	**147,065,311**	**362,612,278**
% of Total	**34.3**	**25.1**	**40.6**	**100.0**

Table 8–10
M 1996

NPRI and TRI Releases and Transfers of Top Chemicals in Border Regions

CAS Number	Chemical	NPRI Total Releases (kg)	NPRI Total Transfers (kg)	NPRI Total Releases and Transfers (kg)	CAS Number	Chemical	TRI Total Releases (kg)	TRI Total Transfers (kg)	TRI Total Releases and Transfers (kg)
	Eastern					**Eastern**			
—	Zinc (and its compounds)	2,188,119	3,843,734	6,031,853	67-56-1	Methanol	1,062,478	12,439	1,074,917
67-56-1	Methanol	3,403,231	1,767,348	5,170,579	7647-01-0	Hydrochloric acid	755,346	0	755,346
	Subtotal	**5,591,350**	**5,611,082**	**11,202,432**		**Subtotal**	**1,817,824**	**12,439**	**1,830,263**
	% of Total	**39.6**	**55.5**	**46.3**		**% of Total**	**61.0**	**2.0**	**50.8**
	Total for Region	**14,106,563**	**10,110,352**	**24,216,915**		**Total for Region**	**2,980,831**	**620,267**	**3,601,098**
	Great Lakes					**Great Lakes**			
—	Zinc (and its compounds)	1,047,084	8,407,146	9,454,230	—	Zinc (and its compounds)	9,308,667	16,828,169	26,136,836
1330-20-7	Xylene (mixed isomers)	4,716,569	1,677,585	6,394,154	67-56-1	Methanol	8,229,181	9,846,878	18,076,059
	Subtotal	**5,763,653**	**10,084,731**	**15,848,384**		**Subtotal**	**17,537,848**	**26,675,047**	**44,212,895**
	% of Total	**17.0**	**37.0**	**25.9**		**% of Total**	**23.2**	**40.2**	**31.2**
	Total for Region	**33,856,450**	**27,275,947**	**61,132,397**		**Total for Region**	**75,565,590**	**66,346,964**	**141,912,554**
	Plains					**Plains**			
108-88-3	Toluene	178,774	94,877	273,651	100-42-5	Styrene	78,859	340	79,199
1330-20-7	Xylene (mixed isomers)	105,473	89,453	194,926	108-88-3	Toluene	14,584	0	14,584
	Subtotal	**284,247**	**184,330**	**468,577**		**Subtotal**	**93,443**	**340**	**93,783**
	% of Total	**58.6**	**63.0**	**60.3**		**% of Total**	**84.8**	**2.9**	**76.9**
	Total for Region	**485,010**	**292,572**	**777,582**		**Total for Region**	**110,132**	**11,811**	**121,943**
	Western					**Western**			
67-56-1	Methanol	589,676	0	589,676	67-56-1	Methanol	464,567	344	464,911
—	Lead (and its compounds)	10,738	209,662	220,400	—	Nitric acid and nitrate compounds	348,007	18,142	366,149
	Subtotal	**600,414**	**209,662**	**810,076**		**Subtotal**	**812,574**	**18,486**	**831,060**
	% of Total	**47.0**	**40.2**	**45.0**		**% of Total**	**29.9**	**23.7**	**29.7**
	Total for Region	**1,276,650**	**521,941**	**1,798,591**		**Total for Region**	**2,717,272**	**78,134**	**2,795,406**
	Northwestern					**Northwestern**			
67-56-1	Methanol	241,000	0	241,000	67-56-1	Methanol	513,156	0	513,156
7782-50-5	Chlorine	218,000	0	218,000	7647-01-0	Hydrochloric acid	258,503	0	258,503
	Subtotal	**459,000**	**0**	**459,000**		**Subtotal**	**771,659**	**0**	**771,659**
	% of Total	**74.4**	**0.0**	**74.4**		**% of Total**	**90.7**	**—**	**90.7**
	Total for Region	**616,600**	**521,941**	**616,600**		**Total for Region**	**851,211**	**0**	**851,211**
	Total for Border Area					**Total for Border Area**			
—	Zinc (and its compounds)	3,242,673	12,292,868	15,535,541	—	Zinc (and its compounds)	9,336,488	17,195,870	26,532,358
67-56-1	Methanol	7,112,977	2,250,433	9,363,410	67-56-1	Methanol	10,269,382	9,859,661	20,129,043
	Subtotal	**10,355,650**	**14,543,301**	**24,898,951**		**Subtotal**	**19,605,870**	**27,055,531**	**46,661,401**
	% of Total	**20.6**	**38.1**	**28.1**		**% of Total**	**23.8**	**40.3**	**31.3**
	Total	**50,341,273**	**38,200,812**	**88,542,085**		**Total**	**82,225,036**	**67,057,176**	**149,282,212**

Table 8–11

M 1996

NPRI and TRI Top Industry Sector Releases and Transfers for Border Regions

US SIC Code	Industry	NPRI Total Releases (kg)	NPRI Total Transfers (kg)	NPRI Total Releases and Transfers (kg)	US SIC Code	Industry	TRI Total Releases (kg)	TRI Total Transfers (kg)	TRI Total Releases and Transfers (kg)
	Eastern					**Eastern**			
33	Primary Metals	3,042,910	4,834,982	7,877,892	26	Paper	2,162,571	461,696	2,624,267
26	Paper	4,433,711	1,741,773	6,175,484	32	Stone/Clay/Glass	546,918	0	546,918
	Subtotal	**7,476,621**	**6,576,755**	**14,053,376**		**Subtotal**	**2,709,489**	**461,696**	**3,171,185**
	% of Total	**53.0**	**65.0**	**58.0**		**% of Total**	**90.9**	**74.4**	**88.1**
	Total for Region	**14,106,563**	**10,110,352**	**24,216,915**		**Total for Region**	**2,980,831**	**620,267**	**3,601,098**
	Great Lakes					**Great Lakes**			
33	Primary Metals	8,579,621	14,816,041	23,395,662	33	Primary Metals	19,124,958	24,925,979	44,050,937
28	Chemicals	6,416,737	8,920,850	15,337,587	28	Chemicals	9,303,071	16,514,255	25,817,326
	Subtotal	**14,996,358**	**23,736,891**	**38,733,249**		**Subtotal**	**28,428,029**	**41,440,234**	**69,868,263**
	% of Total	**44.3**	**87.0**	**63.4**		**% of Total**	**37.6**	**62.5**	**49.2**
	Total for Region	**33,856,450**	**27,275,947**	**61,132,397**		**Total for Region**	**75,565,590**	**66,346,964**	**141,912,554**
	Plains					**Plains**			
28	Chemicals	66,004	239,471	305,475	37	Transportation	59,731	1,450	61,181
25	Furniture	176,054	179	176,233	39	Miscellaneous	41,918	0	41,918
	Subtotal	**242,058**	**239,650**	**481,708**		**Subtotal**	**101,649**	**1,450**	**103,099**
	% of Total	**49.9**	**81.9**	**61.9**		**% of Total**	**92.3**	**12.3**	**84.5**
	Total for Region	**485,010**	**292,572**	**777,582**		**Total for Region**	**110,132**	**11,811**	**121,943**
	Western					**Western**			
26	Paper	892,738	11,540	904,278	26	Paper	991,049	117	991,166
33	Primary Metals	136,718	309,575	446,293	37	Transportation	419,159	55,440	474,599
	Subtotal	**1,029,456**	**321,115**	**1,350,571**		**Subtotal**	**1,410,208**	**55,557**	**1,465,765**
	% of Total	**80.6**	**61.5**	**75.1**		**% of Total**	**51.9**	**71.1**	**52.4**
	Total for Region	**1,276,650**	**521,941**	**1,798,591**		**Total for Region**	**2,717,272**	**78,134**	**2,795,406**
	Northwestern					**Northwestern**			
26	Paper	616,600	0	616,600	26	Paper	851,211	0	851,211
	Total for Border Area					**Total for Border Area**			
33	Primary Metals	11,775,049	19,974,448	31,749,497	33	Primary Metals	19,452,210	24,934,575	44,386,785
28	Chemicals	8,827,149	11,189,527	20,016,676	28	Chemicals	9,328,828	16,541,557	25,870,385
	Subtotal	**20,602,198**	**31,163,975**	**51,766,173**		**Subtotal**	**28,781,038**	**41,476,132**	**70,257,170**
	% of Total	**40.9**	**81.6**	**58.5**		**% of Total**	**35.0**	**61.9**	**47.1**
	Total	**50,341,273**	**38,200,812**	**88,542,085**		**Total**	**82,225,036**	**67,057,176**	**149,282,212**

9 Community Case Studies

Key Findings

- The uses of PRTR data are as varied as communities themselves. PRTR data are used by communities to understand industrial releases and transfers, to assist the company in reducing releases and transfers, and to build a regional picture of releases and transfers.
- Helpful tools communities have employed for using PRTR data include:
  - a new web site that maps and ranks PRTR data and provides detailed information on health, environmental and legislative aspects of listed substances;
  - the use of Good Neighbor Agreements to govern aspects of a facility's daily operation;
  - the creation of briefing books for politicians that summarize information on local facilities as a basis for action;
  - the use of a community advisory panel to create a two-way dialogue between the facilities and different sections of the community;
  - innovative strategies for promoting a PRTR program; and
  - mentoring of small companies by larger ones to encourage environmental management systems.

9.1 Introduction

Communities, industries and governments have used PRTR data for many different purposes. The examples in this chapter profile developments in this area grouped according to country, beginning with the United States. The various sections also highlight some of the tools that groups have used and provide contact information for other groups wishing to investigate the application of these tools in their own communities.

9.2 Innovative Tools using TRI Data in the United States

9.2.1 Public Access to TRI Data Gets a New Face: the Environmental Defense Fund's Scorecard

The Environmental Defense Fund's "Scorecard" is a web site on the Internet designed to help people learn about toxic chemical releases and chemical health effects in their neighborhoods. By integrating over 150 databases, the Environmental Defense Fund (EDF) has created a stir with its new web site. The web site has been wildly popular since its unveiling in April 1998, receiving approximately 125,000 visitors per month. Typically, each visitor views approximately 3–4 pages of information, resulting in about 500,000 page views per month. This makes the EDF site one of the most frequently visited environmental Internet database sites in the world.

The EDF site is unique in that it has become a new front for dialogue between communities and the facilities and provides a wealth of data to permit interpretation and action. It has accelerated and expanded the existing TRI role of spotlighting environmental data from facilities. In addition, by using banners attached to other high-volume web sites, such as Disney and Sportzone, it is building awareness of TRI and other environmental data with an audience not traditionally associated with TRI data use.

Scorecard provides the user with a convenient means of conducting a variety of searches of the available databases. Users may locate facilities using maps; generate TRI data summaries for facilities or geographic regions; compare chemical release information on a state, county, zip code, or facility level; retrieve chemical use information, toxicity profiles and other health effects data from a database of 5,000 chemicals; and browse through environmental and chemical regulations.

Scorecard also presents the Toxicity Equivalent Potential for TRI chemicals, indicating the relative human health risk of one pound of a chemical compared to that posed by a reference chemical. In EDF's risk scoring system, all releases of carcinogens are converted to equivalent pounds of benzene and all releases of chemicals with noncancer health effects are converted into equivalent pounds of toluene. Toxicity Equivalent Potentials vary widely for different chemicals. Chemicals with the highest Toxicity Equivalent Potentials exhibit extreme toxicity and have physical or chemical characteristics that result in very high exposure potential.

Scorecard has limitations, however, some of which are discussed by EDF at various locations in the web site. For example, technical reviewers have pointed out that:

- The model used to calculate human exposure to released chemicals was designed for organic chemicals. It does not work very well for inorganic chemicals such as metals. As a result, the ranking of relative risk among facilities releasing different kinds of substances may not be reliable.
- Scorecard bases exposure estimates on a single set of "landscape" variables that describe the geographic area in which the release takes place. In reality, of course, different parts of the country differ widely in local characteristics that affect dispersion of released chemicals. Actual exposure—and therefore actual risk—may be greatly different from that predicted by Scorecard.
- In the area of non-cancer toxic effects, Scorecard's risk rankings do not distinguish among a wide variety of effects of different importance; for example, bronchial irritation has the same "weight" as kidney damage.

For these reasons, as well as others, these reviewers urge that Scorecard's facility rankings be interpreted cautiously, especially when comparing different kinds of chemicals in different parts of the country.

The Scorecard web site has recently added new environmental databases, such as agricultural animal wastes, and has future plans to incorporate several EPA environmental databases, including the Cumulative Exposure Assessment Project, criteria air contaminants, and Superfund data. EDF is also beginning discussions with Canadian groups to customize its site with NPRI data and Canadian information. Another group, Friends of the Earth in the United Kingdom, will be setting up a site using the Scorecard approach with United Kingdom data.

Other features of Scorecard include a section on Frequently Asked Questions, a glossary, and a "Personalized Scorecard" that allows the user to customize how the web site presents information. For instance, the initial screen can be set to the user's community home page and will display information on the facilities in that area. A new feature of the Scorecard allows people to send requests for information directly to facilities or government by e-mail or fax. Discussion groups have also started around several facilities, allowing citizens to read previous responses and post their own questions. Several companies, such as Monsanto, have posted responses to these requests and added links to their facilities. Additional companies are expected to participate as the service matures. The Scorecard allows EDF to customize press releases for each US county, resulting in extensive local coverage of TRI data.

Tools available:

- information on chemical toxicity, environmental regulations, occupational exposure and environmental risk linked to TRI chemicals
- search TRI by facility name, community, zip code or chemical on the Internet

Web site address for the Environmental Defense Fund is <http://www.scorecard.org> and e-mail contact is via <bill_pease@edf.org>.

9.2.2 US Grass Roots Activism and the Birth of Right-to-Know Legislation

Lima, Ohio, is home to the British Petroleum Lima Integrated Complex (now BP-Amoco Chemicals, Lima Plant), a petroleum refining and chemical manufacturing site. In 1987, BP announced its intention to install a hazardous waste incinerator at this site. When the public notice appeared in local newspapers, a small group of concerned citizens began researching the probable impact on their community of BP's planned incinerator. The group also convened a public meeting, attended by more than 300 area residents along with British Petroleum representatives. In the community's view, BP's responses failed to address the citizens' concerns. The community therefore filed a complaint with the state board of environmental review and successfully blocked construction of the incinerator.

Federal and state lawmakers were already focusing on right-to-know issues, and the public response to the proposed incinerator in Lima, Ohio, became a model for proponents of right-to-know legislation. International coverage of the Lima story helped give it widespread attention.

With its success against the proposed incinerator, the citizens' group began to raise other concerns about toxic substances in the community. Now organized under the name of the Allen County Citizens for the Environment (ACCE), the group sought the help of a statewide organization, Ohio Citizen Action. Armed with TRI data gathered by Ohio Citizen Action, ACCE was able to develop a better understanding of the kinds of chemicals used and released by the BP complex. ACCE has also called in experts from around the country to help citizens understand the potential threat of living next door to the complex.

ACCE is continuing to seek a better understanding of the chemicals used by BP through the development of a Good Neighbor Agreement with BP. Features of a "Good Neighbor Agreement," sometimes also called a "Corporate-Community Compact," include: (1) a broad audit of regulatory compliance, safety training, accident prevention, emergency response, waste analysis and information systems, monitoring programs and waste minimization practices; (2) public disclosure of company documents covering hazard assessment and risk analysis, lists of accidents and corrective actions, and waste minimization and reduction plans; (3) a commitment by the company to negotiate in good faith on the audit recommendations; and (4) participation by community representatives in the audit and plant inspections. Such agreements may also be part of the local government's regulatory process and tied to permit compliance.

ACCE continues to seek better disclosure of information by BP and the end of toxic chemical releases in their community. Attempts to draft a Good Neighbor Agreement have not yet proved successful, and some citizens express frustration with the company's responses to community initiatives. Nevertheless, the citizens of Lima have played an integral role in helping to make industry publicly accountable not only in Allen County, Ohio, but also in their influence on right-to-know legislation.

Tools available:

- examples of Good Neighbor Agreements
- community groups experienced in understanding TRI data

More information on a variety of such agreements and their benefits and limitations can be found in the report by Sanford Lewis, *Precedents for Corporate-Community Compacts and Good Neighbor Agreements*, The Good Neighbor Project for Sustainable Industries (March 1996) at <http://www.enviroweb.org/gnp/compxpr2.html>.

For information on the Allen County Citizens for the Environment group contact Noreen Warnock at Ohio Citizen Action, 3400 North High Street, Suite 430, Columbus, OH 43202, (614) 263-4111, fax (614) 263-4540, or by e-mail at <nwarnock@ohiocitizen.org>.

9.2.3 Louisiana Briefing Books

The Louisiana Environmental Action Network (LEAN) has developed a strategy to encourage community decision-making and legislative challenge in neighborhoods near toxic chemical sites. The group locates waste disposal sites, dumps and industrial facilities that could potentially affect communities, and compiles TRI, accident release data, and state groundwater data on these types of sites. The resulting data compilations are then used as the spearhead of strategic campaigns directed at making changes at the legislative level.

The chemical data are assembled, together with geographic and demographic information for a number of release sites in a given area, in the form of a "briefing book." This is then presented to members of the Louisiana House and Senate environmental committees. After a briefing, the legislators are given tours of the focus sites. These are followed up by a public meeting held in a neighborhood near the focus sites to which grassroots groups, industry representatives, politicians, environmentalists, media and citizens are invited.

These briefing books can be the starting points for change. The goal is to build a knowledge base for legislators and communities and to raise awareness of local environmental problems. Two examples illustrate how the briefing books identified problems that had previously gone undetected.

In one case, a briefing book was compiled for neighborhoods near a railroad switchyard, where leaking valves on the chemical transport cars stored there overnight were found to have contaminated groundwater. The chemicals included styrene, perchloroethylene, benzene, toluene, hexachlorobenzene, hexachlorobutadiene, and vinyl chloride.

Another example was a bayou where local people sometimes went swimming. Upon analysis, the water there was found to contain chemical contaminants such as hexachlorobenzene in levels exceeding state water quality limits. The Louisiana Department of Environmental Quality had not been monitoring the bayou and had not posted it as being unsafe due to chemical contamination. They have now been informed about the problem at the site through the compilation and presentation of the briefing book.

Tools available:

- examples of briefing books with comprehensive environmental, geographic and demographic data developed to inform local politicians

Contact for Louisiana Environmental Action Network (LEAN):

web site <http://leanweb.org> or by telephone (504-928-1315) or e-mail at <LEAN@leanweb.org>.

9.3 Community Initiatives and Innovative Uses of NPRI Data in Canada

9.3.1 Community Advisory Panels in Fort Saskatchewan, Alberta

A small town in central Alberta is the home of an innovative program linking industry to its community. Fort Saskatchewan, Alberta, and its surrounding area are now home to three Community Advisory Panels (CAPs) that were first initiated by Dow Chemical Canada in 1991. These panels serve as a forum for two-way communication, where local citizens share their concerns and ideas with industry, and industry provides updates on processes, problems, and successes. Community Advisory Panels, part of the Canadian Chemical Producers' Association's Responsible Care' program, exist now at a number of other chemical plants across the country.

The first panel created in Fort Saskatchewan, the Dow Community Advisory Panel, sought to inform and receive comment about the plants in Fort Saskatchewan producing polyethylene, ethylene, vinyl chloride, ethylene dichloride, ethylene oxide, ethylene glycol, chlor-alkali and STYROFOAM[1] brand insulation. About 15 members from the community, with a variety of backgrounds such as education, youth, agriculture, and religion, are chosen for two- or three-year terms.

Each September, the advisory panel chooses different topics for their bimonthly meetings—ranging from Dow's involvement in the local community to safety in truck and rail transportation of products. NPRI results are usually one of these topics. The company presents its NPRI data, the reasons for significant changes from year-to-year and projections for future years. Highlights of facility release data of any of the approximately 500 chemicals listed by the National Emissions Reduction Masterplan of the Canadian Chemical Producers' Association are also presented at the panel. After these presentations, the difficulties in linking the releases and transfer data to environmental and health risks are also explored.

The panel has discussed a number of issues over the years, including health and safety, spills and emergency response, community events, provincial and federal standards, public complaints, Responsible Care™ requirements and environmental risks. The panel members have also been asked their opinion on such company decisions as plant expansion plans. In addition, the Community Advisory Panel provided advice on Dow's environment, health and safety goals for 2005, which included a commitment to "further reduce air and water emissions for the company's global operations involving priority compounds by 75 percent and for chemical emissions by 50 percent." NPRI and other data are used to track these commitments.

The panel members also assisted with the development of a community survey, first conducted in 1995 and again in 1997, that was designed to yield better understanding of the issues considered important by the community. Air quality, noise and flaring from the facility were three of the community's main concerns. Based on this feedback, Dow has developed action plans to address these specific issues. Also, a Reference Guide has been compiled by this panel, outlining the terms of reference, issues discussed and resolutions. The guide has been distributed to several community locations such as libraries, city halls, schools and the like.

Based on the success of this panel, two other companies, Degussa, which operates a hydrogen peroxide plant north of Fort Saskatchewan, and Agrium (formerly Sherritt), a chemical fertilizer plant, expressed an interest in starting their own panels. These two plants combined with a third company, NCL Ltd., a natural gas operation, to start a common community advisory panel in 1993. Agrium's other plant in Fort Saskatchewan combined with two other plants, Westaim and Sherritt-Corefco, to form a third community advisory panel. With Dow's support, rather than recreating the wheel, these two panels borrowed the terms of reference and operating procedures from the Dow panel. The panels are coordinated by the same third-party consultant. At all of these panels, NPRI data are discussed with the members.

As a result of the community's concerns about air quality, the city worked with the Fort Saskatchewan Regional Industrial Association to develop a new regional approach to air quality. The final product is the Fort Air Partnership, created in 1997 as a multistakeholder committee that "sees the benefit of sitting together to produce relevant, credible information to manage air quality, protect health and influence public policy." While currently funded by the City of Fort Saskatchewan and the Fort Saskatchewan Regional Industrial Association, the committee proposes to use "emitter pays" as the principle for future work. The voluntary partnership will determine the boundaries of the airshed, choose optimum sites for a monitoring program, develop a baseline human health study, assess environmental risks, and assist in communicating environmental information.

Tools available:

- draft terms of reference to create a community advisory panel
- experience in running a community advisory panel
- framework for an industrial monitoring program based on "emitter pays"
- Canadian Chemical Producers' Association annual reporting on environment

Contact:

Barbara Mayben, Dow Chemical Canada,
Fort Saskatchewan, Alberta, (403) 998-8937.

9.3.2 Canadian Nongovernmental Organizations Analyze NPRI Data on Local Industries

Citizens' groups across Canada, as exemplified by the four cases described below, use NPRI data to understand releases and transfers from local industries.

The **Citizens' Environmental Alliance of Southwestern Ontario** has begun to issue annual reports on NPRI releases and transfers from local and regional industries in southwestern Ontario. Their first "Toxic Tracker" report, which appeared in 1998, provided recommendations to improve the NPRI program and used 1995 NPRI data to identify 20 facilities with the largest NPRI releases in the Windsor area.

[1] STYROFOAM is a trademark of the Dow Chemical Company. Responsible Care™ is a certification mark of the Canadian Chemical Producers' Association. Used under license by Dow Chemical Canada Inc.

Local media focused on the facilities with the largest NPRI-reported releases. This year's report uses 1996 NPRI data to identify facilities with large releases and provides a comparison with 1995. Special interest focused on local facilities with the largest releases, especially releases of carcinogens. These have remained virtually the same from 1995 to 1996. They include General Chemical, Zalev Brothers, and the City of Windsor's West Windsor Pollution Control Plant. In addition, the neighboring Detroit River received the third largest releases to water in Canada, after the Saint John River and the St. Lawrence River.

Bruce Walker of Montreal's **Society to Overcome Pollution** (STOP) used NPRI data as a tool to evaluate the environmental performance of the two petroleum refineries in the Montreal area, one operated by Shell Canada and the other by Petro Canada. The group analyzed total benzene emissions from these refineries, trying to understand why one refinery, Petro Canada, was releasing almost twice as much benzene as its neighbor. The group further broke down the NPRI data on benzene releases to air to determine the quantity of fugitive releases from each refinery, as these can be major sources of releases. High fugitive air emissions could indicate that the facility was not fully implementing the Code of Practice for Fugitive Emissions for Petroleum Refineries developed under the NO_x/VOC Protocol. Last year, in response to numerous factors, including STOP's tracking of their NPRI data, the three petroleum refineries in Quebec signed a memorandum of understanding with the Quebec government and the Montreal Urban Community. Under this voluntary agreement, the three refineries pledged to reduce their benzene emissions. NPRI data will assist in the tracking of these reductions.

A third group, the **Center for Long-term Environmental Action** in Newfoundland, has recently used NPRI data to challenge environmental claims made by the North Atlantic Refining Ltd. oil refinery in Come-by-Chance. The Center noted that releases from the oil refinery of two carcinogenic compounds, nickel and benzene, had increased from 1995 to 1996. The NPRI information was a "breakthrough" for the group in their attempts to examine the environmental and health impacts of the refinery. A local doctor and the provincial health departments are now reviewing the information.

A fourth group, ***La Societé pour Vaincre la Pollution*** (SVP) in Montreal, has developed an index of environmental risk for NPRI facilities. SVP uses this index to map environmental risks from different facilities in the Montreal area. For each substance reported, a specific factor is developed, based on acute and chronic toxicity, and then this factor is multiplied by the release amount reported to NPRI. The subsequent ranking of facilities can then be used to identify facilities for priority action. The future of this project and, indeed, the group's continued existence, however, is threatened because the provincial government stopped its subventions three years ago and now (Spring 1999) SVP faces a severe budgetary shortfall.

A fifth group, the **Canadian Institute for Environmental Law and Policy**, in association with Environment Canada and the University of Toronto Cartography Department, has developed a poster-size map illustrating highlights from the NPRI data. The map shows the leading facilities by media and by substance. Designed to raise public awareness of NPRI data, the map will be distributed to schools and libraries.

Expertise and tools available:

- experience with using NPRI data to track local industries
- NPRI data customized for local industries on the Internet
- NPRI data on maps

Contacts:

Information on the Citizens' Environmental Alliance of Southwestern Ontario and its reports are available at the Alliance's web site: <http://www.mnsi.net/~cea/ceareports.html>, or by calling (519) 973-1116.

For more information on STOP, contact Bruce Walker at (514) 393-9559.

For more information on the Center for Long-term Environmental Action in Newfoundland, contact Lynda Whalen at (709) 722-8159or by e-mail at <clean@roadrunner.nf.net>.

For more information on SVP in Montreal, contact Daniel Green at (514) 486-9806.

For more information on Canadian Institute for Environmental Law and Policy maps, contact Mark Winfield at (416) 923-3529 or visit the web site for CIELAP at: <http://www.web.net/cielap>.

9.4 Tools for Communities and Industries in Mexico

9.4.1 Environmental Activities in the State of Jalisco, Mexico

El Colectivo Ecologista Jalisco is an NGO based in the state of Jalisco, Mexico, which has been actively promoting the proposed RETC among the different community groups of Jalisco. Part of the group's efforts have been to explain the objectives of the proposed RETC, holding workshops that describe the RETC to interested groups in the community, and meeting with environmental authorities and the media.

In December 1997, *El Colectivo Ecologista Jalisco* presented a report, entitled "*Divulgación Ciudadana del RETC en Jalisco*" (Citizen Promotion of the RETC in Jalisco), written under the aegis of the Commission for Environmental Cooperation. The report introduces PRTRs as a concept. It does not make use of quantitative data from the TRI or NPRI reports, but instead, based on the principle of a society's right-to-know, sets forth the objectives of the RETC and the legal foundation for its implementation as a component of the Mexican National Environmental Information System.

An important part of the report is the presentation of a strategy for promoting the proposed RETC to community groups in Jalisco. The report discusses the design of publicity material and gives practical advice on organizing meetings with environmental authorities and mass media as well as workshops and conferences oriented to such specific audiences as student groups, other NGOs and citizen groups.

