

# **TAKING STOCK 1998**

North American Pollutant Releases  
and Transfers

## **SUMMARY**



**Commission for  
Environmental Cooperation  
of North America**

*July 2001*

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**For more information:**

Commission for Environmental Cooperation  
393, rue St-Jacques Ouest, bureau 200  
Montréal (Québec) Canada H2Y 1N9  
Tel.: (514) 350-4300 Fax: (514) 350-4314

<http://www.cec.org>

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# Preface

An important first step toward reducing toxic pollutants in our environment is to know where such substances are coming from, in what amounts, and in what forms. It is well known that toxic chemicals and other pollutants are transported across borders by wind and water and as shipments for recycling or disposal, sometimes to points far from the original source. Because of this and our shared ecosystems, people in North America have a need not only for local and national data but also for comparable international data that will provide all of us—governments, industry, NGOs, and communities—with an informed basis for individual and collective action.

For the past five years, the CEC has been tracking the sources and handling of industrial pollutants and making this information more accessible to the public through our annual *Taking Stock* reports. Our analyses draw upon data collected by the national governments under reporting systems referred to internationally as 'pollutant release and transfer registers' (PRTRs). Based on data reported each year by industrial facilities, PRTRs provide publicly accessible information on the amounts of certain toxic chemicals released to the air, water and land, as well as amounts sent to other locations for further management.

North America is fortunate to have publicly available data from the US Toxics Release Inventory (TRI) and the Canadian National Pollutant Release Inventory (NPRI), two of the world's most well-established PRTRs. As data become available from the evolving *Registro de Emisiones y Transferencia de Contaminantes* (RETC) in Mexico, we will be able to take a truly continental perspective on toxic substances of common concern.

This year's report provides the North American public with valuable new information due to important developments in the national programs for the 1998 reporting year. Due to a recent expansion of TRI reporting, we now have comparable Canadian and US data for a handful of additional industries, including two important sectors: electric utilities and the hazardous waste management industry. The impact of this change is significant. The electric utility and hazardous waste sectors alone account for approximately one-quarter—more than 800 million kilograms—of the total reported amounts in the matched North American data set.

For the first time, *Taking Stock* also includes information on the amounts of chemicals that facilities sent for recycling, due to an improvement in the NPRI program. With recycling data now available for Canada and the United States, we are able to obtain a better picture of how chemicals from industrial activities are being managed in North America. In 1998, facilities in the matched data set sent almost one million tonnes, or roughly one-third of total reported amounts, for recycling.

These improvements in the national programs have led to greater comparability among the data collected under PRTRs in North America, and thus are bringing our common picture into sharper focus. The collaboration that is facilitated through the CEC PRTR project—the ongoing dialogue among the national PRTR programs and the active involvement of other interested stakeholders—creates a favorable climate for identifying additional opportunities to further sharpen that picture through increased comparability among our national systems.



North America is plowing new ground in the use of PRTR data on a continental scale. As a growing number of countries and regions around the world look to PRTRs as valuable tools, aiding environmental management and the public's right-to-know, we in North America will have much to share in the way of experience and practical expertise, both individually as nations and collectively as a region.

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 features a new format, with chapters on releases on- and off-site, transfers to recycling and other transfers for further management, and total reported amounts of releases and transfers. Trends in pollutant releases and transfers from 1995–1998 are presented, as well as a special analysis of pollution prevention activity reporting.

We have also introduced a new two-volume format for the report. This *Taking Stock 1998* "Summary" document provides an overview of the data and analyses. A more in-depth look can be found in the complementary "Sourcebook." This year we are also launching the *Taking Stock* web site, which allows you, the user, to create your own queries and analyses of the matched set of data on industrial pollutants. We look forward to your feedback on these new developments, and welcome your suggestions on ways in which *Taking Stock* can keep pace with your evolving interests and needs.

**Janine Ferretti**

CEC EXECUTIVE DIRECTOR

## ACKNOWLEDGEMENTS

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

Officials from Environment Canada, INE and the US EPA contributed vital information and assistance throughout the report's development. This past year we have worked with the following officials from these agencies: Canada—Alain Chung, François Lavallée and Steve McCauley; Mexico—Juan Barrera Cordero, Hilda Martínez Salgado and Luis Sánchez Cataño; and the United States—Maria Doa and John Harman.

Special thanks and recognition go to the team of consultants who worked tirelessly to put this report together: Catherine Miller, John Howay and John Young of Hampshire Research Associates (United States); Sarah Rang of Environmental Economics International (Canada); Isabel Kreiner of TÜV Latinoamerica and Rafael Ramos, formerly with Dames and Moore de México (Mexico).

A number of CEC Secretariat staff have been involved in the development and launching of this report. Erica Phipps, program manager for the CEC's PRTR project, oversaw the development of the report and coordinated the public consultations. The CEC's publications staff—Jeffrey Stoub, Douglas Kirk, Raymonde Lanthier and Miguel López—have handled the tremendous task of coordinating the editing, translation and publication of the document in the three languages.

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

# Introduction

Are releases of chemicals to air, water and land from industry increasing or decreasing in North America? What chemicals are released in the largest amounts and in what geographical areas? What are the main North American industrial sources for chemical releases and how are these chemicals being managed by different industrial sectors and facilities? Information to help answer these questions can be drawn from pollutant release and transfer registers (PRTRs), which provide detailed information on the types, locations and amounts of chemicals released or transferred by facilities.

This report is intended to provide answers to these and other such questions and, at the same time, serve as an information source for governments, industry and communities in identifying opportunities for pollution reduction. The analyses upon which this report is based utilize **1995–1998 data** from the US Toxics Release Inventory (TRI) and the Canadian National Pollutant Release Inventory (NPRI). Data highlights from the 1998 reporting

year and trends over the 1995–1998 period are presented here. As data become available from the currently voluntary Mexican *Registro de Emisiones y Transferencia de Contaminantes*, they will be included in future reports.

This report is the fifth in the CEC's *Taking Stock* series on sources and management of industrial pollutants in North America. Past volumes of *Taking Stock* are available as PDF files on the CEC's web site <takingstock.cec.org>.

As in previous volumes of the annual *Taking Stock* series, this report profiles releases and transfers from manufacturing facilities in North America on a list of 165 "matched" chemicals that are common to both the US TRI and the Canadian NPRI. This *Taking Stock* report also provides data for the 1998 reporting year for electric utilities, hazardous waste management and solvent recovery facilities, chemical wholesale distributors and coal mines as a result of changes to the US TRI program in 1998.

It also includes data on transfers to recycling and energy recovery since the Canadian NPRI program made such reporting mandatory for 1998.

While this report can provide answers to many questions, readers may need to go to other sources for more information. The report does not provide information on:

- ⦿ all pollutants—only those 165 chemicals common to TRI and NPRI,
- ⦿ all sources of chemicals—only facilities in certain industry sectors common to TRI and NPRI,
- ⦿ data from facilities in Mexico,
- ⦿ environmental damage, or
- ⦿ health risks.

For more detailed presentation of the data and more in-depth analyses, please see *Taking Stock 1998 Sourcebook* (available at <www.cec.org> or by contacting the CEC offices).

**Further information on PRTR systems can be found in the section "Background on Pollutant Release and Transfer Registers" on page 53.**

## SUMMARY of findings

This volume presents the main findings from the data, including:

- ⦿ highlights of the current year data, 1998,
- ⦿ trends in pollutant releases and management activities, 1995–1998,
- ⦿ a feature on pollution prevention activities,
- ⦿ answers to frequently asked questions, and
- ⦿ an outline of pollutant release and transfer register programs in North America.

This *Taking Stock* analysis shows that for 1998:

- ⦿ Over three million tonnes of the 165 “matched” chemicals were reported to TRI and NPRI in 1998 by manufacturing facilities, electric utilities, hazardous waste management/solvent recovery facilities and coal mines.
- ⦿ One-half of the three million tonnes were releases on-and off-site, with one-quarter being on-site releases to air.
- ⦿ Electric utilities reported the largest total releases (on-and off-site) of all sectors in North America in 1998 and ranked third for total reported amounts of releases and transfers.
- ⦿ In 1998, the states and provinces with the largest total releases (on- and off-site) of the matched chemicals from manufacturing and new sectors were Ohio, Texas, Pennsylvania and Ontario.

- ⦿ Large quantities of chemicals were sent off-site for recycling in North America. In 1998, almost one million tonnes of chemicals were recycled, or one-third of the total reported amounts of releases and transfers.

Release and transfer trends from 1995 to 1998 were generally downward with the exception of transfers of chemicals for further management:

- ⦿ Total releases and transfers of the 165 matched chemicals *decreased* by two percent in North America from 1995 to 1998.
- ⦿ Total releases (on- and off-site) *decreased* by four percent from 1995 to 1998.
- ⦿ From 1995 to 1998, on-site releases (releases to air, water, land and underground injection at the facility) *decreased* 12 percent.
- ⦿ Off-site releases (transfers to disposal and metals transferred to sewage and treatment) showed the opposite pattern, with an *increase* of 35 percent from 1995 to 1998.

## What's new in TAKING STOCK this year?

This fifth *Taking Stock* report includes for the first time:

- ⦿ data on additional pollutant sources such as electric utilities, hazardous waste management and solvent recovery facilities;
- ⦿ analyses of recycling and energy recovery transfers;
- ⦿ tracking of data over four years: 1995–1998;
- ⦿ a new method of classification for releases and transfers.

In addition, in an attempt to make the report even easier to use, *Taking Stock 1998* has been prepared in a new two-volume format, featuring this summary volume, intended to supply the information that most readers will need, and a second volume that provides more detailed data and analyses. Both documents are available on the CEC's web site or in hard copy upon request to the CEC.

The CEC welcomes your comments on changes to the report. Please forward your feedback and suggestions to the address provided on p. 51.

## TAKING STOCK online

*Taking Stock* is now online at <[takingstock.cec.org](http://takingstock.cec.org)>

The new web site permits searches of the entire matched data set from 1995–1998 and the ability to generate customized data reports. The site also includes links to electronic versions of *Taking Stock*, the three North American PRTRs, and other PRTR-related information.

# Using and understanding this report

This report uses two data sets and specific terms to describe releases and transfers of chemicals. Taking a few moments to familiarize yourself with the differences in these data sets and terms will help you to use and understand the information presented in this report.

**TABLE 1. FEATURES OF**  
North American PRTRs

FEATURE	US TOXICS RELEASE INVENTORY (TRI)	CANADIAN NATIONAL POLLUTANT RELEASE INVENTORY (NPRI)	MEXICAN REGISTRO DE EMISIONES Y TRANSFERENCIA DE CONTAMINANTES (RETC, SECTION V OF COA)
Who reports?	<ul style="list-style-type: none"> <li>Manufacturing, federal facilities, coal mines, metal mines, electric utilities, hazardous waste management facilities, solvent recovery facilities, chemical wholesale distributors and petroleum bulk terminals</li> <li>Facilities also need to meet reporting thresholds</li> </ul>	<ul style="list-style-type: none"> <li>Any facility manufacturing or using a listed chemical, except for research, repair and retail sales and a few other exemptions</li> <li>Facilities also need to meet reporting thresholds</li> </ul>	Any facility under federal jurisdiction (11 sectors) whose processes include thermal treatment or a foundry. The 11 sectors are: petroleum, chemical/petrochemical, paints/inks, metallurgy (iron/steel), automobile manufacture, cellulose/paper, cement/limestone, asbestos, glass, electric power generation and hazardous waste management
Number of chemicals on list for reporting	606 substances and 28 chemical categories	176 chemicals	104 chemicals
What media/transfers are covered?	Air, water, land, underground injection, transfers to recycling, energy recovery, treatment, sewage and disposal	Air, water, land, underground injection, transfers to recycling, energy recovery, treatment, sewage and disposal	Air, water, land, transfers to treatment, sewage and disposal; underground injection into wells not practiced in Mexico
Mandatory for facilities to report?	Yes	Yes	No
How often is reporting required?	Annually	Annually	Annually
Public access to data?	Annual summary report; full database publicly accessible	Annual summary report; full database publicly accessible	Annual summary report (does not include facility-specific data); database not available to the public

Note: Features current for 1998 reporting year for NPRI and TRI and for 1999 reporting year for RETC.

## SCOPE OF the analyses

*Taking Stock* is developed by looking at the information that is comparable among the national PRTR programs of North America. While Canada, Mexico and the United States have the same basic pollutant release and transfer register, there are important differences among them. Some of the most important include the number of chemicals listed, the types of industrial sectors covered, whether reporting is mandatory or voluntary, and the degree of public access to the facility data.

When using the report, it is important to keep in mind that there are two different data sets:

- ☉ 1998 data (used to present data for 1998 only)
- ☉ 1995–1998 data (used to present changes from 1995 to 1998)

As outlined in the table below, the two data sets are different. Thus the **conclusions drawn from one data set cannot be applied to the other**. Each data set is clearly marked in the text. The 165 chemicals in the matched data set are listed in the **Appendix**.

## TERMINOLOGY

*Taking Stock 1998* uses the following categories for presenting information on pollutant releases and transfers:

- ☉ **"on-site releases"** describes releases that occur at the facility—i.e., chemicals put into the air, water, injected into underground wells or put in landfills "inside the fence line."
- ☉ **"off-site releases"** describes chemicals sent off-site to other locations for disposal, as well as metals sent to treatment, sewage and energy recovery.
- ☉ **"total releases on- and off-site"** or simply **"total releases"** is the sum of on-site and off-site releases.
- ☉ **"transfers for further management"** encompasses (1) chemicals sent for recycling and (2) other transfers for further management, i.e., chemicals (other than metals) sent for treatment, energy recovery and to sewage plants.
- ☉ **"total reported amounts"** describes the sum of all of the above categories: on- and off-site releases, recycling and other transfers for further management.

*Taking Stock 1998* features this new method of classification that aims to address a question that many users have raised: "Why are chemicals sent to a landfill site at the facility called a 'release,' while chemicals sent to a landfill site away from the facility are called a 'transfer'? These are similar activities—shouldn't they be presented in a similar way?"

**TABLE 2. FEATURES OF THE TWO DATA SETS**  
in *TAKING STOCK 1998*

FEATURE	1998 DATA SET	1995–1998 DATA SET
Number of chemicals	165 chemicals	165 chemicals
Industry sectors	Manufacturing facilities, electric utilities, hazardous waste management/solvent recovery facilities, chemical wholesalers, coal mines	Manufacturing facilities only
On-site releases to air, water, land, underground injection	Included	Included
Off-site releases (transfers to disposal)	Included	Included
Transfers to sewage and treatment	Included	Included
Transfers to recycling/energy recovery	Included	Not included (mandatory data not available for all years)

The new categorization allows us to use terms that more clearly describe the nature of the activities, making the information more easily understood.

Part of this new categorization is the inclusion of metals sent off-site to disposal, treatment, for energy recovery or to sewage as part of off-site releases. This was needed in order to make the TRI and NPRI data comparable. TRI has a special method for classifying transfers of metals. In TRI, transfers of metals to sewage, treatment or energy recovery are considered releases, because metals are not destroyed by treatment or burned in energy recovery.

Because of TRI requirements, it was necessary to adopt this new method of classifying transfers of metals for *Taking Stock* in order to match up the data from the two countries.

While it may seem confusing at first to those who are accustomed to seeing the term "releases" used to describe activities on-site and the term "transfers" to describe all activities that occur off-site, this new categorization has several benefits. It brings together similar activities: for example, all chemicals that are landfilled are called releases, regardless of where the landfill is located. The new approach also recognizes the physical nature of metals, and acknowledges that metals sent to disposal, sewage, treatment and energy recovery are not likely to be destroyed or burned and so may eventually enter the environment. These changes were supported by the three national governments.

### What are releases? What's an off-site release?

Releases are chemicals put into the air, water, injected into underground wells or put into landfills.

**On-site releases** are those releases that occur at the facility.

In this year's report, the category of releases has been expanded to include off-site releases.

**Off-site releases** are:

- ☉ chemicals, including metals, sent off site to other locations for disposal, usually in landfills but may also include off-site underground injection, and
- ☉ metals sent to treatment, sewage and energy recovery

### What are transfers for further management?

In this report, there are two categories of **transfers for further management**:

- ☉ "**transfers to recycling**" describes chemicals sent for recycling at another site, and
- ☉ "**other transfers for further management**" describes chemicals, other than metals, sent to another site for energy recovery, treatment or sewage.

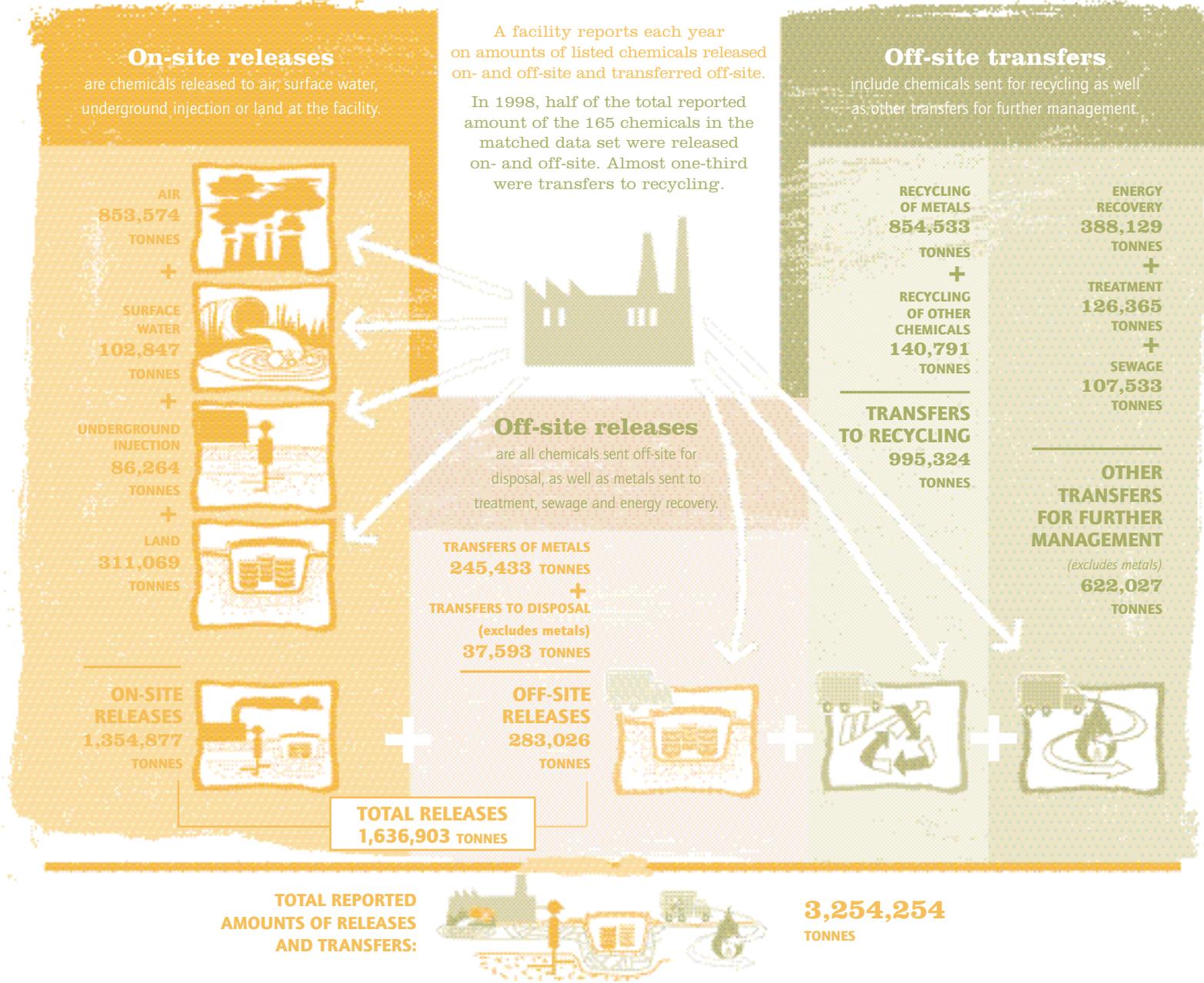
In previous reports, all chemicals sent away from the facility, whether for disposal, treatment, sewage, recycling or energy recovery, were called transfers.

