TAKING STOCK 1999

North American Pollutant Releases and Transfers

SUMMARY

Commission for Environmental Cooperation
of North America

May 2002

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Disclaimer

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

The CEC follows a similar process. For the purposes of this report, the TRI data set of April 2001 and the NPRI data set of May 2001 were used. The CEC is aware that changes have occurred to both data sets for the reporting year 1999 since this time that are not reflected in this report. These changes will be reflected in the next reports, which will summarize the 2000 data and make year-to-year comparisons with previous years' data.

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Preface

Tracking pollutant data is important not only for what it tells us about the environment around us but also for the questions it can raise. This year's *Taking Stock* takes a five-year look at the amounts of toxic releases and transfers reported by industrial facilities in North America, from 1995 to 1999. Based on data from the national pollutant release and transfer registers (PRTRs), this five-year span provides us with an opportunity to assess key trends and ask ourselves the central question: are we making sufficient progress in reducing the amounts of these substances we are releasing into the environment and transferring into and through our communities each year.

The results are mixed. While we have achieved a slight overall decrease of 3 percent in the total amounts reported by industries in the 1995–1999 time period, when we look at the underlying figures we find some very different patterns. Facilities have made good progress in cutting releases to air (down by 25 percent), but over the same time period the amounts sent to surface waters—lakes, rivers, streams—have actually increased by 26 percent. The picture is also quite different when we look at total releases—amounts put directly into air, water and land—as compared with quantities shipped to other locations for further management (e.g., to sewage or for other treatment). Releases are down 6 percent, but the transfers of chemicals by truck, train or other modes of transport have increased over the five-year period by 12 percent. These five-year trends are for the manufacturing sectors only. As of the 1998 reporting year, we now also have comparable data for additional industry sectors such as electric utilities and hazardous waste management facilities, as well as on transfers for recycling and energy recovery.

These mixed results should prompt all of us—industry, government, NGOs and citizens—to ask ourselves what can be done to get all of the PRTR trends pointing in a downward direction. We have made progress in reducing toxic releases to air. Now, how can we do the same for water and land releases? Why are more substances being shipped off-site for management? Is this indicative of facilities' desire to send their wastes to locations that are better equipped to manage them effectively? Or does it signal that end-of-the-pipe approaches are still too frequently employed instead of preventing pollution at the source? How can the right mix of requirements, incentives and tools be brought to bear to foster a decisive shift to the use of preventive approaches that will safeguard our environment and the health of our populations?

These are vital questions for us to explore and answer in our common pursuit for sustainable development here in North America and worldwide. Indeed, the use of PRTRs to identify opportunities for improvement, to stimulate pollution reductions and to put the power of information into the hands of citizens are gathering momentum around the world. Recent global meetings have called upon countries to develop PRTRs as tools for sound management of chemicals and the public's right-to-know. And there is increasing interest in the use of PRTRs regionally and even globally to track progress on chemicals that are the focus of global concern, such as the persistent organic pollutants (POPs) targeted under the Stockholm Convention. The CEC and the three North American countries are working hard—individually and collectively— to pioneer some of these applications and to share what we are learning with others around the world.

In addition to the five-year trends in pollutant releases and transfers, this year's report provides North Americans with valuable new information as a result of important developments in the national programs for the 1999 reporting year. Due to a recent expansion of NPRI reporting, we now have comparable Canadian and US data for a number of new chemicals, including some of the substances that are known to deplete the ozone layer. We have also included analyses of certain subsets of chemicals, including the ozone depleters, chemicals listed as toxic in the Canadian Environmental Protection Act (CEPA) and chemicals appearing on the California Proposition 65 list of carcinogens and reproductive toxins.

We hope that this report provides you, the reader, with a basis for exploring the issues and questions that are of greatest interest to you. As always, we welcome your suggestions on ways in which *Taking Stock* can keep pace with your 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, Semarnat and the US EPA contributed vital information and assistance throughout the report's development. This past year we have worked with the following officials from these agencies: Canada— Alain Chung and François Lavallée; Mexico—Juan Barrera Cordero, Hilda Martínez Salgado, Maricruz Rodríguez Gallego, Juan David Reyes Vázquez and Floreida Paz; 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 and Nancy Levine of Hampshire Research Institute (United States); Sarah Rang of Environmental Economics International (Canada); Isabel Kreiner of UV Lateinamerika S. de R.L. de C.V. Thanks also go to Hampshire Research Institute, in particular, to Rich Puchalsky and Catherine Miller, for their work in creating the *Taking Stock Online* web site <www.cec.org/takingstock/>.

A number of CEC Secretariat staff have been involved in the development and launching of this report and the companion web site. Erica Phipps, program manager for CEC's PRTR project, is responsible for guiding the development of the *Taking Stock* series, including coordinating the public consultations. The CEC's publications staff—Jeffrey Stoub, Douglas Kirk, Raymonde Lanthier, Miguel López, Carol Smith and Kevin Crombie—have handled the tremendous task of coordinating the editing, translation and publication of the document in the three languages. Patrick Scantland, CEC webmaster, has contributed greatly to the development of *Taking Stock OnLine*.

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

Has North America made progress in reducing industrial releases of chemicals in the five years from 1995 to 1999? How many tonnes of carcinogens are released to air, water and land each year, and what are the trends in these releases? Have the agreements and regulations on chemicals that deplete that ozone layer had any effect on releases of those substances? 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 serve as an information source for governments, industry and communities in answering such questions and for identifying opportunities for pollution reduction. The analyses are based on **1995–1999 data** from the US Toxics Release Inventory (TRI) and the Canadian National Pollutant Release Inventory (NPRI). Results from 1999, trends over the five years from 1995–1999 and changes from 1998 to 1999 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 sixth in the CEC's *Taking Stock* series on sources and management of industrial pollutants in North America. This *Summary* report, the more detailed *Sourcebook*, past volumes of *Taking Stock* (as PDF files), and searchable access to the data sets used in *Taking Stock* analyses are all available on the CEC's web site at <www.cec.org/takingstock>.

Further information on PRTR systems can be found in the section "Background on Pollutant Release and Transfer Registers" on page 78.

What's new THIS YEAR?

Taking Stock is based on data collected by the national governments. Each year, some of the reporting requirements change, presenting new opportunities for this report.

New this year:

- The first five-year picture of releases and transfers of chemicals;
- A greater than 25-percent increase in the number of chemicals analyzed;
- The first North American analysis of releases of chemicals known to damage the ozone layer;
- Analysis of groups of chemicals that are associated with certain health impacts;
- Analysis of chemical loadings in states and provinces; and
- A method to adjust for "double-counting."

Other actions were taken to improve reporting and use of the PRTR data. Mexico made a significant step forward with the passage of legislation in December 2001, requiring a mandatory and publicly accessible PRTR system. The CEC web site has been improved to make online searches of the data easier and more flexible.

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 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.

SUMMARY of findings

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

- highlights from the current year (1999) data;
- a five-year picture of pollutant releases and transfers, 1995–1999;
- changes from 1998–1999;
- a look at ozone-depleting substances and progress in reducing their production and releases;
- answers to frequently asked questions; and
- an overview of pollutant release and transfer register programs in North America.

This *Taking Stock* analysis shows that for 1999:

- Almost 3.4 million tonnes of 210 "matched" chemicals were reported to TRI and NPRI in 1999 by manufacturing facilities, electric utilities, hazardous waste management/solvent recovery facilities and coal mines.
- One-half of the 3.4 million tonnes were releases on-and off-site, with over one-quarter being on-site releases to air.
- Over 220,000 tonnes of chemicals known to cause cancer, birth defects or other reproductive harm were released in 1999.
- Over 13,000 tonnes of chemicals known to damage the ozone layer were released in 1999
- Electric utilities reported the largest total releases (on- and off-site) of all sectors in North America in 1999 and ranked third for total reported amounts of releases and transfers.
- In 1999, 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.
- These same four jurisdictions, Ohio, Texas, Pennsylvania and Ontario, also had the largest chemical "loadings" in 1999 (chemical loadings are defined in this report as the sum of the amount of chemicals released on-site plus the amount of chemicals sent for disposal within the same jurisdiction plus the amount received from external jurisdictions)
- Large quantities of chemicals were sent off-site for recycling in North America. In 1999, over one million tonnes of chemicals were recycled, or almost one-third of the total reported amounts of releases and transfers

For the first time, we can get a five-year picture of releases and transfers of chemicals. Over the five years 1995 to 1999:

- There has been some progress in reducing releases at the site of many facilities. Overall, on-site releases (releases to air, water, land and underground injection at the facility) have *decreased* 13 percent from 1995 to 1999 in North America. Facilities seem to be paying particular attention to reducing releases to air, which have decreased by 25 percent over the five years. However, there has been a steady and substantial 25-percent increase in releases to land at the site of the facility (mainly landfill).
- Progress has been slow in reducing chemicals of concern such as carcinogens. Total releases of known or suspected carcinogens decreased by only 3 percent, compared to a decrease of 6 percent for all chemicals from 1995 to 1999.
- Progress in reducing amounts of chemicals sent off-site has also not been very marked. In fact, off-site releases (transfers of all chemicals to disposal and of metals transferred to sewage and treatment) showed the opposite pattern to the overall on-site decreases, with an *increase* of 35 percent from 1995 to 1999. These off-site releases are mainly transfers to disposal in landfills.
- Over the five years, facilities seem to be increasingly choosing to dispose of chemicals on land, both on-site and off-site, at other locations.
- The reductions in amounts of chemicals released on-site are almost offset by the increasing amounts of chemicals sent off-site, resulting in similar amounts of chemicals requiring management during the five years. While the location of chemical releases may have changed, there is little change in the total amount of chemicals requiring management.

TAKING STOCK online

Got a particular question about a facility? Industrial sector? State or province? Try *Taking Stock Online* at **<www.cec.org/takingstock>**. The newly designed web site permits searches of the entire matched data set from 1995–1999 and allows user to customize reports. You can search by chemical, facility, sector, or geographic region. The site also includes links to electronic versions of *Taking Stock*, the three North American PRTRs, and other PRTR-related information.

Changes from 1998–1999, included:

- A one-percent *decrease* in total releases on- and off-site. Within this overall slight decrease, there were:
  - *decreases* in on-site releases to air, underground injection and land but an *increase* in on-site water discharges, and
  - a 4-percent *decrease* in off-site releases of metals, but
  - a 31-percent *increase* in off-site releases of substances that are not metals.
- A one-percent *increase* in transfers to recycling,
- A 10-percent *decrease* in other transfers for further management (transfers to energy recovery, treatment, and sewage of chemicals that are not metals); and
- A decrease in transfers across the Canadian-US border.

MEXICAN RETC REPORTING IN 1999

Mexico took a giant step towards mandatory reporting of releases and transfers with the passage of enabling legislation in late 2001. Until regulations are passed, the reporting to Mexico's PRTR (the RETC) remains voluntary. The following 117 facilities voluntarily reported data on releases and transfers of listed chemicals for 1999, according to the latest available information from Semarnat. Congratulations to these companies for showing leadership in reporting their data. This will contribute to the further development of the RETC program, help these and other facilities find cost savings and efficiency improvements, and assist communities in better understanding their neighbors. Hopefully, more and more companies will join these early leaders in reporting on their environmental releases and transfers. The reports were under Sections 5.2 (Listed Pollutant Releases) and/or 5.3 (Listed Pollutant Transfers) of the COA.

CONGRATULATIONS TO THESE EARLY LEADERS
in reporting on their environmental releases and tranfers in Mexico in 1999

FACILITY NAME	STATE
ACEITES Y PARAFINAS INDUSTRIALES, S.A. DE C.V.	JALISCO
ADHESIVOS, S.A. DE C.V.	TLAXCALA
ADYDSA DEL CENTRO, S.A. DE C.V.	SAN LUIS POTOSI
AGRICULTURA NACIONAL SA. DE CV.	PUEBLA
ALKEMIN, S. DE R.L. DE C.V.	MICHOACAN
ARNESES Y ACCESORIOS DE MEXICO S. DE R.L. DE C.V. PLANTA ACI	COAHUILA
ARNESES Y ACCESORIOS DE MEXICO, S. DE R.L. DE C.V. PLANTA 3	COAHUILA
ARNESES Y ACCESORIOS DE MEXICO, S. DE R.L. DE C.V. PLANTA 4	COAHUILA
ARTEVA SPECIALITIES S. DE R.L. DE CV.	QUERETARO
AVENTIS CROPSCIENCE S.A. DE C.V.	MEXICO
B D SHANNON DE MEXICO, S.A. DE C.V.	TAMAULIPAS
BENEFICIADORA E INDUSTRIALIZADORA, S.A. DE C.V.	MEXICO
BOMBARDIER CONCARRIL, S.A. DE C.V.	HIDALGO
BUCKAMN LABORATORIES, S.A. DE C.V.	MORELOS
CAMINOS Y PUENTES FEDERALES DE INGRESOS Y SERVICIOS CONEXOS	GUANAJUATO
CELANESE MEXICANA S.A. DE C.V.	GUANAJUATO
CELANESE MEXICANA, S.A. DE C.V. COMPLEJO OCOTLAN	JALISCO
CELULOSA Y DERIVADOS, S.A. DE C.V. PLANTA CRYSEL	JALISCO
CEMENTOS APASCO, S.A. DE C.V.	GUERRERO
CEMENTOS APASCO, S.A. DE C.V.	MEXICO
CEMEX MEXICO S.A. DE C.V. (PLANTA ATOTONILCO)	HIDALGO
CFE, CENTRAL TERMOELECTRICA CICLO COMBINADO TULA	HIDALGO
CHRISTIANSON, S.A. DE C.V.	MORELOS
CIA HULERA TORNEL, S.A. DE C.V. PLANTA 1	DISTRITO FEDERAL
CIA. HULERA TORNEL, S.A. DE C.V. PLANTA 2	DISTRITO FEDERAL
CLOROBENCENOS, S.A. DE C.V.	TLAXCALA
COMPAÑIA MINERA AUTLAN (UNIDAD MOLANGO), S.A. DE C.V.	HIDALGO
DEMATEO Y COMPAÑIA, S.A. DE C.V.	MEXICO
DINA AUTOBUSES, S.A. DE C.V.	HIDALGO
DOW AGROSCIENCES, S.A. DE C.V.	TLAXCALA
DOW QUIMICA MEXICANA, S.A. DE C.V.	TLAXCALA
DUCOA MEXICO, S.A. DE C.V.	VERACRUZ

CONGRATULATIONS (continued)

FACILITY NAME	STATE
DUPONT, S.A. DE C.V.	MEXICO
DURAMAX SA. DE CV.	MEXICO
ECOQUIM, S.A. DE C.V.	NUEVO LEON
EJES TRACTIVOS SA. DE CV.	MEXICO
EMPRESAS CALE DE TLAXCALA, S.A. DE C.V.	TLAXCALA
ENERTEC MEXICO, S. DE R.L. DE C.V.	TLAXCALA
ERIKA MICHEL MORALES	JALISCO
ESSEX DE HERMOSILLO, S.A. DE C.V.	SONORA
EXPLORACIONES EL DORADO, S.A. DE C.V.	SONORA
EXPORTACIONES DE MINERALES DE TOPIA, S.A. DE C.V.	DURANGO
FABRICACION DE MAQUINAS, S.A. DE C.V.	NUEVO LEON
FERSINSA GIST BROCADES, S.A. DE C.V. PLANTA SINTESIS	COAHUILA
FIBRAS PARA EL ASEO, S.A. DE C.V.	TLAXCALA
FORD MOTOR COMPANY S.A. DE C.V.	MEXICO
FORMULABS DE MEXICO SA. DE CV.	DISTRITO FEDERAL
FUNDITEC SA. DE CV.	QUERETARO
GOLDSCHMIDT QUIMICA DE MEXICO, S.A. DE C.V.	SAN LUIS POTOSI
GRAFICOS MUNDIAL, S.A. DE C.V. PLANTA AGUA BLANCA	JALISCO
HAI MEXICANA S. DE R.L. DE C.V.	TAMAULIPAS
HULES BANDA S.A. DE C.V.	MEXICO
ICI MEXICANA SA. DE CV.	MEXICO
IDASA INTERNACIONAL DE ACEROS	QUERETARO
INDUSTRIAS CIDSA BAYER, S.A. DE C.V.	VERACRUZ
INDUSTRIAS OKEN, S.A. DE C.V.	MICHOACAN
INDUSTRIAS PETROQUIMICAS MEXICANAS, S.A. DE C.V.	JALISCO
INSECTICIDAS DEL PACIFICO, S.A. DE C.V.	SONORA
JOHNSON MATTHEY DE MEXICO SA. DE CV.	QUERETARO
KENDALL DE MEXICO S.A. DE C.V.	DISTRITO FEDERAL
KENWORTH MEXICANA S.A. DE C.V.	BAJA CALIFORNIA
KODAK DE MEXICO, S.A. DE C.V.	JALISCO
LABORATORIO AGROENZIMAS, S.A. DE C.V.	TLAXCALA
LABORATORIOS DERMATOLOGICOS DARIER, S.A. DE C.V.	MORELOS
LABORATORIOS SENOSIAN S.A. DE C.V.	GUANAJUATO
LEAR CORPORATION MEXICO, S.A. DE C.V.	SONORA
LORETO Y PEÑA POBRE, S.A. DE C.V.	TLAXCALA
MEXALIT INDUSTRIAL SA. DE CV.	TABASCO
MINERA SANTA MARIA, S.A. DE C.V.	DURANGO
NITROGENO INDUSTRIAL Y ALIMENTICIO, S.A. DE C.V.	TLAXCALA
NUTRIMENTOS MINERALES DE HIDALGO, S.A. DE C.V.	HIDALGO
NUTRIMENTOS MINERALES, S.A. DE C.V. (PLANTA II)	HIDALGO
OLIVETTI LEXIKON MEXICANA, S.A. DE C.V.	TLAXCALA
ORGANO SINTESIS, S.A DE C.V.	MEXICO
PEMEX REFINACION	DURANGO
PEMEX REFINACION CENTRO EMBARCADOR PAJARITOS	VERACRUZ
PEMEX REFINACION TERMINAL DE ALMACENAM Y DISTRIBUCION COLIMA	COLIMA
PIVIDE, S.A. DE C.V.	TLAXCALA
PLASTICOS ESPECIALES GAREN, S.A. DE C.V.	TLAXCALA
POLAQUIMIA DE TLAXCALA, S.A. DE C.V	TLAXCALA
POLIMEROS DE MEXICO, S.A. DE C.V.	TLAXCALA
POLIUREQUIMICA, S.A. DE C.V.	MEXICO
POLY FORM DE MEXICO, S.A. DE C.V.	DISTRITO FEDERAL
POM, S.A. DE C.V.	JALISCO
PPG INDUSTRIES DE MEXICO SA. DE CV.	QUERETARO
PRAXAIR MEXICO SA. DE CV.	MEXICO
PROCESOS AMBIENTALES ALFA SA. DE CV.	QUERETARO
PROCTER & GAMBLE DE MEXICO S.A. DE C.V.	GUANAJUATO
PRODUCTOS FARMACEUTICOS	DISTRITO FEDERAL
PRODUCTOS QUIMICOS Y PINTURAS, S.A. DE C.V.	MEXICO
PRODUCTOS R.G.L.	DISTRITO FEDERAL
QUEST INTERNATIONAL DE MEXICO SA. DE CV.	QUERETARO
QUIMIC, S.A. DE C.V.	MICHOACAN
QUIMICA LUCAVA, S.A. DE C.V.	MEXICO
QUIMICAL, S.A. DE C.V.	BAJA CALIFORNIA
QUIMIKAO, S.A. DE C.V.	JALISCO
RAGASA INDUSTRIAS, S.A. DE C.V.	JALISCO
RAMIRO CARDENAS CAMPOS	JALISCO
REBECA OCAMPO GONZALEZ	MEXICO
RESIRENE, S.A. DE C.V.	TLAXCALA
ROHM AND HAAS MEXICO, S.A. DE C.V.	TLAXCALA
RUST INTERNATIONAL SA. DE CV.	QUERETARO
SMITHKLINE & FRENCH, S.A. DE C.V. PTA. 2	DISTRITO FEDERAL
SMITHKLINE BEECHAM MEXICO, S.A. DE C.V. PLANTA I	DISTRITO FEDERAL
SUELAS PUSA, S.A. DE C.V.	JALISCO
SUPER DIESEL, S.A. DE C.V.	JALISCO
TAURUS MEXICANA, S.A. DE C.V.	TLAXCALA
TECSIQUIM, S.A. DE C.V.	DISTRITO FEDERAL
TEKCHEM S.A. DE C.V.	GUANAJUATO
TERMINAL DE ALMAC. Y DISTRIBUCION SATELITE ORIENTE (AÑIL)	DISTRITO FEDERAL
TETRA PAK QUERETARO SA. DE CV.	QUERETARO
TRATAMIENTO DE DESECHOS MEDICOS, S.A. DE C.V.	MEXICO
UGIMAG, S.A. DE C.V.	TAMAULIPAS
UQUIFA MEXICO, S.A. DE C.V.	MORELOS
USEM DE MEXICO, S.A. DE C.V.	NUEVO LEON
VALEO MATERIALES DE FRICCION DE MEXICO SA. DE CV.	QUERETARO
VDO CONTROL SYSTEMS DE MEXICO, S.A. DE C.V.	CHIHUAHUA

Note: *Names of facilities appear as provided by Semarnat in April 2002 from the 1999 RETC database. We apologize if any facilities have been omitted or if there are other errors in the list.*

Using and understanding this report

This report uses three 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
for the 1999 Reporting Year

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?	• Manufacturing, federal facilities, coal mines, metal mines, electric utilities, hazardous waste management facilities, solvent recovery facilities, chemical wholesale distributors and petroleum bulk terminals • Facilities also need to meet reporting thresholds	• Any facility manufacturing or using a listed chemical, except for research, repair and retail sales and a few other exemptions • Facilities also need to meet reporting thresholds	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	634 chemicals	245 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

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 (see Table 1). 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 three different data sets (see Table 2):

- 1999 data (used to present data for 1999 only);
- 1995–1999 data (used to present five-year trends); and
- 1998–1999 data (used to present year-to-year changes).

The data in this report are taken from the US and Canadian PRTRs. The data are "matched" for a particular span of years, that is, they are based on chemicals and industrial sectors that are common to both TRI and NPRI for the year(s) in question. Reporting to the Mexican PRTR system was voluntary for 1999 and prior years, and thus the data are not comparable to those reported in the US and Canada. As outlined in the table below, the three data sets are different. Thus the **conclusions drawn from one data set cannot be applied to another.** Each data set is clearly marked in the text and on each table and figure. The chemicals in the matched data sets are listed in **Appendix A.**

TABLE 2. FEATURES OF THE THREE DATA SETS in *TAKING STOCK 1999*

FEATURE YEARS	1999 DATA SET 1999 ONLY	1998 DATA SET 1998–1999	1995 DATA SET 1995-1999
Number of chemicals	210 chemicals	165 chemicals	165 chemicals
Industry sectors			
Manufacturing facilities	✓	✓	✓
Electric Utilities	✓	✓	
Hazardous Waste Management/Solvent recovery	✓	✓	
Chemical Wholesalers	✓	✓	
Coal Mines	✓	✓	
On-site releases to air, water, land, underground injection	✓	✓	✓
Off-site releases (transfers to disposal)	✓	✓	✓
Transfers to sewage and treatment	✓	✓	✓
Transfers to recycling/energy recovery	✓	✓	

TERMINOLOGY

Taking Stock 1999 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 fenceline."
- **"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- and off-site releases.
- **"total releases (adjusted)"** is the sum of on- and off-site releases minus those off-site releases that are reported as on-site releases by another NPRI or TRI facility.
- **"transfers to recycling"** describes chemicals sent off-site for recycling
- **"other transfers for further management"** describes chemicals (other than metals) sent for treatment and energy recovery and to sewage plants.
- **"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 and 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. All releases as reported are included. While not perfect, this is the closest estimate available from the matched North American PRTR data of the total amount of chemicals arising from a facility's activities that need to be managed.

This *Taking Stock* report includes a new methodology that adjusts the total release numbers for "double-counting." Double-counting can occur when a facility sends chemicals for disposal or metals to treatment, sewage or energy recovery to another facility that also reports on its releases and transfers. This creates the possibility that the same chemicals can be reported twice: once as an off-site release by the first facility, and again as an on-site release by the second facility.

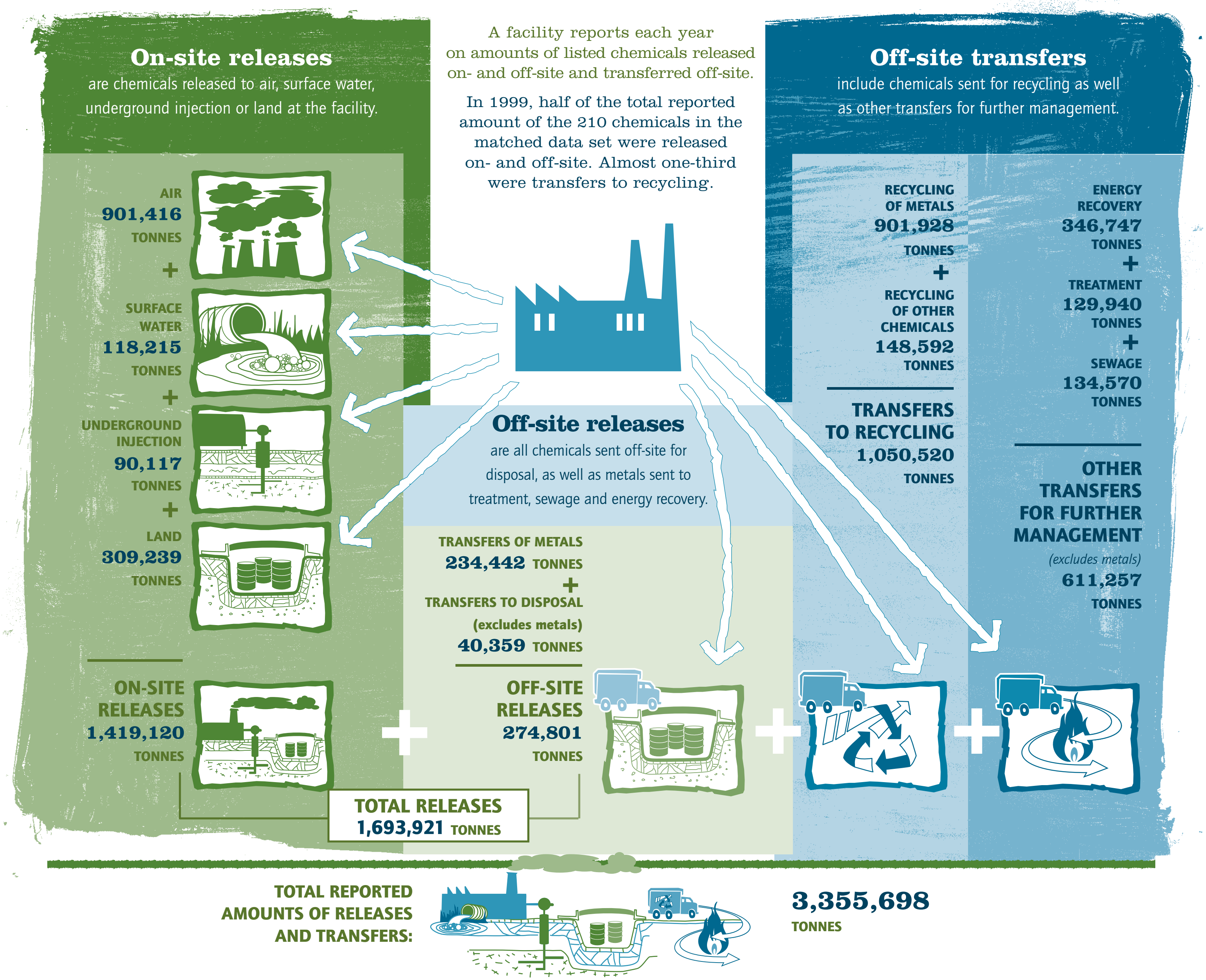
Double-counting can be compared to lending a book among friends. A person gives a book to a friend to read, who in turn lends the same book to another friend, and so forth. In the the end, the book has changed hands several times, but there is still only one book. The same can be true for PRTR reporting, the chemical has changed hands and may be reported more than once, but it is still the same chemical.