The report also provides an evaluation of these activities as undertaken by *El Colectivo Ecologista Jalisco*, identifying barriers and opportunities. Based on the experience gained, it also makes suggestions for a number of proposed actions to facilitate the process of promoting the RETC.

Tools available:

- strategy and techniques for promoting the establishment of a PRTR program

Contact:

María Esther Cortés, *El Colectivo Ecologista Jalisco*, México (523) 615-0948 and e-mail: <semillas23@hotmail.com>.

9.4.2 Use of Hazardous Substances in the Industry of Tijuana, Mexico

El Proyecto Fronterizo de Educación Ambiental, A.C., is a nongovernmental organization based in Tijuana, Baja California, that has implemented a Right-to-Know program in Tijuana. Their strategy includes gathering publicly available information to identify pollution sources, promoting public involvement in the management of hazardous substances, disseminating the information to the public, and participating in international hazardous substances networks.

El Proyecto Fronterizo issues a monthly brochure called *Ecos de Frontera—Toxi Noticias* that provides information on the implementation of the proposed RETC and local environmental issues. *El Proyecto Fronterizo* was also one of the few active NGOs taking part in the National Coordinating Group that developed the framework for the RETC.

In collaboration with the US Environmental Health Coalition, the organization conducted a survey on the use of hazardous substances in Tijuana's industrial facilities. Over 700 industries that use such substances were surveyed and a sample of over 200 industries was chosen for in-depth analysis, using US EPA techniques to estimate substance type and release. The results of the survey showed that the most common types of industries (by labor force) are electronics/electrical equipment, metal/mechanical, wood furniture and accessories, and plastics. The most used hazardous substances in Tijuana are solvents, including acetone, dichloromethane, trichloroethane, methanol, methyl ethyl ketone, toluene and xylene. The survey also lists known potential risks to humans from exposure to these substances and determines the size of the exposed population, based on the facility location and demographic data. Although it does not consider meteorological conditions or releases to different media, the survey provided one of the first publicly available overviews of hazardous substance use in Tijuana.

Tools available:

- monthly brochure
- survey identifying local sources of hazardous chemicals from industry and associated health risks

Contact:

Laura Durazo, *El Proyecto Fronterizo de Educación Ambiental, A.C.*, Tijuana 52-66-30.05.90 and e-mail: <pfea@mail.tij.cetys.mx>.

A Spanish-language copy of their survey of hazardous substances is available from the CEC as an unedited working paper (L. Durazo and M. Díaz. "*Uso de Sustancias Peligrosas en la Industria de Tijuana, B.C.: Desde una Perspectiva del Derecho a la Información Ambiental*").

9.4.3 Mexican Industrial Mentoring

An innovative project in transferring environmental knowledge from large to small and medium-size companies started in Guadalajara in late 1996. Eleven large companies signed a voluntary agreement with Semarnap to mentor their small or medium-size suppliers in implementing an environmental management system (EMS). Each of the industrial companies invited one to three suppliers to participate in the two-year project. Partially funded by the World Bank, the project is also supported by the Mexican government, by universities, including the *Instituto Tecnológico de Estudios Superiores de Monterrey* and the *Universidad de Guadalajara*, and by the *Centro de Investigaciones y Estudios Superiores en Antropología Social* (CIESAS), a Mexican anthropological research group.

The corporate invitations to suppliers were vital to the project's success. Nearly half of the suppliers said they would not have participated without such a specific invitation. Suppliers were motivated by the need to strengthen or maintain ties with the large companies, especially for those whose performance is audited periodically by the large companies.

Project managers chose an internationally recognized management system—ISO 14001 EMS—as the model for the small and medium-size suppliers to incorporate into their business. Developed by the International Organization for Standardization (ISO), the ISO 14001 EMS sets voluntary standards for good environmental management practices. These guidelines are widely used. (ISO develops standards for many technical fields, including basic chemicals, non-metallic materials, environment, and the packaging and distribution of goods.)

From May 1997 to February 1998, the large companies, their suppliers and various experts participated in a series of workshops designed to guide the companies through the essential elements of the 14001 system. Suppliers were assigned a

consultant at one of the Mexican agencies to assist with the process. Access to this personalized, specialized knowledge was instrumental to the suppliers' success in implementing the EMS. Although some thought the ISO 14001 system might prove too complex for small and medium-size firms, the participating suppliers completed 85 percent of the required planning and almost 50 percent of the EMS implementation by February 1998.

Three months after the workshops, 80 percent of the suppliers reported reductions in environmental releases, 70 percent reported an improved work environment and approximately 50 percent reported improvements in waste handling, materials management, energy efficiency and compliance. These results had occurred even before full implementation of the EMS. The suppliers also noted a raised environmental awareness of all staff members and indicated that having measurable environmental goals and assigned environmental responsibilities have led to beneficial organizational changes. This was especially important in small and medium-size firms where environmental managers also bear significant other responsibilities.

Tools available:

- strategies to transfer environmental knowledge from large to smaller industrial companies

  For more information on the EMS workshops, see the full text of the World Bank report: *Mexico: The Guadalajara Environmental Management Pilot.* Report No. 18071-ME. 8 September 1998. <http://www.worldbank.org/nipr/work_paper/guada/>.

Appendix A
1996

A Comparison of Chemicals Listed under 1996 TRI, NPRI and RETC†

CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
50-00-0	Formaldehyde	Formaldéhyde	Formaldehído	X	X	X
50-29-3	DDT	DDT	DDT			X
51-03-6	Piperonyl butoxide	Pipéronyl butoxyde	Piperonil butóxido	X		
51-21-8	Fluorouracil	Fluoro-uracil	Fluorouracilo	X		
51-28-5	2,4-Dinitrophenol	2,4-Dinitrophénol	2,4-Dinitrofenol	X		X
51-75-2	Nitrogen mustard	Moutarde azotée	Mostaza de nitrógeno	X		
51-79-6	Urethane	Uréthane	Uretano	X		
52-51-7	2-Bromo-2-nitropropane-1,3-diol	2-Bromo-2-nitropropane-1,3-diol	2-bromo-2-nitropropano-1,3-diol	X		
52-68-6	Trichlorfon	Trichlorfon	Triclorfón	X		
52-85-7	Famphur	Famphur	Famfur	X		
53-96-3	2-Acetylaminofluorene	2-Acétylaminofluorène	2-Acetilaminofluoreno	X		
55-18-5	N-Nitrosodiethylamine	N-Nitrosodiéthylamine	N-Nitrosodietilamina	X		
55-21-0	Benzamide	Benzamide	Benzamida	X		
55-38-9	Fenthion	Fenthion	Fentión	X		
55-63-0	Nitroglycerin	Nitroglycérine	Nitroglicerina	X	X	
56-23-5	Carbon tetrachloride	Tétrachlorure de carbone	Tetracloruro de carbono	X	X	X
56-35-9	Bis(tributyltin) oxide	Oxyde de bis(tributylétain)	Óxido de tributilestaño	X		X
56-38-2	Parathion	Parathion	Paratión	X		X
57-14-7	1,1-Dimethylhydrazine	1,1-Diméthylhydrazine	1,1-Dimetilhidracina	X		
57-33-0	Pentobarbital sodium	Pentobarbital sodique	Pentobarbital sódico	X		
57-41-0	Phenytoin	Phénytoine	Fenitoina	X		
57-57-8	beta-Propiolactone	bêta-Propiolactone	beta-Propiolactona	X		
57-74-9	Chlordane	Chlordane	Clordano	X		X
58-89-9	Lindane	Lindane	Lindano	X		X
58-90-2	2,3,4,6-Tetrachlorophenol	2,3,4,6-Tétrachlorophénol	2,3,4,6-Tetraclorofenol			X
59-89-2	N-Nitrosomorpholine	n-Nitrosomorpholine	N-Nitrosomorfolina	X		X
60-09-3	4-Aminoazobenzene	4-Aminoazobenzène	4-Aminoazobenceno	X		X
60-11-7	4-Dimethylaminoazobenzene	4-Diméthylaminoazobenzène	4-Dimetilaminoazobenceno	X		
60-34-4	Methylhydrazine	Méthylhydrazine	Metilhidracina	X		
60-35-5	Acetamide	Acétamide	Acetamida	X		X
60-51-5	Dimethoate	Diméthoate	Dimetoato	X		
60-57-1	Dieldrin	Dieldrine	Dieldrín			X
61-82-5	Amitrole	Amitrole	Amitrol	X		
62-53-3	Aniline	Aniline	Anilina	X	X	X
62-55-5	Thioacetamide	Thioacétamide	Tioacetamida	X		
62-56-6	Thiourea	Thio-urée	Tiourea	X	X	X
62-73-7	Dichlorvos	Dichlorvos	Diclorvos	X		
62-74-8	Sodium fluoroacetate	Fluoroacétate de sodium	Fluoroacetato de sodio	X		
62-75-9	N-Nitrosodimethylamine	N-Nitrosodiméthylamine	N-Nitrosodimetilamina	X		X

† Proposed list of chemicals for RETC currently under review.

Appendix A
1996

A Comparison of Chemicals Listed under 1996 TRI, NPRI and RETC†

CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
63-25-2	Carbaryl	Carbaryl	Carbaril	X		
64-17-5	Ethanol	Éthanol	Etanol			X
64-18-6	Formic acid	Acide formique	Ácido fórmico	X		
64-67-5	Diethyl sulfate	Sulfate de diéthyle	Sulfato de dietilo	X	X	
64-75-5	Tetracycline hydrochloride	Chlorhydrate de tétracycline	Clorhidrato de tetraciclina	X		
67-56-1	Methanol	Méthanol	Metanol	X	X	
67-63-0	Isopropyl alcohol	Alcool iso-propylique	Alcohol isopropílico	X	X	
67-64-1	Acetone	Acétone	Acetona		X	
67-66-3	Chloroform	Chloroforme	Cloroformo	X	X	X
67-72-1	Hexachloroethane	Hexachloroéthane	Hexacloroetano	X	X	X
68-12-2	N,N-Dimethylformamide	N,N-Diméthyl formamide	N.N-Dimetilformamida	X		
68-76-8	Triaziquone	Triaziquone	Triaziquone	X		
70-30-4	Hexachlorophene	Hexachlorophène	Hexaclorofeno	X		
71-36-3	n-Butyl alcohol	Butan-1-ol	Alcohol n-butílico	X	X	
71-43-2	Benzene	Benzène	Benceno	X	X	X
71-55-6	1,1,1-Trichloroethane	1,1,1-Trichloroéthane	1,1,1-Tricloroetano	X		X
72-20-8	Endrin	Endrine	Endrín			X
72-43-5	Methoxychlor	Méthoxychlore	Metoxicloro	X		X
72-57-1	Trypan blue	Bleu trypan	Azultripán	X		
74-82-8	Methane	Méthane	Metano			X
74-83-9	Bromomethane	Bromométhane	Bromometano	X	X	X
74-85-1	Ethylene	Éthylène	Etileno	X	X	
74-87-3	Chloromethane	Chlorométhane	Clorometano	X	X	X
74-88-4	Methyl iodide	Iodométhane	Yoduro de metilo	X	X	
74-90-8	Hydrogen cyanide	Cyanure d'hydrogène	Ácido cianhídrico	X	X	
74-95-3	Methylene bromide	Bromure de méthyle	Bromuro de metilo	X		
75-00-3	Chloroethane	Chloroéthane	Cloroetano	X	X	
75-01-4	Vinyl chloride	Chlorure de vinyle	Cloruro de vinilo	X	X	X
75-05-8	Acetonitrile	Acétonitrile	Acetonitrilo	X	X	
75-07-0	Acetaldehyde	Acétaldéhyde	Acetaldehído	X	X	X
75-09-2	Dichloromethane	Dichlorométhane	Diclorometano	X	X	X
75-15-0	Carbon disulfide	Disulfure de carbone	Disulfuro de carbono	X	X	X
75-21-8	Ethylene oxide	Oxyde d'éthylène	Óxido de etileno	X	X	X
75-25-2	Bromoform	Bromoforme	Bromoformo	X		X
75-27-4	Dichlorobromomethane	Dichlorobromométhane	Diclorobromometano	X		X
75-34-3	1,1-Dichloroethane	1,1-Dichloroéthane	1,1-Dicloroetano	X		
75-35-4	Vinylidene chloride	Chlorure de vinylidène	Cloruro de vinilideno	X	X	X
75-43-4	Dichlorofluoromethane (HCFC-21)	Dichlorofluorométhane (HCFC-21)	Diclorofluorometano (HCFC-21)	X		
75-44-5	Phosgene	Phosgène	Fosgeno	X	X	

† Proposed list of chemicals for RETC currently under review.

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
75-45-6	Chlorodifluoromethane (HCFC-22)	Chlorodifluorométhane (HCFC-22)	Clorodifluorometano (HCFC-22)	X		
75-55-8	Propylenimine	Propylènimine	Propilenimina	X		
75-56-9	Propylene oxide	Oxyde de propylène	Óxido de propileno	X	X	
75-63-8	Bromotrifluoromethane (halon 1301)	Bromotrifluorométhane (halon 1301)	Bromotrifluorometano (halon 1301)	X		
75-65-0	tert-Butyl alcohol	2-Méthylpropan-2-ol	Alcohol terbutílico	X	X	
75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	1-Chloro-1,1-difluoroéthane (HCFC-142b)	1-Cloro-1,1-difluoroetano (HCFC-142b)	X		
75-69-4	Trichlorofluoromethane (CFC-11)	Trichlorofluorométhane (CFC-11)	Triclorofluorometano (CFC-11)	X		X
75-71-8	Dichlorodifluoromethane (CFC-12)	Dichlorodifluorométhane (CFC-12)	Diclorodifluorometano (CFC-12)	X		X
75-72-9	Chlorotrifluoromethane (CFC-13)	Chlorotrifluorométhane (CFC-13)	Clorotrifluorometano (CFC-13)	X		
75-86-5	2-Methyllactonitrile	Acétonecyanhydrine	2-Metillactonitrilo	X		
75-88-7	2-Chloro-1,1,1-trifluoroethane (HCFC-133a)	Chloro-1,1,1-trifluoroéthane (HCFC-133a)	2-Cloro-1,1,1-trifluoroetano (HCFC-133a)	X		
76-01-7	Pentachloroethane	Pentachloroéthane	Pentacloroetano	X		X
76-02-8	Trichloroacetyl chloride	Chlorure de trichloroacétyle	Cloruro de tricloroacetilo	X		
76-06-2	Chloropicrin	Chloropicrine	Cloropicrina	X		
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	1,1,2-Trichloro-1,2,2-trifluoroéthane (CFC-113)	1,1,2-Tricloro-1,2,2-trifluoroetano (CFC-113)	X		
76-14-2	Dichlorotetrafluoroethane (CFC-114)	Dichlorotétrafluoroéthane (CFC-114)	Diclorotetrafluoroetano (CFC-114)	X		
76-15-3	Monochloropentafluoroethane (CFC-115)	Chloropentafluoroéthane (CFC-115)	Cloropentafluoroetano (CFC-115)	X		
76-44-8	Heptachlor	Heptachlore	Heptacloro	X		X
76-87-9	Triphenyltin hydroxide	Hydroxyde de triphénylétain	Hidróxido de trifenilestaño	X		
77-47-4	Hexachlorocyclopentadiene	Hexachlorocyclopentadiène	Hexaclorciclopentadieno	X	X	X
77-73-6	Dicyclopentadiene	Dicyclopentadiène	Dicloropentadieno	X		
77-78-1	Dimethyl sulfate	Sulfate de diméthyle	Sulfato de dimetilo	X	X	
78-00-2	Tetraethyl lead	Plomb tétraéthyle	Tetraetilo de plomo			X
78-48-8	S,S,S-Tributyltrithiophosphate	Trithiophosphate de S,S,S-tributyle	S,S,S-Tributiltritiofosfato	X		
78-83-1	i-Butyl alcohol	2-Méthylpropan-1-ol	Alcohol i-butílico		X	X
78-84-2	Isobutyraldehyde	Isobutyraldéhyde	Isobutiraldehído	X	X	
78-87-5	1,2-Dichloropropane	1,2-Dichloropropane	1,2-Dicloropropano	X	X	X
78-88-6	2,3-Dichloropropene	2,3-Dichloropropène	2,3-Dicloropropeno	X		
78-92-2	sec-Butyl alcohol	Butan-2-ol	Alcohol sec-butílico	X	X	
78-93-3	Methyl ethyl ketone	Méthyléthylcétone	Metil etil cetona	X	X	X
79-00-5	1,1,2-Trichloroethane	1,1,2-Trichloroéthane	1,1,2-Tricloroetano	X	X	X
79-01-6	Trichloroethylene	Trichloroéthylène	Tricloroetileno	X	X	X
79-06-1	Acrylamide	Acrylamide	Acrilamida	X	X	X
79-10-7	Acrylic acid	Acide acrylique	Ácido acrílico	X	X	
79-11-8	Chloroacetic acid	Acide chloroacétique	Ácido cloroacético	X	X	
79-19-6	Thiosemicarbazide	Thiosemicarbazide	Tiosemicarbacida	X		
79-21-0	Peracetic acid	Acide peracétique	Ácido peracético	X	X	
79-22-1	Methyl chlorocarbonate	Chlorocarbonate de méthyle	Clorocarbonato de metilo	X		
79-34-5	1,1,2,2-Tetrachloroethane	1,1,2,2-Tétrachloroéthane	1,1,2,2-Tetracloroetano	X	X	X

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
79-44-7	Dimethylcarbamyl chloride	Chlorure de diméthylcarbamyle	Cloruro de dimetilcarbamil	X		
79-46-9	2-Nitropropane	2-Nitropropane	2-Nitropropano	X	X	X
80-05-7	4,4'-Isopropylidenediphenol	p,p'-Isopropylidènediphénol	4,4'-Isopropilidenodifenol	X	X	
80-15-9	Cumene hydroperoxide	Hydroperoxyde de cumène	Cumeno hidroperóxido	X	X	
80-62-6	Methyl methacrylate	Méthacrylate de méthyle	Metacrilato de metilo	X	X	X
81-07-2	Saccharin	Saccharine	Sacarina	X		
81-88-9	C.I. Food Red 15	Indice de couleur Rouge alimentaire 15	Rojo 15 alimenticio	X	X	
82-28-0	1-Amino-2-methylanthraquinone	1-Amino-2-méthylanthraquinone	1-Amino-2-metilantraquinona	X		
82-68-8	Quintozene	Quintozène	Quintoceno	X		
83-32-9	Acenaphthene	Acénaphtène	Acenafteno			X
84-66-2	Diethyl phthalate	Phtalate de diéthyle	Dietil ftalato		X	
84-74-2	Dibutyl phthalate	Phtalate de dibutyle	Dibutil ftalato	X	X	X
85-01-8	Phenanthrene	Phénanthrène	Fenantreno	X		
85-44-9	Phthalic anhydride	Anhydride phtalique	Anhídrido ftálico	X	X	
85-68-7	Butyl benzyl phthalate	Phtalate de benzyle et de butyle	Butil bencil ftalato		X	X
86-30-6	N-Nitrosodiphenylamine	N-Nitrosodiphénylamine	N-Nitrosodifenilamina	X	X	X
87-62-7	2,6-Xylidine	2,6-Xylidine	2,6-Xilidina	X		
87-68-3	1,1,2,3,4,4-Hexachloro-1,3-butadiene	1,1,2,3,4,4-Hexachloro-1,3-butadiène	1,1,2,3,4,4-Hexacloro-1,3-butadieno	X		X
87-86-5	Pentachlorophenol	Pentachlorophénol	Pentaclorofenol	X		X
88-06-2	2,4,6-Trichlorophenol	2,4,6-Trichlorophénol	2,4,6-Triclorofenol	X		X
88-75-5	2-Nitrophenol	2-Nitrophénol	2-Nitrofenol	X		
88-85-7	Dinitrobutyl phenol	Dinosébé	Dinitrobutilfenol	X		
88-89-1	Picric acid	Acide picrique	Ácido pícrico	X		
90-04-0	o-Anisidine	o-Anisidine	o-Anisidina	X		X
90-43-7	2-Phenylphenol	o-Phénylphénol	2-Fenilfenol	X	X	X
90-94-8	Michler's ketone	Cétone de Michler	Cetona Michler	X	X	
91-08-7	Toluene-2,6-diisocyanate	Toluène-2,6-diisocyanate	Toluen-2,6-diisocianato	X	X	
91-20-3	Naphthalene	Naphtalène	Naftaleno	X	X	X
91-22-5	Quinoline	Quinoléine	Quinoleína	X	X	X
91-59-8	beta-Naphthylamine	bêta-Naphtylamine	beta-Naftilamina	X		X
91-94-1	3,3'-Dichlorobenzidine	3,3'-Dichlorobenzidine	3,3'-Diclorobencidina	X		X
92-52-4	Biphenyl	Biphényle	Bifenilo	X	X	X
92-67-1	4-Aminobiphenyl	4-Aminobiphényle	4-Aminobifenilo	X		X
92-87-5	Benzidine	Benzidine	Bencidina	X		X
92-93-3	4-Nitrobiphenyl	4-Nitrobiphényle	4-Nitrobifenilo	X		X
93-65-2	Mecoprop	Mécoprop	Mecoprop	X		
93-72-1	Silvex	Silvex	Silvex			X
94-11-1	2,4-D Isopropyl ester	2,4-Dichlorophénoxyacétate d'isopropyle	2,4-D isopropilester	X		
94-36-0	Benzoyl peroxide	Peroxyde de benzoyle	Peróxido de benzoilo	X	X	

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
94-58-6	Dihydrosafrole	Dihydrosafrole	Dihidrosafrol	X		
94-59-7	Safrole	Safrole	Safrol	X	X	
94-74-6	Methoxone	Méthoxone	Metoxona	X		
94-75-7	2,4-D (Acetic acid)	Acide dichloro-2,4-phénoxyacétique	Ácido 2,4-diclorofenoxiacético	X		X
94-80-4	2,4-D Butyl ester	2,4-Dichlorophénoxyacétate de butyle	2,4-D butilester	X		
94-82-6	2,4-DB	Acide 4-(2,4-dichlorophénoxy)butyrique	2,4-DB	X		
95-47-6	o-Xylene	o-Xylène	o-Xileno	X	X	
95-48-7	o-Cresol	o-Crésol	o-Cresol	X	X	X
95-50-1	1,2-Dichlorobenzene	o-Dichlorobenzène	1,2-Diclorobenceno	X	X	X
95-53-4	o-Toluidine	o-Toluidine	o-Toluidina	X		
95-54-5	1,2-Phenylenediamine	o-Phénylènediamine	1,2-Fenilendiamina	X		
95-63-6	1,2,4-Trimethylbenzene	1,2,4-Triméthylbenzène	1,2,4-Trimetilbenceno	X	X	X
95-69-2	p-Chloro-o-toluidine	4-Chloro-o-toluidine	p-Cloro-o-toluidina	X		
95-80-7	2,4-Diaminotoluene	2,4-Diaminotoluène	2,4-Diaminotolueno	X	X	
95-95-4	2,4,5-Trichlorophenol	Trichloro-2,4,5-phénol	2,4,5-Triclorofenol	X		X
96-09-3	Styrene oxide	Oxyde de styrène	Óxido de estireno	X	X	
96-12-8	1,2-Dibromo-3-chloropropane	1,2-Dibromo-3-chloropropane	1,2-Dibromo-3-cloropropano	X		X
96-18-4	1,2,3-Trichloropropane	1,2,3-Trichloropropane	1,2,3-Tricloropropano	X		
96-33-3	Methyl acrylate	Acrylate de méthyle	Acrilato de metilo	X	X	
96-45-7	Ethylene thiourea	Imidazolidine-2-thione	Etilén tiourea	X	X	X
97-23-4	Dichlorophene	Dichlorophène	Diclorofeno	X		
97-56-3	C.I. Solvent Yellow 3	Indice de couleur Jaune de solvant 3	Solvente de amarillo 3	X		
98-07-7	Benzoic trichloride	Trichlorure de benzylidyne	Benzotricloruro	X		
98-82-8	Cumene	Cumène	Cumeno	X	X	
98-86-2	Acetophenone	Acétophénone	Acetofenona	X		
98-87-3	Benzal chloride	Chlorure de benzale	Cloruro de benzal	X		
98-88-4	Benzoyl chloride	Chlorure de benzoyle	Cloruro de benzoilo	X	X	
98-95-3	Nitrobenzene	Nitrobenzène	Nitrobenceno	X	X	X
99-30-9	Dichloran	Chlorure de dichlorobenzalkonium	Cloruro de diclorobenzalconio	X		
99-55-8	5-Nitro-o-toluidine	5-Nitro-o-toluidine	5-Nitro-o-toluidina	X		
99-59-2	5-Nitro-o-anisidine	5-Nitro-o-anisidine	5-Nitro-o-anisidina	X		
99-65-0	m-Dinitrobenzene	m-Dinitrobenzène	m-Dinitrobenceno	X		
100-00-5	1-Chloro-4-nitrobenzene	1-Chloro-4-nitrobenzène	1-Cloro-4-nitrobeceno			X
100-01-6	p-Nitroaniline	p-Nitroaniline	p-Nitroanilina	X		
100-02-7	4-Nitrophenol	p-Nitrophénol	4-Nitrofenol	X	X	X
100-25-4	p-Dinitrobenzene	p-Dinitrobenzène	p-Dinitrobenceno	X		
100-41-4	Ethylbenzene	Éthylbenzène	Etilbenceno	X	X	X
100-42-5	Styrene	Styrène	Estireno	X	X	X
100-44-7	Benzyl chloride	Chlorure de benzyle	Cloruro de bencilo	X	X	X

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
100-75-4	N-Nitrosopiperidine	N-Nitrosopipéridine	N-Nitrosopiperidina	X		
101-05-3	Anilazine	Anilazine	Anilacina	X		
101-14-4	4,4'-Methylenebis(2-chloroaniline)	p,p'-Méthylènebis(2-chloroaniline)	4,4'-Metilenobis(2-cloroanilina)	X	X	X
101-61-1	4,4'-Methylenebis(N,N-dimethyl)benzeneamine	4,4'-Méthylènebis(N,N-diméthyl)benzèneamine	4,4'-Metilenobis(N,N-dimetil)bencenamina	X		X
101-68-8	Methylenebis(phenylisocyanate)	Méthylènebis(phénylisocyanate)	Metilenobis(fenilisocianato)		X	
101-77-9	4,4'-Methylenedianiline	p,p'-Méthylènedianiline	4,4'-Metilenodianilina	X	X	
101-80-4	4,4'-Diaminodiphenyl ether	Éther 4,4'-diaminodiphényle	Éter 4,4'-diaminodifenílico	X		
101-90-6	Diglycidyl resorcinol ether	Éther de résorcinol et de diglycydile	Diglicidil resorcinol éter	X		
103-23-1	Bis(2-ethylhexyl) adipate	Adipate de bis(2-éthylhexyle)	Bis(2-etilhexil) adipato		X	
104-12-1	p-Chlorophenyl isocyanate	Isocyanate de 4-chlorophényle	p-Clorofenil isocianato	X		
104-94-9	p-Anisidine	p-Anisidine	p-Anisidina	X		
105-67-9	2,4-Dimethylphenol	2,4-Diméthylphénol	2,4-Dimetilfenol	X		X
106-42-3	p-Xylene	p-Xylène	p-Xileno	X	X	
106-44-5	p-Cresol	p-Crésol	p-Cresol	X	X	X
106-46-7	1,4-Dichlorobenzene	p-Dichlorobenzène	1,4-Diclorobenceno	X	X	X
106-47-8	p-Chloroaniline	p-Chloroaniline	p-Cloroanilina	X		
106-50-3	p-Phenylenediamine	p-Phénylènediamine	p-Fenilenodiamina	X	X	
106-51-4	Quinone	p-Quinone	Quinona	X	X	
106-88-7	1,2-Butylene oxide	1,2-Époxybutane	Óxido de 1,2-butileno	X	X	
106-89-8	Epichlorohydrin	Épichlorohydrine	Epiclorohidrina	X	X	X
106-93-4	1,2-Dibromoethane	1,2-Dibromoéthane	1,2-Dibromoetano	X		X
106-99-0	1,3-Butadiene	Buta-1,3-diène	1,3-Butadieno	X	X	X
107-02-8	Acrolein	Acroléine	Acroleína	X		X
107-04-0	1-Bromo-2-chloroethane	1-Bromo-2-chloroéthane	1-Bromo-2-cloroetano			X
107-05-1	Allyl chloride	Chlorure d'allyle	Cloruro de alilo	X	X	
107-06-2	1,2-Dichloroethane	1,2-Dichloroéthane	1,2-Dicloroetano	X	X	X
107-11-9	Allylamine	Allylamine	Alil amina	X		
107-13-1	Acrylonitrile	Acrylonitrile	Acrilonitrilo	X	X	X
107-18-6	Allyl alcohol	Alcool allylique	Alcohol alílico	X	X	
107-19-7	Propargyl alcohol	Alcool propargylique	Alcohol propargílico	X		
107-21-1	Ethylene glycol	Éthylèneglycol	Etilén glicol	X	X	
107-30-2	Chloromethyl methyl ether	Éther de méthyle et de chlorométhyle	Éter clorometil metílico	X		
108-05-4	Vinyl acetate	Acétate de vinyle	Acetato de vinilo	X	X	
108-10-1	Methyl isobutyl ketone	Méthylisobutylcétone	Metil isobutil cetona	X	X	X
108-31-6	Maleic anhydride	Anhydride maléique	Anhídrido maleico	X	X	
108-38-3	m-Xylene	m-Xylène	m-Xileno	X	X	
108-39-4	m-Cresol	m-Crésol	m-Cresol	X	X	X
108-45-2	1,3-Phenylenediamine	m-Phénylènediamine	1,3-Fenilendiamina	X		
108-60-1	Bis(2-chloro-1-methylethyl) ether	Éther di(2-chloro-1-méthyléthyle)	Éter bis(2-cloro-1-metil etil)	X		X

