

TAKING STOCK

North American Pollutant Releases and Transfers 1 9 9 7

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 1999 and the NPRI data set of December 1999 were used. The CEC is aware that changes have occurred to both data sets for the reporting year 1997 since this time that are not reflected in this report. These changes will be reflected in the next report, which will summarize the 1998 data and make year-to-year comparisons with previous years' data.

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Preface

Pollutant release and transfer registers (PRTRs) provide a valuable source of information on the generation and management of pollutants by tracking the amounts of specific chemicals that are released and transferred from industrial facilities into and through our communities each year. By having access to such information, governments, industry and citizens alike are better equipped to set priorities, engage in informed dialogue and undertake positive action to prevent or reduce the generation and release of pollutants of concern.

Relatively simple in concept, the power of PRTRs to stimulate pollution reductions and improved environmental management is being increasingly recognized in countries around the world. We in North America are fortunate to have access to information collected under the US Toxics Release Inventory (TRI) and the Canadian National Pollutant Release Inventory (NPRI), two of the world's most well-established PRTR systems. As information from the Mexican *Registro de Emisiones y Transferencia de Contaminantes* (RETC) becomes available, we will be in a position to track substances of common concern on a continental basis. While the PRTR data collected in North America and included in this report do not cover all sources of pollutants—activities such as agriculture and transportation, small and medium-size facilities, and services such as dry cleaners and gas stations are not included—the information nevertheless provides an important part of the picture and a sound basis for action.

This report, which is fourth in the Commission for Environmental Cooperation's annual *Taking Stock* series, contains some positive news: releases of the chemicals in the matched data set have decreased by nine percent over the period from 1995–1997. However, some less positive trends have also emerged. Transfers, i.e., the amounts of substances shipped off-site for waste management or disposal, have increased by 27 percent during the same period. This serves as an indication that we need to reinforce our collective and independent efforts to promote preventive approaches to reducing industrial pollution in North America. Another finding worth noting is that while a small number of top facilities continue to dominate PRTR reporting (50 facilities, less than 0.1 percent of all reporting facilities, were responsible for one-quarter of total releases and transfers in 1997), the large block of facilities that reported less than 100,000 kg are not part of the overall reduction trend. These facilities with “smaller” reported amounts showed significant increases in both releases and transfers from 1995 to 1997.

The CEC is grateful for the interest and involvement of stakeholders throughout North America in the continued evolution of the *Taking Stock* series. As a result of suggestions they have made, this latest report is organized somewhat differently, with separate chapters on releases, transfers, and releases and transfers, respectively. Other features new this year are the inclusion of information on pollution prevention activities undertaken by facilities and an in-depth look at the primary metals sector.

Officials from Environment Canada, INE and the US 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 and François Lavallée; Mexico—Luis Sánchez Cataño and Hilda Martínez Salgado; the United States—Susan Hazen, John Harman and Maria Doa.

On behalf of CEC, I would like to thank the consultants who worked tirelessly to put this report together: Catherine Miller, Sharon Martin, John Young, and John Howay of Hampshire Research Associates (United States); Sarah Rang and Nicola Crawhall of Environmental Economics International (Canada); and Raphael Ramos of Dames and Moore de Mexico (Mexico).

I would also like to thank Lisa Nichols and Erica Phipps, past and present program managers, for their efforts in overseeing the CEC PRTR Program. Special thanks also go to the CEC Publications staff—Jeffrey Stoub, Douglas Kirk, Raymonde Lanthier and Miguel López—for their efforts in bringing this volume to fruition.

Janine Ferretti
Executive Director

Acronym**Meaning**

ARET	Accelerated Reduction/Elimination of Toxics
BACT	Best available control technology
BAF/BCF	Bioaccumulation/bioconcentration factor
BATEA	Best available technology economically achievable
CAAA	US Clean Air Act Amendments
CAFE	US Corporate Average Fuel Economy
CAS	Chemical Abstract Service
CEC	Commission for Environmental Cooperation
CEPA	Canadian Environmental Protection Act
CMAP	<i>Clasificación Mexicana de Actividades y Productos</i> (Mexican Activities and Products Classification)
CMVA	Canadian Vehicle Manufacturers' Association
COA	<i>Cédula de Operación Anual</i> (Annual Certificate of Operation: replaced the former <i>Cédula de Operación para Establecimientos Industriales de Jurisdicción Federal</i>) also: Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (1994)
CWA	US Clean Water Act
DOF	Mexican <i>Diario Oficial de la Federación</i> (Official Gazette of the Federation)
DRI	Direct reduced iron
EDF	Environmental Defense Fund
EPA	US Environmental Protection Agency
EPCRA	US Emergency Planning and Community Right-to-Know Act
HPV	High production volume
IARC	International Agency for Research on Cancer
IFCS	Intergovernmental Forum on Chemical Safety
INE	<i>Instituto Nacional de Ecología</i> (Mexican National Institute of Ecology)
INEGI	<i>Instituto Nacional de Estadística Geografía e Informática</i> (Mexican National Institute of Statistics, Geography and Informatics)
kg	kilograms
LAER	Lowest achievable emission rate
LGEEPA	<i>Ley General del Equilibrio Ecológico y la Protección al Ambiente</i> (General Law of Ecological Equilibrium and Environmental Protection)
MACT	Maximum Achievable Control Technology

MISA	Ontario Municipal Industrial Strategy for Abatement
MSDS	Material Safety Data Sheet
MSTP	Canadian municipal sewage treatment plant
NAAQS	US National Ambient Air Quality Standards
NAFTA	North American Free Trade Agreement
NAICS	North American Industry Classification System
NESHAPS	US National Emission Standards for Hazardous Air Pollutants
NOM	<i>Norma Oficial Mexicana</i> (Mexican Official Standard)
NPRI	National Pollutant Release Inventory (PRTR for Canada)
NSR	New Source Review (under US Clean Air Act Amendments)
NTP	US National Toxicological Program
OECD	Organization for Economic Cooperation and Development
OSHA	US Occupational Safety and Health Administration
PAH	Polycyclic aromatic hydrocarbons
PBT	Persistent bioaccumulative toxicant
PCB	Polychlorinated biphenyls
PFC	Perfluorocarbon
POTWs	US publicly owned treatment works
PVC	Polyvinyl chloride
PRTR	Pollutant release and transfer register
RCRA	US Resource Conservation and Recovery Act
RETC	<i>Registro de Emisiones y Transferencia de Contaminantes</i> (PRTR for Mexico)
Semarnap	<i>Secretaría de Medio Ambiente, Recursos Naturales y Pesca</i> (Mexican Secretariat of the Environment, Natural Resources and Fisheries)
SCA	Statement of Commitment and Action (of Canadian Steel Producers' Association)
SIC	Standard Industrial Classification
SOP	Strategic Options Process
SSOP	Steel Strategic Options Process
TRI	Toxics Release Inventory (PRTR for US)
TCE	Trichloroethylene
TSMP	Toxic Substances Management Policy
VOC	Volatile organic compound

Carcinogens

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

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.

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 (prevention of pollution at its source), followed by recycling, energy recovery, treatment, and 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

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

Otherwise used

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

Point source

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

Pollution prevention

See Source reduction.

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. In Chapter 6 of *Taking Stock*, “source reduction” refers to activities (see below) reported to both TRI and NPRI to indicate actions undertaken to reduce the generation of waste. NPRI facilities may also indicate on-site reuse, recycling or recovery as a category of action to prevent pollution; TRI source reduction reporting does not include this category. In Chapter 6 of *Taking Stock*, “pollution prevention” refers to all the reportable activities, including on-site reuse, recycling and recovery.

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 tonne, which is 1,000 kilograms or 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 materials destined for recycling, reuse, or energy recovery are included or not in their definition of waste.

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■ Guide to *Taking Stock 1997*

- **Chapter 1** introduces pollutant release and transfer registers (PRTRs) and the North American PRTR initiative, and describes each of the North American PRTR programs, including recent and forthcoming developments. Program contacts and web sites for all three countries are provided.
- **Chapter 2** offers guidance on using the North American PRTR data, explains how the data from the Canadian NPRI and United States TRI are compiled for this report (no data from Mexican facilities for 1997 are available) and provides context for understanding the data and their limitations. This chapter itemizes characteristics of the three North American PRTRs, and it explains the releases and transfers that facilities report.
- **Chapters 3 through 5** present the matched data from the United States and Canada for 1997 and compare the matched data for 1995–1997:
 - **Chapter 3** presents data on on-site releases. These data cover facilities' releases of the substances of concern that are emitted to the air, discharged to surface waters, injected into underground wells, and disposed of on the land at the facility site.
 - **Chapter 4** presents data on off-site transfers. These data address the amounts of the substances of concern present in waste transferred off-site for treatment or disposal. Some transfers are disposed of directly in landfills at the off-site location (not at the facility site). Other transfers may be treated at the off-site location; what remains after treatment is released or disposed of. These data do not estimate how much of the substance is released after treatment away from the facility, but instead estimate how much of the substance the reporting facility sends off-site for waste management, whether for disposal or for treatment.
 - **Chapter 5** presents data on total releases and transfers. These data, therefore, show the amount of the substances of concern that are in wastes the reporting facility generated that are released at the facility site or must be otherwise managed off-site.
- **Chapter 6** provides several special analyses: a summary of data at the parent-company level, a look at facilities reporting the smallest amounts of releases and transfers, and a discussion of pollution prevention activities.
- **Chapter 7** supplies a more detailed analysis of reporting by the primary metals industry, which refines and manufactures iron and steel as well as nonferrous metals such as aluminum, copper and zinc.
- **Appendix A** lists the chemicals required to be reported under the three PRTRs. **Appendix B** identifies facilities that appear in tables in this report. **Appendix C** indicates potential health effects and uses of chemicals with large totals for releases, transfers, or both. **Appendices D through F** show the TRI, NPRI, and COA reporting forms for 1997.

1.1 Introduction

North Americans are concerned about the effect of chemicals on their health and the environment. PRTRs are designed to track the quantities of substances of concern that are released into the air, water or land, and are a cornerstone in the effort to identify and provide information to the public on the sources and handling of chemical pollutants. Data on releases and transfers of these substances are submitted by individual facilities. These data are then fed into a national, publicly available database, allowing that information to be made available to the public. Many companies, as well as governments and communities, have used PRTR information as a basis for action to prevent and reduce chemical releases and transfers.