Adjustment of releases is not necessary when considering total reported amounts which provides an estimate of total amounts generated and requiring handling or management. Double-counting became more likely with the addition of hazardous waste management/solvent recovery facilities to TRI in 1998.

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

While it may seem confusing at first to those who are accustomed to seeing the terms "releases" used to describe activities on-site and "transfers" for all activities that occur off-site, the new categorization has several benefits. It aggregates similar activities: for example, all chemicals that are landfilled are called releases, regardless of where the landfill is located. It preserves the sense of location of releases, either on or off the site of the facility. The 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. Another important point is that this classification method is supported by all three national governments.

FIGURE 1. POLLUTANT RELEASES AND TRANSFERS
in North America, 1999



Note: *Canada and US data only, Mexico data not available for 1999. Analyses are based on the matched set of chemicals and industry sectors for which comparable data are available for 1999. 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.*

1999 data

This section presents data from the 1999 reporting year. The data in this section include reporting on:

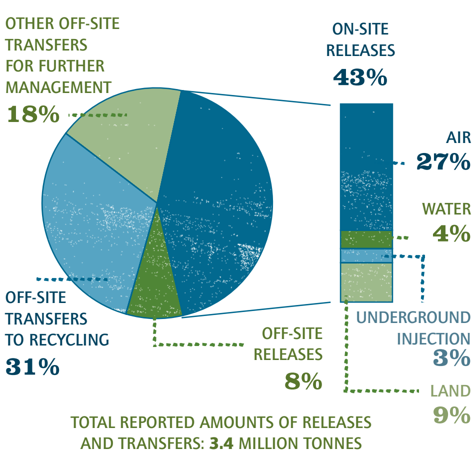
- an expanded set of 210 chemicals, some of which were reported for the first time in 1999 to NPRI,
- manufacturing facilities,
- facilities from electric utility, hazardous waste management/solvent recovery, wholesale chemical distribution and coal mining sectors, referred to as 'newly reporting industries' given that they were added to TRI in 1998 and thus are only recently part of the matched *Taking Stock* data sets,
- transfers to recycling and energy recovery.

THE BIG picture

How many tonnes of chemicals were reported released or transferred in North America in 1999?

FIGURE 2.
TOTAL REPORTED AMOUNTS of releases and transfers in North America by category, 1999

(1999 Matched Chemicals and Industries)



Note: Canada and US data only. Mexico data not available for 1999.

As shown in Figure 1, in 1999, just under 3.4 million tonnes of matched chemicals were released and transferred in North America. About half of the total reported amounts of releases and transfers, or 1.7 million tonnes were released on- and off-site. Almost one million tonnes of chemicals were released into the air at the site of the facility.

About one-third of the total reported amounts, over 1 million tonnes, were substances sent off-site for recycling (see Table 3, Figure 2). Less than one-fifth, or 611,000 tonnes, were other transfers for further management including to energy recovery, treatment and sewage.

NPRI facilities reported 9 percent of the total North American amounts while those in the TRI database had 91 percent of the North American total reported amounts.

What is being released into our air, land and water and injected underground?

In 1999, most chemicals being released at the site of the facility went into the air. Almost one million tonnes of chemicals were released into the air in 1999 in North America. This large amount of chemicals sent to the air was more than all the chemicals released to land, water and underground injection combined. The next largest amount of on-site releases, 309,200 tonnes of chemicals, was disposed of on land at the facility. In addition, transfers off-site for disposal (mostly to landfills) totaled 274,800 tonnes. Facilities also discharged 118,200 tonnes of chemicals into rivers, lakes and streams and injected 90,100 tonnes of chemicals underground in 1999.

TABLE 3. SUMMARY OF TOTAL REPORTED AMOUNTS of releases and transfers in North America, NPRI and TRI, 1999

(1999 Matched Chemicals and industries)

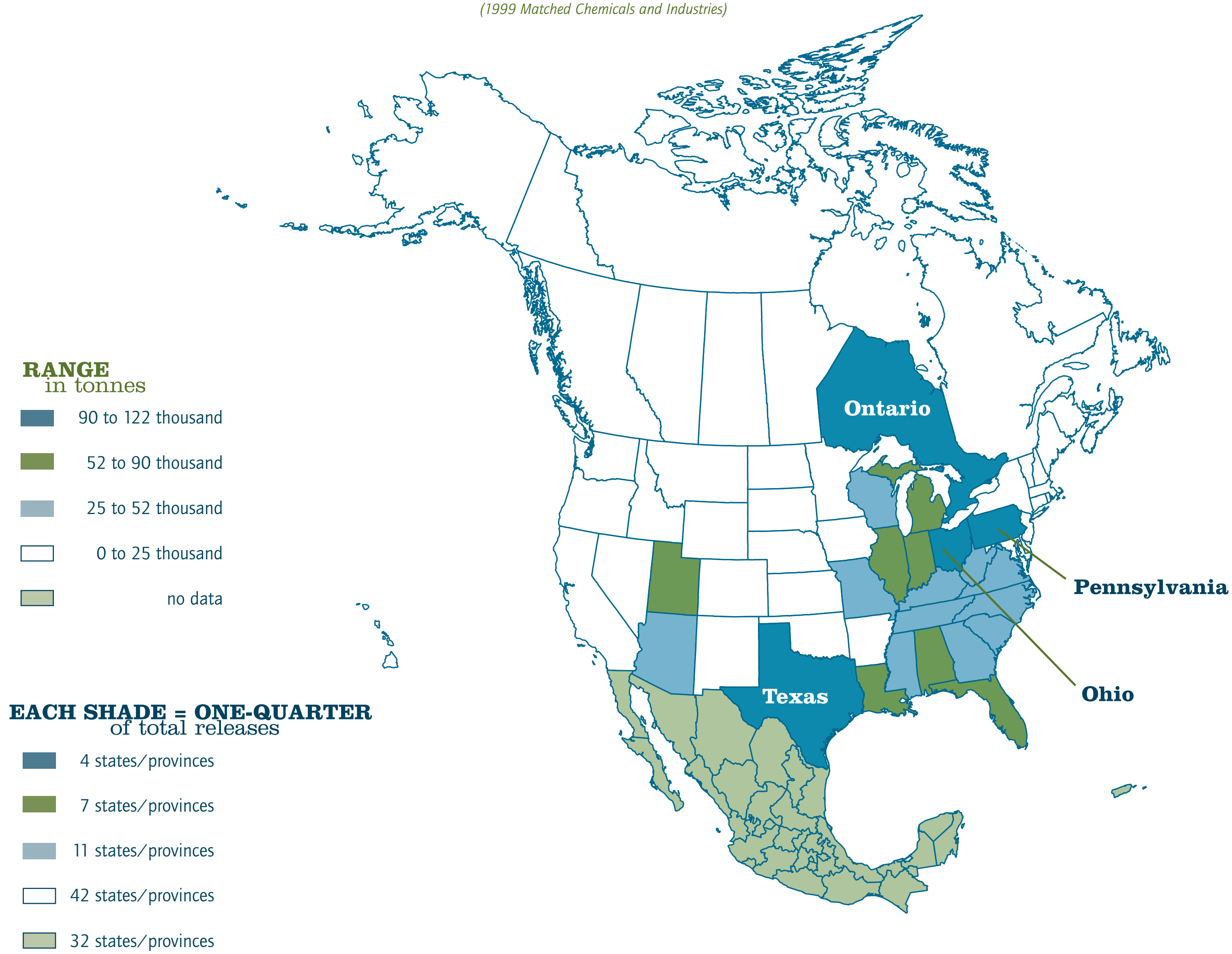
	North America Number		NPRI* Number		TRI Number		NPRI as % of North American Total	TRI as % of North American Total
Total Facilities	21,521		1,634		19,887		8	92
Total Forms	74,108		5,741		68,367		8	92
Releases On- and Off-site	**tonnes**	**%**	**tonnes**	**%**	**tonnes**	**%**	**%**	**%**
On-site Releases	**1,419,120**	**43**	**124,751**	**41**	**1,294,369**	**42**	**9**	**91**
Air	901,416	27	87,801	29	813,616	27	10	90
Surface Water	118,215	4	5,855	2	112,360	3	5	95
Underground Injection	90,117	3	3,323	1	86,793	3	4	96
Land	309,239	9	27,640	9	281,600	9	9	91
Off-site Releases	**274,801**	**8**	**43,710**	**14**	**231,091**	**8**	**16**	**84**
Transfers to Disposal (except metals)	40,359	1	9,469	3	30,890	1	23	77
Transfers of Metals**	234,442	7	34,241	11	200,201	7	15	85
Total Releases On- and Off-site	**1,693,921**	**51**	**168,461**	**55**	**1,525,460**	**50**	**10**	**90**
Off-Site Transfers for Further Management								
Off-site Transfers to Recycling	**1,050,520**	**31**	**108,714**	**35**	**941,806**	**31**	**10**	**90**
Transfers to Recycling of Metals	901,928	27	93,959	30	807,968	27	10	90
Transfers to Recycling (except metals)	148,592	4	14,755	5	133,838	4	10	90
Other Off-site Transfers for Further Management	**611,257**	**18**	**31,085**	**10**	**580,172**	**19**	**5**	**95**
Energy Recovery (except metals)	346,747	10	14,143	4	332,605	11	4	96
Treatment (except metals)	129,940	4	11,508	4	118,432	4	9	91
Sewage/To POTWs (except metals)	134,570	4	5,434	2	129,135	4	4	96
Total Reported Amounts of Releases and Transfers	**3,355,698**	**100**	**308,260**	**100**	**3,047,438**	**100**	**9**	**91**

Note: *Canada and US data only, Mexico data not available for 1999. Data include 210 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, 1999: states and provinces
(1999 Matched Chemicals and Industries)



Which states and provinces reported the largest amount of releases in North America in 1999?

In 1999, the jurisdictions with the largest total releases, both on- and off-site, of the matched chemicals from manufacturing and newly reporting industry sectors were Ohio, Texas, Pennsylvania, and Ontario, each reporting more than 90,000 tonnes.

Ohio topped the list because of the largest releases to air and to land on-site.

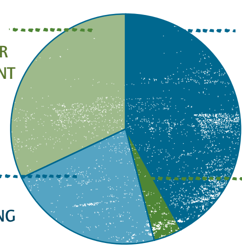
Facilities in Texas released the largest amounts of chemicals on-site. Texas also reported the largest amounts of chemicals injected underground at facility sites of any jurisdiction in North America.

Pennsylvania had the highest on-site releases to water in North America in 1999, mainly due to one Armco Inc. facility in Butler, Pennsylvania, which released over 14,000 tonnes to water, or 13 percent of all water releases in TRI.

FIGURE 3. STATES/PROVINCES WITH LARGEST TOTAL RELEASES
or largest total reported amounts in 1999

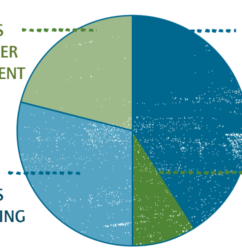
(Ordered by Total Reported Amounts)

Texas



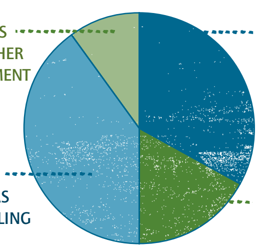
	tonnes
On-site Releases	107,294
Off-site Releases	10,743
Transfers to Recycling	58,319
Other Transfers for Further Management	83,418
Total Reported Amounts of Releases and Transfers	**259,774**
Number of Facilities	1,214
1999 Population (000)	20,044
Land Area (sq km)	678,305
1999 Gross Domestic Product (millions of US$)	687,272

Ohio



	tonnes
On-site Releases	101,012
Off-site Releases	25,910
Transfers to Recycling	81,746
Other Transfers for Further Management	41,274
Total Reported Amounts of Releases and Transfers	**249,942**
Number of Facilities	1,504
1999 Population (000)	11,257
Land Area (sq km)	106,060
1999 Gross Domestic Product (millions of US$)	361,981

Ontario



	tonnes
On-site Releases	66,360
Off-site Releases	34,853
Transfers to Recycling	81,194
Other Transfers for Further Management	20,516
Total Reported Amounts of Releases and Transfers	**202,923**
Number of Facilities	862
1999 Population (000)	11,517
Land Area (sq km)	1,068,586
1999 Gross Domestic Product (millions of US$)	267,069

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.

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

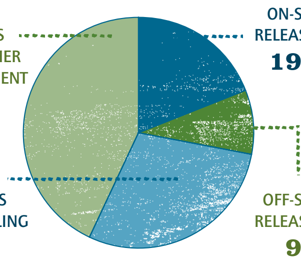
These four jurisdictions also had the largest on-site releases in 1999 in North America. In order, they were Texas, Ohio, Pennsylvania, and Ontario—each reporting more than 65,000 tonnes. These four jurisdictions were responsible for more than one-third of all on-site releases of chemicals in North America in 1999.

Which states and provinces reported the largest total amounts of releases and transfers in North America in 1999?

When looking at total reported amounts, which includes releases on-and off-site, transfers to recycling and other transfers for further management, the rankings by jurisdiction were: Texas, Ohio, Ontario, Michigan, Pennsylvania, and Indiana, each reporting more than 170,000 tonnes (Map 1). Except for Texas, these states and provinces are located around the Great Lakes. These six jurisdictions accounted for a significant portion of the chemicals reported released and transferred in North America in 1999. They accounted for 38 percent of the total amounts of chemicals released and transferred, 35 percent of the total releases, 41 percent of the transfers to recycling, and 42 percent of the total other transfers for further management.

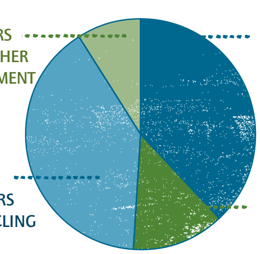
FIGURE 3. (continued)

Michigan



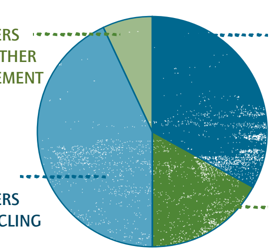
	tonnes
On-site Releases	37,536
Off-site Releases	18,510
Transfers to Recycling	55,997
Other Transfers for Further Management	84,435
Total Reported Amounts of Releases and Transfers	**196,478**
Number of Facilities	820
1999 Population (000)	9,864
Land Area (sq km)	147,124
1999 Gross Domestic Product (millions of US$)	308,310

Pennsylvania



	tonnes
On-site Releases	74,638
Off-site Releases	25,673
Transfers to Recycling	78,699
Other Transfers for Further Management	17,027
Total Reported Amounts of Releases and Transfers	**196,037**
Number of Facilities	1,203
1999 Population (000)	11,994
Land Area (sq km)	116,075
1999 Gross Domestic Product (millions of US$)	382,980

Indiana



	tonnes
On-site Releases	56,768
Off-site Releases	29,665
Transfers to Recycling	71,459
Other Transfers for Further Management	12,735
Total Reported Amounts of Releases and Transfers	**170,647**
Number of Facilities	940
1999 Population (000)	5,943
Land Area (sq km)	92,896
1999 Gross Domestic Product (millions of US$)	182,202

Note (continued): *Other transfers for further management include transfers to energy recovery, treatment and sewage except for metals, which are included in off-site releases.*

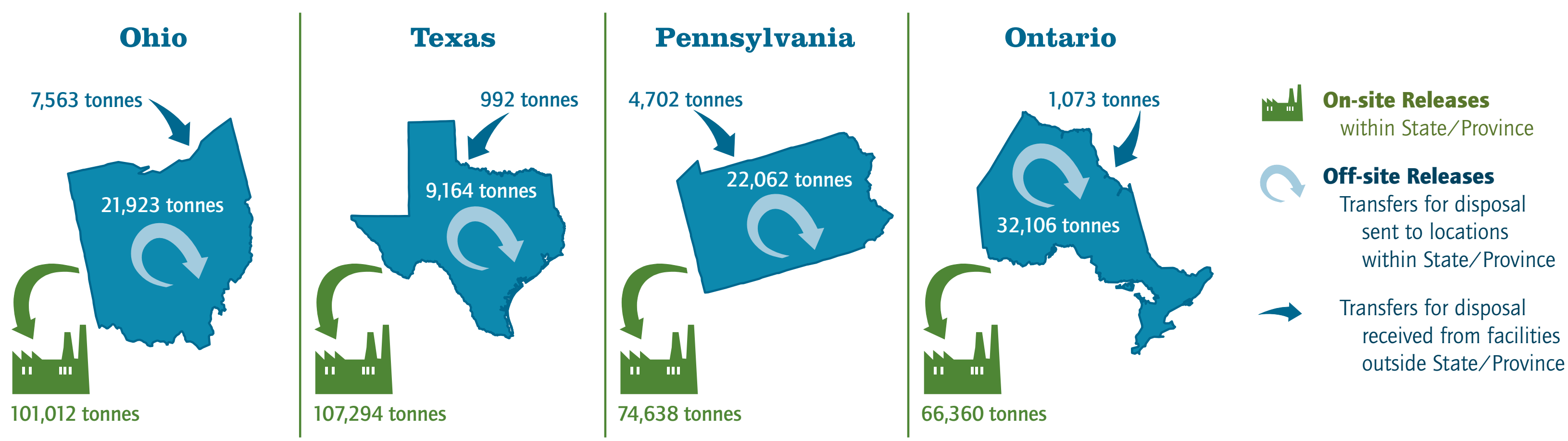
Texas facilities reported the largest amounts of on-site releases (Figure 3). Ohio reported the second-largest amounts of on-site releases and the largest amounts of transfers to recycling. While Ontario ranked third overall, facilities in that jurisdiction reported the largest amounts of off-site releases and the second-largest amounts of transfers to recycling. Michigan facilities, ranked fourth overall, reported the largest amounts of transfers for further management.

WHICH STATES AND PROVINCES had the largest chemical "loadings"?

New for this year's report is an analysis of chemical "loadings" for states and provinces. Chemicals that end up within a jurisdiction's borders include (1) amounts released by facilities located within the state/province, (2) amounts that facilities within the state/province sent to other facilities also located within the jurisdiction, and (3) amounts received by facilities within the state/province from facilities outside its borders. This year's report combines these amounts to provide an estimate of chemical "loadings," which is defined for the purpose of this report as the sum of the releases on-site, the off-site releases sent within the jurisdiction and the amount of chemicals received from an external jurisdiction.

These chemical loadings will be underestimates, as they do not include chemicals that can be received from long-range transport by wind or water, do not include all sources of chemicals (only those industry sectors that report to both TRI and NPRI) and do not include all chemicals (only the 210 matched chemicals reported to TRI and NPRI). They also do not include substances sent to recycling or energy recovery. It should also be recognized that some chemicals persist in the environment for a long time and may bioaccumulate in living organisms, while others may break down relatively quickly.

FIGURE 4. STATES/PROVINCES with the largest Chemical "Loadings" in 1999
(1999 Matched Chemicals and Industries)



Using this chemical loading approach, Ohio, Texas, Pennsylvania and Ontario had the largest amounts of chemicals released, sent and received within their jurisdictions (Figure 4). All of these states and provinces had large releases in North America. Ohio tops the list because its facilities released, sent and received large amounts of the chemicals for a total loading of 130,500 tonnes. Texas facilities, however, reported the largest on-site releases, 107,000 tonnes. Ontario moves more chemicals around the province for disposal than any other jurisdiction, reporting more than 32,000 tonnes sent from Ontario facilities to other sites within the province for disposal.

This approach illustrates the large quantities of chemicals that are transported for disposal within many jurisdictions. Chemicals are generated at one site and generally moved by truck or train to another community. Ontario does this with more than 32,000 tonnes, as mentioned above. Almost half as much again as the chemicals released on-site are sent for disposal. Pennsylvania sends the next largest amount, 22,000 tonnes, to facilities in Pennsylvania.

The chemical loading approach also demonstrates that some jurisdictions have large quantities of waste being received for disposal from facilities outside their jurisdictions. In this, Michigan leads all other jurisdictions—receiving over 9,000 tonnes of chemicals from facilities located outside the state. Ohio follows with 7,500 tonnes of chemicals received for disposal from facilities elsewhere.

Some jurisdictions with large chemical loadings release most of those chemicals on-site and have only small amounts of chemicals sent to sites within the jurisdiction or received from external facilities. Texas for example, has the largest on-site releases of all jurisdictions, with 107,000 tonnes, which accounted for 91 percent of its chemical loadings. Texas sends about 9,000 tonnes to other sites within the state and receives less than 1,000 tonnes from facilities outside Texas.

Some states with large numbers of facilities, such as California, have much smaller chemical loadings. California, with the largest number of facilities, has approximately 17,000 tonnes released on-site, 3,200 tonnes sent within the state and receives less than 70 tonnes from external sources (Figure 5).

FIGURE 5. CHEMICAL "LOADINGS" in California in 1999

(1999 Matched Chemicals and Industries)

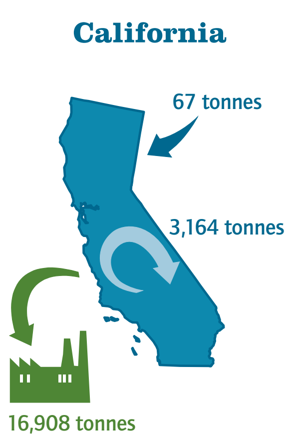


TABLE 4. CHEMICAL "LOADINGS" WITHIN A STATE/PROVINCE

on-site releases, transfers to disposal sent and received in the state/province, ordered by total releases (adjusted), 1999

(1999 Matched Chemicals and Industries)

STATE/PROVINCE	ON-SITE RELEASES		OFF-SITE RELEASES (adjusted)* TRANSFERS FOR DISPOSAL SENT FROM FACILITIES WITHIN STATE/PROVIINCE TO LOCATIONS WITHIN STATE/PROVINCE		OFF-SITE RELEASES (adjusted)* TRANSFERS FOR DISPOSAL RECEIVED FROM FACILITIES OUTSIDE STATE/PROVINCE AT LOCATIONS WITHIN STATE/PROVINCE		TOTAL RELEASES (adjusted) WITHIN STATE/PROVINCE*	
	tonnes	Rank	tonnes	Rank	tonnes	Rank	tonnes	Rank
Ohio	101,012	2	21,923	3	7,563	2	130,499	1
Texas	107,294	1	9,164	7	992	11	117,450	2
Pennsylvania	74,638	3	22,062	2	4,702	4	101,402	3
Ontario	66,360	4	32,106	1	1,073	10	99,538	4
Indiana	56,788	8	16,909	5	1,564	8	75,261	5
Illinois	57,256	7	11,982	6	3,207	6	72,444	6
North Carolina	63,621	5	1,933	15	128	30	65,682	7
Michigan	37,536	16	17,934	4	9,318	1	64,787	8
Florida	58,872	6	1,542	21	46	40	60,460	9
Louisiana	52,426	9	885	28	808	12	54,119	10
Tennessee	49,498	10	2,242	14	202	26	51,942	11
Alabama	48,363	11	2,717	13	205	25	51,285	12
Georgia	47,231	12	972	25	290	19	48,493	13
Utah	45,114	13	1,924	16	453	15	47,492	14
West Virginia	40,044	14	967	26	108	33	41,120	15
Kentucky	38,319	15	1,797	18	476	14	40,592	16
Missouri	30,608	17	1,724	20	4,006	5	36,338	17
South Carolina	29,025	19	3,332	11	242	23	32,598	18
Virginia	26,772	20	4,091	8	93	36	30,955	19
Mississippi	30,012	18	387	37	236	24	30,635	20
Oregon	26,153	21	328	39	327	17	26,807	21
Arizona	24,048	22	163	48	193	27	24,404	22
New York	21,347	24	1,883	17	110	32	23,340	23
Montana	23,162	23	52	54	0	--	23,215	24
Wisconsin	17,617	27	3,995	9	1,446	9	23,058	25
Quebec	16,712	29	3,969	10	1,734	7	22,414	26
Idaho	20,862	25	70	51	369	16	21,301	27
California	16,908	28	3,164	12	67	37	20,139	28
Maryland	18,235	26	207	45	102	34	18,544	29
Alberta	15,435	30	1,755	19	20	46	17,209	30
Oklahoma	10,805	33	787	30	5,374	3	16,966	31
Iowa	15,300	31	497	36	25	44	15,823	32
Arkansas	12,496	32	571	33	723	13	13,790	33

TABLE 4. (continued)

(1999 Matched Chemicals and Industries)

STATE/PROVINCE	ON-SITE RELEASES		OFF-SITE RELEASES (adjusted)* TRANSFERS FOR DISPOSAL SENT FROM FACILITIES WITHIN STATE/PROVIINCE TO LOCATIONS WITHIN STATE/PROVINCE		OFF-SITE RELEASES (adjusted)* TRANSFERS FOR DISPOSAL RECEIVED FROM FACILITIES OUTSIDE STATE/PROVINCE AT LOCATIONS WITHIN STATE/PROVINCE		TOTAL RELEASES (adjusted) WITHIN STATE/PROVINCE*	
	tonnes	Rank	tonnes	Rank	tonnes	Rank	tonnes	Rank
New Jersey	9,928	34	1,277	23	274	20	11,480	34
British Columbia	9,777	36	952	27	0	52	10,730	35
New Mexico	9,896	35	554	34	1	51	10,451	36
Nebraska	8,856	38	385	38	190	28	9,432	37
Washington	8,865	37	272	40	51	38	9,188	38
Kansas	7,917	40	813	29	274	21	9,004	39
Minnesota	7,968	39	650	31	100	35	8,718	40
New Brunswick	6,577	42	604	32	46	39	7,227	41
Puerto Rico	7,019	41	195	46	0	--	7,213	42
Wyoming	5,460	43	61	53	0	54	5,520	43
Manitoba	4,580	44	184	47	0	--	4,765	44
Delaware	3,386	46	1,335	22	1	50	4,722	45
Massachusetts	3,506	45	548	35	250	22	4,305	46
Nevada	3,028	48	264	42	317	18	3,610	47
Nova Scotia	3,364	47	214	44	3	49	3,581	48
North Dakota	2,380	52	1,066	24	4	48	3,449	49
Colorado	3,010	49	266	41	45	41	3,321	50
Maine	2,696	50	250	43	34	43	2,981	51
Connecticut	2,393	51	155	49	135	29	2,683	52
New Hampshire	2,284	54	63	52	127	31	2,474	53
South Dakota	2,336	53	86	50	0	--	2,423	54
Saskatchewan	1,364	55	2	59	4	47	1,370	55
Hawaii	1,050	56	23	57	0	--	1,073	56
Rhode Island	354	58	37	55	38	42	430	57
Newfoundland	387	57	8	58	0	--	395	58
Virgin Islands	279	59	0	--	0	--	279	59
Vermont	159	62	33	56	22	45	213	60
Alaska	199	60	0	--	0	55	199	61
Prince Edward Island	196	61	0	60	0	--	196	62
District of Columbia	36	63	0	--	0	53	36	63
Total	**1,419,120**		**184,332**		**48,117**		**1,651,569**	

* *Off-site releases are omitted (adjusted) if the amount of off-site release is also reported as an on-site release by another facility within the state/province.*

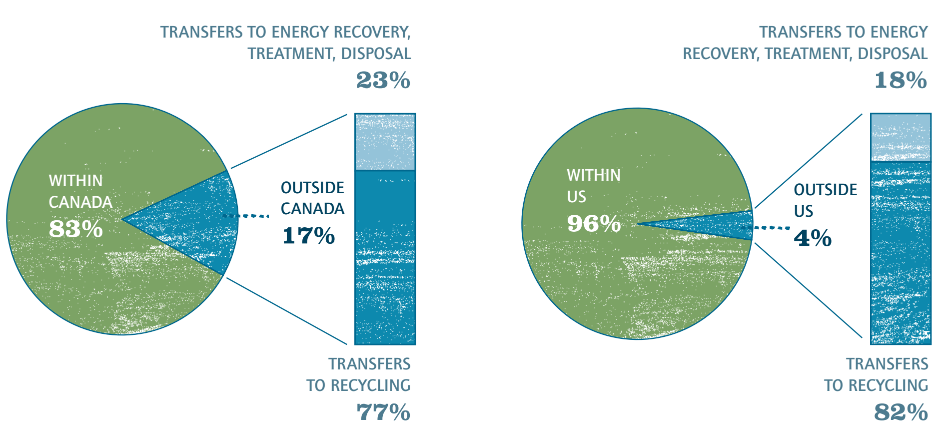
TRANSPORTATION OF CHEMICALS
off-site and across borders in 1999

What amounts of chemicals are being transported through communities?