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
108-88-3	Toluene	Toluène	Tolueno	X	X	X
108-90-7	Chlorobenzene	Chlorobenzène	Clorobenceno	X	X	X
108-93-0	Cyclohexanol	Cyclohexanol	Ciclohexanol	X		
108-95-2	Phenol	Phénol	Fenol	X	X	X
109-06-8	2-Methylpyridine	2-Méthylpyridine	2-Metilpiridina	X		X
109-77-3	Malononitrile	Malononitrile	Malononitrilo	X		
109-86-4	2-Methoxyethanol	2-Méthoxyéthanol	2-Metoxietanol	X	X	
110-49-6	2-Methoxyethyl acetate	Acétate de 2-méthoxyéthyle	2-Metoxietil acetato		X	
110-54-3	n-Hexane	n-Hexane	n-Hexano	X		
110-57-6	trans-1,4-Dichloro-2-butene	1,4-Dichloro-2- butène	Trans-1,4-Dicloro-2-buteno	X		
110-80-5	2-Ethoxyethanol	2-Éthoxyéthanol	2-Etoxietanol	X	X	X
110-82-7	Cyclohexane	Cyclohexane	Ciclohexano	X	X	
110-86-1	Pyridine	Pyridine	Piridina	X	X	X
111-15-9	2-Ethoxyethyl acetate	Acétate de 2-éthoxyéthyle	2-Etoxietil acetato		X	
111-42-2	Diethanolamine	Diéthanolamine	Dietanolamina	X	X	
111-44-4	Bis(2-chloroethyl) ether	Éther di(2-chloroéthyle)	Éter bis(2-cloroetil)	X		X
111-91-1	Bis(2-chloroethoxy) methane	Méthane di(2-chloroéthoxy)	Bis(2-cloroetoxi) metano	X		
112-40-3	n-Dodecano	n-Dodécane	n-Dodecano			X
114-26-1	Propoxur	Propoxur	Propoxur	X		
115-07-1	Propylene	Propylène	Propileno	X	X	
115-28-6	Chlorendic acid	Acide chlorendique	Ácido cloréndico	X		
115-32-2	Dicofol	Dicofol	Dicofol	X		
116-06-3	Aldicarb	Aldicarbe	Aldicarb	X		
117-79-3	2-Aminoanthraquinone	2-Aminoanthraquinone	2-Aminoantraquinona	X		
117-81-7	Di(2-ethylhexyl) phthalate	Phtalate de bis(2-éthylhexyle)	Di(2-etilhexil) ftalato	X	X	X
117-84-0	Di-n-octyl phthalate	Phtalate de di-n-octyle	Di-n-octil ftalato		X	
118-74-1	Hexachlorobenzene	Hexachlorobenzène	Hexaclorobenceno	X		X
119-90-4	3,3'-Dimethoxybenzidine	3,3'-Diméthoxybenzidine	3,3'-Dimetoxibencidina	X		
119-93-7	3,3'-Dimethylbenzidine	3,3'-Diméthylbenzidine	3,3'-Dimetilbencidina	X		
120-12-7	Anthracene	Anthracène	Antraceno	X	X	
120-36-5	2,4-DP	Dichlorprop	2,4-DP	X		
120-58-1	Isosafrole	Isosafrole	Isosafrol	X	X	
120-71-8	p-Cresidine	p-Crésidine	p-Cresidina	X		
120-80-9	Catechol	Catéchol	Catecol	X	X	
120-82-1	1,2,4-Trichlorobenzene	1,2,4-Trichlorobenzène	1,2,4-Triclorobenceno	X	X	X
120-83-2	2,4-Dichlorophenol	2,4-Dichlorophénol	2,4-Diclorofenol	X	X	X
121-14-2	2,4-Dinitrotoluene	2,4-Dinitrotoluène	2,4-Dinitrotolueno	X	X	X
121-44-8	Triethylamine	Triéthylamine	Trietilamina	X		
121-69-7	N,N-Dimethylaniline	N,N-Diméthylaniline	N,N-Dimetilanilina	X	X	

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
121-75-5	Malathion	Malathion	Malatión	X		X
122-34-9	Simazine	Simazine	Simacina	X		
122-39-4	Diphenylamine	Dianiline	Difenilamina	X		
122-66-7	1,2-Diphenylhydrazine	1,2-Diphénylhydrazine	1,2-Difenilhidracina	X		X
123-31-9	Hydroquinone	Hydroquinone	Hidroquinona	X	X	
123-38-6	Propionaldehyde	Propionaldéhyde	Propionaldehído	X	X	
123-63-7	Paraldehyde	Paraldéhyde	Paraldehído	X		
123-72-8	Butyraldehyde	Butyraldéhyde	Butiraldehído	X	X	
123-91-1	1,4-Dioxane	1,4-Dioxane	1,4-Dioxano	X	X	X
124-38-9	Carbon dioxide	Dioxyde de carbone	Bióxido de carbono			X
124-40-3	Dimethylamine	Diméthylamine	Dimetilamina	X		
124-48-1	Chlorodibromomethane	Chlorodibromométhane	Clorodibrometano			X
124-73-2	Dibromotetrafluoroethane (halon 2402)	Dibromotétrafluoroéthane (halon 2402)	Dibromotetrafluoroetano (halon 2402)	X		
126-72-7	Tris(2,3-dibromopropyl) phosphate	Phosphate de tris(2,3-dibromopropyle)	Tris(2,3-dibromopropil) fosfato	X		
126-98-7	Methacrylonitrile	Méthacrylonitrile	Metacrilonitrilo	X		
126-99-8	Chloroprene	Chloroprène	Cloropreno	X		
127-18-4	Tetrachloroethylene	Tétrachloroéthylène	Tetracloroetileno	X	X	X
128-03-0	Potassium dimethyldithiocarbamate	Diméthyldithiocarbamate de potassium	Dimetilditiocarbamato de potasio	X		
128-04-1	Sodium dimethyldithiocarbamate	Diméthyldithiocarbamate de sodium	Dimetilditiocarbamato de sodio	X		
128-66-5	C.I. Vat Yellow 4	Indice de couleur Jaune 4	Amarillo 4	X		
131-11-3	Dimethyl phthalate	Phtalate de diméthyle	Dimetil ftalato	X	X	
131-52-2	Sodium pentachlorophenate	Pentachlorophénate de sodium	Pentaclorofenato de sodio	X		
132-27-4	Sodium o-phenylphenoxide	2-Biphénylate de sodium	Ortofenilfenóxido de sodio	X		
132-64-9	Dibenzofuran	Dibenzofurane	Dibenzofurano	X		
133-06-2	Captan	Captan	Captan	X		X
133-07-3	Folpet	Folpet	Folpet	X		
133-90-4	Chloramben	Chlorambène	Cloramben	X		
134-29-2	o-Anisidine hydrochloride	Chlorhydrate d'o-anisidine	o-Anisidina hidrocloruro	X		
134-32-7	alpha-Naphthylamine	alpha-Naphtylamine	alfa-Naftilamina	X		
135-20-6	Cupferron	Cupferron	Cupferron	X		
136-45-8	Dipropyl isocinchomeronate	Pyridine-2,5-dicarboxylate de dipropyle	Dipropilisocincomeronato	X		
137-26-8	Thiram	Thirame	Tiram	X		X
137-41-7	Potassium N-methyldithiocarbamate	Méthyldithiocarbamate de potassium	N-metilditiocarbamato de potasio	X		
137-42-8	Metham sodium	Métam-sodium	N-Metilditiocarbamato de sodio	X		
138-93-2	Disodium cyanodithioimidocarbonate	Cyanodithiocarbamate de disodium	Cianoditiocarbamato de disodio	X		
139-13-9	Nitrilotriacetic acid	Acide nitrilotriacétique	Ácido nitrilotriacético	X	X	
139-65-1	4,4'-Thiodianiline	4,4'-Thiodianiline	4,4'-Tiodianilina	X		
140-88-5	Ethyl acrylate	Acrylate d'éthyle	Acrilato de etilo	X	X	
141-32-2	Butyl acrylate	Acrylate de butyle	Acrilato de butilo	X	X	

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
142-59-6	Nabam	Nabame	Nabam	X		
148-79-8	Thiabendazole	Thiabendazole	Tiabendazol	X		
149-30-4	2-Mercaptobenzothiazole	Benzothiazole-2-thiol	2-Mercaptobenzotiazol	X		
150-50-5	Merphos	Trithiophosphate de tributyle	Merfos	X		
150-68-5	Monuron	Monuron	3-(4-cloro fenil)–1,1-dimetilurea	X		
151-56-4	Ethyleneimine	Éthylène imine	Etilenimina	X		
156-10-5	p-Nitrosodiphenylamine	p-Nitrosodiphénylamine	p-Nitrosodifeniamina	X		
156-62-7	Calcium cyanamide	Cyanamide calcique	Cianamida de calcio	X	X	
298-00-0	Methyl parathion	Parathion-méthyl	Metilparatión	X		X
300-76-5	Naled	Naled	Naled	X		
301-12-2	Oxydemeton methyl	Oxydéméton-méthyl	Metiloximetón	X		
302-01-2	Hydrazine	Hydrazine	Hidracina	X	X	X
306-83-2	2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)	2,2-Dichlo-1,1,1-trifluoroéthane (HCFC-123)	2,2-Dicloro-1,1,1-trifluoroetano (HCFC-123)	X		
309-00-2	Aldrin	Aldrine	Aldrín	X		X
314-40-9	Bromacil	Bromacil	Bromacilo	X		
319-84-6	alpha-Hexachlorocyclohexane	alpha-Hexachlorocyclohexane	alfa-Hexaclorociclohexano	X		X
330-54-1	Diuron	Diuron	3-(3,4 dicloro-fenil)-1,1-dimetil urea	X		
330-55-2	Linuron	Linuron	3-(3,4 dicloro-fenil)-1-metoxi-1-metil urea	X		
333-41-5	Diazinon	Diazinon	Diazinon	X		X
334-88-3	Diazomethane	Diazométhane	Diazometano	X		
353-59-3	Bromochlorodifluoromethane (halon 1211)	Bromochlorodifluorométhane (halon 1211)	Bromoclorodifluorometano (halon 1211)	X		
354-11-0	1,1,1,2-Tetrachloro-2-fluoroethane	1,1,1,2-Tétrachloro-2-fluoroéthane	1,1,1,2-Tetracloro-2- fluoroetano	X		
354-14-3	1,1,2,2-Tetrachloro-1-fluoroethane	1,1,2,2-Tétrachloro-1-fluoroéthane	1,1,2,2-Tetracloro-1-fluoroetano	X		
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (HCFC-123a)	1,2-Dichloro-1,1,2-trifluoroéthane (HCFC-123a)	1,2-Dicloro-1,1,2-trifluoroetano (HCFC-123a)	X		
354-25-6	1-Chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	1-Chloro-1,1,2,2-tétrafluoroéthane (HCFC-124a)	1-Cloro-1,1,2,2-tetrafluoroetano (HCFC-124a)	X		
357-57-3	Brucine	Brucine	Brucina	X		
422-44-6	1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225bb)	1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225bb)	1,2-Dicloro-1,1,2,3,3-pentafluoropropano (HCFC-225bb)	X		
422-48-0	2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)	2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)	2,3-Dicloro-1,1,1,2,3-pentafluoropropano (HCFC-225ba)	X		
422-56-0	3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	3,3-Dicloro-1,1,1,2,2-pentafluoropropano (HCFC-225ca)	X		
431-86-7	1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da)	1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da)	1,2-Dicloro-1,1,3,3,3-pentafluoropropano (HCFC-225da)	X		
460-35-5	3-Chloro-1,1,1-trifluoropropane (HCFC-253fb)	3-Chloro-1,1,1-trifluoropropane (HCFC-253fb)	3-Cloro-1,1,1-trifluoropropano (HCFC-253fb)	X		
463-58-1	Carbonyl sulfide	Sulfure de carbonyle	Sulfuro de carbonilo	X		
465-73-6	Isodrin	Isodrine	Isodrín	X		
492-80-8	C.I. Solvent Yellow 34	Indice de couleur Jaune de solvant 34	Solvente amarillo 34	X		
505-60-2	Mustard gas	Gaz moutarde	Gas mostaza	X		
507-55-1	1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	1,3-Dicloro-1,1,2,2,3-pentafluoropropano (HCFC-225cb)	X		
510-15-6	Chlorobenzilate	Chlorobenzilate	Clorobencilato	X		
528-29-0	o-Dinitrobenzene	o-Dinitrobenzène	o-Dinitrobenceno	X		
532-27-4	2-Chloroacetophenone	2-Chloroacétophénone	2-Cloroacetofenona	X		

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
533-74-4	Dazomet	Dazomet	Dazomet	X		
534-52-1	4,6-Dinitro-o-cresol	4,6-Dinitro-o-crésol	4,6-Dinitro-o-cresol	X	X	X
540-59-0	1,2-Dichloroethylene	1,2-Dichloroéthylène	1,2-Dicloroetileno	X		
541-41-3	Ethyl chloroformate	Chloroformiate d'éthyle	Cloroformiato de etilo	X	X	
541-53-7	2,4-Dithiobiuret	2,4-Dithiobiuret	2,4-Ditiobiuret	X		
541-73-1	1,3-Dichlorobenzene	1,3-Dichlorobenzène	1,3-Diclorobenceno	X		X
542-75-6	1,3-Dichloropropylene	1,3-Dichloropropylène	1,3-Dicloropropileno	X		X
542-76-7	3-Chloropropionitrile	3-Chloropropionitrile	3-Cloropropionitrilo	X		
542-88-1	Bis(chloromethyl) ether	Éther di(chlorométhylique)	Bis(clorometil) éter	X		X
554-13-2	Lithium carbonate	Carbonate de lithium	Carbonato de litio	X		
556-61-6	Methyl isothiocyanate	Isothiocyanate de méthyle	Isocianato de metilo	X		
563-47-3	3-Chloro-2-methyl-1-propene	3-Chloro-2-méthylpropène	3-Cloro-2-metil-1-propeno	X		
569-64-2	C.I. Basic Green 4	Indice de couleur Vert de base 4	Verde 4 básico	X	X	
576-26-1	2,6-Dimethylphenol	2,6-Diméthylphénol	2,6-Dimetilfenol	X		X
584-84-9	Toluene-2,4-diisocyanate	Toluène-2,4-diisocyanate	Toluen-2,4-diisocianato	X	X	X
593-60-2	Vinyl bromide	Bromure de vinyle	Bromuro de vinilo	X		X
594-42-3	Perchloromethyl mercaptan	Perchlorométhylmercaptan	Percloro metilmercaptano	X		
606-20-2	2,6-Dinitrotoluene	2,6-Dinitrotoluène	2,6-Dinitrotolueno	X	X	X
612-82-8	3,3'-Dimethylbenzidine dihydrochloride	Dichlorhydrate de 4,4'-bi-o-toluidine	Dihidrocloruro de 3,3'-dimetilbencidina	X		
612-83-9	3,3'-Dichlorobenzidine dihydrochloride	Dichlorhydrate de 3,3'-dichlorobenzidine	Dihidrocloruro de 3,3'-diclorobencidina	X		
615-05-4	2,4-Diaminoanisole	2,4-Diaminoanisole	2,4-Diaminoanisol	X		
615-28-1	1,2-Phenylenediamine dihydrochloride	Dichlorhydrate d'o-phénylènediamine	Dihidrocloruro de 1,2-fenilendiamina	X		
621-64-7	N-Nitrosodi-n-propylamine	N-Nitrosodi-n-propylamine	N-Nitrosodi-n-propilamina	X		X
624-18-0	1,4-Phenylenediamine dihydrochloride	Dichlorhydrate de benzène-1,4-diamine	Dihidrocloruro de 1,4-fenilendiamina	X		
624-83-9	Methyl isocyanate	Isocyanate de méthyle	Isocianato de metilo	X		
630-08-0	Carbon monoxide	Monoxyde de carbone	Monóxido de carbono			X
630-20-6	1,1,1,2-Tetrachloroethane	1,1,1,2-Tétrachloroéthane	1,1,1,2-Tetracloroetano	X		X
636-21-5	o-Toluidine hydrochloride	Chlorydrate de o-toluidine	o-Toluidina hidrocloruro	X		
639-58-7	Triphenyltin chloride	Chlorure de triphénylétain	Cloruro de trifenilestaño	X		
680-31-9	Hexamethylphosphoramide	Hexaméthylphosphoramide	Hexametilfosforamida	X		
684-93-5	N-Nitroso-N-methylurea	N-Nitroso-N-méthylurée	N-Nitroso-N-metilurea	X		
688-73-3	Tributyltin hydride	Hydride de tributylétain	Tributilestaño			X
709-98-8	Propanil	Propanil	Propanilo	X		
759-73-9	N-Nitroso-N-ethylurea	N-Nitroso-N-éthylurée	N-Nitroso-N-etilurea	X		
759-94-4	Ethyl dipropylthiocarbamate	EPTC	Dipropiltiocarbamato de etilo	X		
760-23-8	1,2-Dichloro-3-butane	1,2-Dichloro-3-butane	1,2-Dicloro-3-butane			X
764-41-0	1,4-Dichloro-2-butene	1,4-Dichloro-2-butène	1,4-Dicloro-2-buteno	X		X
812-04-4	1,1-Dichloro-1,2,2-trifluoroethane (HCFC-123b)	1,1-Dichloro-1,2,2-trifluoroéthane (HCFC-123b)	1,1,-Dicloro-1,2,2-trifluoroetano (HCFC-123b)	X		
834-12-8	Ametryn	Amétryne	Ametrín	X		

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
842-07-9	C.I. Solvent Yellow 14	Indice de couleur Jaune de solvant 14	Amarillo 14 solvente	X	X	
872-50-4	N-Methyl-2-pyrrolidone	N-Méhyl-2-pyrrolidone	N-Metil2-pirrolidona	X		
924-16-3	N-Nitrosodi-n-butylamine	N-Nitrosodi-n-butylamine	N-Nitrosodi-n-butilamina	X		
924-42-5	N-Methylolacrylamide	N-(Hydroxyméthyl)acrylamide	N-Metilolacrilamida	X		
957-51-7	Diphenamid	Difénamide	Difenamida	X		
959-98-8	Endosulfan	Endosulfan	Endosulfán			X
961-11-5	Tetrachlorvinphos	Tétrachlorvinphos	Tetraclorvinfos	X		
989-38-8	C.I. Basic Red 1	Indice de couleur Rouge de base 1	Rojo 1 básico	X	X	
1024-57-3	Heptachlor epoxide	Époxyde d'heptachlore	Heptachlorepoxido			X
1114-71-2	Pebulate	Pébulate	Pebulato	X		
1120-71-4	Propane sultone	Propanesultone	Propane sultone	X		
1134-23-2	Cycloate	Cycloate	Ciclolato	X		
1163-19-5	Decabromodiphenyl oxide	Oxyde de décabromodiphényle	Óxido de decabromodifenilo	X	X	
1300-71-6	Dimethylphenol (mixed isomers)	Diméthylphénol (mélange d'isomères)	Dimetilfenol (mezcla de isómeros)			X
1313-27-5	Molybdenum trioxide	Trioxyde de molybdène	Trióxido de molibdeno	X	X	
1314-20-1	Thorium dioxide	Dioxyde de thorium	Dióxido de torio	X	X	
1319-77-3	Cresol (mixed isomers)	Crésol (mélange d'isomères)	Cresol (mezcla de isómeros)	X	X	
1320-18-9	2,4-D Propylene glycol butyl ether ester	(2,4-Dichlorophénoxy)acétate de 2-butoxyméthyléthyle	Ester de 2,4-D propilen glicolbutileter	X		
1330-20-7	Xylene (mixed isomers)	Xylène (mélange d'isomères)	Xileno (mezcla de isómeros)	X	X	
1332-21-4	Asbestos (friable form)	Amiante (forme friable)	Asbestos (friables)	X	X	X
1335-87-1	Hexachloronaphthalene	Hexachloronaphtalène	Hexacloronaftaleno	X		
1336-36-3	Polychlorinated biphenyls (PCBs)	Biphényles polychlorés (BPC)	Bifenilos policlorados (BPC)	X		
1344-28-1	Aluminum oxide (fibrous forms)	Oxyde d'aluminium (formes fibreuses)	Óxido de aluminio (formas fibrosas)	X	X	
1464-53-5	Diepoxybutane	Diépoxybutane	Diepoxibutano	X		
1563-66-2	Carbofuran	Carbofuran	Carbofurano	X		
1582-09-8	Trifluralin	Trifuraline	Trifluralín	X		X
1634-04-4	Methyl tert-butyl ether	Oxyde de tert-butyle et de méthyle	Éter metil terbutílico	X	X	
1649-08-7	1,2-Dichloro-1,1-difluoroethane (HCFC-132b)	1,2-Dichloro-1,1-difluoroéthane (HCFC-132b)	1,2-Dicloro-1,1-difluoroetano (HCFC-132b)	X		
1689-84-5	Bromoxynil	Bromoxynil	Bromoxinilo	X		
1689-99-2	Bromoxynil octanoate	Octanoate de 2,6-dibromo-4-cyanophényle	Bromoxinil octanoato	X		
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)	1,1-Dichloro-1-fluoroéthane (HCFC-141b)	1,1-Dicloro-1-fluoroetano (HCFC-141b)	X		
1746-01-6	2,3,7,8-Tetrachlordibenzo-p-dioxin	2,3,7,8-Tétrachlordibenzo-p-dioxine	2,3,7,8-Tetraclorodibenzo-p-dioxina			X
1836-75-5	Nitrofen	Nitrofène	Nitrofén	X		
1861-40-1	Benfluralin	Benfluralin	Benfluralín	X		
1897-45-6	Chlorothalonil	Chlorothalonil	Clorotalonil	X		
1910-42-5	Paraquat dichloride	Paraquat-dichlorure	Dicloruro de Paracuat	X		
1912-24-9	Atrazine	Atrazine	Atracina	X		
1918-00-9	Dicamba	Dicamba	Dicamba	X		
1918-02-1	Picloram	Piclorame	Picloram	X		

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CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
1918-16-7	Propachlor	Propachlore	Propaclor	X		
1928-43-4	2,4-D 2-Ethylhexyl ester	2,4-Dichlorophénoxyacétate de 2-éthylhexyle	2,4-D 2-Etilexil ester	X		
1929-73-3	2,4-D Butoxyethyl ester	2,4-Dichlorophénoxyacétate de 2-butoxyéthyle	2,4-D Butoxyetilester	X		
1929-82-4	Nitrapyrin	Nitrapyrine	Nitrapirina	X		
1937-37-7	C.I. Direct Black 38	Indice de couleur Noir direct 38	Negro 38	X		
1982-69-0	Sodium dicamba	3,6-Dichloro-o-anisate de sodium	Dicamba de sodio	X		
1983-10-4	Tributyltin fluoride	Fluorure de tributylétain	Fluoruro de tributilestaño	X		
2032-65-7	Methiocarb	Méthiocarbe	Metiocarb	X		
2155-70-6	Tributyltin methacrylate	Méthacrylate de tributylétain	Metacrilato de tributilestaño	X		
2164-07-0	Dipotassium endothall	Endothal-potassium	Endotal dipotásico	X		
2164-17-2	Fluometuron	Fluométuron	Fluometurón	X		
2212-67-1	Molinate	Molinate	Molinato	X		
2234-13-1	Octochloronaphthalene	Octochloronaphtalène	Octacloronaftaleno	X		
2300-66-5	Dimethylamine dicamba	Acide 3,6-dichloro-o-anisique, composé avec diméthylamine	Dicamba dimetilamina	X		
2303-16-4	Diallate	Diallate	Diallate	X		
2303-17-5	Triallate	Triallate	Trialato	X		
2312-35-8	Propargite	Propargite	Propargita	X		
2439-01-2	Chinomethionat	Chinométionate	Quinometionato	X		
2439-10-3	Dodine	Dodine	Dodina	X		
2524-03-0	Dimethyl chlorothiophosphate	Thiophosphorochloridate de O,O-diméthyle	Clorotiofosfato de dimetilo	X		
2602-46-2	C.I. Direct Blue 6	Indice de couleur Bleu direct 6	Azul 6	X		
2655-15-4	2,3,5-Trimethylphenyl methylcarbamate	Méthylcarbamate de 2,3,5-triméthylphényle	Metilcarbamato de 2,3,5-trimetilfenilo	X		
2699-79-8	Sulfuryl fluoride	Fluorure de sulfuryle	Fluoruro de sulfurilo	X		
2702-72-9	2,4-D Sodium salt	2,4-Dichlorophénoxyacetate de sodium	Sal sódica del 2,4-D	X		
2832-40-8	C.I. Disperse Yellow 3	Indice de couleur Jaune de dispersion 3	Amarillo 3 disperso	X	X	
2837-89-0	2-Chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	2-Chloro-1,1,1,2-tétrafluoroéthane (HCFC-124)	2-Cloro-1,1,1,2-tetrafluoroetano (HCFC-124)	X		
2921-88-2	Chlorpyrifos	Chlorpyrifos	Clorpirifos			X
2971-38-2	2,4-D Chlorocrotyl ester	(2,4-Dichlorophénoxy)acétate de 4-chlorobutén-2-yle	Ester clorocrotílico del 2,4-D	X		
3118-97-6	C.I. Solvent Orange 7	Indice de couleur Orange de solvant 7	Naranja 7 solvente	X	X	
3383-96-8	Temephos	Téméphos	Temefos	X		
3653-48-3	Methoxone, sodium salt	Acide (4-chloro-2-méthylphenoxy)acétique, sel de sodium	Sal sódica de metoxona	X		
3761-53-3	C.I. Food Red 5	Indice de couleur Rouge alimentaire 5	Rojo 5 alimenticio	X		
4080-31-3	1-(3-Chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride	3-Chloroallylochlorure de méthénamine	Cloruro de 1-(3-Cloroalil)-3,5,7-triasa-1-azoniaadamantano	X		
4170-30-3	Crotonaldehyde	Crotonaldéhyde	Crotonaldehído	X		
4549-40-0	N-Nitrosomethylvinylamine	N-Nitrosométhylvinylamine	N-Nitrosometilvinilamina	X		
4680-78-8	C.I. Acid Green 3	Indice de couleur Vert acide 3	Verde 3 ácido	X	X	
4901-51-3	2,3,4,5-Tetrachlorophenol	2,3,4,5-Tétrachlorophénol	2,3,4,5-tetraclorofenol			X
5234-68-4	Carboxin	Carboxine	Carboxina	X		
5598-13-0	Chlorpyrifos methyl	Chlorpyrifos-méthyl	Metil clorpirifos	X		

† Proposed list of chemicals for RETC currently under review.