In this report, transfers are defined more narrowly. Chemicals sent to disposal, traditionally referred to as transfers, are now categorized as off-site releases. Metals sent to energy recovery, treatment, sewage and disposal, also previously considered transfers, are also included in the off-site releases category, as explained above.

### What are total reported amounts?

**"Total reported amounts"** describes the sum of all of the above categories: on- and off-site releases, recycling and other transfers for further management. While not perfect, this is the closest estimate available from PRTR data of the total amount of chemicals arising from a facility's activities that need to be managed.

**FIGURE 1. POLLUTANT RELEASES AND TRANSFERS**  
in North America, 1998



Note: Canada and US data only, Mexico data not available for 1998. Analyses are based on the matched set of chemicals and industry sectors for which comparable data are available for 1998. Total on-site releases are greater than the sum of the individual media because an NPRI facility can report only the total if it is less than one tonne.

# 1998 data

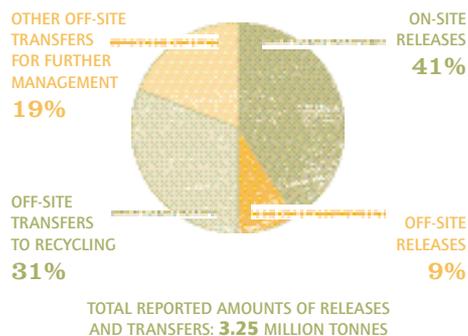
This section presents data from the 1998 reporting year. The data in this section differ from those used in the following section, which focuses on the period 1995–1998. Those for 1998 include data from the newly reporting industry sectors, and for transfers to recycling and energy recovery.

## THE BIG picture

**How many tonnes of chemicals were reported released or transferred in North America in 1998?**

**FIGURE 2.**  
**TOTAL REPORTED AMOUNTS**  
of releases and transfers in  
North America by category, 1998

*(1998 Matched Chemicals and Industries)*



*Note: Canada and US data only.  
Mexico data not available for 1998.*

If you had to guess how many tonnes of chemicals are released or transferred in North America in 1998, what would your guess be? One thousand tonnes of chemicals? One million? One billion tonnes?

In fact, in 1998 over 3.2 million tonnes of matched chemicals were released and transferred in North America. This includes amounts from the new industry sectors as well as the newly reported data on transfers to recycling and energy recovery.

About half of the total reported amounts of releases and transfers, or 1.6 million tonnes, were released on- and off-site. Half of all releases (854,000 tonnes or 26 percent of total reported amounts) were on-site air releases.

About one-third of these total reported amounts, or almost 1 million tonnes, were substances sent off-site for recycling. About one-fifth, or 622,000 tonnes, were other transfers for further management including to energy recovery, treatment and sewage.

Facilities reporting to NPRI were nine percent of the North American total reported amounts and facilities reporting to TRI were 91 percent of the North American total reported amounts.

## Which states and provinces reported the largest amount of releases in North America in 1998?

In 1998, the jurisdictions with the largest total releases, both on- and off-site, of the matched chemicals from manufacturing and new industry sectors were Ohio, Texas, Pennsylvania, Ontario and Indiana, each reporting more than 80,000 tonnes.

Ohio topped the list because of large releases from several electric utilities. Electric utilities are among the new industry sectors that reported to TRI for the first time in 1998 and, therefore, are now included in the North American matched data set.

Pennsylvania had the highest on-site releases to water in North America in 1998, mainly due to one Armco Inc. facility in Butler, Pennsylvania, which released over 14,000 tonnes to water, or 14 percent of all water releases in TRI.

Ontario facilities reported the largest off-site releases in North America, mainly transfers of metals to disposal.

The jurisdictions with the largest on-site releases in 1998 in North America were the states of Ohio, Texas, Pennsylvania, Louisiana and Florida, each reporting more than 55,000 tonnes.

**TABLE 3. SUMMARY OF TOTAL REPORTED AMOUNTS**  
of releases and transfers in North America, NPRI and TRI, 1998  
*(1998 Matched Chemicals and Industries)*

	NORTH AMERICA NUMBER		NPRI* NUMBER		TRI NUMBER		NPRI AS % OF NORTH AMERICAN TOTAL	TRI AS % OF NORTH AMERICAN TOTAL
Total Facilities	21,974		1,552		20,422		7	93
Total Forms	72,795		5,235		67,560		7	93
<b>Releases On-site and Off-site</b>	<b>tonnes</b>	<b>%</b>	<b>tonnes</b>	<b>%</b>	<b>tonnes</b>	<b>%</b>	<b>%</b>	<b>%</b>
<b>On-site Releases</b>	<b>1,353,877</b>	<b>42</b>	<b>98,638</b>	<b>35</b>	<b>1,255,239</b>	<b>42</b>	<b>7</b>	<b>93</b>
Air	853,574	26	75,808	27	777,765	26	9	91
Surface Water	102,847	3	4,361	2	98,486	3	4	96
Underground Injection	86,264	3	3,701	1	82,563	3	4	96
Land	311,069	10	14,644	5	296,425	10	5	95
<b>Off-site Releases</b>	<b>283,026</b>	<b>9</b>	<b>51,173</b>	<b>18</b>	<b>231,853</b>	<b>8</b>	<b>18</b>	<b>82</b>
Transfers to Disposal (except metals)	37,593	1	9,567	3	28,026	1	25	75
Transfers of Metals**	245,433	8	41,606	15	203,827	7	17	83
<b>Total Releases On-site and Off-site</b>	<b>1,636,903</b>	<b>50</b>	<b>149,811</b>	<b>53</b>	<b>1,487,092</b>	<b>50</b>	<b>9</b>	<b>91</b>
<b>Off-Site Transfers for Further Management</b>								
<b>Off-site Transfers to Recycling</b>	<b>995,324</b>	<b>31</b>	<b>106,793</b>	<b>38</b>	<b>888,531</b>	<b>30</b>	<b>11</b>	<b>89</b>
Transfers to Recycling of Metals	854,533	26	89,044	31	765,489	26	10	90
Transfers to Recycling (except metals)	140,791	4	17,749	6	123,042	4	13	87
<b>Other Off-site Transfers for Further Management</b>	<b>622,027</b>	<b>19</b>	<b>28,173</b>	<b>10</b>	<b>593,853</b>	<b>20</b>	<b>5</b>	<b>95</b>
Energy Recovery (except metals)	388,129	12	12,023	4	376,106	13	3	97
Treatment (except metals)	126,365	4	10,736	4	115,629	4	8	92
Sewage/To POTWs (except metals)	107,533	3	5,415	2	102,118	3	5	95
<b>Total reported Amounts of Releases and Transfers</b>	<b>3,254,254</b>	<b>100</b>	<b>284,777</b>	<b>100</b>	<b>2,969,477</b>	<b>100</b>	<b>9</b>	<b>91</b>

*Note: Canada and US data only, Mexico data not available for 1998. Data include 165 chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data in combination with other information can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.*

*\* The sum of air, surface water, underground injection and land releases in NPRI does not equal the total on-site releases because in NPRI on-site releases of less than 1 tonne may be reported as an aggregate amount.*

*\*\* Includes transfers of metals and metal compounds to energy recovery, treatment, sewage and disposal.*

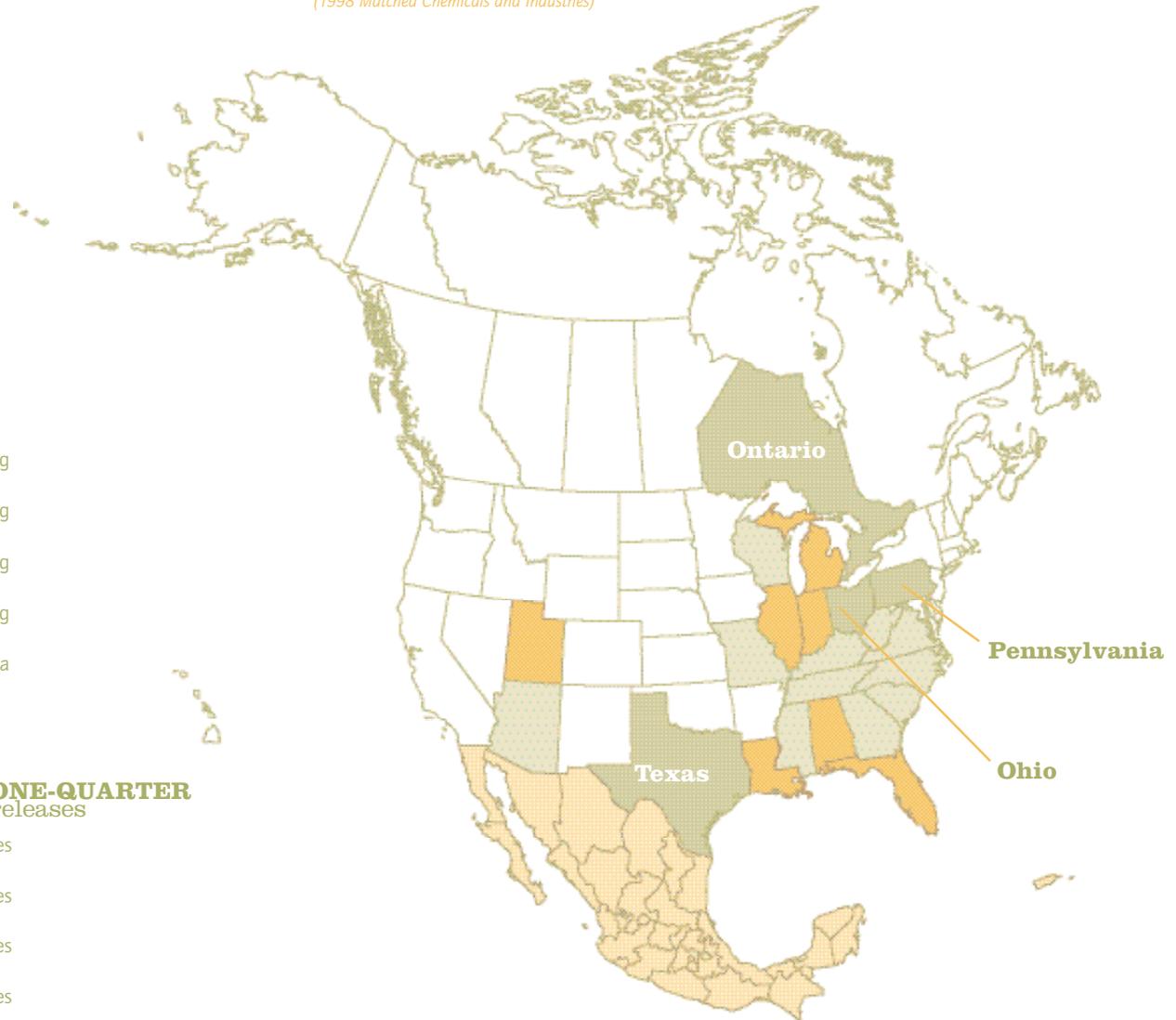
**MAP 1. LARGEST SOURCES OF TOTAL RELEASES**  
 on- and off-site in North America, 1998: states and provinces  
*(1998 Matched Chemicals and Industries)*

**RANGE**  
 in kilograms

- 80 to 139 million kg
- 54 to 80 million kg
- 25 to 54 million kg
- 0 to 25 million kg
- no data

**EACH SHADE = ONE-QUARTER**  
 of total releases

- 4 states/provinces
- 7 states/provinces
- 11 states/provinces
- 42 states/provinces
- 32 states/provinces (no data)



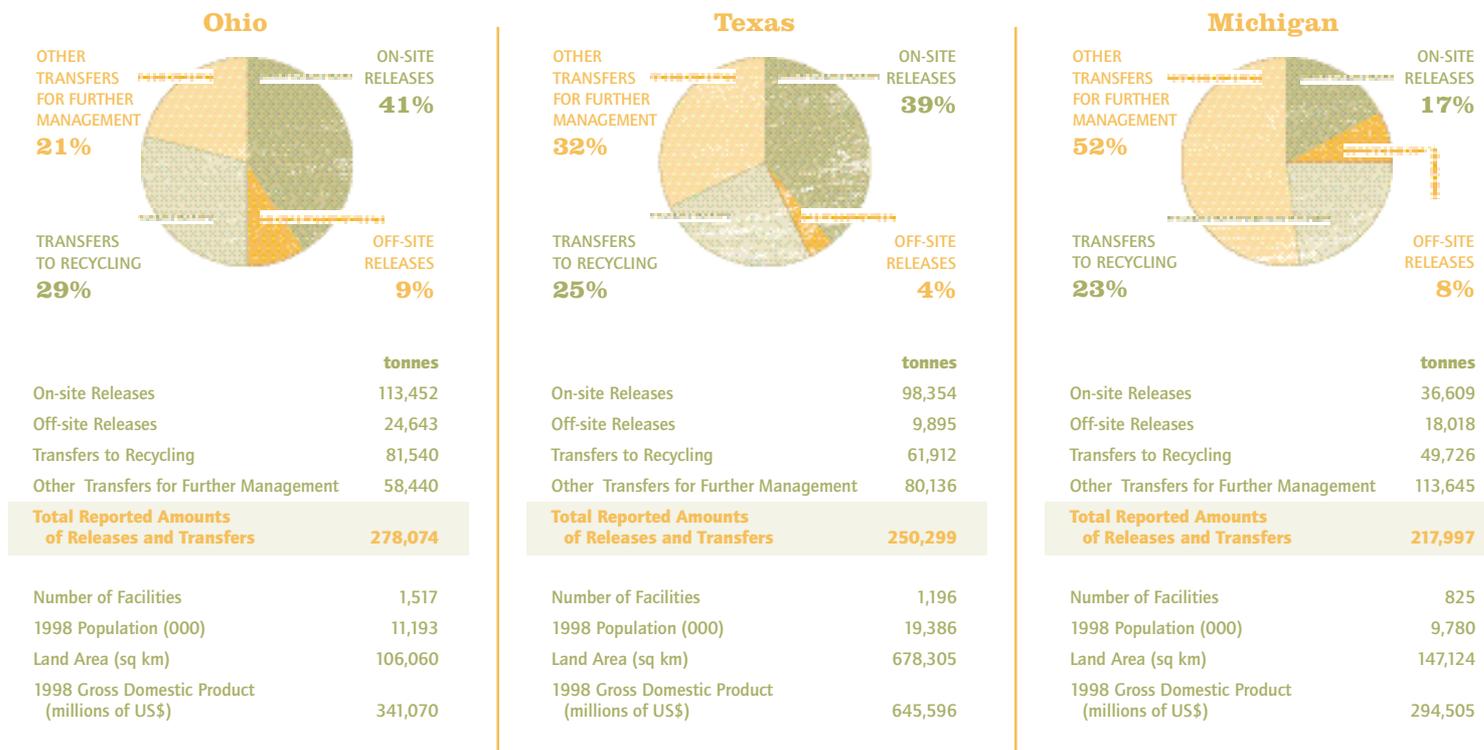
### Which states and provinces reported the largest total amounts of releases and transfers in North America in 1998?

When looking at total reported amounts, which includes total releases on-and off-site, recycling and other transfers for further management, the rankings by jurisdiction were: Ohio, Texas, Michigan, Indiana, Ontario and Pennsylvania, each reporting more than 170,000 tonnes. Except for Texas, these states and provinces are located around the Great Lakes. They accounted for 40 percent of the total, 35 percent of the total releases, 41 percent of the total transfers to recycling and 53 percent of the total other transfers for further management.

Ohio facilities reported the largest amounts of all categories of releases and transfers except for other transfers for further management, for which Michigan ranked first. Texas reported the second-largest amounts in all categories except transfers to recycling, for which Indiana ranked second. While Ontario ranked fifth overall,

**FIGURE 3. STATES/PROVINCES WITH LARGEST TOTAL RELEASES or largest total reported amounts in 1998**

(Ordered by Total Reported Amounts)



Note: Canada and US data only. Mexico data not available for 1998. The data are estimates of releases and transfers of chemicals as reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements.



**TABLE 4. THE 15 NORTH AMERICAN FACILITIES**  
with the largest total reported amounts of releases and transfers, 1998  
*(1998 Matched Chemicals and Industries)*

RANK	FACILITY	CITY, PROVINCE/ STATE	SIC CODES		TOTAL ON- AND OFF-SITE RELEASES (kg)	TOTAL TRANSFERS TO RECYCLING (kg)	TOTAL OTHER TRANSFERS FOR FURTHER MANAGEMENT (kg)	TOTAL REPORTED AMOUNTS OF RELEASES AND TRANSFERS
			CANADA	US				
1	Petro-Chem Processing Group/Solvent Distillers Group. Nortru Inc.	Detroit, MI		495/738	477,681	0	60,056,477	60,534,158
2	Pollution Control Inds. Inc.	East Chicago, IN		495/738	744,592	0	28,355,375	29,099,967
3	Magnesium Corp. of America, Renco Group Inc.	Rowley, UT			33	26,163,746	0	26,163,746
4	Envirosafe Services of Ohio Inc., ETDS Inc.	Oregon, OH		495/738	22,918,608	0	0	22,918,608
5	ASARCO Inc. Ray Complex/Hayden Smelter & Concentrator	Hayden, AZ			33	20,858,816	1,955,416	22,814,232
6	ASARCO Inc.	East Helena, MT			33	21,317,968	0	21,317,968
7	Armco Inc. Butler Ops. (Rte 85)	Butler, PA			33	14,338,363	2,349,886	16,705,300
8	Southeastern Chemical & Solvent Co. Inc., TBN Holdings	Sumter, SC		495/738	4,369,588	0	11,392,337	15,761,925
9	Kennecott Utah Copper Smelter & Refy.	Magna, UT			33	15,446,345	2	15,446,349
10	Envirosafe Services of Idaho Inc., ETDS Inc.	Grand View, ID		495/738	14,100,227	2	0	14,100,229
11	Philip Enterprises Inc., Parkdale Avenue Facility	Hamilton, ON	77	495/738	6,948,232	219,579	6,503,147	13,670,958
12	Pharmacia & Upjohn	Kalamazoo, MI			28	620,526	0	11,506,498
13	Systech Environmental Corp., Lafarge Corp.	Demopolis, AL		495/738	1,294	12,245	11,097,366	11,110,905
14	Celanese Ltd.- Clear Lake Plant, Hoechst	Pasadena, TX			28	398,351	108	10,652,677
15	CWM Resource Recovery Inc., Waste Management Inc.	West Carrollton, OH		495/738	28,669	0	10,527,319	10,555,988
	<b>Subtotal</b>				<b>148,733,006</b>	<b>4,537,238</b>	<b>150,108,249</b>	<b>303,378,493</b>
	<b>% of Total</b>				<b>9</b>	<b>0.5</b>	<b>24</b>	<b>9</b>
	<b>Total</b>				<b>1,636,903,244</b>	<b>995,324,253</b>	<b>622,026,834</b>	<b>3,254,254,331</b>

Note: Canada and US data only. Mexico data not available for 1998. The data are estimates of releases and transfers of chemicals as reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements.

## Data from newly added industry sectors AND TRANSFERS TO RECYCLING and energy recovery

Two new developments in the government programs have significantly changed the scope of the matched North American data set, starting with the 1998 reporting year:

- ⦿ the addition of reporting by industry sectors newly added to TRI, and
- ⦿ the requirement that facilities report transfers to recycling and energy recovery to NPRI.

As a result of these changes, the 1998 data set is more comprehensive than previous years' data.