This report is the fourth in the annual *Taking Stock* series prepared by the Commission for Environmental Cooperation (CEC). By compiling these reports, which are based on the data collected under the national PRTR programs, the CEC aims to:

- provide an overview of North American pollutant releases and transfers, thereby enabling citizens to better understand the sources and handling of industrial pollution;
- provide information to help national, state and provincial governments as well as industry and communities identify priorities for pollution reduction;
- invite reductions in North American pollutant releases and transfers through information comparison;
- enable a more informed dialogue among citizens, industry and government and foster collaborative actions towards a more healthy environment;
- provide analyses and contextual information to assist citizens in understanding North American PRTR data; and
- encourage enhanced comparability of North American PRTR systems.

The preparation of this *Taking Stock* report, as in previous years, has benefited from the valuable input and suggestions provided by a broad range of stakeholders through the annual consultative process.

This chapter gives an overview of PRTRs and describes recent and forthcoming developments in each of the North American systems. Contacts and web sources for additional information in Canada, Mexico and the United States conclude this chapter.

1.2 What is a Pollutant Release and Transfer Register?

Pollutant release and transfer registers generally provide detailed data on types, locations and amounts of substances of concern released on-site and transferred off-site by industrial and other facilities. The register provides data on the amounts of listed substances released by the facilities to all environmental media, including air, water and land. The facilities also report on transfers of these substances in waste sent to other sites for treatment or disposal. PRTRs are recognized as an important tool for fulfilling the public's "right-to-know." Governments compile annual reports based on the PRTR data that are made available to the public; the databases are also made publicly accessible.

PRTRs are an innovative tool that can be used for a variety of purposes. PRTRs track environmental substances of concern and, thereby, help industry, government and citizens identify ways to prevent pollution, reduce waste generation, decrease releases and transfers and assume responsibility for chemical use. For example, many corporations use the data to report on their environmental performance and to identify opportunities for reducing/preventing pollution. Governments can use PRTR data to shift program priorities. New government programs or enforcement measures can be tailored to accomplish specific goals, such as reducing certain substances or targeting releases in a particular region. Communities and citizens use PRTR data to gain an understanding of the sources and management of pollutants and as a basis for dialogue with facilities and governments.

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

- reporting on individual substances,
- 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 collect data on individual substances, rather than on the volume of wastestreams containing mixtures of substances, because this is the only meaningful way to compile and compare information about the various types of on-site releases and off-site transfers. These chemical-specific data may be supplemented with additional information that is 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.

CEC Support for North American PRTRs

The Commission for Environmental Cooperation (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. The CEC recognizes the importance of 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) in Mexico—for their potential to enhance the quality of the North American environment.

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 which 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 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 June 1997 the Ministers passed Council 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.

At the Sixth Annual Regular Session of the CEC in June 1999, the Ministers noted in their Communiqué:

The Council reaffirms its commitment to assure that the peoples of North America have access to accurate information about the release and transfer of toxic chemicals from specific facilities into and through their communities. The Council supports the continued development and improvement of the North American PRTR system, with a goal of mandatory reporting for all nations.

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 in releases and transfers, reports must be made periodically and cover the same period of time for all facilities reporting. Without an established report period (e.g., reports covering one year), data from one facility cannot be compared to another or with previous reports from the same facility.

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. While the data may be collected on paper, the design and structure of the reports are standardized so that computer management and analysis can reduce costs and errors and provide standardized analyses over time.

Much of the power of a PRTR comes from public disclosure of its contents and limiting the scope of trade secret claims. Active dissemination to a wide range of users in both raw and summarized form 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, concealing its chemical identity).

1.3 Overview of Existing PRTR Programs in North America

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 the collection of data for 1997.

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

Worldwide Support for PRTR Development

PRTRs are gaining increasing interest and policy support worldwide. Following are some of the key developments at the international level:

Chapter 19 of Agenda 21, adopted by some 150 heads of state and government during the 1992 United Nations Conference on Environment and Development (the “Earth Summit”), calls for the establishment of pollutant emission registers and promotes the principle of right-to-know.

The OECD, through a 1996 Council Recommendation, has called on member countries to take steps to establish, implement and make publicly available a PRTR system. The Council Recommendation also promotes comparability among national PRTRs and sharing of PRTR data between neighboring countries.

Recognizing the growing interest in establishing national PRTRs, not only among industrialized nations but also among industrializing countries and countries with economies in transition, the Intergovernmental Forum on Chemical Safety (IFCS) will have special session on PRTRs during its Forum III meeting in Salvador, Brazil, in October 2000.

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 the special industrial characteristics of the country. The Mexican system has been initiated, but awaits further development. **Chapter 2**, which focuses on using and interpreting the information presented in *Taking Stock 1997*, examines the similarities and differences among the three national programs in greater depth. The forms that are filled out by facilities in each country are reproduced in Appendices to this report. **Appendix D** contains the US TRI form, **Appendix E** the Canadian NPRI form, and **Appendix F** the Mexican COA.

1.3.1 The US TRI

The 1997 reporting year is the eleventh year of the US TRI. TRI was created under the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, following a fatal chemical-release accident from a facility owned by a US company in Bhopal, India. The original TRI list contained over 300 chemicals and covered the manufacturing sector. Since then, the US TRI has undergone

significant changes. The goal of these changes is to ensure that the public has access to comprehensive information about releases, transfers and other waste management of toxic chemicals in their communities. The US EPA, therefore, has taken steps to improve the information available through the TRI.

Beginning with the 1987 reporting year, TRI required information on on-site releases and off-site transfers to treatment and disposal. Passage of the Pollution Prevention Act of 1990 broadened the information TRI collects to include off-site transfers to recycling and energy recovery as well as facilities' management of toxic chemicals in waste on-site, such as on-site treatment, recycling and energy recovery, as well as qualitative information on pollution prevention activities at the facility. The first year for the expanded information reporting was 1991. There have also been yearly changes to the TRI chemical list as industry and the public petitioned EPA to add or remove chemicals. The most significant change to the TRI chemical list came with the addition of 286 chemicals and chemical categories for the 1995 reporting year.

The 1997 reporting year saw relatively few changes in TRI. The most significant modification was the deletion of two chemicals from the TRI chemical list: 2-bromo-2-nitropropane (bronopol) and 2,6-dimethylphenol. Neither of these substances is on the NPRI list. The United States also began correcting for a common reporting error for metals and metal compounds. Facilities frequently reported transfers of these chemicals to POTWs (publicly operated treatment works, i.e., municipal sewage treatment plants) or to other treatment sites. Because metals are not destroyed by treatment processes, EPA has added two new transfer categories: 1) solidification/stabilization of metals and metal compounds and 2) wastewater treatment of metals and metal compounds. As with the case of transfers of metals to sewage, these are assigned to the category "transfers to disposal," described by EPA as off-site releases.

The list of industrial sectors also has expanded. Section 313 of EPCRA, the law that created TRI, identified the manufacturing sector as the original set of industries required to submit TRI reports. The first modification to this list was the 1994 addition of federal facilities. This change was followed by the addition of seven new industrial sectors, for which 1998 is the first reporting year. These new industries include metal mines, coal mines, electricity generating facilities, petroleum bulk storage terminals, chemical wholesale distributors, hazardous waste management facilities and solvent recovery facilities.

Present changes underway for TRI include a focus on chemicals that are persistent, bioaccumulative and toxic (PBTs). Vice President Gore, in his 1998 Earth Day speech, called on EPA to take steps to provide the public with better information on these PBT chemicals. In response, the EPA issued a rule on 29

October 1999 on PBTs. This rule takes three actions regarding certain PBT chemicals. The first is the addition of seven PBT chemicals and one chemical category to the TRI chemical list. The second is to lower the reporting threshold for these chemicals below the present levels. The third action is to lower the threshold for certain chemicals and chemical categories already on the TRI chemical list.

There are three distinct proposed new thresholds. For dioxin and dioxin-like compounds, the threshold would be 0.1 grams. For chemicals that persist in the environment with a half-life greater than six months and have a bioaccumulation/bioconcentration factor (BAF/BCF) of greater than 5000, the threshold would be 10 pounds (4.5 kg) per year. For chemicals that persist in the environment with a half-life between two and six months and that have a BAF/BCF between 1000 and 5000, the threshold would be 100 pounds (45 kg) per year. (A BCF of 5000, for example, indicates a concentration of the targeted substance in an organism, such as a fish, at 5000 times the level in the surrounding medium, i.e., water.) The rule can be found on the Internet at <www.epa.gov/opptintr/tri>. This rule becomes effective with the 2000 reporting year.

Also within the PBT issue, EPA has proposed changing the reporting threshold for lead and lead compounds to 10 pounds (4.5 kg). (See **Section 2.1.4** in **Chapter 2** for current reporting thresholds.) It would also add tetraethyl lead as a listed TRI chemical at the lower reporting thresholds. The proposed rule can be found on the Internet at <www.epa.gov/opptintr/tri>.

EPA is reviewing exemptions for "otherwise use" of TRI chemicals, including the motor vehicle exemption. These modifications will establish more limited interpretations of the exemptions that facilities can claim for "otherwise use." The goal is to ensure the public's access to information on the release, transfer, and other waste management options for toxic chemicals in greater than *de minimis* amounts.

Other future changes to TRI include the possible addition of airports. In 1997, EPA received a petition from environmental groups requesting the addition of airports on the basis that these facilities meet the reporting criteria under Section 313 of EPCRA. Further action on this petition will follow the review of "otherwise use" exemptions, which include a motor vehicle exemption. Under present guidance, the motor vehicle exemption would limit the amount of information TRI would collect on releases, transfers, and other waste management of TRI chemicals at airports. Action is expected before the 2002 reporting year.

TRI also will benefit from a related program on chemicals testing. In an effort to increase the public's access to information on chemicals, EPA is presently

working on a program in cooperation with industry and environmental groups to collect more complete toxicity information on high production volume (HPV) chemicals. These are substances that are produced or imported in excess of one million pounds (454 tonnes) per year.

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 seven 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. A primary objective of this program is to make the toxicity information available to the public, especially through the Internet. Further information on the program can be found on the Internet at <www.epa.gov/chemrtk/volchall.htm>.

1.3.2 Canada's NPRI

The 1997 data are the fifth set reported to NPRI. The NPRI was established with the help of a multi-stakeholder advisory committee, which included representatives from industry, environmental and labor organizations, and provincial ministries as well as federal departments. The first reporting requirements were detailed in the 27 March 1993, *Canada Gazette* notice by the Minister of the Environment pursuant to subsection 16(1) of the Canadian Environmental Protection Act (CEPA). NPRI requires information on on-site releases and off-site transfers to treatment and disposal. Off-site transfers to recycling and energy recovery are voluntary. Ongoing stakeholder consultations have modified reporting requirements since the first reporting year 1993.