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A Comparison of Chemicals Listed under 1996 TRI, NPRI and RETC†

CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
5902-51-2	Terbacil	Terbacile	Metilterbacilo	X		
6459-94-5	C.I. Acid Red 114	Indice de couleur Rouge acide 114	Índice de color rojo ácido 114	X		
6484-52-2	Amonium nitrate (solution)	Nitrate d'amonium (en solution)	Nitrato de amonio (solución)	X	X	
7287-19-6	Prometryn	Prométryne	Prometrín	X		
7429-90-5	Aluminum (fume or dust)	Aluminium (fumée ou poussière)	Aluminio (humo o polvo)	X	X	
7439-92-1	Lead	Plomb	Plomo	X		
7439-96-5	Manganese	Manganèse	Manganeso	X		X
7439-97-6	Mercury	Mercure	Mercurio	X		
7440-02-0	Nickel	Nickel	Níquel	X		
7440-22-4	Silver	Argent	Plata	X		
7440-28-0	Thallium	Thallium	Talio	X		
7440-36-0	Antimony	Antimoine	Antimonio	X		
7440-38-2	Arsenic	Arsenic	Arsénico	X		
7440-39-3	Barium	Baryum	Bario	X		
7440-41-7	Beryllium	Béryllium	Berilio	X		
7440-42-8	Boron	Bore	Boro			X
7440-43-9	Cadmium	Cadmium	Cadmio	X		
7440-47-3	Chromium	Chrome	Cromo	X		
7440-48-4	Cobalt	Cobalt	Cobalto	X		
7440-50-8	Copper	Cuivre	Cobre	X		
7440-62-2	Vanadium (fume or dust)	Vanadium (fumée ou poussière)	Vanadio (humo o polvo)	X	X	
7440-66-6	Zinc (fume or dust)	Zinc (fumée ou poussière)	Zinc (humo o polvo)	X		
7550-45-0	Titanium tetrachloride	Tétrachlorure de titane	Tetracloruro de titanio	X	X	
7632-00-0	Sodium nitrite	Nitrite de sodium	Nitrato de sodio	X		
7637-07-2	Boron trifluoride	Trifluorure de bore	Trifluoruro de boro	X		
7647-01-0	Hydrochloric acid	Acide chlorhydrique	Ácido clorhídrico	X	X	
7664-38-2	Phosphoric acid	Acide phosphorique	Ácido fosfórico	X	X	
7664-39-3	Hydrogen fluoride	Fluorure d'hydrogène	Ácido fluorhídrico	X	X	
7664-41-7	Ammonia	Ammoniac	Amoniaco	X	X	
7664-93-9	Sulfuric acid	Acide sulfurique	Ácido sulfúrico	X	X	
7696-12-0	Tetramethrin	Tétraméthrine	Tetrametrina	X		
7697-37-2	Nitric acid	Acide nitrique	Ácido nítrico	X	X	
7723-14-0	Phosphorus (yellow or white)	Phosphore (jaune ou blanc)	Fósforo (amarillo o blanco)	X	X	
7726-95-6	Bromine	Brome	Bromo	X		
7758-01-2	Potassium bromate	Bromate de potassium	Bromato de potasio	X		
7782-41-4	Fluorine	Fluor	Fluor	X		
7782-49-2	Selenium	Sélénium	Selenio	X		
7782-50-5	Chlorine	Chlore	Cloro	X	X	
7783-06-4	Hydrogen sulfide	Hydrogène sulfuré	Ácido sulfhídrico			X

† Proposed list of chemicals for RETC currently under review.

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A Comparison of Chemicals Listed under 1996 TRI, NPRI and RETC†

CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
7783-20-2	Ammonium sulfate (solution)	Sulfate d'ammonium (en solution)	Sulfato de amonio (solución)	X	X	
7786-34-7	Mevinphos	Mevinphos	Mevinfos	X		
7803-51-2	Phosphine	Phosphine	Fosfina	X		
8001-35-2	Toxaphene	Toxaphène	Toxafeno	X		X
8001-58-9	Creosote	Créosote	Creosota	X		
9006-42-2	Metiram	Métirame	Metiram	X		
10024-97-2	Nitrous oxide	Oxide nitreux	Óxido nitroso			X
10028-15-6	Ozone	Ozone	Ozono	X		
10034-93-2	Hydrazine sulfate	Sulfate d'hydrazine	Sulfato de hidracina	X		
10049-04-4	Chlorine dioxide	Dioxyde de chlore	Dióxido de cloro	X	X	X
10061-02-6	trans-1,3-Dichloropropene	(E)-1,3-Dichloroprop-1-ène	Trans-1,3-dicloropropeno	X		
10294-34-5	Boron trichloride	Trichlorure de bore	Tricloruro de Boro	X		
10453-86-8	Resmethrin	Resméthrine	Resmetrina	X		
11096-82-5	Aroclor 1260	Arochlore 1260	Aroclor 1260			X
12122-67-7	Zineb	Zinèbe	Zineb	X		
12427-38-2	Maneb	Manèbe	Maneb	X		
12674-11-2	Aroclor 1016	Arochlore 1016	Aroclor 1016			X
13194-48-4	Ethoprop	Éthoprophos	Etoprofos	X		
13356-08-6	Fenbutatin oxide	Fenbutatin oxyde	Óxido de fenbutaestaño	X		
13463-40-6	Iron pentacarbonyl	Fer-pentacarbonyle	Pentacarbonilo de hierro	X		
13474-88-9	1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc)	1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc)	1,1-Dicloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc)	X		
13684-56-5	Desmedipham	Desmédiphame	Desmedifam	X		
14484-64-1	Ferbam	Ferbame	Ferban	X		
15972-60-8	Alachlor	Alachlore	Alaclor	X		
16071-86-6	C.I. Direct Brown 95	Indice de couleur Brun direct 95	Café 95	X		
16543-55-8	N-Nitrosonornicotine	N-Nitrosonornicotine	N-Nitrosonornicotina	X		
17804-35-2	Benomyl	Bénomyl	Benomil	X		
19044-88-3	Oryzalin	Oryzalin	Orizalina	X		
19666-30-9	Oxydiazon	Oxydiazon	Oxidiazono	X		
20325-40-0	3,3'-Dimethoxybenzidine dihydrochloride	Dichlorure de 3,3'-diméthoxybiphényl-4,4'-ylènediammonium	Dicloruro de 3,3'-dimetoxibencidina	X		
20354-26-1	Methazole	Méthazole	Metazol	X		
20816-12-0	Osmium tetroxide	Tétroxyde d'osmium	Tetróxido de osmio	X		X
20859-73-8	Aluminum phosphide	Phospure d'aluminium	Fosfuro de aluminio	X		
21087-64-9	Metribuzin	Métribuzine	Metribucina	X		
21725-46-2	Cyanazine	Cyanazine	Cianacina	X		
22781-23-3	Bendiocarb	Bendiocarbe	Bendiocarb	X		
22967-92-6	Methylmercury	Méthylmercure	Metil mercurio			X
23564-05-8	Thiophanate-methyl	Thiophanate-méthyl	Metiltiofanato	X		
23564-06-9	Thiophanate ethyl	Thiophanate	Etiltiofanato	X		

† Proposed list of chemicals for RETC currently under review.

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A Comparison of Chemicals Listed under 1996 TRI, NPRI and RETC†

CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
23950-58-5	Pronamide	Pronamide	Pronamida	X		
25311-71-1	Isofenphos	Isophenphos	Isofenfos	X		
25321-14-6	Dinitrotoluene (mixed isomers)	Dinitrotoluène (mélange d'isomères)	Dinitrotolueno (mezcla de isómeros)	X	X	X
25321-22-6	Dichlorobenzene (mixed isomers)	Dichlorobenzène (mélange d'isomères)	Diclorobenceno (mezcla de isómeros)	X		
25376-45-8	Diaminotoluene (mixed isomers)	Diaminotoluène (mélange d'isomères)	Diaminotolueno (mezcla de isómeros)	X		
26002-80-2	Phenothrin	Phénothrine	Fenotrina	X		
26471-62-5	Toluenediisocyanate (mixed isomers)	Toluènediisocyanate (mélange d'isomères)	Toluendiisocianatos (mezcla de isómeros)	X	X	X
26628-22-8	Sodium azide	Azide de sodium	Azida de Sodio	X		
26644-46-2	Triforine	Triforine	Triforina	X		
27314-13-2	Norflurazon	Norflurazon	Norfurazona	X		
28057-48-9	d-trans-Allethrin	Alléthrine	d-trans-Alletrina	X		
28249-77-6	Thiobencarb	Diéthylthiocarbamate de S-4-chlorobenzyle	Tiobencarb	X		
28407-37-6	C.I. Direct Blue 218	Indice de couleur Bleu direct 218	Índice de color Azul directo 218	X		
29082-74-4	Octachlorostyrene	Octachlorostyrène	Percloroestireno			X
29232-93-7	Pirimiphos methyl	Pirimiphos-méthyl	Metilpirimifos	X		
30402-15-4	Pentachlorodibenzofurans	Pentachlorodibenzofuranes	Pentaclorodibenzofuranos			X
30560-19-1	Acephate	Acéphate	Acefato	X		
31218-83-4	Propetamphos	Propétamphos	Propetamfos	X		
33089-61-1	Amitraz	Amitraze	Amitraz	X		
34014-18-1	Tebuthiuron	Tébuthiuron	Tebutiurón	X		
34077-87-7	Dichlorotrifluoroethane	Dichlorotrifluoroéthane	Diclorotrifluoroetano	X		
35367-38-5	Diflubenzuron	Diflubenzuron	Diflubenzurón	X		
35400-43-2	Sulprofos	Sulprofos	Sulprofos	X		
35554-44-0	Imazalil	Imazalil	Imazalil	X		
35691-65-7	1-Bromo-1-(bromomethyl)-1,3-propanedicarbonitrile	2-Bromo-2-(bromométhyl)pentanedinitrile	1-Bromo-1-(bromometil)-1,3-propanedicarbonitrilo	X		
36088-22-9	Pentachloro-p-dioxin	Pentachloro-p-dioxine	Pentaclorodibenzo-p-dioxina			X
38727-55-8	Diethatyl ethyl	N-(chloroacetyl)-N-(2,6-diethylphenyl) glycinate d'éthyle	Etildietatil	X		
39156-41-7	2,4-Diaminoanisole sulfate	Sulfate de 2,4-diaminoanisole	Sulfato de 2,4-diaminoanisol	X		
39300-45-3	Dinocap	Dinocap	Dinocap	X		
39515-41-8	Fenpropathrin	Fenpropathrine	Fenpropatrina	X		
40487-42-1	Pendimethalin	Pendiméthaline	Pendimetalina	X		
41198-08-7	Profenofos	Profénofos	Profenofos	X		
41766-75-0	3,3'-Dimethylbenzidine dihydrofluoride	Dihydrofluorure de 3,3'-diméthylbenzidine	Difluoruro de 3,3´-dimetilbencidina	X		
42874-03-3	Oxyfluorfen	Oxyfluorfène	Oxifluorfeno	X		
43121-43-3	Triadimefon	Triadiméfon	Triadimefón	X		
50471-44-8	Vinclozolin	Vinclozoline	Vinclosolín	X		
51207-31-9	2,3,7,8-Tetrachlorodibenzo furan	2,3,7,8-Tétrachlorodibenzofurane	2,3,7,8-Tetraclorodibenzo furano			X
51235-04-2	Hexazinone	Hexazinone	Hexacinona	X		
51338-27-3	Diclofop methyl	Diclofop-méthyl	Metildiclofop	X		

† Proposed list of chemicals for RETC currently under review.

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A Comparison of Chemicals Listed under 1996 TRI, NPRI and RETC†

CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
51630-58-1	Fenvalerate	Fenvalérate	Fenvalerato	X		
52645-53-1	Permethrin	Perméthrine	Permitrina	X		
53404-19-6	Bromacil, lithium salt	Bromacil, sel de lithium	Sal de litio bromacílica	X		
53404-37-8	2,4-D 2-Ethyl-4-methylpentyl ester	(2,4-Dichlorophénoxy)acétate de 2-éthyl-4-méthylpentyle	2,4-D 2-Etil-4-metilpentil éster	X		
53404-60-7	Dazomet, sodium salt	Dazomet, sel de sodium	Sal de sodio diazomética	X		
53469-21-9	Aroclor 1242	Arochlore 1242	Aroclor 1242			X
55290-64-7	Dimethipin	Diméthipin	Dimetipina	X		
55406-53-6	3-Iodo-2-propynyl butylcarbamate	Butylcarbamate de 3-iodo-2-propynyle	3-yodo-2-propinil butilcarbamato	X		
57213-69-1	Triclopyr triethylammonium salt	Acide [(3,5,6-trichloro-2-pyridyl)oxy]acétique, composé avec triéthylamine	Sal de triclopir trietilamonio	X		
59669-26-0	Thiodicarb	Thiodicarbe	Tiodicarb	X		
60168-88-9	Fenarimol	Fénarimol	Fenarimol	X		
60207-90-1	Propiconazole	Propiconazole	Propiconazol	X		
62476-59-9	Acifluorfen, sodium salt	Acifluorfen, sel de sodium	Sal de sodio de acifluorfeno	X		
63938-10-3	Chlorotetrafluoroethane	Chlorotétrafluoroéthane	Clorotetrafluoroetano	X		
64902-72-3	Chlorsulfuron	Chlorsulfuron	Clorsulfurón	X		
64969-34-2	3,3'-Dichlorobenzidine sulfate	Dihydrogénobis(sulfate) de 3,3'-dichlorobenzidine	Sulfato de 3,3´-diclorobencidina	X		
66441-23-4	Fenoxaprop ethyl	Fénoxaprop-p-éthyl	Etilfenoxaprop	X		
67485-29-4	Hydramethylnon	Hydraméthylnon	Hidrametilnona	X		
68085-85-8	Cyhalothrin	Cyhalothrine	Cialotrina	X		
68359-37-5	Cyfluthrin	Cyfluthrine	Ciflutrina	X		
69409-94-5	Fluvalinate	Fluvalinate	Fluvalinato	X		
69806-50-4	Fluazifop butyl	Fluazifop-butyl	Butil flucifop	X		
71751-41-2	Abamectin	Abamectine	Abamectina	X		
72178-02-0	Fomesafen	Fomésafène	Fomesafén	X		
72490-01-8	Fenoxycarb	Fénoxycarbe	Fenoxicarb	X		
74051-80-2	Sethoxydim	Séthoxydime	Setoxidime	X		
76578-14-8	Quizalofop-ethyl	Quizalofop	Etilquizalofop	X		
77501-63-4	Lactofen	Lactofène	Lactofén	X		
82657-04-3	Bifenthrin	Bifenthrine	Bifentrina	X		
88671-89-0	Myclobutanil	Myclobutanil	Miclobutanilo	X		
90454-18-5	Dichloro-1,1,2-trifluoroethane	Dichloro-1,1,2-trifluoroéthane	Dicloro-1,1,2-trifluoroetano	X		
90982-32-4	Chlorimuron ethyl	Chlorimuron	Etil clorimurón	X		
101200-48-0	Tribenuron methyl	Tribénuron	Metiltribenurón	X		
111512-56-2	1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC-225eb)	1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC-225^{e}b)	1,1-Dicloro-1,2,3,3,3-pentafluoropropano (HCFC-225eb)	X		
111984-09-9	3,3'-Dimethoxybenzidine hydrochloride	Hydrochlorure de 3,3'-ddiméthoxybenzidine	Hidrocloruro de 3,3´-dimetoxibencidina	X		
127564-92-5	Dichloropentafluoropropane	Dichloropentafluoropropane	Dicloropentafluoropropane	X		
128903-21-9	2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)	2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)	2,2-Dicloro-1,1,1,3,3-pentafluoropropano (HCFC-225aa)	X		
136013-79-1	1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225ea)	1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225ea)	1,3-Dicloro-1,1,2,3,3-pentafluoropropano (HCFC-225ea)	X		

† Proposed list of chemicals for RETC currently under review.

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A Comparison of Chemicals Listed under 1996 TRI, NPRI and RETC†

CAS Number	Chemical Name	Nom Chimique	Sustancia	TRI	NPRI	RETC
	Antimony compounds*	Antimoine (et ses composés)*	Antimonio y compuestos*	X	X	
	Arsenic compounds	Arsenic (et ses composés)	Arsénico y compuestos	X	X	X
	Barium compounds	Baryum (et ses composés)	Bario y compuestos	X		X
	Beryllium compounds	Béryllium (et ses composés)	Berilio y compuestos	X		X
	Cadmium compounds	Cadmium (et ses composés)	Cadmio y compuestos	X	X	X
	Chlorophenols	Chlorophénols	Clorofenoles	X		
	Chromium compounds	Chrome (et ses composés)	Cromo y compuestos	X	X	X
	Cobalt compounds	Cobalt (et ses composés)	Cobalto y compuestos	X	X	X
	Copper compounds	Cuivre (et ses composés)	Cobre y compuestos	X	X	X
	Cyanide compounds	Cyanure (et ses composés)	Cianuro y compuestos	X	X	X
	Diisocyanates	Diisocyanates	Diisocianatos	X		
	Ethylenebisdithiocarbamic acid, salts and esters	Acide, sels et éthers éthylènebisdithiocarbamiques	Ácido etilenobisditiocarbámico, sales y ésteres	X		
	Glycol ethers	Éthers glycoliques	Éteres glicólicos	X		
	Lead compounds	Plomb (et ses composés)	Plomo y compuestos	X	X	X
	Manganese compounds	Manganèse (et ses composés)	Manganeso y compuestos	X	X	
	Mercury compounds	Mercure (et ses composés)	Mercurio y compuestos	X	X	X
	Nickel compounds	Nickel (et ses composés)	Níquel y compuestos	X	X	X
	Nicotine and salts	Nicotine et sels	Nicotina y sales	X		
	Nitrate compounds	Composés de nitrate	Compuestos nitrados	X		
	Nitrogen oxides (NO_x)	Oxydes d'azote (NO_x)	Óxidos de nitrógeno (NO_x)			
	Polybrominated biphenyls	Biphényles polybromés	Bifenilos polibromados	X		
	Polychlorinated alkanes	Alcanes poychlorés	Alcanos policlorinados	X		
	Polycyclic aromatic amines	Amines aromatiques polycycliques	Nitro-hidrocarburos aromáticos policíclicos			X
	Polycyclic aromatic compounds	Composés aromatiques polycycliques	Compuestos aromáticos policíclicos	X		X
	Polycyclic aromatic hydrocarbons (PAHs)	Hydrocarbures aromatiques polycycliques (HAP)	Hidrocarburos aromáticos policíclicos			X
	Selenium compounds	Sélénium (et ses composés)	Selenio y compuestos	X	X	X
	Silver compounds	Argent (et ses composés)	Plata y compuestos	X	X	X
	Strychnine and salts	Strychnine et sels	Estricnina y sales	X		
	Sulfur oxides (SO_x)	Oxydes de soufre (SO_x)	Óxidos de azufre (SO_x)			X
	Thallium compounds	Thallium (et ses composés)	Talio y compuestos	X		
	Uranium	Uranium	Uranio			X
	Warfarin and salts	Warfarine et sels	Warfarina y sales	X		X
	Zinc compounds	Zinc (et ses composés)	Zinc y compuestos	X	X	X

* Elemental compounds are reported separately from their respective element in TRI and RETC and aggregated with it in NPRI.

† Proposed list of chemicals for RETC currently under review.

Appendix B
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List of Facilities that Appear in Tables

Facility Name	City	Province/ State	PRTR ID Number	Tables Facility Appears in
3M Canada Company (Perth)	Perth	ON	0000003201	6–23 6–42 6–44
3M Co.	Guin	AL	35563M HIGHW	6–46 6–48
A.G.Simpson Co Ltd.	Oshawa	ON	0000003120	5–26 5–36 6–35
A.G.Simpson Co. Ltd.	Oakville	ON	0000004424	6–35
A.P. Green Refractories (Canada) Ltd	Smithville	ON	0000003266	6–24 6–34
Abbott Chemicals Inc.	Barceloneta	PR	00617BBTTCROADN	4–13 4–14 5–25 5–27 6–27
Abbott Labs.	North Chicago	IL	60064BBTTL1400N	6–28
ABC Rail Prods. Corp.	Calera	AL	35040BCRLC14THS	6–38
Abitibi-Consolidated Inc., Division Belgo	Shawinigan	QC	0000002752	6–22 6–24 6–42 6–44
Abitibi-Consolidated Inc., Division Port-Alfred	La Baie	QC	0000002636	5–24 5–26 6–23 6–25 6–34
Able Electro Polishing	Chicago	IL	60623BLLCT2001S	6–29 6–39
Accuflex Industrial Hose Ltd.	Guelph	ON	0000000087	6–22 6–24
Advanced Monobloc Manufacturing	Penetanguishene	ON	0000000092	5–24 6–22 6–24
Agrium Products Inc.	Fort Saskatchewan	AB	0000004874	5–2 5–4 6–43 6–45
Agrium Products Inc.	Redwater	AB	0000002134	5–2 5–4 6–25 6–43 6–45
Agropur Coopérative agro-alimentaire, Agropur la Fromagerie	Granby	QC	0000004341	6–44
Aimco Solrec Ltd.	Milton	ON	0000004893	5–4 6–45 7–12 8–6
Ainsworth Lumber Co. Ltd.	Grande Prairie	AB	0000004880	6–23 6–25
Air liquide Canada Inc., usine d'électrodes	Montréal	QC	0000003513	6–35
Air Products & Chemicals Inc.	Pasadena	TX	77506RPRDC1423H	4–5 5–5
AK Steel Corp., AK Steel Holding	Middletown	OH	45043RMCNC1801C	4–18 5–35 6–29 6–37
Albemarle Corp.	Orangeburg	SC	29116THYLCCANNO	5–27 6–27 6–29 6–36
Albright & Wilson Americas, Albright & Wilson PLC	Charleston	SC	29415LBRGH2151K	6–28
Alcan Smelters and Chemicals Ltd.	Kitimat	BC	0000002788	5–2 5–4 6–43 6–45
Alcatel Cable	Montréal-Est	QC	0000000959	6–33
Alcoa	Riverdale	IA	52808LMNMCHIGHW	6–26 6–28 6–46 6–48
Alcoa	Rockdale	TX	76567LMNMCSANDO	6–47
Algoma Steel Inc., Main Works	Sault Ste. Marie	ON	0000001070	5–24 5–26 6–22 6–32 6–34 6–42 6–44
Allegheny Ludlum Corp.	New Castle	IN	47362LLGHNPOBOX	4–14 5–27
Allegheny Ludlum Corp.	Brackenridge	PA	15014LLGHNRIVER	6–28 6–38 6–48 7–11
Alloy Wheels International (Canada) Ltd.	Barrie	ON	0000004430	6–32
Alpha/Owens-Corning (Canada) Inc.	Guelph	ON	0000003284	6–22
AltaSteel Ltd.	Edmonton	AB	0000001106	4–18 5–2 5–4 5–24 5–34 5–36 6–24 6–32 6–34 6–44
Aluminerie de Bécancour Inc.	Bécancour	QC	0000001071	6–42
American Alloys Inc.	New Haven	WV	25265MRCNLRT62	6–37
American Bumper & Mfg. Co.	Ionia	MI	48846MRCNB14NOR	4–14 5–27 6–29 6–39
American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi	TX	78407MRCNC3800B	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–27 6–29 6–37 6–39 6–47 6–49 7–12
American Insulated Wire, Leviton Mfg. Co. Inc.	Attleboro	MA	02703NRTHS330TU	5–37 6–39 6–49 7–9

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American Steel Foundries, Amsted Ind. Inc.	Alliance	OH	44601MRCNS1001E	6–28 6–36 6–38 6–48 7–11
American Steel Foundries, Amsted Industries Inc.	Granite City	IL	62040MRCNS1700W	4–13 4–18 5–25 5–35 6–27 6–29
Ameristeel Corp.	Charlotte	NC	28213FLRDSHWY11	4–19 5–37 6–39 6–49 7–9
Ameristeel Corp.	Jackson	TN	38305FLRDSUSHIG	4–19 5–37 6–29 6–39 6–49 7–9
Ameristeel Corp., Jacksonville Mill Div.	Baldwin	FL	32234FLRDSHWY21	4–5 4–19 5–5 5–37 6–29 6–39 6–49 7–9
Ameristeel Knoxville Mill Div., Ameristeel Corp.	Knoxville	TN	37921FLRDS1919T	6–39
Amoco Chemical Co., Amoco Corp.	Decatur	AL	35601MCCHMFINLE	6–36 6–49
Amoco Petroleum Prods., Amoco Corp., Texas City Business Uni	Texas City	TX	77590MCLCM24015	6–47 6–49
Angus Chemical Co.	Sterlington	LA	71280NGSCHLAHWY	4–4 4–13 4–14 5–3 5–25 5–27 6–27 6–29 6–47
Aqua Glass Performance Plant, Masco Corp.	Mc Ewen	TN	37101QGLSS155FO	6–27
Aqua Glass West Inc., Masco Corp.	Klamath Falls	OR	97603QGLSS5855W	4–13 5–25 6–27
Aquaglass Corp., Masco Corp.	Adamsville	TN	38310QGLSSINDUS	4–13 4–14 5–25 5–27 6–27 6–29 6–47
Arco Chemical Co., Atlantic Richfield Co.	South Charleston	WV	25303CWSTV437MA	6–28
Armco Inc.	Coshocton	OH	43812CSHCTSTATE	6–47
Armco Inc.	Butler	PA	16003RMCDVROUTE	4–4 4–5 5–3 5–5 6–47 6–49
Armkem Inc.	Drummondville	QC	0000000116	6–25
Armstrong World Ind. Inc.	Lancaster	PA	17604RMSTRLIBER	6–28
Arvin N.A. Automotive, Arvin Industries Inc.	Dexter	MO	63841RVNNR1207A	6–26 6–36
ASARCO Inc.	East Helena	MT	59635SRCNCSMELT	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–37 6–39 6–47 6–49 7–7 7–9
ASARCO Inc.	Omaha	NE	68102SRCNC500DO	4–19 5–37
ASARCO Inc., Glover Plant	Annapolis	MO	63646SRCNCHIGHW	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–27 6–29 6–37 6–39 6–47 6–49 7–7 7–9
ASARCO Inc., Ray Complex/Hayden Smelter	Hayden	AZ	85235SRCNC64ASA	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–26 6–29 6–36 6–38 6–46 6–48 7–6 7–8 7–12
Asea Brown Boveri Inc., ABB Coiltech	Smiths Falls	ON	0000004702	6–22
AT Plastics Inc.	Edmonton	AB	0000000126	5–24 6–23 6–24 6–43 6–44
Atotech Canada Ltd.	Burlington	ON	0000001109	6–32
Auburn Steel Co. Inc.	Auburn	NY	13021BRNSTQUARR	6–39
Augusta Fiberglass Coatings Inc.	Blackville	SC	29817GSTFBROUTE	6–26
Austeel Lemont Co. Inc.	Lemont	IL	60439STLLMNEWAV	4–18 5–35 6–27 6–37 6–39 6–47 6–49
Avenor Inc.	Gold River	BC	0000000927	6–23
Avenor Inc.	Thunder Bay	ON	0000000930	5–2 5–4 6–23 6–25 6–42 6–44
Avenor Inc., Dryden Mill	Dryden	ON	0000000928	5–2 5–4 6–23
Avesta Sheffield Plate Inc., Avesta Sheffield N.A.	New Castle	IN	47362VSTNCSTRD3	6–28 6–38 6–48 7–11
Babcock & Wilcox Canada	Cambridge	ON	0000005600	6–33
Bar Techs. Inc., Primary Ops.	Johnstown	PA	15907FRNKL119WA	6–39
BASF Canada Inc. - Sarnia Site	Sarnia	ON	0000000037	6–24 6–44