### Newly added industry sectors accounted for more than one-quarter of total reported amounts in North America

In 1998, TRI added seven new industries: coal mines, electric utilities, hazardous waste management facilities, solvent recovery facilities, chemical wholesale distributors, metal mines and petroleum bulk terminals. The first five of these seven new sectors also report in the same way to NPRI and so can be included in *Taking Stock* for the first time.

While metal mines reported the largest amounts of the chemicals to TRI of any industry sector, they cannot be included in this report. Both countries require metal mines to report, however NPRI does not require the reporting of chemicals in waste rock whereas TRI does. This fundamental difference in reporting of waste rock means the metal mining data cannot be compared. Waste rock is the barren or submarginal rock or ore which has been mined but is not of sufficient value to warrant extraction of the metals. Waste rock is removed to gain access to the target ores. It differs from tailings—the rock and other materials left over after ore is extracted or processed.

Petroleum bulk terminals do not report to NPRI, and thus are not part of the matched data set. Also, nuclear power plants are not generally included in the reporting, since only electric utilities that combust oil or coal are required to report to TRI.

Therefore, the new sectors included in *Taking Stock* for the 1998 data are:

- ⦿ coal mines,
- ⦿ electric utilities (that combust oil and/or coal),
- ⦿ hazardous waste management and solvent recovery facilities,
- ⦿ and chemical wholesale distributors.

**TABLE 4.** (continued)

#### MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/TRANSFERS)\*

Xylene, Toluene, Naphthalene, Ethylbenzene, Benzene, n-Butyl alcohol, Methyl ethyl ketone, Methanol, Methyl isobutyl ketone (transfers to energy recovery), Dichloromethane, 1,2-Dichlorobenzene (transfers to treatment) Naphthalene, Acetaldehyde, Toluene, Methyl ethyl ketone, Methanol, n-Butyl alcohol, Benzene, Xylene (transfers to energy recovery)

Chlorine (air)

Zinc and compounds (land)

Copper/Zinc and compounds (land)

Zinc and compounds (land)

Nitric acid and nitrate compounds (water)

Ethylene glycol (transfers to disposal), Methyl ethyl ketone, Toluene, Methanol (transfers to energy recovery)

Copper/Zinc/Arsenic and compounds (land)

Zinc and compounds (land)

Xylene, Toluene (transfers to energy recovery, disposal),

Zinc and compounds (transfers of metals to disposal)

Methanol (transfers to energy recovery), Dichloromethane (transfers to treatment)

Xylene, Toluene, Methyl ethyl ketone (transfers to energy recovery)

Ethylene glycol (transfers to sewage), Diethyl sulfate,

Acrylic acid (transfers to energy recovery)

Methanol, Methyl isobutyl ketone, Xylene (transfers to energy recovery)

**Note:** \* Chemicals accounting for more than 70% of total reported amounts from the facility.

It is important to realize that most of the releases and transfers reported by these new sectors may not be new additions to the environment. Facilities may have been releasing and transferring chemicals to the environment for years, but have not been required to report to TRI. Now, the releases and transfers from these sectors are reported to TRI, and thus can be included in *Taking Stock*.

The addition of these new industry sectors has greatly changed the way the data look compared to previous years. The large releases and transfers reported by some of these new sectors means that the top chemicals, industry sectors, top facilities and top states and provinces are different than in previous *Taking Stock* reports. In fact, the newly reporting sectors accounted for over one-quarter of the total reported amounts in the 1998 North America data set.

The new industry sectors accounted for just six percent of facilities reporting in 1998, but 43 percent of all on-site air releases and 47 percent of all on-site land releases that year.

The large on-site releases to air were mainly from the electric utilities, while the large on-site releases to land came primarily from the hazardous waste management/solvent recovery facilities.

The new industries, on average, reported on more chemicals and had larger releases on- and off-site than the original manufacturing sectors. They also reported relatively small amounts of transfers to recycling.

**TABLE 5. SUMMARY OF TOTAL REPORTED AMOUNTS OF RELEASES and transfers in North America, original and new industries, 1998**  
(1998 Matched Chemicals and Industries)

	NORTH AMERICA			
	TOTAL NUMBER	ORIGINAL INDUSTRIES NUMBER	NEW INDUSTRIES NUMBER	NEW AS % OF TOTAL
Total Facilities	21,974	20,681	1,293	6
Total Forms	72,795	63,611	9,184	13
<b>Releases On-site and Off-site</b>				
	<b>tonnes</b>	<b>tonnes</b>	<b>tonnes</b>	<b>%</b>
<b>On-site Releases</b>	<b>1,353,877</b>	<b>826,494</b>	<b>527,383</b>	<b>39</b>
Air	853,574	483,384	370,190	43
Surface Water	102,847	101,226	1,621	2
Underground Injection	86,264	76,604	9,660	11
Land	311,069	165,158	145,911	47
<b>Off-site Releases</b>	<b>283,026</b>	<b>225,200</b>	<b>57,826</b>	<b>20</b>
Transfers to Disposal (except metals)	37,593	23,136	14,457	38
Transfers of Metals*	245,433	202,064	43,369	18
Total Releases On-site and Off-site	1,636,903	1,051,694	585,209	36
<b>Off-Site Transfers for Further Management</b>				
<b>Off-site Transfers to Recycling</b>	<b>995,324</b>	<b>982,581</b>	<b>12,743</b>	<b>1</b>
Transfers to Recycling of Metals	854,533	849,871	4,662	1
Transfers to Recycling (except metals)	140,791	132,710	8,081	6
<b>Other Off-site Transfers for Further Management</b>	<b>233,898</b>	<b>206,397</b>	<b>27,500</b>	<b>12</b>
Energy Recovery (except metals)	388,129	193,386	194,744	50
Treatment (except metals)	126,365	99,369	26,997	21
Sewage/To POTWs (except metals)	107,533	107,029	504	0.5
<b>Total reported Amounts of Releases and Transfers</b>	<b>3,254,254</b>	<b>2,434,058</b>	<b>820,196</b>	<b>25</b>

*Note: Canada and US data only, Mexico data not available for 1998. Data include 165 chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data in combination with other information can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.*

*\* Includes transfers of metals and metal compounds to energy recovery, treatment, sewage and disposal.*

**The newly added electric utility sector ranked third for total reported amounts and first for total releases.**

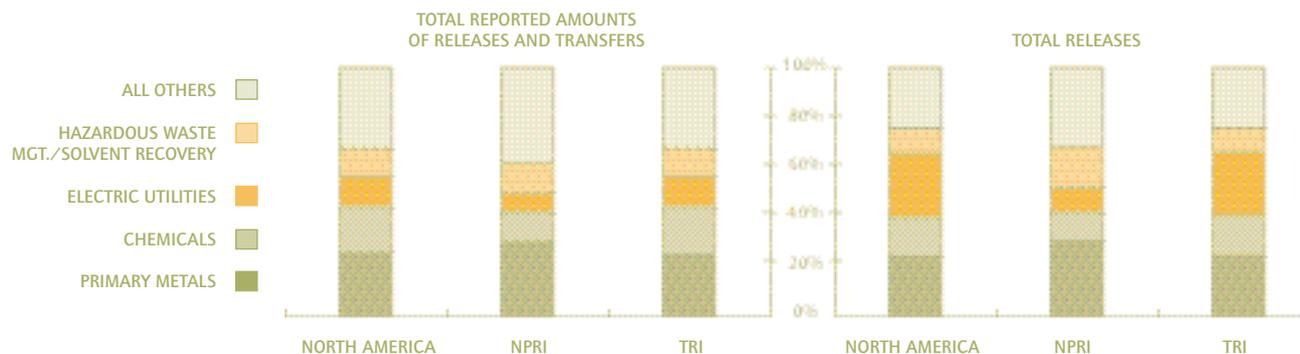
Electric utilities ranked third in terms of total reported amounts of chemicals in North America in 1998, behind primary metals and chemicals. Electric utilities contributed 13 percent of the total reported amounts of releases and transfers in 1998 in North America. In the United States, electric utilities reported 14 percent of all releases and transfers reported to TRI. In Canada, electric utilities contributed seven percent of the releases and transfers reported to NPRI.

Electric utilities ranked number one for total releases, on-and off-site, of all industry sectors in North America in 1998. They contributed 26 percent of all releases, on- and off-site, in North America.

The 15 facilities in the electric utilities sector reporting the largest total releases, on- and off-site in North America in 1998 reported five percent of all releases in 1998.

Most electric utilities released hydrochloric acid to the air. Other air releases included sulfuric acid and hydrogen fluoride. Electric utilities disposed of chemicals in landfills, but these amounts were ten times less than the amount of chemicals they released into the air. In fact, electric utilities accounted for 43 percent of the total air releases in North America in 1998.

**FIGURE 4. CONTRIBUTION OF TOP INDUSTRY SECTORS TO TOTAL reported amounts of releases and transfers and total releases, 1998**  
*(1998 Matched Chemicals and Industries)*



Note: Canada and US data only. Mexico data not available for 1998.

**TABLE 6. THE 15 NORTH AMERICAN FACILITIES IN THE ELECTRIC UTILITIES INDUSTRY**  
with the largest total releases, 1998

(1998 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	TOTAL ON-SITE RELEASES (kg)	TOTAL OFF-SITE RELEASES (kg)	TOTAL RELEASES ON- AND OFF-SITE (kg)	MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/ TRANSFERS) *
1	Bowen Steam Electric Generating Plant, Southern Co.	Cartersville, GA	8,507,288	8	8,507,296	Hydrochloric acid (air)
2	American Electric Power, John E. Amos Plant	Winfield, WV	7,782,473	371,553	8,154,026	Hydrochloric acid (air)
3	Roxboro Steam Electric Plant, Carolina Power & Light Co.	Semora, NC	7,307,075	0	7,307,075	Hydrochloric acid (air)
4	Dayton Power & Light Co. J.M Stuart Station	Manchester, OH	6,674,054	5	6,674,059	Hydrochloric acid (air)
5	American Electric Power, Mitchell Plant	Moundsville, WV	6,282,013	364	6,282,377	Hydrochloric acid (air)
6	Firstenergy, W.H. Sammis Plant	Stratton, OH	5,498,289	546,394	6,044,683	Hydrochloric acid, Sulfuric acid (air)
7	Cardinal Plant, Cardinal Operating Co.	Brilliant, OH	5,627,995	489	5,628,484	Hydrochloric acid (air)
8	Brandon Shores & Wagner Complex, Baltimore Gas Electric Co.	Baltimore, MD	5,188,497	2,804	5,191,301	Hydrochloric acid (air)
9	PSI Gibson Generating Station, Cinergy Corp.	Princeton, IN	5,120,354	1	5,120,355	Hydrochloric acid, Sulfuric acid (air), Zinc and compounds (land)
10	Ontario Power Generation Inc., Nanticoke Generating Station	Nanticoke, ON	5,114,650	0	5,114,650	Hydrochloric acid (air)
11	Scherer Steam Electric Generating Plant	Juliette, GA	4,718,212	0	4,718,212	Hydrochloric acid, Hydrogen fluoride (air)
12	Kentucky Utilities Co. - Ghentstation, LG&E Energy Corp.	Ghent, KY	4,649,310	0	4,649,310	Hydrochloric acid, Sulfuric acid (air)
13	U.S. TVA Paradise Fossil Plant	Drakesboro, KY	4,369,346	0	4,369,346	Sulfuric acid, Hydrochloric acid (air)
14	Gulf Power Co. - Plant Crist, Southern Co.	Pensacola, FL	4,346,736	0	4,346,736	Hydrochloric acid (air)
15	Detroit Edison Monroe Power Plant, DTE Energy	Monroe, MI	4,275,759	25	4,275,784	Hydrochloric acid, Sulfuric acid (air)
	<b>Subtotal</b>		<b>85,462,051</b>	<b>921,643</b>	<b>86,383,694</b>	
	% of Total		6.3	0.3	5.3	
	<b>Total</b>		<b>1,353,877,039</b>	<b>283,026,205</b>	<b>1,636,903,244</b>	

Note: Canada and US data only. Mexico data not available for 1998. The data are estimates of releases and transfers of chemicals as reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements.

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

### **New data from hazardous waste/solvent recovery facilities showed large amounts of transfers to energy recovery and on-site land disposal**

Hazardous waste management and solvent recovery facilities were the fourth-largest sector for total reported amounts and for total releases of chemicals in North America in 1998. Sixteen of the 50 facilities in North America with the largest total reported amounts of releases and transfers were in this industry sector, while 10 of the 50 with the largest total releases were.

Half of all releases and transfers reported by this industry sector were transfers to energy recovery. This industry sector accounted for 47 percent of all transfers to energy recovery in North America in 1998.

One-quarter of all releases and transfers of hazardous waste management and solvent recovery facilities were on-site land releases. This industry sector accounted for one-third of all on-site land releases in North America in 1998 and just 15 hazardous waste management/solvent recovery facilities accounted for almost one-quarter of on-site land releases reported by all North American facilities. One facility in this sector, Waste Management of Ohio Inc., in Vickery, Ohio, also accounted for almost 10 percent of all chemicals injected underground in North America.

Facilities transfer off-site chemicals to other facilities for disposal. These amounts are considered as off-site releases in *Taking Stock*. These other facilities (usually, hazardous waste management facilities) can dispose of the chemicals in on-site landfills, underground injection wells, or, if they are metals sent to wastewater treatment facilities, they may be discharged to surface waters. These are types of on-site releases. Therefore, one facility may report chemicals as off-site releases (sent off-site for disposal) while another facility reports the same quantity as an on-site release. With the inclusion of hazardous waste management facilities in the matched data set for the first time, such on-site releases may now be included as well. Approximately three percent, or 55,000 tonnes out of a total 1.6 million tonnes, were found to have been off-site releases sent to facilities that reported these amounts as on-site releases.

### **Two other new sectors, chemical wholesalers and coal mining, now included**

Another new sector, chemical wholesaler distributors, reported 14.0 thousand tonnes of releases and transfers. Over three-quarters of the chemical wholesalers releases and transfers were as transfers to energy recovery, mainly of toluene, methyl ethyl ketone and methanol.

Coal mines also reported for the first time to TRI for 1998. The total reported amounts from this sector was smaller still, 2.5 thousand tonnes of chemicals released and transferred in North America in 1998. Only one coal mine reported to NPRI, and it reported zero releases and transfers. Thirty-two coal mining facilities reported to TRI, mostly on-site releases to air and land of the metal zinc and its compounds and on-site releases to land of the metal manganese and its compounds.

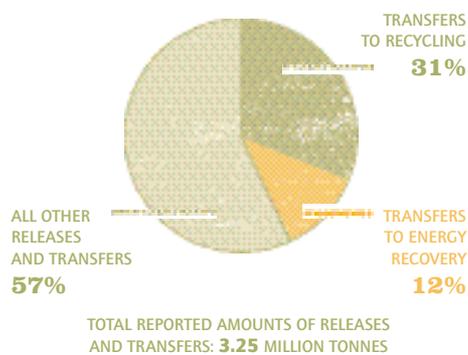
**TABLE 7. THE 15 NORTH AMERICAN FACILITIES IN THE HAZARDOUS WASTE MANAGEMENT INDUSTRY**  
with the largest total releases, 1998  
(1998 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	TOTAL ON-SITE RELEASES (kg)	TOTAL OFF-SITE RELEASES (kg)	TOTAL RELEASES ON- AND OFF-SITE (kg)	MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/ TRANSFERS)*
1	Envirosafe Services of Ohio Inc., ETDS Inc.	Oregon, OH	22,882,149	36,459	22,918,608	Zinc and compounds (land)
2	Envirosafe Services of Idaho Inc., ETDS Inc.	Grand View, ID	14,100,210	17	14,100,227	Zinc and compounds (land)
3	Peoria Disposal Co. #1, Coulter Cos. Inc.	Peoria, IL	9,779,338	3,086	9,782,424	Zinc and compounds (land)
4	Philip Enterprises Inc., Yard 3 Facility	Hamilton, ON	0	8,576,167	8,576,167	Zinc and compounds (transfers of metals)
5	Waste Management of Ohio Inc.	Vickery, OH	7,899,321	28,583	7,927,904	Nitric acid and nitrate compounds, Hydrogen fluoride (UU)
6	Philip Enterprises Inc., Parkdale Avenue Facility	Hamilton, ON	0	6,948,232	6,948,232	Zinc and compounds (transfers of metals), Xylene, Toluene (transfers to disposal)
7	Safety Kleen (Lone & Grassy) Inc. GMF	Grantsville, UT	6,473,315	5,811	6,479,126	Zinc/Lead/Manganese/Copper and compounds (land)
8	Chemical Waste Management of the Northwest Inc.	Arlington, OR	5,457,133	3,466	5,460,599	Asbestos, Aluminum (land)
9	Chemical Waste Management	Emelle, AL	5,043,917	75,064	5,118,981	Lead/Zinc/Copper/Arsenic and compounds (land)
10	Chemical Waste Management Inc.	Kettleman City, CA	4,856,221	1,491	4,857,712	Aluminum oxide, Lead and compounds, Asbestos, Aluminum (land)
11	Southeastern Chemical & Solvent Co. Inc., TBN Holdings	Sumter, SC	1,997	4,367,591	4,369,588	Ethylene glycol (transfers to disposal)
12	Envirite of Ohio Inc.	Canton, OH	924	3,674,705	3,675,629	Nickel/Zinc/Chromium and compounds (transfers of metals)
13	Safety-Kleen Lone & Grassy Mtn. Inc.	Waynoka, OK	2,890,537	1,599	2,892,136	Lead/Zinc/Cadmium/Chromium and compounds (land)
14	Browning Ferris Industries, BFI Calgary Landfill District #2	Calgary, AB	2,802,160	0	2,802,160	Asbestos (land)
15	Heritage Environmental Services L.L.C.	Indianapolis, IN	82	2,707,242	2,707,324	Nickel/Zinc/Copper and compounds (transfers of metals)
	<b>Subtotal</b>		<b>82,187,304</b>	<b>26,429,513</b>	<b>108,616,817</b>	
	% of Total		6	9	7	
	<b>Total</b>		<b>1,353,877,039</b>	<b>283,026,205</b>	<b>1,636,903,244</b>	

Note: Canada and US data only. Mexico data not available for 1998. The data are estimates of releases and transfers of chemicals as reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements.

\* Chemicals accounting for more than 70% of total releases at the facility. UU=underground injection

**FIGURE 5.**  
**TRANSFERS TO RECYCLING**  
**AND ENERGY RECOVERY**  
 compared to total reported  
 amounts of releases and transfers  
 in North America, 1998  
*(1998 Matched Chemicals and Industries)*



*Note: Canada and US data only.  
 Mexico data not available for 1998.*

### Transfers to recycling account for nearly one-third and transfers to energy recovery for over 12 percent of total reported amounts in 1998

The other significant change in the data used for this year's *Taking Stock* is the addition of transfers to recycling and energy recovery, which were required to be reported to NPRI for the first time. Previously, reporting for recycling or energy recovery was voluntary in NPRI. It has been mandatory under TRI since the 1991 reporting year. Now that these TRI and NPRI data can be compared, we are able to gain a broader picture of transfers to recycling and energy recovery in North America.

Large volumes of chemicals were sent for recycling in North America in 1998: transfers to recycling accounted for almost one-third of the total reported amount of chemicals. In fact, slightly greater amounts of chemicals were recycled than were released on-site to the air and water combined (see Table 5). Twelve percent of the total reported amounts of releases and transfers were transfers to energy recovery.

In 1998, almost one million tonnes of materials were recycled in Canada and the US. Most (86 percent) of the material sent for recycling consisted of metals such as copper, lead and zinc and their compounds. Three sectors, primary metals, fabricated metals and manufacturers of electronics/electrical equipment, reported the greatest quantities of chemicals sent to recycling.

The jurisdictions reporting the largest amount of chemicals sent for recycling were Ohio with 82 thousand tonnes, Indiana with 81 thousand tonnes, Ontario with 75 thousand tonnes and Texas with almost 62 thousand tonnes.