Facilities in North American produce large quantities of chemicals that may require transportation to off-site landfills, incinerators or treatment facilities (Table 4). Over 886,000 tonnes of chemicals were reported sent off-site to these types of facilities in 1999. In addition, large quantities of substances, over 1 million tonnes, also required transport to recyclers.

There are risks and benefits to transporting chemicals. On the risk side, chemicals may be released during handling, involved in an accident during transportation and contribute to the noise, dust and emissions from transportation. On the benefit side, transporting chemicals to another facility may result in treatment or disposal methods that more effectively reduce a chemical's potential to cause environmental and health damage.

FIGURE 6. PERCENTAGE OF TRANSFERS SENT WITHIN and outside country, NPRI and TRI, 1999
(1999 Matched Chemicals and Industries)



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

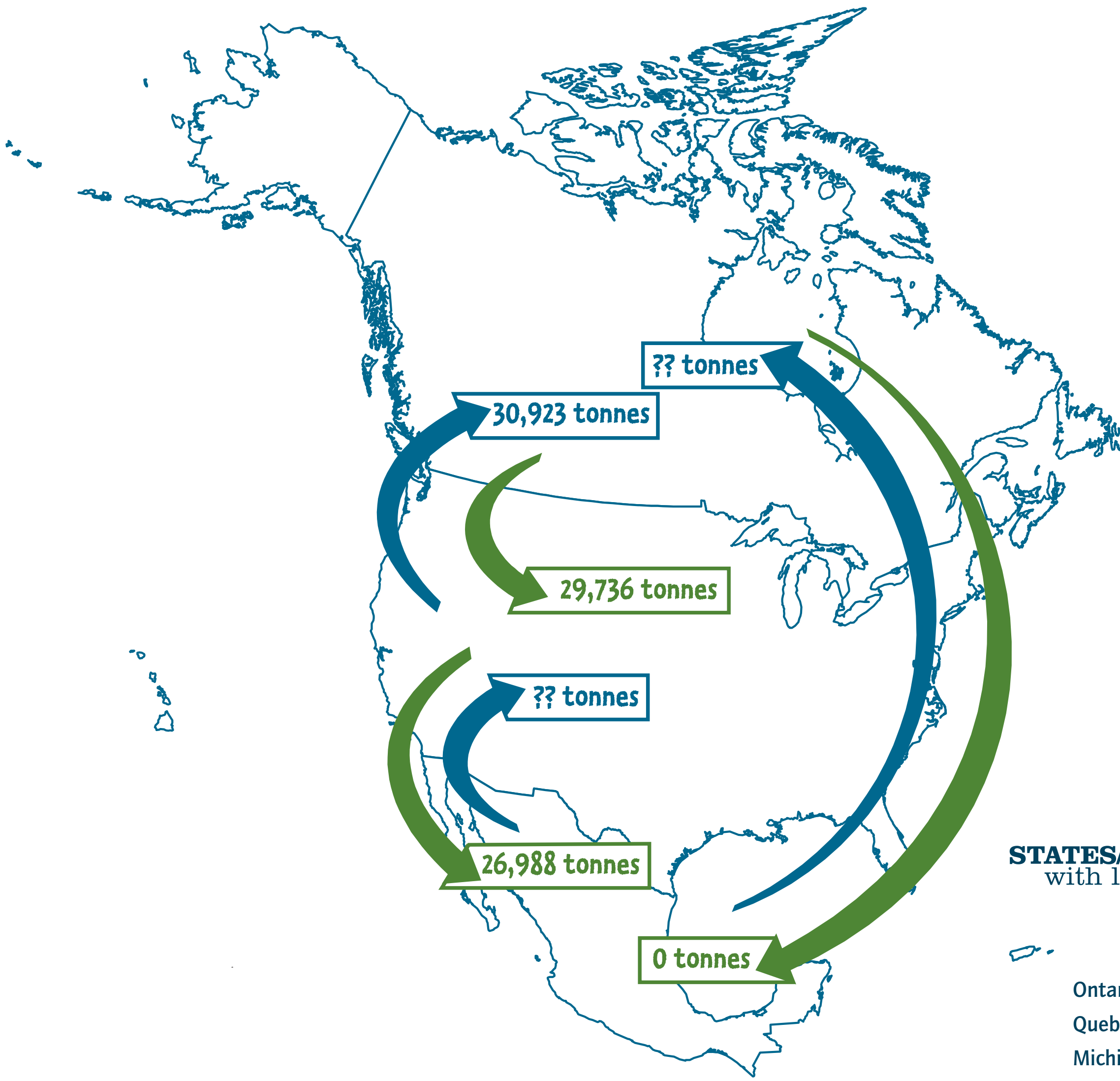
What amounts of chemicals are transported across borders?

Chemicals may be destined for disposal, treatment or recycling. Looking at all types of transfers, we see that in 1999, most chemicals were transferred to sites within national boundaries. Only four percent of all transfers in the US were sent outside the country and most of these were sent for recycling in Canada (Figure 4). The US sent 31,000 tonnes to sites in Canada, most of which went to Ontario and Quebec (Map 2). The US also sent 27,000 tonnes to sites in Mexico. Data are not available for transfers sent from Mexico to US sites in 1999.

Canadian facilities sent 17 percent of all of their reported transfers outside the country, almost all of it to the US. Canada sent 30,000 tonnes to sites in the US, with over 75 percent sent for recycling. Most of this material was sent to Michigan and Ohio, both states on the US/Canadian border.

Only a handful of facilities in each country sent the majority of chemicals across the Canada-US border. A total of 15 facilities in the US accounted for almost three-quarters of the total cross border transfers to Canada and 15 facilities in Canada accounted for almost two-thirds of transfers to the US.

MAP 2. OFF-SITE TRANSFERS across North America, 1999



STATES/PROVINCES with largest transfers received

	TO tonnes	FROM tonnes
Ontario	15,494	22,205
Quebec	14,709	4,998
Michigan	13,410	8,831
Ohio	3,868	2,481

TABLE 5. THE 15 NORTH AMERICAN FACILITIES with the largest total reported amounts of releases and transfers, 1999

(1999 Matched Chemicals and Industries)

RANK	FACILITY	CITY, PROVINCE/ STATE	SIC CODES CANADA	SIC CODES US	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
1	ASARCO Inc. Ray Complex/Hayden Smelter & Concentrator,Grupo Mexico	Hayden, AZ		33	21,026,352	3,187,296	0	24,213,648
2	Magnesium Corp. of America, Renco Group Inc.	Rowley, UT		33	21,471,752	0	0	21,471,752
3	ASARCO Inc.	East Helena, MT		33	20,163,873	0	0	20,163,873
4	Petro-Chem Processing Group/ Solvent Distillers Group, Nortru, Inc.	Detroit, MI		495/738	7,718	0	18,955,182	18,962,900
5	AK Steel - Butler Works (Rte. 8 S)	Butler, PA		33	15,512,541	3,242,993	130	18,755,664
6	Chemical Waste Management of the Northwest Inc., Waste Management Inc.	Arlington, OR		495/738	18,037,638	0	480,061	18,517,699
7	Envirosafe Services of Ohio Inc., ETDS Inc.	Oregon, OH		495/738	17,465,186	0	0	17,465,186
8	Michigan Recovery Sys. Inc., EQ - The Environmental Quality Co.	Romulus, MI		495/738	44,099	12,245	15,909,751	15,966,095
9	Safety-Kleen Ltd., Lambton Facility	Corunna, ON	37	28	15,378,584	0	0	15,378,584
10	Solutia Inc.	Gonzalez, FL		28	14,406,069	63,492	0	14,469,561
11	Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT		33	12,893,911	0	0	12,893,911
12	Pharmacia & Upjohn	Kalamazoo, MI		28	292,161	0	12,287,042	12,579,203
13	Onyx Environmental Services L.L.C	Azusa, CA		495/738	1,255,896	596,150	10,666,844	12,518,890
14	Delphi Energy & Chassis Sys., Delphi Automotive Sys. L.L.C.	Olathe, KS		36	104,684	12,406,332	0	12,511,016
15	Zinc Corp. of America Monaca Smelter, Horsehead Inds. Inc.	Monaca, PA		33	12,325,557	0	0	12,325,557
	Subtotal				**170,386,021**	**19,508,508**	**58,299,010**	**248,193,539**
	% of Total				***10***	***2***	***10***	***7***
	Total				**1,693,921,282**	**1,050,519,901**	**611,256,767**	**3,355,697,950**

Note: Canada and US data only. Mexico data not available for 1999. The data are estimates of releases and transfers of chemicals as reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements.
UIJ=underground injection.

TABLE 5. (continued)

MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/TRANSFERS) (CHEMICALS ACCOUNTING FOR MORE THAN 70% OF TOTAL REPORTED AMOUNTS FROM THE FACILITY)
Copper/Zinc and compounds (land)
Chlorine (air)
Zinc and compounds (land)
Toluene, Xylenes, Methanol, Methyl isobutyl ketone, Methyl ethyl ketone (transfers to energy recovery)
Nitric acid and nitrate compounds (water)
Aluminum oxide, Asbestos (land)
Zinc and compounds (land)
Xylenes, Toluene, n-Hexane (transfers to energy recovery/treatment)
Zinc and compounds (land)
Nitric acid and nitrate compounds (UIJ)
Copper/Arsenic/Zinc and compounds (land)
Methanol (transfers to energy recovery), Dichloromethane (transfers to treatment), Toluene (transfers to energy recovery)
Methyl ethyl ketone, Xylenes, Toluene, Dichloromethane, Tetrachloroethylene , Methyl isobutyl ketone, 2-Ethoxyethanol, Methanol (transfers to energy recovery), Ethylene glycol (transfers to recycling)
Lead and compounds (transfers to recycling)
Zinc and compounds (transfers of metals to disposal)

1999 HIGHLIGHTS BY facility, sector, and chemical

Which facilities reported the largest total amounts of releases and transfers in North America in 1999?

In North America, a relatively small number of facilities account for a large proportion of releases and transfers. In 1999, just 15 out of more than 21,500 facilities in North America reported a total of almost 248,200 tonnes of chemicals released and transferred (Table 5). In other words, less than 0.1 percent of the total number of facilities reported 7 percent of the total reported amounts of releases and transfers. Fourteen of the 15 facilities were located in the US. Six of the 15 were primary metals facilities and five were hazardous waste management/solvent recovery facilities

These 15 facilities accounted for 10 percent of total releases, 10 percent of transfers for further management (transfers to energy recovery, treatment and sewage), and 2 percent of transfers to recycling.

Which facilities reported the largest total releases in North America in 1999?

If we look just at total releases, we see a similar pattern: a small number of facilities accounted for a large portion of total releases. In 1999, 15 facilities reported 217,600 tonnes of releases, accounting for 13 percent of total releases in North America (Table 6).

Seven of the facilities were primary metals facilities, four were chemical manufacturers, three were hazardous waste management/solvent recovery facilities and one was an electric utility. These facilities accounted for 14 percent of all on-site releases and for 8 percent of all off-site releases (transfers to disposal) in 1999.

TABLE 6. THE 15 NORTH AMERICAN FACILITIES with the largest total reported releases, 1999

(1999 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE CANADA	SIC CODE US	NUMBER OF FORMS	TOTAL ON-SITE RELEASES (kg)	TOTAL OFF-SITE RELEASES (kg)	TOTAL REPORTED RELEASES ON- AND OFF-SITE (kg)	MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/TRANSFERS) (CHEMICALS ACCOUNTING FOR MORE THAN 70% OF TOTAL RELEASES FROM THE FACILITY)
1	Magnesium Corp. of America, Renco Group Inc.	Rowley, UT		33	6	21,471,752	0	21,471,752	Chlorine (air)
2	ASARCO Inc. Ray Complex/ Hayden Smelter & Concentrator,	Hayden, AZ		33	11	21,026,203	149	21,026,352	Copper/Zinc and compounds (land)
3	ASARCO Inc.	East Helena, MT		33	10	19,551,186	612,687	20,163,873	Zinc and compounds (land)
4	Chemical Waste Management of the Northwest Inc., Waste Management Inc.	Arlington, OR		495/738	37	18,034,749	2,889	18,037,638	Aluminum oxide, Asbestos (land)
5	Envirosafe Services of Ohio Inc., ETDS Inc.	Oregon, OH		495/738	10	17,464,378	808	17,465,186	Zinc and compounds (land)
6	AK Steel - Butler Works (Rte. 8 S)	Butler, PA		33	13	15,399,348	113,193	15,512,541	Nitric acid and nitrate compounds (water)
7	Safety-Kleen Ltd., Lambton Facility	Corunna, ON	37	28	15	15,378,584	0	15,378,584	Zinc and compounds (land)
8	Solutia Inc.	Gonzalez, FL		28	20	14,404,882	1,187	14,406,069	Nitric acid and nitrate compounds (UIJ)
9	Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT		33	18	12,842,521	51,390	12,893,911	Copper/Arsenic/Zinc and compounds (land)
10	Zinc Corp. of America Monaca Smelter, Horsehead Inds. Inc.	Monaca, PA		33	13	425,594	11,899,963	12,325,557	Zinc and compounds (transfers of metals)
11	Envirosafe Services of Idaho Inc., ETDS Inc.	Grand View, ID		495/738	9	10,856,777	8	10,856,785	Zinc and compounds (land)
12	BASF Corp.	Freeport, TX		28	28	9,738,400	11,441	9,749,841	Nitric acid and nitrate compounds (water)
13	Steel Dynamics Inc.	Butler, IN		33	8	14,836	9,575,540	9,590,376	Zinc and compounds, Aluminum (transfers of metals)
14	DuPont, Victoria Plant	Victoria, TX		28	32	9,399,111	9,027	9,408,138	Nitric acid and nitrate compounds (UIJ)
15	Keystone Station, Reliant Energy Inc.	Shelocta, PA		491/493	10	9,303,002	0	9,303,002	Hydrochloric acid (air)
	Subtotal				**240**	**195,311,323**	**22,278,282**	**217,589,605**	
	% of Total				***0.3***	***14***	***8***	***13***	
	Total				**74,108**	**1,419,119,790**	**274,801,492**	**1,693,921,282**	

Note: *Canada and US data only. Mexico data not available for 1999. The data are estimates of releases and transfers of chemicals as reported by facilities and should not be interpreted as levels of human exposure or environmental impact. The rankings are not meant to imply that a facility, state or province is not meeting its legal requirements.*
UIJ=underground injection.

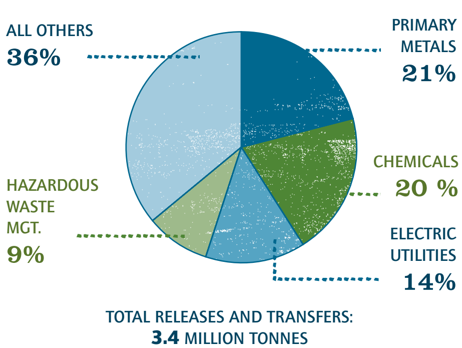
Which industry sectors reported the largest amounts in North America in 1999?

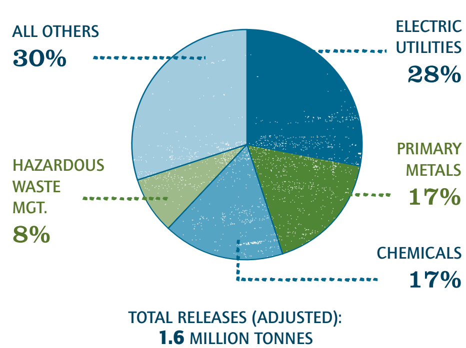
Many different types of industry sectors report to TRI and NPRI. Of these, four industries—primary metals, chemical manufacturing, electric utilities and hazardous waste management/solvent recovery—accounted for almost two-thirds of total releases and transfers in North America in 1999 (Figure 7).

These same four industries released the largest amounts as well, accounting for 70 percent of total releases. However, electric utilities reported the largest releases, while the primary metals sector reported the largest total releases and transfers.

FIGURE 7. CONTRIBUTION OF TOP INDUSTRY SECTORS to total reported amounts of releases, and transfers and total releases, 1999

(1999 Matched Chemicals and Industries)





Note: *Canada and US data only. Mexico data not available for 1999.*

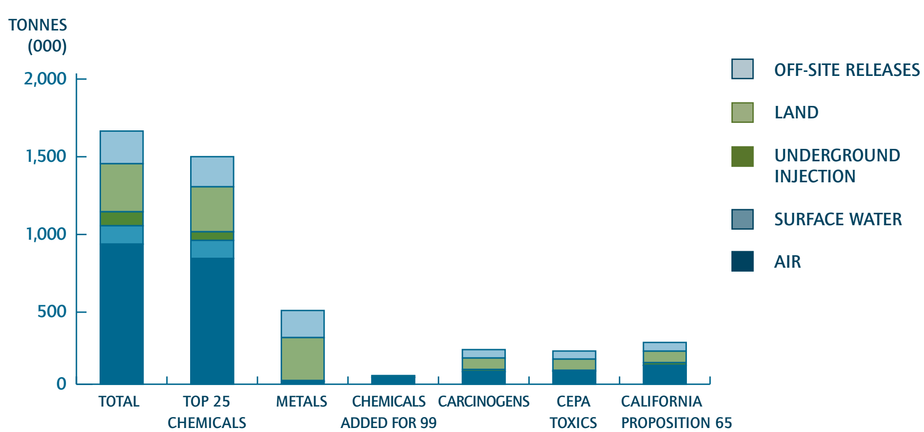
Which chemicals were released in the largest amounts in North America in 1999?

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 210 chemicals reported to both NPRI and TRI totaled over 90 percent of the total releases in North America. Appendices in the companion Sourcebook describe the uses and the health effects of the chemicals with the largest releases and transfers.

Data on releases of several groups of chemicals within the matched 1999 data set were analyzed (Figure 8). These groups—the 25 chemicals with largest releases, metals and their compounds, newly added chemicals including ozone depleters, known or suspected carcinogens, substances on the Canadian CEPA toxics list, and substances on the California Proposition 65 list—contain chemicals with certain health and environmental effects in common. Note that these lists overlap, in that a given chemical may be on several lists.

FIGURE 8. THE 25 CHEMICALS WITH THE LARGEST TOTAL RELEASES and other groups of chemicals in North America, 1999

(1999 Matched Chemicals and Industries)



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

Thirty percent of total releases were metals and their compounds

Almost one-third of total releases in North America were metals and their compounds, such as lead, chromium and nickel and their compounds. Over 474,400 tonnes of releases of metals and their compounds were released on- and off-site in 1999. These metals were mainly sent to landfills either at the facility or off-site at another location.

Nearly 223,000 tonnes of carcinogens were released in 1999

In 1999, almost 223,000 tonnes, or 14 percent of total releases, of known or suspected carcinogens were released on- and off-site in North America. Over one-third of the designated carcinogens were released to the air and one-third were disposed of on land on-site (mainly in landfills).

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

Of the 210 chemicals in the matched data set (see listing in the **Appendix**), about one-quarter (56 chemicals) are designated known or suspected carcinogens.

Carcinogens showed a different pattern than other matched chemicals. Carcinogens were more likely to be landfilled or sent off-site for disposal and less likely to be released to air and water than other matched chemicals.

TABLE 7. THE 15 NORTH AMERICAN FACILITIES with the largest total on- and off-site releases of known or suspected carcinogens, 1999

(1999 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE CANADA	SIC CODE US	NUMBER OF FORMS	TOTAL ON-SITE RELEASES (kg)	TOTAL OFF-SITE RELEASES (kg)	TOTAL REPORTED RELEASES ON- AND OFF-SITE (kg)	MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/TRANSFERS) (CHEMICALS ACCOUNTING FOR MORE THAN 70% OF TOTAL RELEASES OF CARCINOGENS FROM THE FACILITY)
1	Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT		33	6	6,122,416	24,726	6,147,142	Arsenic/Lead and compounds (land)
2	Elementis Chromium L.P., Elementis Inc.	Corpus Christi, TX		28	1	5,943,219	195,646	6,138,865	Chromium and compounds (land)
3	Chemical Waste Management of the Northwest Inc., Waste Management Inc.	Arlington, OR		495/738	14	4,324,756	1,358	4,326,114	Asbestos (land)
4	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	4,039,024	1,048	4,040,072	Chromium and compounds (land)
5	Monsanto - Luling	Luling, LA		28	2	3,194,331	0	3,194,331	Formaldehyde (UIJ)
6	American Steel Foundries Alliance Plant, Amsted Inds. Inc.	Alliance, OH		33	1	8,254	2,812,336	2,820,590	Chromium and compounds (transfers of metals)
7	Yuasa Inc. Battery Plant	Richmond, KY		36	2	130	2,462,187	2,462,317	Lead and compounds (transfers of metals)
8	Safety-Kleen Ltd., Lambton Facility	Corunna, ON	37	28	5	2,430,505	0	2,430,505	Lead and compounds (land)
9	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	5	1,153,037	920,000	2,073,037	Chromium and compounds (land, transfers of metals)
10	Safety Kleen Inc., Grassy Mountain Facility	Grantsville, UT		495/738	8	1,947,765	5,149	1,952,914	Lead/Chromium/Cadmium/Arsenic and compounds (land)
11	Envirite of Ohio Inc., Envirite Corp.	Canton, OH		495/738	5	247	1,879,766	1,880,013	Nickel/Chromium and compounds (transfers of metals)
12	Heritage Environmental Services L.L.C.	Indianapolis, IN		495/738	4	14	1,847,830	1,847,844	Nickel/Chromium and compounds (transfers of metals)
13	Safety-Kleen (Lone & Grassy Mountain) Inc.	Waynoka, OK		495/738	6	1,834,405	539	1,834,944	Lead/Chromium and compounds (land)
14	USL City Environmental Inc., U.S. Liquids Inc.	Detroit, MI		495/738	5	0	1,761,787	1,761,787	Lead and compounds (transfers of metals)
15	Chemical Waste Management, Waste Management	Emelle, AL		495/738	7	1,734,465	19,718	1,754,183	Lead/Chromium and compounds (land)
	Subtotal				**72**	**32,732,568**	**11,932,090**	**44,664,658**	
	% of Total				***0.4***	***19***	***18***	***19***	
	Total for Carcinogens				**19,786**	**168,529,527**	**65,627,759**	**234,157,286**	

Note: *Canada and US data only. Mexico data not available for 1999. The data are estimates of releases and transfers of chemicals reported by facilities. None of the rankings are meant to imply that a facility, state or province is not meeting its legal requirements. The data do not predict levels of exposure of the public to those chemicals.*
A chemical (and its compounds) is included if the chemical or any of its compounds is a designated carcinogen. Carcinogenic substances are those chemicals or chemical compounds listed by the International Agency for Research on Cancer (IARC) or the US National Toxicology Program (NTP).
UIJ=underground injection.

Fifteen facilities in North America accounted for almost one-fifth of all total releases of carcinogens (Table 7). Seven of the 15 facilities were hazardous waste management facilities, 4 were chemical manufacturers and 3 were primary metals manufacturers.

What were the releases of chemicals on the Canadian CEPA Toxics list?

Chemicals considered toxic under the Canadian Environmental Protection Act (CEPA) accounted for 213,700 tonnes, or 13 percent of total releases in 1999. The metals chromium and its compounds (hexavalent chromium only is on the CEPA list) and lead and its compounds were the CEPA toxics with the largest releases. Almost 40 percent of the releases of CEPA Toxics were on-site air emissions, mainly of hydrogen fluoride. Three-quarters of the hydrogen fluoride was released by electric utilities. Hydrogen fluoride, also known as hydrofluoric acid, is released as a result of impurities in the coal and fuel oil used by the electric utilities.

In Canada, substances are classified as "toxic" under the Canadian Environmental Protection Act (CEPA) of 1999 if they enter or may enter the environment in quantities that: may have an immediate or long-term harmful effect on it or on biodiversity, may constitute a danger to the environment on which life depends, or may constitute a danger to human life or health. As of May 2001, 52 chemicals had been found to be toxic and the 30 that were common to both the NPRI and TRI lists could be included in *Taking Stock 1999*.

Chromium and its compounds

The primary metals industry reported the largest releases of chromium and its compounds in 1999, accounting for 14,000 tonnes or almost one-third of total reported releases of chromium and its compounds. Chromium is used in steel and other alloys, in making refractories (bricks used in industrial furnaces), dyes and pigments and in plating chrome, tanning leather and preserving wood. Chromium and its compounds are also used as cleaning agents in electroplating and textile manufacture. Hexavalent forms (Cr VI) are more toxic than trivalent (Cr III) forms. Inhalation effects include irritation/damage to nose, lungs, stomach, and intestines. Ingestion can lead to stomach upset and ulcers, convulsions, and damage to kidneys and liver. While hexavalent chromium is considered toxic under CEPA, the most common form of chromium is trivalent chromium. Under some conditions, though, trivalent chromium may be converted to hexavalent chromium. Because both TRI and NPRI require reporting on the group of chromium compounds rather than the individual members of the group, it is not possible to analyze releases and transfers of only hexavalent chromium. Because of the toxicity of some chromium compounds and the element's ability to convert from one form to another, chromium and its compounds are included in the analysis of CEPA chemicals.

Lead and its compounds

The primary metals industry also reported the largest releases of lead and its compounds, accounting for 20,300 tonnes or more than 40 percent of total reported releases of lead and its compounds. The most important use of lead is in the production of batteries. Its use in gasoline, paints and ceramic products, caulking and pipe solder has been dramatically reduced. Lead compounds appear in dyes, explosives, asbestos brake linings, insecticides and rodenticides, ointments and other products and are used as catalysts, cathode material, flame retardant, metal and wire coating, and as a constituent in glass. Exposure to lead can affect almost every organ and system: most sensitive is the central nervous system, particularly in children. Lead can cause premature births, growth deficits and mental impairment in offspring of exposed mothers.