A major change was instituted with the 1995 reporting year, requiring the weight of a byproduct to be included in the calculation of the reporting threshold, regardless of the concentration of the substance in that byproduct. Previously, such byproducts with concentrations of listed substances of less than one percent were not included in the calculation of the reporting threshold. Many facilities noted that the byproduct reporting change resulted in larger amounts reported for 1995 and subsequent reporting years. Also, for the 1996 reporting year, the amount of the release to each receiving water body and the amount of the transfer to each receiving site is required. Previously, the total amount of on-site surface water discharges or off-site transfers to treatment or disposal was required, but the amounts were not broken down by receiving site.

Based on stakeholder consultations conducted in 1996, Environment Canada made three noteworthy changes to the 1997 reporting requirements: an increased number of categories for the voluntary reporting of transfers off-site for recycling;

mandatory qualitative reporting of pollution prevention activities; and voluntary reporting of a production ratio or activity index.

These changes introduced new reporting requirements for off-site transfers in waste for recycling, based on the OECD International Waste Identification Codes. The section on quantities transferred off-site to recycling was optional for the 1997 reporting year and becomes mandatory with the 1998 reporting year. Reporting guidelines for 1997 included definitions of recycling and supporting instructions on reporting requirements. Environment Canada now requires more specific information than was previously the case. Facilities must now report on the actual quantities of materials transferred off-site for recycling, the nature of recycling activities, and the name and address of the receiving facility.

Starting with the 1997 reporting year, Environment Canada is also now requiring mandatory reporting on pollution prevention activities. Facilities that have taken measures to prevent the generation of pollutants or wastes are asked to identify these measures. The issue of quantifying amounts of waste reduced through pollution prevention activities has been raised in stakeholder consultations. However, it was decided to postpone this requirement.

Also, beginning with the 1997 reporting year, facilities are asked to provide voluntarily a production ratio or activity index for each substance. Such an index can assist in explaining year-to-year fluctuations in releases and transfers.

No additional substances were added to the NPRI list in 1997. In 1998, Environment Canada established a multi-stakeholder working group to make recommendations on substances that should be added or removed from the NPRI list, on a permanent process for adding and deleting substances and on alternative reporting thresholds. Based on these recommendations, Environment Canada is adding 73 new substances to the 1999 NPRI list. Acetone was also deleted for the 1999 reporting year following a review of the scientific evidence by Environment Canada. This brings the total number of substances on which companies must report in 1999 to 246 substances of concern and 20 substances identified as toxic under the Canadian Environmental Protection Act.

Environment Canada has also reviewed the Working Group's recommendations on alternate reporting thresholds for substances that are persistent, bioaccumulative and toxic. For the 2000 reporting year:

- four additional substances were added at current thresholds;
- the threshold for mercury was lowered to five kg per year and the one-percent concentration requirement was removed;

- 17 polycyclic aromatic hydrocarbons were added, with a 50-kg release-based reporting trigger;
- identified sources are required to report on a group of dioxins and furans;
- identified sources are required to report on hexachlorobenzene;
- the 10-employee threshold was removed for a variety of incinerators and wood preserving facilities.

In 1999 the Canadian Environmental Protection Act (CEPA) was renewed. It includes provisions that enshrine mandatory NPRI reporting and the annual publication of a summary report. Reports on stakeholder recommendations and Environment Canada's response to these recommendations can be found on the Environment Canada web site at <www.ec.gc.ca/pdb/npri>.

1.3.3 The RETC in Mexico

Industrial facilities in Mexico under federal jurisdiction report their annual emissions and transfers of pollutants in the Annual Certificate of Operation (*Cédula de Operación Anual*—COA). The National Institute of Ecology (*Instituto Nacional de Ecología*—INE) is the federal environmental authority in charge of the collection, management and analysis of COA data. The first reporting cycle covered the reporting year 1997.

Facilities under federal jurisdiction include facilities in 11 industrial sectors: petroleum, chemical and petrochemical, paints and inks, metallurgy (includes the iron and steel industry), automobile manufacture, cellulose and paper, cement and limestone, asbestos, glass, electric power generation, and hazardous waste management. While there are no reporting thresholds based on amount of chemical use, federal jurisdiction covers only those facilities whose processes include thermal treatment or a foundry.

Under the current legislation, only Sections I and II of the COA, which deal with the facilities' general information and air emissions of criteria pollutants, respectively, are mandatory according to the Agreement published in the Federal Official Publication (*Diario Oficial de la Federación*—DOF) on 9 April 1998. The air pollution section (Section II) requires reporting on seven pollutants (sulfur oxides, nitrogen oxides, particulates, hydrocarbons from combustion, carbon monoxide, carbon dioxide and volatile organic compounds). These pollutants, commonly referred to as criteria air pollutants, generally arise from combustion. They are of concern in such environmental problems as urban air pollution, including visibility and health effects of smog, climate change and acidification.

Section III of the COA, "Water Usage and Wastewater Discharge," is optional. These data cover volumes of wastewater and concentrations of heavy metals rather than specific amounts of substances that are in the wastewater. Section IV, "Hazardous Waste Generation, Treatment and Transfer," is also optional, but when submitted, the facility is exempted from having to submit the corresponding hazardous waste manifests to the INE during the same period of the COA. The reports cover volumes of hazardous waste that contain hazardous substances, but do not detail the amounts of the substances contained in the waste.

Finally, Section V, "Pollutant Releases and Transfers," is optional until the list of substances to be reported is published as a Mexican Official Standard (*Norma Oficial Mexicana*—NOM). This is the section of the form that would be comparable to NPRI and TRI reporting and the basis of the RETC. It gives the individual substances and the amounts of those substances for the individual media, including on-site releases and off-site transfers to treatment and disposal.

The first COA reporting cycle, with data collected for the year 1997, took place in 1998. The first National Pollutant Releases and Transfers Report, describing the RETC process and objectives, was issued in December 1999. This report is a summary of the status of the implementation of environmental policy tools for pollution control and prevention currently available and of the issues facing Mexico in its path to continued development of environmental policy. The report summarizes the numbers of reports received under the new COA system and the continuing legislative and administrative issues underlying the objective of a consolidated system for pollution prevention and control regulation.

For the 1997 reporting year, a total of 1,893 documents were submitted. About 60 percent of the documents (1,129 submissions) were considered complete COAs (that is, Section I and II data submitted) with 20 percent submitted in old, expired formats and the other 20 percent lacking some of the required information. Only five percent of all the forms received provided data in Section V, the basis for the RETC. Even for those forms with Section V data filled in, though, it was found that in many cases the information provided was inaccurate. INE noted that these issues arose mainly because the COA was a new form, different from the previous reporting obligations; there was not enough training in how to fill it out; and a few of the questions were found to be confusing.

While the first National Pollutant Release and Transfers Report does not contain data reported on the COA, it does present a summary of monitoring data on criteria air pollutants, average daily wastewater discharge volumes (both municipal and non-municipal), hazardous waste generation volumes from industrial facilities, and estimates of greenhouse gases from fuel consumption, industrial processes,

agriculture and other sources. These summaries present data from various recent time periods as collected under different governmental programs, for the Mexican states and for industry categories.

The last day of April 1999 was the deadline for industrial facilities to submit the second COA, covering the year 1998. The COA form for this second reporting cycle underwent minor changes, as a result of review of the COA forms from the previous year. There is more detail requested in Sections I and II, which includes annual air emissions estimations for criteria pollutants, total hydrocarbons and carbon dioxide emissions; and Section III, which includes reporting of heavy metals in wastewater discharges. Other sections basically remained the same. The COA form is available for downloading from the Internet at <www.ine.gob.mx/dggia/retc/coa/formato.html>. (Also see **Appendix F**.)

To increase and improve the level of reporting, INE has issued guidance manuals for individual industrial sectors. The purpose of the manuals is to identify the facility's sources of pollution, identify chemicals used, processed or generated and to estimate the corresponding emissions. The manuals for 15 industrial sectors can be downloaded at <www.ine.gob.mx/dggia/retc/coa/guias.html>.

In addition, INE and the Mexican Secretariat of Environment, Natural Resources and Fisheries (*Secretaría de Medio Ambiente, Recursos Naturales y Pesca*—Semarnap), in collaboration with Mexican industrial groups, academic institutions and professional associations, are organizing and conducting training courses at the national level on how to fill in the COA. The training courses conducted during 1998 and 1999 can be found at <www.ine.gob.mx/dggia/retc/coa/cursoper.html>. An interactive computer program to assist in filling in data on the COA form is under development and is expected to be available for downloading at the INE Internet site.

To remove the existing legal barriers for the complete implementation of the RETC, several legal and regulatory avenues are being explored. The General Law of Ecological Equilibrium and Environmental Protection (*Ley General del Equilibrio Ecológico y la Protección al Ambiente*—LGEEPA) outlines the need to develop and consolidate the regulatory procedures and instruments for prevention and control of environmental pollution into a simplified administrative framework. The LGEEPA expressly empowers Semarnap to create a consolidated environmental information system based in the related licenses or permits that have to be obtained. The 1995-2000 Environmental Program (*Programa del Medio Ambiente 1995-2000*) also includes the implementation of a consolidated system, as a management and documentation tool, that encompasses pollutant atmospheric releases, wastewater discharges, hazardous waste generation and management, and highly hazardous activities.

While there are no particular regulations for hazardous materials reporting, exploration of what authorities might exist to aid in this effort is ongoing. Semarnap is considering the issuance of a regulation to prevent and control pollution of air, water and land for industries under federal jurisdiction. Such a regulation would not have to be passed by the Congress in order to be effective and, as a consequence of a regulation expressly requiring it, a list of chemicals to be reported would be mandatory. Semarnap is also exploring, under the LGEEPA, the issuance of an administrative agreement (*Acuerdo Administrativo*) for RETC management. Again, this would not have to be passed by Congress in order to achieve the mandatory reporting of releases and transfers of listed chemicals.

1.4 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 Canadian NPRI Data and Information

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

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

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

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

NPRI data on the Internet, in French: <www.ec.gc.ca/pdb/inrp>

e-Mail: npri@ec.gc.ca

Additional Information on Mexican RETC

Instituto Nacional de Ecología
Dirección de Gestión Ambiental
Av. Revolución 1425 – 9
Col. Tlacopac, San Angel
01040 Mexico, D.F.
Tel: (525) 624-3750
Fax: (525) 624-3584

Luis Sánchez Cataño: lsanchez@ine.gob.mx

INE's web site for the RETC on the Internet, in Spanish:
<www.ine.gob.mx/dggia/retc/index.html>

RETC Documents on the Internet, in English:
<www.ine.gob.mx/dggia/retc/ingles/ingles.html>

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

Public Access to US 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: <www.epa.gov>

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

On-line Data Access

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

RTK-NET: <www.rtk.net> for Internet access

202-234-8570 for free on-line access to TRI data, or
202-234-8494 for information.

