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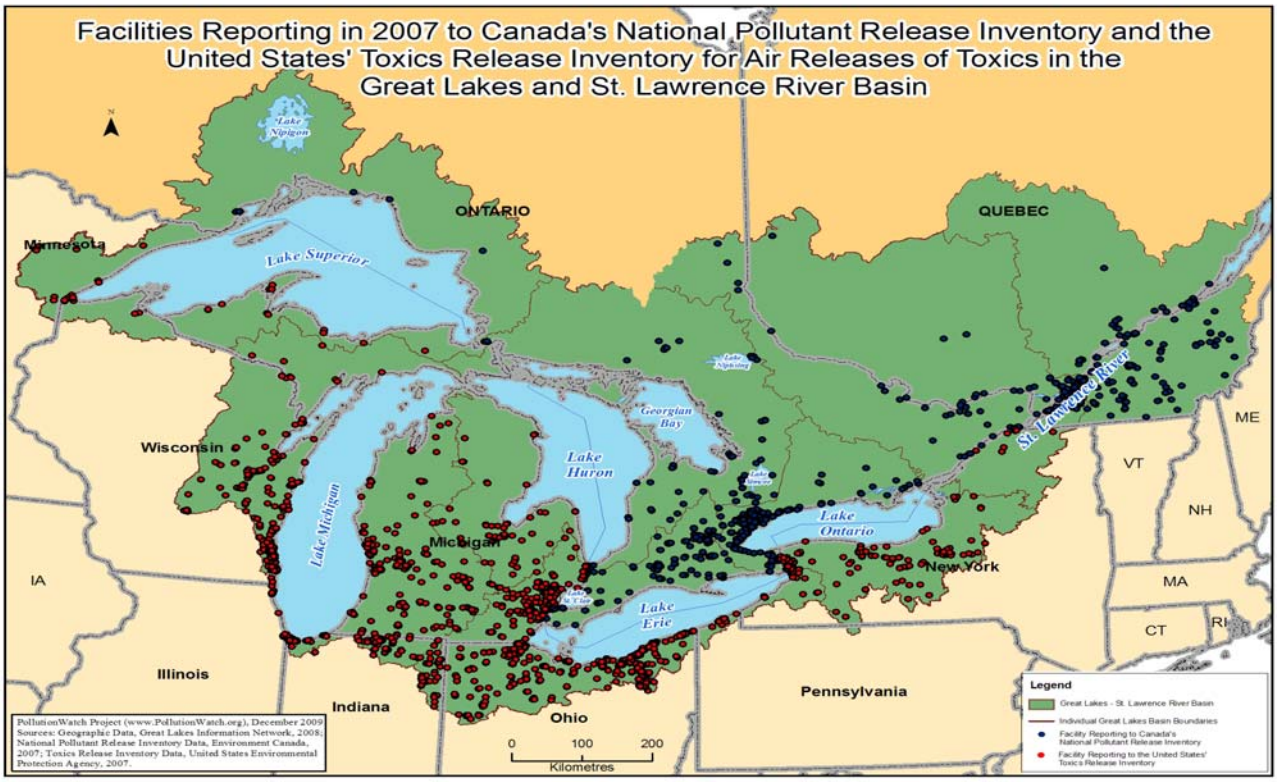

Partners in Pollution 2:

An Update on the Continuing Canadian and United States Contributions to Great Lakes-St. Lawrence River Ecosystem Pollution

A project of PollutionWatch
March 2010

Acknowledgements

This report was prepared by the Canadian Environmental Law Association (CELA) and Environmental Defence under their joint project, PollutionWatch (www.PollutionWatch.org). Information in this report is based on pollution data for 2007 from the National Pollutant Release Inventory in Canada and the Toxics Release Inventory in the United States.

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About PollutionWatch

PollutionWatch (www.PollutionWatch.org) is a collaborative project of Environmental Defence and the Canadian Environmental Law Association. The web site tracks releases and transfers of pollutants across Canada based on data collected by Environment Canada through the National Pollutant Release Inventory (NPRI) and emissions of greenhouse gases based on the federal government's mandatory Greenhouse Gas Emissions Reporting Program. NPRI and the Greenhouse Gas Emissions Reporting Program do not include data from all pollutants or sources. Visitors to the PollutionWatch web site can identify facilities in their home towns by searching by postal code or by a specific street address, access "quick lists" of the facilities reporting the largest releases and transfers of pollutants and greenhouse gases in the country, or create their own ranked lists of facilities by province, industrial sector, or corporation.

Disclaimer

The data used in this report are based on the Canadian National Pollutant Release Inventory, a publicly available database administered by Environment Canada, and the United States Toxics Release Inventory, a publicly available database administered by the United States (U.S.) Environmental Protection Agency.

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Executive Summary

The Great Lakes-St. Lawrence River basin is one of North America's great natural treasures, providing drinking water, recreation and livelihoods for millions of people. Yet, as has been the case for decades, the basin is under threat from a wide range of pollutants, many of which are harmful to wildlife and human health.

Partners in Pollution 2 uses data provided to the governments of the United States (U.S.) and Canada by thousands of industrial facilities to examine the level of pollutant releases and transfers throughout the basin. Data from facilities in the United States are reported in the Toxics Release Inventory (TRI), while data from Canadian facilities are reported in the National Pollutant Release Inventory (NPRI).

Key findings, examined in greater detail in the Section 2 of the report, include the following:

- There are 204 pollutants and 3,960 facilities in the matched datasets[1] used to determine pollutant releases and transfers in the Great Lakes-St. Lawrence River basin.
- 285 million kg of pollutants were released and transferred (excluding recycling) from NPRI and TRI facilities in the Great Lakes-St. Lawrence River basin in 2007
- Approximately 75 million kg of pollutants were released into the air from matched NPRI and TRI facilities.
- About 5 million kg of pollutants under Canada's NPRI and U.S. TRI were released to water. However, this is a large underestimation of the pollutants released to water because wastewater treatment plants do not report to TRI and, therefore, are not included in the matched dataset.
- The Lake Erie basin had the largest number of matched facilities and half of the total reported releases in the Great Lakes-St. Lawrence River basin. This is of concern as Lake Erie is the smallest and shallowest of all the Lakes.
- Canadian NPRI facilities emitted more known carcinogens and reproductive/ developmental toxicants to the air than U.S. TRI facilities. (This finding is not due to the different numbers of facilities.)
- On a per facility basis, Canadian NPRI facilities emitted to the air, on average, almost three times more known carcinogens and more than twice the reproductive/developmental toxins than U.S. TRI facilities.

The Canadian Environmental Law Association and Environmental Defence have several recommendations for governments on both sides of the Great Lakes-St. Lawrence River basin to help clean up and restore the ecosystem from toxic chemicals and other chemicals of emerging concern.

[1] The database used in this report consists of a matched data set of industries and chemicals common to both NPRI and TRI. See Methodology section for more information.

Key recommendations include:

- *Quantify and report annually the pollution loading to the Great Lakes-St. Lawrence River basin.*
- *Develop and implement a binational strategy for elimination and reductions of persistent toxic chemicals and other chemicals of concern, principally through a strengthened Great Lakes Water Quality Agreement.*
- *Expand and strengthen Canada's NPRI and U.S. TRI programs.*
- *Expand and strengthen the role of the IJC for Great Lakes-St. Lawrence River protection.*

Specific recommendations for each government are outlined in Section 3 of the report.

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Section 1: Introduction

1.1 Purpose of Report

As an update to the earlier report, *Partners in Pollution: An Assessment of Continuing Canadian and United States Contributions to Great Lakes Pollution* (released in February 2006), the Canadian Environmental Law Association (CELA) and Environmental Defence prepared this second report to:

1) Map the facilities in the Great Lakes-St. Lawrence River Basin ecosystem reporting to the Canadian National Pollutant Release Inventory and United States (U.S.) Toxics Release Inventory in 2007.

2) Analyze the releases and transfer of pollutants in the Great Lakes-St. Lawrence River basin ecosystem for 2007. This report provides relevant data for the on-going binational discussions to protect and restore the Great Lakes-St. Lawrence River basin, including the review of the Great Lakes Water Quality Agreement (GLWQA) and the Great Lakes Binational Toxics Strategy. Other initiatives such as the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA), and the U.S. Great Lakes Restoration Initiative will also find the report findings relevant.

3) Make recommendations to reduce pollution and eliminate the most hazardous chemicals in the Great Lakes-St. Lawrence River basin.

The Great Lakes governments have not quantified the amount of pollution loading to the Great Lakes basin. The absence of this information has been a challenge in efforts to implement strong management activities on toxic chemicals. The information presented in this report is intended to provide the governments with evidence of threats to the Great Lakes from one significant source – industrial releases and transfers of pollutants. Since the report findings rely on pollution data collected and maintained by the federal governments, there are several limitations regarding the inventories' reporting framework that are worthy of mention here.

First, the thresholds for reporting under these programs are high, which may result in reporting pollutants emitted by larger facilities and creating a gap in understanding the contribution of medium- and smaller- size facilities. Second, the inventories do not require reporting on all pollutants used in the market or released to the environment. Third, exemptions for specific industry sectors exist in each of the inventories such as wastewater treatment plants in the U.S. TRI and specific mining activities in Canada's NPRI programs. All these limitations contribute to an underestimation of pollutant releases and transfers to the environment.

Despite these limitations, this report demonstrates the need for governments to take the necessary preventive and precautionary measures to protect the chemical, biological and physical integrity of the Great Lakes-St. Lawrence River basin ecosystem.

About the data

This report uses matched datasets for chemicals and industries for the year 2007.

The data set used in this report was created using pollution release and transfer data from the Canadian National Pollutant Release Inventory (NPRI) and the U.S. Toxics Release Inventory (TRI). Not all data submitted to the individual countries' systems can be used; only those data common to both systems. This matching process eliminates chemicals reported under one system but not the other. It also eliminates data from industry sectors covered by one Pollutant Release and Transfer Register (PRTR) but not the other. The data used do not include pollutant data from sewage treatment plants since they are not required to report under TRI, and mining is also not included because reporting criteria under the two inventories differ. Thus, the database used in this report consists of a matched data set of industries and chemicals common to NPRI and TRI.

The data for 2007 submitted by facilities during the summer of 2008 to the federal governments were used in this report along with data from earlier years, back to 2003. For 2007, a total of 3,960 facilities are included in the matched dataset (1,610 facilities in Canada; 2,350 facilities in the U.S.) for 2007. There are 204 chemicals in the matched data set for 2003-2007.

1.2 Background

The Great Lakes-St. Lawrence River basin is a significant natural resource and home to 40 million people in the United States and Canada. The Great Lakes - Superior, Michigan, Huron, Erie and Ontario - and the St. Lawrence River and their connecting channels form the largest freshwater system on earth; the area drained by the basin covers 766,000 square kilometres. The Great Lakes-St. Lawrence River basin holds 95% of North America's fresh water supply and provides a source of drinking water for 24 million people in the U.S. and Canada. These water bodies represent 20% of the world's total fresh water supply.[2]

The threats to the well-being of the Great Lakes-St. Lawrence River basin ecosystem are wide-ranging: from toxic pollution (e.g. industrial emissions, toxic substances from consumer products, pharmaceuticals, bacteria, pathogens), which are released from municipal sewage treatment plants and wastewater systems, to increasing numbers of invasive species, urban

[2] Environment Canada. "The Great Lakes," June 16, 2009. See: www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=70283230-1.

development, demands for water withdrawal and diversion, climate change, contaminated sediments, and shoreline development.

A recent report from an International Joint Commission (IJC) Multi-board Work Group on Chemicals of Emerging Concern in the Great Lakes (www.ijc.org) highlights that hundreds of toxic chemicals are now being detected in the Great Lakes. These newer detected categories of chemicals include pharmaceuticals, musks from fragrances, flame retardants, perfluorinated surfactants, short chain chlorinated paraffins and pesticides. Many of these chemicals are found in consumer products, including personal care- and pharmaceutical products. They are entering the waters, sediments and land of the Great Lakes because they are being discharged through our drainage system, released in stormwater and wastewater, and flowing off our streets and fields. Some of these chemicals end up in the food chain. Traditionally, the focus on abating toxic chemicals in the Great Lakes has been on industrial sources of toxic chemicals.

Over the past three decades, the reduction efforts by the U.S. and Canadian governments focused on a few chemicals (e.g., mercury, lead, PCBs, dioxins and furans, etc.). While some reductions in levels of these chemicals have been seen, many of these toxic chemicals continue to be present in the Great Lakes ecosystem at unacceptably high levels. The IJC report concluded that "the accumulation of these substances in the Great Lakes may be preventable..." by applying pollution prevention strategies such as use reduction, in addition to relying on traditional end-of-pipe controls.[3]

A preventative approach for managing industrial sources of toxic chemicals in the Great Lakes basin remains as relevant today as it did in the mid 1980's. The presence of chemicals of emerging concern from non-point sources in the Great Lakes basin adds stress to an already fragile ecosystem that requires the political and financial commitment of the Canadian and U.S. federal governments to restore its health.[4]

Health and environmental advocates are urging governments to put an increased focus on efforts that aim to eliminate toxic chemicals in products and enhance elimination strategies for toxic releases from industrial processes in the Great Lakes-St. Lawrence River basin. The current national programs to address toxic chemicals in Canada and the U.S. are not proving to be capable of protecting the Great Lakes from chemical pollution. For example, many of the efforts aimed to reduce toxic chemicals in the past several decades have focused on only a few toxic chemicals such as lead, mercury and PCBs.

[3] International Joint Commission. *Work Group Report on Chemicals of Emerging Concern: Great Lakes Water Quality Agreement Priorities 2007-09 Series*, August 2009, page 3. See: www.ijc.org/en/priorities/2009/reports/2009-chemicals.pdf.

[4] Canadian Environmental Law Association and Lowell Center for Sustainable Production. *The Challenge of Substances of Emerging Concern in the Great Lakes Basin: A review of chemicals policies and programs in Canada and the United States*, June 2009. See: www.cela.ca/sites/cela.ca/files/667IJC.pdf.

Recent efforts under the Chemicals Management Plan in Canada[5] were not designed with a specific geographic focus or commitment to address toxic chemicals in the Great Lakes basin or other vulnerable ecosystems. In the U.S., the federal government is reviewing the *Toxic Substances Control Act*, federal legislation to assess and manage toxic chemicals. It is unknown at this time if revisions to the Act will target geographic areas and effectively protect the Great Lakes from chemical threats.

A growing body of evidence demonstrates that toxic substances may be linked to significant problems for human health and wildlife and are an on-going threat to the quality of the Great Lakes. Carcinogenicity, endocrine disruption, reproductive and developmental effects are a few of the health effects associated with many of these toxic chemicals. Many of these effects are being observed in extremely low concentrations, yet they can affect future generations. The sources of the toxic substances detected in the Great Lakes come from the air, from either local or distant manufacturing sources, or are released from wastewater treatment plants and runoff from roads and agricultural sources.