Hydrogen fluoride

Electric utilities accounted for more than 70 percent (28,000 tonnes) of all reported releases of hydrogen fluoride in 1999. In North America, much of the hydrogen fluoride manufactured is used to produce fluorocarbons (including CFCs and HCFCs). It is also used in steel pickling and the production of aluminum fluoride. Hydrogen fluoride is not a carcinogen, but inhalation can irritate the nose, throat and respiratory system. Ingestion can cause mouth, throat and stomach burns and may be fatal. Severe exposure via inhalation can result in depletion of body calcium levels.

Fifteen facilities in North America accounted for one-fifth of the total releases of CEPA toxics in 1999 (Table 8). Eight of the 15 were hazardous waste management facilities, 3 were primary metals manufacturers and 3 were chemical manufacturers.

TABLE 8. THE 15 NORTH AMERICAN FACILITIES with the largest total on- and off-site releases of CEPA Toxic Chemicals, 1999

(1999 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE CANADA	SIC CODE US	NUMBER OF FORMS	TOTAL ON-SITE RELEASES (kg)	TOTAL OFF-SITE RELEASES (kg)	TOTAL REPORTED RELEASES ON- AND OFF-SITE (kg)	MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/TRANSFERS) (CHEMICALS ACCOUNTING FOR MORE THAN 70% OF TOTAL RELEASES OF CEPA TOXICS FROM THE FACILITY)
1	Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT		33	6	6,124,900	24,726	6,149,626	Arsenic/Lead and compounds (land)
2	Elementis Chromium L.P., Elementis Inc.	Corpus Christi, TX		28	1	5,943,219	195,646	6,138,865	Chromium and compounds (land)
3	Chemical Waste Management of the Northwest Inc., Waste Management Inc.	Arlington, OR		495/738	10	4,282,211	1,358	4,283,569	Asbestos (land)
4	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	4,039,024	1,048	4,040,072	Chromium and compounds (land)
5	American Steel Foundries Alliance Plant, Amsted Inds. Inc.	Alliance, OH		33	1	8,254	2,812,336	2,820,590	Chromium and compounds (transfers of metals)
6	Yuasa Inc. Battery Plant	Richmond, KY		36	2	130	2,462,187	2,462,317	Lead and compounds (transfers of metals)
7	Safety-Kleen Ltd., Lambton Facility	Corunna, ON	37	28	4	2,430,501	0	2,430,501	Lead and compounds (land)
8	Vickery Environmental Inc., Waste Management Inc.	Vickery, OH		495/738	5	2,282,993	8,417	2,291,410	Hydrogen fluoride (UIJ)
9	Safety-Kleen Inc., Grassy Mountain Facility	Grantsville, UT		495/738	9	2,130,410	5,788	2,136,198	Lead/Chromium/Cadmium/Arsenic and compounds (land)
10	Inco Limited, Copper Cliff Smelter Complex	Cooper Cliff, ON	29	33	5	1,153,037	920,000	2,073,037	Chromium and compounds (land, transfers to metals)
11	Envirite of Ohio Inc., Envirite Corp.	Canton, OH		495/738	5	247	1,879,766	1,880,013	Nickel/Chromium and compounds (transfers of metals)
12	Heritage Environmental Services L.L.C.	Indianapolis, IN		495/738	5	14	1,847,830	1,847,844	Nickel/Chromium and compounds (transfers of metals)
13	Safety-Kleen (Lone & Grassy Mountain) Inc.	Waynoka, OK		495/738	7	1,834,405	539	1,834,944	Lead/Chromium and compounds (land)
14	Chemical Waste Management, Waste Management	Emelle, AL		495/738	8	1,745,726	19,723	1,765,449	Lead/Chromium and compounds (land)
15	USL City Environmental Inc., U.S. Liquids Inc.	Detroit, MI		495/738	5	0	1,761,787	1,761,787	Lead and compounds (transfers of metals)
	Subtotal				**74**	**31,975,071**	**11,941,151**	**43,916,222**	
	% of Total				***0.5***	***20***	***19***	***20***	
	Total for CEPA Toxic Chemicals				**16,295**	**161,722,467**	**63,316,607**	**225,039,074**	

Note: *Canada and US data only. Mexico data not available for 1999. The data are estimates of releases and transfers of chemicals reported by facilities. None of the rankings are meant to imply that a facility, state or province is not meeting its legal requirements. The data do not predict levels of exposure of the public to those chemicals.*
A chemical (and its compounds) is included if the chemical or any of its compounds is a designated carcinogen. Carcinogenic substances are those chemicals or chemical compounds listed by the International Agency for Research on Cancer (IARC) or the US National Toxicology Program (NTP).
UIJ=underground injection.

How many tonnes of chemicals on the California Proposition 65 List of substances linked to cancer, birth defects and other reproductive harm were released in 1999?

Almost 269,000 tonnes of chemicals known to the state of California to cause cancer, birth defects or other reproductive harm were released on- and off-site in 1999. Over 45 percent of these total releases or over 121,000 tonnes of chemicals linked to cancer, birth defects or other reproductive harm were released into the air at the facility site.

In 1986, California voters approved a ballot initiative (Proposition 65) to address growing concerns about exposures to toxic chemicals. The law requires a list of chemicals known to the state of California to cause cancer, birth defects or other reproductive harm. The list as of June 2001 contained almost 700 substances, of which 77 were in the 1999 matched data set. These Proposition 65 chemicals accounted for 17 percent of total releases in North America.

Toluene and the metals, chromium and lead and their compounds were the Proposition 65 chemicals with the largest releases. These three substances each had releases greater than 40,000 tonnes in 1999. They accounted for almost half of all releases of Proposition 65 chemicals.

Toluene

The printing industry reported the largest releases of toluene, accounting for 9,200 tonnes, or almost one-fifth of the total reported releases of toluene in 1999. By far the largest use of toluene is in gasoline; most toluene is never separated from petroleum crude oil (its largest source), but is pumped from refineries to other locations where it is added directly to gasoline. It is also used in paints, lacquers, thinners and strippers, adhesives, and cosmetic nail products. Exposure to toluene can cause fatigue, confusion, weakness, memory loss, nausea, loss of appetite, and hearing loss. High exposure can cause permanent brain and nervous system damage. It also affects kidneys and leads to fetal toxicity.

Fifteen facilities in North America accounted for almost one-fifth of the total releases of chemicals on the California Proposition 65 list in 1999 (Table 9). Six of the 15 were chemical manufacturers, 5 were hazardous waste management facilities, and 3 were primary metals manufacturers.

TABLE 9. THE 15 NORTH AMERICAN FACILITIES with the largest total on- and off-site releases of California Proposition 65 Chemicals, 1999

(1999 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE CANADA	SIC CODE US	NUMBER OF FORMS	TOTAL ON-SITE RELEASES (kg)	TOTAL OFF-SITE RELEASES (kg)	TOTAL REPORTED RELEASES ON- AND OFF-SITE (kg)	MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/TRANSFERS) (CHEMICALS ACCOUNTING FOR MORE THAN 70% OF TOTAL RELEASES OF PROPOSITION 65 CHEMICALS FROM THE FACILITY)
1	Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT		33	7	6,125,013	24,728	6,149,741	Arsenic/Lead and compounds (land)
2	Elementis Chromium L.P.,	Corpus Christi, TX		28	1	5,943,219	195,646	6,138,865	Chromium and compounds (land)
3	Lenzing Fibers Corp.	Lowland, TN		28	1	6,060,997	0	6,060,997	Carbon disulfide (air)
4	Chemical Waste Management of the Northwest Inc., Waste Management Inc.	Arlington, OR		495/738	16	4,337,308	1,358	4,338,666	Asbestos (land)
5	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	4,039,024	1,048	4,040,072	Chromium and compounds (land)
6	Acordis Cellulosic Fibers Inc., Acordis U.S. Holding Inc.	Axis, AL		28	1	3,859,002	0	3,859,002	Carbon disulfide (air)
7	Monsanto - Luling	Luling, LA		28	3	3,227,892	0	3,227,892	Formaldehyde (UIJ)
8	American Steel Foundries Alliance Plant, Amsted Inds. Inc.	Alliance, OH		33	1	8,254	2,812,336	2,820,590	Chromium and compounds (transfers of metals)
9	Yuasa Inc. Battery Plant	Richmond, KY		36	2	130	2,462,187	2,462,317	Lead and compounds (transfers of metals)
10	Safety-Kleen Ltd., Lambton Facility	Corunna, ON	37	28	5	2,430,509	0	2,430,509	Lead and compounds (land)
11	Safety-Kleen Inc., Grassy Mountain Facility	Grantsville, UT		495/738	9	2,130,410	5,788	2,136,198	Lead/Chromium/Cadmium/Arsenic and compounds (land)
12	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	5	1,153,037	920,000	2,073,037	Chromium and compounds (land, transfers to metals)
13	Envirite of Ohio Inc., Envirite Corp.	Canton, OH		495/738	5	247	1,879,766	1,880,013	Nickel/Chromium and compounds (transfers of metals)
14	Heritage Environmental Services L.L.C.	Indianapolis, IN		495/738	4	14	1,847,830	1,847,844	Nickel/Chromium and compounds (transfers of metals)
15	Safety-Kleen (Lone & Grassy Mountain) Inc.	Waynoka, OK		495/738	6	1,834,405	539	1,834,944	Lead/Chromium and compounds (land)
	Subtotal				**67**	**41,149,461**	**10,151,226**	**51,300,687**	
	% of Total				**0.3**	**19**	**15**	**18**	
	Total for Proposition 65 Chemicals				**22,364**	**212,931,496**	**67,380,588**	**280,312,084**	

Note: *Canada and US data only. Mexico data not available for 1999. The data are estimates of releases and transfers of chemicals reported by facilities. None of the rankings are meant to imply that a facility, state or province is not meeting its legal requirements. The data do not predict levels of exposure of the public to those chemicals.*
UIJ=underground injection.

How many tonnes of ozone depleters were released to the air, water or land in 1999?

Some chemicals can damage the ability of the ozone layer to shield us from the sun's harmful ultraviolet rays. Releases to air, water and land (including off-site releases) of the 15 ozone depleters in the matched data set were almost 13,300 tonnes in 1999 (Table 10). Ozone-depleting substances were added to the NPRI list for 1999 and are included in the matched data set for the first time. Production of ozone depleters is subject to ban under the international agreement called the Montreal Protocol. When ranked by their ozone-depleting potential (a measure of the ability of various ozone-depleting chemicals to destroy ozone molecules), releases of CFC-114 ranked the highest of all the ozone depleters in the matched data set.

TABLE 10. TOTAL AIR/WATER/LAND releases in North America of ozone depleters, by chemical, 1999

(1999 Matched Chemicals and Industries)

CAS NUMBER		CHEMICAL	AIR/WATER/LAND RELEASES ON- AND OFF-SITE (ADJUSTED)* — AMOUNT OF AIR/WATER/LAND RELEASES ON- AND OFF-SITE (adjusted) (tonnes)	Rank	NPRI AS % OF TOTAL RELEASES (adjusted)	TRI AS % OF TOTAL RELEASES (adjusted)	AMOUNT WEIGHTED BY OZONE DEPLETION POTENTIAL (tonnes)	Rank
75-45-6		Chlorodifluoromethane (HCFC-22)	4,018	1	3	97	221	5
1717-00-6		1,1-Dichloro-1-fluoroethane (HCFC-141b)	3,766	2	2	98	414	2
75-68-3		1-Chloro-1,1-difluoroethane (HCFC-142b)	3,308	3	23	77	215	6
74-83-9		Bromomethane	649	4	0	100	389	3
76-14-2		Dichlorotetrafluoroethane (CFC-114)	422	5	0.03	99.97	422	1
--		Chlorotetrafluoroethane (HCFC-124 and isomers)	360	6	1	99	360	4
75-71-8		Dichlorodifluoromethane (CFC-12)	336	7	0	100	13	11
75-69-4		Trichlorofluoromethane (CFC-11)	194	8	0.6	99.4	194	7
56-23-5	c	Carbon tetrachloride	119	9	2	98	131	8
--		Dichlorotrifluoroethane (HCFC-123 and isomers)	89	10	0.3	99.7	5	12
76-15-3		Monochloropentafluoroethane (CFC-115)	35	11	0	100	21	10
75-63-8		Bromotrifluoromethane (Halon 1301)	13	12	2	98	128	9
75-72-9		Chlorotrifluoromethane (CFC-13)	5	13	0	100	5	13
353-59-3		Bromochlorodifluoromethane (Halon 1211)	1	14	0.8	99.2	3	14
Subtotal			**13,314**		**7**	**93**	**2,522**	
% of Total			**0.9**					
Total			**1,539,039**		**10**	**90**		

Note: Canada and US data only. Mexico data not available for 1999.

* Sum of on-site air, surface water and land releases. Does not include on-site underground injection or aggregate amounts reported by NPRI facilities or off-site releases reported as on-site releases by another NPRI or TRI facility.

c=Known or suspected carcinogen.

The chemical manufacturing industry reported more than one-third of the amount of releases to air water and land of the ozone depleters (Table 11). This sector manufactures the HCFCs, which are often used as refrigerant substitutes for the CFCs and are subject to a phase out in the future, and the CFC-114 used for essential uses such as metered-dose inhalers.

The plastics industry reported almost one-quarter of all releases to air, water and land of ozone depleters. The ozone-depleter with the largest releases by this sector is HCFC-142b, which is used for blowing foam insulation products.

TABLE 11. NORTH AMERICAN RELEASES of ozone depleters by industry, 1999

(1999 Matched Chemicals and Industries)

US SIC CODE	INDUSTRY	FORMS NUMBER	FORMS %	TOTAL REPORTED AIR/WATER/LAND/RELEASES ON- AND OFF-SITE (adjusted)* tonnes	%
28	Chemicals	304	36.0	4,457	33.5
30	Rubber and Plastics Products	127	15.0	3,059	23.0
–	Multiple codes 20–39	39	4.6	1,758	13.2
36	Electronic/Electrical Equipment	24	2.8	1,345	10.1
35	Industrial Machinery	109	12.9	729	5.5
38	Measurement/Photographic Instruments	26	3.1	629	4.7
34	Fabricated Metals Products	35	4.1	429	3.2
37	Transportation Equipment	41	4.9	399	3.0
20	Food Products	32	3.8	259	1.9
5169	Chemical Wholesalers	14	1.7	75	0.6
39	Misc. Manufacturing Industries	11	1.3	41	0.3
33	Primary Metals	4	0.5	32	0.2
29	Petroleum and Coal Products	14	1.7	31	0.2
495/738	Hazardous Waste Mgt./Solvent Recovery	47	5.6	23	0.2
32	Stone/Clay/Glass Products	7	0.8	17	0.1
22	Textile Mill Products	1	0.1	13	0.1
24	Lumber and Wood Products	4	0.5	12	0.1
25	Furniture and Fixtures	2	0.2	5	0.0
26	Paper Products	1	0.1	0.04	0.0
27	Printing and Publishing	1	0.1	0	0.0
491/493	Electric Utilities	1	0.1	0	0.0
	Total	**844**	**100**	**13,314**	**100**

Note: *Canada and US data only. Mexico data not available for 1999.*

* *Sum of on-site air, surface water and land releases. Does not include on-site underground injection or aggregate amounts reported by NPRI facilities or off-site releases reported as on-site releases by another NPRI or TRI facility.*

The electronic/electric equipment manufacturers reported 10 percent of all releases to air, water and land of ozone depleters. They use these substances as solvent cleaners. The ozone depleter with the largest releases by this sector is HCFC-141b, which is used as a substitute for CFC-113 and 1,1,1-trichloroethane. The ban on production and importation of this chemical in the US goes into effect in 2003.

In 1999, 15 facilities in North America reported over one-third of all on- and off-site releases to air, water, and land of ozone depleters (Table 12). Three facilities were chemical manufacturers located in Kentucky, Ohio and Louisiana. Two chemical manufacturers reported the largest releases of ozone depleters, each releasing over 500 tonnes of mainly HCFC-22, a substitute for CFCs whose production has been banned. These HCFCs will also be phased-out by 2030. Five Dow Chemical facilities located in Missouri, Ohio, Connecticut, Illinois and Ontario also were among the 15 facilities with the largest amounts of ozone depleters reported. They reported releases primarily of HCFC-142b, a foam blowing agent. Most of the Dow plants reported both chemical and plastics manufacturing operations. Five plastics manufacturers (including the Dow Chemical plant in Ontario) were among the 15 and were located in Ohio, Quebec, Virginia, Illinois, and Ontario, reporting primarily releases of HCFC-142b.

TABLE 12. THE 15 NORTH AMERICAN FACILITIES
with the largest total on- and off-site air/water/land releases of ozone depleters, 1999

(1999 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE CANADA	SIC CODE US	NUMBER OF FORM	TOTAL REPORTED AIR/WATER/LAND RELEASES ON- AND OFF-SITE* (kg)	MAJOR CHEMICALS REPORTED (PRIMARY MEDIA/TRANSFERS) (CHEMICALS ACCOUNTING FOR MORE THAN 70% OF TOTAL FOR OZONE DEPLETERS)
1	DuPont, Louisville Plant	Louisville, KY		28	1	847,166	Chlorodifluoromethane (HCFC-22) (air)
2	Honeywell Intl. Inc., Baton Rouge Plant	Baton Rouge, LA		28	12	571,057	Chlorodifluoromethane (HCFC-22) (air)
3	Dow Chemical Co. Riverside Site	Pevely, MO		Mult.	1	474,830	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
4	Owens-Corning	Tallmadge, OH		30	1	393,605	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
5	Frigidaire Home Prods., Freezer, White Consolidated Inds.	Saint Cloud, MN		36	1	318,821	1,1-Dichloro-1-fluoroethane (HCFC-141b) (air)
6	OC Celfortec Inc.	Grande-Ile, QC	16	30	2	296,949	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
7	Pactiv Corp.	Winchester, VA		30	1	268,625	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
8	Owens-Corning	Rockford, IL		30	1	240,219	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
9	Dow Chemical USA, Hanging Rock Plant	Ironton, OH		Mult.	2	223,464	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
10	Dow Chemical Canada Inc., Weston	Weston, ON	16	30	1	202,433	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
11	Dow N.A. Allyn's Point Plant, Dow Chemical Co.	Gales Ferry, CT		Mult.	1	200,608	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
12	US DOE Portsmouth Gaseous Diffusion Plant, United States Enrichment	Piketon, OH		28	1	197,732	Dichlorotetrafluoroethane (CFC-114) (air)
13	GE Appliances, GE Co.	Louisville, KY		36	1	196,717	1,1-Dichloro-1-fluoroethane (HCFC-141b) (air)
14	Atofina Chemicals Inc., Atofina Delaware Inc.	Calvert City, KY		28	5	192,023	1-Chloro-1,1-difluoroethane (HCFC-142b), 1,1-Dichloro-1-fluoroethane (HCFC-141b) (air)
15	Dow Chemical, Joliet Continental Ops.	Channahon, IL		Mult.	1	186,547	1-Chloro-1,1-difluoroethane (HCFC-142b) (air)
	Subtotal				**32**	**4,810,796**	
	% of Total				**4**	**36**	
	Total for Ozone Depleters				**844**	**13,319,970**	

Note: *Canada and US data only. Mexico data not available for 1999. The data are estimates of releases and transfers of chemicals reported by facilities. None of the rankings are meant to imply that a facility, state or province is not meeting its legal requirements. The data do not predict levels of exposure of the public to those chemicals.*

* *Sum of on-site air, surface water and land releases. Does not include on-site underground injection or aggregate amounts reported by NPRI facilities or off-site transfers reported as on-site releases by another NPRI or TRI facility.*

How many tonnes of releases were from chemicals being reported for the first time?

The newly added chemicals accounted for 55,700 tonnes of total releases, or 3 percent of total North American releases in 1999 (Table 13).
The newly added chemicals were mainly released to the air at the facility site (43,600 tonnes or 5 percent of total releases to air).

In 1999, the number of chemicals required to be reported to NPRI significantly increased. Many of the 73 substances were added because of health and environmental concerns. This new group of chemicals includes ozone depleters and nonylphenols and chemicals drawn from other Canadian lists of substances of concern (such as the priority substances lists, the ARET list and CEPA Schedule 1). Two-thirds of the 73 newly added substances were also on the TRI list and, therefore, could be included in the matched data set for *Taking Stock* 1999. This expanded the matched set by 25 percent over previous years.

n-Hexane

n-Hexane was the substance among the newly added chemicals with the largest releases in 1999, accounting for 27,700 tonnes of releases (mostly to air) or almost half of all releases of the newly added chemicals. The food industry reported over half of all releases of n-hexane and the chemical industry reported 20 percent.

n-Hexane is used in the extraction of vegetables oil from crops such as soybeans, cottonseed, safflower seed and peanuts. It is also a solvent used as a cleaning agent in the printing, textile, furniture, and shoemaking industries and as a reaction medium in the manufacture of polyolefins, synthetic rubbers and some pharmaceuticals. n-Hexane may cause neurological damage. It has been shown to damage the peripheral nerve cells, which are the ones that run from the spinal cord to other parts of the body. Inhalation of large amounts of n-hexane can cause numbness in hands and feet, followed by muscle weakness in the feet and lower legs.

TABLE 13. NORTH AMERICAN releases of newly added chemicals, 1999

(1999 Matched Chemicals and Industries)

CAS NUMBER	CHEMICAL	TOTAL ON-SITE RELEASES (tonnes)	TOTAL OFF-SITE RELEASES (tonnes)	TOTAL REPORTED RELEASES ON- AND OFF-SITE (tonnes)	ADJUSTMENT COMPONENT* (tonnes)	TOTAL RELEASES (adjusted)** (tonnes)	TOTAL RELEASES (adjusted)** Percent
110-54-3	n-Hexane	27,642	31	27,673	1	27,672	50
64-18-6	Formic acid	5,616	20	5,636	0	5,636	10
75-45-6	Chlorodifluoromethane (HCFC-22)	3,987	38	4,025	6	4,019	7
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)	3,631	135	3,766	0	3,766	7
75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	3,306	2	3,308	0	3,308	6
	Subtotal	**44,182**	**226**	**44,409**	**8**	**44,401**	**80**
	% of Total	**81**	**21**	**80**	**99.9**	**80**	
	Total for Newly Added Chemicals	**54,565**	**1,104**	**55,668**	**8**	**55,661**	**100**

Note: *Canada and US data only. Mexico data not available for 1999.*
** Off-site releases also reported as on-site releases by another NPRI or TRI facility.*
*** Does not include off-site releases also reported as on-site releases by another NPRI or TRI facility.*

Ozone-depleting chemicals from the Montreal Protocol

Among the chemicals added to NPRI for 1999, 15 were ozone-depleting substances. The ozone layer is a protective layer of ozone molecules high above the earth, which shields us from the sun's harmful ultraviolet rays. Some chemicals can damage the ozone layer by reacting with the ozone molecules. In the 1980s, countries worldwide developed the Montreal Protocol, an international agreement regulating the production of ozone-depleting chemicals.

The Montreal Protocol called for the elimination of production of some of the most damaging ozone depleters, except for a few uses, by 1996 in developed countries, including Canada and the US, and by 2010 in developing countries, including Mexico. While **production** of the ozone depleters has been banned in Canada and the US and is being phased out in Mexico, this ban does not automatically mean the ban of all **uses** of the substances. Therefore, **releases** from these uses may still occur.

Some releases will come from the use of the ozone depleters manufactured and stockpiled before the ban or from recycling of the chemicals. These uses of the substances are allowed for as long as the substances are available. For example, refrigerators still in use and manufactured before the ban on CFCs could emit them if the CFCs are not adequately recovered at the time of disposal. Or, CFCs in air conditioning units in automobiles must be retrofitted or replaced as they wear out. Such releases are not generally captured in the PRTR data because they do not occur as a result of manufacturing products but as a result of product use.

However, there are exemptions to the production ban whereby the substances can still be produced or used in manufacturing processes. The substances may continue to be produced for essential uses, if the substance is used as a feedstock to make other products and is completely transformed in the process, and if the substance is exported to developing countries where the ban is not yet implemented.

Under the Montreal Protocol, essential uses are those uses that are necessary for the health and safety of the society, for which all economically feasible steps have been taken to minimize the uses and associated releases, there are not sufficient stockpiles or recycled quantities to provide for the use, and the needs for the substances in the developing countries for which the ban has not yet taken place. Such uses include, for example, the use of CFC-114 in the metered-dose inhaler used by asthmatics or the use of 1,1,1-trichloroethane in specific cleaning and bonding applications in rocket motor manufacturing for the US Space Shuttle. These uses will be phased out only as alternatives become available.

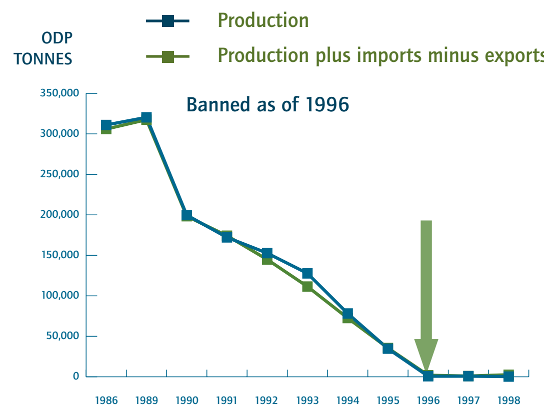
Each country has its own regulations on schedules for phasing out production, on allowable essential uses and on how the substances may be recycled and reused. For example, programs to recover CFCs from discarded household appliances have been instituted in the US and in most provinces in Canada, and Canada's National Action Plan includes plans to develop alternatives for metered-dose inhalers. Information on country-specific actions on ozone-depleting chemicals can be found on the web at <www.epa.gov/ozone> for the US and <www.ec.gc.ca/ozone/> for Canada. General information on the Montreal Protocol is available at the United Nations Environment Programme web site <www.unep.org/ozone/>.

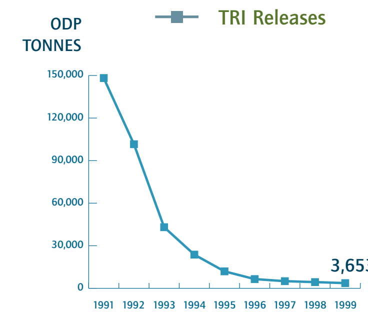
Ozone-depleting chemicals are also rated by their ozone-depleting potential (ODP), a measure of the difference in the ability of various chemicals to destroy the ozone molecules. CFC-11 is used as the reference and is assigned an ODP value of 1.0. Chemicals that are more destructive of the ozone layer than CFC-11 have higher ODP values and those less destructive have lower ODP values.

Data on production are available from the United Nations Environment Programme and show the decline in production of in the three countries (Figure 9). Production plus net imports (imports minus exports) are also shown to indicate how much of the substance is available for use in the country. These figures show the amount of the substance weighted by the ozone-depleting potential. Where available, data on releases of the substances from the complete TRI and NPRI are also shown.