National Library of Medicine's Toxnet (Toxicology Data Network) computer system: toxnet@tox.nlm.nih.gov

<sis.nlm.nih.gov/sis1/> for Toxnet home page

<www.nlm.nih.gov/pubs/factsheets/trifs.html> for information,
including information related to TRI

Environmental Defense Fund Scorecard home page:
<www.scorecard.org/>

Chapter 2: User's Guide to North American PRTR Data

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A All chemicals and industries

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M Matched chemicals/industries

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The CEC wishes to assist citizens in understanding and using the existing data from North American PRTRs. PRTR data serve many purposes very well, but they may not serve a particular purpose perfectly. To apply PRTR data appropriately, users need to understand what the numbers represent, the limitations involved in their use, and how they can be compared with data from other PRTRs or other sources. *Taking Stock* 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.

This chapter offers guidance on using the North American data, with specific references to the data for 1997 from Canada and the United States. *Taking Stock 1997* summarizes PRTR data from reports that industrial facilities filed for the 1997 reporting 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 1998. The US EPA released the TRI data to the public in a report dated April 1999, and Environment Canada released the NPRI data in December 1999. PRTR data from Mexico are not available for 1997.

2.1 Understanding PRTR Data

Simply put, facilities report to PRTRs the amounts of listed chemical substances that they release directly to the environment on-site and that they transfer off-site to other locations for reuse/recycling/recovery, for treatment, or for disposal. (Figure 2-1.) However, for each PRTR, these basic rules differ in the details. Thus, to use data from different PRTRs effectively, it is important to understand how they differ and how they are the same. Table 2-1 summarizes the basic data elements and what each country requires.

2.1.1 Facilities/Companies

Each PRTR system covers specified types of business activities. Canada's NPRI covers all business activities, with very few exceptions. Canada exempts 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. In the United States, manufacturers have been required to report to TRI since its inception, and federally owned facilities were added in 1994. Beginning with reporting for 1998, several additional industries associated with manufacturing will also have to report to TRI. Mexico requires any facility under federal jurisdiction to report. These include the following industrial sectors: petroleum, chemical and petrochemical, paints and inks, metallurgical, automotive, cellulose and paper, cement and limestone, asbestos, glass, electric power generation, and hazardous

waste management. Federal jurisdiction is further limited to those facilities with thermal treatment processes or a foundry.

Note that "companies" do not report to PRTRs. Instead, each individual facility submits reports. Although some companies may centralize reporting procedures for all their facilities, individual submissions must be made for each facility. Both NPRI and TRI ask facilities to identify their parent companies. Although this information can be used to analyze PRTR reporting at the corporate level, painstaking care is needed to identify all versions of a corporate name (for example: GM, General Motors, Delco Div. of General Motors, etc.)

2.1.2 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 COA uses the Mexican Activities and Products Classification (*Clasificación Mexicana de Actividades y Productos*—CMAP code), 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 there is no direct correspondence between the two SIC code systems.

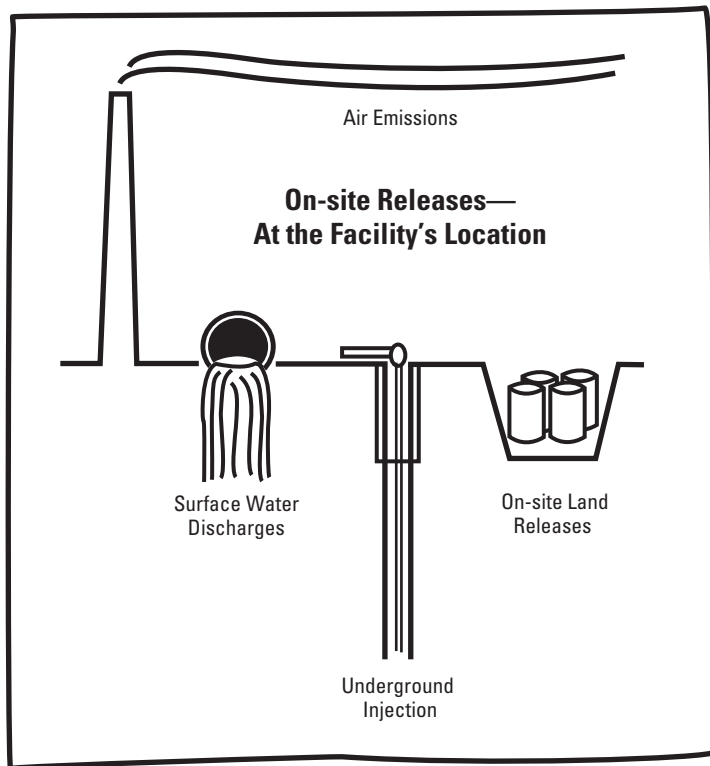
The United States, Canada and Mexico are working together to develop a common North American Industry Classification System (NAICS) that, if used, will allow more far-reaching comparisons in the future. In reporting year 1998, NPRI facilities will begin reporting their NAICS code, along with the Canadian and US SIC codes. TRI is expected to implement the NAICS sometime after the reporting year 2000. The Mexican RETC will use the NAICS code starting with the reporting year 2000. Information on NAICS is available from Statistics Canada on the Internet at <www.statcan.ca/english/Subjects/Standard/index.htm>. The US government has information on NAICS at: <www.ntis.gov/yellowbk/Inty205.htm>. For information on NAICS in Spanish, see the INEGI web site <www.inegi.gob.mx/economia/espanol/feconomia.html>. (The English site is <www.inegi.gob.mx/economia/ingles/feconomia.html>.)

[continued on page 20]

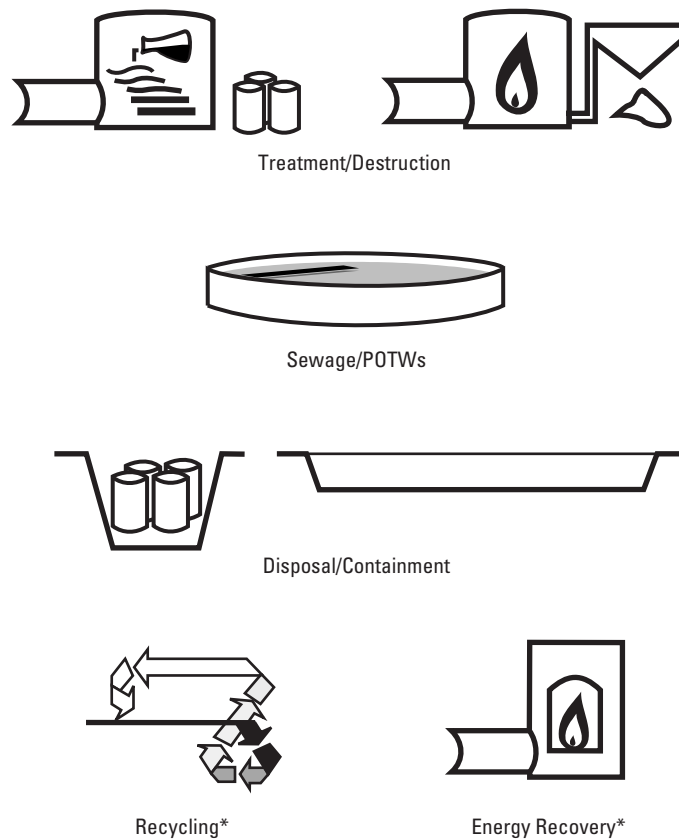
Figure 2-1

1997

On-site Releases and Off-site Transfers



Off-site Transfers—
Sent to Locations away from the Facility



* 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**, on previous page)

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 (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, and 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.

Other transfers may go to facilities that recycle the substance for reuse or burn the substance as fuel (energy recovery). Such transfers are required to be reported to TRI; they are voluntary for NPRI until the reporting year 1998 when they also become mandatory.

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		Comparison of Mandatory Reporting in North American PRTRs		
M		1997		
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 with 1998 reporting year.)	Any facility manufacturing or using a listed chemical, except research, repair and retail sales. Agriculture, mining, well drilling also exempt, except if processing or otherwise using 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 (601 substances, including 28 chemical categories).	Chemicals used or manufactured in sufficient quantities (176 substances, including 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 use 10 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 byproducts 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 (454 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 pounds (454 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, other 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 2-1 (cont.)

M 1997

Comparison of Mandatory Reporting in North American PRTRs (cont.)

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. (Reporting amount to Class I wells 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. List 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			
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 beginning with 1998 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.
Pollution prevention/ source reduction	Type of source reduction activities (21 categories).	Type of pollution prevention activity (8 categories).	Not mandatory.

2.1.3 Chemicals

Each PRTR system covers an itemized list of pollutant substances. These include both individual chemicals, such as toluene and 1,1,1-trichloroethane, and certain chemical groups, such as polycyclic aromatic compounds or zinc and zinc compounds. Typically, PRTRs focus on toxic chemicals, although definitions of “toxic” vary from country to country. PRTRs in place and in development around the world take various approaches to the list of substances for which they require reporting. Some, for example Mexico, include substances that affect air quality by contributing to smog formation although those substances are not necessarily deemed “toxic.”

Chemical substances often have more than one name (synonyms). Methyl bromide and bromo methane, for example, are names for the same substance (an ozone-depleting chemical whose production and use have been limited under the Montreal Protocol). PRTRs rely on the identification systems of various authorities to specify the exact chemicals that are to be reported. NPRI and TRI use Chemical Abstracts Service (CAS) Registry Numbers, which is a service of the American Chemical Society. The CAS number of bromo methane, for example, is 74-83-9. Tables in *Taking Stock* that present chemical-specific data include CAS numbers.

As of 9 June 1999, the Chemical Abstracts Service had listed more than 16 million chemical substances and identified more than 210,000 of them as regulated or covered by chemical inventories worldwide <www.cas.org/cgi-bin/regreport.pl>. Of this immense universe, NPRI covers over 170 chemical substances and TRI approximately 600. (Counts of the number of substances on a list vary, as some observers may count individual substances within a chemical category and others may not.) Seven pollutants are required to be reported on the Mexican COA (Section II). These are sulfur oxides, nitrogen oxides, particulates, hydrocarbons from combustion, carbon monoxide, carbon dioxide and volatile organic compounds. None of these are on the NPRI or TRI lists because the COA pollutants are categories of substances rather than individually listed ones and because NPRI and TRI collect data on substances from more diverse sources, including air emissions from sources other than combustion, and releases to water and soil. Therefore, data from the mandatory portion of the COA are not comparable to NPRI or TRI.

As explained below in **Section 2.2**, NPRI and TRI listed 165 substances in common in 1997. For a detailed comparison of the chemical lists in the three countries, see **Appendix A**.