Recycling can conserve energy and natural resources and reduce the need for treatment or disposal of waste. In the process of recycling, chemicals may be released into the air, water and land, or sludges may be created requiring transfer to another site.

In 1998, 388,000 tonnes of chemicals were sent for energy recovery in Canada and the US. This does not include any metals that were reported under energy recovery since the TRI classifies such transfers as transfers to disposal because metals are not burned in energy recovery units. More than 70,000 tonnes each of toluene and xylene were sent for energy recovery in North America in 1998.

Most transfers to energy recovery were reported by just two industry sectors. Hazardous waste management/solvent recovery facilities reported over 47 percent of all transfers to energy recovery, and the chemical manufacturing sector reported 40 percent. Almost 20 percent was reported by just two facilities. Petro-Chem Processing Group/Solvent Distillers Group, Nortru Inc. in Detroit, Michigan, reported 48,000 tonnes and Pollution Control Industries, Inc. in East Chicago, Indiana, reported 27,000 tonnes of transfers to energy recovery. Both of these facilities were in the hazardous waste management/solvent recovery industry.

## Which chemicals were released IN THE LARGEST AMOUNTS in North America in 1998?

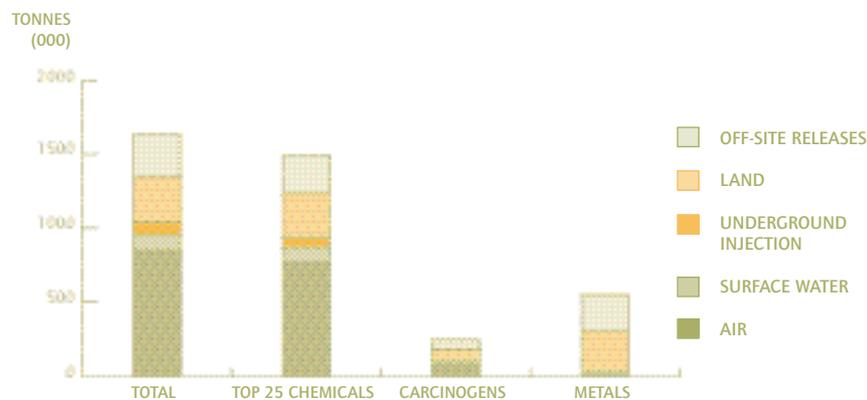
One of the remarkable aspects of looking at chemicals released in North America is that only a handful of chemicals accounted for most of the releases. Just 25 of the 165 chemicals reported to both NPRI and TRI totaled over 90 percent of the total releases on- and off-site in North America in 1998.

### Hydrochloric acid

Hydrochloric acid was the chemical released in the largest amount in North America in 1998. Almost 280,000 tonnes of hydrochloric acid were released on-site to the air. Hydrochloric acid was mainly released by electric utilities, which, as a new industry, are included in *Taking Stock* for the first time. Only on-site releases to air of hydrochloric acid are included in the matched data set because only aerosol forms are reportable to TRI.

Hydrochloric acid can be either a colorless liquid or gas with an acidic, pungent odor. Effects observed following exposure to hydrochloric acid in the workplace or through accidents include irritation of the eyes, nose and throat, ulceration of the respiratory tract, laryngitis, bronchitis, pulmonary edema, gastrointestinal effects and convulsions. Hydrochloric acid is often used to make other chemicals or in industrial processes

**FIGURE 6. THE 25 CHEMICALS WITH THE LARGEST TOTAL RELEASES**  
on- and off-site and other groups of chemicals in North America, 1998  
(1998 Matched Chemicals and Industries)



Note: Canada and US data only. Mexico data not available for 1998.

such as tanning, textiles, electroplating, metal treating and food processing. It is a byproduct of the combustion of the fuel used by electric utilities burning coal.

### Zinc and its compounds

Zinc and its compounds was the substance released in the second-largest amount in North America in 1998. About half of the almost 250,000 tonnes of zinc and its compounds was put in landfills at the site of the facility and the other half sent to land disposal off-site. Most (60 percent) of the releases of zinc and its compounds were generated from the primary metals industry.

Zinc combines with other chemicals to form a number of zinc compounds such as zinc chloride, zinc sulfate and zinc acetate. Zinc and its compounds have a number of uses, including batteries, rust coatings, alloys such as brass and bronze, paints, rubber, dyes, wood preservatives and ointments.

Zinc is one of the most common elements in the earth's crust, an essential element for human diets, and is found in air, soil, water and food. However, breathing high levels of zinc and its compounds may cause "metal fume fever," affecting the lungs and body temperature. Ingestion of high concentrations may cause stomach cramps, nausea and vomiting.

### Fifteen percent of total releases were carcinogens

Of the 165 chemicals in the matched data set (see listing in the **Appendix**), 49 are designated known or suspected carcinogens.

In 1998, almost 250,000 tonnes, or 15 percent of total releases, of known or suspected carcinogens were released on- and off-site in North America. Over 84,000 tonnes of carcinogens were released to the air in North America. Almost as many carcinogens, 81,000 tonnes, were disposed of on land on-site and another 69,000 tonnes were sent for disposal off-site.

Of the designated carcinogens, lead and its compounds were released in the largest amounts, followed by chromium and its compounds.

Carcinogens showed a different pattern than other matched chemicals. Carcinogens were more likely to be landfilled and less likely to be released to air and water than other matched chemicals.

Fifty facilities in North America accounted for over one-third of all total releases of carcinogens.

### One-third of total releases were metals and their compounds

Metals and their compounds that are not sent for recycling are mainly put in on-site landfills or sent off-site for disposal in landfills. The 550,000 tonnes of releases of the 15 metals and their compounds in the matched data set accounted for one-third of total releases in North America in 1998.

The chemical with the second-largest releases, zinc and its compounds, is a metal.

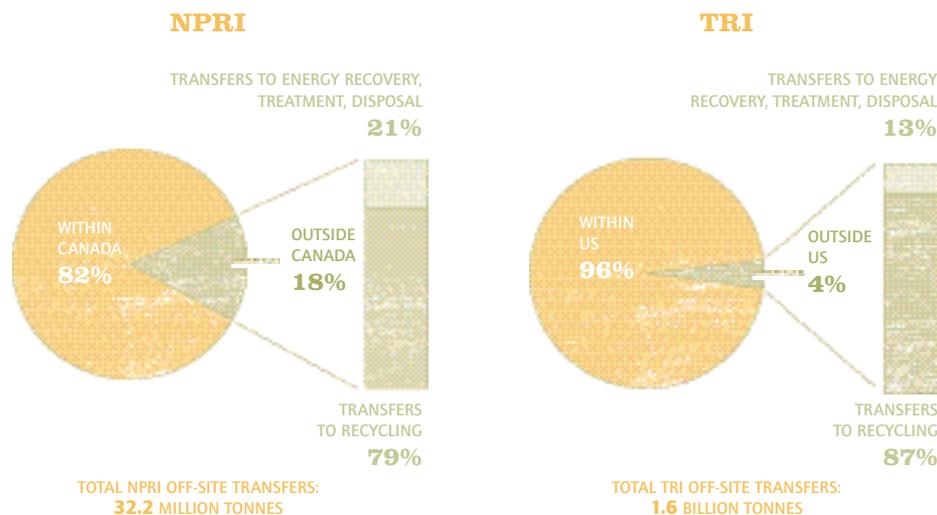
## WHERE ARE ALL THESE chemicals being sent?

In 1998, most chemicals were transferred to sites within national boundaries. Only four percent of all transfers in the US were sent outside the country. Most of these materials were sent for recycling in Canada. The US sent 39,000 tonnes to sites in Canada. Most of this material was sent to Ontario and Quebec. The US also sent 26,000 tonnes to sites in Mexico. Data are not available for transfers sent from Mexico to US sites in 1998.

Canadian facilities sent 18 percent of all of their reported transfers outside the country, almost all of it to the US. Canada sent 32,000 tonnes to sites in the US, with almost 80 percent sent for recycling. Most of this material was sent to Michigan and New York.

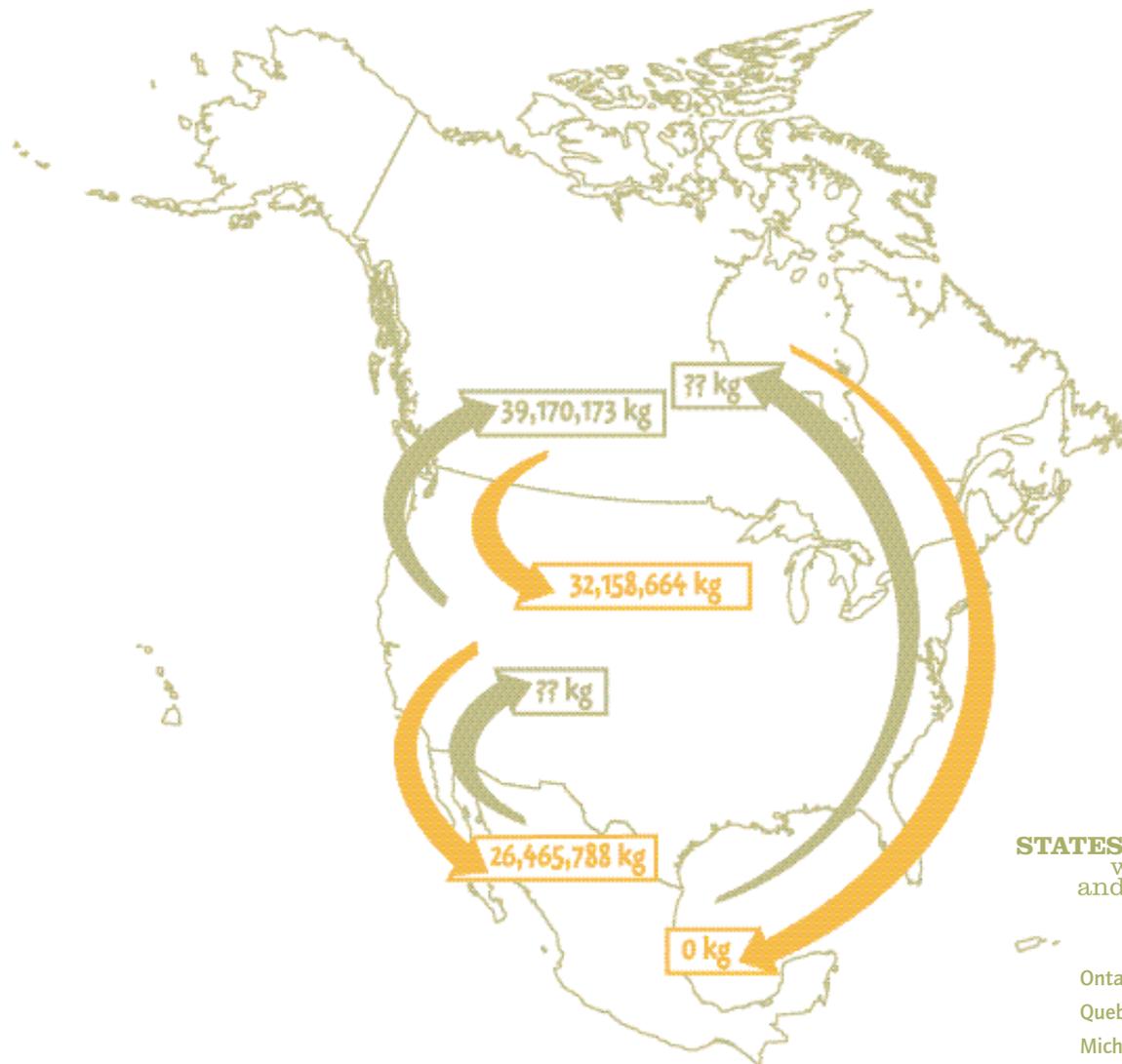
Earlier, we saw that a few chemicals, a few facilities and a few sectors were responsible for the majority of releases and transfers. The same pattern holds true for cross border transfers. Only a handful of facilities in each country sent the majority of chemicals across the Canada-US border. A total of 15 facilities in each country accounted for two-thirds of the total cross border transfers.

**FIGURE 7. PERCENTAGE OF TRANSFERS SENT WITHIN and outside country, NPRI and TRI, 1998**  
(1998 Matched Chemicals and Industries)



Note: Does not include transfers to sewage. Does not include transfers to unknown destinations (less than 0.01% of total).

**MAP 2. OFF-SITE TRANSFERS**  
across North America, 1998



**STATES/PROVINCES**  
with largest transfers sent  
and received

	TO (kg)	FROM (kg)
Ontario	25,074,485	24,252,558
Quebec	13,833,937	3,965,461
Michigan	9,370,865	6,016,808
New York	4,981,655	3,872,396

# 1995–1998 data

The data set for the period 1995–1998 differs from that for 1998 used in the previous section. It does not include the data for the new industries or for transfers to recycling or energy recovery, since comparable data for these categories are not available for years prior to 1998.

This section presents information on total releases on- and off-site and transfers for further management, which includes chemicals that are not metals sent to treatment, including sewage treatment plants, for the years 1995–1998.

**TABLE 8. RELEASES AND TRANSFERS**  
in North America, 1995–1998

(1995 Matched Chemicals and Industries)

	NORTH AMERICA							NPRI*						TRI						
	1995 NUMBER	1996 NUMBER	1997 NUMBER	1998** NUMBER	CHANGE 1997- 1998	CHANGE 1995- 1998		1995 NUMBER	1996 NUMBER	1997 NUMBER	1998** NUMBER	CHANGE 1997- 1998	CHANGE 1995- 1998		1995 NUMBER	1996 NUMBER	1997 NUMBER	1998** NUMBER	CHANGE 1997- 1998	CHANGE 1995- 1998
Total Facilities	21,438	21,159	20,944	20,681	-7	-4		1,302	1,355	1,445	1,488	3	14		20,136	19,804	19,499	19,193	-2	-5
Total Forms	65,498	64,091	64,035	63,611	-7	-3		4,164	4,324	4,632	4,797	4	15		61,334	59,767	59,403	58,814	-7	-4
	TONNES	TONNES	TONNES	TONNES	%	%		TONNES	TONNES	TONNES	TONNES	%	%		TONNES	TONNES	TONNES	TONNES	%	%
Total Releases On- and Off-site	1,101,180	1,064,923	1,086,153	1,051,694	-3	-4		118,786	110,559	113,878	106,124	-7	-11		982,394	954,364	972,274	945,570	-3	-4
On-site Releases	934,948	884,488	852,008	826,494	-3	-12		92,672	83,080	79,569	76,903	-3	-17		842,276	801,408	772,438	749,591	-3	-11
Off-site Releases	166,232	180,435	234,145	225,200	-4	35		26,114	27,479	34,309	29,221	-15	12		140,118	152,956	199,836	195,978	-2	40
Total Transfers Off-site for Further Management	186,119	180,788	212,222	206,397	-3	11		11,635	14,029	15,189	13,549	-11	16		174,484	166,759	197,034	192,848	-2	11
Total Releases and Transfers	1,287,299	1,245,711	1,298,375	1,258,092	-3	-2		130,421	124,588	129,067	119,674	-7	-8		1,156,878	1,121,123	1,169,308	1,138,418	-3	-2

**Note:** Canada and US data only, Mexico data not available for 1995–1998. Data include 165 chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. The data in combination with other information can be used as a starting point in evaluating exposures that may result from releases and other management activities which involve these chemicals.

\* The sum of air, surface water, underground injection and land releases in NPRI does not equal the total on-site releases because in NPRI on-site releases of less than 1 tonne may be reported as an aggregate amount.

\*\* New TRI industry sectors not included for 1998.

## OVERALL TRENDS

### Are total releases on- and off-site and transfers of chemicals increasing or decreasing in North America?

Decreasing. From 1995 to 1998, total releases and transfers of chemicals reported in North America declined by 29,000 tonnes (two percent).

However, breaking releases and transfers down into its two components we see that

- total releases on- and off-site declined by 49,000 tonnes (four percent), while
- total transfers for further management increased by 20,000 tonnes (11 percent)

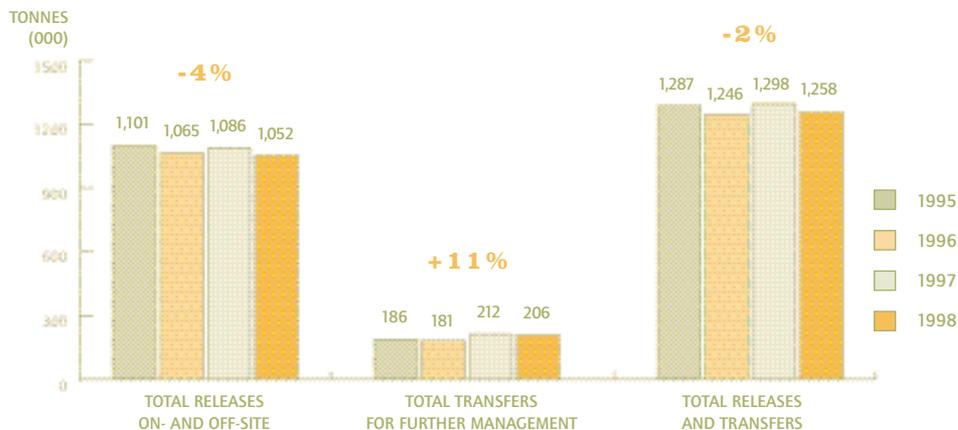
What this reveals is that while there is a downward trend in total releases on- and off-site, there were increases in transfers for further management.

If we look more closely at total releases, we also see that releases at the facility have decreased substantially (12 percent from 1995 to 1998), while off-site releases (transfers sent off-site for disposal) have increased, by 35 percent.

In summary, the data show that while on-site releases have decreased from 1995 to 1998 in North America, off-site releases and other transfers show the opposite pattern, with large increases from 1995 to 1998. In Canada, releases decreased 11 percent (to 106,000 tonnes) and transfers increased 16 percent (to 13,500 tonnes). In the US, these trends were a decrease of four percent (1,051,700 tonnes) and an increase of 11 percent (206,400 tonnes).

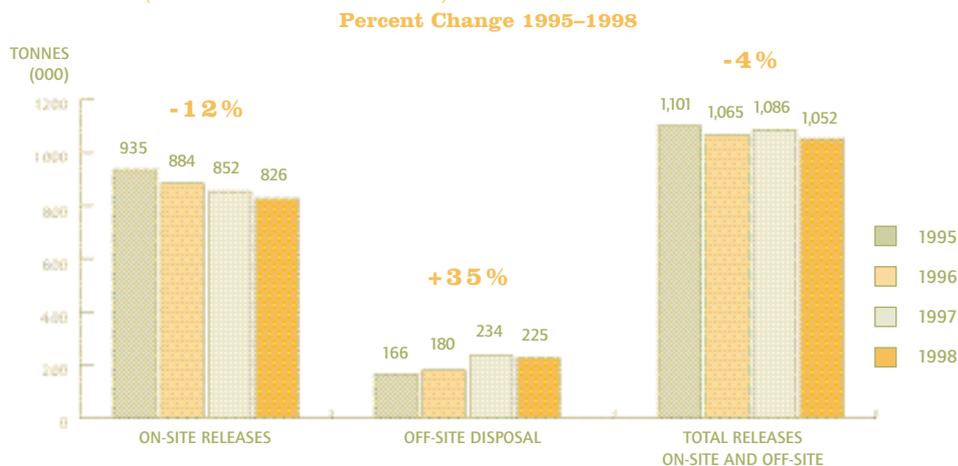
There are some signs that the rise in chemicals sent off site may be diminishing. In the most recent year, from 1997 to 1998, there was a four-percent reduction in chemicals sent off site for disposal and a three percent reduction in transfers for further management.

**FIGURE 8. CHANGE IN TOTAL REPORTED AMOUNTS of releases and transfers in North America, 1995–1998**  
(1995 Matched Chemicals and Industries)  
Percent Change 1995–1998



Note: Canada and US data only, Mexico data not available for 1995–1998.  
Does not include amounts from new industries, transfers to recycling, or transfers to energy recovery in 1998.