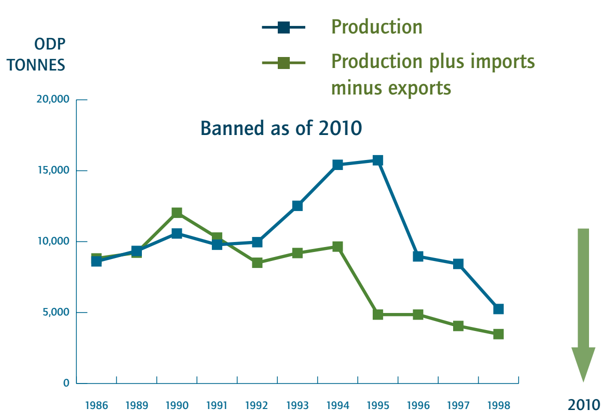
FIGURE 9. PRODUCTION AND RELEASES OF CFCs (Montreal Protocol, Annex A, Group 1)

United States

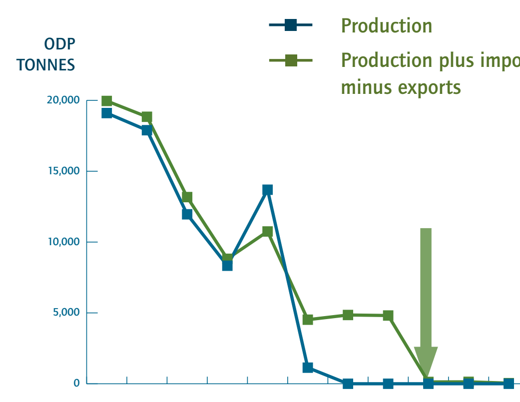




Mexico



Canada



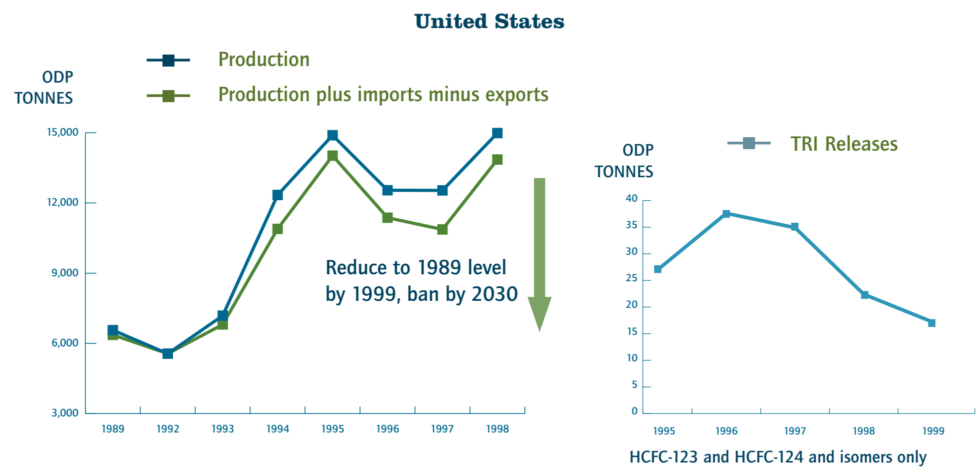
NPRI Releases for 1999
(ODP Tonnes)

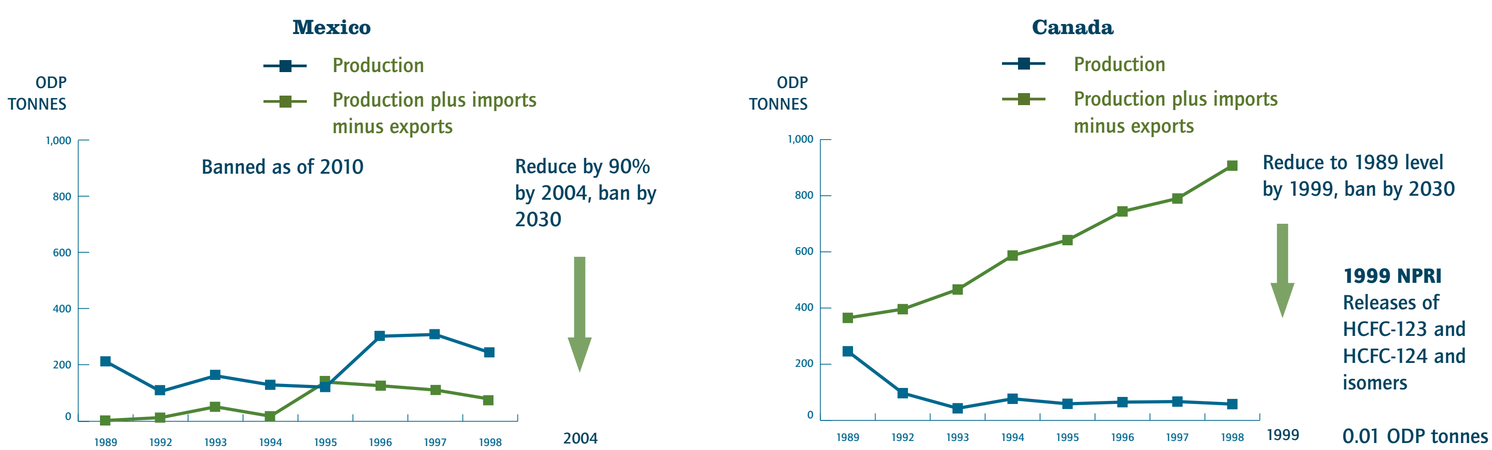
CFC-1	1.1
CFC-12	3.4
CFC-113	no data
CFC-114	0.1
CFC-115	0

Note: *Note: ODP tonnes = Metric tonnes x Ozone Depletion Potential*
Source: Data Report: Production and Consumption of Ozone Depleting Substances 1986–1998, UNEP, October 1999.
TRI and NPRI releases: Total on-site air, water and land releases and off-site transfers to disposal for all chemicals and industries in the Inventory

CFCs (chlorofluorocarbons) are used as refrigerants, solvents and foam-blowing agents. CFC-114 is also used as the propellant in metered-dose inhalers for asthmatics. Production and imports of CFCs, except for essential uses, have been banned since 1996 in the US and Canada and will be prohibited in Mexico in 2010. TRI has collected information on releases of CFCs from manufacturing operations since 1991. The reduction from 1991 to 1999 of releases of CFCs from TRI manufacturing facilities has been 98 percent.

FIGURE 10. PRODUCTION AND RELEASES OF HCFCs (Montreal Protocol, Annex C, Group 1)



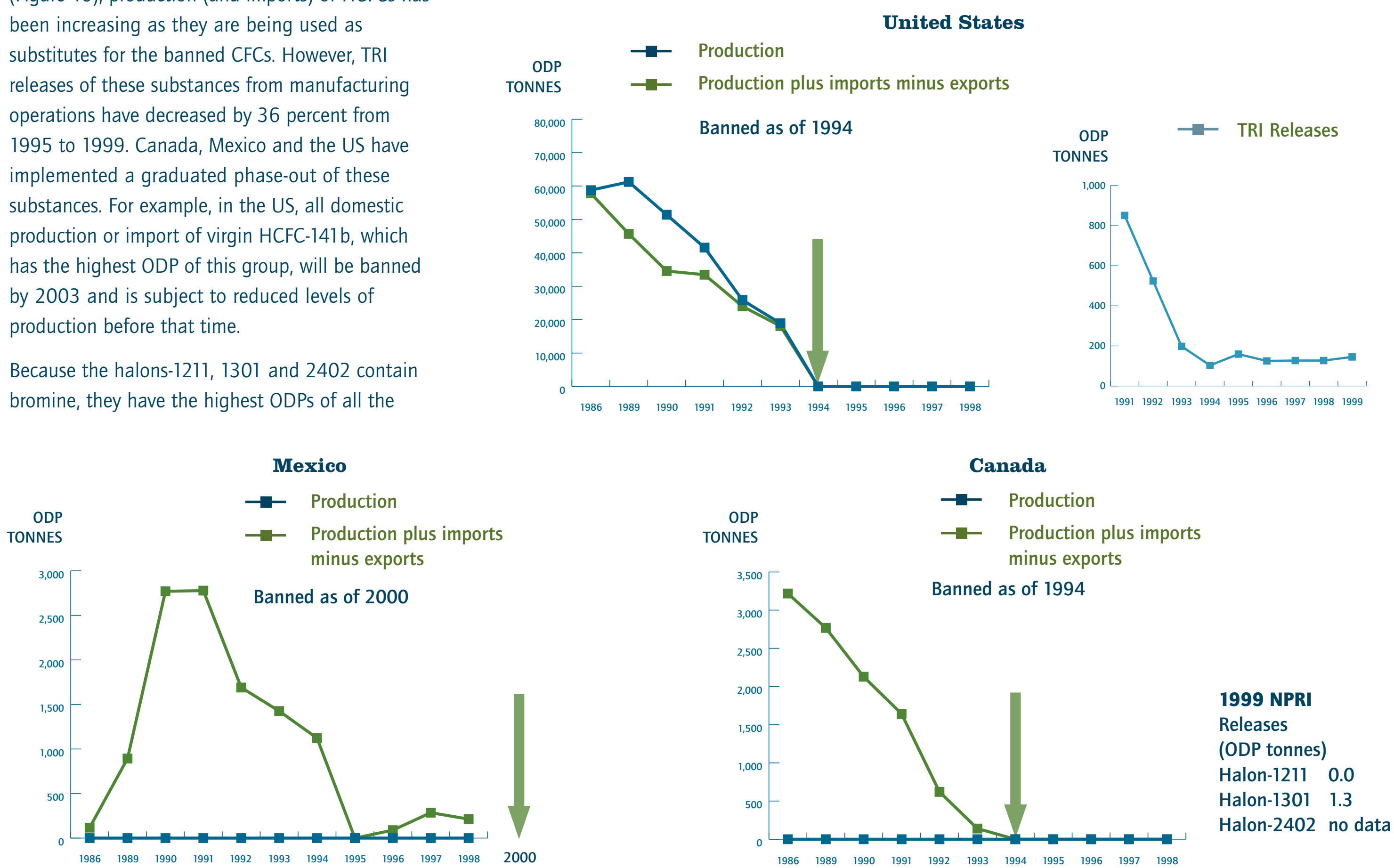


Note: *Note: ODP tonnes = Metric tonnes x Ozone Depletion Potential*
Source: Data Report: Production and Consumption of Ozone Depleting Substances 1986–1998, UNEP, October 1999.
TRI and NPRI releases: Total on-site air, water and land releases and off-site transfers to disposal for all chemicals and industries in the Inventory

HCFCs (hydrochlorofluorocarbons) are second-generation ozone-depleters. These substances were originally created as substitutes for CFCs and their ozone-depleting potentials are far less than those of the CFCs and halons. Under the Montreal Protocol, production levels of these substances were to be reduced to their 1989 levels by 1999, with a ban on production by 2030. As the figures show (Figure 10), production (and imports) of HCFCs has been increasing as they are being used as substitutes for the banned CFCs. However, TRI releases of these substances from manufacturing operations have decreased by 36 percent from 1995 to 1999. Canada, Mexico and the US have implemented a graduated phase-out of these substances. For example, in the US, all domestic production or import of virgin HCFC-141b, which has the highest ODP of this group, will be banned by 2003 and is subject to reduced levels of production before that time.

Because the halons-1211, 1301 and 2402 contain bromine, they have the highest ODPs of all the ozone-depleting substances. These halons are used as fire-extinguishing agents. Their production and importation in the US and Canada have been prohibited since 1994. The use of recycled halons is still permitted to allow for transition to alternatives. Halons have not been produced or imported into the US or Canada since 1994. The ban took effect in Mexico as of 2000. TRI has collected information on releases of halons since 1991 (Figure 11). The reduction from 1991 to 1999 of releases of halons from TRI manufacturing facilities has been 93 percent.

FIGURE 11. PRODUCTION AND RELEASES OF HALONS (Montreal Protocol, Annex A, Group 2)



Note: *Note: ODP tonnes = Metric tonnes x Ozone Depletion Potential*
Source: Data Report: Production and Consumption of Ozone Depleting Substances 1986–1998, UNEP, October 1999.
TRI and NPRI releases: Total on-site air, water and land releases and off-site transfers to disposal for all chemicals and industries in the Inventory

1995–1999 data

This section differs from the previous section of 1999 data in that it does not include the newly added chemicals, the newly reporting industry sectors, or transfers to recycling and energy recovery. This section also differs from the following section of 1998–1999 data, which does include the newly reporting industry sectors, and transfers to recycling and energy recovery, but does not include the newly added chemicals.

Taking Stock 1999 has a unique opportunity to analyze trends in releases and transfers of chemicals in North America over the five years, from 1995–1999. The data in this section have been consistently reported over this five-year period and include:

- 165 chemicals
- manufacturing industries

TABLE 14. RELEASES AND TRANSFERS in North America, 1995–1999 *(1995 Matched Chemicals and Industries)*

	NORTH AMERICA				NPRI*				TRI			
	1995 NUMBER	1999 NUMBER	CHANGE 1995–1999 NUMBER	%	1995 NUMBER	1999 NUMBER	CHANGE 1995–1999 NUMBER	%	1995 NUMBER	1999 NUMBER	CHANGE 1995–1999 NUMBER	%
Total Facilities	20,737	19,762	-975	-5	1,250	1,532	282	23	19,487	18,230	-1,257	-6
Total Forms	63,538	61,444	-2,094	-3	4,015	5,070	1,055	26	59,523	56,374	-3,149	-5
	TONNES	TONNES	TONNES	%	TONNES	TONNES	TONNES	%	TONNES	TONNES	TONNES	%
Total Releases On- and Off-site	1,101,729	1,040,045	-61,685	-6	121,525	128,813	7,288	6	980,204	911,231	-68,973	-7
On-site Releases	934,143	814,300	-119,843	-13	95,813	102,242	6,430	7	838,330	712,058	-126,272	-15
Off-site Releases	167,586	225,744	58,158	35	25,712	26,571	859	3	141,874	199,173	57,299	40
Total Transfers Off-site for Further Management	206,425	230,570	24,145	12	10,099	13,349	3,250	32	196,326	217,222	20,895	11
Total Releases and Transfers	1,308,155	1,270,615	-37,540	-2	131,624	142,162	10,538	8	1,176,530	1,128,453	-48,078	-4

Note: *Canada and US data only. Mexico data not available for 1995–1999. 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 that involve these chemicals.*

What are some of the most **SURPRISING TRENDS** over the five years from 1995–1999?

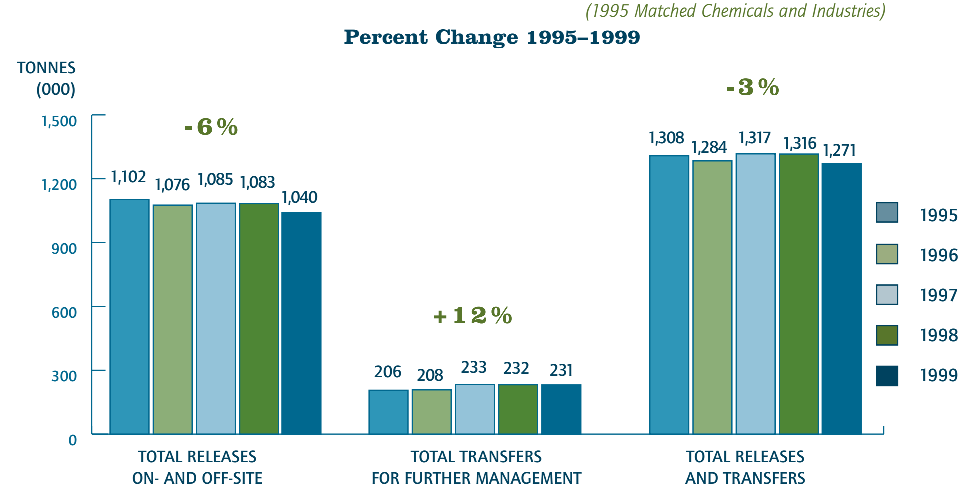
Given the diversity of industries reporting, the large number of facilities and the length of time, it is surprising how little the total amounts of releases and transfers of chemicals changed over the five years from 1995 to 1999 in North America. Over that five-year period total releases and transfers have increased slightly and then decreased slightly and overall showed a slight downward trend, of 3 percent. In 1995, total releases and transfers of chemicals were 1.3 million tonnes, and close to 1.3 million tonnes in 1999 (Table 14 and Figure 12).

This relatively slight decrease in total releases and transfers is all the more surprising when we consider that the underlying components have shown large changes from 1995 to 1999. On-site releases have declined by 13 percent, off-site releases have increased by 35 percent and total transfers for further management have also increased, by 12 percent, from 1995 to 1999 (Figure 13).

The reductions in one component, on-site releases have been partially offset by increases in other components, the off-site releases and transfers for further management. In general, fewer chemicals are being released at the facility site, especially to air, and more chemicals are being shipped off-site for disposal, mainly in landfills, for treatment or to sewage. While the total amount of releases and transfers has decreased only slightly over the five years, how chemicals are managed has dramatically changed.

This shift in reduced chemicals released at the facility site and increased amounts of chemicals sent off the site for disposal, treatment and sewage is one of the major changes over the five years.

FIGURE 12. CHANGE IN RELEASES AND TRANSFERS in North America, 1995–1999
(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999.*
Does not include amounts from new industries, transfers to recycling, or energy recovery or chemicals added to NPRI for 1999.

What are some of the positive **CHANGES SEEN IN THE FIVE YEARS** from 1995 to 1999?

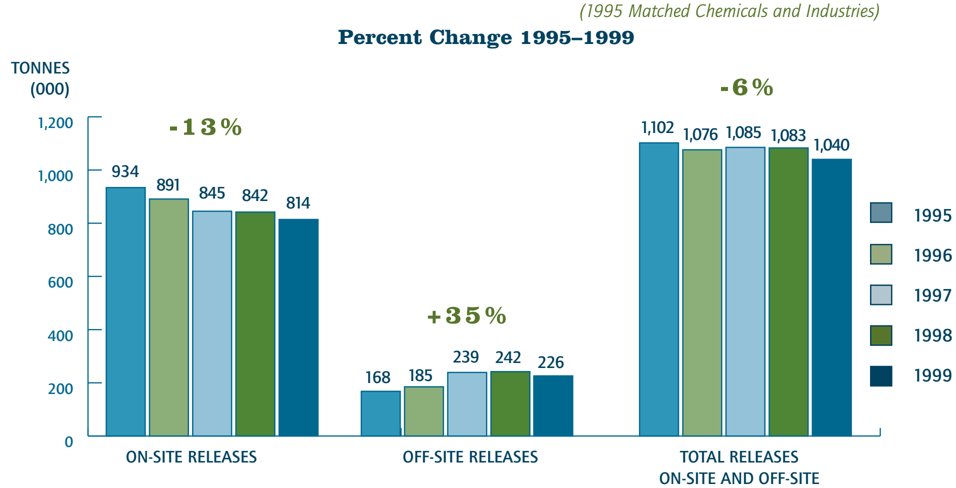
A 13-percent reduction in releases at facilities

Facilities in North America have reported large reductions in the amount of chemicals released on site from 1995 to 1999. In fact, on-site releases have been decreasing every year for five years, for an overall 13-percent reduction from 1995 to 1999. Over 934,000 tonnes of chemicals were released on-site in 1995 and this dropped to 814,000 tonnes in 1999. This is 120,000 fewer tonnes of chemicals released into our air, land, water and injected underground.

In the US, releases decreased by 15 percent at the facility site. In contrast, in Canada, on-site releases increased by 7 percent from 1995 to 1999. The large increase in Canada is due to one facility, Safety-Kleen Ltd. in Corunna, Ontario, which reported a 15,000-tonne increase in chemicals sent to its on-site landfill. If this facility's reporting were omitted from the analysis, then the overall change for on-site releases in Canada would have been a decrease of 9 percent.

FIGURE 13. CHANGE IN RELEASES ON- AND OFF-SITE in North America, 1995–1999

(1995 Matched Chemicals and Industries)



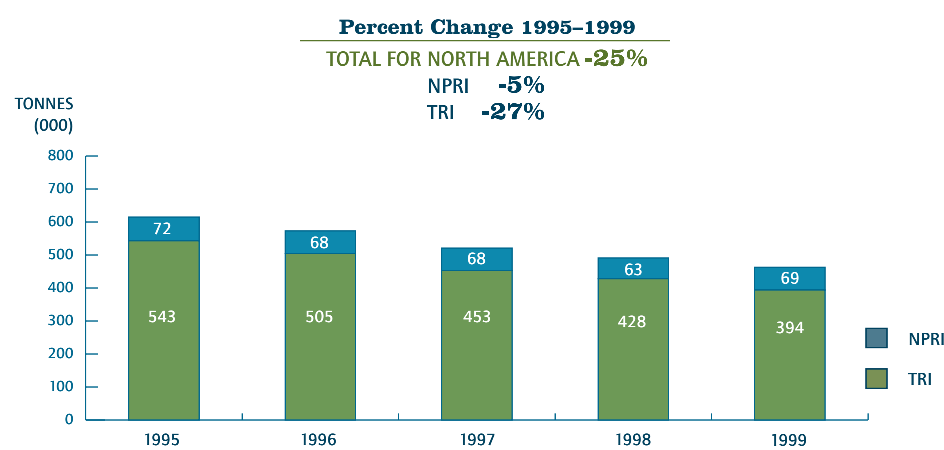
Note: *Canada and US data only. Mexico data not available for 1995–1999.*
Does not include amounts from new industries, transfers to recycling, or energy recovery or chemicals added to NPRI for 1999.

Facilities have reduced releases to air by 25 percent from 1995 to 1999 in North America

About half of the chemicals released at facilities were put into the air. Air releases at facilities are down substantially, from over 615,000 tonnes in 1995 to 463,000 tonnes in 1999. This is a 25-percent reduction in chemicals released to the air or approximately 162,000 fewer tonnes of chemicals (Figure 14). In Canada, this drop was 5 percent and in the US, air releases decreased by 27 percent.

FIGURE 14. CHANGE IN ON-SITE AIR RELEASES in North America, 1995–1999

(1995 Matched Chemicals and Industries)



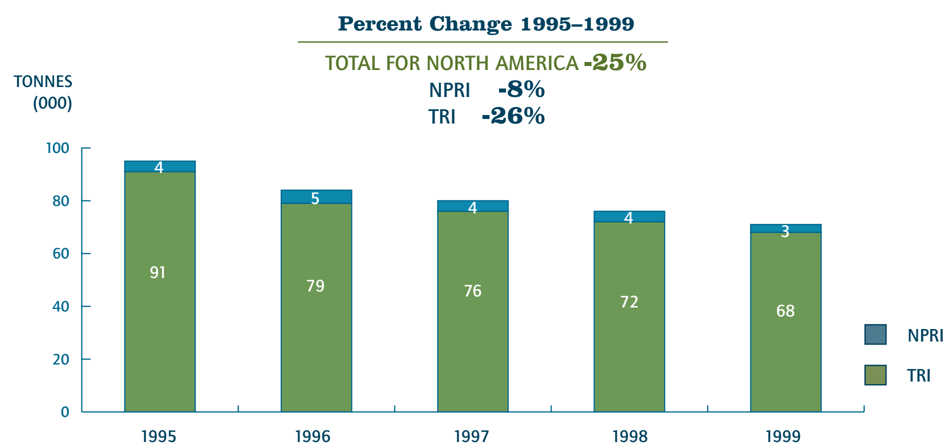
Note: *Canada and US data only. Mexico data not available for 1995–1999.*

Releases injected underground decreased from 1995 to 1999 in North America

Much smaller amounts of chemicals are injected underground than are released to the air, and these underground injections have also decreased in the five years. On-site underground injection dropped by 25 percent from 1995 to 1999 (Figure 15). In the US, underground injection decreased 26 percent, while in Canada, it decreased by 8 percent from 1995 to 1999. TRI facilities report a quantity of chemicals injected underground about twenty times greater than NPRI facilities.

FIGURE 15. CHANGE IN ON-SITE UNDERGROUND INJECTION in North America 1995–1999

(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999.*

WHERE DO WE NEED more progress?

Are carcinogens decreasing?

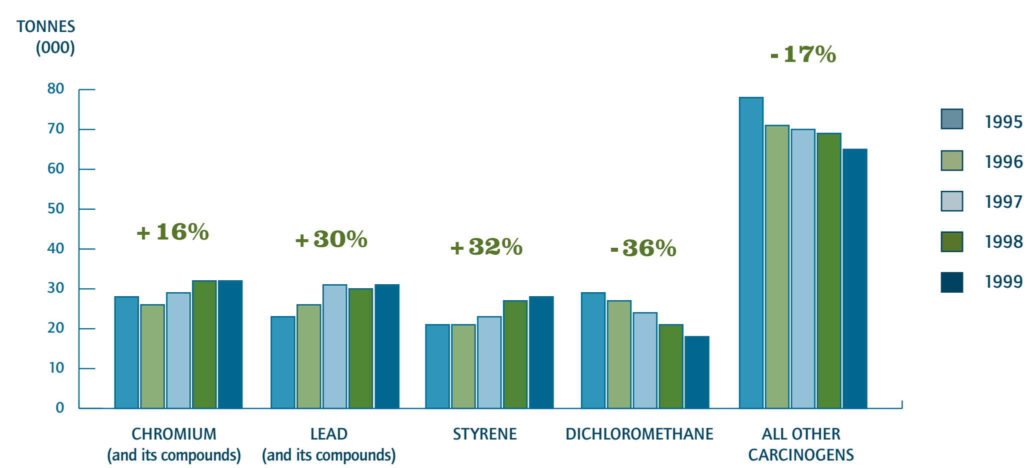
Many of the chemicals released or transferred are known or suspected carcinogens. In 1995, over 179,000 tonnes of carcinogens were released, which had decreased to 174,100 tonnes in 1999. While total releases of carcinogens are decreasing, they are not decreasing as quickly as other chemicals. Total releases of known or suspected carcinogens in North America decreased by 3 percent from 1995 to 1999, less than the 6-percent decrease for all chemicals.

The designated carcinogen with the largest decrease was dichloromethane, with a decrease of 10,000 tonnes or 36 percent (Figure 16). The designated carcinogen with the largest increase was lead and its compounds with an increase of 7,000 tonnes or 30 percent.

FIGURE 16. CHANGE IN ON- AND OFF-SITE RELEASES in North America of known or suspected carcinogens, with largest releases, 1995–1999

(1995 Matched Chemicals and Industries)

Percent Change 1995–1999



Note: *Canada and US data only. Mexico data not available for 1995–1999. Includes manufacturing industries. Does not include amounts from new industries or transfers to recycling or energy recovery.*

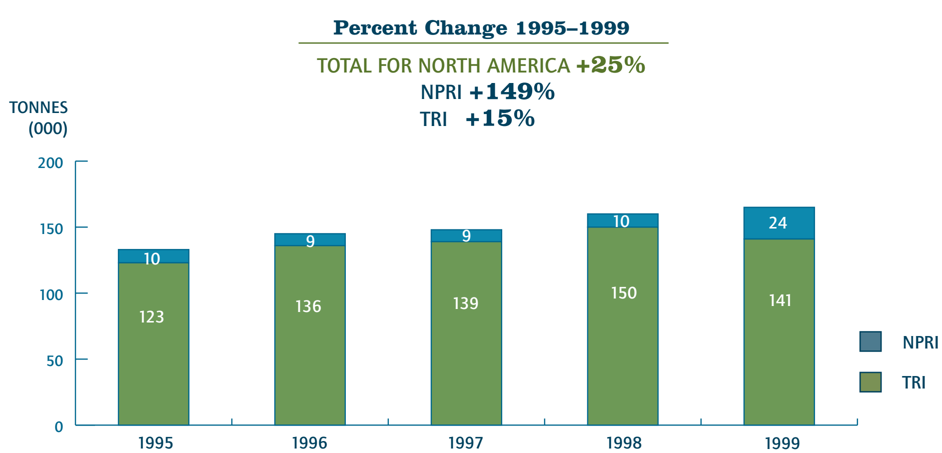
Are more chemicals being sent to landfills?