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BASF Corp.	Freeport	TX	77541BSFCR602CO	4–4 4–5 5–3 5–5 6–46 6–48
Baycoat Ltd.	Hamilton	ON	0000000015	6–35
Bayer Corp.	New Martinsville	WV	26155MBYCRSTATE	4–4 4–5 5–3 5–5 6–46 6–48
Bayer Corp. Baytown	Baytown	TX	77520MBYCR8500W	6–29
Bayer Rubber Inc.	Sarnia	ON	0000001944	5–2 5–4 5–24 5–26 6–22 6–24 6–42 6–44
Bayer-Muscatine IA, Bayer Corp.	Muscatine	IA	52761BYRMS2500W	6–27
Bayway Refining Co., Tosco Corp.	Linden	NJ	07036XXN 1400P	6–47 6–49
Beauce composites Inc.	Ste-Clotilde-de-Beauce	QC	0000004996	6–23 6–25 6–43
Behlen Mfg. Co.	Columbus	NE	68601BHLNMHWY30	6–36
Belden Canada Inc.	Cobourg	ON	0000002670	6–34
Bethlehem Steel Corp.	Burns Harbor	IN	46304BTHLHBURNS	5–35
Bethlehem Steel Corp.	Sparrows Point	MD	21219BTHLHDUALH	4–18 5–35 6–37
BHP Copper Metals Co., BHP Copper Co.	San Manuel	AZ	85631MGMCPHIGHW	4–4 4–18 4–19 5–3 5–35 5–37 6–37 6–39 6–47 6–49 7–7 7–9
Birmingham Southeast L.L.C., Birmingham Steel Corp.	Flowood	MS	39208BSCSTFOURT	6–28 6–38 6–48
Birmingham Steel Corp., Birmingham Alabama Steel Div.	Birmingham	AL	35234BRMNG4301F	6–37
Blount Canada Ltd.	Guelph	ON	0000003845	5–24 6–23 6–25
Boeing Co.	Wichita	KS	67277BNGML3801S	4–13 4–14 5–25 5–27 6–27 6–29
Boise Cascade Corp.	Saint Helens	OR	97051BSCSC1300K	4–5 5–5
Boler Group, Hendrickson Spring	Stratford	ON	0000003778	6–34 6–44
Bombardier Inc., Division Jet Boat	St-Antoine-de-Tilly	QC	0000004351	5–24 6–22
Bombardier Inc., Division Sea-Doo/Ski-Doo	Valcourt	QC	0000000935	6–22 6–24
Bonar Inc., Burlington Plastic	Burlington	ON	0000000135	6–23 6–25
Borden Co., Sunworthy Wallcoverings	Brampton	ON	0000002263	5–2 5–4 6–42
Bowater Inc., Coated Paper & Pulp Div.	Catawba	SC	29704BWTRC5300C	6–37
Bowater Newsprint, Bowater Inc.	Calhoun	TN	37309BWTRSROUTE	6–37
Boyles Galvanizing Co., Kinark Corp.	Commerce City	CO	80022BYLSG4400E	6–39
BP Chemicals Inc.	Lima	OH	45805BPCHMFORTA	4–4 4–5 4–13 4–14 5–3 5–5 5–25 5–27 6–26 6–28
BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca	TX	77979BPCHMTEXAS	4–4 4–5 4–13 4–14 5–3 5–5 5–25 5–27 6–26 6–28 6–46 6–48
Bristol Aerospace Limited	Winnipeg	MB	0000004869	6–23
Brunswick Smelting Division, Fertilizer Operation	Belledune	NB	0000004027	6–32
Brush Wellman Inc.	Elmore	OH	43416BRSHWSOUTH	6–27
Budd Plastics, Limited	Cobourg	ON	0000004558	6–25
Burkart Foam Inc., Ohio Decorative Prods. Inc.	Cairo	IL	62914BRKRT36THS	6–27 6–29
Burns Philp Food Ltd., Fleischmann's Yeast	Calgary	AB	0000004867	6–23
Butcher Engineering Enterprises Ltd., Orenda Plant	Brampton	ON	0000000139	6–43
C&D Powercom Inc., C&D Charter Power Sys. Inc.	Conyers	GA	30207CDCHR1835I	5–27 6–29 6–39
Cambridge Ind. Inc.	Marion	IN	46952GNCRP1700F	6–27
Camco Inc.	Hamilton	ON	0000002750	6–42

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Cametoid Limited	Whitby	ON	0000003358	6–22
Cami Automotive Inc.	Ingersoll	ON	0000003480	6–42 6–44
Camoplast Inc., Div. Roski I	Roxton Falls	QC	0000002561	5–24 6–22
Camoplast Inc., Groupe composite récréatif, Roski III	Princeville	QC	0000002564	6–23
Camoplast Inc., Groupe composite récréatif, Roski IV	Grand-Mère	QC	0000004784	6–23 6–25 6–43
Can Mar Manufacturing Ltd. Inc.	Niagara Falls	ON	0000004533	6–32
Canac Kitchens Limited	Thornhill	ON	0000004732	6–22 6–42
Canadian Fertilizers Limited	Medicine Hat	AB	0000003821	5–2
Canadian General-Tower Ltd.	Cambridge	ON	0000003475	5–2 5–4
Canbro Inc.	Valleyfield	QC	0000004571	6–33 6–35
Canfor, Prince George Pulp & Paper Mills	Prince George	BC	0000004063	5–2 6–42
Caparo Steel, Caparo Inc.	Farrell	PA	16121SHRNSROEME	5–35 6–27 6–29 6–37
Cargill Corn Milling, Cargill Inc.	Cedar Rapids	IA	52406CRGLL17101	6–48
Carpenter Canada Limited	Woodbridge	ON	0000002567	5–24 5–26 6–23 6–25
Carpenter Canada Ltd.	Calgary	AB	0000000152	5–24 6–23
Carpenter Co.	Elkhart	IN	46516RCRPN195CO	5–25
Carpenter Co.	Russellville	KY	42276RCRPNFORRE	4–13 5–25
Carpenter Co., Tupelo Div.	Verona	MS	38879RCRPNLEEIN	4–13 4–14 5–25 5–27 6–27
Carpenter Tech. Corp.	Reading	PA	19612CRPNT101WB	6–46
Cartons St-Laurent Inc.	Latuque	QC	0000003140	5–2 5–34 5–36 6–23 6–25 6–33 6–35 6–42 6–44
Cascade Steel Rolling Mills, Schnitzer Steel Ind.	McMinnville	OR	97128CSCDS3200N	6–39
Casco Impregnated Papers, Inc.	Cobourg	ON	0000000177	6–22
Celanese Canada Inc.	Edmonton	AB	0000001162	4–4 4–5 4–13 4–14 5–2 5–4 5–24 5–26 6–23 6–25 6–32 6–43 6–45
Celanese Eng. Resins Inc., Hoechst Corp.	Bishop	TX	78343CLNSNONEMI	4–13 5–25
Centrifugal Coaters Inc.	Oakville	ON	0000000675	6–43
Cerro Wire & Cable Co. Inc.	Hartselle	AL	35640CRRWR201TH	4–5 4–19 5–5 5–37
Cezinc (Zinc électrolytique du Canada Limitée)	Salaberry-de-Valleyfield	QC	0000002938	5–34 5–36 6–33 6–34
Champion International Corp.	Bucksport	ME	04416CHMPNMAINS	6–36
Champion International Corp.	Cantonment	FL	32533CHMPN375MU	6–46 6–48
Champion International Corp.	Canton	NC	28716CHMPNMAINS	6–46 6–48
Champion International Corp., Sheldon Mill	Sheldon	TX	77044CHMPN11611	6–37
Charter Steel, Charter Mfg. Co. Inc.	Saukville	WI	53080CHRTR1658C	6–39
Chemetals Inc., Comilog	New Johnsonville	TN	37134CHMTLFOOTE	4–18 4–19 5–35 5–37 6–36 6–38 6–46
Chemical Solvents Inc., Denison Facility	Cleveland	OH	44109CHMCL1010D	6–28 6–48
Chevron Chemical Co. Oak Point Plant, Chevron Corp.	Belle Chasse	LA	70037CHVRNHIGHW	6–46
Chevron Chemical Co., Polyethylene Plant, Chevron Corp.	Orange	TX	77630CHVRNFM100	6–28
Chevron Prods. Co., Chevron Corp., Pascagoula Refinery	Pascagoula	MS	39567CHVRNPOBOX	6–47 6–49
Chevron Prods. Co., Chevron Corp., Richmond Refinery	Richmond	CA	94802CHVRN841ST	6–47

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Chevron USA Prods. Co., Chevron USA	El Segundo	CA	90245CHVRN324WE	6–47 6–49
Chino Mines Co.	Hurley	NM	88043CHNMN210CO	4–4 4–5 4–18 4–19 5–3 5–5 5–35 5–37 6–37 6–39 6–47
Chrysler Canada, Ltd., Bramalea Assembly Plant	Brampton	ON	0000004173	5–2 6–43 6–45
Chrysler Canada, Ltd., Pillette Road Truck Assembly Plant	Windsor	ON	0000003478	6–42 6–44
Chrysler Canada, Ltd., Windsor Assembly Plant	Windsor	ON	0000003476	5–2 5–4 6–23 6–32
Circo Craft	Granby	QC	0000003124	6–23
Cleveland Laminating Corp.	Cleveland	OH	44104LMTT 2909E	5–25 6–27
CMI-Cast Parts Inc., CMI-International Inc.	Cadillac	MI	49601CMCST23010	6–36 6–38
Coastal Chem Inc., Coastal Corp.	Cheyenne	WY	82007WYCNC8305O	4–4 5–3 6–46 6–48
Coatings 85 Ltd.	Mississauga	ON	0000002545	5–36
Cobalt Refinery Company	Fort Saskatchewan	AB	0000004868	5–34 6–25 6–33 6–35
Consumers Packaging Inc., Consumers Glass (Bramalea)	Brampton	ON	0000000517	6–24 6–34
Consumers Packaging Inc., Consumers Glass (Scoudouc)	Scoudouc	NB	0000000520	6–34
Cooper Automotive Products, Wagner Div.	Stratford	ON	0000004489	6–24
Corhart Refractories Corp.	Buckhannon	WV	26201CRHRTROUTE	6–28 6–38
Corn Prods. & Best Foods, CPC International Inc., Argo Plant	Bedford Park	IL	60501CRNPR6400A	6–46 6–48
Corning Inc., Fall Brook Plant	Corning	NY	14831CRNNGTIOGA	6–28 6–38
Cornwall Chemicals Limited	Cornwall	ON	0000003438	6–24
Cosmar Co., Fina Oil & Chemical Co.	Carville	LA	70721CSMRPLAHWY	6–28
Co-Steel Lasco	Whitby	ON	0000003824	4–5 4–14 4–18 4–19 5–2 5–4 5–24 5–26 5–34 5–36 6–22 6–24 6–32 6–34 6–42 6–44 7–6 7–8
Courtaulds Fibers Inc., Courtaulds Finance U.S. Inc.	Axis	AL	36505CRTLDUSHIG	4–4 4–5 5–3 5–5 6–36 6–46 6–48
Cox Creek Refining Co.	Baltimore	MD	21226CXCRK1000K	6–38
CPI, Consolidated Papers Inc.	Wisconsin Rapids	WI	54494CNSLD950FO	4–5 5–5
Craig Industries	Teresita	MO	65573CRGNDCORD6	6–46 6–48
Crain Ind. Inc.	Easton	PA	18042STNFM50HIL	6–27
Crest Foam, Leggett & Platt Inc.	Newburyport	MA	01950CRSTH122PA	6–26
Crown Cork & Seal Canada Inc., Plant 244	Concord	ON	0000003216	6–43 6–45
Crown Packaging Ltd., Paper Mill Division	Burnaby	BC	0000003374	6–22 6–24
CXY Chemicals-Nanaimo Plant	Nanaimo	BC	0000003526	6–24 6–44 7–8
Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool	AZ	85532NSPRTPOBOX	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–27 6–29 6–37 6–39 6–47 6–49 7–7 7–9
Cytec Ind. Inc.	Westwego	LA	70094MRCNC10800	4–4 4–5 4–13 4–14 5–3 5–5 5–25 5–27 6–36 6–46 6–48
Daam Galvanizing Inc.	Edmonton	AB	0000003424	6–32 6–35
Daishowa Inc., usine de Québec	Québec	QC	0000004068	6–42
Daishowa Marubeni International, Peace River Div.	Peace River	AB	0000000223	5–2 5–4 5–24
Dana Canada Inc. Axle Plant	Barrie	ON	0000004737	6–32 6–43
Dana Canada Inc., Spicer Driveshaft Division	Thorold	ON	0000000376	5–36 6–35 6–45

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Dana Corp. Victor Products Div.	Robinson	IL	62454DNCRPSOUTH	6–46
Dana Corp., Sealed Power Div., SPX Corp.	Saint Johns	MI	48879SLDPW916WE	6–27
Delhi Industries Inc	Delhi	ON	0000000231	6–22 6–24
Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum	MO	63048HRCLN881MA	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–26 6–36
Dofasco Inc.	Hamilton	ON	0000003713	4–13 4–14 4–19 5–2 5–4 5–24 5–26 5–34 5–36 6–32 6–35 6–45
Domco Inc.	Farnham	QC	0000002420	6–43
Domfoam International Inc.	St-Léonard	QC	0000002601	5–24 5–26 6–23 6–25
Dominion Castings Ltd.	Hamilton	ON	0000004739	4–14 5–4 5–26 5–36 6–24 6–33 6–34 6–44
Dominion Colour Corporation	Ajax	ON	0000001495	4–5 5–4 5–26 5–36 6–25 6–35 6–45
Domtar Packaging, Red Rock Mill	Red Rock	ON	0000003013	6–23 6–42 6–44
Domtar Papers, Cornwall Business Unit	Cornwall	ON	0000001197	5–24 5–26 6–23 6–25 6–42 6–44
Doorhandle Systems	Brampton	ON	0000001433	5–26 5–36
Dow Chemical Canada Inc.	Sarnia	ON	0000003146	5–2 5–4 5–24 5–26 6–22 6–25 6–42
Dow Chemical Canada Inc., Western Canada Operations	Fort Saskatchewan	AB	0000000280	5–2 5–26 6–43 6–45
Dow Chemical Co.	Freeport	TX	77541THDWCBUILD	4–13 5–3 5–25 5–27
Dow Chemical Co., Louisiana Div.	Plaquemine	LA	70765THDWCHIGHW	6–27
Dow Corning Corp., Midland Site	Midland	MI	48686DWCRN3901S	8–6
DuPont	Louisville	KY	40216DPNTL4200C	6–48 7–11
DuPont	Beaumont	TX	77704DPNTBSTATE	4–4 4–5 5–3 5–5 6–26 6–28 6–46 6–48
DuPont	Victoria	TX	77902DPNTVOLDBL	4–4 4–5 5–3 5–5 6–46 6–48
DuPont Cape Fear	Leland	NC	28451DPNT STATE	6–26 6–36 6–46 6–48
DuPont Circleville Plant	Circleville	OH	43113DPNTCUSRT2	6–27
DuPont Sabine River Works	Orange	TX	77631DPNTSFARMR	4–14 5–27 6–29 6–39
DuPont Canada Inc.	Maitland	ON	0000001207	5–2 5–4 5–34 6–22 6–24
DuPont Canada Inc., Ajax Finishes Division	Ajax	ON	0000000286	6–34
DuPont Chambers Works, DuPont Dow Elastomers LLC	Deepwater	NJ	08023DPNTCRT130	6–29 6–47 6–49
DuPont Dow Elastomers LLC	Louisville	KY	40216DDLSV4242C	6–49 7–12
DuPont Dow Elastomers, DuPont Dow Elastomers LLC	Beaumont	TX	77705DDBMNSTATE	6–27
Durabla Canada Ltd.	Belleville	ON	0000004496	6–42 6–44
Duracell Canada Inc.	Mississauga	ON	0000004631	6–34
E.B. Eddy Forest Products Ltd.	Espanola	ON	0000003185	6–22 6–24
Eastman Chocolate Bayou, Eastman Chemical Co.	Alvin	TX	77511STMNCFM291	6–27 6–29
Eastman Kodak Co., Kodak Park	Rochester	NY	14652STMNK1669L	4–4 4–5 4–13 4–14 5–3 5–5 5–25 5–27 6–26 6–28 6–46
Edo Corp., Acoustic Div.	Salt Lake City	UT	84115DCRPR2645S	6–29
EKA Chimie Canada Inc.	Magog	QC	0000000302	6–25 6–35
El Dorado Chemical Co., LSB Ind. Inc.	El Dorado	AR	71730LDRDC4500N	6–47
Electralloy Corp., G.O. Carlson Inc.	Oil City	PA	16301LCTRL175MA	6–28 6–36 6–38 6–48 7–8 7–11
Electro Finition	LaSalle	QC	0000004363	6–35

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Electrosource Inc.	San Marcos	TX	78666LCTRS2809I	6–28	6–38						
Elkem Metals Co.	Marietta	OH	45750LKMMTROUTE	4–4	4–5	4–13	4–14	4–18	4–19	5–3	5–5
				5–25	5–27	5–35	5–37	6–27	6–37		
Emballages Stone Canada, Division Pontiac	Portage-du-Fort	QC	0000000271	5–2							
Erie Forge & Steel Inc.	Erie	PA	16502NTNLF1341W	6–38							
Esco Limited	Port Coquitlam	BC	0000000606	5–34	5–36	6–32	6–34				
Essex Group Inc.	Lithonia	GA	30058SSXGR6588M	6–38							
Eveready Battery Co. Inc., Ralston Purina Co.	Marietta	OH	45750VRDYBCOUNT	5–37							
Exide Canada Inc.	Drummondville	QC	0000004042	6–32							
Exxon Chemical, Exxon Corp.	Baton Rouge	LA	70805XXNCH4999S	6–46	6–48						
F.F. Soucy Inc.	Rivière-du-Loup	QC	0000004790	5–34	5–36	6–32	6–35				
Fabricated Steel Products Inc.	Dresden	ON	0000004912	6–33							
Fairmount Chemical Co. Inc.	Newark	NJ	07105FRMNT117BL	6–48							
Falconbridge Limited, Smelter Complex	Falconbridge	ON	0000001236	5–34	6–33						
Federal Paper Board Co. Inc.	Riegelwood	NC	28456FDRLPRIEGE	5–25							
Filpac Inc./Transformateur de pellicules d'emballage	Terrebonne	QC	0000001263	6–43	6–45						
Fina Oil & Chemical, American Petrofina Inc.	Big Spring	TX	79721FNLNDIS20E	6–46	6–48						
Finch Pruyn & Co. Inc.	Glens Falls	NY	12801FNCHP1GLEN	6–46	6–48						
Fleet Industries Ltd.	Fort Erie	ON	0000004990	6–23	6–25	6–43					
Fletcher Challenge Canada, Elk Falls Mill	Campbell River	BC	0000000333	5–2	5–4	6–43	6–45				
Flexel Indiana Inc.	Covington	IN	47932FLXLNUSHIG	6–47							
Flexible Foam Products, Ohio Decorative Products	Elkhart	IN	46515FLXBL1900W	4–13	5–25						
Flexsys America L.P. Krummrich	East Saint Louis	IL	62206FLXSY500MO	6–49							
FMC Corp.	Pocatello	ID	83202FMCCR3MIWE	4–4	4–5	4–13	4–14	4–18	4–19	5–3	5–5
				5–25	5–27	5–35	5–37	6–37	6–47		
FMC Corp.	Baltimore	MD	21226FMCCR1701E	6–49							
Foamex Canada Inc.	Toronto	ON	0000002422	5–24	5–26						
Foamex International Inc.	Milan	TN	38358FMXPRKEFAU	4–13	4–14	5–25	5–27	6–27			
Foamex L.P.	Elkhart	IN	46516FMXPR603IN	6–26							
Foamex L.P.	Morristown	TN	37814FMXLP328HA	4–13	5–25						
Foamex L.P., Div. of Kihi	Corry	PA	16407FMXPR466SH	4–13	4–14	5–25	5–27	6–27	6–29		
Foamex L.P., Foamex Intl., Inc.	La Porte	IN	46350RCTCLBOYDB	6–26	6–28						
Fonderies canadiennes d'ccier Ltée	Montréal	QC	0000004371	5–24	5–26	5–34	5–36	6–22	6–24	6–32	6–34
Ford Motor Co., Cleveland Casting	Brook Park	OH	44142FRDMT5600H	6–27	6–38						
Ford Motor Co., Louisville Assembly Plant	Louisville	KY	40213FRDMTFERNV	6–47							
Ford Motor Co., Michigan Truck Plant	Wayne	MI	48184FRDMT38303	6–46							
Ford Motor Co., Sheldon Rd. Plant	Plymouth	MI	48170FRDMT14425	6–26	6–28						
Ford Motor Company of Canada Ltd., Windsor Aluminum Plant	Windsor	ON	0000004416	6–32							
Ford Motor Company, Essex Aluminum Plant	Windsor	ON	0000001269	6–22	6–24	6–32	6–34	6–44			
Ford Motor Company, Oakville Assembly Plant	Oakville	ON	0000003419	5–2							

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Ford Motor Company, Ontario Truck	Oakville	ON	0000001215	6–44
Ford Motor Company, St. Thomas Assembly Plant	St. Thomas	ON	0000003883	5–2 5–4 6–42 6–44
Ford Motor Company, Windsor Casting Plant	Windsor	ON	0000003416	5–34 5–36 6–32 6–34
Formica Canada Inc., FCI-JN	Saint-Jean-sur-Richelieu	QC	0000004378	6–42
Fort Wayne Foundry Pontiac Inc., Cole Pattern & Eng. Co. Inc	Fort Wayne	IN	46803FRTWY2509E	6–38
Franklin Bronze & Alloy Co. Inc.	Franklin	PA	16323FRNKLBOX87	6–38
Fraser Papers Inc (Canada)	Edmundston	NB	0000001221	5–4 5–26 6–25
Freeport Brick Co., Freeport Refractories Inc.	Freeport	PA	16229FRPRTDRAWE	6–47
Freightliner of Canada Ltd.	St. Thomas	ON	0000001224	6–42
Frog Switch & Mfg. Co.	Carlisle	PA	17013THFRG600EH	6–39 6–49
Future Foam Inc.	Middleton	WI	53562FTRFM2210P	6–27
G. W. Composites Inc.	O'fallon	MO	63366GWFBR1700W	6–26
Gaska Tape Inc.	Elkhart	IN	46517GSKTP1810W	6–26 6–28
Gaston Copper Recycling Corp., Southwire Co.	Gaston	SC	29053TTNSSHIGHW	6–38
Gates Rubber Co., Gates Corp.	Iola	KS	66749GTSRB999MI	6–28
GE Lighting Canada, Oakville Lamp Plant	Oakville	ON	0000001281	6–24 6–34
GE Plastics Co., General Electric Co.	Mount Vernon	IN	47620GPLSTLEXAN	4–13 4–14 5–25 5–27 6–26
Gecamex Technologies Inc., Apex Metals Inc.	Kitchener	ON	0000004703	6–34 6–44
Gencorp Automotive Inc., Reinforced Plastics Div., Gencorp I	Marion	IN	46952DVRST1700F	6–28
Gencorp Inc.	Columbus	MS	39702DVRSTYORKV	6–47
General Battery Corp., Exide Corp.	Reading	PA	19605GNRLBSPRIN	4–14 4–19 5–27 5–37 6–29 6–39
General Electric Co.	Burkville	AL	36752GPLSTONEPL	4–13 5–25 6–27 6–29
General Electric Co.	Ottawa	IL	61350BRGWRCANAL	4–13 4–14 5–25 5–27
General Electric Co., Silicone Products	Waterford	NY	12188GNRLL260HU	4–18 5–35 6–36
General Foam Corp., PMC Inc.	Bridgeview	IL	60455GNRLF7401S	4–13 5–25
General Foam Corp., PMC Inc.	West Hazelton	PA	18201GNRLFVALMO	4–13 5–25
General Motors Corp., GMC Powertrain Div.	Danville	IL	61832GMC I74AT	6–36
General Motors Corp., GMTG Saginaw Metal Casting	Saginaw	MI	48605SGNWG1629N	4–18 5–35 5–37 6–36 6–38
General Motors Corp., Powertrain Defiance	Defiance	OH	43512GMC STATE	4–4 4–5 4–18 4–19 5–3 5–5 5–35 5–37 6–36 6–38
General Motors of Canada Limited, Car Plant-Autoplex	Oshawa	ON	0000003893	5–2 5–4 6–42 6–44
General Motors of Canada Limited, Diesel Division	London	ON	0000003766	6–33 6–34
General Motors of Canada Limited, St. Catharines Foundry	St. Catharines	ON	0000003621	6–32
General Motors of Canada Limited, Truck Plant-Autoplex	Oshawa	ON	0000003870	5–2 5–4 6–42 6–44
General Motors of Canada Ltd., Battery Plant-Autoplex	Oshawa	ON	0000003221	6–32
Geneva Steel	Vineyard	UT	84057GNVST1600W	4–18 5–35 6–37 6–39 6–47
Georgia-Pacific Corp.	Brunswick	GA	31520BRNSWWEST9	6–37
Georgia-Pacific Paper Operations	Crossett	AR	71635GRGPCPAPER	5–35 6–36
Georgia-Pacific Resins Inc., Georgia-Pacific Corp.	Elk Grove	CA	95624GRGPC10399	6–48 7–11
Georgia-Pacific Resins Inc., Georgia-Pacific Corp.	White City	OR	97503RVPCR1405A	6–26