**FIGURE 9. CHANGE IN RELEASES**  
**on-and off-site in North America, 1995–1998**  
*(1995 Matched Chemicals and Industries)*



*Note: Canada and US data only. Mexico data not available for 1995–1998.  
 Does not include amounts from new industries, transfers to recycling, or transfers to energy recovery in 1998.*

### Which states and provinces showed decreases in releases and transfers from 1995 to 1998?

Texas, with the largest amount of releases and transfers from manufacturing facilities in 1998, also showed the largest reductions. From 1995 to 1998, facilities in Texas reported a 15,400-tonne (11 percent) reduction in releases and transfers of the matched chemicals.

Some of this reduction is the result of large decreases at three facilities in Texas: Millennium Petrochemicals Inc. (Millennium Chemicals Inc.) in La Porte, the DuPont Beaumont Plant and Huntsman Corporation, Port Arthur, A&O plant.

North Carolina had the second-largest decrease in total releases and transfers from 1995 to 1998. Part of the almost 11,000-tonne (26 percent) decrease came from the DuPont Cape Fear facility in Leland, North Carolina, which reported a 4,000-tonne reduction, mainly of ethylene glycol.

Alabama had the third-largest decrease, with almost a 10,000-tonne reduction (20 percent) in releases and transfers from 1995 to 1998. This was driven by large decreases from one facility, Acordis Cellulosic Fibers Inc., Akzo Nobel Finance US, in Axis, which reported a reduction of over 10,000 tonnes.

### Which states and provinces showed increases in releases and transfers from 1995 to 1998?

Utah had the greatest increase in releases and transfers in North America from 1995 to 1998. Overall, facilities in Utah reported an increase of almost 12,500 tonnes, or 35 percent, from 1995 to 1998. One facility, Kennecott Utah Copper Smelter and Refinery in Magna, Utah, reported an even larger individual change, increasing its on-site landfill disposal of copper, zinc and arsenic and its compounds by over 12,500 tonnes.

Indiana had the second-largest increase in releases and transfers in North America from 1995 to 1998. Most of the 7,300-tonne increase in releases and transfers in Indiana was due to two facilities, Steel Dynamics Inc. in Butler, Indiana, and Nucor Steel in Crawfordsville, Indiana.

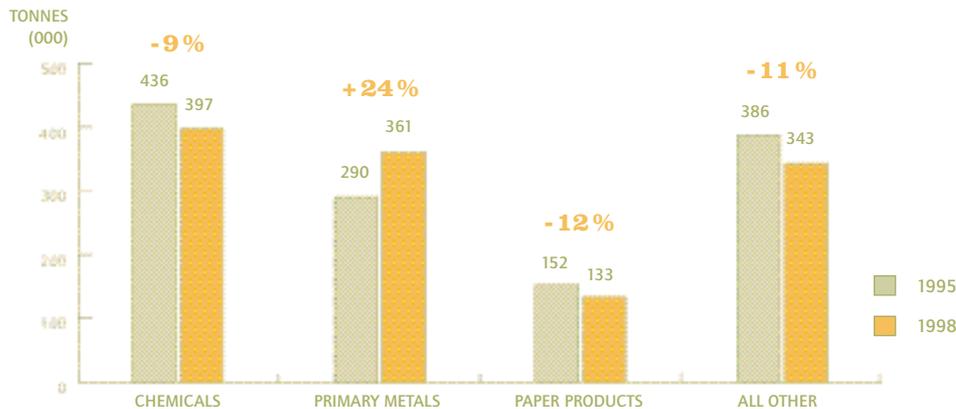
### Which industrial sectors decreased releases and transfers from 1995 to 1998?

Two industrial sectors (chemicals and paper) showed the largest decrease in chemicals released and transferred from 1995 to 1998 in North America. The chemical industry led all manufacturing sectors with reductions of almost 40,000 tonnes, or nine percent, from 1995 to 1998, followed by paper products with almost 19,000 tonnes, a 12 percent reduction.

The chemical industry reported a reduction of 17 percent in total releases, but an increase of 14 percent in transfers to treatment and sewage from 1995 to 1998. The paper products industry reported reductions in both total releases (of 12 percent) and in transfers to treatment and sewage (of 11 percent).

Other industry sectors reporting decreases from 1995 to 1998 included furniture and fixtures (over 10,000 tonnes, 53 percent) and two industries reporting reductions of almost 5,000 tonnes: fabricated metal products (12 percent) and transportation equipment (eight percent).

**FIGURE 10. CHANGE IN TOTAL RELEASES AND TRANSFERS**  
in North America for industries with  
largest total releases and transfers, 1995–1998  
*(1995 Matched Chemicals and Industries)*  
**Percent Change 1995–1998**



*Note: Canada and US data only. Mexico data not available for 1995–1998. Does not include amounts from new industries, transfers to recycling, or transfers to energy recovery in 1998.*

### **Which industrial sectors increased releases and transfers from 1995 to 1998?**

The primary metals sector showed the largest increase in releases and transfers of all manufacturing sectors from 1995 to 1998. In fact, releases and transfers from the primary metals sector rose to over 70,000 tonnes, an increase of almost one-quarter from 1995 to 1998. Just to appreciate the scale of this increase from the primary metals sector, the 70,000 tonne increase is similar to all the air releases from Canadian facilities in 1998.

The large increase from 1995 to 1998 from the primary metals sector is due to increases of over 53,000 tonnes in metals sent off-site to landfills, an increase of almost 14,000 tonnes in on-site land releases and 10,500 tonnes of on-site water discharges. The primary metals industry did report reductions of 5,500 tonnes of on-site air emissions.

Six manufacturing industry sectors reported increases from 1995 to 1998. The second-largest increase was reported by the petroleum and coal products industry (an increase of 6,900 tonnes, or 23 percent).

### **Which facilities reported the largest decrease in releases and transfers in North America from 1995 to 1998?**

A chemical plant, Acordis Cellulosic Fibers, Akzo Nobel Finance US, in Axis, Alabama, had the largest reduction (over 10,000 tonnes) in releases and transfers of matched chemicals reported in North America from 1995 to 1998. In 1997, Acordis completed the installation of a new spinning machine to produce rayon fibers, which recycles carbon disulfide instead of releasing it to the air.

The Canadian facility showing the greatest decrease in releases and transfers was Methanex Corporation, in Medicine Hat, Alberta, with a reduction of over 3,000 tonnes, mainly a reduction of methanol to air. Methanex installed vent gas recovery units in 1995 and 1996 and mothballed one methanol production unit in 1997.

### **Which facilities showed the largest increase in releases and transfers in North America from 1995 to 1998?**

The facility with the largest increase in North America from 1995 to 1998 was Kennecott Utah Copper Smelter and Refinery in Magna, Utah. This facility reported an increase of over 12,500 tonnes, mainly of copper/zinc/arsenic and its compounds to on-site land disposal. A new smelter was installed in 1995, which increased production and releases. Some metals that were previously below reporting thresholds were reported for the first time in 1998.

Another primary metals facility, ASARCO Inc Ray Complex/Hayden Smelter and Concentrate in Hayden, Arizona, posted the second-largest increase in releases and transfers in North America from 1995 to 1998. This facility also increased its on-site land disposal of copper and its compounds, the majority of the almost 11,000-tonne increase. Part of this increase was due to new reporting from its mining operations.

The Canadian facility with the largest increase was Dofasco Inc., in Hamilton, Ontario. From 1995 to 1998, Dofasco increased its releases and transfers by over 4,000 tonnes, mainly of zinc and its compounds. Dofasco Inc. changed its operations by installing an electric arc furnace, sending furnace sludge to landfill instead of a mine reclamation project. Recently it has reduced its emissions of benzene and other pollutants through pollution control projects.

**TABLE 9. THE 15 FACILITIES WITH LARGEST DECREASE IN TOTAL RELEASES**  
**and Transfers in North America, 1995–1998**  
*(1995 Matched Chemicals and Industries)*

RANK	FACILITY	CITY, STATE/ PROVINCE	TOTAL RELEASES AND TRANSFERS				CHANGE 1995–1998 (kg)	MAJOR CHEMICALS REPORTED WITH DECREASES (PRIMARY MEDIA/ TRANSFERS WITH DECREASES)*	
			SIC CODE		1995 (kg)	1997 (kg)			1998 (kg)
			CANADA	US					
1	Acordis Cellulosic Fibers Inc., Akzo Nobel Finance US	Axis, AL		28	15,427,756	7,033,029	5,033,198	-10,394,558	Carbon disulfide (air)
2	Cyprus Miami Mining Corp., Cyprus Climax Metals Co.	Claypool, AZ		33	7,066,233	8,596,691	**	-7,066,233	Copper/Zinc and compounds (land)
3	Zinc Corp. of America Monaca Smelter, Horsehead Inds.	Monaca, PA		33	15,994,774	14,080,761	9,466,279	-6,528,495	Zinc/Lead and compounds (transfers of metals)
4	Millennium Petrochemicals Inc., Millennium Chemicals Inc.	La Porte, TX		28	5,148,906	1,526,810	373,251	-4,775,655	Vinyl acetate (transfers to treatment)
5	Phelps Dodge Hidalgo Inc.	Playas, NM		33	14,607,894	12,345,858	9,939,594	-4,668,300	Zinc and compounds (land)
6	DuPont Beaumont Plant	Beaumont, TX		28	8,849,238	3,091,620	4,609,373	-4,239,865	Nitric acid and nitrate compounds, Acetonitrile (UII)
7	Huntsman Corp. Port Arthur - A&O Plant	Port Arthur, TX		28	4,462,200	936,832	340,935	-4,121,265	Propylene (air)
8	DuPont Cape Fear	Leland, NC		28	5,233,475	1,258,675	1,138,866	-4,094,609	Ethylene glycol (transfers to treatment)
9	Cytec Inds. Inc. Fortier Plant	Westwego, LA		28	11,718,277	10,120,445	7,679,132	-4,039,145	Acetonitrile, Acrylic acid (UII)
10	IMC-Agrico Co., New Wales Plant	Mulberry, FL	Mult.		3,746,031	1,631,746	**	-3,746,031	Phosphoric acid (land)
11	GM Powertrain Defiance, General Motors Corp.	Defiance, OH		33	6,571,336	5,979,266	3,111,346	-3,459,990	Zinc and compounds (land)
12	Chino Mines Co., Phelps Dodge Corp.	Hurley, NM		33	3,233,586	**	**	-3,233,586	Copper and compounds (land)
13	Sterling Chemicals Inc.	Texas City, TX		28	5,427,247	2,889,508	2,307,474	-3,119,773	Nitric acid and nitrate compounds (UII)
14	Methanex Corporation, Medicine Hat Plant	Medicine Hat, AB	37	28	3,385,170	795,850	366,186	-3,018,984	Methanol (air)
15	Magnesium Corp. of America, Renco Group Inc.	Rowley, UT		33	29,168,743	28,270,233	26,163,746	-3,004,997	Hydrochloric acid, Chlorine (air)
<b>Total</b>					<b>140,040,866</b>	<b>98,557,324</b>	<b>70,529,380</b>	<b>-69,511,486</b>	

*Note: Canada and US data only. Mexico data not available for 1995–1998. The data are estimates of releases and transfers of chemicals as reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements. Does not include amounts from new industries, transfers to recycling, or transfers to energy recovery in 1998.*

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

*\*\* Indicates facility did not report any matched chemicals that year.*

*UII=Underground injection*

**TABLE 10. THE 15 FACILITIES WITH LARGEST INCREASE IN TOTAL RELEASES**  
and transfers in North America, 1995–1998  
(1995 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE		TOTAL RELEASES AND TRANSFERS				MAJOR CHEMICALS REPORTED WITH INCREASES (PRIMARY MEDIA/ TRANSFERS WITH INCREASES)*
			CANADA	US	1995 (kg)	1997 (kg)	1998 (kg)	CHANGE 1995–1998 (kg)	
1	Kennecott Utah Copper Smelter & Refy.	Magna, UT		33	2,885,124	11,214,648	15,446,347	12,561,223	Copper/Zinc/Arsenic and compounds (land)
2	ASARCO Inc. Ray Complex/ Hayden Smelter & Concentrator	Hayden, AZ		33	9,919,427	935,935	20,858,816	10,939,389	Copper and compounds (land)
3	Armco Inc. Butler Ops. (Rte 85)	Butler, PA		33	4,744,406	12,046,568	14,355,414	9,611,008	Nitric acid and nitrate compounds (water)
4	Nucor-Yamato Steel Co.	Blytheville, AR		33	72,019	7,550,269	5,103,675	5,031,656	Zinc and compounds (transfers of metals)
5	Steel Dynamics Inc.	Butler, IN		33	6,117	6,536,202	4,653,338	4,647,221	Zinc and compounds (transfers of metals)
6	Dofasco Inc.	Hamilton, ON	29	33	2,523,129	8,600,541	6,706,253	4,183,124	Zinc and compounds (transfers of metals)
7	Solutia Inc.	Gonzalez, FL		28	5,939,341	9,818,975	9,869,345	3,930,004	Nitric acid and nitrate compounds (UII)
8	Nucor Steel	Crawfordsville, IN		33	5,236,425	5,655,990	8,863,386	3,626,961	Zinc and compounds (transfers of metals)
9	ASARCO Inc.	East Helena, MT		33	17,921,953	17,697,271	21,317,968	3,396,015	Zinc and compounds (land, transfers of metals), Lead/Cadmium and compounds (transfers of metals)
10	DuPont Delisle Plant	Pass Christian, MS		28	241,836	4,100,235	3,425,265	3,183,429	Manganese and compounds (UII)
11	Cascade Steel Rolling Mills, Schnitzer Steel Inds.	McMinnville, OR		33	1,969	1,063,826	3,023,279	3,021,310	Zinc and compounds (transfers of metals)
12	Elementis Chromium L.P.	Corpus Christi, TX		28	4,307,148	8,013,086	7,268,731	2,961,583	Chromium and compounds (land)
13	Norco Chemical Plant - East Site, Shell Oil Co.	Norco, LA		28	**	**	2,813,438	2,813,438	Propylene, 1,3-Butadiene (transfers to treatment), Ethylene (transfers to treatment, air)
14	Nucor Corp. Nucor Steel	Plymouth, UT		33	180,863	3,929,232	2,979,970	2,799,107	Zinc and compounds (transfers of metals)
15	Nucor Steel, Nebraska	Norfolk, NE		33	1,272	309,143	2,588,657	2,587,385	Zinc and compounds (transfers of metals)
	<b>Total</b>				<b>53,981,029</b>	<b>97,471,921</b>	<b>129,273,882</b>	<b>75,292,853</b>	

*Note: Canada and US data only. Mexico data not available for 1995–1998. The data are estimates of releases and transfers of chemicals as reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements. Does not include amounts from new industries, transfers to recycling, or transfers to energy recovery in 1998.*

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

*\*\* Indicates facility did not report any matched chemicals that year.*

*UII=Underground injection*

## TRENDS by chemical

### Which chemicals showed the largest reductions from 1995–1998 in North America?

Of the 165 matched chemicals, the chemicals with the largest reduction in total releases on-and off-site and transfers from 1995 to 1998 were:

- ⑥ methanol
- ⑥ toluene
- ⑥ carbon disulfide

### Methanol

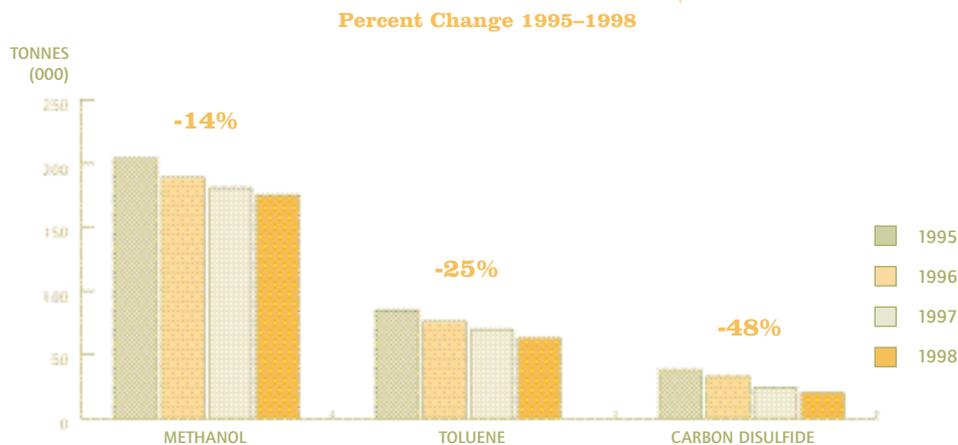
Total releases and transfers of methanol were reduced by 14 percent from 1995 to 1998. While both TRI and NPRI showed large decreases in methanol, NPRI facilities reported a 38-percent decrease and TRI facilities reported a 10-percent decrease.

In both the US and Canada, the largest reductions of methanol were reported by paper products and chemical manufacturers. North American facilities in the paper products industry reported an overall decrease of 17,100 tonnes, with Canadian facilities reporting 9,400 tonnes and US facilities reporting 7,700 tonnes. North American chemical manufacturers reported an overall reduction of 11,400 tonnes, with US facilities reporting a reduction of 8,100 tonnes and Canadian facilities reporting a reduction of 3,300 tonnes.

Methanol evaporates into the air, breaks down into other chemicals and can contribute to smog formation. Methanol can also react in the air to produce formaldehyde, a carcinogen. Methanol can be broken down by microorganisms and is of low toxicity to aquatic and terrestrial organisms.

Health effects from exposure to high concentrations of methanol, usually in occupational settings or from accidental exposure, include visual disturbances, permanent blindness, damage to the nervous system, nausea, vomiting, cardiac depression, liver damage and eye, nose and mouth irritation.

**FIGURE 11. CHANGE IN TOTAL RELEASES AND TRANSFERS for the three chemicals with largest decrease in North America, 1995–1998**  
(1995 Matched Chemicals and Industries)



*Note: Canada and US data only. Mexico data not available for 1995–1998. Does not include amounts from new industries, transfers to recycling, or transfers to energy recovery in 1998.*

Methanol can be released from a number of sources including pulp and paper mills, chemical and plastic manufacturing plants, extraction of crude petroleum and natural gas, and biological decomposition of wastes, sludges and sewage. Methanol is used to make a variety of chemicals including methyl tert-butyl ether (MTBE), a gasoline additive, and formaldehyde. It is also used as a solvent in products such as paint strippers, wall paints, and in processes to coat wood and paper, making synthetic fibers and pharmaceuticals.

### **Toluene**

Toluene showed the second-largest decrease in total releases and transfers from 1995 to 1998, with a reduction of 25 percent. All of this decrease was from TRI facilities that reported a 28-percent decrease. NPRI facilities actually increased total releases and transfers of toluene, by five percent.

TRI facilities in the furniture and fixtures industry reported the largest reduction, 3,300 tonnes, a 57-percent decrease for this industry in the US from 1995 to 1998. TRI facilities in the printing and publishing industry also reported a 3,300 tonne decrease, a 29-percent reduction for that industry in the US.

Toluene evaporates into the air, breaks down into other chemicals that can contribute to smog formation. Toluene is used to make chemicals, explosives, dyes and many other products. It can also be found in products such as inks, paints, resins, cleaners, glues and gasoline.

A number of health effects have been found for toluene in clinical and occupational studies from repeated high level exposure including damage to the brain and nervous system, kidneys and bone marrow.

### **Carbon disulfide**

Carbon disulfide had the third-largest reduction in total releases and transfers from 1995 to 1998 in North America. Most of this decrease was from TRI facilities, which reported a 48-percent decrease. One facility, Acordis Cellulosic Fibers Inc., Akzo Nobel Finance US, in Axis, Alabama, with a reduction of 10 million tonnes, accounted for over half of the total decrease.