Further, the present control technologies employed by drinking water, sewage treatment or industrial wastewater treatment systems today are not capable of effectively removing or treating all chemicals that enter the systems. This results in discharges of a variety of toxic chemicals from these municipal sources that may not have been adequately quantified, tracked or detected in the waters of the Great Lakes. The sewer systems of many municipalities located in the Great Lakes are in need of significant investments in upgrades. The aging of sewer systems means that wastewater entering the Great Lakes waterways may be untreated or only partially treated.[6] It is estimated that billions of dollars will be required to upgrade these systems. Over the past few years, government investments have been directed to address these infrastructure needs but this may not be enough to effectively address the challenges to the Great Lakes basin from toxic chemicals. A policy commitment focused on preventative strategies promoting source elimination together with adequate funding to support these system upgrade initiatives is necessary to protect the Great Lakes basin from the various chemical threats.

Since 2006, the governments of Canada and the U.S. have made several announcements concerning the protection of the Great Lakes-St. Lawrence River basin, including: increased support towards the clean up and restoration of contaminated sites and Areas of Concern in the Great Lakes; continuation of voluntary initiatives between governments and industry stakeholders to promote the reduction of some toxic substances through the Great Lakes Binational Toxics Strategy; the undertaking of a binational review of the Great Lakes Water Quality Agreement; and, in June 2009, initiating the renegotiation of the Great Lakes Water Quality Agreement.

[5] See: www.chemicalsubstanceschimiques.gc.ca.
[6] Ecojustice (formerly Sierra Legal Defence Fund). *The Great Lakes Sewage Report*. November 2006. See: www.ecojustice.ca/publications/reports/the-great-lakes-sewage-report-card/attachment.

Also in 2009, the U.S. administration committed $475 million to support the Great Lakes Restoration Initiative (GLRI). This is part of a five-year commitment of $2.2 billion (USD) by the U.S. government to GLRI with an additional $300 million announced in February 2010. The U.S. Great Lakes Restoration Initiative Action Plan has proposed actions and funding in five areas, including toxic substances and areas of concerns, invasive species, and nearshore health and non-point source pollution.[7]

No similar comprehensive action plan or comparable funding commitments for the Great Lakes has been proposed in Canada to date. A 2008 report by the Commissioner of Environment and Sustainable Development in Canada noted that little progress has been made by the Canadian government to fulfill the objectives on the areas of concern under the Great Lakes Water Quality Agreement. The report highlighted that two significant sources of contamination to the Great Lakes areas of concern urgently need government focus: contaminated sediments and degrading municipal wastewater systems. Environment Canada estimated that it would cost approximately $2.4 billion to upgrade municipal wastewater infrastructure in the Great Lakes basin, alone.[8] This report, however, did not provide an estimate of costs associated with eliminating and preventing toxic chemicals and other chemical stressors to the Great Lakes. While these initiatives are expected to have some impact on addressing toxic pollution in the Great Lakes, the level of action needed to clean up and protect the Great Lakes-St. Lawrence River basin from all identified threats is far from being addressed fully.

The Great Lakes Water Quality Agreement (GLWQA) forms a fundamental basis for Canada and the U.S. to undertake binational efforts that aim to protect and restore the Great Lakes-St. Lawrence River basin. The GLWQA was first signed in 1972 but has undergone two revisions to address emerging issues facing the Great Lakes ecosystem since then. The 1978 GLWQA established objectives to enhance and maintain ecosystem quality and to virtually eliminate persistent toxic substances from entering the lakes. To reach this goal and to restore, preserve and protect the Great Lakes basin ecosystem, the Agreement calls for an ecosystem approach that considers the interaction of air, land, water, and living things, including humans. In 1987, the revisions to the GLWQA established the need to clean up contaminated sites, in particular those in Areas of Concern. That being said, the scope of the GLWQA has not been adequate to address all the challenges to the Great Lakes.

In June 2009, the U.S. and Canadian governments announced the renegotiation of the Great Lakes Water Quality Agreement. This is a welcome opportunity, and opens many new possibilities for the protection of the Great Lakes. CELA and Environmental Defence, along with

[7] White House Council on Environmental Quality, US Department of Agriculture, US Department of Commerce, US Department of Health and Human Services, US Department of Homeland Security, US Department of Housing and Urban Development, US Department of State, US Department of the Army, US Department of the Interior, US Department of Transportation, US Environmental Protection Agency. *Great Lakes Restoration Initiative Action Plan (Draft)*. December 3, 2009. See: www.greatlakesrestoration.us/action/wp-content/uploads/glri_actionplan12032009.pdf.

[8] Office of the Auditor General of Canada. *2008 Report of the Commissioner of Environment and Sustainable Development to the House of Commons* – Chapter 7 Ecosystems – Areas of Concern in the Great Lakes. March 2008. See: www.oag-bvg.gc.ca/internet/docs/aud_ch_cesd_200803_07_e.pdf.

other Great Lakes organizations, will take this unique opportunity to highlight the need for strong government commitment for Great Lakes protection.

In addition to the binational review of the GLWQA, states, provinces, municipalities and federal governments have developed relevant initiatives focused on the protection of the Great Lakes. In Canada, the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA), the principal financial and program mechanism for Canada to implement the GLWQA, is due for a review by Canada and the Province of Ontario. The COA was first signed in 1972 and is

Recent Studies of Threats to Great Lakes

More recently, the threats from increased toxic pollution, from invasive species, urban development and climate change have been the focus of several reports produced by Great Lakes organizations that recognize the growing challenges facing the Great Lakes today. Many of these organizations are calling for a binational commitment by the U.S. and Canadian governments to take comprehensive actions to protect the Great Lakes.

- National Wildlife Federation, *Prescription for Great Lakes Ecosystem Protection and Restoration: Avoiding the Tipping Point of Irreversible Changes*, in December 2005 focused on the irreversible impacts that these threats may have on the Great Lakes (online.nwf.org/site/DocServer/prescriptionforgreatlakes_1_.pdf?docID=2621).

- U.S. and Canadian public interest organizations have stressed the importance of needing the binational commitment and resources to protect the Great Lakes basin. See Alliance for the Great Lakes, Biodiversity Project, Canadian Environmental Law Association, and Great Lakes United 2006 report, *The Great Lakes Water Quality Agreement: Promises to Keep, Challenges to Meet* (http://s.cela.ca/files/uploads/553GLWQA_promises.pdf) and the Canadian Environmental Law Association (CELA), Canadian Institute for Environmental Law and Policy, Ecojustice, Environmental Defence, Great Lakes United and Sierra Club of Canada. *Great Lakes Blueprint: A Canadian vision protection the restoring the Great Lakes-St. Lawrence River Ecosystem*. September 2005 (http://s.cela.ca/files/uploads/gl_report_1309_low.pdf).

- *The Challenge of Substances of Emerging Concern in the Great Lakes Basin: A review of chemicals policies and programs in Canada and the United States*, a 2009 report prepared by CELA and Lowell Center for Sustainable Production for the Multi-Board Work Group of the International Joint Commission focused on Chemicals of Emerging Concern in the Great Lakes and provided a substantial review of programs and policies on toxic chemicals management in the Great Lakes. This report presented a roadmap for addressing toxic chemicals in the Great Lakes that was based on implementing prevention and precaution (http://www.cela.ca/sites/cela.ca/files/667IJC.pdf).

updated through a periodic review process. The COA calls for the virtual elimination of persistent toxic chemicals, remediation of contaminated sites in the Areas of Concern and water sustainability. It also outlines surveillance, research, and monitoring activities. The current COA runs out in March 2010. The Canadian and Ontario governments have proposed to

extend the deadline for COA renewal to coincide with the completion of the renegotiation of the GLWQA. By doing so, the renewed COA can reflect the new provisions of the GLWQA.
In 2006, CELA and Environmental Defence released the first Great Lakes report, *Partners in Pollution*, which outlined pollution levels in the Great Lakes basin for the year 2002. At the time of its release, the findings in *Partners in Pollution* filled a significant knowledge gap on the amounts of, sources of and trends in pollution levels in the Great Lakes-St. Lawrence River basin. The findings of this report contributed to discussions at the binational and national levels.

The need for this type of report continues since the federal governments do not present their own analyses of pollution reported to NPRI and TRI in the Great Lakes. Clean up and protection of the Great Lakes remains a binational responsibility that requires the cooperation and commitment of all levels of government, in particular the federal governments on both sides of the U.S.-Canada border. Furthermore, binational agencies such as the International Joint Commission have significant roles to play in clean up and protection of the Great Lakes-St. Lawrence River basin. In the recent decade, the role of the IJC has dramatically diminished on issues such as toxic chemicals. However, these *PollutionWatch* reports are intended, in part, to demonstrate the need for enhanced capacity by these agencies to report on the pollution threats to the Great Lakes basin and recommend actions the governments need to take to address these threats.

Section 2: Findings

Key Findings

- **There are 204 pollutants and 3,960 facilities in the matched datasets used to determine pollutant releases and transfers in the Great Lakes-St. Lawrence River basin.**
- **285 million kg of pollutants were released and transferred (excluding recycling) from NPRI and TRI facilities in the Great Lakes-St. Lawrence River basin in 2007.**
- **Approximately 75 million kg of pollutants were released into the air from matched NPRI and TRI facilities.**
- **About 5 million kg of pollutants under Canada's NPRI and U.S. TRI were released to water. However, this is a large underestimation of the pollutants released to water because wastewater treatment plants do not report to TRI and, therefore, are not included in the matched dataset.**
- **About 10 million kg of chemicals were also injected underground, mainly by a handful of U.S. facilities along Lake Erie.**
- **About 50 million kg of chemicals were landfilled on site and even more (almost 70 million kg) were transferred to other sites for disposal.**
- **About 250 million kg of reported pollutants were recycled.**
- **The Lake Erie basin had the largest number of matched facilities and half of the total reported releases in the Great Lakes-St. Lawrence River basin. It also had the largest amounts of air releases, land releases and underground injection of all the Lakes. This is concerning as Lake Erie is the smallest and shallowest of all the Lakes.**
- **Canadian NPRI facilities emitted more known carcinogens and reproductive/ developmental toxicants to the air than U.S. TRI facilities. This finding is not due to the different numbers of facilities; NPRI facilities are only one third of the total Great Lakes-St. Lawrence River facilities reporting carcinogens and one-half of facilities reporting reproductive/developmental toxicants.**
- **On a per facility basis, Canadian NPRI facilities emitted to the air, on average, almost three times more known carcinogens and more than twice the reproductive/developmental toxins than U.S. TRI facilities.**
- **Overall, releases and transfers in the Great Lakes-St. Lawrence River basin from matched NPRI and TRI facilities decreased in the past five years (2003-2007). However, on- and off-site land disposal increased.**

This section uses the Canadian National Pollutant Release Inventory (NPRI) data and the U.S. Toxics Release Inventory (TRI) data to identify releases and transfers of over 200 matched pollutants from matched facilities in the Great Lakes-St. Lawrence River basin. Each year, more than 8,500 facilities across Canada and more than 22,000 facilities across the U.S. submit their pollutant data to Environment Canada and U.S. Environmental Protection Agency respectively. A facility reports on the amount of a specific pollutant released to the air, water, land or injected underground and also on the amounts of pollutants transferred off site for disposal, treatment, or recycling.

NPRI and TRI data are a good source of information about pollutant releases and transfers from larger industrial facilities. However, each country has its own list of chemicals to be reported and its own requirements about which facilities are required to report. This report uses only those chemicals and industry sectors that are common to both NPRI and TRI. This approach allows for an accurate comparison between the two countries' data. To help understand how the data were matched and the limitations of the data please see Section 4: Methodology.

2.1 Number of Facilities

For 2007, 3,960 matched TRI and NPRI facilities in the Great Lakes-St. Lawrence River basin reported on releases and transfers of matched chemicals (Figure 1).

- Of these, over 40% were located in Canada = 1,610 facilities
- Almost 60% were in the U.S. = 2,350 facilities

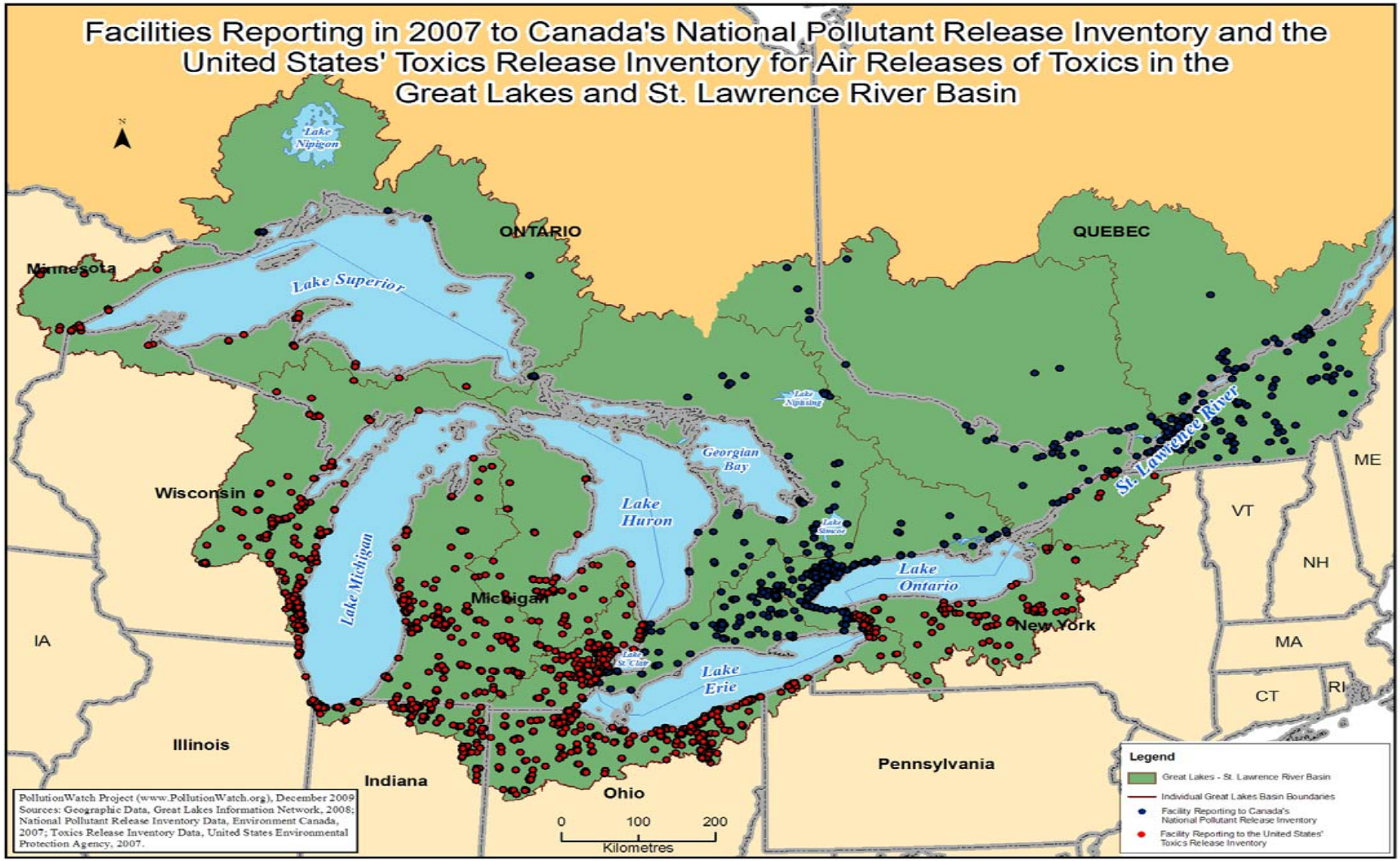
Great Lakes-St. Lawrence River basin facilities were almost 18% of all matched North American facilities (22,146 matched facilities). However, in Canada, the Great Lakes facilities represented almost three-quarters (72%) of matched NPRI facilities. In the U.S., Great Lakes facilities were just 12% of matched TRI facilities (Table 1).