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Gerdau Courtice Steel Inc., Courtice Steel Inc.	Cambridge	ON	0000004169	5–4, 5–26, 5–34, 5–36, 6–25, 6–35, 6–45
Gerdau MRM Steel Inc.	Selkirk	MB	0000001651	4–18, 4–19, 5–2, 5–4, 5–24, 5–26, 5–34, 5–36, 6–23, 6–25, 6–33, 6–35, 6–43, 6–45, 7–7, 7–9
Glenbrook Nickel Co., Cominco American Inc.	Riddle	OR	97469GLNBR5093R	4–13, 4–14, 4–18, 5–25, 5–27, 5–35, 5–37, 6–27, 6–29, 6–37, 6–39, 6–47
Glopak Inc.	Montréal	QC	0000000358	6–43
GNB Tech. Inc., Pacific Dunlop GNB Corp.	Leavenworth	KS	66048GNBNC1901S	6–36
GNB Techs. Inc., Pacific Dunlop GNB Corp.	Frisco	TX	75034GNBNCSOUTH	5–35
Goodyear Canada Inc.	Medicine Hat	AB	0000002998	6–32
Goodyear Canada, usine de Québec	Québec	QC	0000001325	6–34
Goodyear Tire & Rubber Co.	Lincoln	NE	68501GDYRT4021N	6–46, 6–48, 7–11
Granite City Steel, National Steel Corp.	Granite City	IL	62040GRNTC20THS	4–4, 4–18, 4–19, 5–3, 5–35, 5–37, 6–37, 6–39
Grant Forest Products Corp.	Englehart	ON	0000004559	5–24, 6–23, 6–25, 6–43, 6–45
Great Lakes Chemical Corp., Central Plant	El Dorado	AR	71731GRTLKHIGHW	4–13, 5–25, 6–26
Great Southern Paper Co., Georgia-Pacific Corp.	Cedar Springs	GA	31732GRTSTHIGHW	5–35
Grede Foundries Inc., Milwaukee Steel Div.	Milwaukee	WI	53204GRDFN1320S	6–29, 6–39, 6–49
Griffin Canada Inc.	Winnipeg	MB	0000001344	6–34
Griffin Wheel Co. Columbus Plant, Amsted Ind. Inc.	Groveport	OH	43125GRFFN3900B	4–18, 5–35, 6–37
Griffin Wheel Co., Amsted Industries Inc.	Bessemer	AL	35020GRFFN2100G	4–18, 5–35
Griffin Wheel Co., Amsted Industries Inc.	Keokuk	IA	52632GRFFNCARBI	4–18, 5–35
Griffin Wheel Co., Amsted Industries Inc.	Kansas City	KS	66111GRFFN7111G	4–18, 5–35
Gulf States Steel Inc., GSS Holding Corp.	Gadsden	AL	35904GLFST174SO	4–18, 5–35, 6–36, 6–38
Harrison Steel Castings Co.	Attica	IN	47918HRRSN900MO	6–26, 6–36
Hayes-Albion Corp., Harvard Industries Inc.	Albion	MI	49224HRVRD601NO	5–35
Heatcraft Inc., Lennox International Inc.	Grenada	MS	38901HTCRFHIGHW	6–26, 6–28
Henkel Canada Ltd., Henkel Surface Technologies	Rexdale	ON	0000001401	6–32
Hercules Inc.	Hopewell	VA	23860QLNCM1111H	5–5
Hexcel Corp.	Salt Lake City	UT	84044HRCLS6800W	6–26
Hoechst-Celanese Chemical Group Ltd., Hoechst Corp.	Bay City	TX	77414HCHSTPOBOX	6–26, 6–28
Hoechst-Celanese Chemical, Hoechst Corp., Clear Lake Plant	Pasadena	TX	77507HCHST9502B	4–4, 4–5, 5–3, 5–5, 6–26, 6–28, 6–46, 6–48
Hoechst-Celanese Corp., Hoechst Corp.	Spartanburg	SC	29304HCHSTI85AT	6–26, 6–28
Hoffmann-La Roche	Freeport	TX	77541HFFMN1000C	6–28
Honda of America Mfg. Inc., American Honda Motor Co. Inc.	Anna	OH	45302HNDFM12500	6–38
Honda of Canada Mfg., Div. of Honda Canada Inc.	Alliston	ON	0000000397	6–43
Horner Charcoal Co. Inc.	Taneyville	MO	65759HRNRC1420G	6–47
Horton CBI Limited	Fort Erie	ON	0000004510	6–34
Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon	MB	0000003414	4–18, 5–2, 5–24, 5–26, 5–34, 5–36, 6–23, 6–25, 6–33, 6–35, 6–43, 6–45
Huls Canada (Brampton)	Brampton	ON	0000003430	6–32, 6–45
Huls Canada, Leaside Facility	Toronto	ON	0000003433	6–33
Huntsman Corporation Canada Inc.	Guelph	ON	0000001436	6–45

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Huntsman Petrochemical Corp., Huntsman Corp.	Port Arthur	TX	77641TXCCHGATE2	4–4 4–5 5–3 5–5 6–26
Hydrite Chemical Co.	Cottage Grove	WI	53527HYDRT150WD	4–14 5–27 6–29
IBM	Endicott	NY	13760BM 1701N	6–28
IBP Inc.	Columbus Junction	IA	52738BPNC HWY70	6–46
IBP Inc.	Joslin	IL	61254BPNC HIGHW	6–46
ICI Canada, ICI Explosifs	Brownsburg	QC	0000002852	5–34 6–33
IMC-Agrico Co., IMC Global Inc.	Uncle Sam	LA	70792GRCCHEASTB	6–47 6–49
IMC-Agrico Co., IMC Global Inc., Faustina Plant	Saint James	LA	70346GRCCHLAHIG	4–4 5–3 6–47
IMC-Agrico Co., New Wales Plant	Mulberry	FL	33860MCFRTHIGHW	5–3 6–46 6–48
Imco Recycling Inc.	Morgantown	KY	42261MCRCY609GA	4–18 5–35 6–37 6–39 6–47
Imco Recycling Inc.	Sapulpa	OK	74066NTRNT15031	6–36
Imco Recycling of Ohio Inc., Imco Recycling Inc.	Uhrichsville	OH	44683MCRCY7335N	6–38
Imperial Oil, IOL Dartmouth Refinery	Dartmouth	NS	0000003698	6–42 6–44
Imperial Oil, IOL Sarnia Refinery	Sarnia	ON	0000003704	5–2 5–4 5–34 5–36 6–23 6–24 6–33 6–35
Imperial Oil, IOL Strathcona Refinery	Edmonton	AB	0000003707	6–24 6–33
Imperial Oil, Sarnia Chemical Plant	Sarnia	ON	0000001464	5–2 5–4 5–24 5–26 6–22
Inco Copper Refinery, Copper Cliff Copper Refinery	Copper Cliff	ON	0000001469	6–32 6–34
Inco Limited Central Mills	Copper Cliff	ON	0000001465	5–34 6–23 6–33 6–35
Inco Limited, Copper Cliff Smelter Complex	Copper Cliff	ON	0000000444	4–4 4–5 4–18 5–2 5–4 5–24 5–26 5–34 5–36 6–22 6–24 6–32 6–34 6–43 6–45
Inco Limited, Manitoba Division	Thompson	MB	0000001473	5–24 5–34 5–36 6–22 6–24 6–32 6–34
Inco Limited, Port Colborne Refinery	Port Colborne	ON	0000001471	5–34 6–33 6–35
Inco Nickel Refinery, Copper Cliff Nickel Refinery	Copper Cliff	ON	0000001467	6–22 6–24 6–32 6–34 6–42 6–44
Industrial Chrome Inc.	Topeka	KS	66608NDSTR834NE	6–37
Industrial Tires Limited	Mississauga	ON	0000000448	6–22
Industries James Maclaren Inc., Div. de la pâte Kraft	Thurso	QC	0000001528	6–42
Industries James Maclaren Inc., Div. du papier journal	Masson-Angers	QC	0000001525	6–42
Inland Technologies Inc., Debert Treatment Centre	Debert	NS	0000004936	6–45
Intermet Corp., Archer Creek Plant	Lynchburg	VA	24505LYNCHRT726	6–36 6–38
International Paper	Hampton	SC	29924WSTNGPOBOX	4–4 5–3
International Paper Co. Riverdale Mill	Selma	AL	36701HMMRMRIVER	6–46
International Paper, Pineville Mill	Pineville	LA	71361NTRNTWILLI	6–47
International Wallcoverings Ltd	Brampton	ON	0000003759	5–2 6–43 6–45
Ioco Refinery—Imperial Oil	Port Moody	BC	0000003710	6–42 6–44
Irving Paper	Saint John	NB	0000003394	6–42
Irving Pulp & Paper Ltd./Irving Tissue Co.	Saint John	NB	0000002604	4–4 5–2 5–4 6–42 6–44
ISK Biosciences Corp., ISK Americas Inc.	Houston	TX	77015FRMNT2239H	6–48
ISP Chemicals Inc., International Specialty Prods.	Calvert City	KY	42029GFCHMHIGHW	6–28
Ivaco Rolling Mills	L'Orignal	ON	0000001520	4–19 5–4 5–26 5–34 5–36 6–32 6–35
I-XI Industries Ltd., Medicine Hat Brick & Tile Plant	Medicine Hat	AB	0000002446	6–33

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J. Ray Mcdermott Inc.	Amelia	LA	70381MRNCNSTATI	6–36
James River Corp.	Camas	WA	98607JMSRVNE4TH	6–26
James River Corp., James River Corp. of VA	Pennington	AL	36916JMSRVROUTE	6–26
James River Corporation	Marathon	ON	0000000462	6–42 6–44
John Deere Limited	Welland	ON	0000001534	6–33
John Morrell & Co., Smithfield Foods Inc.	Sioux Falls	SD	57117JHNMR1400N	6–47 6–49
Johnson Matthey Limited, PMD-Brampton	Brampton	ON	0000003991	6–34
Johnstown Wire Techs.	Johnstown	PA	15906JHNST124LA	6–38
JPE Canada Inc.	Peterborough	ON	0000002656	6–42
K G Packaging	Concord	ON	0000001553	6–22 6–24
Kemira Pigments Inc., Kemira Holdings Inc.	Savannah	GA	31404KMRNCEASTP	6–36
Kennecott Utah Copper, Kennecott Holdings Corp.	Magna	UT	84006KNNCT8362W	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–37 6–39 6–47 6–49 7–7 7–9
Kenworth du Canada	Ste-Thérèse	QC	0000002803	6–44
Kerr-McGee Chemical Corp.	Henderson	NV	89015KRRMC8000L	4–18 5–35 5–37 6–37
Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp.	Hamilton	MS	39746KRRMCUSHIG	4–4 4–18 4–19 5–3 5–35 5–37 6–37 6–39 6–47
Keymark Corp.	Fonda	NY	12068KYMRKRTE33	6–36
Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria	IL	61641KYSTN7000S	4–18 4–19 5–5 5–35 5–37 6–27 6–37 6–47
Kimberly-Clark Corp.	Mobile	AL	36652SCTTPBAYBR	4–13 5–25
Kindred Industries Div. of Emco Ltd.	Midland	ON	0000001555	6–32
Kobe Copper Prods. Inc.	Pine Hall	NC	27042HLSTDHWY31	6–37
Koppel Steel Corp.	Koppel	PA	16136BBCCKMOUNT	5–37 6–39 6–49
Kraft Canada Inc., Ingleside Cheese Operations	Ingleside	ON	0000004441	6–43 6–45
Kronos Canada, Inc.	Varennes	QC	0000001561	5–4 5–34 5–36 6–33 6–35 6–45
Kurz-Hastings Inc.	Philadelphia	PA	19154KRZHSDUTTO	6–46
Lake Erie Steel Company Ltd.	Nanticoke	ON	0000003855	4–5 4–18 4–19 5–2 5–4 5–34 5–36 6–22 6–24 6–33 6–35 6–45 7–9 8–6
Lallemand Inc.	Montréal	QC	0000000705	6–23
Lenzing Fibers Corp.	Lowland	TN	37778LNZNGTENNE	4–4 4–5 5–3 5–5 6–37 6–38 6–46 6–48
Leprino Foods Co.	Roswell	NM	88201LPRNFRTE25	6–47
Les Forges de Sorel Inc.	St-Joseph-de-Sorel	QC	0000004797	5–26 5–36 6–25 6–32 6–35 6–45
Les Papiers Perkins Ltée	Candiac	QC	0000002524	6–42 6–44 7–11
Les Produits chimiques Delmar Inc.	LaSalle	QC	0000004321	5–4 6–45
Les Technologies industrielles SNC Inc.	Le Gardeur	QC	0000004388	6–33
Lilly Industries, Inc., Guardsman Products Ltd.	Cornwall	ON	0000001353	6–23 6–43 6–45
Long Manufacturing Inc.	Cambridge	ON	0000000717	6–33
Long Manufacturing Ltd.	Mississauga	ON	0000001583	6–22
Long Manufacturing Ltd.	Oakville	ON	0000004756	6–35
Louisiana Pigment Co. L.P., Kronos Louisiana Inc.	Westlake	LA	70669KRNSL3300B	4–18 4–19 5–35 5–37 6–26 6–28 6–37

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Louisiana-Pacific Canada Ltd., Dawson Creek OSB	Dawson Creek	BC	0000000718	6–23 6–25 6–43 6–45
LPB Poles Inc.	Masson-Angers	QC	0000002478	6–34
LTV Steel Co. Inc.	East Chicago	IN	46312LTVST3001D	5–35 6–36
LTV Steel Co. Inc.	Cleveland	OH	44127LTVST3100E	4–18 5–35 6–36 6–38 6–46
Lukens Steel Co., Lukens Inc.	Coatesville	PA	19320LKNSSMODEN	6–36
Lynchburg Foundry Co., Intermet Corp.	Radford	VA	24141LYNCHFIRST	6–37
M.B. Paper, Alberni Specialties Division	Port Alberni	BC	0000001593	6–24 6–43 6–45
Maax, Division fibre de verre moderne-usine 4	Tring-Jonction	QC	0000004324	6–22 6–24 6–42
Maax, Division fibre de verre moderne-usine 5	Tring-Jonction	QC	0000004916	6–23 6–25 6–43
Macmillan Bloedel, North Superior Forest Products	Wawa	ON	0000004892	6–23 6–25 6–43
Madison Ind. Inc.	Old Bridge	NJ	08857MDSNNOLDWA	5–37 6–39 6–49
Magnesium Corp. of America, Renco Group	Rowley	UT	84074MXMGNROWLE	4–4 4–5 5–3 5–5 6–47
Magotteaux Corp., Magotteaux International	Pulaski	TN	38478MRCNM2360I	6–36 6–38
Magotteaux Inc.	Magog	QC	0000004799	6–24 6–34 6–44
Malette Inc., Kraft Pulp & Paper Division	Smooth Rock Falls	ON	0000001596	6–43
Malette Québec Inc., Panneaux Malette OSB	St-Georges-de-Champlain	QC	0000004386	6–22 6–24
Maritime Electric Company Ltd., Thermal Generating Station	Charlottetown	PE	0000004268	6–32
Maritime Steel and Foundries Limited	New Glasgow	NS	0000004883	5–36 6–35
Marport Smelting Co.	East Chicago	IN	46312MRPRT4323K	6–39
Mastercraft Boat Co., Meridian Sports Inc.	Vonore	TN	37885MSTRC100CH	6–26
MB Paper Ltd.	Powell River	BC	0000000723	6–42
Merck & Co. Inc.	Rahway	NJ	07065MRCKC126EL	6–48
Merichem Co., Greens Bayou Plant	Houston	TX	77015MRCHM1914H	6–48
Metal Impact Corp.	Rosemont	IL	60018MTLMP5500M	5–25 6–27 6–29
Metal Mark Inc., Imco Recycling Inc.	Chicago Heights	IL	60411CLMBL400EA	4–18 5–35 6–37 6–39
Metalex Products Ltd.	Richmond	BC	0000000732	5–26 5–34 5–36 6–25 6–33 6–35 6–45
Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda	QC	0000003623	4–13 4–18 5–2 5–4 5–24 5–26 5–34 5–36 6–33 6–35
Métallurgie Noranda, Affinerie CCR	Montréal-Est	QC	0000003916	5–36 6–33 6–35
Methanex Corporation	Medicine Hat	AB	0000001782	5–2 5–4 6–42 6–44
Michelin North America (Canada) Inc.	Bridgewater	NS	0000003468	5–34 6–33
Michelin North America (Canada) Inc.	Kitchener	ON	0000003472	6–35
Michelin North America (Canada) Inc., Waterville NS Plant	Cambridge Station	NS	0000003470	6–34
Millennium Inorganic Chemicals Plant 1, Millennium Chemicals	Ashtabula	OH	44004SCMCH2900M	6–37 6–39 6–49
Millennium Inorganic Chemicals, Millennium Chemicals, Hawking Point Plants	Baltimore	MD	21226SCMCH3901G	6–36 6–38 6–46
Millennium Petrochemical Inc., Millennium Chemicals Inc.	La Porte	TX	77571QNTMC11603	6–28 6–38 6–48
Mirolin Industries	Toronto	ON	0000003573	5–24 5–26 6–22
Mitsubishi Electronics Industries Canada Inc.	Midland	ON	0000000734	5–26 5–36 6–22 6–25 6–32 6–35
Mobil Chemical Co., Mobil Corp., Houston Olefins Plant	Houston	TX	77017MBLCH9822L	6–47 6–49

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Monarch Tile Inc., Ceragen Holdings S.A.	Marshall	TX	75670MNRCH333MA	6–36
Mondo America Inc.	Laval	QC	0000004326	6–32
Monsanto Canada Inc., Produits chimiques	LaSalle	QC	0000001648	6–24 6–45
Monsanto Co.	Decatur	AL	35601MNSNTCOURT	6–26 6–46
Monsanto Co.	Gonzalez	FL	32533MNSNT3000O	4–4 4–5 5–3 5–5 6–47 6–49
Monsanto Co.	Luling	LA	70070MNSNTRIVER	4–4 4–13 4–14 5–3 5–25 5–27 6–27 6–29 6–47 6–49
Monsanto Co., Chocolate Bayou	Alvin	TX	77511MNSNTFM291	4–13 4–14 5–25 5–27 6–26 6–28
Monsanto Co., Indian Orchard	Springfield	MA	01151MNSNT730WO	6–28 6–48
Montell Canada Inc	Varennes	QC	0000000391	6–42
Morbern Incorporated	Cornwall	ON	0000000741	5–2 5–4 6–43 6–45
Morton International, Ltd.	Ajax	ON	0000003971	6–45
Motor Coach Industries Ltd., Plants 1, 2 and 3	Winnipeg	MB	0000001653	6–33
Mountain Pass Operation, Unocal Corp.	Mountain Pass	CA	92366MLYCRI15AN	6–36 6–46 6–48
Murray Inc., Tompkins - PLC	Lawrenceburg	TN	38464MRRYHHANNO	6–29
National Steel Corp., Great Lakes Div.	Ecorse	MI	48229GRTLKNO1QU	4–5 4–19 5–5 5–37
National Steel Corp., Midwest Steel Div.	Portage	IN	46368MDWSTROUTE	6–37
National-Spar Inc	Swift Current	SK	0000004194	6–33
National-Standard Co. of Canada Ltd., Guelph Plant (70)	Guelph	ON	0000004538	5–26 5–36 6–25 6–35 6–45
New Boston Coke Corp.	New Boston	OH	45662NWBST600RI	6–47
Newport Steel Corp., NS Group Inc.	Wilder	KY	41071NWPRTLICKI	6–38
Noltex L.L.C., Mitsubishi Chemical America Inc.	La Porte	TX	77571NLTXL12220	4–14 5–27 6–29 6–49
Noranda Mining and Exploration Inc., Brunswick Smelting Divi	Belledune	NB	0000004024	5–34 6–33
Norbord Industries Inc.	La Sarre	QC	0000001748	6–22
Norbord Industries Inc.	Val-d'or	QC	0000001745	6–23
Norcast Division de Tritech Precision, Fonderie Norcast Inc.	Mont-Joli	QC	0000004819	6–33 6–34
Norkraft Quévillon Inc.	Lebel-sur-Quévillon	QC	0000000279	6–22
Norsk Hydro Canada Inc., Hydro Magnesium Canada	Bécancour	QC	0000000747	6–35
North American Rayon Corp., North American Corp.	Elizabethton	TN	37643NRTHMWESTE	6–37
North American Royalties Inc., Wheland Foundry Div.	Chattanooga	TN	37343WHLND2800S	6–38
North American Stainless L.P., Acerinox S.A. Spain	Ghent	KY	41045NRTHMUS42E	6–47
North Atlantic Refining Ltd	Come By Chance	NF	0000004316	5–34 5–36 6–33 6–43
North Star Recycling, Cargill Inc.	Saint Paul	MN	55119NRTHS1678A	6–36 6–38
North Star Steel Houston, Cargill Inc.	Houston	TX	77229NRTHS8603S	6–36
Northwestern Steel & Wire Co.	Sterling	IL	61081NRTHW121WA	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–36 6–38 6–46 6–48
Nova Chemicals (Canada) Ltd.	Corunna	ON	0000001776	5–24 6–23 6–25 6–32 6–34
Nova Chemicals Ltd.	Sarnia	ON	0000001785	6–24
Nova Chemicals Ltd., Joffre Petrochemical Plantsite	Red Deer	AB	0000001779	6–22 6–24
Nova Chemicals Ltd., St. Clair Site	Corunna	ON	0000004700	4–4 5–2 5–4 6–24

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Nova Corporation of Alberta	Montréal	QC	0000000752	6–23
Novartis Crop Protection Inc., Novartis Corp.	St. Gabriel	LA	70776CBGGYRIVER	6–47
Novopharm Limited	Markham	ON	0000002472	5–24 6–22
Novopharm Limited	Scarborough	ON	0000002469	4–13 5–24 5–26 6–22 6–24
Nucor Steel, Nucor Corp.	Crawfordsville	IN	47933NCRST400SO	4–5 4–19 5–5 5–37 6–39 6–49 7–9
Nucor Steel, Nucor Corp.	Darlington	SC	29532NCRSTBOX52	4–19 5–37 6–29 6–39 6–49 7–9
Nucor Steel, Nucor Corp.	Jewett	TX	75846NCRSTHWY79	5–35 6–37
Nucor Steel, Nucor Corp.	Plymouth	UT	84330NCRST7285W	4–19 5–37 6–29 6–39 6–49 7–9
Nucor-Yamato Steel Co., Nucor Corp.	Blytheville	AR	72316NCRYM5929E	4–19 5–37 6–29 6–39 6–49 7–9
Nu-Foam Products, Ohio Decorative Products Inc.	Chattanooga	TN	37406NFMPR1101W	4–13 5–25 5–27 6–27
Nutrite Inc., Nitrogen Division	Maitland	ON	0000003807	6–43 6–45
Oakside Chemicals Limited	London	ON	0000003968	6–44
Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne	NC	28429CCDNTOFFST	4–4 4–5 4–13 4–14 4–18 4–19 5–3 5–5 5–25 5–27 5–35 5–37 6–27 6–29 6–37 6–39 6–47 6–49 7–12
Olin Brass Indianapolis, Olin Corp.	Indianapolis	IN	46241BRDGP1800S	6–38
Olin Corp., Lake Charles Plant	Westlake	LA	70602LNCRPI10WE	6–29
Olympic Products Co., Cone Mills Corp.	Tupelo	MS	38802LYMPC1116S	4–13 5–25 6–27 6–29
Oregon Steel Mills Inc.	Portland	OR	97203RGNST14400	4–19 5–37
Organic Techs., Wiley Organics Inc.	Newark	OH	43055RGNCT1780T	6–29
OSF Inc., P12	Weston	ON	0000004766	6–43
OSI Specialties Inc., Organosilicones Group	Friendly	WV	26175NNCRBSTATE	6–48
O'Sullivan Corp.	Winchester	VA	22601SLLVN1944V	6–46
Owens-Corning	Newark	OH	43055WNSCRCASEA	6–29 6–37
Owens-Corning Canada Inc.	Edmonton	AB	0000001251	6–34
Owens-Corning Canada Inc.	Candiac	QC	0000001858	6–22
Owens-Corning Canada Inc., Guelph Glass Plant	Guelph	ON	0000003287	6–32 6–34 6–44
Oxid L.P.	Houston	TX	77012XDNCR101CO	6–49
Paintplas Inc.	Ajax	ON	0000000733	5–2
PCS Nitrogen Fertilizer L.P., Potash Corp. of Saskatechwan	Geismar	LA	70734RCDNCHIGHW	4–4 4–5 5–3 5–5 6–47 6–49
PCS Phosphate Co. Inc., Potash Corp. of Saskatchewan	Aurora	NC	27806TXSGLHIGHW	4–4 4–5 5–3 5–5
PCS Phosphate, Potash Corp. of Saskatchewan	White Springs	FL	32096CCDNTSTATE	4–4 5–3
PD Glycol, Occidental Petroleum Corp.	Beaumont	TX	77704PDGLYGULFS	6–28 6–48
Pemco Aeroplex Inc., Precision Standard Inc.	Birmingham	AL	35212HYSNT19435	6–26 6–28
Petro-Canada, Burrard Products Terminal	Port Moody	BC	0000003905	6–25 6–45
Petro-Canada, Edmonton Refinery	Edmonton	AB	0000003903	6–25 6–42 6–44
Petro-Canada, Mississauga Lubricant Center	Mississauga	ON	0000003899	6–24
Petro-Canada, raffinerie de Montréal	Montréal	QC	0000003897	5–24 5–34 6–32
Pétroles Coastal Canada Inc., Pétrochimie Coastal du Canada	Montréal	QC	0000004569	6–43 6–45
Pétromont, société en commandite	Varennes	QC	0000003634	6–22 6–24 6–42

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Pétromont, société en commandite	Montréal-Est	QC	0000003635	6–42	6–44						
Pfizer Inc-Groton Site	Groton	CT	06340PFZRNEASTE	6–46							
Pfizer Pharmaceuticals Inc., Pfizer Inc.	Barceloneta	PR	00617PFZRPHIGHW	6–28							
Pharmacia & Upjohn Co.	Portage	MI	49001THPJH7171P	4–5	4–14	5–5	5–27	6–26	6–29	6–46	6–48
Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas	NM	88009PHLPSHIDAL	4–4 6–36	4–5 6–38	4–18	4–19	5–3	5–5	5–35	5–37
Philips Display Components Co., Philips Electronics N.A.	Ottawa	OH	45875PHLPS700NO	6–28	6–38						
Pioga LLC, Pioneer International Inc.	Nashville	GA	31639CRTVDHWY12	6–27	6–29						
Piper Impact Inc.	New Albany	MS	38652PPRMPBOX72	6–26	6–28						
Potlatch Corp., Idaho Pulp & Paperboard Div.	Lewiston	ID	83501PTLTC805MI	6–36							
PPG Canada Inc., Clarkson Coatings & Related Products	Mississauga	ON	0000001953	6–44							
PPG Canada Inc., Works 84	Owen Sound	ON	0000004861	5–26	5–36	6–25	6–35	6–45			
Prestige Fabricators Inc.	Asheboro	NC	27203PRSTG2206D	6–27							
Produits American Biltrite Ltée	Sherbrooke	QC	0000001083	6–22	6–32						
Produits forestiers Donohue Inc., usine de pâte Kraft	St-Félicien	QC	0000003242	5–2	5–34	5–36	6–33	6–35	6–43	6–45	
Pro-Line Boats Inc., American Marine Holdings	Homosassa	FL	32646PRLNB1520S	6–26							
Protec Finishing Ltd.	Mississauga	ON	0000002543	6–35							
Prototype Circuits Inc	Scarborough	ON	0000001993	6–34							
Pyron Metal Powders Inc.	Greenback	TN	37742GRNBCBOX63	6–36							
QIT-Fer et Titane Inc.	Tracy	QC	0000004806	5–34	5–36	6–24	6–32	6–34	6–44		
Quality Automotive Co.	Tappahannock	VA	22560QLTYTRT627	6–28							
Quality Chemicals Inc., Chemfirst Corp.	Tyrone	PA	16686QLTYCINDUS	4–14	5–27	6–29					
Quanex Corp., Macsteel Michigan Div.	Jackson	MI	49204QNXCRPOBOX	6–37							
Quemetco Inc., RSR Corp.	City of Industry	CA	91745QMTCN720SO	4–14	4–19	5–27	5–37	6–29			
Quemetco Inc., RSR Corp.	Indianapolis	IN	46231QMTCN7870W	4–14	4–19	5–27	5–37	6–39			
QX Inc., Spectro Alloys Corp.	Hamel	MN	55340QXNC 2705W	6–37							
R.J. Reynolds Tobacco Co., RJR Nabisco Holding Corp.	Merry Hill	NC	27957RJRYNSTATE	6–36							
Ranger Board Ltd	Blue Ridge	AB	0000004830	6–22							
Ranger Boats/Wood Mfg. Co., Genmar Holdings Inc.	Flippin	AR	72634RNGRBHWY17	6–26							
Recyclage d'aluminium Québec Inc.	Bécancour	QC	0000002799	5–34	5–36	6–33					
Recyclage d'aluminium Québec Inc., Ragueneau	Baie-Comeau	QC	0000002801	5–34	5–36	6–33					
Regal Ware Inc.	Kewaskum	WI	53040RGLWR20120	4–5	4–19	5–5	5–37	6–39	6–49		
René Matériaux Composites Ltée	St-Éphrem-de-Beauce	QC	0000004981	5–24	5–26	6–23	6–25	6–43	6–45		
Rexam Metallizing	Brantford	ON	0000003580	6–43							
Reynolds Metals Co.	Sheffield	AL	35660RYNLD501W2	6–46	6–48	7–11					
Rhone-Poulenc Basic Chemicals, Rhone-Poulenc Inc.	Martinez	CA	94553STFFR100MO	6–38							
Rinker Boat Co. Inc.	Syracuse	IN	46567RNKRB207CH	6–27							
Riverside Brass Ltd.	New Hamburg	ON	0000004978	5–34	6–33						
Riverside Brass, Riverside Brass & Aluminum Foundry	New Hamburg	ON	0000002544	6–32	6–34						
Rockwell International of Canada, Tilbury Brake Plant	Tilbury	ON	0000004770	6–32							