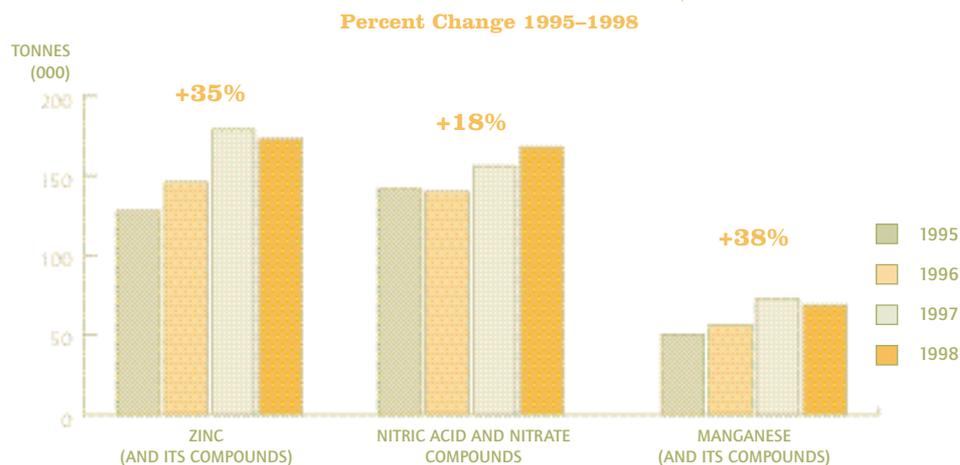
Carbon disulfide is used to produce rayon, rubber, cellophane and fumigants. Exposure to high concentrations may lead to skin burns, headaches, and fatigue, sleep disturbances and chest pains. Longer-term effects of carbon disulfide exposure may include effects on the brain, liver, heart and nerves.

### Which chemicals showed the largest increases from 1995–1998 in North America?

Of the 165 substances common to both TRI and NPRI, the substances with the largest increase in releases and transfers in North America from 1995 to 1998 were:

- ⦿ zinc and its compounds
- ⦿ nitric acid and nitrate compounds
- ⦿ manganese and its compounds

**FIGURE 12. CHANGE IN TOTAL RELEASES AND TRANSFERS**  
for the three chemicals with largest increase in North America, 1995–1998  
*(1995 Matched Chemicals and Industries)*



*Note: Canada and US data only. Mexico data not available for 1995–1998.  
Does not include amounts from new industries, transfers to recycling, or transfers to energy recovery in 1998.*

## Zinc and its compounds

From 1995–1998, total releases and transfers of zinc and its compounds increased by 45,000 tonnes, or 35 percent. Both TRI and NPRI facilities reported large increases in zinc and its compounds.

Most of the increase in zinc and its compounds was due to increases in off-site releases from the primary metals sector. The primary metals sector in North America reported an increase of over 44,000 tonnes. The increase was reported primarily as transfers to disposal (an increase of 40,000 tonnes).

Zinc is used to galvanize metals (including steel) to prevent rust and is often in materials recycled by these facilities into steel and other products. While an essential nutrient, prolonged ingestion of excessive levels of zinc can cause anemia, damage to pancreas, and reduction of beneficial cholesterol.

## Nitric acid and nitrate compounds

Nitric acid and nitrate compounds showed the second-largest increase in total releases and transfers, increasing by 26,000 tonnes, or 18 percent.

One Armco Inc. facility in Butler, Pennsylvania, reported almost 10 million tonnes of its 25–million-tonne increase in nitric acid and nitrate compounds to water. Another facility, Solutia Inc., in Gonzalez, Florida, reported an almost four–million-tonne increase in nitric acid and nitrate compounds to underground injection.

Breathing high concentrations of nitric acid can irritate the lungs, mouth, nose and throat, higher exposures can lead to fluid buildup called pulmonary edema. Contact with nitric acid can cause severe, permanent eye and skin damage.

## Manganese and its compounds

Manganese and its compounds had the third-largest increase in total releases and transfers from 1995 to 1998. Manganese and its compounds increased by 19,000 tonnes or 38 percent. The primary metals industry accounted for almost 8,000 tonnes of this increase, primarily as off-site transfers to disposal.

Manganese is a silvery brittle metal found in rock, and can combine with other chemicals to form a variety of manganese compounds. Manganese is considered an essential element for humans and animals. Exposure to manganese dioxide in high amounts in the workplace may result in “metal fume fever” and chronic exposure to inorganic manganese compounds may cause manganism, which involves various neurological symptoms and biochemical changes. Workplace exposure to dusts of manganese oxide, sulfate and carbonate may also have reproductive effects. Exposure to manganese may also irritate the eyes, nose and throat and respiratory tract. Manganese and its compounds have moderate acute and chronic toxicity to aquatic life, can be highly persistent in water and do not tend to bioaccumulate.

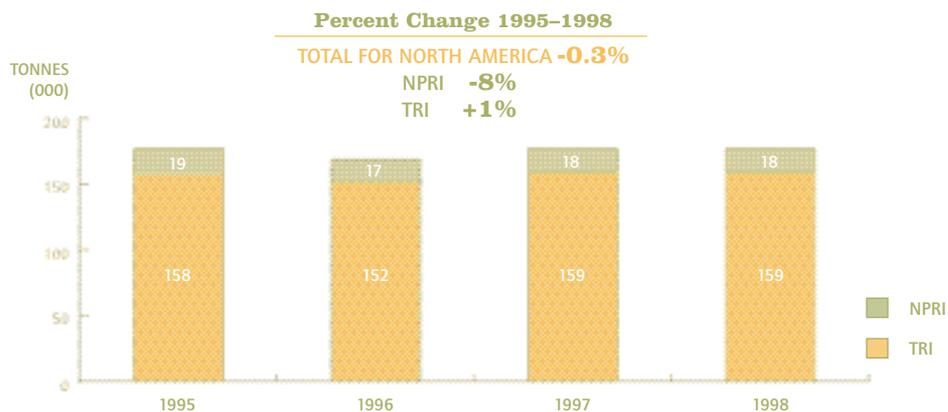
Manganese is often used in steel production and manganese compounds can be used in a variety of products such as batteries, glass, inks, fertilizers, fungicides, and disinfectants.

### What about releases of carcinogens?

Total releases on- and off-site of known or suspected carcinogens in North America decreased only slightly from 1995 to 1998. About 170,000 tonnes of carcinogens were released each year from 1995 to 1998. Total releases of carcinogens decreased by less than one percent over that period, less than the four-percent decrease for all chemicals.

The trend in total releases of carcinogens is very different between the two countries. Total releases of carcinogens in Canada decreased by eight percent (1.5 million tonnes), compared to a one-percent increase (1.0 million tonnes) in total releases of carcinogens in TRI.

**FIGURE 13. CHANGE IN RELEASES ON- AND OFF-SITE**  
of known or suspected carcinogens in North America, 1995–1998  
*(1995 Matched Chemicals and Industries)*



*Note: Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) or the US National Toxicological Program (NTP) Annual Report to Congress. Does not include amounts from new industries in 1998. Canada and US data only. Mexico data not available for 1995–1998.*

## Trends in releases **AND TRANSFERS** from 1995 to 1998, by type

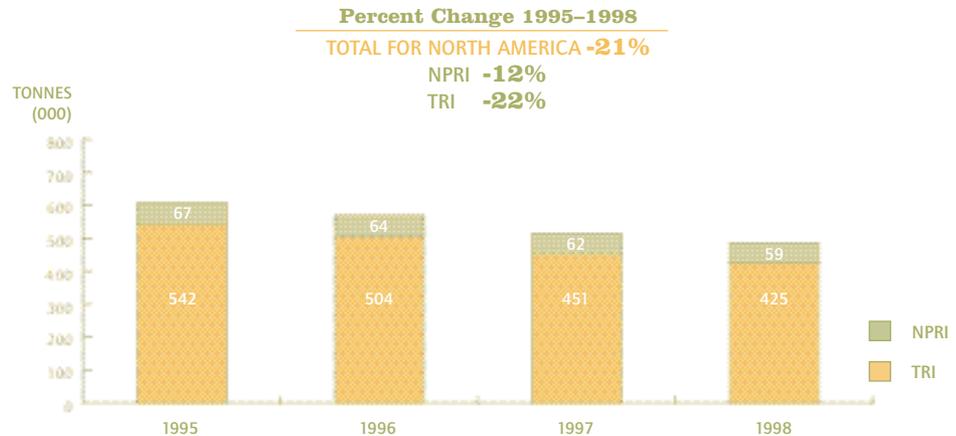


### On-site releases to air decreased by 21 percent from 1995 to 1998 in North America

About half of the on-site releases were put into the air. On-site releases to air of the matched chemicals decreased from 1995 to 1998. This decrease was substantial, 21 percent or 125,000 tonnes. The chemical manufacturers accounted for 48,000 tonnes of the decrease in on-site air releases and the paper products industry decreased by almost 14,000 tonnes. In Canada this drop was 12 percent and in the US, air releases decreased by 22 percent.

**FIGURE 14. CHANGE IN ON-SITE AIR EMISSIONS**  
in North America, 1995–1998

*(1995 Matched Chemicals and Industries)*

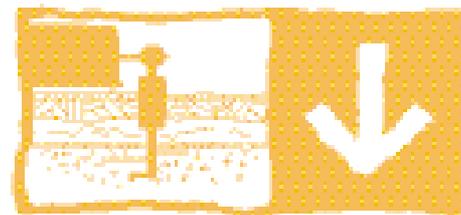


*Note: Canada and US data only. Mexico data not available for 1995–1998. Does not include amounts from new industries in 1998.*

## Releases injected underground decreased from 1995 to 1998 in North America

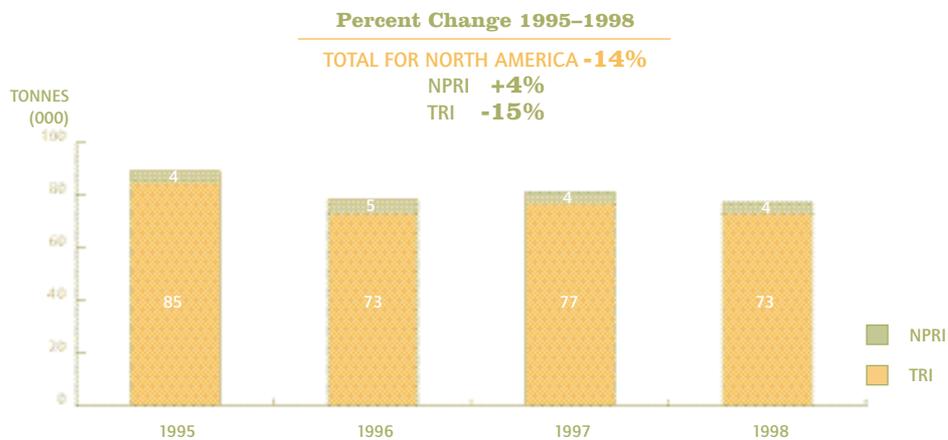
In some areas of Canada and the US, facilities inject chemicals into known geological formations, generally at great depths. There is no underground injection in Mexico.

In general, in North America, on-site underground injection is decreasing. It dropped by 14 percent from 1995 to 1998. However, in the US underground injection decreased 15 percent, while in Canada underground injection increased four percent from 1995 to 1998. TRI facilities report about twenty times the quantity of chemicals injected underground than do NPRI facilities.



**FIGURE 15. CHANGE IN ON-SITE UNDERGROUND INJECTION**  
in North America 1995–1998

*(1995 Matched Chemicals and Industries)*



*Note: Canada and US data only, Mexico data not available for 1995–1998. Does not include amounts from new industries in 1998.*



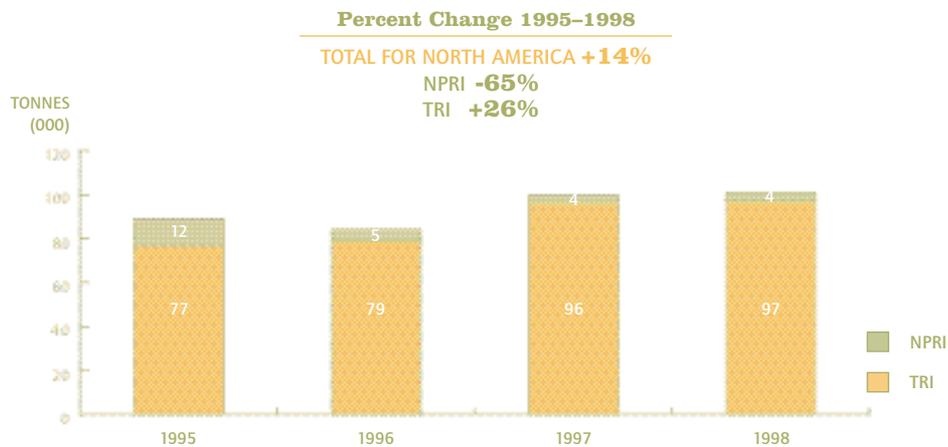
### Releases to water increased from 1995 to 1998 in North America

Unlike air releases, on-site releases to water have increased 14 percent or almost 12,100 tonnes from 1995 to 1998 in North America. All of this increase is from facilities in the US, which reported a 26-percent increase, or 20,000 tonnes. Approximately three-quarters of this increase is a result of one US facility, Armco Inc. in Butler, Pennsylvania, which reported an increase in on-site releases of approximately 9,000 tonnes, primarily of nitrate compounds.

Facilities in Canada showed the opposite trend, with a large reduction in water releases from 1995 to 1998 of 65 percent, or 8,000 tonnes. This significant reduction in releases to water in Canada was the result of the paper products sector reducing discharges of methanol, as a result of government regulations and industry improvements. Total water releases from paper products facilities in Canada decreased by almost 8,500 tonnes from 1995 to 1998.

**FIGURE 16. CHANGE IN ON-SITE SURFACE WATER discharges in North America, 1995–1998**

*(1995 Matched Chemicals and Industries)*

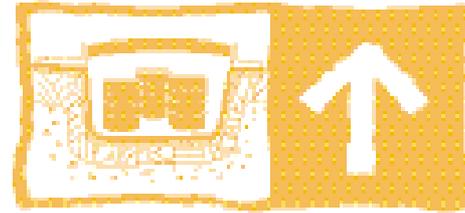


*Note: Canada and US data only. Mexico data not available for 1995–1998. Does not include amounts from new industries in 1998.*

## On-site releases to land increased from 1995 to 1998 in North America

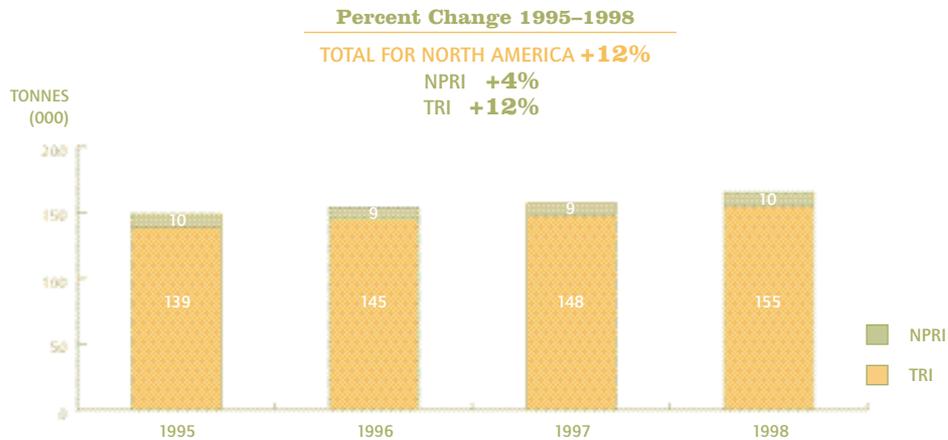
Many facilities dispose of chemicals on land, including burying waste in a landfill, incorporating it into the soil (land treatment), holding chemicals in surface ponds or accumulating it in waste piles.

There was an increase in the total amount of on-site land disposal in North America from 1995 to 1998. During this time, facilities disposed of 12 percent more chemicals on land at the site of the facility. Both TRI and NPRI facilities showed an increase. The increase has occurred in each year from 1995 to 1998.

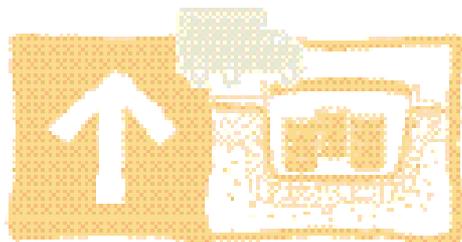


**FIGURE 17. CHANGE IN ON-SITE LAND RELEASES in North America, 1995–1998**

*(1995 Matched Chemicals and Industries)*



*Note: Canada and US data only. Mexico data not available for 1995–1998. Does not include amounts from new industries in 1998.*



### Off-site releases increased from 1995 to 1998 in North America

Chemicals can also be buried in landfills away from the facility. From 1995 to 1998, there was a 35-percent increase in chemicals sent to off-site for disposal. This increase in chemicals sent off-site for disposal is one of the most significant changes from 1995 to 1998.

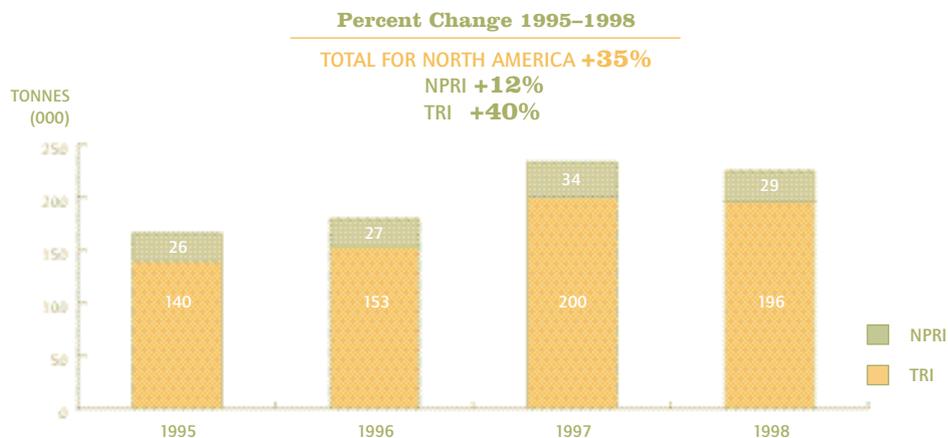
This tremendous increase in disposal off-site happened in both Canada and the US. In Canada, the increase was 12 percent and in the US the increase was 40 percent from 1995 to 1998.

The disposal of metals and their compounds drove most of this increase in off-site disposal. In fact, off-site releases of metals and their compounds increased by 41 percent in North America from 1995 to 1998.

Facilities in both Canada and the US increased disposal of metals off-site. Canadian facilities showed a 22-percent increase and US facilities, a 44-percent increase. Interestingly, the story for chemicals that are not metals, such as xylene, is quite different in Canada. Off-site disposal of these substances markedly decreased (39 percent) from 1995 to 1998.

However, after increases of nine percent from 1995 to 1996 and 30 percent from 1996 to 1997, total off-site releases decreased from 1997 to 1998 in North America by four percent. This pattern held true for both NPRI and TRI.

**FIGURE 18. CHANGE IN OFF-SITE RELEASES in North America, 1995–1998**  
(1995 Matched Chemicals and Industries)

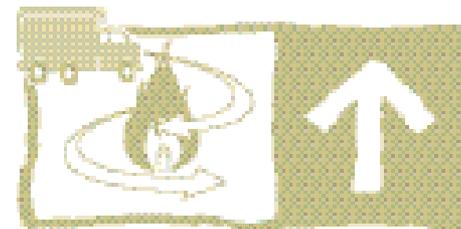


Note: Canada and US data only. Mexico data not available for 1995–1998. Does not include amounts from new industries in 1998.