Table 1. Number of Matched Facilities Reporting for 2007, by Basin, NPRI and TRI

Basin	Number of Facilities			% of Total		
	NPRI	TRI	Total	NPRI	TRI	Total
Lake Erie	368	1,015	1,383	23	43	35
Lake Michigan	0	984	984	0	42	25
Lake Ontario	635	222	857	39	9	22
St. Lawrence River	482	12	494	30	1	12
Lake Huron	108	78	186	7	3	5
Lake Superior	17	39	56	1	2	1
Total for Great Lakes-St. Lawrence River Basin	1,610	2,350	3,960	100	100	100
% of Total for North America*	72	12	18			
Total for North America	2,247	19,899	22,146			

Note: Includes only facilities reporting 204 chemicals common to both NPRI and TRI from selected industrial and other sources.
* This report does not include data from Mexico's RETC program.

Figure 1. Locations of Matched Canadian NPRI and U.S. TRI Facilities in the Great Lakes-St. Lawrence River Basin in 2007



The Lake Erie basin had the largest number of facilities reporting to NPRI and TRI combined since there are more than 1,000 U.S. TRI facilities located in this watershed. The Lake Michigan basin is located entirely within the U.S. and had the second largest number of facilities reporting. Almost 85% of the U.S. TRI facilities were located in these two Great Lakes-St. Lawrence River basins. The largest number of Canadian NPRI facilities was located in the Lake Ontario basin. Over 90% of Canadian NPRI facilities were located in three basins: Lake Ontario, St. Lawrence River and Lake Erie. (See Table 1 and Figure 1.)

2.2 Great Lakes-St. Lawrence River Basins Overview – Total Releases

In 2007, total releases on- and off-site of all matched chemicals from all matched facilities in the Great Lakes-St. Lawrence River basin was almost 209 million kg. TRI facilities contributed 142 million kg (68% of the total releases). NPRI facilities contributed 66 million kg (32% of the total). (See Figure 2 and Table 2.)

Figure 2. Total Releases On- and Off-site from Matched NPRI and TRI Facilities, by Basin, 2007

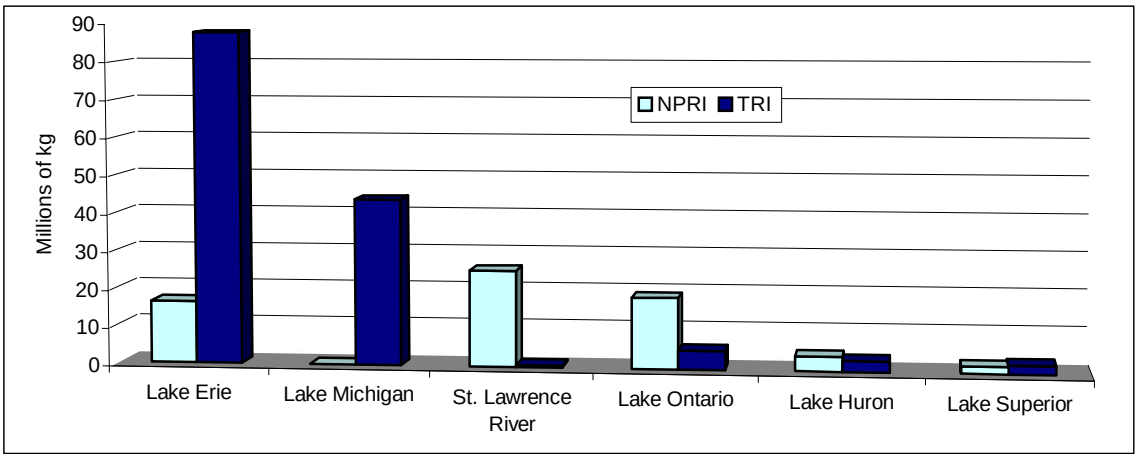


Table 2. Total Reported Releases for 2007, by Basin, NPRI and TRI

Basin	Total Reported Releases On- and Off-site			% of Total		
	NPRI (kg)	TRI (kg)	Total (kg)	NPRI (%)	TRI (%)	Total (%)
Lake Erie	16,393,329	87,895,455	104,288,784	25	62	50
Lake Michigan	0	43,928,218	43,928,218	0	31	21
St. Lawrence River	25,474,031	468,418	25,942,449	38	0	12
Lake Ontario	18,806,189	5,019,145	23,825,334	28	4	11
Lake Huron	3,890,057	2,864,266	6,754,323	6	2	3
Lake Superior	1,896,341	2,308,007	4,204,348	3	2	2
Total	66,459,947	142,483,508	208,943,455	100	100	100

Note: Includes only facilities reporting 204 chemicals common to both NPRI and TRI from selected industrial and other sources. Includes transfers of metals and metal compounds to energy recovery, treatment, sewage and disposal.

Lake Erie Basin: Lake Erie basin is the unfortunate winner of the pollution prize – the largest amount of chemicals released of all the Great Lakes-St. Lawrence River basins, accounting for 50% of all releases in the Great Lakes-St. Lawrence River basin in 2007. Matched NPRI and TRI facilities in the Lake Erie basin reported the largest air releases, land releases and amounts injected underground, ranging from 49% of air releases, 28% of water discharges, 56% of on-site land releases and 96% of amounts injected underground. These large amounts of chemicals entering the air, water, land, and injected underground in the Lake Erie basin are of concern as Lake Erie is the smallest and shallowest of the Lakes.

Almost three-quarters (73%) of the facilities in the Lake Erie basin are located in the U.S. The U.S. TRI facilities accounted for 80% of the total releases in the basin, including all of the chemicals injected underground and over 90% of the on-site land releases. While most of the total air releases in the Lake Erie basin (70%) came from U.S. TRI facilities, NPRI facilities, representing about one-quarter (27%) of the facilities in the basin, contributed 30% of air releases. Electric power plants in both Canada and the U.S. accounted for 40% or more of total air releases in each country in the Lake Erie basin. The large air releases from power plants in Canada in this basin also accounted for over one-quarter (27%) of total releases from NPRI facilities. However, in the U.S., hazardous waste facilities in this basin accounted for the most total releases (31%) followed by primary metals facilities (such as smelters and steel mills) with 28%.

Lake Michigan Basin: Facilities in the Lake Michigan basin reported over one-fifth (21%) of total releases in the Great Lakes-St. Lawrence River basin in 2007. Only U.S. facilities are located in the Lake Michigan basin as it falls completely within the U.S. jurisdiction. They accounted for 25% of facilities and 30% of water releases and 16% of air releases. Primary metals facilities (such as smelters and steel mills) accounted for over half (52%) of water releases, and power plants accounted for 44% of air releases within the Lake Michigan basin.

Lake Ontario Basin: While the Lake Ontario basin had almost one-quarter (22%) of the reporting facilities in 2007, it accounted for 11% of the total releases of the Great Lakes-St. Lawrence River basins. Almost three-quarters (74%) of the facilities in the Lake Ontario basin are located in Canada. These NPRI facilities accounted for over three-quarters (79%) of total releases including 72% of air releases within the Lake Ontario basin, but contributed over 90% of transfers to disposal and less than 10% of water releases. Hazardous waste management facilities in the Lake Ontario basin on the Canadian side contributed one-third of Canadian total releases within the basin, mainly as transfers to disposal. Transportation equipment manufacturers accounted for almost one-quarter (22%) of air releases from NPRI facilities in this basin. Electric power plants contributed 30% of total releases of U.S. TRI facilities in this basin. Electric power plants and chemical manufacturers each accounted for 40% of air releases reported by TRI facilities in this basin. Over 70% of water releases in the Lake Ontario basin were releases of nitrate compounds reported by U.S. TRI food products facilities.

St. Lawrence River Basin: Facilities in the St. Lawrence River basin accounted for 12% of the Great Lakes facilities reporting in 2007 with almost 98% of them located in Canada. NPRI facilities in this basin also accounted for 98% of total releases. The St. Lawrence River basin accounted for 14% of the air releases and 21% of the on-site land releases in the Great Lakes-St. Lawrence River basin. Almost two-thirds (65%) of the large on-site land disposal were due to one hazardous waste management facility in Canada (Stablex Canada in Blainville, Quebec). Paper manufacturers reported the largest air releases in the St. Lawrence basin. Canadian pulp and paper mills contributed over one-quarter of the total air releases in the St. Lawrence basin.

Lake Huron Basin: Just 5% of the facilities in the Great Lakes are located in the Lake Huron basin, with over half of them (58%) located in Canada. However, Lake Huron basin contributed 7% of the total air releases in the Great Lakes-St. Lawrence River basin. Primary metals facilities (such as smelters and steel mills) in Canada represented 40% of that amount with one smelter (Vale Inco's Copper Cliff (Ontario) Smelter Complex) contributing one-third of the total air releases in the basin. Power plants located in the U.S. contributed almost one-quarter (22%) of the basin's air releases.

Lake Superior Basin: Just 1% of Great Lakes facilities are located in the Lake Superior basin, with 70% located in the U.S. and 30% in Canada. However, Lake Superior basin contributed 4% of the total air releases in the Great Lakes-St. Lawrence River basin. Over 45% of the Lake Superior basin air releases were from pulp and paper mills located in Canada and almost one-quarter (24%) were from power plants located in the U.S.

2.3 Air Releases

In 2007, total air releases of all matched chemicals from all matched facilities in the Great Lakes were almost 75 million kg. TRI facilities released 43 million kg to air (58% of the total). NPRI facilities released 31 million kg (42% of the total). On a per facility basis, NPRI facilities averaged slightly higher air releases than TRI (19,438 kg for NPRI vs. 18,425 kg for TRI). (See Figure 3 and Table 3.)

Figure 3. Air Releases from Matched NPRI and TRI Facilities, by Basin, 2007

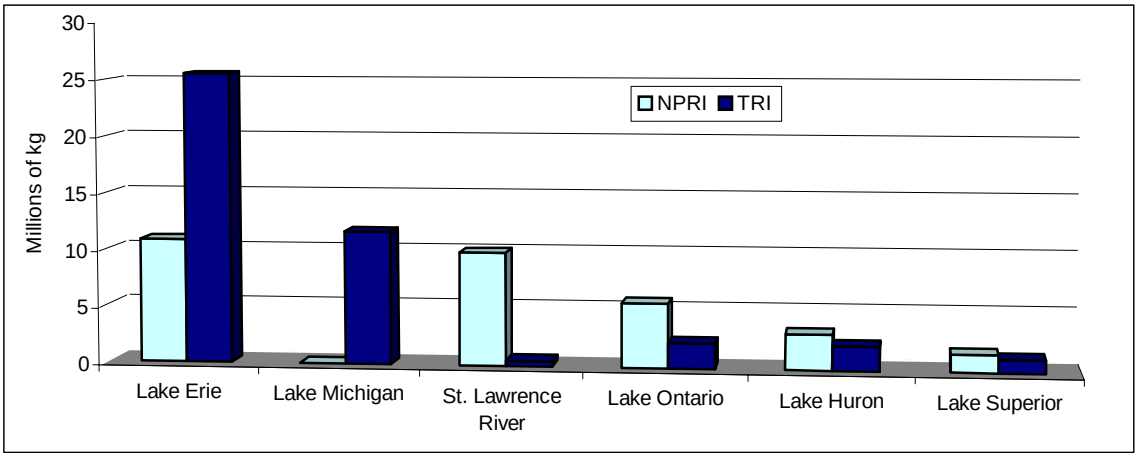


Table 3. Air Releases from Matched NPRI and TRI Facilities, by Basin, 2007

Basin	Air Releases			% of Total		
	NPRI (kg)	TRI (kg)	Total (kg)	NPRI (%)	TRI (%)	Total (%)
Lake Erie	10,921,337	25,593,280	36,514,617	35	59	49
Lake Michigan	0	11,715,867	11,715,867	0	27	16
St. Lawrence River	9,975,550	459,982	10,435,532	32	1	14
Lake Ontario	5,689,876	2,202,858	7,892,734	18	5	11
Lake Huron	3,141,041	2,173,082	5,314,123	10	5	7
Lake Superior	1,567,716	1,153,293	2,721,009	5	3	4
Total	31,295,520	43,298,362	74,593,882	100	100	100

Note: Includes only facilities reporting 204 chemicals common to both NPRI and TRI from selected industrial and other sources.

The Lake Erie basin, with the largest number of facilities, had 49% of total air releases in the Great Lakes-St. Lawrence River basin. TRI facilities contributed 70% of total air releases in the Lake Erie basin.

Seven of the top 10 facilities with the largest air releases in the Great Lakes-St. Lawrence River basin were located in the Lake Erie basin (Table 4). The top four were electric power plants; two were located in the U.S. and two in Canada. The Lake Michigan and St. Lawrence River basins had about 15% each of total air releases, with TRI facilities contributing all in the Lake Michigan basin and NPRI facilities contributing over 95% of air releases in the St. Lawrence River basin.

Table 4. Top 10 Matched Facilities Releasing the Largest Amounts of Matched Chemicals to Air, 2007

Basin	Facility Name	Company Name	City	Province/ State	Air Releases (kg)
Erie	Detroit Edison Monroe Power Plant	DTE Energy	Monroe	MI	6,551,460
Erie	Lyondell Co Millennium Inorganic Chemicals A Cristal Co	Lyondell Chemicals Inc	Ashtabula	OH	2,433,977
Erie	Nanticoke Generating Station	Ontario Power Generation	Nanticoke	ON	2,266,857
Erie	Lambton Generating Station	Ontario Power Generation	Courtright	ON	2,090,910
Huron	Copper Cliff Smelter Complex	Vale Inco	Copper Cliff	ON	1,776,026
Erie	FirstEnergy Corp Eastlake Plant	FirstEnergy Generation Corp	Eastlake	OH	1,510,685
Erie	Lanxess East	Lanxess Inc.	Sarnia	ON	1,292,582
Huron	De Karn JC Weadock Generating Plant	Consumers Energy	Essexville	MI	1,169,250
Erie	Millennium Inorganic Chemicals A Cristal Co	Cristal Global	Ashtabula	OH	1,114,570
Michigan	J H Campbell Generating Plant	Consumers Energy	West Olive	MI	1,086,811
	Total Top 10 Facilities				21,293,127
	Total for All Matched Facilities				74,593,882

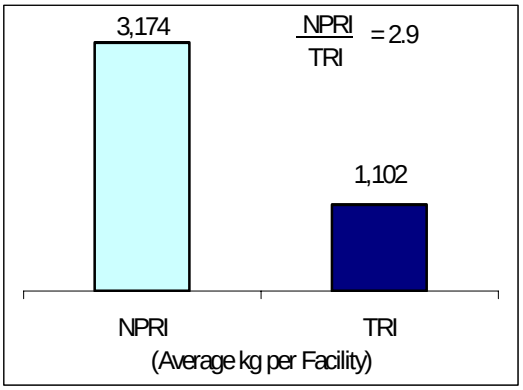
Note: Canada and U.S. data only. Data include 204 chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers of chemicals, not exposures of the public to those chemicals. Since reporting in 2007, some of these facilities may have changed their name or ownership.