2.1.4 Thresholds

One other central criterion determines who must report what data to a PRTR: a reporting threshold. PRTRs set parameters for minimum amounts of a reportable substance involved in certain activities—a facility’s first responsibility under a PRTR is to determine whether it meets this reporting threshold. Typically, the reporting threshold involves manufacturing a listed substance, using a listed substance in a process (for example, as a reagent or catalyst), or otherwise using a listed substance (for example, in cleaning industrial equipment). For NPRI, if 10 tonnes (22,050 lbs) or more of the substance is manufactured, processed or “otherwise used,” then releases and transfers must be reported. For TRI, the thresholds are more than 25,000 lbs (11.34 tonnes) if a substance is manufactured or processed and 10,000 lbs (4.54 tonnes) if it is “otherwise used.”

For the 1995 and subsequent reporting years, Canada requires, as does the United States, that the total weight of the byproduct, regardless of concentration, be included in the calculation of the reporting threshold, eliminating one difference between the two systems. For this reason, the base year used in this report for analysis of changes over time is 1995.

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 or number of employees. However, only facilities under federal jurisdiction, which is limited to those facilities with thermal treatment processes or a foundry, must report, and smaller facilities are not expected to fall under this classification.

The United States also has set an alternative threshold calculation for facilities with relatively small reportable amounts of a listed chemical: if a facility does not manufacture, process, or otherwise use more than 1 million pounds (454 tonnes) of the chemical, and if the facility’s “total reportable amount”—all on-site and off-site recycling, energy recovery, and treatment, plus production-related on-site releases and off-site transfers for disposal—is less than 500 pounds (227 kg). These facilities file short certification statements that identify the chemical but do not supply any quantitative information.

2.1.5 Reporting Forms

Facilities submit one reporting form for each listed substance for which they must report. A facility reporting on 10 chemicals files 10 forms (electronically in Canada and electronically or on hard copy in the United States). Thus, the individual, chemical-specific forms are the critical source of data for reports such as NPRI's annual Summary Report, TRI's annual Public Data Release, and the annual *Taking Stock* reports.

This point is important for understanding certain analyses of PRTR data, especially analyses of US data by industry sector. Using up to six SIC codes, TRI facilities identify the business activities or industry sectors associated with manufacture or use of each chemical on which they report. A facility may use the same SIC codes on all its TRI forms or it may use different SIC codes to describe its industrial activities for various chemicals. For example, a petrochemical facility may indicate petroleum refining as the industrial activity associated with one chemical, while it reports chemical manufacturing for another. One chemical form will be analyzed with other forms in petroleum refining and the second in chemical manufacturing. However, the facility itself—with the sum of all its reports—cannot be accounted as either a petroleum refinery or a chemical manufacturing plant for purposes of industry-based analyses of TRI data. In the analyses in *Taking Stock*, such facilities appear in the industry category called “multiple SIC codes.”

2.1.6 Amounts Reported

Amounts reported to NPRI and TRI are estimates. These estimates may reflect monitoring, engineering calculations, emission factors (which identify the amounts of a chemical that can be expected to result from particular industrial processes or from use of specific equipment), or other estimation techniques. Although the numbers represent estimates, NPRI and TRI require facilities to report releases and transfers to the tonne or pound, respectively. (For production-related waste management, in a separate section of the TRI form, facilities may report quantities rounded to two significant digits—for example, 2,100,000 pounds rather than 2,145,678 pounds.)

For releases of a substance that total less than one tonne, NPRI allows facilities 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.

2.1.7 Confidentiality Claims/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 disclosure. 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 11 TRI forms out of 71,670 submitted for 1997 contained such claims. The trade secrecy claims constitute 14,000 pounds (6,350 kg) of releases and 3,605 pounds (1,635 kg) of transfers. In Canada, all information in a report, including the identity of the facility, 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 30 forms out of the national total of 7,375 forms were given confidential status for the 1997 NPRI reporting year. This represented 61 tonnes of releases and 3,352 tonnes of off-site transfers. Mexico is currently discussing criteria for trade secrecy.

2.1.8 Releases and Transfers

PRTRs collect data on two basic types of releases and transfers: those resulting from normal business activities—these represent the greatest potential for pollution prevention efforts—and those arising from accidents, from clean-up activities to remedy earlier releases, or from other one-time events. This section gives general descriptions of the types of releases and transfers. (See also **Figure 2-1**, on page 16). Both the NPRI and TRI databases contain much greater detail than is presented in these descriptions or in summary tables throughout *Taking Stock*.

Reporting instructions for NPRI and TRI give detailed information on the releases and transfers that facilities must report, and both systems supply guidance to specific industries in published manuals and/or training sessions. Reporting instructions are available on the NPRI and TRI web sites, respectively, at www.ec.gc.ca/pdb/npri/1998/index.html for 1998 NPRI instructions and www.epa.gov/opptintr/tri/report.htm for 1998 TRI instructions.

On-site Releases

Releases represent the entry of a chemical substance into the environment. Facilities report amounts of the listed chemicals they have released to the environment at their own location (“on-site”). Amounts are reported separately for each environmental medium:

- **Air emissions**—Releases to air that occur through identified outlets such as stacks (“smokestacks”) or vents are labeled “stack” or “point” emissions. Air releases that occur because of leaks are labeled “fugitive” or “non-point”

emissions. Generally, facilities apply pollution-control devices or technologies to limit stack emissions of listed chemicals. Some facilities have found PRTR reporting beneficial in helping to identify unexpected emissions sources, such as leaking ducts or pipes, which can then be corrected.

- **Surface water discharges**—Releases to surface water bodies such as rivers and lakes generally occur through discharge pipes. (Wastewater is generally treated first, to remove or minimize its pollutant content.) Rainwater may also wash pollutants from on-site waste storage areas into surface waters. These releases from run-off are also reportable, and surface water discharges reported to PRTRs usually rise in years with above-average rainfall, especially from storms.
- **Underground injection**—Facilities may inject listed chemicals in waste into deep underground wells, a practice more common in certain parts of the United States than in Canada. Underground injection is regulated, and deep wells that receive toxic waste are intended to isolate the pollutants from groundwater sources. Underground injection is not practiced in Mexico.
- **On-site land releases**—Releases to land at the facility include burying chemical waste in landfills, incorporating it into soil (“land treatment”), holding it in surface impoundments, accumulating it in waste piles or disposing of it by other methods.

Off-site Transfers

Facilities report amounts of the listed chemicals they have sent to other locations to be handled by various waste management practices. In PRTRs, the amount of the chemical in the waste is reported and not the total volume of the waste. Both NPRI and TRI have collected data on off-site transfers for treatment and for disposal since the respective inventories began (1993 for NPRI and 1987 for TRI). In 1991, TRI began requiring facilities to report transfers for recycling and energy recovery. Reporting of these transfer types has been optional in NPRI, but will become mandatory with reports for 1998, as discussed in **Chapter 1**.

- **Treatment**—Methods of treatment applied to chemical waste include physical, chemical, or biological treatment. Neutralization and incineration are examples. Treatment is intended to alter or destroy the chemical. Treatment processes must be appropriate for the particular substance—a chemical that will not burn, for example, cannot be successfully incinerated. Treatment processes are seldom 100 percent effective, and some release to the environment is likely.
- **Sewage Treatment**—Facilities may send their chemical waste to sewage treatment facilities—municipal sewage treatment plants (MSTPs) in Canada

or publicly owned treatment works (POTWs) in the United States. Again, effectiveness depends on both the substance and the sewage plant’s processes. Volatile chemicals are likely to evaporate (releases to air). Typically, secondary treatment processes apply microorganisms (with aeration or oxygenation) to biodegrade organic compounds.

- **Disposal**—Waste sent off-site for disposal may be disposed of on land or by underground injection. As with on-site land releases and underground injection, these methods represent direct releases to the environment, although they occur at locations away from the originating facility.
- **Transfers of Metals**—Metals sent to treatment or to sewage treatment may be captured and removed from waste and disposed of in landfills or by other disposal methods, but they are not destroyed by treatment processes. In the *Taking Stock* analyses, therefore, all transfers of metals are presented in a single separate category.

It should be noted that PRTRs do not measure all environmental releases occurring as a result of off-site transfers. Transfers sent for disposal and transfers of metals to treatment/sewage/disposal indicate releases at the receiving site, but transfers of other substances may also result in such releases.

2.2 Creating the *Taking Stock 1997* Matched Data Set

To compare data from PRTRs with different reporting requirements, *Taking Stock* relies on selecting the elements they have in common. The data are from Canada and the United States; the Mexican system is being implemented and data comparable to the PRTR data for the US and Canada are not available for 1997. The important principle is that the data compiled here represent the substances and the industries covered by both Canada’s NPRI and the US TRI. This matching process eliminates from the matched data set all facility submissions in both countries for chemicals whose releases and transfers are reported under one system but not the other. It also eliminates reporting forms submitted by facilities in any industry that is covered by one PRTR but not the other. Thus, the North American database used in this report consists of a matched data set of common industries and chemicals in the two PRTRs.

The matched data set for 1997 includes data on 165 substances reported from facilities in the manufacturing sector. In practice, the matched data set limits the analysis to this sector because non-manufacturing facilities were not required to report to TRI.

In creating the matched data set, specific differences between the two systems must be taken into account. One such issue is that while certain chemicals may be reportable in both systems, they may be 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.

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 1997* add the TRI amount reported for the given chemical to the amount reported for its compounds, to correspond with NPRI practice.

Environment Canada considers 1995 as a base year for NPRI, while EPA considers 1988 as a base year for TRI. Although each inventory started in an earlier year, unfamiliarity with reporting and data quality concerns led them to use these years as a more reliable baseline to measure subsequent progress and trends. Beginning with the 1997 data, TRI also adopted 1995 as an additional baseline for tracking progress because more than 250 additional substances were added to the TRI list for reporting that year. Therefore, **Chapters 3, 4 and 5**, which compare PRTR data across the years, examine 1995–1997 data. The chemicals and industries matched for 1995–1997 are the same as those used for 1997 only.

The following sections present summary data to demonstrate the method used to select comparable data sets. Throughout *Taking Stock 1997*, letters (M = matched chemicals/industries or A = all chemicals/industries) on the left sides of the tables and figures indicate which data set is in use. Only tables and figures based on the same data set can be meaningfully compared with one another.