Yes. There has been a significant increase in the amount of chemicals being disposed of in landfills. This includes amounts released to land on-site at the facility (i.e., chemicals disposed of on land, buried in landfills, incorporated into the soil (land treatment), held in surface ponds and/or accumulated in waste piles) as well as chemicals sent off-site to landfills at other locations.

There was an increase in the total amount of on-site land disposal in North America from 1995 to 1999. During this time, facilities disposed of 25 percent more chemicals on land at the site of the facility (Figure 17). In 1995, 133,000 tonnes of chemicals were disposed of which rose to 165,000 tonnes in 1999. The increase has occurred in each year from 1995 to 1999. Both TRI and NPRI facilities showed an increase from 1995 to 1999.

FIGURE 17. CHANGE IN ON-SITE LAND RELEASES in North America, 1995–1999

(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999.*

Has there been progress in reducing the amount of chemicals released off- site?

No. Off-site releases have shown the opposite pattern to on-site releases, with a large 35-percent increase from 1995 to 1999. Off-site releases are chemicals sent off-site to other locations for disposal, and metals sent offsite for treatment, energy recovery and sewage. In 1995, 168,000 tonnes were released off-site, increasing to 226,000 tonnes in 1999 (Figure 18). This increase in chemicals sent off-site for disposal is one of the most significant changes from 1995 to 1999.

In the US the increase was 40 percent from 1995 to 1999 and increases were reported in all years except from 1997 to 1998. Canadian facilities reported an overall increase of 3 percent from 1995 to 1999, but these amounts have decreased since 1997.

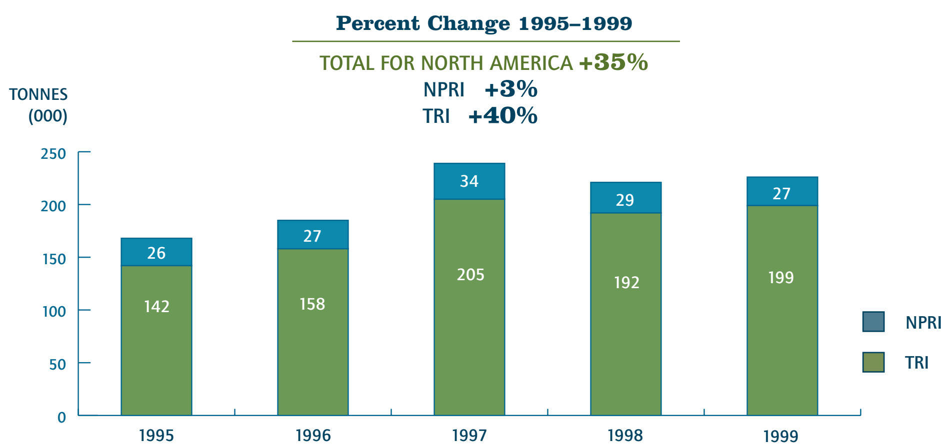
The disposal of metals and their compounds drove most of this increase in off-site disposal. In fact, off-site releases of metals and their compounds increased by 51,100 tonnes, 35 percent, in North America from 1995 to 1999.

Facilities in both Canada and the US increased disposal of metals off-site. Canadian facilities showed an 11-percent increase and US facilities, a 39-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 1999. For US facilities, however, such transfers increased steadily since 1995, reaching a level 48 percent higher in 1999.

FIGURE 18. CHANGE IN OFF-SITE RELEASES in North America, 1995–1999

(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999.*

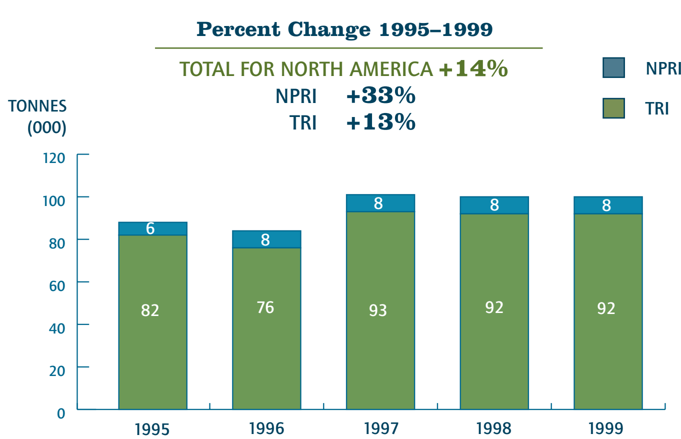
Are more chemicals being sent to treatment and sewage?

Much smaller quantities of chemicals are sent to treatment and sewage than land disposal. But like land disposal, both transfers of chemicals to treatment as well as to sewage increased from 1995 to 1999, for a total increase of 12 percent (Figures 19 and 20). Transfers to treatment increased by 14 percent and those to sewage by 10 percent. This was true for both NPRI and TRI, although such transfers increased by a much greater percent in NPRI (by 33 percent for transfers to treatment and by 31 percent for transfers to sewage).

Transfers to both treatment and to sewage did decrease from 1998 to 1999 in North America and in TRI. Transfers to treatment have decreased in NPRI since 1997 although transfers to sewage continued increasing in NPRI throughout the period 1995 to 1999.

FIGURE 19. CHANGE IN TRANSFERS to treatment in North America, 1995–1999

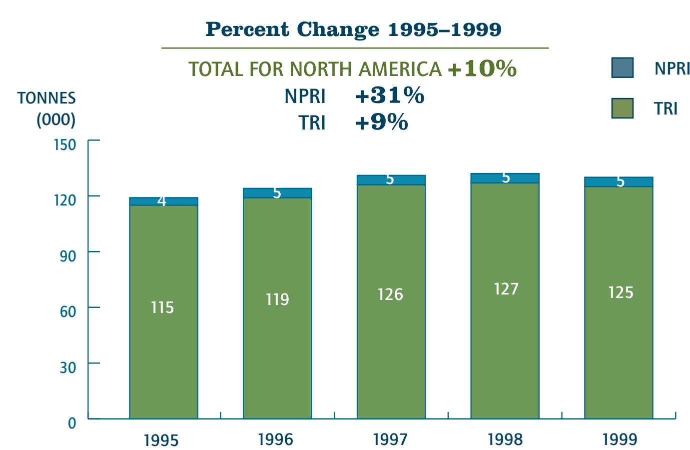
(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999.*

FIGURE 20. CHANGE IN TRANSFERS to sewage in North America, 1995–1999

(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999.*

Are more chemicals being sent to our lakes, rivers and streams?

Unlike air releases, on-site releases to water increased, by 26 percent or about 24,000 tonnes from 1995 to 1999 in North America (Figure 21). Most of this increase is from facilities in the US, which reported a 35-percent increase, or 28,400 tonnes. Approximately 40 percent 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 10,000 tonnes, primarily of nitrate compounds.

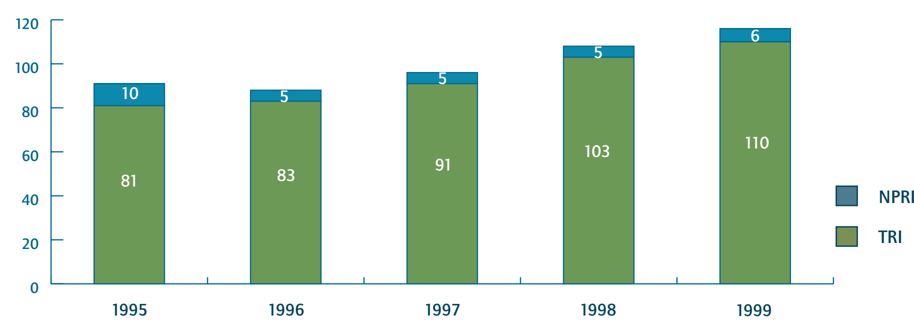
Canadian facilities reported an overall reduction of 43 percent or 4,400 tonnes in the amount of chemicals released to water from 1995 to 1999, but this decrease happened from 1995 to 1997 and these releases have been increasing since 1997.

FIGURE 21. CHANGE IN ON-SITE SURFACE WATER DISCHARGES in North America, 1995–1999

(1995 Matched Chemicals and Industries)

Percent Change 1995–1999

TOTAL FOR NORTH AMERICA **+26%**
NPRI **-43%**
TRI **+35%**



Note: Canada and US data only. Mexico data not available for 1995–1999.

What's the total of chemicals **RELEASED AND TRANSFERRED** over the five years, 1995–1999?

Over the five years from 1995 to 1999, a total of approximately 6.5 million tonnes of chemicals have been released or transferred in North America, according to the PRTR matched data reported to the Canadian and US databases.

Almost half of this amount has been put into the air. Over the five-year period from 1995 to 1999, a total of 2.7 million tonnes of chemicals have been released into the air from facilities. Next-largest is the 1.1 million tonnes of chemicals transferred to treatment and sewage. Over 1 million tonnes of chemicals were released off-site, mainly metals to disposal. Almost three quarters of a million tonnes of chemicals have been disposed of on land at the facility site, again mainly metals to landfill. Almost half a million tonnes of chemicals have been released into our rivers, lakes and streams over the five years. Another almost half-million tonnes has also been injected underground at facilities.

These five-year totals will be underestimates as they do not include reporting from the new sectors such as electric utilities, which first reported in 1998 and reported large amounts of chemicals (more than one-quarter of all releases in 1999). In addition, these totals do not include all chemicals, just the 165 chemicals that are reported over the five years, do not include all sources, just those that report to NPRI and TRI over the five years, and do not include chemicals transported long distances by wind or water. Some of these chemicals may persistent in the environment for long periods of time, and others may be broken down more rapidly.

FIVE-YEAR TRENDS
by jurisdiction, sector, facility and chemical

Which states and provinces showed decreases in releases and transfers from 1995 to 1999?

Texas, with the largest amount of releases and transfers from manufacturing facilities in 1995 and 1999, also showed the largest reductions. From 1995 to 1999, facilities in Texas reported a 22,500-tonne (15 percent) reduction in releases and transfers of the matched chemicals. Some of this reduction is the result of decreases of over 4,000 tonnes at each of three facilities in Texas: Millenium Petrochemicals Inc. (Millennium Chemicals Inc.) in La Porte, Huntsman Corporation, Port Arthur, A&O plant and the DuPont Beaumont Plant.

Alabama had the second-largest decrease, with a 13,500-tonne reduction (27 percent) in releases and transfers from 1995 to 1999. 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 11,000 tonnes.

Tennessee had the third-largest decrease, with a 12,000-tonne reduction (24 percent) in releases and transfers from 1995 to 1999. Tennessee facilities with the largest reduction were Lenzing Fibres Corp. in Lowland, with a 4,500-tonne decrease, and the DuPont Johnsonville plant, with a 2,400-tonne decrease.

Which states and provinces showed increases in releases and transfers from 1995 to 1999?

Ontario had the largest increase in releases and transfers in North America from 1995 to 1999, with an increase of 13,200 tonnes (19 percent). One facility, Safety-Kleen Ltd., in Corunna, reported a 15,000-tonne increase in zinc and its compounds sent to disposal in on-site landfill.

Indiana had the second-largest increase in releases and transfers in North America from 1995 to 1999. Most of the 12,700-tonne increase in releases and transfers in Indiana was due to two facilities, Steel Dynamics Inc., in Butler, Indiana, with a 9,600-tonne increase, and USX Corporation's USS Gary Works in Gary, Indiana, with a 2,900-tonne increase.

Which industrial sectors decreased releases and transfers from 1995 to 1999?

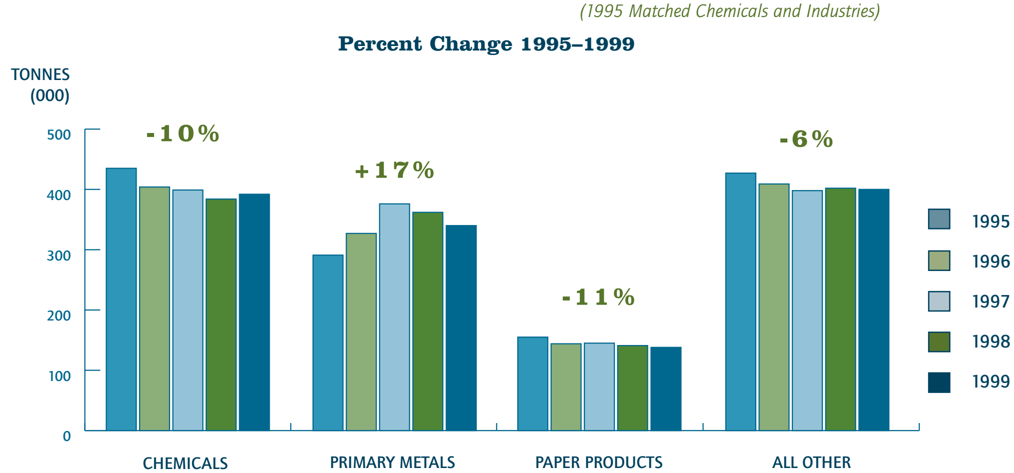
Two industrial sectors (chemicals and paper) showed the largest decrease in chemicals released and transferred from 1995 to 1999 in North America (Figure 22). The chemical industry led all manufacturing sectors with reductions of more than 43,000 tonnes, or 10 percent, from 1995 to 1999, followed by paper products with more than 16,000 tonnes, an 11-percent reduction.

The chemical industry reported a reduction of 60,000 tonnes in total releases, but an increase of 16,700 tonnes in transfers to treatment and sewage from 1995 to 1999. The reduction in total releases was largely due to reductions in on-site air emissions and on-site underground injection.

Other industry sectors reporting decreases from 1995 to 1999 included furniture and fixtures (over 11,000 tonnes, 58 percent) and two industries reporting reductions of over 5,000 tonnes: fabricated metal products (12 percent) and rubber and plastics products (9 percent).

FIGURE 22. CHANGE IN TOTAL RELEASES AND TRANSFERS in North America for industries with largest total releases and transfers, 1995–1999

(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999. Includes manufacturing industries and 165 chemicals. Does not include amounts from new industries, transfers to recycling or energy recovery or chemicals added to NPRI for 1999.*

Which industrial sectors increased releases and transfers from 1995 to 1999?

The primary metals sector showed the largest increase in releases and transfers among all manufacturing sectors from 1995 to 1999. Releases and transfers from the primary metals sector rose to almost 49,000 tonnes, an increase of 17 percent from 1995 to 1999.

The large increase from 1995 to 1999 from the primary metals sector is due to increases of over 41,600 tonnes in metals sent off-site to landfills, an increase of 14,000 tonnes in on-site water discharges, and 8,000 tonnes of on-site land disposal. The primary metals industry did report reductions of almost 12,000 tonnes of on-site air emissions.

One other manufacturing industry sector reported increases of over 10,000 tonnes from 1995 to 1999. This was the food products industry, which reported an increase of 12,800 tonnes, or 40 percent.

Which facilities reported the largest decrease in releases and transfers in North America from 1995 to 1999?

A chemical plant, Acordis Cellulosic Fibers, Akzo Nobel Finance US, in Axis, Alabama, had the largest reduction (over 11,000 tonnes) in releases and transfers of matched chemicals reported in North America from 1995 to 1999 (Table 15). 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 Co-Steel Lasco, in Whitby, Ontario, with a reduction of over 4,000 tonnes, mainly a reduction of transfers of zinc and its compounds for disposal. This steel manufacturer reported that decrease was due to a change in raw material composition.

Which facilities showed the largest increase in releases and transfers in North America from 1995 to 1999?

The facility with the largest increase in North America from 1995 to 1999 was Safety-Kleen in Corunna, Ontario (Table 16). This facility reported an increase of 15,000 tonnes, mainly of zinc and its compounds sent disposed of in to its on-site landfill. The facility stated that the cited variation in its hazardous waste management operations was the reason for the increase.

The 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 to1999. This facility increased its on-site land disposal of copper and zinc and their compounds, which accounted for the majority of the almost 11,000-tonne increase. Part of this increase was due to new reporting from its mining operations.

TABLE 15. THE 15 FACILITIES IN NORTH AMERICA with largest decreases in total releases and transfers, 1995–1999

(1995 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE CANADA	SIC CODE US	TOTAL RELEASES AND TRANSFERS 1995 (kg)	TOTAL RELEASES AND TRANSFERS 1999 (kg)	TOTAL RELEASES AND TRANSFERS CHANGE 1995–1999 (kg)	MAJOR CHEMICALS REPORTED WITH DECREASES (PRIMARY MEDIA/ TRANSFERS WITH DECREASES)*
1	Acordis Cellulosic Fibers Inc., Acordis U.S. Holding Inc.	Axis, AL		28	15,427,756	3,995,214	-11,432,542	Carbon disulfide (air)
2	Magnesium Corp. of America, Renco Group Inc.	Rowley, UT		33	29,168,743	21,471,752	-7,696,991	Chlorine (air)
3	Phelps Dodge Miami Inc., Phelps Dodge	Claypool, AZ		33	7,066,233	**	-7,066,233	Copper/Zinc and compounds (land)
4	Cytec Inds. Inc. Fortier Plant	Westwego, LA		28	11,718,277	5,108,617	-6,609,660	Acetonitrile, Acrylic acid (UIJ)
5	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	14,607,894	8,512,671	-6,095,223	Zinc/Copper and compounds (land)
6	GMC Powertrain Defiance, General Motors Corp.	Defiance, OH		33	6,544,692	1,137,457	-5,407,235	Zinc and compounds (land)
7	Millennium Petrochemical Inc. La Porte Plant, Millennium Chemicals	La Porte, TX		28	5,148,906	104,618	-5,044,288	Vinyl acetate (transfers to treatment)
8	Lenzing Fibers Corp.	Lowland, TN		28	10,789,274	6,280,657	-4,508,617	Carbon disulfide (air)
9	DuPont Cape Fear	Leland, NC		28	5,283,733	793,120	-4,490,613	Ethylene glycol (transfers to treatment)
10	Huntsman Corp. Port Arthur - A&O Plant, Hunstman Petrochemical Corp.	Port Arthur, TX		28	4,462,199	80,222	-4,381,977	Propylene (air)
11	DuPont Beaumont Plant	Beaumont, TX		28	8,921,575	4,600,819	-4,320,756	Nitric acid and nitrate compounds (UIJ)
12	Co-Steel Lasco	Whitby, ON	29	33	8,442,331	4,170,767	-4,271,564	Zinc and compounds (transfers of metals), Copper and compounds (land)
13	Simpson Pasadena Paper Co., Simpson Investment Co.	Pasadena, TX		26	4,359,973	283,575	-4,076,398	Methanol (transfers to sewage)
14	Celanese Ltd. Clear Lake Plant, Celanese Americas Corp.	Pasadena, TX		28	7,498,535	3,606,079	-3,892,456	Ethylene glycol (UIJ)
15	Zinc Corp. of America Monaca Smelter, Horsehead Inds. Inc.	Monaca, PA		33	15,994,774	12,325,557	-3,669,217	Lead/Zinc/Manganese and compounds (transfers of metals)
	Total				**155,434,895**	**72,471,125**	**-82,963,770**	

Note: *Canada and US data only. Mexico data not available for 1995–1999. The data are estimates of releases and transfers of chemicals reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are meant to imply that a facility, state or province is not meeting its legal requirements.*

* *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 within US SIC code 20–39.*

UIJ = Underground injection.

TABLE 16. THE 15 FACILITIES IN NORTH AMERICA with largest increases in total releases and transfers, 1995–1999

(1995 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODE CANADA	SIC CODE US	TOTAL RELEASES AND TRANSFERS 1995 (kg)	TOTAL RELEASES AND TRANSFERS 1999 (kg)	TOTAL RELEASES AND TRANSFERS CHANGE 1995–1999 (kg)	MAJOR CHEMICALS REPORTED WITH INCREASES (PRIMARY MEDIA/ TRANSFERS WITH INCREASES)*
1	Safety-Kleen Ltd., Lambton Facility	Corunna, ON	37	28	**	15,378,584	15,378,584	Zinc and compounds (land)
2	ASARCO Inc. Ray Complex/Hayden Smelter & Concentrator, Grupo Mexico	Hayden, AZ		33	9,919,427	21,026,352	11,106,925	Copper/Zinc and compounds (land)
3	AK Steel - Butler Works (Rte. 8 S)	Butler, PA		33	4,738,386	15,512,671	10,774,285	Nitric acid and nitrate compounds (water)
4	Kennecott Utah Copper Smelter & Refy., Kennecott Holdings Corp.	Magna, UT		33	2,885,124	12,893,911	10,008,787	Arsenic/Copper/Zinc and compounds (land)
5	Steel Dynamics Inc.	Butler, IN		33	6,117	9,590,376	9,584,259	Zinc and compounds, Aluminum (transfers of metals)
6	Solutia Inc.	Gonzalez, FL		28	5,939,341	12,118,894	6,179,553	Nitric acid and nitrate compounds (UIJ)
7	Nucor-Yamato Steel Co., Nucor Corp.	Blytheville, AR		33	72,019	5,802,738	5,730,719	Zinc and compounds (transfers of metals)
8	Dofasco Inc., Dofasco Hamilton	Hamilton, ON	29	33	2,523,129	7,231,033	4,707,904	Zinc and compounds (transfers of metals)
9	Jayhawk Fine Chemicals Corp., Laporte Fine Chemicals	Galena, KS		28	1,926,108	6,342,694	4,416,586	Nitric acid and nitrate compounds (transfers to disposal)
10	Dow Chemical Co., Midland Ops.	Midland, MI		28	582,446	4,143,576	3,561,130	Styrene (transfers to treatment)
11	Nucor Steel, Nucor Corp.	Huger, SC		33	**	3,302,097	3,302,097	Zinc and compounds (transfers of metals)
12	Cascade Steel Rolling Mills, Schnitzer Steel Inds.	McMinnville, OR		33	1,969	3,168,046	3,166,077	Zinc and compounds (transfers of metals)
13	Ipsco Steel Inc., Ipsco Inc.	Muscatine, IA		33	**	3,065,625	3,065,625	Zinc and compounds (transfers of metals)
14	IBP Inc.	Lexington, NE		20	**	2,950,029	2,950,029	Nitric acid and nitrate compounds (water)
15	USS Gary Works, USX Corp.	Gary, IN		33	3,512,656	6,373,902	2,861,246	Zinc and compounds (land)
	Total				**32,106,722**	**128,900,528**	**96,793,806**	

Note: *Canada and US data only. Mexico data not available for 1995-1999. The data are estimates of releases and transfers of chemicals reported by facilities, and should not be interpreted as levels of human exposure or environmental impact. The rankings are meant to imply that a facility, state or province is not meeting its legal requirements.*

* *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 within US SIC code 20–39.*

UIJ = Underground injection.

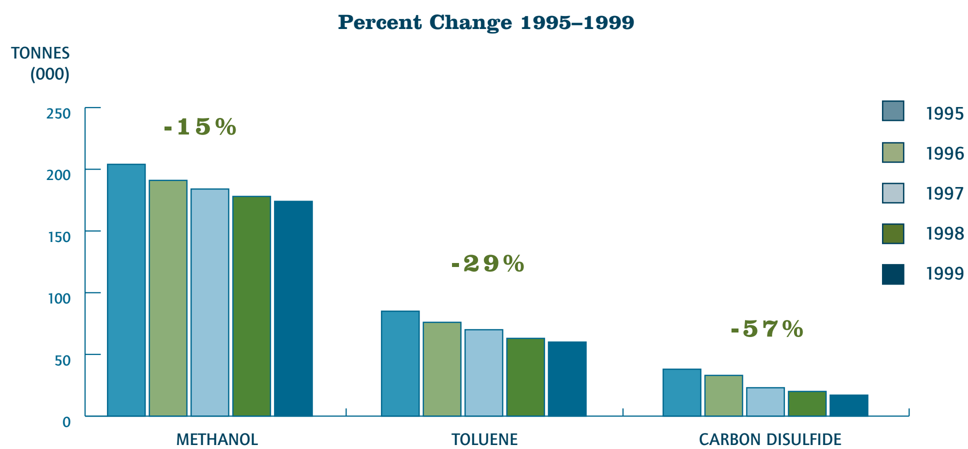
Which chemicals showed the largest reductions from 1995 to 1999 in North America?

Of the 165 matched chemicals in this matched data set, the chemicals with the largest reduction in total releases on-and off-site and transfers from 1995 to 1999 were (Figure 23):

- methanol
- toluene
- carbon disulfide

FIGURE 23. CHANGE IN TOTAL RELEASES AND TRANSFERS in North America for the three chemicals with the largest decreases, 1995–1999

(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999. Includes manufacturing industries. Does not include amounts from new industries or transfers to recycling or energy recovery.*

Methanol

Total releases and transfers of methanol were reduced by 30,000 tonnes or 15 percent from 1995 to 1999. Both TRI and NPRI showed large decreases in methanol. NPRI facilities reported a 6,000-tonne decrease and TRI facilities reported a 24,000-tonne decrease.

In both the US and Canada, the largest reductions of methanol were reported by chemical and paper products manufacturers. North American facilities in the chemical industry reported an overall decrease of 13,900 tonnes, with Canadian facilities reporting 4,000 tonnes and US facilities reporting 9,900 tonnes. North American paper products manufacturers reported an overall reduction of 12,800 tonnes, with US facilities reporting a reduction of 9,700 tonnes and Canadian facilities, a reduction of 3,100 tonnes.

Methanol evaporates into the air, breaks down into other chemicals and can contribute to smog formation. It can also react in the air to produce the carcinogen, formaldehyde. 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.

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. It 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 1999, with a reduction of 25,000 tonnes (29 percent). Most of this decrease was from TRI facilities that reported a 26,000-tonne decrease or 34 percent. NPRI facilities actually increased total releases and transfers of toluene by 12 percent (almost 1,000 tonnes).

TRI facilities in the furniture and fixtures industry reported the largest reduction, 3,700 tonnes, and a 64-percent decrease for this industry in the US from 1995 to 1999. TRI facilities in the printing and publishing industry reported a 3,600-tonne decrease, a 31-percent reduction for that industry in the US.

Toluene evaporates into the air, breaks down into other chemicals that can contribute to smog formation. It 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 attributed to toluene in clinical and occupational studies of repeatedly high levels of 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 1999 in North America. Most of this came from TRI facilities, which reported a 57-percent decrease of 22,000 tonnes. One facility, Acordis Cellulosic Fibers Inc., Akzo Nobel Finance US, in Axis, Alabama, with a reduction of 11,000 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 to 1999 in North America?

Of the 165 substances common to both TRI and NPRI for the reporting years 1995 through 1999, the substances with the largest increase in releases and transfers in North America from 1995 to 1999 were (Figure 24):

- zinc and its compounds,
- nitric acid and nitrate compounds, and
- manganese and its compounds.

Zinc and its compounds

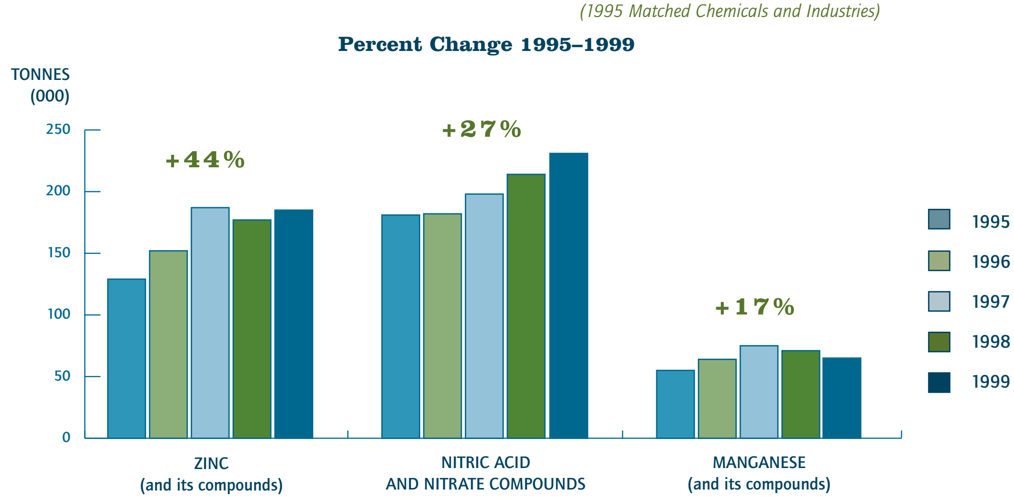
From 1995–1999, total releases and transfers of zinc and its compounds increased by 56,800 tonnes, or 44 percent. Both TRI and NPRI facilities reported large increases in zinc and its compounds: 43,600 tonnes (39 percent) in TRI and 13,200 tonnes (78 percent) in NPRI.