2.3.1 Air Releases of Known Carcinogens

About 6% of all air releases were chemicals considered "known carcinogens" (as known to the state of California and listed in California Proposition 65, see www.oehha.ca.gov/prop65.html). The total air releases of chemicals considered known carcinogens in 2007 from matched NPRI and TRI facilities in the Great Lakes-St. Lawrence River basin was 4 million kg.

NPRI facilities reported more carcinogens released to air than would be expected – NPRI facilities make up about 34% of facilities reporting carcinogens, but these facilities reported 60% of total air carcinogen releases in Great Lakes-St. Lawrence River basin in 2007.

Figure 4. Average kg per Facility of Air Releases, Known Carcinogens, NPRI and TRI, 2007



On a per facility basis, NPRI facilities reported more carcinogens released into air than TRI facilities. In fact, on average, NPRI facilities released almost triple the amount of carcinogens into the air than TRI facilities (ratio 2.9). (See Figure 4 and Table 5.) There are more facilities in Canada reporting releases to air of pollutants that are known carcinogens than U.S. facilities. Among the 10 facilities with the largest air releases of known carcinogens, eight are located in Canada (Table 6). Thus, even without the 10 largest facilities, NPRI facilities had higher average air releases of known carcinogens (ratio 2.4).

Table 5. Air Releases of Known Carcinogens per Facility, NPRI And TRI, 2007

	Number of facilities releasing known carcinogens to air	Percentage of total number of facilities	Air releases of known carcinogens (kg)	Percentage of total air releases	Amount per facility (kg)
NPRI	778	34%	2,469,113	60%	3,174
TRI	1,496	66%	1,648,798	40%	1,102
Total	2,274		4,117,910		
Note: Chemicals considered known carcinogens as identified on the California Proposition 65 List.					

Table 6. Top 10 Matched Facilities Releasing the Largest Amounts of Known Carcinogens to Air in 2007

Basin	Facility Name	Company Name	City	Province/ State	Air Releases (kg)
Superior	Terrace Bay Pulp	Terrace Bay Pulp Inc.	Terrace Bay	ON	129,180
Erie	Holcim (US) Inc. - Dundee Plant	Holcim (US) Inc.	Dundee	MI	124,611
Ontario	Dofasco Hamilton	ArcelorMittal-Dofasco Inc.	Hamilton	ON	98,604
Huron	Huntsville	CANUSA-CPS	Huntsville	ON	95,934
Ontario	Eastman Kodak Co Kodak Park	Eastman Kodak Co	Rochester	NY	89,483
St. Lawrence	Englehart Oriented Strand Board Plant	Grant Forest Products	Englehart	ON	89,177
Ontario	Hamilton Works	U. S. Steel Canada	Hamilton	ON	76,798
St. Lawrence	Division Mont-Laurier	Uniboard Canada	Mont-Laurier	QC	68,550
St. Lawrence	Tafisa Canada	Société en commandite Tafisa Canada	Lac-Mégantic	QC	59,565
Huron	Copper Cliff Smelter Complex	Vale Inco	Copper Cliff	ON	59,395
	Total for Top 10 Facilities				891,297
	Total for All Matched Facilities				4,117,910

Note: Canada and U.S. data only. Data include 67 chemicals considered known carcinogens as identified on the California Proposition 65 list and 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. Since reporting for 2007, some of these facilities may have changed their name or ownership.

Canadian facilities also released to air a greater proportion of the top six known carcinogens. Over half (52%) of the facilities reporting formaldehyde, the carcinogen with the largest air releases for 2007, were NPRI facilities, and they accounted for over three-quarters (78%) of the air releases of formaldehyde. For benzene, the carcinogen with the second largest air releases, while NPRI facilities accounted for about one-quarter (27%) of all facilities reporting this chemical, they accounted for over half (52%) of the air releases (Table 7). All of the top six carcinogens, except ethylbenzene, are also considered toxic in Canada under the *Canadian Environmental Protection Act*. All carcinogens, excluding acetaldehyde, have been identified under Phase 1 of Ontario's *Toxics Reduction Act* for pollution prevention plans.[9]

Table 7. Top 6 Matched Chemicals with the Largest Amounts of Known Carcinogens to Air in 2007

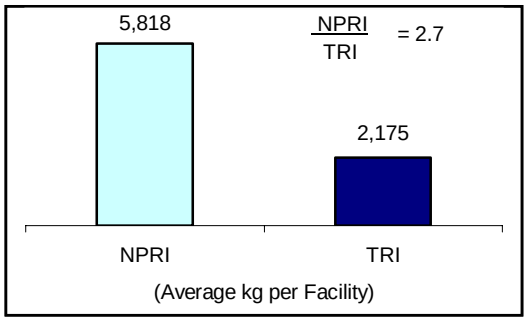
CAS Number	Chemical	Number of facilities reporting					Air Releases (kg)				
		NPRI Number	TRI Number	Total Number	NPRI as % of Total	TRI as % of Total	NPRI kg	TRI kg	Total kg	NPRI as % of Total	TRI as % of Total
50-00-0	Formaldehyde	81	74	155	52%	48%	578,419	158,648	737,067	78%	22%
71-43-2	Benzene	35	97	132	27%	73%	359,127	329,430	688,557	52%	48%
100-41-4	Ethylbenzene	109	158	267	41%	59%	298,133	226,259	524,392	57%	43%
79-01-6	Trichloroethylene	36	43	79	46%	54%	266,913	168,468	435,381	61%	39%
75-07-0	Acetaldehyde	20	16	36	56%	44%	309,071	101,871	410,942	75%	25%
75-09-2	Dichloromethane	45	38	83	54%	46%	138,784	190,081	328,865	42%	58%
	Total for Top 6	326	426	752	43%	57%	1,950,447	1,174,757	3,125,204	62%	38%
	Total for All Carcinogens	778	1,496	2,274	34%	66%	2,469,113	1,648,798	4,117,910	60%	40%

[9] See: www.ene.gov.on.ca/en/news/2009/040701mb.pdf.

2.3.2 Air Releases of Known Reproductive and Developmental Toxicants

About 8% of all air releases were chemicals considered "known reproductive and developmental toxins" (known to the state of California and listed in California Proposition 65). Total air releases of chemicals considered to be reproductive and developmental toxins from matched NPRI and TRI facilities in the Great Lakes-St. Lawrence River basin was 6 million kg for 2007.

Figure 5. Average kg per Facility of Air Releases, Known Reproductive/ Developmental Toxins, NPRI and TRI, 2007



NPRI facilities reported more known reproductive and developmental toxins released to air than would be expected – NPRI facilities made up about one-third (33%) of facilities reporting these reproductive and developmental toxins, but these facilities reported over half (57%) of total air the reproductive/developmental toxins releases in Great Lakes-St. Lawrence River basin in 2007.

On a per facility basis, NPRI facilities reported more known reproductive and developmental toxins released into air than TRI facilities. In fact, on average, NPRI facilities released more than double the amount of these reproductive and developmental toxins into the air than TRI facilities (ratio 2.7). (See Figure 5 and Table 8.)

Table 8. Air Releases of Known Reproductive/Developmental Toxins per Facility, NPRI and TRI, 2007

	Number of facilities releasing known reproductive/developmental toxins to air	Percentage of total number of facilities	Air releases of known reproductive/developmental toxins (kg)	Percentage of total air releases	Amount per facility (kg)
NPRI	604	33%	3,513,788	57%	5,818
TRI	1,230	67%	2,674,767	43%	2,175
Total	1,834		6,188,555		

Note: Chemicals considered reproductive/developmental toxins as identified on the California Proposition 65 List.

The facility with the largest air releases of these reproductive/developmental toxins in 2007 was located in the U.S. and released almost twice as much as the next largest facility, representing almost 10% of total air releases of these reproductive/developmental toxins in the Great Lakes-St. Lawrence River basin (Table 9). However, the next three top facilities were located in Canada. These facilities contributed 13% of the total air releases of these chemicals in the Great Lakes-St. Lawrence River basin. Even without the 10 largest facilities, NPRI facilities had higher average air releases of known reproductive/developmental toxins (ratio 3.5).

Table 9. Top 10 Matched Facilities Releasing the Largest Amounts of Known Reproductive/Developmental Toxins to Air in 2007

Basin	Facility Name	Company Name	City	Province/ State	Air Releases (kg)
Erie	Intertape Polymer Group		Marysville	MI	591,650
St. Lawrence	Montreal Plant	Canadian Technical Tape	St-Laurent	QC	299,636
Ontario	Quebecor World Islington	Quebecor World	Etobicoke	ON	252,063
Erie	Lanxess East	Lanxess Inc.	Sarnia	ON	244,447
Erie	Holcim (US) Inc. - Dundee Plant	Holcim (US) Inc.	Dundee	MI	147,268
Ontario	3M Co - Tonawanda	3M Co	Tonawanda	NY	143,311
Ontario	Dofasco Hamilton	ArcelorMittal-Dofasco Inc.	Hamilton	ON	102,617
Michigan	Quad/Graphics, Inc.	Quad/Graphics, Inc.	Lomira	WI	92,744
Erie	3M Elyria	3M Co	Elyria	OH	87,029
Erie	Quebecor World Buffalo	Quebecor World Corp	Depew	NY	86,567
	Total for Top 10 Facilities				2,047,332
	Total for All Matched Facilities				6,188,555

Note: Canada and U.S. data only. Data include 19 chemicals considered known reproductive/developmental toxins as identified on the California Proposition 65 list and 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. Since reporting for 2007, some of these facilities may have changed their name or ownership.

Toluene accounted for over 70% of air releases of known reproductive/developmental toxins in the Great Lakes-St. Lawrence River basin (Table 10). While NPRI facilities represented less than half (46%) of facilities reporting toluene for 2007, they reported more than half (58%) of the total air releases of this chemical. A similar pattern held true for three of the next four top reproductive/developmental toxins (benzene, chloromethane and N-methyl-2-pyrrolidone) with the largest air releases.

Table 10. Top 5 Matched Chemicals with the Largest Amounts of Known Reproductive/Developmental Toxins to Air in 2007

CAS Number	Chemical	Number of facilities reporting					Air Releases				
		NPRI Number	TRI Number	Total Number	NPRI as % of Total	TRI as % of Total	NPRI kg	TRI kg	Total Kg	NPRI as % of Total	TRI as % of Total
108-88-3	Toluene	251	300	551	46%	54%	2,577,362	1,837,643	4,415,005	58%	42%
71-43-2	Benzene	35	97	132	27%	73%	359,127	329,430	688,557	52%	48%
75-15-0	Carbon disulfide	2	11	13	15%	85%	51,827	271,836	323,663	16%	84%
74-87-3	Chloromethane	1	6	7	14%	86%	244,447	7,020	251,467	97%	3%
872-50-4	N-Methyl-2-pyrrolidone	25	52	77	32%	68%	135,665	108,327	243,992	56%	44%
	Total for Top 5	314	466	780	40%	60%	3,368,428	2,554,256	5,922,684	57%	43%
	Total for All Reproductive/ Developmental Toxins	797	1,680	2,477	32%	68%	3,513,788	2,674,767	6,188,555	57%	43%

2.4 Water Releases

The pollutant releases to water were much smaller than air releases in the Great Lakes-St. Lawrence River basin in 2007 - 5.5 million kg released to water compared to 75 million kg to air. However, the amount of chemicals released to water is underestimated. Wastewater treatment plants are not required to report to TRI and so a major source of water releases cannot be included in the matched data. In Ontario, 62 sewage treatment plants reported over 50 million kg of water releases for 2007 and, in Quebec, 41 sewage treatment plants reported over 13 million kg.[10]

Figure 6. Water Releases from Matched NPRI and TRI Facilities, by Basin, 2007

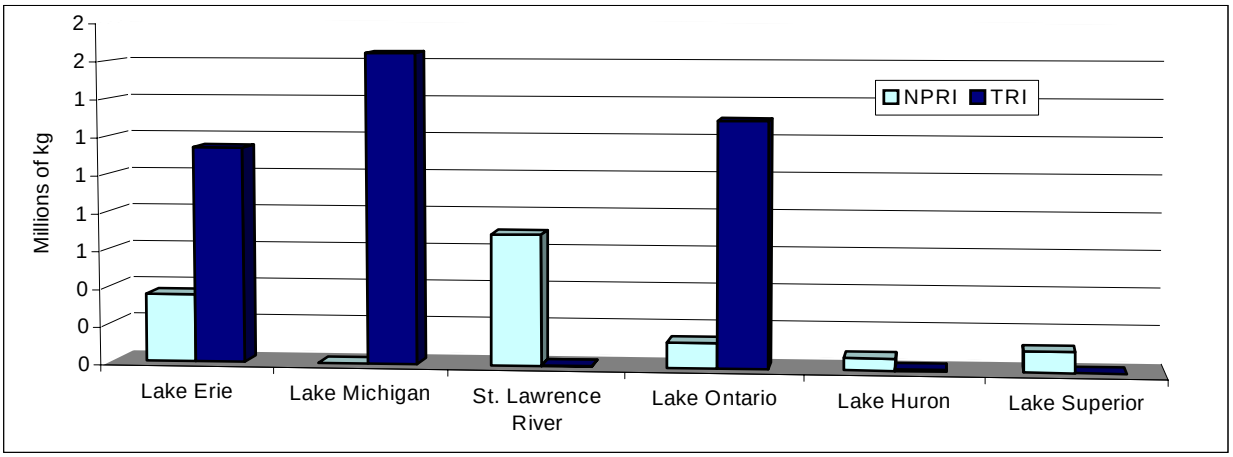


Table 11. Water Releases, by Basin, NPRI and TRI, 2007

Basin	Water Releases			% of Total		
	NPRI (kg)	TRI (kg)	Total (kg)	NPRI (%)	TRI (%)	Total (%)
Lake Michigan	0	1,647,256	1,647,256	0	40	30
Lake Erie	358,708	1,143,649	1,502,357	26	28	28
Lake Ontario	133,268	1,299,453	1,432,721	10	32	26
St. Lawrence River	694,681	2,154	696,835	51	0	13
Lake Superior	110,095	917	111,012	8	0	2
Lake Huron	63,665	8,420	72,085	5	0	1
Total	1,360,416	4,101,849	5,462,265	100	100	100

Note: Includes only facilities reporting 204 chemicals common to both NPRI and TRI from selected industrial and other sources.

The Lake Michigan basin, which only has TRI facilities, had 30% of total water releases in the Great Lakes-St. Lawrence River basin in 2007. Two of the four facilities with the largest water releases were located in the Lake Michigan basin. The Lake Erie and Lake Ontario basins each contributed over one-quarter of water releases and each had one of the top two facilities for water releases. For NPRI facilities, water releases in the St. Lawrence River basin represented

[10] PollutionWatch. NPRI data for 2007, accessed February 2009. See: www.PollutionWatch.org/.

over half of NPRI water releases in the Great Lakes-St. Lawrence River basin. (See Figure 6 and Tables 11 and 12.)