Table 2-2		Overview of North American PRTR Data: All Releases and Transfers, NPRI and TRI, 1997	
A	1997	Canadian NPRI Number	US TRI Number
		Canadian NPRI Number	US TRI Number
		Total Facilities	1,973
		Total Forms	7,375
		Releases	kg
		Total Air Emissions	109,576,994
		Surface Water Discharges	15,070,781
		Underground Injection	18,224,597
		On-site Land Releases	18,792,841
		Total Releases	161,875,744
		Transfers	kg
		Treatment (except Metals)	19,330,533
		Sewage/To POTWs (except Metal)	9,916,973
		Disposal (except Metals)	12,785,886
		Treatment/Sewage/Disposal of Met	54,307,787
		Total Transfers	96,341,179
		Total Releases and Transfers	258,216,923
		Transfers to Recycling/Reuse*	112,563,826
		Transfers to Energy Recovery*	12,185,174
			230,378,937

* Optional reporting for NPRI, required for TRI.

► Canada and US data only. Mexico data not collected for 1997.

2.2.1 Effects of Matching Releases and Transfers

In 1997, Canadian facilities in all industries reported 258.2 million kg of releases and transfers to NPRI. In the United States, manufacturing facilities and federal facilities—the only sectors covered by TRI—reported 1.41 billion kg of releases and transfers. While most analyses in *Taking Stock 1997* use the matched data set, a few address the complete NPRI and TRI data as summarized in **Table 2-2**.

Matched releases and transfers in *Taking Stock 1997* exclude transfers to recycling and energy recovery. NPRI facilities voluntarily reported transfers of 112.6 million kg to recycling/reuse and 12.2 million kg to energy recovery in 1997. TRI facilities, for which these reporting categories are mandatory, transferred 1.08 billion kg to recycling and 230.4 million kg to energy recovery. Totals presented by Environment Canada and the US EPA in their 1997 summary reports include these amounts.

2.2.2 Effects of Matching Chemicals and Industries

In 1997, Canadian manufacturing facilities reported 45.0 million kg of releases and transfers for substances reportable to NPRI but not covered in TRI—or reportable in both systems but defined differently. These reports were eliminated from the matched data set (“excluded due to chemical only”). Canadian facilities in non-manufacturing industries reported 60.2 million kg of releases and transfers for substances covered in both PRTRs. Because these industries did not have to report in TRI, the NPRI reports for these facilities were also removed in compiling the matched data set (“excluded due to industry only”). In addition, some reports in the NPRI database fell into both categories (“excluded due to both chemical and industry”), and their 23.1 million kg of total releases and transfers were also excluded (**Table 2–3**).

In TRI, matching for common chemicals eliminated 238.1 million kg of releases and transfers. Matching for industries excluded a much smaller amount—6.2 million kg—because nearly all of TRI’s industrial base is covered in NPRI. A total of

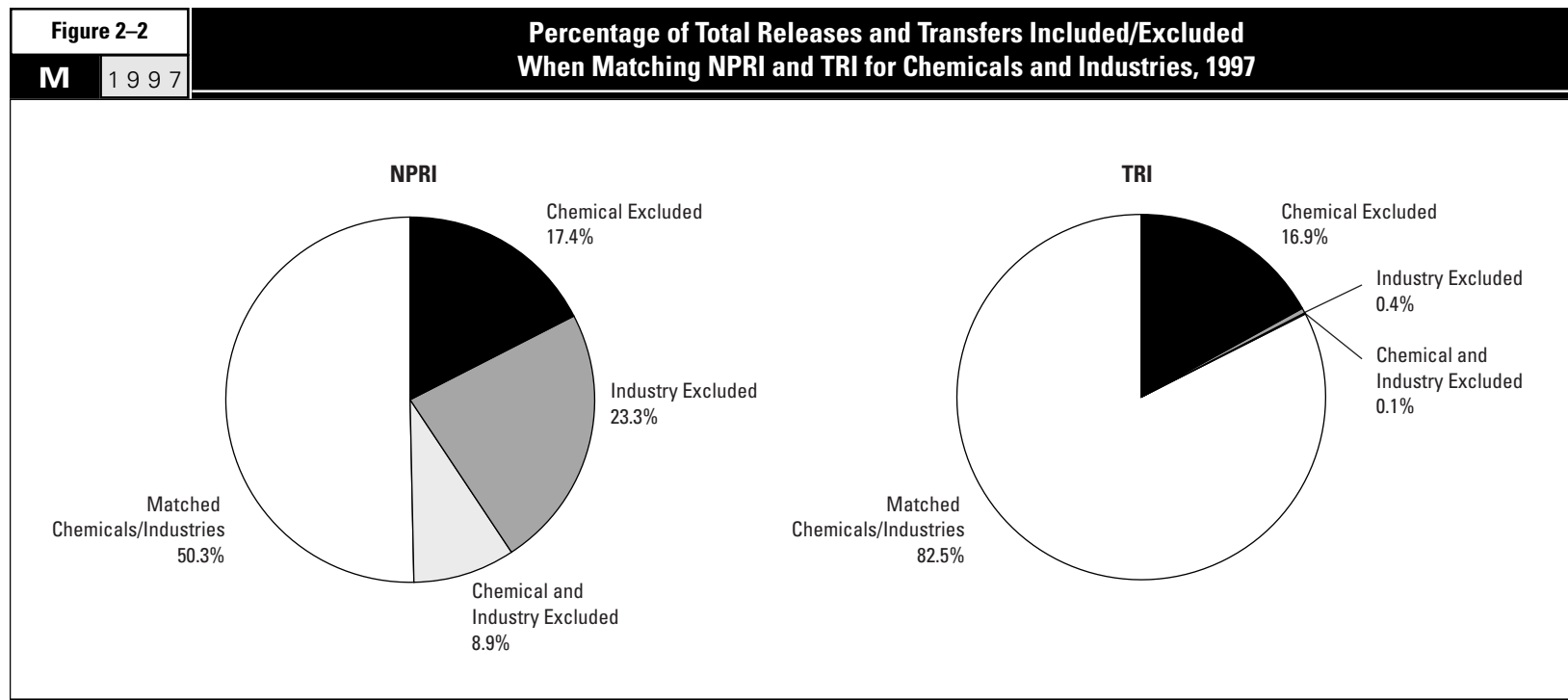
1.6 million kg was excluded because both the chemical and the industry were not comparable to NPRI.

The 1997 matched data set thus included 50 percent of the matched releases and transfers in the NPRI database and 83 percent of those in the TRI database. The largest factor in this matching process was the difference in reporting definitions of ammonia, described above. Excluding ammonia eliminated 17 percent of NPRI’s releases and 9 percent of those in TRI from the matched data set.

Chemical exclusions alone eliminated 17 percent of total releases and transfers in both systems. Another 23 percent of NPRI releases and transfers were excluded by industry differences between the two PRTRs and a further 9 percent by both chemical and industry differences (**Figure 2–2**).

The great majority of analyses presented in *Taking Stock 1997* examine this matched data set.

Table 2-3		Creating the Matched Data Set for <i>Taking Stock 1997</i> : Effects of Matching NPRI and TRI for Chemicals and Industries, 1997							
*	1997	NPRI				TRI			
		Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Number of Forms	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
A	Total in Individual Database	7,375	161,875,744	96,341,179	258,216,923	71,670	959,843,200	447,463,104	1,407,306,304
	Excluded due to chemical only	1,042	34,720,232	10,261,966	44,982,198	12,604	186,763,148	51,365,075	238,128,223
	Hydrochloric and sulfuric acid: non-air releases	386	178,265	7,434,993	7,613,258	495	326,307	4,142,267	4,468,574
	Isopropyl alcohol	186	2,147,101	911,446	3,058,547	72	416,459	47,398	463,857
	Ammonia	228	27,941,409	1,078,847	29,020,256	2,708	89,265,716	9,068,098	98,333,814
	Other chemicals	242	4,453,457	836,680	5,290,137	9,329	96,754,666	38,107,312	134,861,978
	Excluded due to industry only	1,516	24,971,373	35,212,319	60,183,692	647	4,310,097	1,924,557	6,234,654
	Excluded due to both chemical and industry	218	21,735,215	1,358,633	23,093,848	167	1,467,102	132,532	1,599,634
M	Total for Matched Chemicals/Industries	4,599	80,448,924	49,508,261	129,957,185	58,252	767,302,852	394,040,940	1,161,343,792
		%	%	%	%	%	%	%	%
	Total in Individual Database	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Excluded due to chemical only	14.1	21.4	10.7	17.4	17.6	19.5	11.5	16.9
	Hydrochloric and sulfuric acid: non-air releases	5.2	0.1	7.7	2.9	0.7	0.0	0.9	0.3
	Isopropyl alcohol	2.5	1.3	0.9	1.2	0.1	0.0	0.0	0.0
	Ammonia	3.1	17.3	1.1	11.2	3.8	9.3	2.0	7.0
	Other chemicals	3.3	2.8	0.9	2.0	13.0	10.1	8.5	9.6
	Excluded due to industry only	20.6	15.4	36.5	23.3	0.9	0.4	0.4	0.4
	Excluded due to both chemical and industry	3.0	13.4	1.4	8.9	0.2	0.2	0.0	0.1
	Total for Matched Chemicals/Industries	62.4	49.7	51.4	50.3	81.3	79.9	88.1	82.5



2.2.3 Effects of Revisions for Previous Years

Facilities that report to PRTRs are free to revise their previous years' submissions at any time. They may correct previous errors, or they may re-calculate earlier years' data using a different estimation method. Some facilities that adopt new methods of estimating reportable amounts find that their results for the current year give a very different picture of releases and transfers from previous years. They may appear to have made large increases or decreases in reportable amounts, when in fact only the estimation methods have changed. These facilities may choose to revise earlier submissions so that their totals over time reflect consistent assumptions and approaches.

Each year, some facilities miss the reporting deadline or certain quality-control issues affecting their submissions are unresolved at the time the database is used for preparation of the annual PRTR report. Facilities may also withdraw earlier submissions if they determine that they were not, in fact, required to report. A facility may have misinterpreted the threshold calculations, for example, or it may have misunderstood that only particular forms of a listed substance had to be

reported. A facility that changes its estimation methods may also find that the revised calculations for a previous year leave it below the reporting threshold.

As a result, database totals for a given year change when revised reports, late reports, and withdrawals are received. *Taking Stock 1996* reported a total of 1.55 billion kg in North American releases and transfers, reflecting the complete NPRI and TRI databases for that year. (As noted above in **Section 2.2.1**, this excludes voluntary reporting in NPRI and mandatory reporting in TRI of transfers to recycling/reuse and energy recovery.) Revisions received since the close of the 1996 reporting period raised the total to 1.56 billion kg. This amounted to a difference of one-half of one percent (0.5 percent). Both Canadian and US revisions increased the totals for releases and decreased them for transfers. (**Table 2-4**.)

Data for the previous years, 1995 and 1996, are presented in this report, *Taking Stock 1997*, for comparison purposes. Some of the data in previous editions of *Taking Stock* may have been revised so that readers should use the current report or the current databases. Similarly, both Canada and the United States update previous years' data when releasing the next year's data.