### Transfers to both treatment and to sewage increased from 1995 to 1998 in North America

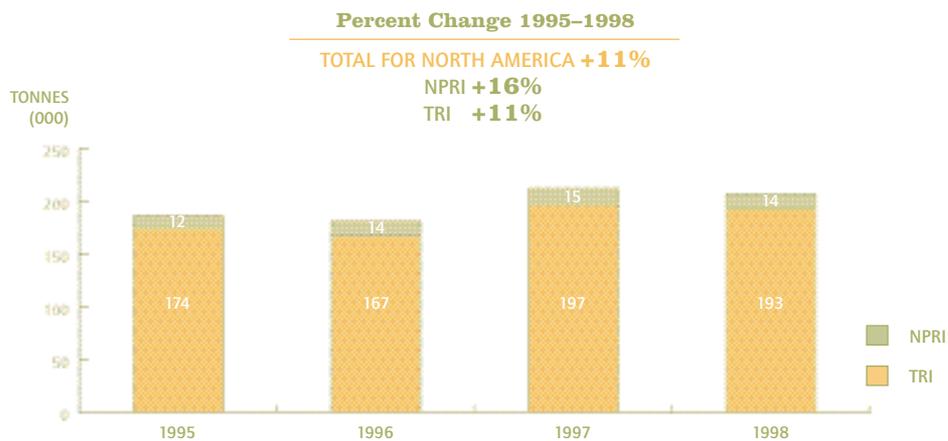
Transfers of chemicals to treatment and to sewage both increased from 1995 to 1998, for a total increase of 11 percent. Transfers to treatment increased by 12 percent and those to sewage by 10 percent. This was true for both NPRI and TRI, although transfers to sewage increased by a much greater percent in NPRI (by 30 percent).

Transfers to both treatment and to sewage did decrease from 1997 to 1998 in North America and in TRI. Transfers to treatment also decreased in NPRI from 1997 to 1998 (by 18 percent) although transfers to sewage continued increasing in NPRI throughout the period 1995 to 1998.



**FIGURE 19. CHANGE IN TRANSFERS TO TREATMENT and sewage in North America, 1995–1998**

*(1995 Matched Chemicals and Industries)*



*Note: Canada and US data only. Mexico data not available for 1995–1998. Does not include amounts from new industries in 1998.*

## **TRENDS** in cross-border transfers

### **Cross border transfers from the US to Canada increased from 1996–1998**

The amount of waste sent for treatment and disposal from the US to Canada has more than doubled from 1996 to 1998. In 1996, 1,500 tonnes of waste was transferred to Canada for treatment and disposal, and this increased to 3,500 tonnes in 1998. This increase was the result of a change at one facility, Zinc Corp. of America in Palmerton, Pennsylvania, which sent 1,700 tonnes of lead and zinc and their compounds to Safety Kleen in Corunna, Ontario, for the first time in 1998.

The time period 1996–1998 is used for cross border transfers because in 1995 NPRI did not require the reporting of a specific amount sent to an individual site. Also, the data for 1996–1998 do not include transfers to recycling or energy recovery or the newly reporting industry sectors, as data before 1998 are not available for these new additions.

### **Cross-border transfers from Canada to the US decreased from 1996–1998**

The amount of waste sent for treatment and disposal from Canada to the US decreased by more than half from 1996 to 1998. In 1996, 4,300 tonnes was sent for treatment and disposal in the US, but had dropped to 1,700 tonnes in 1998. Some of this decrease was due to Lake Erie Steel in Nanticoke, Ontario, which reduced its transfers of manganese and its compounds by 175 tonnes by developing the waste into a product to be sold. It also reduced its transfers of zinc and its compounds sent to landfills in the US by 1,200 tonnes, by sending them to a different site within the country (Philip Environmental Services in Stoney Creek, Ontario).

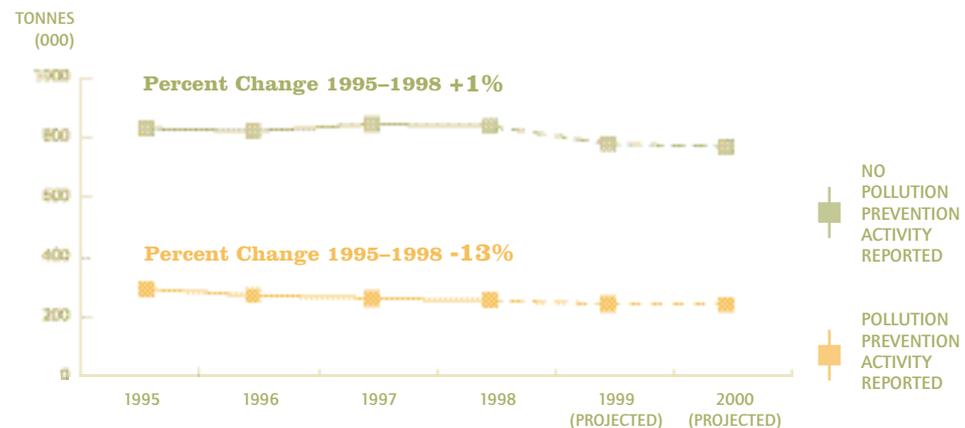
# Pollution prevention activities in Canada, Mexico and United States

## Are facilities taking action to prevent pollution in North America?

This year, *Taking Stock* takes a special look at reporting of pollution prevention activities. As government policies in all three countries encourage pollution prevention and given the interest in pollution prevention among stakeholders, we analyzed the number and types of pollution prevention activities being reported, the opportunities and barriers to pollution prevention and examples of pollution prevention.

Pollution prevention is defined differently in the three countries. In general terms, the United States has the most restrictive definition of pollution prevention, Canada has a mixed definition and Mexico has the most inclusive definition of pollution prevention. The US EPA defines pollution prevention as "source reduction—preventing or reducing waste where it originates at the source, including practices that conserve natural resources by reducing or eliminating pollutants through increased efficiency in the use of raw materials, energy, water and land." In the TRI, on-site recycling and recovery are not included as pollution prevention activities.

**FIGURE 20. CHANGE IN TOTAL REPORTED AMOUNTS OF RELEASES and transfers in North America for forms with and without pollution prevention activity reporting, 1995–2000 (projected)**  
(1995 Matched Chemicals and Industries)



Note: For chemicals reported in all four years (1995–1998) only.

In Canada, pollution prevention is defined as “the use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and waste and reduce the overall risk to human health or the environment.” In NPRI, in contrast to TRI, on-site reuse, recycling and recovery are included as pollution prevention activities.

In Mexico, pollution prevention is defined in the General Law on Ecological Equilibrium and Environmental Protection as “the set of norms and measures to prevent degradation of the environment” (Article 3/XXV of Chapter 1). This definition allows pollution control measures such as installation of air filters to be considered a pollution prevention activity. In the US and Canada, pollution control measures using “end of pipe technology” are not considered pollution prevention.

At first glance, it seems as if NPRI facilities report double the pollution prevention activities as TRI. In NPRI, 54 percent of all facilities reported doing some type of pollution prevention activity during 1998. In contrast, 19 percent of all TRI facilities reported doing some type of pollution prevention activity in 1998. This difference may be a result of a number of factors, including different interpretations of what qualifies as pollution prevention and differences in reporting.

As noted by Environment Canada, the comments provided by some NPRI facilities may indicate a misunderstanding of which activities are considered pollution prevention and which are pollution control. Comments indicated that NPRI plants were reporting the installation of pollution control equipment as pollution prevention.

In TRI, this is less likely to happen because of the manner in which pollution prevention activities are reported. In TRI, facilities must choose among 43 specific pollution prevention actions compared to eight general categories in NPRI. For example, the single category of spill and leak prevention in NPRI is broken into six specific actions in TRI. The more specific categories in TRI may help guide facilities in deciding what qualifies as pollution prevention.

### **Do pollution prevention measures help drive reductions in releases and transfers of chemicals?**

Perhaps. The NPRI and TRI data can be analyzed to see if facilities that are reporting pollution prevention activities are also showing reductions in releases and transfers over the years. It should be kept in mind however, that there are many reasons, besides pollution prevention activities, why a facility may show reductions from year to year, including changes in production, installation of pollution control equipment or a change in the method used to calculate releases and transfers.

Facilities that reported pollution prevention activities in 1998 showed reductions in releases and transfers from 1995 to 1998. Facilities that did not report any pollution prevention activities in 1998 showed little change in releases and transfers.

As a means to better understand some of the reasons behind the numbers on pollution prevention, we interviewed 30 facilities in Canada, Mexico and the US about their pollution prevention projects.

In general, the pollution prevention activities most frequently reported by the interviewed facilities were equipment and process modifications followed by spill and leak prevention and the least implemented activities were product changes.

### **What motivated the interviewed facilities to take pollution prevention measures?**

The motivations for implementing pollution prevention programs were diverse. An environmental policy or implementation of a process control plan, such as ISO or quality assurance, spurred on many facilities. Customers requiring changes or an employee's personal environmental interest motivated others. Sometimes the motivation was specific to the chemical, such as trichloroethylene, which smells at low concentrations, creating employee pressure to reduce usage. Other companies were motivated by the high cost of purchase and disposal of a chemical.

### **How did the interviewed facilities get information on pollution prevention?**

The interviewed facilities had multiple sources of environmental information, but often did not know where to go for new ideas on pollution prevention for a particular process. Some of the most useful assistance had come from facilities sharing information with other facilities. Often this happened at companies with multiple plants or occasionally through a facility in a different sector using the chemical in a similar process. Trade shows, journals and suppliers were also important sources of information on pollution prevention. Trial and error was a common method of researching alternatives.

Companies with a person responsible for environmental protection often had started pollution prevention projects. Most small facilities did not have a written environmental policy or designated person. However, in one case the small size of the company allowed fundamental questions to be asked about the continued use of the chemicals, and one individual had all the information required to switch to an alternative.

Selected case studies and more detailed analysis are presented in the *Taking Stock 1998* Sourcebook.

# Frequently asked questions on TAKING STOCK

The following section presents questions frequently asked about the information in TAKING STOCK.

## HOW DO PRTR DATA RELATE to environmental problems?

### Toxic chemicals

Many of the 165 matched chemicals are persistent, bioaccumulative and/or toxic. Chemicals that are persistent are slow to break down and can continue to circulate in the environment for many years. Chemicals that are bioaccumulative can be readily taken into fish or animals, and can accumulate over time in fatty tissue. Chemicals that are toxic can damage plants or animals.

The TRI and NPRI data can assist in estimating loadings of these toxic chemicals into the air, water, land and injected underground, which may help to identify local "hot spots" or areas of high contamination.

## TAKING ACTION: THE CEC'S

### sound management of chemicals program tackles priority chemicals

The three NAFTA countries are working together to reduce or prevent the risks of, and exposures to, chemical substances through the ongoing Sound Management of Chemicals (SMOC) Program.

The program focuses especially on persistent, bioaccumulative and toxic substances and those that are transported long distances through the air and water.

The SMOC program is committed to developing North American Regional Action Plans (NARAPs) for selected persistent and toxic substances as a first priority. The substances typically considered for regional action are or have been contained in traded goods (examples include PCBs; pesticides such as DDT, chlordane and lindane; and metals

such as mercury) or are byproducts of industrial activities (examples include dioxins, furans, and hexachlorobenzene). Actions include the phase-out and banning of the particular chemicals of concern, encouraging pollution prevention, and reducing emissions.

SMOC Task Forces were established to set the regional action plans in motion. The first NARAPs were initiated for DDT, chlordane, PCBs and mercury. A NARAP for dioxins/furans and hexachlorobenzene is now being developed and a decision on a plan for lindane is expected shortly. A substance selection process helps the governments identify and act on other chemicals of concern.

PRTRs are becoming an increasingly valuable tool for the SMOC program for tracking progress in reducing industrial releases of priority chemicals, particularly as the PRTR reporting thresholds are lowered for some of the persistent bioaccumulative toxics.

Documents about the program are posted on the CEC web site <[www.cec.org](http://www.cec.org)> and are also available in a consolidated report entitled *The Sound Management of Chemicals Initiative under the North American Agreement on Environmental Cooperation: Regional Commitments and Action Plans*.

### Drinking water

Many of these matched chemicals have drinking water standards or guidelines that prescribe the maximum allowable concentration of the chemical in the water. The data in this report describe the total amount of a chemical released from each facility into the water over a year. Thus, PRTR data are useful for estimating industrial loadings or amounts of chemicals put into a local river or lake, but not so good at determining the concentration of a chemical in a particular river or lake. The data in this report could be used to identify chemicals that need to be monitored in a lake or river that feeds a drinking water plant. The data would not be good at providing estimates of drinking water quality.

### Long-range pollution

Many of the chemicals in this report can travel large distances through the "grasshopper effect." A chemical evaporates, travels with the wind, and is deposited only to be evaporated, carried again and redeposited, often hundreds of miles from its source.

Because of the ability of many chemicals to travel long distances, chemicals released from one facility may travel throughout North America. For example, some chemicals deposited in the ecologically sensitive Arctic have been released thousands of miles away.

### Smog

Many of the 165 chemicals analyzed in this report can contribute to smog. Ground-level ozone, one of the main components of smog, is often produced when volatile organic compounds and nitrogen oxides react in the presence of sunlight. Many of the matched chemicals are considered volatile organic compounds, such as methanol, benzene and cyclohexane. Other sources such as emissions from cars, incineration and evaporation from gasoline, solvents and paints are also sources of volatile organic compounds.

Nitrogen oxides are not one of the 165 chemicals analyzed in this report, because data on nitrogen oxides are not collected under the TRI and NPRI programs.

## THE CEC LAUNCHES NEW INITIATIVE on criteria air pollutants

Responding to a suggestion from the PRTR Consultative Group and input received from the governments and scientific communities, the CEC has begun a project to compile existing information on criteria air pollutants in the three countries. The CEC will work with each of the countries, as well as with state/provincial and local agencies, to develop annual reports of criteria pollutant emissions information. Currently, Mexico collects criteria emissions data on four pollutants in Section II of its COA form. Reporting on three other air criteria pollutants is still voluntary. Canada is looking into including criteria air pollutants in its NPRI system in the future. The US collects these data under a separate program.

A goal of this CEC initiative is to foster further cooperation among the three countries in presenting emissions data already collected within each country in a comparable and consistent manner. The initiative will also promote public dissemination and understanding of criteria air pollutant emissions in North America and will be invaluable in assessing emission trends on a continental basis, resulting from the air quality programs in each country. For more information on this initiative, contact Paul Miller, CEC Air Quality Program Manager, at (514) 350-4326, <pmiller@cceintl.org>.

### Thinning of the ozone layer

Releases of certain chemicals can contribute to the thinning of the ozone layer in the upper atmosphere, which shields life from the sun's harmful ultraviolet radiation. Less protection from ultraviolet light will, over time, lead to higher skin cancer and cataract rates and crop damage.

A few of the 165 chemicals in this report, such as carbon tetrachloride, can contribute to ozone thinning but other chemicals like CFCs and HCFCs are not included in this year's report because they were not reported to NPRI. This will change for the next *Taking Stock* report, as CFCs and HCFCs have been added to NPRI for the 1999 reporting year.

## Climate change

The build up of certain gases such as carbon dioxide, nitrous oxide and methane in the atmosphere can contribute to climate change. These gases are not reported to NPRI or TRI and so are not included in this report. Some of the greenhouse gases are included in the Mexican reporting system.

## Acid rain

Acid rain occurs when emissions of sulfur dioxide and nitrogen oxides react in the atmosphere to form an acidic mixture that falls as rain, snow or mist or as a gas or as particles. Acid rain can damage forests, lakes, crops and stone buildings. Nitrogen oxides and sulfur dioxide are not reported to TRI or NPRI and so are not included in this report. Electric utilities and transportation are major contributors of these chemicals to acid rain. Hydrochloric and sulfuric acid emissions, chemicals that are on the TRI and NPRI lists, may enhance the acidity in clouds downwind from the facilities, contributing to the formation of acid rain.

## Endocrine disruption

Certain chemicals have the ability to disrupt the proper functioning of endocrine systems. Scientists are working hard to learn how endocrine disruptors may be linked to a number of effects including reproductive and developmental problems. Endocrine systems can act as the body's chemical messengers and control a wide variety of cellular and developmental processes. A lost, jumbled or wrong signal during some of these development events may result in damage. While there are endocrine disruptors on the PRTR lists, there is considerable debate on just which chemicals are involved, the concentrations required to produce an effect and the significance of some of the effects.

## Does naming a facility, jurisdiction or industry sector mean that they are not in compliance with environmental laws?

No. The mere fact that a facility, jurisdiction or industry sector is named in *Taking Stock* does not mean that it is not in compliance with environmental laws. For information on the applicable permits, regulations or programs that may apply to a facility, contact local environmental authorities, the facility or local community groups.

## What's being done to reduce the releases and transfers of chemicals in North America?

Each country has many laws and programs to control, reduce and prevent pollution. In the US and Canada, the government also has voluntary challenges to reduce chemical releases. For an overview of each country's legislative program, please see the CEC web site at <[www.cec.org](http://www.cec.org)>.

For information on:

- ☉ Canadian programs, see <[www.ec.gc.ca](http://www.ec.gc.ca)>
- ☉ Mexican programs, see <[www.ine.gob.mx](http://www.ine.gob.mx)>
- ☉ US programs, see <[www.epa.gov](http://www.epa.gov)>

Many companies are also reducing chemical releases following company environmental policies, targets or programs. More information about a specific facility can be found by typing in the facility name on the government web sites, and contacting the company person listed. Some industrial sectors also publish summaries of their environmental data.

## QUESTIONS on the data used in TAKING STOCK

### It's the year 2001—why are these data from 1998?

The CEC uses the most recent public data available at the time of development of *Taking Stock*. The facilities report their 1998 data in the summer of 1999, and the governments then review the data. The 1998 data were publicly released by the governments in the spring of 2000. The CEC then selects the common chemicals and industrial sectors from this data, performs data analyses, and then writes, edits and translates the report into three languages.

Recognizing the need for more timely delivery of data, the CEC is striving to shorten the time it takes to produce *Taking Stock*, to make it available to users more quickly.

## Does TAKING STOCK include all chemicals?

*Taking Stock* includes the 165 chemicals that are common to both NPRI and TRI (see the Appendix to this volume). Each system has chemicals on its list that do not match, and so are not included in the *Taking Stock* report. (See Appendix A, Sourcebook.)

This report uses approximately 65 percent of the data reported to NPRI and 60 percent of the data reported to TRI for 1998. The national programs can provide data on the chemicals and industries that are not part of the matched data set used in this report.

It is important to realize that the 165 matched chemicals are only a small part of the total universe of chemicals. The Chemical Abstracts Service has more than 16 million substances listed and identified more than 210,000 of these as regulated or covered by chemical inventories worldwide.

## Does TAKING STOCK include all sources of chemicals?

*Taking Stock* presents data from industrial facilities that are required to report to both TRI and NPRI. There are many facilities that are not included in the *Taking Stock* report:

- ⦿ small facilities that are below the reporting thresholds for number of employees (generally fewer than 10);
- ⦿ facilities that do not meet the reporting thresholds for quantity of chemical manufactured, processed or otherwise used;
- ⦿ mobile sources such as cars, trucks, trains, boats;
- ⦿ agricultural activities; and
- ⦿ metal mines (see discussion above under new sectors).

## Why does TAKING STOCK add all the chemicals together?

This report analyses the 165 chemicals common to both TRI and NPRI. These chemicals differ in their toxicity, ability to cause health effects and environmental significance. During meetings to discuss *Taking Stock* some groups have supported adding the chemicals together while others have urged that the chemicals be kept separate.

*Taking Stock* adds chemicals together to provide a picture of the total reported amount of chemicals from a facility. The total reported amount represents the best estimate available from a PRTR of the total amount of chemicals arising from a facility's activities that require management. It is not a perfect measure, but can serve as a useful indicator.

In some sections, *Taking Stock* presents analyses for chemicals with similar toxicological properties such as carcinogens.

The data represent estimates of releases and transfers of chemicals, as reported by facilities, and should not be interpreted as levels of risk to human health or environmental impact.