Table 12. Top 10 Matched Facilities Releasing Largest Amounts of Matched Chemicals to Water in 2007

Basin	Facility Name	Company Name	City	Province/ State	Water Releases (kg)
Ontario	Anheuser-Busch, Inc.	Anheuser-Busch Cos Inc.	Baldwinsville	NY	1,012,242
Erie	Brush Wellman Inc	Brush Engineered Materials Inc.	Elmore	OH	790,509
Michigan	USS Gary Works	United States Steel Corp	Gary	IN	746,124
Michigan	Georgia-Pacific Consumer Products LP	Georgia-Pacific LLC	Green Bay	WI	441,803
Ontario	Eastman Kodak Co Kodak Park	Eastman Kodak Co	Rochester	NY	275,562
Erie	Sarnia Refinery Plant	Imperial Oil	Sarnia	ON	239,385
St. Lawrence	Usine de Windsor	Domtar Inc.	Windsor	QC	128,261
Erie	PCS Nitrogen of Ohio L.P.	PCS Nitrogen L.P.	Lima	OH	92,566
Erie	Republic Engineered Products Inc. Lorain Plant	Republic Engineered Products Inc.	Lorain	OH	87,533
St. Lawrence	Site de Témiscaming	Tembec Inc. Témiscaming	Témiscaming	QC	68,016
	Total for top 10 Facilities				3,882,001
	Total for All Matched Facilities				5,462,265

Note: Canada and U.S. data only. Data include 204 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. Since reporting for 2007, some of these facilities may have changed their name or ownership.

Unlike air releases, TRI facilities averaged larger water releases than NPRI facilities. On a per facility basis, TRI facilities released about double the amount of chemicals to the water compared to NPRI facilities. (See Figure 7 and Table 13.) Seven of the 10 facilities with the largest water releases were located in the U.S. The water releases from these TRI facilities are significant. If the 10 facilities with the largest water releases are not included, then NPRI facilities, on average, released twice the amount compared to TRI facilities (ratio 2.1).

Figure 7. Average kg per Facility of Water Releases, NPRI and TRI, 2007

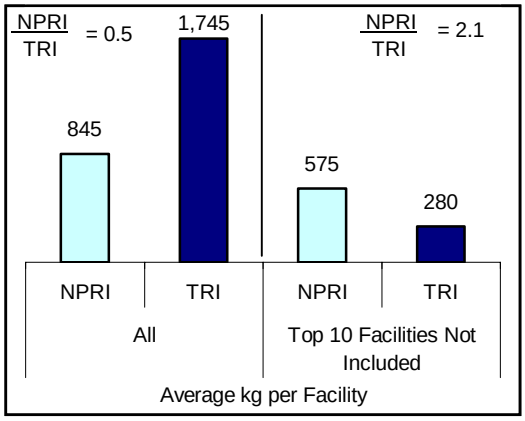


Table 13. Water Releases per Facility, NPRI and TRI, 2007

	Number of facilities	Percentage of total number of facilities	Water Releases (kg)	Percentage of total water releases	Amount per facility (kg)
All Great Lakes Facilities					
NPRI	1,610	41%	1,360,416	25%	845
TRI	2,350	59%	4,101,849	75%	1,745
Total	3,960		5,462,265		
Great Lakes Facilities, not including Top 10 with largest releases					
NPRI	1,607	41%	924,754	59%	575
TRI	2,343	59%	655,510	41%	280
Total	3,950		1,580,264		

Nitrate compounds and manganese (and its compounds) had the largest water releases in the Great Lakes-St. Lawrence River basin for both NPRI and TRI. The industry sectors reporting water releases, however, differed in the two countries. For NPRI, the paper products sector (pulp and paper mills) reported the largest water releases, including the largest water releases of nitrate compounds and manganese (and its compounds). On the other hand, for TRI, the primary metals sector (smelters and steel mills) and the food products sector had the largest water releases. These two sectors reported the largest releases of nitrate compounds. For TRI, the paper products sector had the largest releases of manganese (and its compounds).

In contrast to air, less than 1% of total water releases were carcinogens or reproductive/developmental toxins. Formaldehyde was the carcinogen with the largest water releases in NPRI (with 19,951 kg). Lead (and its compounds) was the reproductive/developmental toxin with the largest water releases in both NPRI (with 1,710 kg) and TRI (with 5,717 kg). Lead (and its compounds) was also the carcinogen with the largest water releases in TRI.

2.5 Underground Injection

Underground injection is rare in the Great Lakes-St. Lawrence River basin. Only 6 facilities (5 in the U.S. and 1 in Canada) reported underground injection in 2007 (Table 14). A total of almost 10 million kg was injected, with two U.S. facilities in the Lake Erie basin accounting for over 96% of the total. The hazardous waste management facility, Vickery Environmental in Vickery, Ohio, injected 5.9 million kg, including over 2 million kg each of nitric acid and hydrogen fluoride. The chemical manufacturer, Ineos USA LLC in Lima, Ohio, injected 3.5 million kg, including almost 2 million kg of acetonitrile.

Table 14. Matched Facilities[11] Releasing Largest Amounts of Matched Chemicals to Underground Injection in 2007

Basin	Facility Name	Company Name	City	Province/ State	Under-ground Injection (kg)
Erie	Vickery Environmental Inc.	Waste Management of Ohio	Vickery	OH	5,942,601
Erie	Ineos USA LLC	Innovene USA LLC	Lima	OH	3,466,722
Michigan	Pharmacia & Upjohn Co. LLC A Subsidiary of Pfizer Inc.	Pfizer Inc.	Kalamazoo	MI	153,878
Michigan	Arcelormittal Burns Harbor LLC	Arcelormittal USA Inc.	Burns Harbor	IN	130,705
Michigan	Pfizer Inc. Parke-Davis Div.	Pfizer Inc.	Holland	MI	72,549
St. Lawrence	La Brasserie Labatt	Labatt Breweries of Canada	Lasalle	QC	10,072
	Total for All Matched Facilities				9,776,527

Note: Canada and U.S. data only. Data include 204 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. Since reporting for 2007, some of these facilities may have changed their name or ownership.

More chemicals are injected underground than released to water (almost 10 million kg underground vs. about 5 million kg to water).

About 9% of chemicals injected underground are known carcinogens (Table 15).

Table 15. Underground injection from Matched NPRI and TRI Facilities in the Great Lakes Basin, 2007

	Amount injected underground in 2007 (kg)	% of Total
All Matched Chemicals		
NPRI	10,072	0.1%
TRI	9,766,455	99.9%
Total	9,776,527	
Known Carcinogens		
NPRI	0	0.0%
TRI	872,811	100.0%
Total	872,811	
Known Reproductive/Developmental Toxins		
NPRI	0	0.0%
TRI	13,165	100.0%
Total	13,165	

2.6 Land Releases and Disposal

Large amounts of chemicals are landfilled on-site on both sides of the Great Lakes (almost 50 million kg). On-site land releases and disposal in the Great Lakes-St. Lawrence River basin are greater than water and underground injection but less than air releases.[12]

Overall, TRI facilities landfilled more chemicals, about 31 million kg, compared to NPRI facilities with about 18 million kg. The Lake Erie basin had the largest on-site land releases and disposal, primarily due to TRI facilities. NPRI facilities located in the St. Lawrence River basin accounted for over half (57%) of the amounts in Canada. (See Figure 8 and Table 16.)

[11] Note, only 6 facilities in the Great lakes-St. Lawrence River basin use this waste disposal method.

[12] Note that in this report all on-site land releases are included in this section. This differs from Environment Canada's categorization of NPRI data which defines on-site landfills and land treatment as land disposal and on-site land spills, leaks and other releases as land releases.

Figure 8. On-site Land Disposal and Releases from Matched NPRI and TRI Facilities, by Basin, 2007

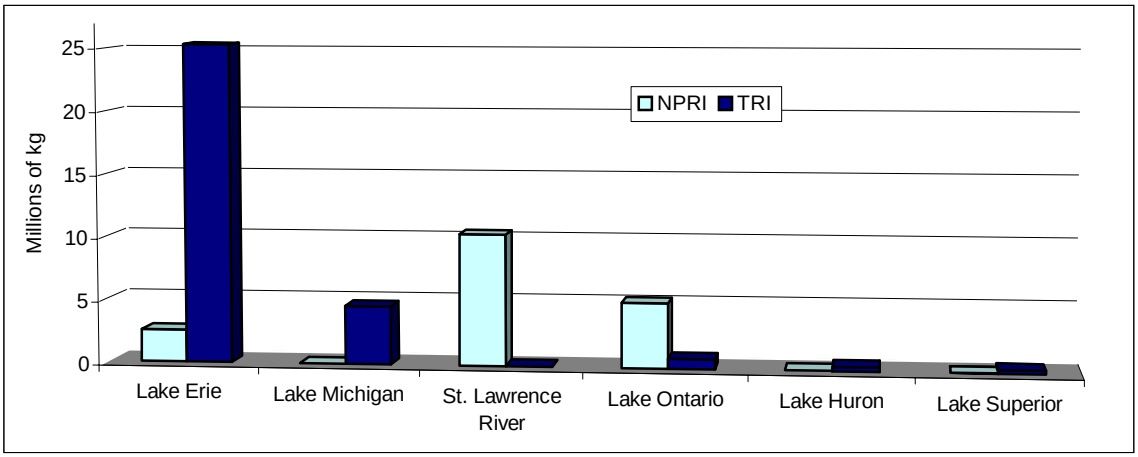


Table 16. On-site Land Releases, by Basin, NPRI and TRI, 2007

Basin	On-site Land Releases			% of Total		
	NPRI (kg)	TRI (kg)	Total (kg)	NPRI (%)	TRI (%)	Total (%)
Lake Erie	2,563,932	25,341,469	27,905,401	14	81	56
St. Lawrence River	10,446,238	0	10,446,238	57	0	21
Lake Ontario	5,170,248	766,124	5,936,372	28	2	12
Lake Michigan	0	4,609,433	4,609,433	0	15	9
Lake Huron	35,881	353,366	389,247	0	1	1
Lake Superior	12,284	272,699	284,983	0	1	1
Total	18,228,582	31,343,092	49,571,674	100	100	100

Note: Includes only facilities reporting 204 chemicals common to both NPRI and TRI from selected industrial and other sources. Since reporting for 2007, some of these facilities may have changed their name or ownership.

On a per facility basis, NPRI facilities had smaller on-site land releases, on average, than TRI facilities (NPRI 11,322 vs. TRI 13,337 kg per facility). However, for known carcinogens, NPRI facilities reported on-site land releases, on average, about six times more than the average for TRI facilities (NPRI 9,964 kg vs. TRI 1,622 kg).

The same holds true for known reproductive and developmental toxins – on a per facility basis, NPRI facilities, on average, reported almost six times the amount of land releases of reproductive and developmental toxins compared to TRI facilities (NPRI 8,354 kg vs. TRI 1,422 kg.)

Lead (and its compounds) is listed both as a known carcinogen and reproductive/ developmental toxin. It accounted for almost two-thirds of the on-site land releases of the carcinogens and over 99% of on-site land releases of the reproductive/developmental toxins.

Like underground injection, a few facilities contributed the majority of chemicals landfilled in the Great Lakes-St. Lawrence River basin. Just 10 facilities accounted for over 95% of the total on-site land releases of lead (and its compounds) in 2007 (Table 17). Of the 10 facilities with the

largest on-site land releases of lead (and its compounds), four were hazardous waste facilities operating landfills and four were steel mills disposing of lead and its compounds in on-site landfills at the mill. The three largest were hazardous waste facilities – Stablex Canada in Blainville, Quebec; Envirosafe Services in Oregon, Ohio; and the Canadian Clean Harbors Lambton facility in Corunna, Ontario. The next two largest were steel mills located in Canada.

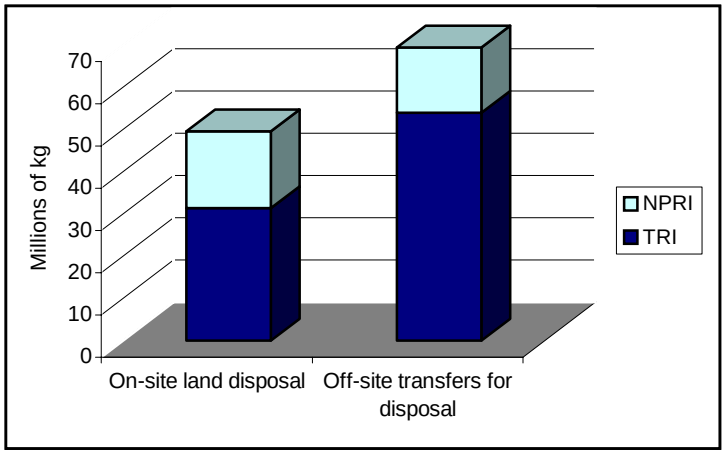
Table 17. Top 10 Matched Facilities with Largest On-site Land Releases of Lead (and its compounds), 2007

Basin	Facility Name	Company Name	City	Province/ State	On-site Land Releases (kg)
St. Lawrence	Stablex Canada - Blainville	Stablex Canada	Blainville	QC	3,361,050
Erie	Envirosafe Services of Ohio Inc		Oregon	OH	1,360,544
Erie	Lambton Facility	Clean Harbors	Corunna	ON	1,201,023
Ontario	Whitby	Gerdau Ameristeel	Whitby	ON	168,734
St. Lawrence	ArcelorMittal Contrecoeur-Ouest	Mittal Canada Inc.	Contrecoeur	QC	117,062
Ontario	CWM Chemical Services LLC	Waste Management	Model City	NY	87,982
St. Lawrence	Aciérie - ArcelorMittal Contrecoeur	Mittal Canada Inc.	Contrecoeur	QC	80,585
Michigan	USS Gary Works	United States Steel Corp	Gary	IN	53,841
Erie	Detroit Edison Monroe Power Plant	DTE Energy	Monroe	MI	38,580
Ontario	Colortech Inc. Brampton	Colortech Inc	Brampton	ON	34,100
	Total for Top 10 Facilities				6,503,502
	Total for All Matched Facilities				6,756,903

Note: Canada and U.S. data only. Data include 204 chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers, not exposure of the public to those chemicals. Since reporting for 2007, some of these facilities may have changed their name or ownership.