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Rouge Steel Co.	Dearborn	MI	48121RGSTL3001M	4–5, 4–19, 5–5, 5–37, 6–39, 6–49
Royal Oak Ents., Kenbridge Kilns	Kenbridge	VA	23944RYLKNHWY13	6–47, 6–49
Royal Oak Ents., Medford Furnace	White City	OR	97503RYLKN7930A	6–47
Rubicon Inc.	Geismar	LA	70734RBCNN9156H	4–4, 5–3, 5–5, 6–46, 6–48
S. D. Warren Co.	Westbrook	ME	04092SDWRR89CUM	6–38
Sammi Atlas Inc., Aciers inoxydables Atlas	Tracy	QC	0000003953	5–2, 5–4, 5–26, 5–36, 6–22, 6–25, 6–32, 6–35, 6–42, 6–44
Sammi Atlas Inc., Atlas Specialty Steels	Welland	ON	0000003158	5–4, 5–24, 5–26, 5–34, 5–36, 6–23, 6–25, 6–33, 6–35, 6–45
Sandvik Steel Canada	Arnprior	ON	0000004524	5–24, 5–26, 6–23
Schering-Plough Prods. Inc., Schering-Plough Corp.	Manati	PR	00701SCHRNROAD6	6–28
SCM Chemicals Americas Plant II, SCM Chemicals Inc.	Ashtabula	OH	44004SCMCH2426M	4–19, 5–37, 6–37
Secal, usine Vaudreuil	Jonquière	QC	0000002978	6–43
Senior Flexonics Inc., Senior Eng.	Bartlett	IL	60103FLXNC300ED	6–27
Sequentia Inc.	Grand Junction	TN	38039SQNTN450NO	4–14, 5–27
Shell Canada Products Ltd., Sarnia Manufacturing Centre	Corunna	ON	0000003962	5–24, 5–26, 5–34, 6–32
Shell Canada Products Ltd., Scotford Refinery	Fort Saskatchewan	AB	0000002960	6–23, 6–25, 6–43, 6–45
Shell Oil Co.	Deer Park	TX	77536SHLLLHIGHW	4–14, 5–27, 6–29, 6–46, 6–48
Sherritt International Corporation	Fort Saskatchewan	AB	0000002132	6–24, 6–32, 6–34, 6–42, 6–44
Shieldalloy Metallurgical, Metallurg Inc.	Newfield	NJ	08344SHLDLWESTB	6–28, 6–38
Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur	QC	0000003649	4–4, 4–18, 4–19, 5–2, 5–4, 5–24, 5–26, 5–34, 5–36, 6–23, 6–25, 6–33, 6–35, 6–43, 6–45
Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur	QC	0000003655	4–18, 5–2, 5–24, 5–26, 5–34, 5–36, 6–23, 6–25, 6–33, 6–35, 6–43, 6–45
Sifto Canada Inc.	Unity	SK	0000002152	6–32
Simpson Pasadena Paper Co., Simpson Investment Co.	Pasadena	TX	77506SMPSNNORTH	6–48
Simpson Steel Fabricators & Erectors Inc.	Murray	UT	84107SMPSN120WF	6–37
Sivaco Québec	Marieville	QC	0000003812	6–34
Skeena Cellulose Inc., Skeena Pulp Operations	Skeena	BC	0000002158	5–2, 5–4
Slater Steels, Fort Wayne Spec. Alloys Div.	Fort Wayne	IN	46801SLTRS2400T	6–28, 6–38
Slater Steels, Hamilton Specialty Bar Division	Hamilton	ON	0000002161	4–19, 5–4, 5–26, 5–34, 5–36, 6–24, 6–34, 6–44
Sloan Valve Co.	Augusta	AR	72006NBCNCHWY33	6–36
Smith & Nephew Inc.	Lachine	QC	0000002167	6–23
Société canadienne de métaux Reynolds	Baie-Comeau	QC	0000002038	6–35
Societe d'électrolyse et de chimie Alcan, usine Arvida	Jonquière	QC	0000003406	6–43, 6–45
Southwire Co.	Carrollton	GA	30119CPPRDCENTR	4–14, 5–27, 5–37, 6–29, 6–39, 6–49
Spicer Driveshaft Div., Dana Corp.	Louisville	KY	40245SPCRD12720	6–37
Spruce Falls Inc.	Kapuskasing/O'Brien	ON	0000002173	5–34, 6–33
St. Anne-Nackawic Pulp Company Ltd.	Nackawic	NB	0000002181	5–2, 5–4, 5–34, 6–22, 6–24, 6–32
Standard Products (Can.) Ltd., Mitchell Rubber Plant #4	Mitchell	ON	0000004411	6–34
Standard Products (Canada) Ltd., Rubber Plant #1	Stratford	ON	0000002176	5–2, 5–4, 6–42, 6–44

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Standard Products (Canada) Ltd., Rubber Plant #2	Stratford	ON	0000004409	6–34
Stanley-Bostitch, Stanley Works	Clinton	CT	06413STNLYKNOLL	6–36
Steel Dynamics Inc.	Butler	IN	46721STLDY4500C	4–19 5–37 6–29 6–39 6–49 7–9
Steelwood Doors Co.	Woodbridge	ON	0000002633	6–43
Stelco Inc., Hilton Works	Hamilton	ON	0000002984	4–14 5–4 5–24 5–26 5–34 5–36 6–23 6–25 6–33 6–34 6–43 6–45
Stelco McMaster Ltée	Contrecoeur	QC	0000002986	4–19 5–4 5–26 5–34 5–36 6–25 6–33 6–35 6–45 7–9
Stelfil Ltée	Lachine	QC	0000003568	6–34
Stelpipe Ltd., Steel Tube Manufacturing	Welland	ON	0000003403	6–34
Stelwire Ltd., Parkdale Works	Hamilton	ON	0000004045	5–36 6–33 6–35
Sterling Chemicals Inc.	Texas City	TX	77592STRLN201BA	4–4 4–13 4–14 5–3 5–5 5–25 5–27 6–46 6–48
Sternson Group Head Office	Brantford	ON	0000002211	6–32 6–34
Stone Container Corp.	Panama City	FL	32401STNCN1EVER	5–5 6–37
Stone-Consolidated Corporation	Kenora	ON	0000004030	6–42 6–44
Strick Corp., Chassis Div.	Berwick	PA	18603STRCK9THOA	6–36 6–38
Styrochem International, Ltd.	Baie d'Urfé	QC	0000003250	6–22
Sulconam Inc., Sulfur Plant	Montréal-Est	QC	0000002229	6–42
Sunbird Boat Co., Outboard Marine Corp.	Columbia	SC	29201SNBRD2348S	6–26
Sunoco Inc., Sarnia Refinery	Sarnia	ON	0000003071	6–43
Suzorite Mica Products Inc., Mica Plant	Boucherville	QC	0000004573	5–24
Sydney Steel Corporation	Sydney	NS	0000004204	4–18 5–34 5–36 6–22 6–24 6–32 6–34 6–42 6–44
Talley Metals Tech. Inc., Talley Ind. Inc.	Hartsville	SC	29550TLLYMSCHWY	6–38
Tamco	Rancho Cucamonga	CA	91739TMC 12459	6–39
Tarxien Components Corporation, Paint Facility	Concord	ON	0000004849	6–42
Techno Caoutchouc Inc.	Rock Forest	QC	0000002975	6–22
Tennessee Eastman, Eastman Chemical	Kingsport	TN	37662TNNSSEASTM	4–4 5–3 6–46 6–48
Texas Fibers, Leggett & Platt Inc.	Brenham	TX	77833TXSFB1200R	6–26 6–28
Thomson Consumer Electronics Inc.	Circleville	OH	43113THMSN24200	4–14 5–27 6–29 6–39
Three Rivers Refy., Ultramar Diamond Shamrock Inc.	Three Rivers	TX	78071DMNDS301LE	6–47 6–49
Timken Co., Faircrest Steel Plant	Canton	OH	44706THTMK4511F	6–39 6–49
Timken Co., Harrison Steel Plant	Canton	OH	44706HRRSNHARRI	6–39
Tippecanoe Labs., Eli Lilly & Co.	Shadeland	IN	47905LLLLYLILLY	6–26 6–46
Titan Steel & Wire Co. Ltd.	Surrey	BC	0000004307	6–24 6–34 6–44
TM Composites Inc.	Thetford Mines	QC	0000004997	6–23 6–25
Tokico USA Inc.	Berea	KY	40403TKCSN301MA	6–26
Tomkins Ind. Inc., Lasco Bathware Div.	Cordele	GA	31015PHLPS210SO	4–13 5–25 6–27
Tomkins Ind. Inc., Lasco Bathware Div.	Three Rivers	MI	49093PHLPS15935	4–13 5–25 6–27
Tomkins Ind. Inc., Lasco Bathware Div.	Moapa	NV	89025LSCBT201NM	6–27

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Tomkins Ind. Inc., Lasco Bathware Div.	South Boston	VA	24592PHLPSPOBOX	6–27
Tonolli Canada Limited	Mississauga	ON	0000002256	5–26 5–36 6–25 6–35 6–45
Trentonworks Ltd.	Trenton	NS	0000004993	6–33 6–43
Trinity American Corp.	High Point	NC	27263TRNTYHWY31	6–26
Trinity Marine Baton Rouge, Trinity Ind. Inc.	Baton Rouge	LA	70821TRNTY6012S	6–27
TXI Operations L.P.	Midlothian	TX	76065TXSND245WA	6–36
US Pipe & Foundry Co., Walter Industries Inc.	Union City	CA	94587NTDST1295W	6–38
US Pipe & Foundry Co., Walter Industries Inc.	Birmingham	AL	35207NTDST30003	5–35
US Steel Gary Works, USX Corp.	Gary	IN	46402SSGRYONENO	4–4 4–5 4–18 4–19 5–3 5–5 5–35 5–37 6–36 6–38
US Sugar Corp., Eastern Div. Chemical House	Canal Point	FL	33438NTDSTOFFUS	6–36
US Vanadium Corp., Strategic Minerals Corp.	Hot Springs	AR	71901SVNDM5911M	5–35
Uniboard Canada Inc.	Val-d'Or	QC	0000004060	5–24 6–23 6–25 6–43
Uniboard Canada Inc.	Mont-Laurier	QC	0000000758	5–24 5–26 6–43
Uniboard Canada Inc., Unires	Val-d'Or	QC	0000003381	5–26 6–25 6–45
Union Camp Corp.	Prattville	AL	36067NNCMP100JE	6–37
Union Carbide Canada Inc., Prentiss Ethylene Glycol Plant	Lacombe County	AB	0000002316	5–2 5–4
Union Carbide Corp.	Texas City	TX	77592NNCRB33015	6–49
Uniroyal Chemical Co. Inc., Crompton & Knowles Corp.	Painesville	OH	44077NRYLC720FA	6–26
Universal- Rundle Corp., Nortek Inc.	Union Point	GA	30669NVRSL1INDU	6–27 6–29
Universal-Rundle Corp., Bathing Systems Div., Nortek Inc.	Ottumwa	IA	50501NVRSL2908N	6–27
Upjohn Mfg. Co., Pharmacia & Upjohn Inc.	Arecibo	PR	00617THPJHHIGHW	4–13 4–14 5–25 5–27 6–26
USS Fairfield Works, USX Corp.	Fairfield	AL	35064SSFRFVALLE	4–18 4–19 5–3 5–35 5–37 6–37
USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock	PA	15104SSDGRBRADD	4–5 4–19 5–5 5–37 6–39 6–49 7–9
USS/Kobe Steel Co.	Lorain	OH	44055SSLRN1807E	6–36
Valeo Engine Cooling Ltd., Automotive Division	Stratford	ON	0000002329	6–35
Valero Refining Co., Valero Energy Corp.	Corpus Christi	TX	78469VLRRF5900U	6–38
Valle Foam Industries Inc., Valle 1	Brampton	ON	0000004428	5–24 5–26 6–22
Valle Foam Industries Inc., Valle 2	Brampton	ON	0000004429	5–24
Varity/Kelsey-Hayes Canada Ltd., Eureka Foundry Division	Woodstock	ON	0000001547	5–36 6–34
Velcro Canada Inc.	Brampton	ON	0000004210	6–42 6–44
Vernomatic I	Concord	ON	0000004556	6–33
Vernomatic II	Downsview	ON	0000003021	6–33
Vicksburg Chemical Co.	Vicksburg	MS	39180CDRCHPOBOX	4–4 5–3 6–46
Vintex Inc.	Mount Forest	ON	0000002355	6–32
Vitafoam Inc., Vita Inc.	High Point	NC	27263LPFMN2222S	6–26
Vitafoam Products Canada Ltd.	Calgary	AB	0000004553	5–24
Vitafoam Products Canada Ltd., Toronto Facility	Downsview	ON	0000004552	5–24 5–26 6–24
Wabash Alloys	Toronto	ON	0000002357	5–34 6–35
Wabash Alloys, Connell L.P.	Wabash	IN	46992WBSHLOLDUS	6–36

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Wacker Siltronic Corp.	Portland	OR	97210WCKRS7200N	6–47
Warner-Lambert Co., Parke-Davis Div.	Holland	MI	49424PRKDV188HO	4–5 5–5 6–49
WCI Steel Inc.	Warren	OH	44481WRRNW1040P	4–18 5–35
Western Co-Operative Fertilizers Limited	Calgary	AB	0000002376	6–24 6–44
Westvaco Corp., Bleached Board Div.	Covington	VA	24426WSTVCRIVER	5–3 6–37
Weyerhaeuser Canada Ltd., Drayton Valley OSB Mill	Drayton Valley	AB	0000002760	5–24 5–26 6–23 6–25
Weyerhaeuser Canada Ltd., Edson OSB Mill	Edson	AB	0000002762	5–24 5–26 6–22 6–24
Weyerhaeuser Canada Ltd., Grande Prairie Operations	Grande Prairie	AB	0000002875	5–34 6–33 6–35
Weyerhaeuser Canada Ltd., Kamloops Pulp Division	Kamloops	BC	0000002924	5–34 5–36 6–33 6–35
Weyerhaeuser Canada Ltd., Slave Lake OSB Mill	Slave Lake	AB	0000002764	5–24 6–23 6–25
Weyerhaeuser Co.	Valliant	OK	74764WYRHSHIGHW	6–27
Weyerhaeuser Co.	Longview	WA	98632WYRHS3401I	4–13 5–3 5–25 5–27 6–26 6–28 6–46
Weyerhaeuser Saskatchewan Ltd., Prince Albert Pulp & Paper	Prince Albert	SK	0000003610	5–2 5–34 6–33 6–35 6–42 6–44
Wheatland Tube Co., John Maneely Co.	Chicago	IL	60609MNLYL4435S	6–26
Wheeling-Pittsburgh Steel Corp, Steubenville East Plant	Follansbee	WV	26037WHLNGROUTE	6–26 6–46
Wheeling-Pittsburgh Steel, Wheeling-Pittsburgh Corp.	Martins Ferry	OH	43935WHLNG1134M	6–38
Wheland Foundry Div., North American Royalties Inc.	Warrenton	GA	30828WHLND1117T	6–37
Willamette Ind. Inc.	Bennettsville	SC	29512WLLMTHWY9A	6–26 6–28
Wilson Trailer Co.	Sioux City	IA	51106WLSNT4400S	6–37
Witco Canada Inc., West Hill Plant	Scarborough	ON	0000003553	5–2 5–4
Wolverine Tube (Canada) Inc.	Fergus	ON	0000002715	5–34 6–32
Wolverine Tube (Canada) Inc.	London	ON	0000002396	5–24 5–26
Woodbridge Foam Corporation, Kipling Plant	Woodbridge	ON	0000002388	6–23
Wyeth-Ayerst, Canada Inc.	St-Laurent	QC	0000003867	6–22 6–24
Xerox Corp.	Webster	NY	14580XRXCR800PH	4–14 5–27 6–29 6–49 7–12
Zalev Brothers Limited	Windsor	ON	0000004980	5–4 5–36 6–35 8–6
Zeneca Specialties, Zeneca Inc.	Mount Pleasant	TN	38474CMRCSMTJOY	6–47
Zenith Electronics Corp., Rauland Div.	Melrose Park	IL	60160ZNTHL2407W	6–26
Zinc Corp. of America, Horsehead Industries Inc.	Bartlesville	OK	74003ZNCCR11THA	6–28 6–38
Zinc Corp. of America, Horsehead Industries Inc.	Monaca	PA	15061ZNCCR300FR	4–5 4–14 4–19 5–5 5–27 5–37 6–28 6–36 6–38 6–48 7–8 7–11

EPA
United States Environmental Protection Agency

FORM R

TOXIC CHEMICAL RELEASE INVENTORY REPORTING FORM

Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986, also known as Title III of the Superfund Amendments and Reauthorization Act

WHERE TO SEND COMPLETED FORMS: 1. EPCRA Reporting Center, P.O. Box 3348, Merrifield, VA 22116-3348, ATTN: TOXIC CHEMICAL RELEASE INVENTORY 2. APPROPRIATE STATE OFFICE (See instructions in Appendix F)

Enter "X" here if this is a revision ☐

For EPA use only

IMPORTANT: See instructions to determine when "Not Applicable (NA)" boxes should be checked.

PART I. FACILITY IDENTIFICATION INFORMATION

SECTION 1. REPORTING YEAR 19 ____

SECTION 2. TRADE SECRET INFORMATION

2.1	Are you claiming the toxic chemical identified on page 2 trade secret? ☐ Yes (Answer question 2.2; Attach substantiation forms) ☐ No (Do not answer 2.2; go to Section 3)	2.2	Is this copy ☐ Sanitized ☐ Unsanitized (Answer only If "YES" in 2.1)

SECTION 3. CERTIFICATION (Important: Read and sign after completing all form sections.)

I hereby certify that I have reviewed the attached documents and that, to the best of my knowledge and belief, the submitted information is true and complete and that the amounts and values in this report are accurate based on reasonable estimates using data available to the preparers of this report.

Name and official title of owner/operator or senior management official:	Signature:	Date signed:

SECTION 4. FACILITY IDENTIFICATION

TRI Facility ID Number

4.1	Facility or Establishment Name	Facility or Establishment Name or Mailing Address (if different from street address)
	Street	Mailing Address
	City/County/State/Zip Code	City/County/State/Zip Code

4.2 This report contains Information for: (**Important**: check a or b; check c if applicable) a. ☐ An entire facility b. ☐ Part of a facility c. ☐ A Federal facility

4.3	Technical Contact Name	Telephone Number (include area code)
4.4	Public Contact Name	Telephone Number (include area code)

4.5	SIC Code(s) (4 digits)	a.	b.	c.	d.	e.	f.

4.6	Latitude	Degrees	Minutes	Seconds	Longitude	Degrees	Minutes	Seconds

4.7	Dun & Bradstreet Number(s) (9 digits)	4.8	EPA Identification Number(s) (RCRA I.D. No.) (12 characters)	4.9	Facility NPDES Permit Number(s) (9 characters)	4.10	Underground Injection Well Code (UIC) I.D. Number(s) (12 digits)
a.		a.		a.		a.	
b.		b.		b.		b.	

SECTION 5. PARENT COMPANY INFORMATION

5.1	Name of Parent Company	☐ NA	
5.2	Parent Company's Dun & Bradstreet Number	☐ NA	(9 digits)

EPA FORM R
PART II. CHEMICAL - SPECIFIC INFORMATION

TRI FACILITY ID NUMBER

Toxic Chemical, Category, or Generic Name

SECTION 1.TOXIC CHEMICAL IDENTITY

(Important: DO NOT complete this section if you completed Section 2 below.)

1.1	**CAS NUMBER** (IMPORTANT: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)
1.2	Toxic Chemical or Chemical Category Name (Important: Enter only one name exactly as it appears on the Section 313 list.)
1.3	Generic Chemical Name (Important: Complete **only** if Part I, Section 2.1 is checked "yes". Generic name must be structurally descriptive.)

SECTION 2. MIXTURE COMPONENT IDENTITY

(Important: DO NOT complete this section if you complete Section 1 above.)

2.1	Generic Chemical Name Provided by Supplier (Important: Maximum of 70 characters, including numbers, letters, spaces, and punctuation.)

SECTION 3. ACTIVITIES AND USES OF THE TOXIC CHEMICAL AT THE FACILITY (Important: Check all that apply.)

3.1 Manufacture the toxic chemical:	3.2 Process the toxic chemical:	3.3 Otherwise use the toxic chemical:
a. ☐ Produce b. ☐ Import		
If produce or import:		
c. ☐ For on-site use/processing	a. ☐ As a reactant	a. ☐ As a chemical processing aid
d. ☐ For sale/distribution	b. ☐ As a formulation component	b. ☐ As a manufacturing aid
e. ☐ As a byproduct	c. ☐ As an article component	c. ☐ Ancillary or other use
f. ☐ As an impurity	d. ☐ Repackaging	

SECTION 4. MAXIMUM AMOUNT OF THE TOXIC CHEMICAL ON-SITE AT ANY TIME DURING THE CALENDAR YEAR

4.1	☐ (Enter two-digit code from instruction package.)	

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM

			A. Total Release (pounds/year)(enter range from instructions or estimate)	B. Basis of estimate (enter code)	C. % From Stormwater
5.1	Fugitive or non-point air emissions	NA ☐			
5.2	Stack or point air emissions	NA ☐			
5.3	Discharges to receiving streams or water bodies (enter one name per box)				
	Stream or Water Body Name				
5.3.1					
5.3.2					
5.3.3					
5.4.1	Underground Injection on-site to Class I Wells	NA ☐			
5.4.2	Underground Injection on-site to Class II-V Wells	NA ☐			

If additional pages of Part II, Section 5.3 are attached, indicate the total number of pages in this box ☐ and indicate which Part II, Section 5.3 page this is, here ☐ (example: 1,2,3, etc.)

Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

EPA FORM R
PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER

Toxic Chemical, Category, or Generic Name

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM

		NA	A. **Total Release** (pounds/year) (enter range code from instructions or estimate)	B. **Basis of Estimate** (enter code)
5.5	Disposal to land on-site			
5.5.1A	RCRA Subtitle C landfills	☐		
5.5.1B	Other landfills	☐		
5.5.2	Land treatment/application farming	☐		
5.5.3	Surface impoundment	☐		
5.5.4	Other disposal	☐		

SECTION 6. TRANSFERS OF THE TOXIC CHEMICAL IN WASTES TO OFF-SITE LOCATIONS

6.1 DISCHARGES TO PUBLICLY OWNED TREATMENT WORKS (POTWs)

6.1.A. Total Quantity Transferred to POTWs and Basis of Estimate

6.1.A.1. Total Transfers (pounds/year) (enter range code or estimate)	**6.1.A.2 Basis of Estimate** (enter code)

6.1.B. ___ POTW Name							
POTW Address							
City		State		County		Zip	
6.1.B. ___ POTW Name							
POTW Address							
City		State		County		Zip	

If additional pages of Part II, Section 6.1 are attached, indicate the total number of pages in this box ☐ and indicate which Part II, Section 6.1 page this is here ☐ (example: 1,2,3, etc.)

SECTION 6.2 TRANSFERS TO OTHER OFF-SITE LOCATIONS

6.2 ___OFF-SITE EPA IDENTIFICATION NUMBER (RCRA ID NO.)							
Off-Site Location Name							
Off-Site Address							
City		State		County		Zip	

Is location under control of reporting facility or parent company? ☐ **Yes** ☐ **No**

Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

EPA FORM R
PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER

Toxic Chemical, Category, or Generic Name

SECTION 6. 2 TRANSFERS TO OTHER OFF-SITE LOCATIONS (continued)

A. Total Transfers (pounds/year) (enter range code or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1.M
2.	2.	2.M
3.	3.	3.M
4.	4.	4.M

6.2 ___ OFF-SITE EPA IDENTIFICATION NUMBER (RCRA ID NO.)

Off-Site Location Name

Off-Site Address

City | State | County | Zip

Is location under control of reporting facility or parent company? ☐ **Yes** ☐ **No**

A. Total Transfers (pound/year) (enter range code or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1.M
2.	2.	2.M
3.	3.	3.M
4.	4.	4.M

SECTION 7A. ON-SITE WASTE TREATMENT METHODS AND EFFICIENCY

☐ **Not Applicable (NA) - Check here if no on-site waste treatment is applied to any waste stream containing the toxic chemical or chemical category.**

a. General Waste Stream (enter code)	b. Waste Treatment Method(s) Sequence [enter 3-character code(s)]	c. Range of Influent Concentration	d. Waste Treatment Efficiency Estimate	e. Based on Operating Data?
7A.1a	7A.1b: 1 2 3 4 5 6 7 8	7A.1c	7A.1d %	7A.1e Yes ☐ No ☐
7A.2a	7A.2b: 1 2 3 4 5 6 7 8	7A.2c	7A.2d %	7A.2e Yes ☐ No ☐
7A.3a	7A.3b: 1 2 3 4 5 6 7 8	7A.3c	7A.3d %	7A.3e Yes ☐ No ☐
7A.4a	7A.4b: 1 2 3 4 5 6 7 8	7A.4c	7A.4d %	7A.4e Yes ☐ No ☐
7A.5a	7A.5b: 1 2 3 4 5 6 7 8	7A.5c	7A.5d %	7A.5e Yes ☐ No ☐

If additional pages of Part II, Sections 6.2/7A are attached, indicate the total number of pages in this box ☐ and indicate which Part II, Sections 6.2/7A page this is, here. ☐ (example: 1.2.3. etc.)

Range Codes: A= 1-10 pounds; B=11- 499 pounds; C= 500 - 999 pounds.

[redacted]

8.10	**Did your facility engage in any source reduction activities for this chemical during the reporting year? If not, enter "NA" in Section 8.10.1 and answer Section 8.11.**			
	Source Reduction Activities [enter code(s)]	**Methods to Identify Activity (enter codes)**		
8.10.1		a.	b.	c.
8.10.2		a.	b.	c.
8.10.3		a.	b.	c.
8.10.4		a.	b.	c.
8.11	**Is additional optional information on source reduction, recycling, or pollution control activities included with this report? (Check one box)**			YES ☐ NO ☐

* Report releases pursuant to EPCRA Section 329(8) including "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment." Do not include any quantity treated on-site or off-site.

EPA Form 9350 - 1 (Rev. 04/97) - Previous editions are obsolete.

Please print all required information, including information required at the bottom of each page.