## Are these releases and transfers of chemicals harmful to my health?

The data in this report alone cannot tell you whether chemicals released or transferred in your area are posing a risk to your health. However, this report is one step towards understanding the potential health effects of releases and transfers of the 165 matched chemicals. PRTR data need to be taken together with other information, such as data on toxicity and exposure, to provide a more complete understanding of the risks.

The 165 chemicals described in this report have been listed by the national governments due to health and/or environmental concerns. Each substance differs in its toxicity and ability to cause environmental and health effects.

Of this group of matched chemicals, 49 are considered to be known or suspected carcinogens by either the International Agency for Research on Cancer or the US EPA National Toxicological Program. The report presents separate analyses for this group of carcinogens.

Many of the chemicals have been targeted for reduction under government and industry programs because of their environmental and health significance.

Some of the chemicals can cause neurological or developmental effects that may be of particular concern to children and fetuses, or may have toxic effects to which children are particularly vulnerable. This year, the CEC will be developing a special feature report on the links between pollutants and children's health.

For more information about the health effects of chemicals, please see:

- ⦿ US Agency for Toxic Substances and Disease Registry at <[www.atsdr.cdc.gov/toxfaq.html](http://www.atsdr.cdc.gov/toxfaq.html)>
- ⦿ US EPA at <[www.epa.gov/chemfact/](http://www.epa.gov/chemfact/)>
- ⦿ Environmental Defense Scorecard site at <[www.scorecard.org](http://www.scorecard.org)>
- ⦿ National Safety Council at <[www.nsc.org/xroads/chem.htm](http://www.nsc.org/xroads/chem.htm)>
- ⦿ International Agency for Research on Cancer at <[www.iarc.fr/](http://www.iarc.fr/)>
- ⦿ Canadian Center for Occupational Health and Safety at <[www.ccohs.ca/oshanswers](http://www.ccohs.ca/oshanswers)>
- ⦿ Appendix D in the Sourcebook which lists the health effects of the 25 chemicals with the largest reported amounts
- ⦿ Toxicology books, scientific journals and other sources in your local library

Some organizations have developed chemical ranking systems intended to account for the differing toxicities and properties of chemicals. Each of these systems has its strengths and weaknesses. The type of information needed should guide the selection of a particular chemical ranking system. Examples include the European Union System for the Evaluation of Chemicals, the ICI Environmental Burden Methodology, and the Environmental Defense Scorecard system, which has dozens of different criteria to rank chemicals.

### **Why are Mexican data not included in TAKING STOCK?**

Reporting to the Mexican PRTR program, the RETC, is currently voluntary. While data collected under voluntary programs can have a variety of uses, they cannot easily be compared to data collected under mandatory programs, such as NPRI and TRI.

The integrated reporting form, called the Annual Certificate of Operation, the *Cédula de Operación Anual* (COA) used in Mexico contains five sections. Section V is for the voluntary reporting of releases and transfers of pollutants and is called the RETC. Mexican facilities submitted 2,677 COA forms for the 1998 reporting year, but less than half of these (1,192 forms) were put into the database, because some facilities were not under federal jurisdiction, lacked an official environment permit number or had erroneous or no information. Less than 50 facilities reported PRTR data in the optional Section V.

Because of the voluntary nature of Mexico's RETC and the limited amount of data currently available, most of the analyses presented here are based on data from the US TRI and the Canadian NPRI. The report strives to include trilateral data wherever possible. The analysis of pollution prevention summarized above and presented in more detail in the Sourcebook draws upon information from all three countries.

### **Why might a facility's numbers go up or down from year to year?**

There are many reasons why a facility might report a decrease or increase in the amount of chemical released or transferred from one year to the next. A facility may have installed pollution control measures or taken pollution prevention actions, but it may also have changed processes, its rate of production, the chemicals used, or its method of estimating releases and transfers; gone out of business; or merged with another facility.

While the PRTR data are good at showing increases and decreases in amount of chemicals, it is often harder to discover the reasons behind the changes.

In the NPRI, facilities can add comments to explain changes in their releases or transfers from one year to the next. Whenever possible, this information is used in *Taking Stock* to provide context for facilities' numbers.

### **Why doesn't the data take into account changes in production?**

Many people have commented that data on releases and transfers should take into account production changes at a facility. The increase in releases and transfers may be a result of increased production. While it would be helpful to better understand the reasons behind the numbers, there are several reasons why release and transfer data are not related to production levels in this report. One important reason is that production data for facilities are not reported to NPRI or TRI.

Reporting of a production ratio and activity index is mandatory in TRI but voluntary in NPRI, so is not reported by all NPRI facilities or for all years. Therefore, this production measure is not used for this report. While other sources of production data outside of NPRI and TRI may be available, these often do not provide data on a facility basis or for the same reporting year.

In addition, there is often no relationship between production and releases and transfers. As production increases, releases and transfers may increase or decrease, depending on the operations at the facility.

While knowing the relationship between production and releases and transfers may be important from an eco-efficiency perspective, it may be less important from an environmental or health perspective. Environmental or health damage may result from the total loading of chemicals, and so knowing if the total quantity of chemicals are increasing or decreasing may be important. For example, a person living in a particular community may be most interested in the actual amounts of releases from a facility and less concerned with amounts released per unit of production. A facility manager looking to increase efficiency, however, may be more interested in release per unit of production.

# Background on pollutant release and transfer registers

## What is a pollutant release and transfer register?

A pollutant release and transfer register (PRTR) provides detailed information on the types, locations and amounts of chemicals released or transferred by facilities. The US Toxics Release Inventory (TRI), the Canadian National Pollutant Release Inventory (NPRI) and the developing Mexican *Registro de Emisiones y Transferencia de Contaminantes* (RETC) are examples of PRTRs.

The first of these national registers to be established in North America was the US TRI in 1987, followed by the Canadian NPRI in 1993. The Mexican RETC had a successful pilot project in 1996, followed by voluntary reporting for facilities under federal jurisdiction in 11 industrial sectors starting in 1997.

## FOR MORE INFORMATION ON the national PRTR programs in North America, see:

### Public Access to Canadian National Pollutant Release Inventory Data and Information

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

Headquarters:

Tel: (819) 953-1656

Fax: (819) 994-3266

NPRI data on the Internet, in English:

<[www.ec.gc.ca/pdb/npri/npri\\_home\\_e.cfm](http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm)>

NPRI data on the Internet, in French:

<[www.ec.gc.ca/pdb/npri/npri\\_home\\_f.cfm](http://www.ec.gc.ca/pdb/npri/npri_home_f.cfm)>

e-mail: [npri@ec.gc.ca](mailto:npri@ec.gc.ca)

Pollution Watch Scorecard home page:

<[www.scorecard.org/pollutionwatch/](http://www.scorecard.org/pollutionwatch/)>

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

*Instituto Nacional de Ecología  
Dirección de Gestión Ambiental*

Av. Revolución 1425 - 9

Col. Tlacopac, San Angel

01040 Mexico, D.F.

Tel: (525) 624-3470

Fax: (525) 624-3584

INE's web site for the RETC on the Internet,  
in Spanish:

<[www.ine.gob.mx/dggia/retc/index.html](http://www.ine.gob.mx/dggia/retc/index.html)>

RETC documents on the Internet, in English:

<[www.ine.gob.mx/dggia/retc/ingles/ingles.html](http://www.ine.gob.mx/dggia/retc/ingles/ingles.html)>

### Public Access to US Toxics Release Inventory Data and Information

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

<[www.epa.gov/tri](http://www.epa.gov/tri)>

Online Data Access:

TRI Explorer: <[www.epa.gov/triexplorer](http://www.epa.gov/triexplorer)>

EPA's Envirofacts:

<[www.epa.gov/enviro/html/tris/](http://www.epa.gov/enviro/html/tris/)>

RTK-NET: <[www.rtk.net](http://www.rtk.net)> for Internet access,  
(202) 234-8494 for information

National Library of Medicine's Toxnet

(Toxicology Data Network) computer system:  
<[toxnet.nlm.nih.gov/](http://toxnet.nlm.nih.gov/)>

Environmental Defense Scorecard home page:

<[www.scorecard.org](http://www.scorecard.org)>

### Where do PRTR data come from?

A facility may emit chemicals into the air from smokestacks, discharge chemicals into nearby rivers or lakes, inject chemical containing wastes into underground wells or dispose of chemicals in landfills. Each year, facilities that are covered under a national PRTR report the amounts of chemicals they have released into the air, water, land or put in underground wells.

Some facilities also send chemicals to other locations for treatment, to sewage treatment plants, or to disposal sites. Facilities may also send chemicals off site for recycling or to be burned for energy recovery. These chemicals transferred to other locations are also reported under a PRTR system.

Facilities may use estimates or actual measurements when reporting chemical amounts. The facility reported information on releases and transfers is collected by governments in computerized databases and summarized in publicly available reports. A key strength of PRTRs is the public availability of release and transfer data from individual facilities.

PRTRs often have thresholds for reporting. For example, facilities with fewer than 10 employees may not be required to report. Or, a facility needs to process, manufacture or use more than a certain quantity of chemicals, such as 10 tonnes, to trigger reporting. Also, a PRTR has a list of specific chemicals that must be reported. So, PRTRs will capture information from certain sources for certain chemicals.

## **BASIC ELEMENTS** of an effective PRTR

While recognizing that individual countries will design PRTRs to meet their own needs and capacities, Resolution 00-07 of the CEC Council sets forth a set of basic elements considered central to the effectiveness of PRTR systems, which include:

- ⑥ reporting on individual substances;
- ⑥ reporting on individual facilities;
- ⑥ covering all environmental media (i.e., releases to air, water, land and underground injection and transfers off-site for further management);
- ⑥ mandatory, periodic reporting (i.e., annually);
- ⑥ public disclosure of reported data on a facility- and chemical-specific basis;
- ⑥ standardized reporting using computerized data management;
- ⑥ limited data confidentiality and indicating what is being held confidential;
- ⑥ comprehensive scope; and
- ⑥ a mechanism for public feedback to improve the system.

### How are the PRTR data used?

PRTRs are a unique source of localized (facility-specific) data on releases and transfers of certain chemicals that have been identified by governments as of concern to health and/or the environment. PRTRs are a tool for fulfilling the public's "right to know" about chemicals released and transferred into and through their communities.

PRTR data can be used for a variety of purposes. The data track chemicals and, thereby, can help industry, governments and citizens identify ways to prevent pollution, reduce waste generation, decrease releases and transfers and assess chemical use.

Many corporations use PRTR data to report on their environmental performance and to identify opportunities for reducing pollution. Governments can use PRTR data to develop or shift program priorities. Citizens use PRTR data to learn about releases and transfers from facilities in their communities.

### What have the three governmental environment leaders from Canada, Mexico and the United States said about PRTRs?

In June 2000, the CEC Council, composed of the Environment Minister from Canada, the Administrator of the US Environmental Protection Agency and the Secretary of Semarnap (now renamed Semarnat—*Secretaría del Medio Ambiente y Recursos Naturales*), in Mexico, signed Council Resolution 00-07 on pollutant release and transfer registers. Through this Resolution, the Council emphasized the value of PRTRs as tools for the sound management of chemicals, for encouraging improvements in environmental performance and for providing the public with access to information on pollutants in their communities. The Resolution also identified a set of basic features considered important to the effectiveness of a PRTR (see previous page for basic elements of effective PRTRs).

The Resolution specifically reaffirmed the Council's commitment to the CEC's analytical work on North American PRTR data (including the *Taking Stock* annual reports). The Council also noted the opportunities for North America to serve as a global leader in the development and use of PRTRs.

### PRTRs worldwide

PRTRs are growing in importance worldwide. According to a recent OECD survey of member countries, 16 countries have or are developing PRTRs. This survey and other OECD reports on PRTRs are available on the OECD web site at <[www.oecd.org/ehs](http://www.oecd.org/ehs)>. At the recent "Forum III" meeting of the Intergovernmental Forum for Chemical Safety, held in Brazil in October 2000, there was a special session on PRTRs, which is a further indication of the growing interest in PRTRs in countries worldwide. For more information on this meeting, see <[www.who.int/ifcs/forum3/final.html](http://www.who.int/ifcs/forum3/final.html)>.

## HOW CAN I BECOME involved in the development of **TAKING STOCK?**

*Taking Stock* is developed with the advice of governments, industry and nongovernmental organizations from the three North American countries. Each year, a consultative meeting is held to discuss the upcoming report and provide updates on government programs.

A public comment period follows the meeting. Based on feedback from the meeting, written comments and ongoing discussions, *Taking Stock* is developed.

For more information, including the materials prepared for the consultative meeting or to get involved in the CEC's North American pollutant release and transfer register project, please contact:

Erica Phipps  
CEC Program Manager

**Commission for  
Environmental Cooperation**

393, rue St-Jacques Ouest  
Bureau 200  
Montreal, Quebec H2Y 1N9

(514) 350-4323  
<[ephipples@ccemtl.org](mailto:ephipples@ccemtl.org)>

# Appendix: Matched chemicals — listed in both TRI and NPRI, 1998

CAS Number	Chemical Name	CAS Number	Chemical Name	CAS Number	Chemical Name
50-00-0	c Formaldehyde	79-00-5	1,1,2-Trichloroethane	98-95-3	c Nitrobenzene
55-63-0	Nitroglycerin	79-01-6	c Trichloroethylene	100-02-7	4-Nitrophenol
56-23-5	c Carbon tetrachloride	79-06-1	c Acrylamide	100-41-4	Ethylbenzene
62-53-3	Aniline	79-10-7	Acrylic acid	100-42-5	c Styrene
62-56-6	c Thiourea	79-11-8	Chloroacetic acid	100-44-7	c Benzyl chloride
64-67-5	c Diethyl sulfate	79-21-0	Peracetic acid	101-14-4	c 4,4'-Methylenebis(2-chloroaniline)
67-56-1	Methanol	79-34-5	1,1,2,2-Tetrachloroethane	101-77-9	c 4,4'-Methylenedianiline
67-66-3	c Chloroform	79-46-9	c 2-Nitropropane	106-42-3	p-Xylene
67-72-1	Hexachloroethane	80-05-7	4,4'-Isopropylidenediphenol	106-44-5	p-Cresol
71-36-3	n-Butyl alcohol	80-15-9	Cumene hydroperoxide	106-46-7	c 1,4-Dichlorobenzene
71-43-2	c Benzene	80-62-6	Methyl methacrylate	106-50-3	p-Phenylenediamine
74-83-9	Bromomethane	81-88-9	C.I. Food Red 15	106-51-4	Quinone
74-85-1	Ethylene	84-74-2	Dibutyl phthalate	106-88-7	1,2-Butylene oxide
74-87-3	Chloromethane	85-44-9	Phthalic anhydride	106-89-8	c Epichlorohydrin
74-88-4	Methyl iodide	86-30-6	N-Nitrosodiphenylamine	106-99-0	c 1,3-Butadiene
74-90-8	Hydrogen cyanide	90-43-7	2-Phenylphenol	107-05-1	Allyl chloride
75-00-3	Chloroethane	90-94-8	c Michler's ketone	107-06-2	c 1,2-Dichloroethane
75-01-4	c Vinyl chloride	91-08-7	c Toluene-2,6-diisocyanate	107-13-1	c Acrylonitrile
75-05-8	Acetonitrile	91-20-3	Naphthalene	107-18-6	Allyl alcohol
75-07-0	c Acetaldehyde	91-22-5	Quinoline	107-21-1	Ethylene glycol
75-09-2	c Dichloromethane	92-52-4	Biphenyl	108-05-4	c Vinyl acetate
75-15-0	Carbon disulfide	94-36-0	Benzoyl peroxide	108-10-1	Methyl isobutyl ketone
75-21-8	c Ethylene oxide	94-59-7	c Safrrole	108-31-6	Maleic anhydride
75-35-4	Vinylidene chloride	95-47-6	o-Xylene	108-38-3	m-Xylene
75-44-5	Phosgene	95-48-7	o-Cresol	108-39-4	m-Cresol
75-56-9	c Propylene oxide	95-50-1	1,2-Dichlorobenzene	108-88-3	Toluene
75-65-0	tert-Butyl alcohol	95-63-6	1,2,4-Trimethylbenzene	108-90-7	Chlorobenzene
77-47-4	Hexachlorocyclopentadiene	95-80-7	c 2,4-Diaminotoluene	108-95-2	Phenol
77-78-1	c Dimethyl sulfate	96-09-3	c Styrene oxide	109-86-4	2-Methoxyethanol
78-84-2	Isobutyraldehyde	96-33-3	Methyl acrylate	110-80-5	2-Ethoxyethanol
78-87-5	1,2-Dichloropropane	96-45-7	c Ethylene thiourea	110-82-7	Cyclohexane
78-92-2	sec-Butyl alcohol	98-82-8	Cumene	110-86-1	Pyridine
78-93-3	Methyl ethyl ketone	98-88-4	Benzoyl chloride	111-42-2	Diethanolamine

CAS Number	Chemical Name	CAS Number	Chemical Name
115-07-1	Propylene	1332-21-4	c Asbestos (friable form)
117-81-7	c Di(2-ethylhexyl) phthalate	1344-28-1	Aluminum oxide (fibrous forms)
120-12-7	Anthracene	1634-04-4	Methyl tert-butyl ether
120-58-1	Isosafrole	2832-40-8	C.I. Disperse Yellow 3
120-80-9	Catechol	3118-97-6	C.I. Solvent Orange 7
120-82-1	1,2,4-Trichlorobenzene	4680-78-8	C.I. Acid Green 3
120-83-2	2,4-Dichlorophenol	7429-90-5	m Aluminum (fume or dust)
121-14-2	c 2,4-Dinitrotoluene	7440-62-2	m Vanadium (fume or dust)
121-69-7	N,N-Dimethylaniline	7550-45-0	Titanium tetrachloride
123-31-9	Hydroquinone	7647-01-0	Hydrochloric acid
123-38-6	Propionaldehyde	7664-38-2	Phosphoric acid
123-72-8	Butyraldehyde	7664-39-3	Hydrogen fluoride
123-91-1	c 1,4-Dioxane	7664-93-9	Sulfuric acid
127-18-4	c Tetrachloroethylene	7697-37-2	Nitric acid
131-11-3	Dimethyl phthalate	7723-14-0	Phosphorus (yellow or white)
139-13-9	c Nitrotriacetic acid	7782-50-5	Chlorine
140-88-5	c Ethyl acrylate	10049-04-4	Chlorine dioxide
141-32-2	Butyl acrylate	25321-14-6	Dinitrotoluene (mixed isomers)
156-62-7	Calcium cyanamide	26471-62-5	c Toluenediisocyanate (mixed isomers)
302-01-2	c Hydrazine		m Antimony compounds*
534-52-1	4,6-Dinitro-o-cresol		c,m Arsenic compounds
541-41-3	Ethyl chloroformate		c,m Cadmium compounds
569-64-2	C.I. Basic Green 4		m Chromium compounds
584-84-9	c Toluene-2,4-diisocyanate		c,m Cobalt compounds
606-20-2	c 2,6-Dinitrotoluene		m Copper compounds
842-07-9	C.I. Solvent Yellow 14		Cyanide compounds
989-38-8	C.I. Basic Red 1		c,m Lead compounds
1163-19-5	Decabromodiphenyl oxide		m Manganese compounds
1313-27-5	Molybdenum trioxide		m Mercury compounds
1314-20-1	Thorium dioxide		c,m Nickel compounds
1319-77-3	Cresol (mixed isomers)		Nitrate compounds or nitrate ion**
1330-20-7	Xylene (mixed isomers)		m Selenium compounds
			m Silver compounds
			m Zinc compounds

**c** = known or suspected carcinogen      **m** = metal and metal compounds

\* Elemental compounds are reported separately from their respective element in TRI and aggregated with it in NPRI and in the matched data set.

\*\* Nitric acid, nitrate ion and nitrate compounds are aggregated into one category called "nitric acid and nitrate compounds" in the matched data set.