In addition to chemicals landfilled on-site, chemicals are shipped off-site for disposal, mainly in landfills. In 2007, Great Lakes facilities reported shipping off-site for disposal 69 million kg of matched chemicals, more than the 50 million kg of on-site land disposal (Figure 9). While almost two-thirds (63%) of the on-site land releases and disposal were from TRI facilities, TRI Facilities reported over three-quarters (78%) of the transfers for disposal for 2007. Over one-third (37%) of the on-site land disposal was from NPRI facilities while about one-quarter (22%) of

Figure 9. On- and Off-Site Land Disposal and Releases, NPRI and TRI, 2007



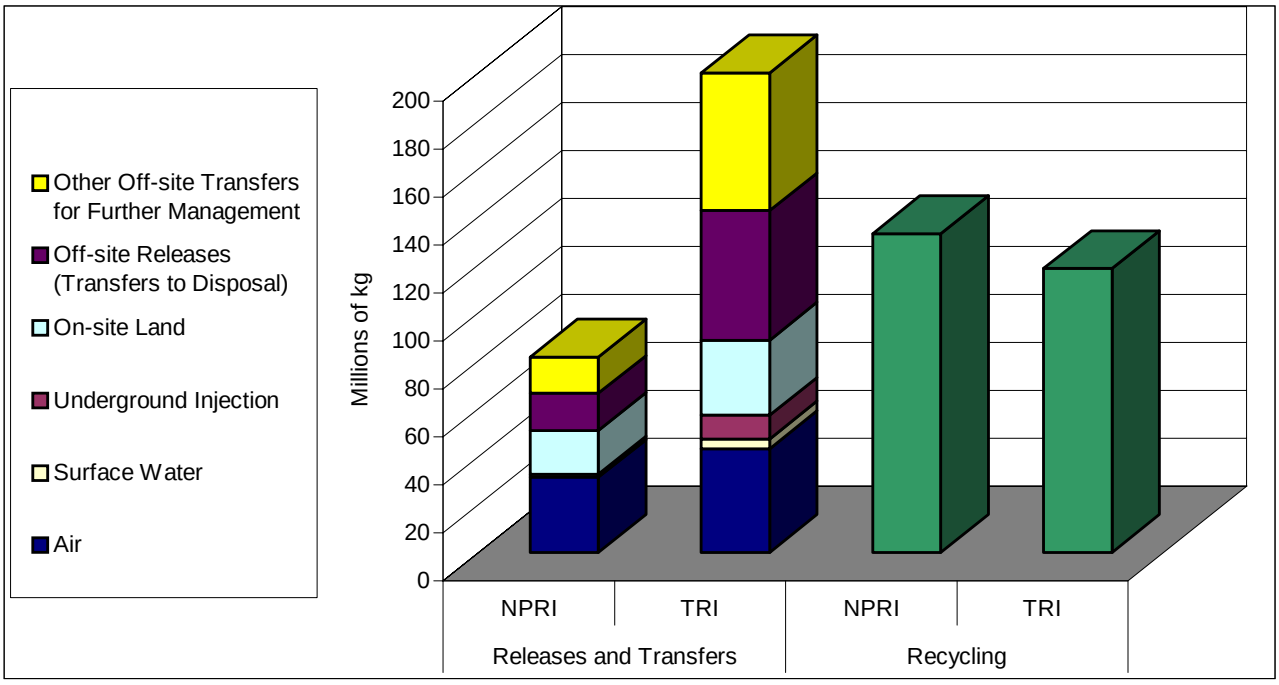
transfers for disposal were from NPRI facilities. Most chemicals were sent to nearby facilities located within the Great Lakes-St. Lawrence River basin while small amounts were sent to facilities in other provinces/states or countries. Most (over 88%) of these transfers were of metals and their compounds.

2.7 Total Releases and Transfers

Total reported amounts of chemicals released and transferred (excluding recycling) from matched facilities in the Great Lakes-St. Lawrence River basin in 2007 was 285 million kg. Recycling added another 251 million kg (Figure 10).

Over 70% of total releases and transfers (excluding recycling) was reported from TRI facilities and almost 30% of the total from NPRI facilities. However, NPRI facilities reported greater transfers to recycling than did TRI facilities in 2007. Recycling for NPRI facilities was 133 million kg and for TRI facilities it was 118 million kg in 2007.

Figure 10. Releases and Transfers in the Great Lakes-St. Lawrence River Basin, NPRI and TRI, 2007



2.8 Five Year Trends 2003-2007

The number of matched facilities in the Great Lakes-St. Lawrence River basin has generally decreased in the past five years (2003-2007) in both NPRI (-5%) and TRI (-21%). Total reported releases and transfers of chemicals (excluding recycling) decreased basin-wide by 18% from 2003 to 2007. Total releases and transfers (excluding recycling) decreased in both NPRI (-25%) and TRI (-16%).

The decrease in the number of facilities can be a factor in some of the downward trends. Other factors affecting how the amounts vary from year to year include changes in levels of business activity that put facilities above or below the reporting thresholds, changes in operations that alter the chemicals they use, adoption of pollution prevention or control activities that put them below reporting thresholds, or complying with NPRI and TRI reporting requirements. There are 204 chemicals in the matched data set for 2003-2007.

2.8.1 Air Releases

Air releases decreased basin wide by 18 million kg, or 19% from 2003 to 2007. Air releases decreased by 13 million kg, or 30%, for NPRI facilities in the Great Lakes-St. Lawrence River basin, driven by large reductions in a few facilities. (See Figure 11 and Table 18.) Four facilities reported reductions of over one million kg and accounted for almost half (6.4 million kg) of the reductions (Table 19).

Air releases from TRI facilities also showed a decrease, of 4 million kg or 9%. However, for TRI facilities, there were increases in air releases over the past five years in the Lake Erie basin (including one electric power plant with increases over 3 million kg, primarily of hydrochloric acid), along the St. Lawrence River and in the Lake Superior basin. (See Figure 11, and Tables 18 and 19.)

Figure 11. Air Releases, by Basin, NPRI and TRI, 2003-2007

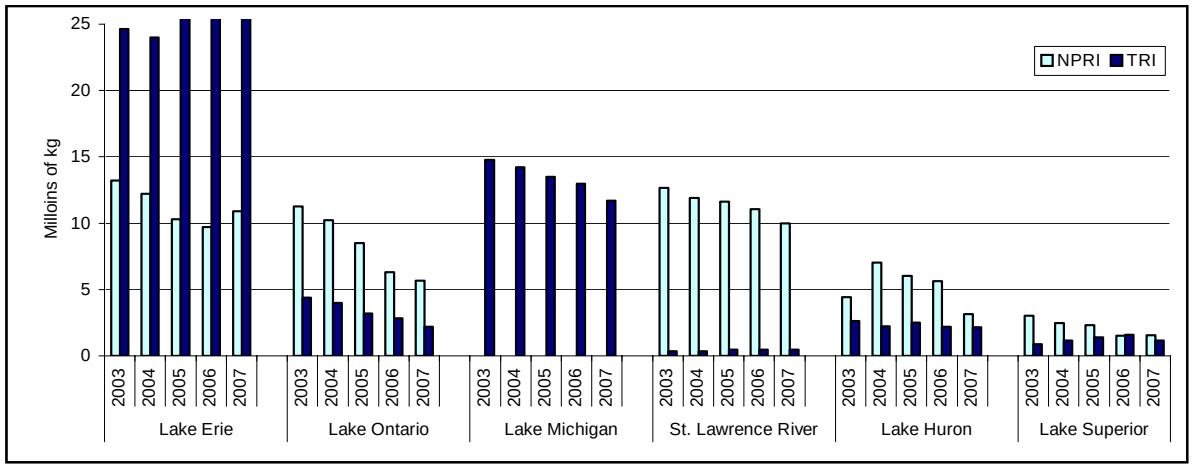


Table 18. Air Releases, by Basin, NPRI and TRI, 2003-2007

Basin	2003			2007			Change 2003-2007		
	NPRI kg	TRI kg	All kg	NPRI kg	TRI kg	All kg	NPRI %	TRI %	All %
Lake Erie	13,212,166	24,658,319	37,870,485	10,921,337	25,593,280	36,514,617	-17	4	-4
Lake Ontario	11,261,437	4,396,273	15,657,710	5,689,876	2,202,858	7,892,734	-49	-50	-50
Lake Michigan	0	14,766,379	14,766,379	0	11,715,867	11,715,867	--	-21	-21
St. Lawrence River	12,647,247	361,872	13,009,118	9,975,550	459,982	10,435,532	-21	27	-20
Lake Huron	4,446,841	2,654,553	7,101,394	3,141,041	2,173,082	5,314,123	-29	-18	-25
Lake Superior	3,018,763	867,525	3,886,288	1,567,716	1,153,293	2,721,009	-48	33	-30
Total	44,586,454	47,704,921	92,291,375	31,295,520	43,298,362	74,593,882	-30	-9	-19

Note: Includes only facilities reporting 204 chemicals common to both NPRI and TRI from selected industrial and other sources.

Table 19. Top Matched Facilities with the Largest Change in Air Releases of Matched Chemicals, 2003-2007

Basin	Facility Name	Company Name	City	Province/ State	On-site Air Releases		
					2003 kg	2007 kg	Change 2003-2007 (kg)
	Decreases						
Erie	Nanticoke Generating Station	Ontario Power Generation	Nanticoke	ON	4,648,629	2,266,857	-2,381,772
Erie	Lanxess West	Lanxess Inc.	Sarnia	ON	1,681,736	58,822	-1,622,914
Ontario	Oshawa Car Assembly Plant	General Motors Of Canada	Oshawa	ON	1,242,981	56,242	-1,186,739
Michigan	J H Campbell Generating Plant	Consumers Energy	West Olive	MI	2,226,926	1,086,811	-1,140,115
Ontario	Lakeview Generating Station	Ontario Power Generation	Mississauga	ON	1,129,707	--	-1,129,707
	Increases						
Erie	Detroit Edison Monroe Power Plant	DTE Energy	Monroe	MI	3,340,123	6,551,460	3,211,337
Erie	Lambton Generating Station	Ontario Power Generation	Courtright	ON	416,222	2,090,910	1,674,687
Erie	Lanxess East	Lanxess Inc.	Sarnia	ON	--	1,292,582	1,292,582
Michigan	State Line Energy LLC	Dominion Energy Inc	Hammond	IN	46,641	1,021,833	975,191
Erie	Millennium Inorganic Chemicals A Cristal Co	Cristal Global	Ashtabula	OH	471,103	1,114,570	643,467

Note: Canada and U.S. data only. Data include 204 chemicals common to both NPRI and TRI lists from selected industrial and other sources. The data reflect estimates of releases and transfers, not exposure of the public to those chemicals.
* denotes facility did not report matched chemicals in year indicated.

Air releases of carcinogens also decreased basin wide, by 36%, for both NPRI and TRI facilities. Facilities no longer reporting in 2007 accounted for about half of the decrease (53% in NPRI and 48% in TRI). NPRI facilities with the largest decrease in air releases of carcinogens included dichloromethane releases in 2003 from three manufacturers of plastic foam products who had ceased to report to NPRI by 2007. The TRI facility with the largest decrease (a chemical manufacturer of photographic supplies) also reported a large decrease in dichloromethane.

Air releases of reproductive and developmental toxins decreased basin-wide by 34%, with NPRI showing a decrease of 42% and TRI a decrease of 18%. Toluene accounted for more than three-quarters of air releases of reproductive/developmental toxins in NPRI and more than two-thirds in TRI. Both NPRI and TRI showed a decrease of more than 15% in air releases of toluene from 2003 to 2007.

2.8.2 Water Releases

Water releases from matched NPRI and TRI facilities decreased basin wide by 25% in the five years from 2003 to 2007. Water releases from matched NPRI facilities decreased by 37% and TRI facilities decreased by 19%. Among the four facilities with the largest decreases, three no longer reported in 2007 (Table 20).

Water releases decreased in all of the basins except for Lake Superior where water releases increased by 64%. Two NPRI pulp and paper mills in the Lake Superior basin each reported over 26,000 kg of water releases of manganese (and its compounds) for 2007 and had not reported on this chemical for 2003. This may reflect changes in reporting guidance (Figure 12).

Water releases of known carcinogens also decreased basin wide (by 9%) in the past five years, with TRI facilities reporting a decrease of 32%. However, matched NPRI facilities showed an increase of 7%. Three NPRI pulp and paper mills reported increases of over 1,300 kg of water releases of formaldehyde from 2003 to 2007.

Note that wastewater treatment plants are not part of this total because they do not report to TRI.

Figure 12. Water Releases, by Basin, NPRI and TRI, 2003-2007

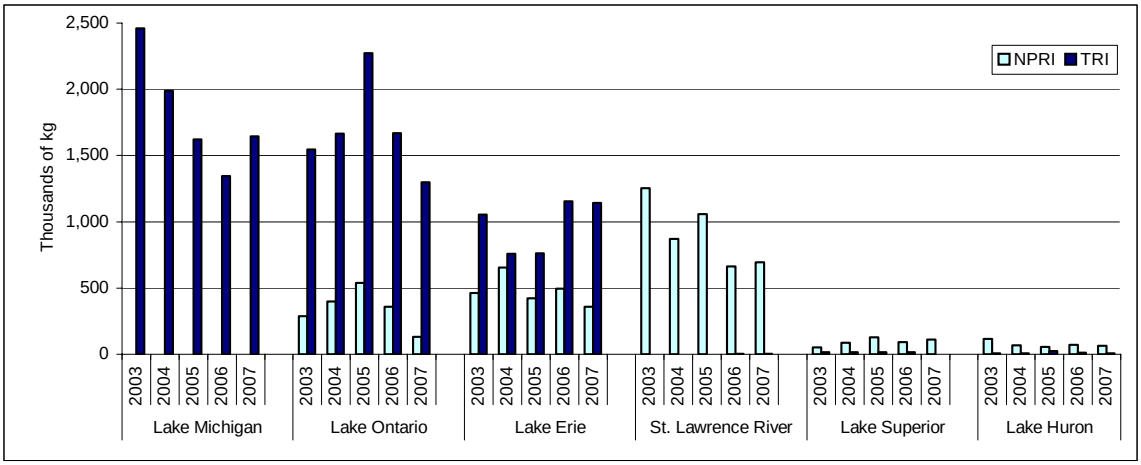


Table 20. Top Matched Facilities with the Largest Changes in Water Releases of Matched Chemicals, 2003-2007

					On-site Water Releases		
Basin	Facility Name	Company Name	City	Province/ State	2003 kg	2007 kg	Change 2003-2007 kg
	Decreases						
Michigan	USS Gary Works	United States Steel Corp	Gary	IN	1,609,185	746,124	-863,061
St. Lawrence	Aciers Inoxydables Atlas	Acier Inoxydable Slater Incorporée	Sorel-Tracy	QC	417,450	--	-417,450
Erie	Double Eagle Steel Coating Co	Severstal Na	Dearborn	MI	181,473	--	-181,473
St. Lawrence	Cornwall Business Unit	Domtar Inc.	Cornwall	ON	143,980	--	-143,980
Ontario	Anheuser-Busch, Inc.	Anheuser-Busch Cos Inc.	Baldwinsville	NY	1,106,546	1,012,242	-94,304
Erie	Middlefield Cheese	Hans Rothenbuhler & Son Inc.	Middlefield	OH	88,435	5,261	-83,175
Ontario	Jungbunzlauer Canada Inc.	Jungbunzlauer Canada	Port Colborne	ON	138,686	60,600	-78,086
Ontario	Delphi Thermal Systems - Lockport	Delphi Corp	Lockport	NY	63,579	58	-63,521
St. Lawrence	Winchester	Parmalat Dairy & Bakery Inc.	Winchester	ON	80,440	31,650	-48,790
Ontario	Hamilton Works	U. S. Steel Canada	Hamilton	ON	45,741	1,445	-44,296
	Increases						
Erie	Brush Wellman Inc	Brush Engineered Materials Inc.	Elmore	OH	561,739	790,509	228,769
Michigan	Georgia-Pacific Consumer Products LP	Georgia-Pacific LLC	Green Bay	WI	263,062	441,803	178,741
Erie	Republic Engineered Products Inc. Lorain Plant	Republic Engineered Products Inc.	Lorain	OH	16,703	87,533	70,830
St. Lawrence	Wayagamack	Kruger Wayagamack	Trois-Rivières	QC	882	65,054	64,171
Erie	PCS Nitrogen of Ohio L.P.	PCS Nitrogen L.P.	Lima	OH	39,669	92,566	52,897
Superior	Thunder Bay Operations	Bowater	Thunder Bay	ON	2,762	32,776	30,014
Superior	Terrace Bay Pulp	Terrace Bay Pulp Inc.	Terrace Bay	ON	7,724	37,163	29,439
Michigan	Kimberly Mill	Newpage Wisconsin System Inc.	Kimberly	WI	11,486	32,298	20,812
St. Lawrence	Usine De Brompton, Sherbrooke	Kruger	Sherbrooke	QC	29,578	49,343	19,765
Erie	Conestoga Meat Packers	Conestoga Meat Packers	Breslau	ON	--	18,432	18,432

Note: Canada and U.S. data only. Data include 204 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. Since reporting for 2007, some of these facilities may have changed their name or ownership.
* denotes facility did not report matched chemicals in year indicated.