One NPRI facility (Safety-Kleen in Corunna, Ontario) reported an increase in on-site land disposal of 11,600 tonnes of zinc and its compounds. Most of the increase in zinc and its compounds from TRI facilities was due to increases in off-site releases from the primary metals sector, which reported an increase of 41,700 tonnes, or 51 percent, of off-site transfers to disposal of this metal from 1995 to 1999. However, the 1999 amount was a decrease of 5 percent from 1998.

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 the pancreas, and reduction of beneficial cholesterol.

FIGURE 24. CHANGE IN TOTAL RELEASES AND TRANSFERS for the three chemicals with the largest increases in North America, 1995–1999

(1995 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1995–1999. Includes manufacturing industries. Does not include amounts from new industries, transfers to recycling or energy recovery.*

Nitric acid and nitrate compounds

Nitric acid and nitrate compounds showed the second-largest increase in total releases and transfers: 49,500 tonnes, or 27 percent.

One Armco Inc. facility in Butler, Pennsylvania, reported almost 10,000 tonnes of increases in nitric acid and nitrate compounds on-site discharges to water. Another facility, Solutia Inc., in Gonzalez, Florida, reported a 5,500-tonne increase in on-site releases to underground injection.

The chief use of nitric acid is in producing ammonium nitrate fertilizer. The chemical is also used in the manufacture of cyclohexanone and as a raw material for adipic acid and caprolactam, both used in the synthesis of nylon. Nitrates are also used in producing explosives, including gunpowder.

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 1999. Manganese and its compounds increased by 9,600 tonnes or 17 percent. The primary metals industry accounted for much of this increase, reporting 5,600 tonnes in increases of 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 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.

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, but do not tend to bioaccumulate.

1998–1999 data

How did releases and transfers change from the previous year? This section analyzes data from 1998 to 1999, which include:

- 165 chemicals;
- manufacturing facilities;
- newly reporting industry sectors (electric utilities, hazardous waste management facilities, chemical wholesalers and coal mines); and
- transfers to recycling and energy recovery.

This data set is different from that for 1999, which analyzes an expanded set of 210 chemicals. This data set also differs from the 1995 to 1999 data set, which covers a longer timespan and does not include newly reporting industry sectors or transfers to recycling and energy recovery.

OVERALL changes

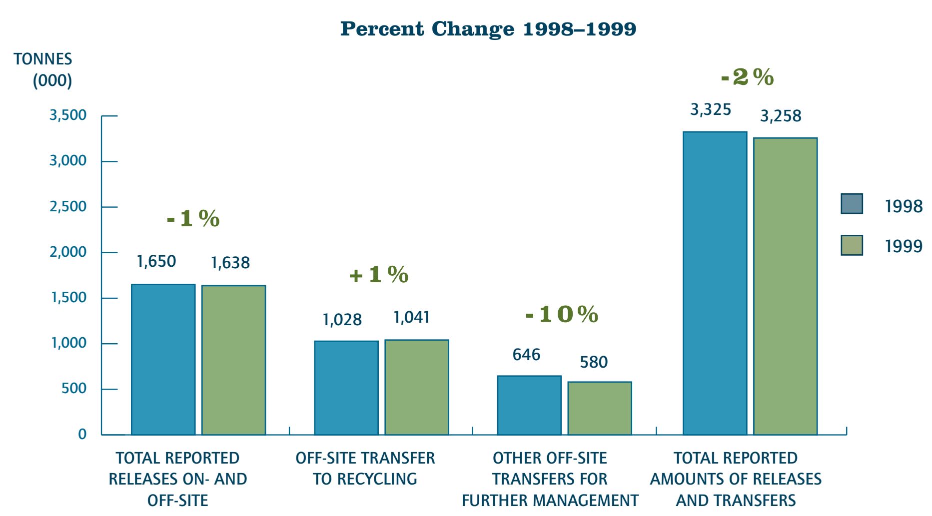
What has changed from 1998 to 1999?

In general, there was little change in the overall North American numbers from 1998 to 1999, but large changes have occurred within both TRI and NPRI (see Table 17 and Figure 25). From 1998 to 1999, total releases and transfers of chemicals reported in North America fell by just 2 percent (from 3.32 million tonnes to 3.26 million tonnes).

On- and off-site releases also showed little change from 1998 to 1999 in North America, with total releases decreasing by only 1 percent (from 1.65 million tonnes to 1.64 million tonnes). The major change was a 10-percent reduction in chemicals transferred off-site for further management, mainly due to a reduced amount sent to energy recovery.

FIGURE 25. CHANGE IN TOTAL REPORTED AMOUNTS of releases and transfers in North America, 1998–1999

(1998 Matched Chemicals and Industries)



Note: Canada and US data only. Mexico data not available for 1998–1999.

TABLE 17. TOTAL REPORTED AMOUNTS OF RELEASES AND TRANSFERS in North America, NPRI and TRI, 1998–1999

(1998 Matched Chemicals and Industries)

	NORTH AMERICA 1998 NUMBER	NORTH AMERICA 1999 NUMBER	NORTH AMERICA CHANGE 1998–1999 %	NPRI* 1998 NUMBER	NPRI* 1999 NUMBER	NPRI* CHANGE 1998–1999 %	TRI 1998 NUMBER	TRI 1999 NUMBER	TRI CHANGE 1998–1999 %
Total Facilities	21,554	21,056	-2	1,510	1,611	7	20,044	19,445	-3
Total Forms	71,242	70,154	-2	5,096	5,509	8	66,146	64,645	-2
	TONNES	TONNES	%	TONNES	TONNES	%	TONNES	TONNES	%
Total Reported Releases On- and Off-site	**1,650,461**	**1,638,253**	**-1**	**155,336**	**164,561**	**6**	**1,495,126**	**1,473,692**	**-1**
On-site Releases	1,376,292	1,364,555	-1	103,762	120,874	16	1,272,529	1,243,681	-2
Off-site Releases**	274,170	273,698	-0.2	51,574	43,686	-15	222,596	230,011	3
Off-site Transfers for Further Management									
Off-site Transfers to Recycling	1,028,270	1,040,540	1	133,153	108,707	-18	895,116	931,833	4
Other Off-site Transfers for Further Management	646,163	579,544	-10	28,110	30,044	7	618,054	549,500	-11
Total Reported Amounts of Releases and Transfers	**3,324,894**	**3,258,337**	**-2**	**316,599**	**303,312**	**-4**	**3,008,296**	**2,955,025**	**-2**

Note: Canada and US data only. Mexico data not available for 1998–1999. 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 that involve these chemicals.

** The sum of air, surface water, underground injection and land releases in NPRI does not equal 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.*

Have releases at facilities increased or decreased from 1998 to 1999?

North American on-site releases were fairly similar from 1998 to 1999, with over 1.3 million tonnes reported released in each year (see Table 18 and Figure 26). However, major shifts occurred in on-site releases in both TRI and NPRI. Some of these shifts were the result of a few facilities or changed estimation methods by one sector.

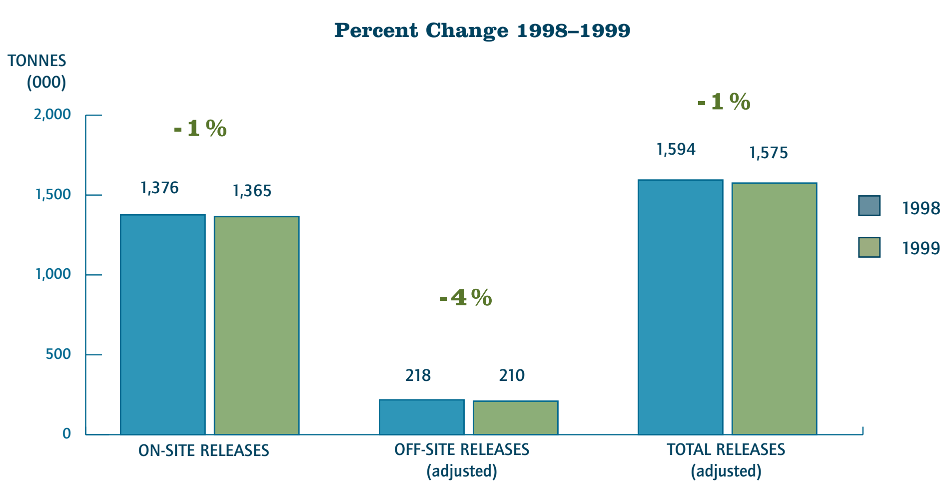
For example, the amount of chemicals released at NPRI facility sites have increased by 16 percent (Table 18). This increase is driven by an 84-percent increase in land disposal, mainly due to a large increase in landfilling at the Safety-Kleen facility in Corunna, Ontario. Safety-Kleen reported that variation in its waste management business was the reason for the large 15,000-tonne increase.

There was also a 5-percent increase in air releases and a 17-percent increase in water releases in NPRI from 1998 to 1999. These increases were partially the result of new estimation methods used by the pulp and paper sector. In NPRI many pulp and paper mills reported a change in how they estimated their on-site releases. A handbook recently developed by the National Council for Air and Stream Improvements (NCASI) provides improved estimation methods and has resulted, in several cases, in increased estimates and/or increased numbers of chemicals reported. Over 70 percent of NPRI paper facilities reported using the new estimation methods for their 1999 data. About 30 percent revised their 1998 data. The NPRI paper industry reported an overall increase of 21 percent in total on-site releases, including a 4,300-tonne increase in air emissions and a 1,300-tonne increase in water discharges. Some of this increase is due to the change in estimation methods and some is due to increased production or other factors.

Overall, TRI showed smaller changes in on-site releases, with air emissions decreasing by 2 percent, land disposal by 5 percent and underground injection by 6 percent. On-site releases to water were up 6 percent in TRI, mainly due to one Armco Inc. facility in Butler, Pennsylvania, which reported an increase of almost 500 tonnes of releases of nitrate compounds.

FIGURE 26. CHANGE IN RELEASES ON- AND OFF-SITE in North America, 1998–1999

(1998 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1998–1999.*

TABLE 18. RELEASES ON- AND OFF-SITE in North America, NPRI and TRI, 1998–1999

(1998 Matched Chemicals and Industries)

	NORTH AMERICA 1998 TONNES	NORTH AMERICA 1999 TONNES	NORTH AMERICA CHANGE 1998–1999 %	NPRI* 1998 TONNES	NPRI* 1999 TONNES	NPRI* CHANGE 1998–1999 %	TRI 1998 TONNES	TRI 1999 TONNES	TRI CHANGE 1998–1999 %
Releases On- and Off-site									
On-site Releases	**1,376,292**	**1,364,555**	**-1**	**103,762**	**120,874**	**16**	**1,272,529**	**1,243,681**	**-2**
Air	868,024	857,822	-1	79,932	84,006	5	788,091	773,816	-2
Surface Water	110,564	117,264	6	4,987	5,831	17	105,577	111,432	6
Underground Inject	85,688	80,395	-6	3,700	3,273	-12	81,988	77,123	-6
Land	311,891	308,949	-1	15,018	27,639	84	296,873	281,310	-5
Off-site Releases	**274,170**	**273,698**	**-0.2**	**51,574**	**43,686**	**-15**	**222,596**	**230,011**	**3**
Transfers to Disposal (except metals)	29,944	39,255	31	9,421	9,445	0.3	20,523	29,810	45
Transfers of Metals**	244,226	234,443	-4	42,152	34,241	-19	202,074	200,201	-1
Total Reported Releases On- and Off-site	**1,650,461**	**1,638,253**	**-1**	**155,336**	**164,561**	**6**	**1,495,126**	**1,473,692**	**-1**
Transfers Omitted for Adjustment Analysis	56,018	63,414	13	1,056	11,502	989	54,962	51,911	-1
Total Releases On- and Off-site (adjusted)	**1,594,443**	**1,574,839**	**-1**	**154,280**	**153,059**	**-1**	**1,440,163**	**1,421,781**	**-1**

Note: *Canada and US data only. Mexico data not available for 1998–1999. 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 that involve these chemicals.*

* *The sum of air, surface water, underground injection and land releases in NPRI does not equal 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.*

How have off-site releases changed from 1998 to 1999?

For North America, off-site releases of chemicals were very similar in 1998 and 1999, with approximately 274,000 tonnes reported each year (see Table 18 and Figure 26). Transfers of metals decreased 4 percent and transfers of non-metals to disposal substantially increased, by 31 percent (9,300 tonnes) from 1998 to 1999, mostly from TRI increases. One TRI facility, Jayhawk Fine Chemicals, in Galena, Kansas, reported an increase of 5,500 tonnes, citing a change in reporting requirements for the increase.

The other interesting change is the reduction in metals released off-site in both TRI and NPRI. TRI reported a small decrease of 1 percent and NPRI reported a decrease of 19 percent in off-site releases of metals. Generally, we have seen steady increases in metals released off site, and this may indicate a change in the general trend.

Has recycling increased or decreased from 1998 to 1999?

This year we can begin to get a picture of recycling in North America, with the second year of comparable reporting. Large quantities of substances continue to be recycled in North America. Overall, in North America, the amount of substances sent for recycling did not change significantly, from 1.03 million tonnes in 1998 to 1.04 million tonnes in 1999. However, the amount of substances sent for recycling decreased in NPRI and increased in TRI from 1998 to 1999.

The amount of materials sent for recycling decreased 18 percent in NPRI, largely due to reporting by two fabricated metals products facilities owned by Cosma International Inc. Reporting on transfers to recycling by these two facilities fell by almost 22,000 tonnes from 1998 to 1999. The facilities suggested that their numbers for 1998 may need to be revised. Recycling increased by 4 percent from 1998 to 1999 in TRI.

The primary metals industry transferred to recycling the largest amount of chemicals in both 1998 and 1999. In North America, transfers to recycling by the primary metals industry increased by 5 percent, from 350,000 tonnes to 368,600 tonnes, from 1998 to 1999.

Which states and provinces reported decreases in releases and transfers from 1998 to 1999?

Ohio reported the largest total releases and transfers in both 1998 and 1999, but also the largest decreases, a reduction of 36,400 tonnes (or 13 percent) in releases and transfers of the matched chemicals. Forty percent of the decrease was accounted for by two hazardous waste management facilities: North East Chemical Corp., in Cleveland, Ohio, which did not report on any chemicals in 1999, and Envirosafe Services of Ohio, in Oregon, Ohio.

Michigan reported the second-largest decrease in total releases and transfers from 1998 to 1999, a reduction of 30,500 tonnes, or 14 percent. Reporting by one hazardous waste management facility in Detroit, Michigan, Petro-Chem Processing Group, fell by almost 43,000 tonnes.

Which states and provinces reported increases in releases and transfers from 1998 to 1999?

Pennsylvania reported the largest increase in total releases and transfers from 1998 to 1999, an increase of 20,600 tonnes (12 percent). Almost one-third of this increase was due to reporting by one facility, the US Mint of the US Department of the Treasury in Philadelphia, Pennsylvania, which reported increases due to increased production of coins.

Arkansas reported the second-largest increase, an increase of 13,500 tonnes, or 29 percent, in total releases and transfers from 1998 to 1999. One hazardous waste management facility, Rineco in Benton, Arkansas, reported an increase of 8,800 tonnes.

CHANGES IN CROSS-BORDER transfers

Chemicals may be transferred off-site for disposal, treatment, energy recovery, or recycling. Most materials are transferred to sites within state and national boundaries. However, each year some materials are sent outside the country. In general, cross-border transfers within North America decreased from 1998 to 1999.

Cross-border transfers to the US from Canada decreased by 9 percent from 1998–1999

The amount of transfers for disposal, recycling, energy recovery, and treatment sent to the US from Canada decreased by 3,000 tonnes, or 9 percent, from 1998 to 1999. These decreases included a 1,700–tonne decrease (42 percent) in transfers of substances other than metals for recycling, and a 1,600-tonne decrease (7 percent) in transfers of metals for recycling. However, transfers for energy recovery increased by 1,300 tonnes (40 percent).

Cross border transfers to Canada from the US decreased by 12 percent from 1998–1999

The amount of transfers for disposal, treatment, energy recovery, and recycling sent to Canada from the US decreased 4,300 tonnes, or 12 percent, from 1998 to 1999. Transfers of metals for recycling decreased by 8,000 tonnes a 33-percent decrease. However, other types of transfers increased, including increases of 2,000 tonnes in transfers of substances other than metals for recycling and for treatment.

CHANGES IN REPORTING
by sector, facility, and chemical

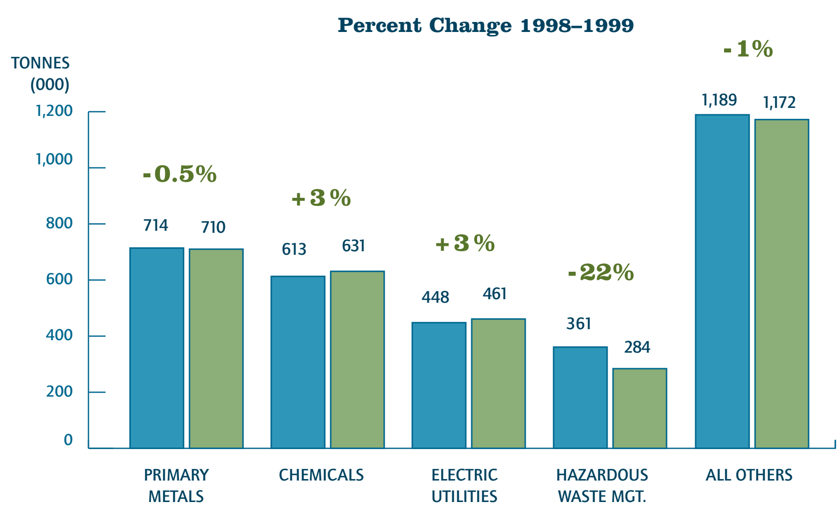
Which industry sectors reported decreases in releases and transfers from 1998 to 1999?

The hazardous waste management and solvent recovery sector showed the largest decrease in total reported releases and transfers from 1998 to 1999. This industry sector reported a reduction of 77,700 tonnes, or 22 percent, and had the fourth-largest total releases and transfers of any industry sector in both 1998 and 1999 (Figure 27).

The primary metals industry reported the largest total releases and transfers in both 1998 and 1999. There was little change between 1998 and 1999.

FIGURE 27. CHANGE IN TOTAL REPORTED RELEASES and transfers in North America for industries, with largest total releases and transfers, 1998–1999

(1998 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1998–1999.*

Which industry sectors reported increases in releases and transfers from 1998 to 1999?

The chemical industry reported the largest increase in total releases and transfers from 1998 to 1999, with an increase of 17,500 tonnes, or 3 percent. This industry sector reported the second-largest total releases and transfers in both 1998 and 1999, behind the primary metals sector.

The electric utilities industry reported the second-largest increase in total releases and transfers from 1998 to 1999, an increase of 13,400 tonnes or 3 percent from 1998 to 1999. This sector reported the third-largest total releases and transfers in both 1998 and 1999. It had an increase of 3 percent (13,700 tonnes) in on-site releases. Four facilities reported 3,000 tonnes or more of increases, mainly in releases to air of hydrochloric acid.

Which facilities reported the largest decrease in releases and transfers from 1998 to 1999?

Two hazardous waste management/solvent recovery facilities, Petro-Chem Processing Group, in Detroit, Michigan, and Pollution Control Inds. Inc., in East Chicago, Indiana, had the largest decreases in total releases and transfers in North America from 1998 to 1999 (Table 19). The main chemicals involved were hydrocarbons transferred to energy recovery or treatment.

The facility with the third-largest decrease in total releases and transfers was Magna-Cosma, Presstran Industries in St. Thomas, Ontario, a fabricated metals facility. Personnel at this facility suggested that they may be revising the amounts reported for 1998.

Which facilities reported the largest increase in releases and transfers from 1998 to 1999?

The facility with the largest increase in total releases and transfers from 1998 to 1999 was Safety-Kleen Ltd. in Corunna, Ontario (Table 20). An additional 15,000 tonnes was landfilled at the site of the facility. Safety Kleen indicated that the change was due to variation in its hazardous waste management business.

The hazardous waste management facility, Onyx Environmental Services L.L.C., in Azusa, California, reported the second-largest increase—almost 10,000 tonnes, mainly of hydrocarbons transferred for energy recovery. The facility with the third-largest increase was also a hazardous waste management facility with increases in transfers for energy recovery, Rineco, located in Benton, Arkansas.

TABLE 19. THE 10 FACILITIES IN NORTH AMERICA with largest decrease in total reported amounts of releases and transfers, 1998–1999

(1998 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODES CANADA	SIC CODES US	RANK	TOTAL REPORTED AMOUNTS OF RELEASES AND TRANSFERS 1998 (kg)	1999 (kg)	CHANGE 1998–1999 (kg)	MAJOR CHEMICALS REPORTED WITH DECREASES (PRIMARY MEDIA/ TRANSFERS WITH DECREASES)*
1	Petro-Chem Processing Group/Solvent Distillers Group, Nortru, Inc.	Detroit, MI		495/738	1	60,534,158	17,789,485	-42,744,673	Xylenes, Naphthalene, Benzene, Ethylbenzene (transfers to energy recovery), 1,2 Dichlorobenzene (transfers to treatment), Phenol, n-Butyl alcohol, Toluene (transfers to energy recovery)
2	Pollution Control Inds. Inc.	East Chicago, IN		495/738	2	29,094,310	143,706	-28,950,604	Naphthalene, Acetaldehyde, Toluene, Methyl ethyl ketone, Methanol, n-Butyl alcohol, Benzene, Xylenes (transfers to energy recovery)
3	Magna - Cosma, Presstran Industries, Cosma International Inc.	St. Thomas, ON	32	34	3	14,944,300	141,770	-14,802,530	Zinc and compounds (transfers to recycling)
4	Systech Environmental Corp., Lafarge Corp.	Demopolis, AL		495/738	4	11,110,905	106,206	-11,004,699	Xylenes, Toluene, Methyl ethyl ketone (transfers to energy recovery)
5	North East Chemical Corp., TBN Holdings Inc.	Cleveland, OH		495/738	5	10,342,275	**	-10,342,275	Toluene, Xylenes, Methyl ethyl ketone, Trichloroethylene, Acrylonitrile (transfers to energy recovery)
6	Karmax Heavy Stampings, Cosma International Inc.	Milton, ON	32	34	6	10,750,300	3,626,800	-7,123,500	Zinc and compounds (transfers to recycling)
7	Safety-Kleen Corp.	San Antonio, TX		495/738	7	5,925,030	**	-5,925,030	Toluene, Xylenes, Methyl ethyl ketone (transfers to energy recovery)
8	Envirosafe Services of Ohio Inc., ETDS Inc.	Oregon, OH		495/738	8	22,918,608	17,465,186	-5,453,422	Zinc and compounds (land)
9	Raw Materials Corporation	Port Colborne, ON	33	36	9	5,304,500	**	-5,304,500	Lead and compounds (transfers to recycling)
10	Exide Corp.	Manchester, IA		36	10	10,530,056	5,382,222	-5,147,834	Lead and compounds (transfers to recycling)
	Total					**181,454,442**	**44,655,375**	**-136,799,067**	

Note: *Canada and US data only. Mexico data not available for 1998–1999. The data are estimates of releases and transfers of chemicals reported by facilities. None of the rankings are meant to imply that a facility, state or province is not meeting its legal requirements. The data do not predict levels of exposure of the public to those chemicals.*
** 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.*

TABLE 20. THE 10 FACILITIES IN NORTH AMERICA with largest increases in total reported amounts of releases and transfers, 1998–1999

(1998 Matched Chemicals and Industries)

RANK	FACILITY	CITY, STATE/ PROVINCE	SIC CODES CANADA	SIC CODES US	TOTAL REPORTED AMOUNTS OF RELEASES AND TRANSFERS 1998 (kg)	1999 (kg)	CHANGE 1998–1999 (kg)	MAJOR CHEMICALS REPORTED WITH INCREASES (PRIMARY MEDIA/ TRANSFERS WITH INCREASES)*
1	Safety-Kleen Ltd., Lambton Facility	Corunna, ON	37	28	152,090	15,378,584	15,226,494	Zinc and compounds (land)
2	Onyx Environmental Services L.L.C	Azusa, CA		495/738	2,216,370	12,174,426	9,958,056	Methyl ethyl ketone, Xylenes, Dichloromethane, Tetrachloroethylene,2-Ethoxyethanol, Methyl isobutyl ketone, Benzene (transfers to energy recovery), Ethylene glycol (transfers to recycling)
3	Rineco	Benton, AR		495/738	2,512,640	11,282,314	8,769,674	Xylenes, Methyl ethyl ketone, Toluene (transfers to energy recovery)
4	Coastal Eagle Point Oil Co., Coastal Corp.	Westville, NJ		29	149,207	8,691,259	8,542,052	Propylene, Ethylene (transfers to energy recovery)
5	Chemical Waste Management of the Northwest Inc., Waste Management Inc.	Arlington, OR		495/738	10,744,650	18,492,890	7,748,240	Aluminum oxide (land)
6	Oxy Vinyls L.P. La Porte - VCM Plant, Occidental Petroleum Corp.	La Porte, TX		28	45,296	7,425,473	7,380,177	1,1,2-Trichloroethane, 1,2-Dichloroethane, Chloroform (transfers to recycling)
7	Delphi Energy & Chassis Sys., Delphi Automotive Sys. L.L.C.	Olathe, KS		36	6,101,885	12,511,016	6,409,131	Lead and compounds (transfers to recycling)
8	U.S. Mint, U.S. Department of the Treasury	Philadelphia, PA		34	2,567,567	8,768,788	6,201,221	Copper and compounds (transfers to recycling)
9	Belden Communications Div., Belden, Inc.	Phoenix, AZ		33	898,653	6,677,698	5,779,045	Copper and compounds (transfers to recycling)
10	Jayhawk Fine Chemicals Corp., Laporte Fine Chemicals	Galena, KS		28	1,131,770	6,690,682	5,558,912	Nitric acid and nitrate compounds (transfers to disposal)
	Total				**152,157,299**	**343,771,690**	**191,614,391**	

Note: Canada and US data only. Mexico data not available for 1998–1999. The data are estimates of releases and transfers of chemicals reported by facilities. None of the rankings are meant to imply that a facility, state or province is not meeting its legal requirements. The data do not predict levels of exposure of the public to those chemicals.

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

Which chemicals showed the largest decreases in releases and transfers from 1998 to 1999?