Table 2-4		Changes in Data as Result of Revisions Since <i>Taking Stock 1996</i> , NPRI and TRI, 1996			
A	*	1996 Data, Reported in <i>Taking Stock 1996</i> *		with Revisions Submitted Since <i>Taking Stock 1996</i> **	
		Canadian NPRI Number	US TRI Number	Canadian NPRI Number	US TRI Number
Total Facilities		1,856	21,626	1,867	22,047
Total Forms		6,754	71,381	6,771	72,643
Releases	kg		kg	kg	kg
Total Air Emissions		98,115,143	658,544,200	98,777,609	661,580,673
Surface Water Discharges		13,013,766	78,588,757	12,955,490	81,283,355
Underground Injection		17,820,743	92,666,263	17,820,743	92,624,631
On-site Land Releases		13,868,575	140,164,719	13,879,775	150,622,890
Total Releases		143,025,595	969,963,939	143,640,954	986,111,549
Transfers					
Treatment, Destruction		20,676,683	131,563,187	20,722,032	102,712,978
Sewage/To POTWs		7,548,491	106,944,902	7,607,352	107,981,229
Disposal, Containment		34,137,359	135,166,656	33,955,734	157,859,735
Total Transfers		62,362,520	373,674,745	62,285,118	368,553,942
Total Releases and Transfers		205,388,115	1,343,638,684	205,926,072	1,354,665,491

* 1996 All 1996 Chemicals/Industries reported in 1996 (in 1996 databases).
 ➤ Canada and US data only. Mexico data not collected for 1996.

** 1997 Revised since 1996 report (in 1997 databases).

2.3 Putting PRTR Data to Work

2.3.1 Public Dissemination

As one of the purposes of the databases is to provide the PRTR 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 contact information at the end of **Chapter 1**). The type and level of detail of the information to be made public under the Mexican RETC is still under discussion. In the beginning, summary data by industrial sector and 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.

PRTR data have a wealth of potential uses beyond the needs and resources of government. Companies and individual facilities use PRTR data to report on their

waste management activities and environmental performances. Publicly available PRTR data also provide a basis for local citizens and industries to track progress in reducing pollutant releases and transfers. The data can also be used to build a regional picture of releases and transfers, and to encourage companies to expand their environmental management programs.

2.3.2 Using PRTR Data Alone

PRTR data are valuable for what they reveal. Using PRTR data alone, releases and transfers can be analyzed by chemical, by facility, by business sector, or for a geographical area—and over time. What chemical is released in the largest amount in a given community? Where are transfers of chemicals in waste into a particular province or state coming from? What chemicals are reported in surface water discharges to tributaries throughout a watershed? How does one facility compare with another in the same business? Such analyses can also show overall progress

or lack thereof. Are local facilities reducing the releases they report? Are reductions in on-site releases accompanied by increases in transfers of listed substances off-site? What industry-wide trends are evident?

PRTR data can answer these questions. In turn, many answers point to new questions that require more information than PRTRs typically supply. For example, how have facilities reduced their releases? Although facilities indicate what source reduction activities they have undertaken during the year (beginning with the 1997 reporting year in NPRI and the 1991 reporting year in TRI), specific reductions cannot be linked directly to any such activity reported in the PRTR data. TRI facilities also report a production index, showing how much production levels have increased or declined since the previous year; reporting a production index to NPRI is voluntary. Again, specific reductions cannot be linked to this index. In both cases, many other factors influence changes in amounts reported from year to year.

2.3.3 PRTR Data as a Basis for Dialogue

While PRTR data alone can provide much information of potential interest, some questions can only be answered by finding out more about what is “behind the numbers.” For example, how have facilities reduced their releases? Did facilities take specific actions to bring about these reductions? Have facilities eliminated or reduced releases of one chemical by switching to processes that use another? If so, is that substance less potentially harmful—or not? To be able to answer such questions, it is necessary to find out more about the facilities. NPRI facilities have the opportunity to comment on their releases and on their transfers, and a facility’s comments—included in the NPRI database—may explain its increases or decreases in reported amounts from previous years. The TRI database does not contain such comments. Most often, however, calling a facility is the only way to obtain an explanation of its releases and transfers and their year-to-year changes. Contact points are provided by facilities as part of their PRTR reporting forms.

2.3.4 Recognizing the Limitations

A principal factor in making good use of PRTR data is to know their limitations. PRTR data:

- do not encompass all potentially harmful substances,
- do not address all sources from which chemicals of concern move into the environment,
- do not identify all on-site releases and off-site transfers from a facility,

- do not measure releases and transfers—they estimate them,
- do not supply a direct perspective on the ultimate environmental fate of chemical substances that reporting facilities release or ship off-site for disposal or other disposition,
- do not provide information on the toxicity or potential health effects of substances released or transferred by reporting facilities,
- do not indicate risks from substances released or transferred by reporting facilities,
- do not identify exposures of human or ecological populations to substances released or transferred by reporting facilities.

Other important information also lies beyond the bounds of PRTR data. For example, information about local/regional geography, demographics, and economics may be needed to interpret PRTR data appropriately in community and ecological contexts.

2.4 Putting PRTR Data in Context

Releases and transfers reported to PRTRs do not happen in a vacuum. They occur in many contexts—physical and chemical, economic and regulatory, geographic and ecological.

Substances that are released on-site or transferred off-site have physical and chemical characteristics that influence their ultimate disposition and their potential consequences for human and ecological life. Some of these substances are used or produced for particular aims—to induce a necessary reaction during manufacture of desired products; to give a product improved performance, a longer life or a better appearance; to clean a surface; to meet a certain demand in the commercial or industrial marketplace. Others result as non-product output from production of goods (a byproduct of manufacture) or delivery of services (such as waste generated from production of electricity). Facilities that report to NPRI or TRI may expand, cut back, or change product lines, bringing about change in their releases and transfers. Some have actively sought ways to reduce the amounts of toxic chemicals they use, to reduce their contributions to pollution—and their costs. Regulations focused on protecting air and water have fostered such improvements at many facilities.

Reportable substances are released to specific environmental media at known locations under specific conditions. Prevailing winds, for example, shape the plume emitted from a stack, and the substances in that plume tend to travel a given

distance in a given direction. Populations both near and far may potentially be affected. Reportable substances may also be shipped across town or out of the country for reuse/recycling/recovery or for treatment or disposal.

Chemicals of concern released to the environment or transferred off-site for disposal by PRTR facilities join those that originate from other sources—from agriculture and transportation, from sectors not required to report (to TRI), and from small sources such as service stations and dry-cleaning establishments.

2.4.1 Chemicals of Concern

Some questions require external information from the start. How effective has the Montreal Protocol been in reducing air emissions of ozone-depleting chemicals? PRTRs collect data on ozone-depleters, but the databases do not explicitly identify these chemicals. Users will need a list of the substances covered by the Montreal Protocol <www.unep.org/unep/secretar/ozone/montreal.htm> to begin investigating air emissions of those substances reported to NPRI and TRI.

A similar step is required to analyze NPRI or TRI data for carcinogens, endocrine disruptors, persistent bioaccumulating toxic pollutants, or other chemical groups. Resources for identifying these groups include:

- Carcinogens—International Agency for Research on Cancer (IARC) <www.iarc.fr/> and US National Toxicological Program (NTP) <ntp-server.niehs.nih.gov/>. (Note: Releases and transfers of known and suspected carcinogens reported to both NPRI and TRI are analyzed in **Chapters 3** through **5** of this report.)
- Endocrine disruptors—World Wildlife Fund Canada <www.wwfcanada.org/>; OECD (discusses research but does not list substances) <www.oecd.org/ehs/endocrin.htm>.
- PBTs—US EPA's proposed TRI regulations and related developments <www.epa.gov/opptintr/tri/pbtrule.htm>.

2.4.2 Chemical Uses and Industry Processes

Releases and transfers arise from particular industrial processes or activities. To assess the significance of the chemicals and amounts reported to PRTRs involves understanding their use.

Many general sources summarize the industrial and commercial uses of specific chemicals. Trichloroethylene (TCE), for example, is used in degreasing fabricated metal parts and as a chemical intermediary in fluorocarbon production. Patterns

of releases from these two principal uses differ substantially. TCE has replaced an ozone-depleting chemical, 1,1,1-trichloroethane, in metal degreasing, an application likely to generate air emissions. However, the predominant—and growing—use of TCE is in producing the hydrofluorocarbon HFC-134a, a use less likely to yield TCE emissions to air. Factsheets and other reference materials that supply toxicity data often summarize uses as well, and the EDF Scorecard also offers such information. Other resources include:

- US National Safety Council's Environment Writer Chemical Backgrounder Index <www.nsc.org/ehc/ew/chemical.htm>,
- Environmental Chemicals Data and Information Network <agnic.nal.usda.gov/agdb/env_chem.html>,
- New Jersey's Right to Know Hazardous Substance Fact Sheets <www.state.nj.us/health/eoh/rtkweb/rtkhsfs.htm>, and
- ChemExpo <www.chemexpo.com>.

Some PRTRs—the States of New Jersey and Massachusetts are examples—collect additional data on facilities' use of toxic chemicals. Known in various contexts as throughput data, materials accounting, or chemical use data, this information allows a more complete accounting of a facility's use of a toxic chemical—how much is brought on-site, produced, held in inventory, shipped in product, transferred as waste to other locations and released to the environment. Such data support a much more extensive range of analyses than the limited release and transfer data available in NPRI and TRI. One example would be assessments of the relative efficiency of facilities that manufacture the same product.

2.4.3 Toxicity and Human Health Effects

“How dangerous are these chemical releases and transfers to my health?” Users of PRTR-type information are likely to ask this question early on, especially if they are examining data from nearby facilities. This question also underlies many more sophisticated analyses of PRTR data. There are no simple answers.

The potential of a substance to cause harm arises from both:

- its inherent toxicity—how harmful is it?—and
- exposure to it—how much and by what route?

What is known about the toxicity and ill effects of various chemicals results principally from studies of animals and human beings that have been exposed to them (ranging from laboratory tests to accidental exposures of human populations,

such as workers). Various authoritative bodies have collected such data and, while PRTR data do not contain such information, the NPRI and TRI web sites link users to various sources of it.

The NPRI web site <www.ec.gc.ca/pdb/npri/links.html> directs users to the US Agency for Toxic Substances and Disease Registry for ToxFAQs summaries about hazardous substances <www.atsdr.cdc.gov/toxfaq.html> and the HazDat database, which includes information on the effects of hazardous substances on human health <www.atsdr.cdc.gov/hazdat.html>; the International Agency for Research on Cancer <www.iarc.fr/>; and Toxicology Excellence for Risk Assessment <www.tera.org/>, which compiles human health risk values from various international health organizations.