2.8.3 Other Releases

Both on-site land disposal and releases and off-site releases (transfers to disposal, mainly to landfills) increased overall in the Great Lakes-St. Lawrence River basin. However, for NPRI facilities, while on-site land releases increased (by 69%), off-site transfers to disposal decreased (by 26%). For known carcinogens, land disposal and releases both on- and off-site increased for NPRI facilities. Two hazardous waste management facilities accounted for more than three-quarters (77%) of the increase. One (Stablex in Blainville, Quebec) increased disposal of lead (and its compounds) and the other (Newalta Industrial Services in Stoney Creek, Ontario) had an increase in disposal of asbestos.

For TRI facilities, however, on-site land releases decreased (by 2%) and off-site transfers to disposal increased (by 28%). For known carcinogens, on-site land disposal and releases also decreased although off-site releases increased.

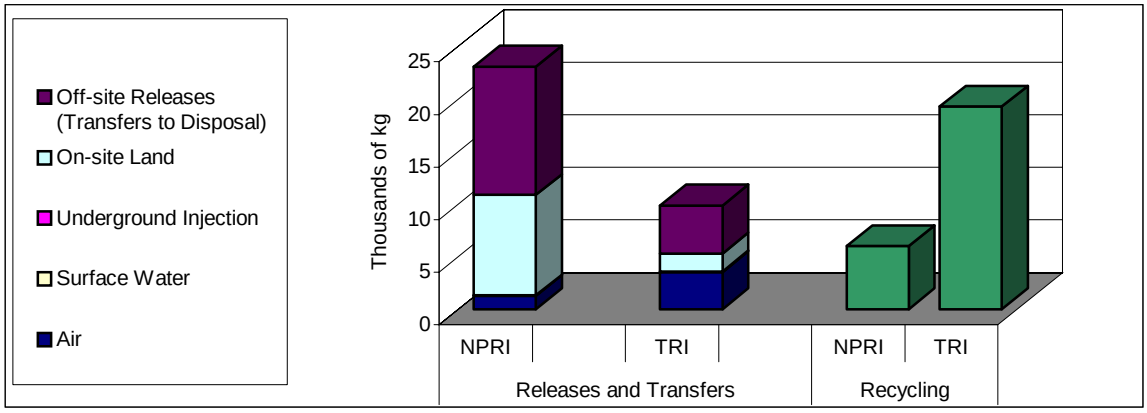
Underground injection decreased by 27% from 2003 to 2007; underground injection is mainly found at five TRI facilities in the Lake Erie and Lake Michigan basins (see Table 14 above). The decrease was due to reductions at two TRI chemical manufacturers. Ineos USA LLC in Lima, Ohio, reduced its underground injection by 48% and Pfizer Inc. in Holland, Michigan, reduced by 91%. The other facilities reporting underground injection for 2007 reported increases from 2003 to 2007.

2.8.4 Mercury in the Great Lakes-St. Lawrence River Basin

For the past several decades, the governments of Canada and the US have dedicated resources to reduce the levels of mercury in the Great Lakes basin. Mercury is a known neurodevelopmental toxicant and has been detected in the environment – in sediments, water and air, and in wildlife species. Under the Binational Toxics Strategy, Canada and the US set specific reduction targets for mercury. Canada committed to reduce mercury by 90% by 2000, or, where warranted, the use of mercury, from polluting sources resulting from human activity in the Great Lakes basin. The US set a target of a 50% reduction by 2006 nationally for the deliberate use of mercury and a 50% reduction in the release of mercury from sources resulting from human activity.

Both governments have reported significant progress towards these goals and continue to work towards the outlined objectives. However, the Great Lakes continue to be a significant source of mercury releases to the environment. The effects of mercury on human health and the environment are a global concern and are the focus of international negotiations through the United Nations Environment Programme. These negotiations are set to begin in 2010 and will highlight the continuing need in the Great Lakes-St. Lawrence River basin for an action plan aimed at the reduction and elimination of mercury.

Releases and Transfers of Mercury and Mercury Compounds in Great Lakes-St. Lawrence River Basin, NPRI and TRI, 2007



	NPRI*		TRI		Total
	(kg)	(%)	(kg)	(%)	(kg)
Air	1,283	6	3,527	36	4,810
Surface Water	21	0.1	38	0.4	82
Underground Injection	0	0	16	0.2	16
On-site Land	9,559	41	1,695	17	11,254
Off-site Releases	12,215	53	4,577	46	16,792
Total Releases and Transfers (not including recycling)	23,079	100	9,853	100	32,955
Off-site Transfers to Recycling	5,974		19,270		25,244

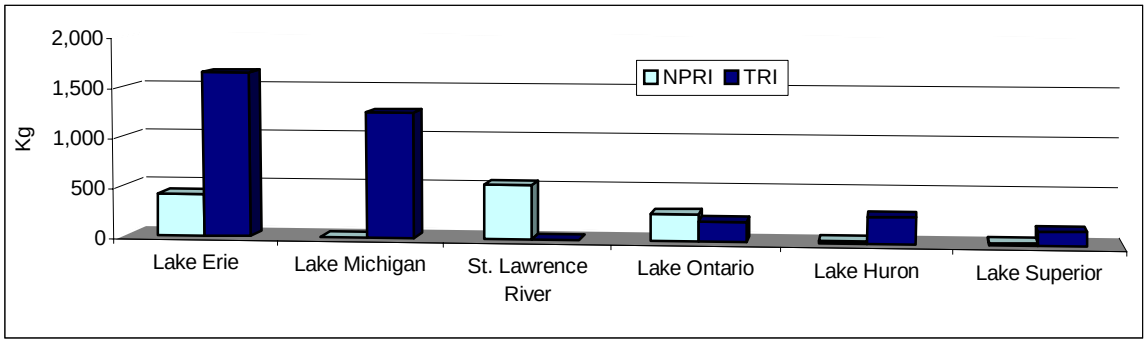
* After the data for this report was obtained from NPRI, one NPRI facility corrected its water releases of mercury for 2007, resulting in a reduction of 24 kg. This correction has been made in this table but not others in this report.

Mercury in the Great Lakes-St. Lawrence River Basin, continued

Total releases of mercury and mercury compounds from NPRI and TRI facilities were almost 33,000 kg in 2007. NPRI facilities reported over 23,000 kg and TRI facilities reported almost 9,900 kg. In addition, NPRI facilities reported almost 6,000 kg transfers to recycling and TRI facilities reported 19,300 kg recycled.

Thus, NPRI facilities reported over twice the amount of mercury released and one-third the amount sent for recycling as did TRI facilities. NPRI facilities reported larger land disposal both on- and off-site than TRI facilities. Almost 90% of the land disposal was reported by NPRI hazardous waste management facilities. Primary metals facilities (smelters and steel mills) accounted for 92% of land disposal on- and off-site for mercury in TRI and for 36% of the amount sent for recycling.

Air Releases of Mercury and Mercury Compounds in Great Lakes-St. Lawrence River Basin, NPRI and TRI, 2007



Basin	NPRI Air Releases (kg)	NPRI Industry	NPRI % of NPRI Basin Total kgs	TRI Air Releases (kg)	TRI Industry	TRI % of TRI Basin Total kgs	Total Air Releases (kg)
Lake Erie	419	Electric Power Plants	61%	1,652	Electric Power Plants	82%	2,132
Lake Michigan	0	--	--	1,260	Electric Power Plants	71%	1,318
St. Lawrence River	545	Hazardous Waste Mgt.	71%	0	--	--	546
Lake Ontario	272	Primary Metals (Steel Mills)	66%	203	Electric Power Plants	63%	488
Lake Huron	23	Primary Metals (Steel Mills) and Hazardous Waste Mgt.	93%	268	Cement	61%	295
Lake Superior	24	Electric Power Plants	99%	143	Electric Power Plants	90%	180
Total	1,283			3,527			4,959

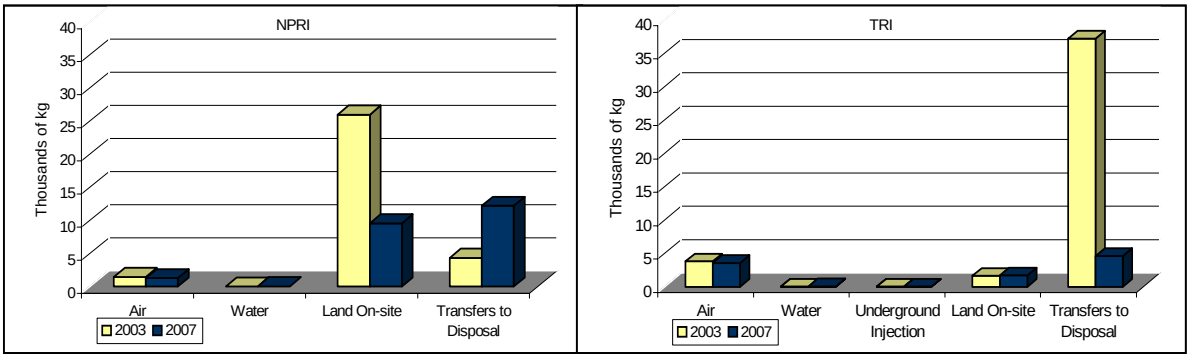
Note: Includes only facilities reporting 204 chemicals common to both NPRI and TRI from selected industrial and other sources.

Air releases of mercury and mercury compounds totalled almost 5,000 kg in 2007 in the Great Lakes-St. Lawrence River basin. NPRI facilities reported 1,283 kg and TRI reported 3,527 kg. For TRI, the Lake Erie basin had the largest air releases, with electric power plants accounting for 82% of the total. For NPRI, the St. Lawrence River basin had the largest air releases, with hazardous waste management facilities accounting for 61% of the total. Four industry sectors (electric power plants, primary metals, hazardous waste management and cement) accounted for 94% mercury air releases in 2007 in both NPRI and TRI.

Mercury in the Great Lakes-St. Lawrence River Basin, continued

However, for TRI, mercury releases from electric power plants accounted for almost three-quarters (74%) of the total mercury air releases. For NPRI, hazardous waste management facilities accounted for almost one-third (32%), primary metals facilities (smelters and steel mills) for about one-quarter (24%) and electric power plants for about one-quarter (22%). Cement plants accounted for 15% of total NPRI air releases and 7% of total TRI air releases of mercury.

Releases and Transfers of Mercury and Mercury Compounds in Great Lakes-St. Lawrence River Basin, NPRI and TRI, 2003-2007



	NPRI*				TRI			
	2003 kg	2007 kg	Change 2003-2007 kg	%	2003 kg	2007 kg	Change 2003-2007 kg	%
Air	1,451	1,283	-168	-12	3,781	3,527	-254	-7
Water	21.2	20.6	-1	-3	19	38	19	99
Underground Injection	0	0	0	--	25	16	-9	-35
On-site Land	25,995	9,559	-16,436	-63	1,631	1,695	63	4
Transfers to Disposal	4,354	12,215	7,861	181	37,153	4,577	-32,576	-88
Total Releases and Transfers (not including recycling)	31,822	23,079	-8,743	-27	42,610	9,853	-32,757	-77
Transfers to Recycling	12,039	5,974	-6,064	-50	36,541	19,270	-17,270	-47

* After the data for this report was obtained from NPRI, one NPRI facility corrected its water releases of mercury for 2007, resulting in a reduction of 24 kg. This correction has been made in this table but not others in this report.

Total releases and transfers (not including recycling) of mercury and mercury compounds decreased from 2003 to 2007. Air releases decreased by 12% for NPRI facilities and 7% for TRI facilities. Water releases were about the same for NPRI but almost doubled for TRI. TRI electric power plants reported an increase of 13 kg in water releases from 2003 to 2007.

For TRI, transfers to disposal off-site (mainly landfills off-site) greatly decreased, primarily due to a decrease of 32,930 kg reported by one hazardous waste management facility in the Lake Michigan basin (Clean Harbors in Chicago, IL). For NPRI, two hazardous waste management facilities located in the Lake Ontario basin reported increases totalling 9,324 kg in off-site transfers to disposal (Newalta Industrial Services in Etobicoke, ON and Clean Harbors Canada in Mississauga, ON).

Transfers to recycling were cut in half in both NPRI and TRI.

Section 3: Recommendations

Based on the findings from NPRI and TRI matched data for 2007 for facilities located in the Great Lakes-St. Lawrence River basin, the Canadian Environmental Law Association and Environmental Defence are building on several key recommendations outlined in the 2006 PollutionWatch report, *Partners in Pollution*.

For 2007, the findings show that close to 4,000 facilities are located in the basin. While 204 matched chemicals were tracked in this report, hundreds of thousands of chemicals are not covered because they are not reported under the NPRI or TRI.

The facilities included in this report released and transferred about 285 million kg of pollutants (excluding recycling). Many of these pollutants may impact the environment and human health. For the 2007 reporting year, Canadian facilities released larger amounts of pollutants that are known to be carcinogenic or reproductive/developmental toxicants than U.S. facilities. U.S. facilities (contributing 75% of the total water releases) released more pollutants to water than Canadian facilities (contributing 25% of the total water releases) reporting to their respective inventories. The data show that between 2003 and 2007 there was a decline in matched facilities. During this time period, there was also a basin wide decline in releases and transfers of pollutants by 18%. Similarly, releases of pollutants to air and water between 2003-2007 declined. Lake Erie, however, experienced only a slight decrease in air releases (4%) and an increase in water releases during the same time period. The Lake Erie basin is the smallest and shallowest of all the Great Lakes. It is also the basin with the highest number of facilities that report to the U.S. TRI (1,015 facilities) and Canada NPRI (368 facilities) programs.

To effectively address threats from pollution in the Great Lakes-St. Lawrence River basin, the PollutionWatch partners urge the U.S. and Canadian governments to shift their efforts to applying prevention and the precautionary approach. Over the past few decades, some progress to address the threats from specific persistent toxic chemicals has been achieved through the implementation of the Great Lakes Water Quality Agreement and the efforts of the Binational Toxics Strategy, which emphasized the need to apply a pollution prevention approach to persistent toxic chemicals. However, these efforts targeted only a few toxic chemicals such as lead, mercury, dioxins and PCBs. Some pollution prevention strategies were implemented, such as product substitution for mercury, but there continued to be a reliance on applying control or end-of-pipe measures rather than the phase out of toxic chemicals at the source of the process. Many of these chemicals continue to be released into, and detected in, the Great Lakes-St. Lawrence River basin, providing evidence that end-of-pipe efforts alone cannot keep pace with the level of protection necessary for the Great Lakes ecosystem. Even with an increased commitment and investment by governments to upgrade their municipal wastewater infrastructure to address chemical stressors in the Great Lakes, the prevention of toxic chemicals at the source should be the priority.