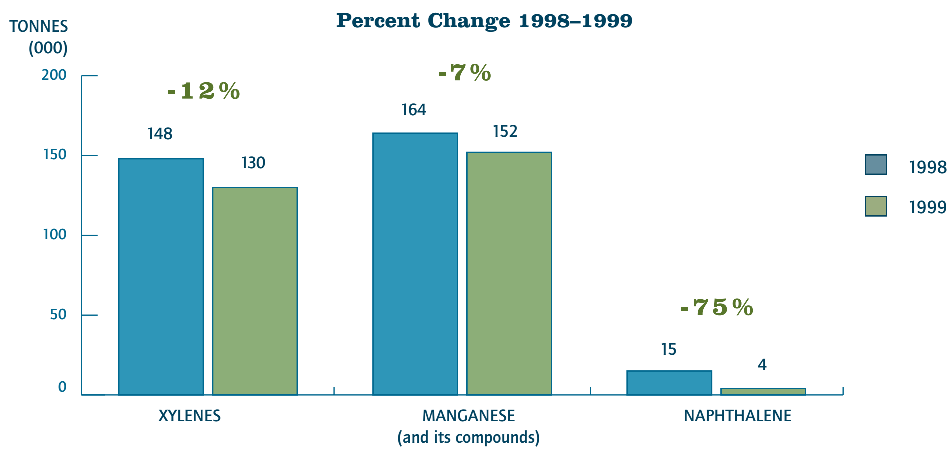
Of the 165 chemicals, the chemicals with the largest reductions in total releases and transfers from 1998 to 1999 were:

- Xylenes,
- Manganese and its compounds, and
- Naphthalene.

Each showed a reduction of more than 11,000 tonnes (Figure 28).

FIGURE 28. CHANGE IN TOTAL REPORTED AMOUNTS of releases and transfers for the three chemicals, with the largest decreases in North America, 1998–1999

(1998 Matched Chemicals and Industries)



Note: *Canada and US data only. Mexico data not available for 1998–1999.*

Xylenes

Total releases and transfers of xylenes were reduced by 12 percent from 1998 to 1999. TRI facilities reported an overall decrease of more than 19,000 tonnes, mainly in transfers to energy recovery. One facility, Petro-Chem Processing Group, in Detroit, Michigan, reported 12,000 tonnes of that decrease. NPRI facilities overall reported an increase of 1,300 tonnes in total releases and transfers of xylenes from 1998 to 1999.

Xylenes are used as solvents in the printing, rubber and leather industries, as well as cleaning agents, and components and thinners for paints and varnishes.

Health effects from exposure to xylenes may include headaches, lack of coordination, dizziness, confusion, and loss of balance. Exposure to high levels can also cause irritation of skin, eyes, nose, and throat, difficulty breathing, lung problems, delayed reaction time, memory difficulties, stomach discomfort, and possibly liver and kidney problems.

Manganese and its compounds

Manganese and its compounds showed the second-largest decrease in total releases and transfers from 1998 to 1999, with a reduction of 11,800 tonnes or 7 percent. Two-thirds of that decrease was in transfers to disposal in landfills either on- or off-site. While TRI facilities reported an overall decrease of 1,600 tonnes, NPRI facilities reported net decreases of over 10,000 tonnes. Several NPRI facilities reported decreases of over 1,000 tonnes of manganese sent for recycling. The NPRI primary metals and fabricated metals industry reported both the largest releases and transfers of the metal, as well as the largest reduction from 1998 to 1999.

Manganese also had the third-largest increase from 1995 to 1999, and its uses and health effects are described in that section (see above).

Naphthalene

Naphthalene showed the third-largest decrease in total releases and transfers from 1998 to 1999, an overall reduction of 11,300 tonnes, or 75 percent. The decrease was mainly due to reporting by two hazardous waste facilities in the US that reported a combined decrease of 10,000 tonnes in transfers of naphthalene for energy recovery. The facilities were Pollution Controls Industries, Inc., in East Chicago, Indiana, and Petro-Chem Processing Group in Detroit, Michigan.

The largest use of naphthalene is in the production of phthalate anhydride (used as an intermediate in the production of phthalate plasticizers, resins, dyes, pharmaceuticals, and other materials), followed by naphthalene sulfonate-based surfactants and dispersants. It is also for making leather tanning agents and in the production of carbaryl, an insecticide, and in moth repellants.

Inhalation of naphthalene may cause headache, nausea, confusion and profuse perspiration. Prolonged exposure may cause irritation to the nasal passages or the skin.

Which chemicals showed the largest increases in releases and transfers from 1998 to 1999?

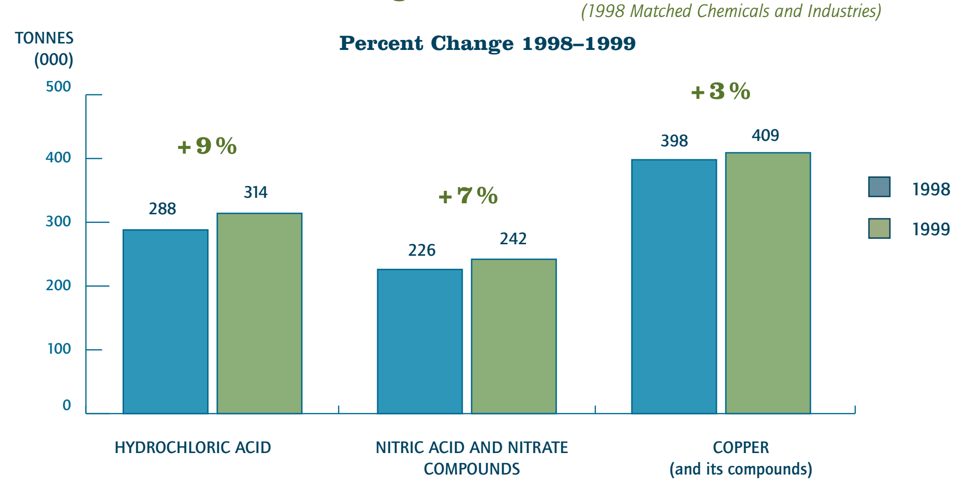
Of the 165 chemicals, the chemicals with the largest increases in total releases and transfers from 1998 to 1999 were:

- Hydrochloric acid
- Nitric acid and nitrate compounds
- Copper and its compounds

Each showed an increase of more than 11,000 tonnes (Figure 29).

FIGURE 29. CHANGE IN TOTAL REPORTED AMOUNTS of releases and transfers for the three chemicals, with the largest increases in North America, 1998–1999

(1998 Matched Chemicals and Industries)



Note: Canada and US data only. Mexico data not available for 1998–1999.

Hydrochloric acid

From 1998 to 1999, total releases and transfers of hydrochloric acid increased by 25,200 tonnes, or 9 percent. While NPRI facilities reported an overall decrease in air releases of hydrochloric acid. TRI electric utilities reported increases of almost 28,000 tonnes. (Only air releases are included in the matched data set because only air releases are reportable under TRI.)

Hydrochloric acid is often used to make other chemicals or in industrial processes such as tanning, textiles, electroplating, metal treating and food processing. It is a byproduct of coal combustion by electric utilities.

Hydrochloric acid can be either a colorless liquid or a gas with a corrosive, 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.

Nitric acid and nitrate compounds

Nitric acid and nitrate compounds showed the second-largest increase in total releases and transfers: 16,300 tonnes, or 7 percent. TRI facilities accounted for most of this, with a 16,100-tonne increase. One Armco Inc. facility in Butler, Pennsylvania, reported increases of almost 500 tonnes in nitrate compounds discharged on-site to water. This facility uses a nitric acid pickling process in the production of specialty steels.

The TRI chemical manufacturing industry reported both the largest releases and transfers of nitric acid and nitrate compounds, and also the largest increase from 1998 to 1999—7,600 tonnes. The TRI food industry reported the second-largest increase—6,000 tonnes.

Nitric acid and nitrate compounds were also the substances with the second-largest increase in total releases and transfers for 1995–1999. Their uses and health impacts are described in that section (see above).

Copper and its compounds

Copper and its compounds showed the third-largest increase in total releases and transfers from 1998 to 1999, with an overall increase of 11,200 tonnes, or 3 percent, all due to increased transfers to recycling. Both NPRI and TRI facilities reported overall increases of copper and its compounds. The fabricated metals industry in both countries reported the largest increases, with such facilities reporting increases of 9,800 tonnes in TRI and 4,100 tonnes in NPRI.

Copper and its compounds are used in electrical and electronic products, building construction and industrial machinery and equipment. Copper and its compounds appear in electroplated coatings, cooking utensils, piping, dyes and dye processes, wood preservatives and pesticides, mildew preventives, corrosion inhibitors, fuel additives, printing and photocopying, and pigments for glass and ceramic production. Copper compounds are also used as catalysts, as a purifying agent in the petroleum industry and in alloys and metal refining.

Exposure to dust and fumes of copper can irritate eyes, nose and throat and may cause "metal fume fever," with symptoms similar to flu. Exposure may decrease fertility in both males and females. Repeated exposure can cause chronic irritation of nose and repeated high exposure can affect the liver.

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** and public health?

Toxic chemicals

Many of the 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.

Drinking water

Many of these matched chemicals have drinking water standards or guidelines that prescribe the maximum allowable concentration of the chemical in drinking 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 but they would not provide good 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, substances 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 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.

However, nitrogen oxides are not one of the 165 chemicals analyzed in this report, because data on nitrogen oxides are not currently collected under the TRI and NPRI programs. In 2002, NPRI will require reporting of criteria air contaminants such as nitrogen oxides, which will help provide information on some sources of smog.

SOUND MANAGEMENT of Chemicals Program

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 chemicals. The first NARAPs were initiated for DDT, chlordane, PCBs and mercury. A NARAP for dioxins and furans, and one on environmental monitoring and assessment, are now being developed and a decision on a plan for lindane is expected shortly. In addition, lead is under consideration as a candidate substance. NARAP goals include the phase-out and banning of the particular chemicals of concern, encouraging pollution prevention, and reducing emissions.

PRTRs are becoming an increasingly valuable tool in 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> and are also available in a consolidated report, entitled The Sound Management of Chemicals (SMOC) Initiative of the Commission for Environmental Cooperation of North America: Overview and Update (September 2001). For more information, contact José Carlos Tenorio, Program Manager, at (514) 350-4372, <jctenorio@ccemtl.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 on earth from the sun's harmful ultraviolet radiation. Less protection from ultraviolet light will, over time, lead to higher incidence of skin cancer and cataracts and increased crop damage.

Some of the matched chemicals discussed in this report, such as CFCs and HCFCs, can contribute to ozone thinning. CFCs and HCFCs are included in this year's report for the first time because they began to be reported to NPRI in the 1999 reporting year.

Climate change

The build up of such gases as carbon dioxide, nitrous oxide and methane in the atmosphere can contribute to climate change. These gases are not currently reported to NPRI or TRI and so are not included in this report. Some of the greenhouse gases, however, are included in the Mexican reporting system and Environment Canada is considering adding greenhouses gases to NPRI. Some of the chemicals on the matched chemical list, though, can play a direct or indirect role in climate change.

Acid rain

Acid rain occurs when emissions of sulfur dioxide and nitrogen oxides react in the atmosphere to form an acidic liquid 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 currently 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. Nitrogen oxides and sulfur oxides are required to be reported to NPRI for 2002.

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.

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 compiled existing information on criteria air pollutants in the three countries. 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. Areas of potential cooperation include mobile sources and data sharing and exchange. For more information on this initiative, contact Paul Miller, CEC Air Quality Program Manager, at (514) 350-4326, <pmiller@ccemtl.org>.

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>.

For information on:

- Canadian programs, see <www.ec.gc.ca>
- Mexican programs, see <www.ine.gob.mx>
- US programs, see <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 2002—why are these data from 1999?

The CEC uses the most recent public data available at the time *Taking Stock* is developed for a given year. The facilities report their 1999 data in the summer of 2000, and the governments then review the data. The 1999 data were publicly released by the governments in the spring and summer of 2001. 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 210 chemicals that are common to both NPRI and TRI for the 1999 reporting year (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, in the companion volume, *Taking Stock 1999*—Sourcebook.)

This report uses approximately 21 percent of the data reported to NPRI and 59 percent of the data reported to TRI for 1999. The lower percent of NPRI data is due to three oil and gas extraction facilities that reported on hydrogen sulfide. Both the industry sector and the particular chemical are not in TRI. Without these three facilities, the percent of NPRI data captured in the matched data set rises to 66 percent. The national programs individually 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 matched chemicals are only a small part of the total universe of chemicals. The Chemical Abstracts Service lists more than 16 million substances and has 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 below under new sectors).

Why does *Taking Stock* add all the chemicals together?

This report analyses the 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 reporting facilities and sectors. 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. Also new this year is the analysis of some chemicals with similar ecological properties, such as CFCs and HCFCs, which contribute to ozone thinning.

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

Of this group of matched chemicals, 56 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.

For the first time, the report also uses a list of chemicals considered by the state of California to cause cancer, birth defects or other reproductive harm (California Proposition 65 list), and a list of chemicals considered "toxic" under the Canadian Environmental Protection Act.

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.

Following are some sources of information about the health effects of chemicals:

- US Agency for Toxic Chemicals and Disease Registry at <www.atsdr.cdc.gov/toxfaq.html>
- US EPA at < www.epa.gov/chemfact/>
- Environmental Defense Scorecard site at <www.scorecard.org>
- National Safety Council at <www.nsc.org/xroads/chem.htm>
- International Agency for Research on Cancer at <www.iarc.fr/>
- Canadian Center for Occupational Health and Safety at <www.ccohs.ca/oshanswers>
- Appendix D in the Sourcebook volume of this report, 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. Recently, Mexico has made great strides in moving toward a mandatory system, with the passage of enabling legislation.

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. About 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 CEC strives to include trilateral data wherever possible in the report.

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 don'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 it 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 releases per unit of production.

Background on pollutant release and transfer registers

What is a pollutant release and transfer register (PRTR)?

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 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. Enabling legislation for a mandatory and publicly accessible system was passed in Mexico in December 2001.

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, and 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:

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

PRTR reporting from a facility perspective

Taking Stock is based on PRTR data collected by governments from individual facilities. Each year across North America, coordinators at facilities ask a series of questions to develop the PRTR data. The first question asked is "Is my facility required to report?" If 10 or more employees work at the facility and the facility manufactures, processes or otherwise uses approximately 10 tonnes or more of certain chemicals and at a concentration of 1 percent by weight or more, then the facility must report. Coordinators use information from suppliers, product information worksheets and company information to answer this question. If the facility needs to report, then the next question is "Which chemicals do I need to report?" Each year the list of chemicals to be reported may change. The coordinator will check the published list of chemicals required to be reported. Only the amount of the chemical in the mixture is reported, rather than the amount of the mixture.

The next question is "Does my facility release this chemical on-site?" For each chemical, the amount of chemical released to the air, land, water and underground injection is estimated. These estimates can be based on monitoring or direct tests such as stack samples, mass balance, emission factors, or engineering estimates. A coordinator would often gather information from many places to answer this question.

The next question is "Does my facility send this chemical off-site?" The coordinator would estimate the amount of each chemical sent off-site for disposal, treatment or recycling. Again, only the amount of the chemical, and not the total volume of the materials sent off-site, is reported.

A coordinator can get answers about a definition or a particular circumstance from detailed guidance manuals available from the government, industry association or by phoning the government help desks. These release and transfer estimates for each chemical are then entered onto a special form. The coordinator and official with legal responsibility sign the form and submit it to the government by a certain date.

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.

How can I get data on chemical releases and transfers from NPRI, TRI or RETC?

A wealth of PRTR information in a variety of formats is valuable. One of the main sources of information about the programs, data and ongoing changes are the national government's web sites (listed below).

Another source of information is the national summary reports produced by all three governments. A copy of the summary reports can be obtained from the government offices or web sites, or often viewed at libraries. Other publications include guidance manuals for reporting, regional fact sheets and background documents of future changes.

In addition to the web site queries, NPRI and TRI data on facilities, sectors, chemical and communities are also available on a data disk from national governments offices. Reports using PRTR data have been developed by industrial associations, provincial and regional governments, nongovernmental groups and academics. A more detailed analysis of the TRI and NPRI data is available in a second volume, the Sourcebook, of *Taking Stock* at the CEC web site <www.cec.org> or from the CEC Secretariat at (514) 350-4300.

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>
NPRI data on the Internet, in French: <www.ec.gc.ca/pdb/npri/npri_home_f.cfm>
e-mail: npri@ec.gc.ca

Pollution Watch Scorecard home page: <www.scorecard.org/pollutionwatch/>

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

Semarnat
Dirección de Gestión Ambiental
Av. Revolución 1425 – 9
Col. Tlacopac, San Angel
01040 Mexico, D.F.

Tel: (525) 55 624–3470
Fax: (525) 55 624–3584

Semarnat on the Internet: <www.semarnat.gob.mx>
Cédula de Operación Anual: < http://www.semarnat.gob.mx/dgmic/tramites/requisitos/r03-001.shtml>

Public Access to US Toxics Release Inventory Data and Information

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

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

Online Data Access:

TRI Explorer: <www.epa.gov/triexplorer>
EPA's Envirofacts:
<www.epa.gov/enviro/html/toxic_releases.html>

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

(202) 234-8570 for free online access to TRI data, or
(202) 234-8494 for information

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

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

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 Minister of Environment 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 box above).

The Resolution specifically reaffirmed the Council's commitment to 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

Over the past decade there has been a growing interest worldwide in PRTRs and related issues of public access to environmental information. The OECD, to which all three North American countries are members, issued a Council Recommendation in 1996, which calls upon all members' counties to establish, implement and make public national PRTRs and to promote comparability among national PRTRs and sharing of PRTR data between neighboring countries.

The Intergovernmental Forum on Chemical Safety has also focused on the topic of PRTRs, including a special session on PRTRs in October 2000. The Forum III meeting recommended that countries without a PRTR take steps to develop one, that a PRTR be established in at least two additional countries in each region by 2004 and that countries link reporting requirements under international agreements to PRTRs. For more information on IFCS, see <www.who.int/ifcs/>.

The United Nations Economic Commission for Europe has developed the Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters. Known as the Aarhus Convention, it came into force on 30 October 2001. Canada, Mexico and the US, together with other countries, form part of a working group developing an international protocol for PRTRs under this Convention. More information on the Aarhus Convention can be found at <www.unece.org/env/pp>.

Another international mechanism, the Inter-Organization Programme for the Sound Management of Chemicals, has a PRTR Coordinating Group that seeks to improve coordination between international organizations, governments and other parties interested in PRTRs. For more information, see <www.who.int/iomc/>.

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:

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Appendix: Matched chemicals — listed in both TRI and NPRI, 1999

CAS Number		Chemical Name
50-00-0	c	Formaldehyde
55-63-0		Nitroglycerin
56-23-5	c	Carbon tetrachloride
62-53-3		Aniline
62-56-6	c	Thiourea
64-18-6	n	Formic acid
64-67-5	c	Diethyl sulfate
64-75-5	n	Tetracycline hydrochloride
67-56-1		Methanol
67-66-3	c	Chloroform
67-72-1		Hexachloroethane
70-30-4	n	Hexachlorophene
71-36-3		n-Butyl alcohol
71-43-2	c	Benzene
74-83-9		Bromomethane
74-85-1		Ethylene
74-87-3		Chloromethane
74-88-4		Methyl iodide
74-90-8		Hydrogen cyanide
75-00-3		Chloroethane
75-01-4	c	Vinyl chloride
75-05-8		Acetonitrile
75-07-0	c	Acetaldehyde
75-09-2	c	Dichloromethane
75-15-0		Carbon disulfide
75-21-8	c	Ethylene oxide
75-35-4		Vinylidene chloride
75-44-5		Phosgene
75-45-6	n	Chlorodifluoromethane (HCFC-22)
75-56-9	c	Propylene oxide
75-63-8	n	Bromotrifluoromethane (Halon 1301)
75-65-0		tert-Butyl alcohol
75-68-3	n	1-Chloro-1,1-difluoroethane (HCFC-142b)
75-69-4	n	Trichlorofluoromethane (CFC-11)
75-71-8	n	Dichlorodifluoromethane (CFC-12)
75-72-9	n	Chlorotrifluoromethane (CFC-13)
76-01-7	n	Pentachloroethane
76-14-2	n	Dichlorotetrafluoroethane (CFC-114)
76-15-3	n	Monochloropentafluoroethane (CFC-115)
77-47-4		Hexachlorocyclopentadiene
77-73-6	n	Dicyclopentadiene
77-78-1	c	Dimethyl sulfate
78-84-2		Isobutyraldehyde
78-87-5		1,2-Dichloropropane
78-92-2		sec-Butyl alcohol
78-93-3		Methyl ethyl ketone
79-00-5		1,1,2-Trichloroethane
79-01-6	c	Trichloroethylene
79-06-1	c	Acrylamide
79-10-7		Acrylic acid
79-11-8		Chloroacetic acid
79-21-0		Peracetic acid
79-34-5		1,1,2,2-Tetrachloroethane
79-46-9	c	2-Nitropropane
80-05-7		4,4'-Isopropylidenediphenol
80-15-9		Cumene hydroperoxide
80-62-6		Methyl methacrylate
81-88-9		C.I. Food Red 15
84-74-2		Dibutyl phthalate
85-44-9		Phthalic anhydride
86-30-6		N-Nitrosodiphenylamine
90-43-7		2-Phenylphenol
90-94-8	c	Michler's ketone
91-08-7	c	Toluene-2,6-diisocyanate
91-20-3		Naphthalene
91-22-5		Quinoline
92-52-4		Biphenyl
94-36-0		Benzoyl peroxide
94-59-7	c	Safrole
95-47-6		o-Xylene
95-48-7		o-Cresol
95-50-1		1,2-Dichlorobenzene
95-63-6		1,2,4-Trimethylbenzene
95-80-7	c	2,4-Diaminotoluene
96-09-3	c	Styrene oxide
96-33-3		Methyl acrylate
96-45-7	c	Ethylene thiourea
98-82-8		Cumene
98-86-2	n	Acetophenone
98-88-4		Benzoyl chloride
98-95-3	c	Nitrobenzene
100-01-6	n	p-Nitroaniline
100-02-7		4-Nitrophenol
100-41-4		Ethylbenzene
100-42-5	c	Styrene
100-44-7	c	Benzyl chloride
101-14-4	c	4,4'-Methylenebis(2-chloroaniline)
101-77-9	c	4,4'-Methylenedianiline
106-42-3		p-Xylene
106-44-5		p-Cresol
106-46-7	c	1,4-Dichlorobenzene
106-50-3		p-Phenylenediamine
106-51-4		Quinone
106-88-7		1,2-Butylene oxide
106-89-8	c	Epichlorohydrin
106-99-0	c	1,3-Butadiene
107-05-1		Allyl chloride
107-06-2	c	1,2-Dichloroethane
107-13-1	c	Acrylonitrile
107-18-6		Allyl alcohol
107-19-7	n	Propargyl alcohol
107-21-1		Ethylene glycol
108-05-4	c	Vinyl acetate
108-10-1		Methyl isobutyl ketone
108-31-6		Maleic anhydride
108-38-3		m-Xylene
108-39-4		m-Cresol
108-88-3		Toluene
108-90-7		Chlorobenzene

CAS Number		Chemical Name
108-95-2		Phenol
109-06-8	n	2-Methylpyridine
109-86-4		2-Methoxyethanol
110-54-3	n	n-Hexane
110-80-5		2-Ethoxyethanol
110-82-7		Cyclohexane
110-82-7	n	Cyclohexane
110-86-1		Pyridine
111-42-2		Diethanolamine
115-07-1		Propylene
115-28-6	n,c	Chlorendic acid
117-81-7	c	Di(2-ethylhexyl) phthalate
120-12-7		Anthracene
120-58-1		Isosafrole
120-80-9		Catechol
120-82-1		1,2,4-Trichlorobenzene
120-83-2		2,4-Dichlorophenol
121-14-2	c	2,4-Dinitrotoluene
121-44-8	n	Triethylamine
121-69-7		N,N-Dimethylaniline
122-39-4	n	Diphenylamine
123-31-9		Hydroquinone
123-38-6		Propionaldehyde
123-63-7	n	Paraldehyde
123-72-8		Butyraldehyde
123-91-1	c	1,4-Dioxane
124-40-3	n	Dimethylamine
127-18-4	c	Tetrachloroethylene
131-11-3		Dimethyl phthalate
139-13-9	c	Nitrilotriacetic acid
140-88-5	c	Ethyl acrylate
141-32-2		Butyl acrylate
149-30-4	n	2-Mercaptobenzothiazole
156-62-7		Calcium cyanamide
302-01-2	c	Hydrazine
353-59-3	n	Bromochlorodifluoromethane (Halon 1211)
534-52-1		4,6-Dinitro-o-cresol
541-41-3		Ethyl chloroformate
542-76-7	n	3-Chloropropionitrile
554-13-2	n	Lithium carbonate
563-47-3	n,c	3-Chloro-2-methyl-1-propene
569-64-2		C.I. Basic Green 4
584-84-9	c	Toluene-2,4-diisocyanate
606-20-2	c	2,6-Dinitrotoluene
612-83-9	n,c	3,3'-Dichlorobenzidine dihydrochloride
630-20-6	n	1,1,1,2-Tetrachloroethane
842-07-9		C.I. Solvent Yellow 14
872-50-4	n	N-Methyl-2-pyrrolidone
924-42-5	n	N-Methylolacrylamide
989-38-8		C.I. Basic Red 1
1163-19-5		Decabromodiphenyl oxide
1313-27-5		Molybdenum trioxide
1314-20-1		Thorium dioxide
1319-77-3		Cresol (mixed isomers)
1330-20-7		Xylene (mixed isomers)
1332-21-4	c	Asbestos (friable form)
1344-28-1		Aluminum oxide (fibrous forms)
1634-04-4		Methyl tert-butyl ether
1717-00-6	n	1,1-Dichloro-1-fluoroethane (HCFC-141b)
2832-40-8		C.I. Disperse Yellow 3
3118-97-6		C.I. Solvent Orange 7
4170-30-3	n	Crotonaldehyde
4680-78-8		C.I. Acid Green 3
7429-90-5	m	Aluminum (fume or dust)
7440-62-2	m	Vanadium (fume or dust)
7550-45-0		Titanium tetrachloride
7632-00-0	n	Sodium nitrite
7637-07-2	n	Boron trifluoride
7647-01-0		Hydrochloric acid
7664-38-2		Phosphoric acid
7664-39-3		Hydrogen fluoride
7664-93-9		Sulfuric acid
7697-37-2		Nitric acid*
7723-14-0		Phosphorus (yellow or white)
7726-95-6	n	Bromine
7758-01-2	n,c	Potassium bromate
7782-41-4	n	Fluorine
7782-50-5		Chlorine
10049-04-4		Chlorine dioxide
13463-40-6	n	Iron pentacarbonyl
25321-14-6		Dinitrotoluene (mixed isomers)
26471-62-5	c	Toluenediisocyanate (mixed isomers)
28407-37-6	n	C.I. Direct Blue 218
34077-87-7	n	Dichlorotrifluoroethane (HCFC-123 and isomers)
63938-10-3	n	Chlorotetrafluoroethane (HCFC-124 and isomers)
	m	Antimony compounds*
	c,m	Arsenic compounds*
	c,m	Cadmium compounds*
	m	Chromium compounds*
	c,m	Cobalt compounds*
	m	Copper compounds*
		Cyanide compounds
	c,m	Lead compounds**
	m	Manganese compounds*
	m	Mercury compounds*
	c,m	Nickel compounds*
		Nitric acid and nitrate compounds***
	n	Polychlorinated alkanes (C10-C13)
	m	Selenium compounds*
	m	Silver compounds*
	m	Zinc compounds*

n = newly added for 1999   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.*

** *Includes tetraethyl lead which is listed separately in NPRI*

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