US EPA's TRI web site offers links to summaries of effects, exposures, and environmental fate for some 40 selected TRI chemicals <www.epa.gov/chemfact/>, as well as to the ToxFAQs summaries mentioned above <www.atsdr.cdc.gov/toxfaq.html>.

Other sources of health and safety information about chemical substances include:

- Canadian Centre for Occupational Health and Safety—<www.ccohs.ca/oshanswers/>
- State of New Jersey, Department of Health, Right-to-Know Hazardous Substances Fact Sheets—<www.state.nj.us/health/eoh/rtkweb/rtkhsfs.htm>
- National Safety Council, *Crossroads* on Chemical Databases and Material Safety Data Sheets (MSDSs)—<www.nsc.org/xroads/chem.htm>

In its Scorecard <www.scorecard.org>, the Environmental Defense Fund (EDF) has mounted the most ambitious on-line source of information about potential ecological and human health effects. For more than 6,500 chemicals, Scorecard reports on recognized and suspected health hazards associated with the chemical in 12 categories (cancer, cardiovascular or blood toxicity, developmental toxicity, endocrine toxicity, gastrointestinal or liver toxicity, immunotoxicity, kidney toxicity, musculoskeletal toxicity, neurotoxicity, reproductive toxicity, respiratory toxicity, and skin or sense organ toxicity).

Scorecard also supplies up to 12 hazard rankings for each chemical. These indicate whether a chemical has been found to be more or less hazardous in particular respects than other chemicals in the database. Existing ranking systems weigh

Beyond PRTR Data: Risk and Exposure Assessment

PRTR data supply information on amounts of substances released to the environment at specific locations. Identifying and assessing potential harm from particular releases of a chemical to the environment is a complex task, requiring information additional to that given in PRTRs, and the results are always tentative or, at best, relative.

A substance is released to a specific medium (air, water, land)—does it remain in that medium or does it move from one to another? How long does it remain in the environment—in which medium—and in what form? How far does it travel? If deposited from air to land in agricultural communities, will it be taken up by crops? How much of such a crop will people eat? What is the physical relationship of the releases to human populations—are the pollutants discharged to surface waters in which people swim or upstream of drinking water intakes? Do prevailing winds carry air emissions toward or away from human populations? Are susceptible populations—school children, the elderly—likely to be exposed to these pollutants?

Answering these questions—and many more—constitutes a risk and exposure assessment. Such assessments should make clear their assumptions and the scientific uncertainties involved in their results.

toxicity alone or in combination with the persistence of a chemical in an environmental medium, and such ranking systems have addressed both human health effects and ecological effects. EDF has added rankings that compare chemicals for their toxicity and potential for human exposure (labeled Toxic Equivalency Potential). These EDF scores compare each chemical's cancer-causing potential—based on both its cancer-causing toxicity and its exposure potential—to benzene. Non-cancer health risks are similarly compared to toluene. (Environment Canada has undertaken support for development of a web-based Scorecard for NPRI data. Organizations involved include the Canadian Institute for Environmental Law and Policy, Canadian Environmental Law Association, and the Canadian Environmental Defence Fund.)

These sources can help PRTR data users begin to weigh the risks posed by releases of specific substances and set priorities for prevention and protection. As

noted in the Scorecard web site <www.scorecard.org/env-releases/us-map.tcl>: "Scorecard cannot tell you whether the amount of pollution in your own area is safe or unsafe, and it does not calculate the amount of health risk that reported pollution in your area poses. Scorecard tells you which chemical releases in your area might be of potential health concern, based on available data, and helps you identify the highest priorities among those chemical releases."

2.4.4 Geographic Information

Every release originates in a particular place. What happens next depends on landforms, stream flow, and air currents—as well as on the physical and chemical properties of the substances of concern. PRTR data can be aggregated by geographic location—postal code, municipality, county or census division, province or state. Data can be mapped. (EDF's Scorecard <www.scorecard.org> and US EPA's Envirofacts <www.epa.gov/enviro> map TRI data on the Internet. Canada's NPRI web site <www.ec.gc.ca/pdb/npri> offers mapping capability for NPRI data.) Maps can correlate releases and transfers with demographic data, sensitive ecological populations, locations of non-PRTR sources of pollution, and other geographic information. Watershed and airshed maps are especially valuable for assessing the cumulative impacts of pollutant sources.

2.4.5 Other Sources of Environmental Releases

Facilities that report to PRTRs are not the only sources of pollutant releases to the environment. For example, neither NPRI nor TRI capture release and transfer data for small factories and businesses that do not meet the reporting thresholds. Further, TRI has not covered non-manufacturing sources, except for federal facilities, although another seven industries related to manufacturing have begun reporting to TRI for the 1998 reporting year. Thus, because of reporting thresholds and/or industry classification, entities such as dry-cleaning establishments and gasoline service stations do not report to the North American PRTRs. Nor do NPRI or TRI capture releases from mobile sources (that is, motor vehicles and other forms of transportation) or from agriculture.

Moreover, the lists of substances covered by the North American PRTRs do not include all chemicals or classes of chemicals for which environmental releases may cause concern. Releases of PRTR-listed substances, and the burdens they impose

on the environment, need to be considered in the context of other (similar or different) environmental burdens posed by non-listed pollutants from many sources, large and small.

Information about these other releases may be gathered from various sources. For example, air and water permitting systems may require regular reporting of emissions. In other cases, governments may estimate the contribution of other sources of environmental releases, as in annual inventories of emissions of "criteria pollutants." Motor vehicle emissions, for example, may be estimated from such data as gasoline consumption (and its chemical composition), national or regional estimates of mileage driven under urban or highway conditions, etc. All three North American countries have estimated their national greenhouse gas emissions in response to the United Nations' Framework Convention on Climate Change.

NPRI Summary Reports supply national summaries of such information, when available. The 1996 report, for example, reviewed available data on architectural surface coatings (paints), commercial and consumer solvents, dry cleaning and solvent degreasing. The 1997 report includes estimates of NPRI substances from mobile sources and fuel distribution as well as estimates of criteria air pollutants. In the United States, the *1996 TRI Public Data Release* compared TRI reporting of selected chemicals with fertilizer and pesticide uses and with estimated total emissions of volatile organic compounds (VOCs).

Mexico's 1997 RETC report (its first national pollutant releases and transfers report) presents data on several groups of pollutants: monitoring data on criteria air pollutants, average daily wastewater discharge volumes (both municipal and non-municipal), hazardous waste generation volumes from industrial facilities, and estimates of greenhouse gases from fuel consumption, industrial processes, agriculture and other sources. These summaries present data from various recent time periods as collected under different governmental programs. The data are presented for Mexican states and for industry categories and include both point sources and non-point sources. Like the Canadian and US non-point source estimates, they are based on monitoring data or estimates for categories of sources, rather than on estimates of individual sources.

Estimating Non-PRTR Sources of Pollutants in North America

Data on industrial point sources are the focus of PRTRs, but they can be a small fraction of sources of releases for some pollutants. The CEC has begun a multi-year effort aimed at addressing other sources of North American pollutant releases, including:

- mobile sources (transportation),
- area sources (agriculture, mining, parking lots),
- small sources (dry cleaners, automobile service stations, others).

The first part of the study has identified inventories in the three countries that have the potential to provide information on nonpoint sources of pollutants. The study (“Compilation of Information on Emissions from Nonpoint Sources,” Eastern Research Group, Inc., May 1999) presents an overview of such inventories developed from interviews and literature and Internet searches. This identifies the source categories and pollutants that each inventory covers, how often each is updated, and how comparable the data are to those in PRTRs. The authors were unable to evaluate the actual data in each inventory, and the list includes a number of inventories that have previously been identified as limited in completeness and/or data quality.

This survey identified approximately 40 inventories or studies (including the PRTR in each country) that were either specific inventories of nonpoint sources or studies that would be instrumental in developing nonpoint source

inventories. The study found that, in Canada and the United States, the nonpoint source studies tended to be part of large national inventories, while in Mexico, the majority of the nonpoint source studies were developed for specific local, urban areas.

As the study notes, the vast majority of these inventories address air pollution sources. Water quality studies done in all three countries quantify pollutant concentrations in water bodies, but do not link these to sources. Only two programs in the United States were identified that correlate water quality with sources, including nonpoint sources such as agricultural and urban run-off. Both of these are primarily watershed modeling systems that attempt to relate water body conditions to known sources (such as facilities reporting to PRTRs) and to estimated emissions from other likely sources.

The study found that nonpoint source inventories are in different stages of development in each of the three countries:

- In Mexico, nonpoint source inventories have been developed in the last three to five years for criteria air pollutants in large urban areas that have significant air quality problems.
- In Canada, national nonpoint source inventories for criteria air pollutants are fairly complete, but such inventories for hazardous air pollutants address fewer source categories.

- The United States has extensive nonpoint source inventories for both criteria and hazardous air pollutants and some limited nonpoint source inventories of discharges to water bodies.

All three countries have developed comprehensive greenhouse gas inventories. However, because of the methods used to construct these inventories, nonpoint sources are not easily distinguished from point sources.

The authors of the study predict little difficulty in obtaining access to the inventories in the United States and Canada, although their project did not include attempts to retrieve data. EPA and Environment Canada, the primary custodians of the inventories, assert that they are publicly available. Data from these inventories are often not disseminated directly, but presented in the form of summary reports, although data may be available on request. In Mexico, most of the inventories were developed for individual cities and urban areas, so there is not always centralized data control, or only summary nonpoint source data may be available.

Including data on emissions of PRTR pollutants from nonpoint sources in the *Taking Stock* reports would provide a more complete understanding of the relative importance of facility-specific releases and transfers. Discussion of releases of other pollutants (such as criteria pollutants) from both point and nonpoint sources would provide an additional perspective on the role played by

PRTR releases in the broader context of environmental protection. In general, however, the amount of nonpoint source data identified in the survey as comparable to the PRTR data was very limited:

- The inventories track criteria air pollutants that are not substances collected by the Canadian NPRI or the US TRI, but are collected by the mandatory portion of the Mexican COA.
- Few of the inventories track substances on the NPRI and the TRI lists.
- Many inventories report on both point and nonpoint sources in aggregated categories that could lead to double counting.

The survey found that a significant amount of activity is underway in all three countries to develop improved estimates of nonpoint source air emissions, but that currently available data are limited for cross-country PRTR comparison purposes. The report also addressed several issues that affect the ability to produce meaningful comparisons to PRTR data. These include variable definitions of nonpoint sources, varying degrees of accuracy and consistency across countries in methods for making estimates, and the need for data management systems to facilitate data exchange. Efforts to address these issues in each country will make the data in these inventories more useful from a North American perspective.