A1.0	Reporting Year	
A1.1	NPRI ID	

A2.0	**FACILITY IDENTIFICATION & SITE ADDRESS**			
A2.1	Facility Name			
A2.2	Address			
A2.3				
A2.4				
A2.5	City			
A2.6	Prov / Territory Code		Postal Code	

A3.0	Full-Time Employees	[ ] (or Equivalent)

A4.0	**FACILITY PUBLIC CONTACT**			
A4.1	Name			
A4.2	Telephone No.	( ) -	Ext	
A4.4	Facsimile No.	( ) -		

A5.0	**FACILITY TECHNICAL CONTACT**			
A5.1	Name			
A5.2	Position			
A5.3	Telephone No	( ) -	Ext	
A5.5	Facsimile No	( ) -		

A6.0	FACILITY TECHNICAL CONTACT ADDRESS			
Is the mailing address for the technical contact in A5.0 different from the facility's street address? If you answer Yes, please provide the technical contact address below.				[ ] Y/N
A6.2	Address			
A6.3				
A6.4				
A6.5	City			
A6.6	Prov/Territory Code		Postal Code	
A6.8	State Code			
A6.9	Country			
A6.10	Zip Code or Other			

A7.0	COMPANY COORDINATOR			
Would you like to have information sent to a central contact?				[ ] Y/N
A7.1	Name			
A7.2	Position			
A7.3	Telephone No.	( ) -	Ext	
A7.5	Facsimile No.	( ) -		

A8.0	COMPANY COORDINATOR ADDRESS			
Is the mailing address for the company coordinator in A7.0 different from the facility's street address? If yes, please complete the following section.				[ ] Y/N
A8.2	Address			
A8.3				
A8.4				
A8.5	City			
A8.6	Prov / Territory Code		Postal Code	
A8.8	State Code			
A8.9	Country			
A8.10	Zip Code or Other			

A9.0	FACILITY LOCATION	
A9.1	Latitude	_ _ ° _ _ ' _ _ " (Degrees ° Minutes' Seconds")
A9.2	Longitude	_ _ _ ° _ _ ' _ _ " (Degrees ° Minutes' Seconds")
A9.3	UTM Zone	
A9.4	UTM Northing	_ , _ _ _ , _ _ _ (Metres)
A9.5	UTM Easting	_ _ _ , _ _ _ (Metres)

A10.0	STANDARD INDUSTRIAL CLASSIFICATION CODE (SIC)	
A10.1	2-digit Canadian SIC Code	
A10.2	4-digit Canadian SIC Code	
A10.3	4-digit U.S. SIC Code	

A11.0	PARENT COMPANY INFORMATION	
A11.1	Is the facility controlled by another company or companies ? If Yes, please provide the required information using Appendix A.	[ ] Y/N

A12.0	REGULATIONS AND PERMITS The submission of this information is optional.	
	Do you report under other environmental regulations or permits ? If you choose to provide it, please use Appendix C.	[ ] Y/N

A13.0	OFF-SITE TRANSFERS	
	Do you send waste containing NPRI substances, for which you are reporting, to an off-site facility or municipal sewage treatment plant OR do you send NPRI substances, for which you are reporting, for recovery/re-use /recycling to an off-site facility? If Yes, please use Appendix B to list all off-site facilities.	[ ] Y/N

A14.0	RELEASES TO SURFACE WATER BODIES	
	Do you release any NPRI substances, for which you are reporting, to surface waters ? If Yes, please use Appendix D to list all surface water bodies.	[ ] Y/N

Environment Canada
Environnement Canada

NPRI - The National Pollutant Release Inventory
PART A - FACILITY IDENTIFICATION

1996

A15.0	COMMENTS	[ ] Y/N

A16.0	CERTIFICATION	
A16.1	Executive Contact Name	
A16.2	Position	

A17.0	ADDRESS OF EXECUTIVE			
	Is the mailing address for the executive contact in A16.0 different from the facility's street address? If yes, please complete the following section.			[ ] Y/N
A17.1	Company Name			
A17.2	Address			
A17.3				
A17.4				
A17.5	City			
A17.6	Prov / Territory Code		Postal Code	
A17.8	State Code			
A17.9	Country			
A17.10	Zip Code or Other			

B1.0	**SUBSTANCE IDENTITY** Enter the CAS Registry Number or the substance name exactly as shown on the NPRI Substance List.	
B1.1	CAS Registry Number	
B1.2	Substance Name	

B2.0	**NATURE OF ACTIVITIES** (Mark choice with a 'Y')	
B2.1	Manufacture the Substance	a) [ ] For On-Site Use / Processing b) [ ] For Sale / Distribution c) [ ] As a Byproduct d) [ ] As an Impurity
B2.2	Process the Substance	a) [ ] As a Reactant b) [ ] As a Formulation Component c) [ ] As an Article Component d) [ ] Repackaging Only
B2.3	Otherwise Use the Substance	a) [ ] As a Chemical Processing Aid b) [ ] As a Manufacturing Aid c) [ ] Ancillary / Other Use

B3.0	**ON-SITE RELEASES**	
	Do you release this substance on-site? If no, then go to section B7.0	[ ] **Y/N**

B4.0	**REPORTING RELEASES LESS THAN ONE TONNE**	
	If total releases are less than one (1) tonne, are you reporting this amount as a sum for all media? If yes, then go to section B5.5	[ ] **Y/N**

B5.0	**ON-SITE RELEASES OF THE SUBSTANCE TO THE ENVIRONMENT** (Tonnes)		
B5.1	**Air Releases**	**Basis of Estimate**	**Amount Released**
	Stack / Point		
	Storage / Handling		
	Fugitive		
	Spills		
	Other Non-Point		

B5.2	Underground Injection	Basis of Estimate	Amount Released	
B5.3	Releases to Water	Basis of Estimate	Amount Released	Water Codes (from Appendix D)
	Direct Discharges			
	Spills			
	Leaks			
B5.4	Releases to Land	Basis of Estimate	Amount Released	
	Landfill			
	Land Treatment			
	Spills			
	Leaks			
	Other			
B5.5	Total Releases			

B6.0	YEARLY BREAKDOWN OF RELEASES BY PERCENTAGE IN EACH QUARTER			
	(Jan-Mar)	(Apr-Jun)	(Jul-Sep)	(Oct-Dec)

B7.0	CHANGES IN REPORTED RELEASES FROM PREVIOUS YEAR (Tonnes)	
B7.1	Releases in 1996 (Total from B5.5)	
B7.2	Reasons for Changes in Quantities Released From Previous Year (Mark choice with a 'Y')	
	[ ] Changes of Production Levels	
	[ ] Changes in Estimation Methods	
	[ ] Other	
	[ ] No Significant Change (i.e., <10%)	
	[ ] Not Applicable (first year reporting)	

B7.3	Comments	[ ] Y/N

B8.0	ANTICIPATED RELEASES (Tonnes)		
	1997	1998	1999
	2000-2001 are Optional	2000	2001

B9.0	RECOVERY , RE-USE OR RECYCLE TO OFF-SITE LOCATIONS (Tonnes) (Optional)		
	Source	**Amount**	**Off-Site Codes** (from Appendix B)
B9.1	Recovery/Re-use/ Recycle		
B9.2	Energy Recovery		
B9.3	ANTICIPATED 3 'R'S (Tonnes)		
	1997	1998	1999
	2000	2001	
B9.4	Comments		[ ] Y/N

B10.0	TRANSFERS OF THE SUBSTANCE IN WASTE TO OFF-SITE LOCATIONS (Tonnes)	
B10.1	Do You Transfer this NPRI Substance in Waste Off-site for Final Disposal?	[ ] Y/N
B10.2	Total Quantity of Substance Transferred (Tonnes)	
B10.3	Comments	[ ] Y/N

B10.4	Disposal Method of B10.2 (Tonnes)			
	Treatment Method	**Percent of B10.2**	**Amount**	**Off-Site Codes** (from Appendix B)
	Physical Treatment			
	Chemical Treatment			
	Biological Treatment			
	Incineration / Thermal			
	MS Treatment Plants			
	Underground Injection			
	Land Treatment			
	Containment Method	**Percent of B10.2**	**Amount**	**Off-Site Codes** (from Appendix B)
	Landfill			
	Other Storage			
	Totals			

B11.0	**CHANGES IN REPORTED TRANSFERS FROM PREVIOUS YEAR** (Tonnes)	
B11.1	Transfers in 1996 (Total from B10.2)	
B11.2	Reasons for changes in quantities transferred from previous year (Mark choice with a 'Y')	
	[ ] Changes in Production Levels	
	[ ] Changes in Estimation Methods	
	[ ] Other	
	[ ] No Significant Change	
	[ ] Not Applicable (first year reporting)	
B11.3	Comments	[ ] **Y/N**

B12.0	**ANTICIPATED TRANSFERS** (Tonnes)		
	1997	1998	1999
	2000-2001 are Optional	2000	2001

	PARENT COMPANIES			
P1.0	Ownership percentage			
P1.1	Company Name			
P1.2	Address			
P1.3				
P1.4				
P1.5	City			
P1.6	Prov/Territory Code		Postal Code	
P1.8	State Code			
P1.9	Country			
P1.10	Zip Code or Other			

	PARENT COMPANIES			
P1.0	Ownership percentage			
P1.1	Company Name			
P1.2	Address			
P1.3				
P1.4				
P1.5	City			
P1.6	Prov/Territory Code		Postal Code	
P1.8	State Code			
P1.9	Country			
P1.10	Zip Code or Other			

	PARENT COMPANIES			
P1.0	Ownership percentage			
P1.1	Company Name			
P1.2	Address			
P1.3				
P1.4				
P1.5	City			
P1.6	Prov/Territory Code		Postal Code	
P1.8	State Code			
P1.9	Country			
P1.10	Zip Code or Other			

	OFF-SITE FACILITIES			
S1.0	Off-Site Code	**Start at 01. Codes are used in Part B, sections B9 and B10**		
S1.1	Facility or MSTP Name			
S1.2	Address			
S1.3				
S1.4				
S1.5	City			
S1.6	Prov/Territory Code		Postal Code	
S1.8	State Code			
S1.9	Country			
S1.10	Zip Code or Other			

	OFF-SITE FACILITIES			
S1.0	Off-Site Code			
S1.1	Facility or MSTP Name			
S1.2	Address			
S1.3				
S1.4				
S1.5	City			
S1.6	Prov/Territory Code		Postal Code	
S1.8	State Code			
S1.9	Country			
S1.10	Zip Code or Other			

	OFF-SITE FACILITIES			
S1.0	Off-Site Code			
S1.1	Facility or MSTP Name			
S1.2	Address			
S1.3				
S1.4				
S1.5	City			
S1.6	Prov/Territory Code		Postal Code	
S1.8	State Code			
S1.9	Country			
S1.10	Zip Code or Other			

	OTHER ENVIRONMENTAL REGULATIONS & PERMITS	
	ID Number	Government Department, Agency, or Program Name

	SURFACE WATER BODIES (Codes are used in Part B, Section B5.3)	
	Alphabetical Code (Start with A)	Name of water body, stream, creek, river, etc.

FORM COA

CERTIFICATE FOR THE OPERATION OF INDUSTRIAL FACILITIES UNDER FEDERAL JURISDICTION FOR THE YEAR _____

TO BE COMPLETED BY INE-SEMARNAP	
1) APPLICATION NUMBER:	**2) ENVIRONMENTAL REGISTRATION NUMBER:**
3) RECEIVED BY: _____ Name and signature	(Signature with date received)

In compliance with Articles 5, sections VI, XII and XVII, 109 BIS, 109 BIS 1 and 111, of the General Law of Ecological Equilibrium and Environmental Protection (LGEEPA); Articles 86, 88, 89, 90 and 91 of the Law on National Waters; and pursuant to the Agreement through which the National Ecological Institute (INE), shall issue a Single Environmental License and request an Annual Operation Certificate, the company I represent hereby provides the following information to INE regarding the annual facility operations covered by Environmental Registration Number: _____

TO BE COMPLETED BY THE INDUSTRIAL FACILITY	
5) PLACE AND DATE OF CERTIFICATE COMPLETION: Day: ☐ Month: ☐☐ Year: ☐☐ I declare that the information contained in this request and the appendices thereto is true. In case of any omissions or false declarations, SEMARNAP may cancel this application or apply appropriate administrative sanctions.	_____ Name and signature of the legal representative _____ Name and signature of the technical officer

WHO SHOULD MAKE THIS APPLICATION?

This form shall be submitted by industrial facilities having a Single Environmental License or an Operating License.

INSTRUCTIONS FOR THE COMPLETION OF THIS FORM:

The data in the tables provided in the General Catalogue of Instructions shall be used to complete this form. The following instructions must also be followed:

One certificate form shall be completed for each facility.

2) This form shall be completed in typescript or in clearly printed letters in blue or black ink.
3) Those spaces where facility data are identical to those reported in the LAU (Single Environmental License) or to those reported previously with this same form for the last Operation Certificate shall not be completed. If an electronic version of the form is being used, ensure that the previously reported data which the form included have not been altered.
4) The Operation Certificate Form shall be prepared in one original and one copy and/or in electronic form (floppy disk), with a printed cover page duly signed by the legal representative and the technical officer.
5) If the requested information is not available, this should be indicated by ND (Not Available); if the information is nil, this should be indicated by 0 (zero). If the information is not applicable, this should be indicated by NA (Not Applicable).
6) If the space provided on the printed form is not large enough to contain the requested information, additional pages should be appended following the model of that heading.
7) The General Operational Diagram requested shall be prepared according to the example included in Appendix 3 of the General Instructions.
8) Section V of the Operation Certificate shall be completed only for substances or chemical categories listed in Table 18 of the General Catalogue of Instructions.
9) Facilities using this Operation Certificate form for the first time shall also complete as an appendix, on a one-time basis, the Registration Data on the application form for the Single Environmental License, pages 3 and 4.

I. GENERAL TECHNICAL INFORMATION

If the facility is using this reporting form for the first time, it shall complete the general technical information requested in this section of the Certificate. If the facility has a Single Environmental License or has used this reporting form previously, it shall enter only the changes made for the reported year. We remind you that changes of Name, Company Name, process or reductions or increases in production should have been reported when they took place at the Applications Office. If there was a change of address or transfer of the facility, the company would have applied for a new License and would therefore have a new Environmental Registration Number. Annual data on raw material and fuel consumption and production shall also be reported in this section.

1.1 CHANGE OF NAME OR COMPANY NAME Date of notice : Day ☐☐ Month ☐☐ Year ☐☐

1.2 CHANGE OF LEGAL REPRESENTATIVE Date of notice : Day ☐☐ Month ☐☐ Year ☐☐

1.3 COMPANY REPRESENTATIVE [1]

Name or company name:	RFC:
Address. Street: _____	
Building and Floor Numbers:_____ Neighbourhood:_____	
Locality (except Mexico City.): _____ Postal Code:_____	
Municipality or Delegation:_____ Federal Body:_____	
Telephones:_____ Fax:_____ Electronic Mail:_____	

1.4 EQUIVALENT NUMBER OF EMPLOYEES [2]**:**

1.5 RISKS AND CONTINGENCIES

1.5.1 Date of submission of the last Risk Assessment: Day ☐☐ Month ☐☐ Year ☐☐

1.5.2 Date of the last update of the Accident Prevention Program: Day ☐☐ Month ☐☐ Year ☐☐

1.5.3 If applicable, date of update of the Contingency Program: Day ☐☐ Month ☐☐ Year ☐☐

1.5.4 If located in the Metropolitan Area of Mexico City, or in an area having an Environmental Contingency Program, give the date your Participation Plan for the Program was submitted: Day ☐☐ Month ☐☐ Year ☐☐

[1] Information on the facility representative authorized to deal with the public and clarify any information supplied in this Certificate.
[2] Divide the total number of man hours (total facility staff) by 2000 hours.

1.6 PROCESS DESCRIPTION

If necessary due to changes in the facility or if using this form for the first time, prepare the *General Operating Diagram* and the *Table of consumption, generation and/or release points,* following the example included in the General Instructions. The diagram shall include all areas (production, wastewater treatment, waste management, services, etc.) where there are consumption points of raw materials, water or energy, or where pollutants are generated, stored or released.

1.7 RAW MATERIALS (not applicable to hazardous waste treatment facilities)

Name[3]			Consumption point[4]	Physical state[5]	Type of storage[6]	Annual consumption	
Commercial	Chemical	CAS Number				Amount[7]	Unit[8]

1.8 PRODUCTS (not applicable to hazardous waste treatment facilities)

Product name	Type of storage[6]	Installed production capacity		Annual production	
		Amount[7]	Unit[8]	Amount[7]	Unit[8]

1.9 ENERGY CONSUMPTION

Consumption points[9]	Energy type[10]	Annual consumption	
		Amount[7]	Unit[8]

[3] Indicate both names when possible and if available the Chemical Abstracts Service identification number (CAS number).
[4] **Consumption point.** Number appearing in the General Operating Diagram.
[5] **Physical state.** Physical State Codes may be consulted in Table 1 of the General Catalogue.
[6] **Type of storage.** According to Table 2 of the General Catalogue.
[7] **Amount.** According to the Table in which it appears, referring to value of, consumption, release, transfer, storage, etc.
[8] **Unit.** Any unit customarily used in the facility may be used; we recommend use of the Decimal Metric System or by default the Imperial System.
[9] When energy consumption per process is unknown, consumption point could refer to the facility's input point(s).
[10] Indicate whether the energy comes from an electrical current input (EE) or if it is internally generated in the facility through fossil fuel combustion (CF), use of combustible waste (RC) or through another generation method (OM).

1.10 FUEL(S) USED

Combustion equipment	Capacity		Burner type	Fuel type	Consump-tion point[11]	Is it pre-heated? [12]	Annual consumption	
	Amount	Unit					Amount	Unit

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II. ATMOSPHERIC POLLUTION

Pursuant to Article 19 of the LGEEPA Regulations on Atmospheric Pollution Prevention and Control, the following data shall be provided the first time this reporting form is used or when the facility data are different from those reported in the Single Environmental License, the Release Inventory or the last Operating Certificate:

2.1 POLLUTANT RELEASE POINTS

Name of machine, equipment or activity	Release point[13]	Release expense		Estimation method[14]	Control equipment or method	Estimated efficiency of control equipment[15]
		Amount	Unit			

[11] When energy consumption per process is unknown, consumption point could refer to the facility's input point(s).
[12] State Yes or No.
[13] **Release point.** Number appearing in the General Operating Diagram.
[14] **Estimation method.** According to Table 3 of the General Catalogue, when no standard applies.
[15] Efficiency of the pollutant reduction control equipment, in percent.

2.2 RELEASE DUCTS

2.2.1 If any emissions are not ducted, give the technical reasons for this situation (append document).

2.2.2 If there are release ducts indicate:

Duct or chimney number[16]	Release point [17]	Height (m)[18]	Inner diameter (m)	Gas flow speed (m/sec)	Output temperature (°C)	Sampling platform[19]

2.3 RELEASES INTO THE ATMOSPHERE BY COMBUSTION EQUIPMENT [20]

2.3.1 Combustion gases [21]

Release point	NO_x			SO_2			CO			HC[22]		
	Amount	Unit	Estimation method[23]	Amount	Unit	Estimation method	Amount	Unit	Estimation method	Amount	Unit	Estimation method

2.3.2 Particles and excess air [20]

Release point	Particles [24]			Smoke density	Excess air % vol
	Amount	Unit	Estimation method		

III. WATER USE AND DISCHARGE OF WASTEWATERS

[16] Enumerate in progressive order.
[17] Release **point.** Number appearing in the General Operating Diagram.
[18] Height in meters of the smokestack or release duct measured from the ground up.
[19] Indicate whether there is one or not.
[20] Reported values must comply with NOM-085-ECOL-1994.
[21] If NOM-085-ECOL-1994 is applicable, the facility shall report here the average value of concentrations of combustion gases measured, in ppm, or use ppm to calculate the annual total released. If this is not the case, an estimate shall be made of the releases, indicating the method used.
[22] If the facility has total hydrocarbon measurements the average value in ppm or total annual releases shall be reported here. If this is not the case, it shall report the estimated releases of specific hydrocarbons in Section Five of this Certificate.
[23] When the NOM-085-ECOL-1994 standard is applicable, only direct measurement may be used. If this is not the case, specify the estimation method according to Table 3 of the General Catalogue.
[24] If NOM-085-ECOL-1994, is applicable, the facility shall report here the average value of concentrations of combustion gases measured, in $\mu g/m^3$ or use them to calculate the annual total released. If this is not the case, an estimate shall be made of the releases, indicating the method used.

If this form is being used for the first time or if the data requested are different from those called for in the Application for a Single Environmental License or in the last Operation Certificate, the following data shall be provided for purposes of information.

3.1 ANNUAL WATER USE

Concession or assignment license number [25]			
Water extraction source:		Amount [7]	Unit [8]
	Drinking water network		
	Surface		
	Underground		
	Salt water		
	Treated (reuse)		
	Other (specify)		

3.2 DISCHARGE OF WASTEWATERS

3.2.1 Changes to the permit or authorized discharge registration

Discharge permit or registration number	
Certificate of change number issued by the Public Registry of Water Rights (REPDA)	

3.2.2 General discharge data

Discharge type[26]	Release point[27]	Discharge number[28]	Hydrological region[29]	Discharge frequency[30]	Crop Irrigation[31]	Treatment in situ		
						Code[32]	Amount	Unit

[25] If there is no grant of concession or assignment, append a copy of the confirmation of connection to the drinking water system.
[26] **Discharge type.** According to Table 4 of the General Catalogue.
[27] **Release point.** Number appearing in the General Operating Diagram
[28] When pertinent, state the relationship between the release points identified in the diagram of the facility's consumption and release points and the discharge numbers appearing in the application made to the National Water Commission.
[29] According to Table 17 of the General Catalogue.
[30] Indicate if continuous (C), intermittent (I) or occasional (F).
[31] Indicate whether restricted (R) or not restricted (N).
[32] **Treatment methods.** See Tables 5, 6 and 7 of the General Catalogue.

3.2.3 Wastewater discharge quality description [33]

Parameter	Discharge number [34]							
Annual volume [liters]								
Hydrogen potential (pH)								
Temperature [°C]								
Fats and oils [mg/l]								
Floating matter (present or absent)								
Sedimentable solids [ml/l]								
Total suspended solids [mg/l]								
Biochemical oxygen demand (DBO_5) [mg/l]								
Total nitrogen [mg/l]								
Total phosphorus [mg/l]								
Fecal coliform bacteria [NMP/100 ml]								
Helminth eggs [organisms/l]								

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IV. HAZARDOUS WASTE GENERATION, TREATMENT AND TRANSFER

Pursuant to NOM-052-ECOL-93, NOM-053-ECOL-93 or when providing hazardous waste treatment services, industrial facilities shall provide the following information when this form is used for the first time or when the data requested are different from those reported in the Single Environmental License or the last Certificate of Operation:

4.1 HAZARDOUS WASTE GENERATION AND TREATMENT WITHIN THE FACILITY

Generation point [35]	Waste identification		Annual generation		Treatment or disposal method		
	NOM-052-ECOL-93 [38]	Code [36]	Amount	Unit	Code [37]	Treatment capacity	
						Amount	Unit

[33] Annual average as a function of the volume. Value estimated based on the data presented during the reported year to the authorities (if the CNA, use the figures given in the quarterly declarations for the right to release).
[34] Enter discharge numbers appearing in the application made to the National Water Commission.
[35] **Generation point.** Number appearing in the General Operating Diagram.
[36] **Hazardous waste code** according to Table 8 of the General Catalogue.
[37] **Treatment or disposal methods** . See Tables 5, 6, 7, 9, 10, 11, 12 13 and 14 of the General Catalogue.
[38] Waste identification number according to NOM-052-ECOL-93, indicating Table number and appendix where listed or CRETIB code. If the waste is not listed, the corresponding CRETIB analysis should be attached.

4.2 HAZARDOUS WASTE STORAGE WITHIN THE FACILITY

Gene-ration point	Waste identification		Storage[39]							
	NOM-052-ECOL-93[43]	Code[40]	Type[41]	Storage description[42]				Capacity		Time (days)
				Site	Material	Ventilation	Lighting	Amount	Unit	

4.3 HAZARDOUS WASTE TRANSFERS [44]

Generation point	Waste identification		Handling company[45]	Total transferred	
	NOM-052-ECOL-93	Code		Amount	Unit

4.4 HAZARDOUS WASTE TREATMENT COMPANIES [46]

Waste identification		Treatment or disposal method[47]	Annual total handled	
NOM-052-ECOL-93	Code		Amount	Unit

[39] Pursuant to Articles 14 to 21 of the LGEEPA Hazardous Wastes Regulations, append a detailed description of how the waste is stored and the site or sites within the facility, indicating drainage and water networks within the storage area as well as the safety measures taken.
[40] **Hazardous waste code** according to Table 8 of the General Catalogue.
[41] **Type of storage.** See Table 2 of the General Catalogue.
[42] **Storage features** . See Table 15 of the General Catalogue.
[43] Waste identification number according to NOM-052-ECOL-93, indicating Table number and appendix where listed or CRETIB code. If the waste is not listed, the corresponding CRETIB analysis should be attached.
[44] The hazardous wastes generator shall contract only the services of companies authorized to handle such wastes by the INE (Articles 151 BIS of the LGEEPA and 10 of the Hazardous Wastes Regulations).
[45] Enter the Hazardous Wastes Treatment Permit Number issued by the INE.
[46] This section is to be completed only by companies providing hazardous waste treatment services.
[47] **Treatment method code.** See Tables 5, 6 7, 10, 11, 12, 13 and 14 of the General Catalogue.

V. ANNUAL RELEASES AND TRANSFER OF LISTED POLLUTANTS

This section is to be completed by industrial facilities releasing or transferring any substance or type of chemical listed in Table 18 of the General Catalogue.

5.1 IDENTIFICATION AND USES

Pollutant identification		Use[50]	Consumption or release point[51]	Amount	Unit	Estimation method[52]
Name[48]	Key[49]					

5.1.1 Information required *only* for hazardous waste treatment and wastewater treatment facilities:

Pollutant identification		Generator identification[53]	Amount received	
Name	Key		Amount	Unit

[48] **Substances.** Chemical name according to Table 18 of the General Catalogue.
[49] **Code** according to Table 18 of the General Catalogue.
[50] Indicate if used as a direct input (ID), indirect input (II), kept in storage (IA) or generated in-plant (EG) by a production, treatment or service process.
[51] **Consumption or release point.** Number appearing in the General Operating Diagram.
[52] **Estimation method** . See Table 3 of the General Catalogue.
[53] Hazardous Wastes Generator Registration Number issued by the INE.

5.2 POLLUTANT RELEASES

Pollutant code[54]	Into air				Into water				Into ground			
	Release point	Amount	Unit	Estimation method[55]	Discharge number[56]	Amount	Unit	Estimation method	Deposit point[57]	Amount	Unit	Estimation method

5.2.1 Pollutant releases to any medium due to accidents and/or contingencies:

Pollutant code	Event code[58]	Amount	Unit	Estimation method

[54] **Code** according to Table 18 of the General Catalogue.
[55] **Estimation method.** See Table 3 of the General Catalogue.
[56] Enter discharge numbers appearing in the application made to the National Water Commission.
[57] Point within the facility where the pollutant is deposited for treatment or final disposal.
[58] **Events.** Enter the event Code according to Table 16 of the General Catalogue.

5.3 POLLUTANT TRANSFERS

5.3.1 Transfer to a hazardous wastes treatment facility or to wastewater treatment facilities

Pollutant code[59]	Physical state[60]	Handling company[61]	Treatment or disposal method code[62]	Amount	Unit	Estimation method[63]

5.3.2 Transfer to the public sewage system

Pollutant code	Release point	Amount	Unit	Estimation method

[59] **Code** according to Table 18 of the General Catalogue.
[60] **Physical state.** See Table 1 of the General Catalogue.
[61] Environmental Registration Number of the facility authorized to handle hazardous wastes.
[62] **Treatment or disposal methods.** See Tables 5, 6, 7, 9, 10, 11, 12, 13 and 14 of the General Catalogue.
[63] **Estimation method.** See Table 3 of the General Catalogue.

5.4 POLLUTION PREVENTION AND CONTROL

5.4.1 Total releases and activity indicators

Pollutant code	Total releases (air + water + soil)						Activity indicators[64]	
	Previous year		Reported year		Estimate for next year			
	Amount	Unit	Amount	Unit	Amount	Unit	Previous year	Reported year

5.4.2 Pollution prevention and control activities

Pollutant code	Control activity[65]	Treatment *in situ*							
		Storage		Treatment		Physical state[68]	Amount	Unit	Estimation method[69]
		Form[66]	Length (days)	Method code[67]	Estimated efficiency				

[64] The reported activity index may be calculated based on the amount of chemical used as raw material or produced.
[65] Indicate if there have been: Changes in operating practices (CPO), Treatment *in situ* (TS), Inventory control (CI), Spill and leakage prevention (PDF), Changes to inputs (CMP), Product changes (CP), Changes in the production process (MPP), Changes in cleaning practices (CPL), Others (O).
[66] **Type of storage.** See Table 2 of the General Catalogue.
[67] **Treatment methods.** See Tables 5, 6 and 7 of the General Catalogue.
[68] **Physical state.** See Table 1 of the General Catalogue
[69] **Estimation method.** See Table 3 of the General Catalogue