As the number and type of chemicals used, manufactured, imported, released, or disposed of in the Great Lakes basin continues to expand to include new chemicals of emerging concern (chemicals from consumer and personal care products, pesticides, pharmaceuticals and pathogens), a shift in the current approach is necessary.

The main purpose of the Great Lakes Water Quality Agreement is to "restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin ecosystem."[13] To fully realize this purpose, a shift from an end-of-pipe strategy to an approach that embraces "virtual elimination" of persistent toxic chemicals is necessary. Given the wide range of chemical stressors to the Great Lakes basin, this objective should be expanded to address other toxic chemicals such as carcinogens, reproductive developmental toxicants and endocrine disruptors that are now being detected in the Great Lakes basin.

The U.S. and Canadian governments are encouraged to consider the following recommendations in their immediate deliberations on the Great Lakes Water Quality Agreement and related policy and program initiatives focused on Great Lakes toxics management.

3.1 Binational

Quantify and Report Annually the Pollution Loading to the Great Lakes-St. Lawrence River Basin

1. The governments should develop a comprehensive Great Lakes pollution database. This database should include in-basin release and transfer data using existing inventories, such as Canada's NPRI, U.S. TRI, the Integrated Atmospheric Deposition Network, and the new Great Lakes Air Deposition Program. In addition, pollutants that are transported from outside the Great Lakes-St. Lawrence River basin should be quantified. The database should be publicly accessible and a summary of loadings to the Great Lakes basin be released to the public on an annual basis. The database should be adequately funded and staffed. The governments should amend the Great Lakes Water Quality Agreement to include a provision that one of the International Joint Commission's roles will be to maintain the Great Lakes pollution database and to annually produce reports based on the data collected.

2. An annual report highlighting the pollution loadings in the Great Lakes should be prepared and released to the public.

An annual report would allow the public to understand changes in pollutant loadings, measure progress for reducing loadings and determine where new action is required. The report should include, but not be limited to, the loadings and trends data for NPRI and TRI chemicals. Loadings data of other chemicals entering the Great Lakes-St. Lawrence River basin should be

[13] Revised Great Lakes Water Quality Agreement of 1978: As Amended by Protocol Signed November 18, 1987. Consolidated by the International Joint Commission. Article II, page 4.

included in this report. For example, chemicals currently not on the NPRI and TRI lists for reporting, chemicals identified by the International Joint Commission Work Group on Chemicals of Emerging Concern in the Great Lakes, the Great Lakes Water Quality Agreement, and through categorization under the *Canadian Environmental Protection Act* should be covered under this report.

Develop and Implement a Binational Strategy for Elimination and Reductions of Persistent Toxic Chemicals and Other Chemicals of Concern, principally through a strengthened Great Lakes Water Quality Agreement.

3. The U.S. and Canadian governments should ensure that a renewed and strengthened Great Lakes Water Quality Agreement includes effective provisions to achieve virtual elimination of persistent toxic chemicals and other chemicals of emerging concern through zero discharge and zero use.

4. The governments should develop a binational pollution elimination action strategy that builds upon, and significantly expands, the scope of the Great Lakes Water Quality Agreement and existing Binational Great Lakes Toxics Strategy. These efforts should include pollution prevention measures that require the application of green chemistry and materials substitution. Furthermore, the IJC should assess the progress made by governments on the implementation of binational elimination action strategies and develop recommendations focused on areas for achieving the goals of elimination.

5. The governments should reconfirm their commitment to virtual elimination through zero discharge and zero use of persistent toxic substances (PTS) and expand that goal to other substances of concern including but not limited to carcinogens, reproductive/developmental toxicants and endocrine disruptors.

6. Require mandatory pollution prevention plans and mandatory implementation of these plans by all facilities reporting to the U.S. TRI and Canadian NPRI for persistent toxic substances and other substances of concern including but not limited to carcinogens, endocrine disruptors, respiratory, reproductive and developmental toxicants.

7. Based on the binational efforts to address mercury in the Great Lakes-St. Lawrence River basin, the governments should support the negotiations for a strong international agreement to eliminate mercury from industrial sources and consumer products, including a focus on achieving the elimination of mercury releases from electric power generating facilities and hazardous waste management facilities and applying the use of substitution in products. The governments should develop an elimination strategy for mercury in the Great Lakes-St. Lawrence River basin.

Expand and Strengthen Canada's NPRI and U.S. TRI programs

8. To improve our knowledge of pollutant releases and transfer from facilities, particularly understanding the contributions of small and medium sized facilities, including those located in the Great Lakes-St. Lawrence River basin, the governments should enhance and expand the Toxics Release Inventory in the United States and the National Pollutant Release Inventory in Canada to include:

- an expanded list of pollutants to include chemicals identified through domestic or binational processes, which should include, but not be limited to, all chemicals identified by the International Joint Commission Work Group on Chemicals of Emerging Concern in the Great Lakes, the Great Lakes Water Quality Agreement, and through categorization under the *Canadian Environmental Protection Act;*
- lower reporting thresholds for facilities and specific chemicals;
- expanded reporting sectors and facilities (e.g., wastewater treatment facilities and oil and gas facilities in the U.S.);
- improved mechanisms for verifying information submitted by facilities and that all facilities that are required to report are doing so;
- enhanced resources to support data collection and verification;
- improved data quality by requiring actual measurement of releases to the environment;
- integration of NPRI and TRI programs with domestic and international toxics programs. For Canada, better linkage between programs such as Ontario's T*oxics Reduction Act*, the Emissions Reporting and Disclosure Programs in the City of Toronto, and Canada's Chemicals Management Plan. In the U.S., better linkage between programs under the U.S. *Toxic Substances Control Act*, the U.S. EPA Endocrine Disruptor Screening Program, the U.S. EPA Green Chemistry Program, projects under the Great Lakes Restoration Initiative and other programs (including state initiatives involving chemicals policies and phase-out of toxic chemicals from industrial sources and consumer products).
- ensure that proposals that aim to reduce the burden of reporting by facilities in Canada and the U.S. do not result in reduced levels of public access to pollution data and frequency of reporting; and
- increased outreach and communication of NPRI and TRI data.

Expand and Strengthen the role of the IJC for Great Lakes-St. Lawrence River protection

9. The International Joint Commission should be tasked with undertaking a study focused on the environmental and human health effects from these chemicals since most of the chemicals being detected in the Great Lakes-St. Lawrence River basin and most of the chemicals reported under TRI and NPRI are not regulated by the U.S. and Canadian governments. Such a report would inform the discussions on improving chemicals management in the Great Lakes-St. Lawrence River basin.

10. In the review of the Great Lakes Water Quality Agreement, governments should include additional provisions to identify, prioritize and address threats to the Great Lakes-St. Lawrence River basin from new chemical threats through prevention and precautionary measures. This should involve establishing criteria for identifying chemicals for action. This should include a focus on criteria for persistence and bioaccumulation. In addition, health endpoints such as, but not limited to, carcinogenicity, endocrine disruption, neurodevelopmental toxicity, reproductive and developmental toxicity should be included. These criteria should reflect the most stringent levels applied by other jurisdictions (such as those established by the European Union's REACH program[14]).

11. Pollution Prevention programs designed to promote a life cycle approach to toxic chemicals management should use green chemistry and material substitution to prevent the manufacture, import, use, release and disposal of toxic chemicals. Regulatory measures should be developed to encourage industry and other affected sectors to adopt green chemistry practices in the Great Lakes-St. Lawrence River basin.

3.2 Additional Recommendations for United States

12. Ensure that reforms to the U.S. *Toxic Substances Control Act* and the U.S. *Federal Insecticide, Fungicide, and Rodenticide Act* will address chemical stressors facing the Great Lakes, which should ensure that greater responsibility is placed on producers of chemicals to demonstrate *safety*, rather than on governments to prove *harm*. These reforms should also commit to protecting the Great Lakes-St. Lawrence River basin from toxic chemicals through the phase out of persistent toxic substances and other chemicals of concern including carcinogens, reproductive developmental toxics, neurodevelopmental toxicants and endocrine disrupting substances.

13. The government should continue to ensure that substantial funding regarding toxic chemicals under the Great Lakes Restoration Initiative be directed at long-term prevention activities, with an emphasis on preventing releases of persistent toxic chemicals and other chemicals of concern. This funding should also cover application of safer material substitution, green chemistry, and related preventative approaches (in addition to ensuring remediation of Areas of Concern).

3.3 Additional Recommendations for Canada

14. We urge Canada to develop a Canadian Great Lakes restoration plan. This plan should be supported by adequate resources for implementation activities.

[14] See: ec.europa.eu/environment/chemicals/reach/reach_intro.htm.

15. Based on the Canadian *Report of the Auditor General* in 2008,[15] substantial federal funding is required to protect and restore the Great Lakes. An estimated $2.6 billion dollars is required for wastewater upgrades in the Great Lakes Areas of Concern while another $600 million is required for infrastructure upgrades for the St. Lawrence River basin. These are substantial funding needs. However, these figures do not effectively account for funds needed to address all the chemical stressors in the Great Lakes-St. Lawrence River basin. For 2011, Canada should make substantial funding commitments of $75 million for one year towards the identification and development of elimination plans for toxic chemicals in the Great Lakes-St. Lawrence River basin. These funds should focus on the elimination of toxic chemicals, the application of safer material substitution and green chemistry and other tools to support prevention strategies. This amount would be in addition to the estimated $3.2 billion required, but not yet committed by the federal government for improvements to waste and sewage treatment infrastructure in the Great Lakes-St. Lawrence River basin.

16. Canada should reaffirm its goals for virtual elimination of Persistent Toxic Substances and other substances of concern such as carcinogens and endocrine disruptors in the renegotiation of the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem.

17. The Canadian federal and provincial governments should recommit resources in their annual budgets to the improvement and implementation of the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem.

18. Support and expand the recommendation of the Auditor General of Canada[16] to require the Canadian government to prepare a comprehensive management plan on mercury and lead. The management plan document should include efforts that specifically aim to reduce and eliminate mercury and lead from the Great Lakes basin. Finally, these management plans should be released for public review.

[15] Office of the Auditor General of Canada. *2008 Status of Report of the Commissioner of the Environment and Sustainable Develop to the House of Commons* – Chapter 7: Areas of Concern in the Great Lakes. March 2008. See: www.oag-bvg.gc.ca/internet/docs/aud_ch_cesd_200803_07_e.pdf.

[16] Office of the Auditor General of Canada. *2009 Report of the Commissioner of the Environment and Sustainable Development to the House of Commons* – Chapter 2 Risks of Toxic Chemicals. Fall 2009. See: www.oag-bvg.gc.ca/internet/docs/parl_cesd_200911_02_e.pdf.

Section 4: Methodology

4.1 Creating the Matched Data Set

The matched data set is created from Canadian National Pollutant Release Inventory (NPRI) and the U.S. Toxics Release Inventory (TRI). Not all data submitted to the individual countries' systems can be used; only those data common to both systems. In order for the data to be comparable, the matching process eliminates chemicals reported under one system but not the other. It also eliminates data from industry sectors covered by one Pollutant Release and Transfer Register (PRTR) but not the other. Thus, the database used in this report consists of a matched data set of industries and chemicals common to both NPRI and TRI. In addition, certain data elements must be added together in order to be comparable between the two countries, as explained below.

The 2007 reporting year data used were submitted to the federal governments by facilities during the summer of 2008. The U.S. EPA released the TRI data to the public in February, 2009. The NPRI data were obtained from the Environment Canada web site in February, 2009.

A total of 3,960 facilities are included in the matched dataset (1,610 facilities in Canada; 2,350 facilities in the U.S.) for 2007.

4.2 Matching for Industry Sectors

Industry sectors are identified by industry classification codes. The U.S. North America Industry Classification System (NAICS) code is used because it is reported by facilities to both NPRI and TRI. (Prior to 2006, TRI had U.S. Standard Industry Code (SIC) codes. The U.S. EPA has assigned a U.S. NAICS code based on the SIC code reported for those years.) Only sectors that are common to both TRI and NPRI are part of the matched data set. They include:

- manufacturing (U.S. NAICS codes 31-33),
- coal mining,
- electric utilities,
- hazardous waste treatment and solvent recovery facilities,
- chemical wholesalers, and
- petroleum bulk terminals.

Some sectors with significant releases and transfers, such as mining, are not included in the matched data set because the reporting criteria differ between TRI and NPRI. Sewage treatment plants are not included because they do not report to TRI.

4.3 Matching for Chemicals

The matched data set includes only those substances on both the TRI and NPRI lists. NPRI covers over 260 chemical substances and TRI approximately 650. The matched data set for 2003-2007 includes 204 substances.

While certain chemicals may be reportable in both systems, they may be defined differently. For sulfuric acid and hydrochloric acid, for example, under TRI only aerosol forms are reportable; these are released only to air. All forms of these acids are reportable to NPRI. For comparing TRI and NPRI data then, the matched data set includes only air emissions of these two chemicals.

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

For other chemicals the reporting threshold is different. The threshold for reporting arsenic and cadmium was lowered in NPRI for 2002 and so no longer matches the TRI threshold. Arsenic and cadmium and their compounds are, therefore, not included in the matched data set. Dioxins/furans are reported only by certain industries in NPRI, but by all TRI facilities so they also are not included in the matched data set.

TRI facilities report separately for certain chemicals and their compounds, while in NPRI, a chemical and its compounds count as one category. For example, TRI lists both nickel and nickel compounds, counting them as two separate substances, while NPRI lists the single category, nickel and its compounds. All the analyses add the TRI amount reported for the given chemical to the amount reported for its compounds, to correspond with NPRI practice.

Note that NPRI added reporting on criteria air contaminants for 2002. These substances are not reported to TRI and are not included in the matched data set.

4.4 Release and Transfer Categories

The particular types of releases and transfers reported to NPRI and TRI also differ. Individual reporting elements within the two systems must be added together in order to compare NPRI and TRI data. (See Table 21.) The reader is cautioned that some categories may differ than those presented on Environment Canada's NPRI web site or U.S. EPA's TRI web site.

Table 21. Matching NPRI and TRI Data Elements

PollutionWatch Categories	Matching TRI Categories	Matching NPRI Categories
On-site Releases		Total Releases (reportable as one number for amounts <1 tonne)
Air	Fugitive Air Emissions	Stack or Point Releases
	Point Source Air Emissions	Storage or Handling Releases
		Fugitive Releases
		Spills
		Other Non-Point Releases
Surface Water	Surface Water Discharges	Direct Discharges
		Spills
		Leaks
Underground Injection	Underground Injection Class I Wells	Underground Injection
	Underground Injection Class II-V Wells	
Land	RCRA Subtitle C Landfills	Landfill
	Other On-site Landfills	Land Treatment
	Land Treatment	Spills
	Surface Impoundment	Leaks
	Other Land Disposal	Other
Off-site Releases		
Transfers to disposal	Storage Only	Containment: Landfill
(except metals)	Solidification/Stabilization (except Metals and Metal Compounds)	Containment: Other Storage
	Wastewater Treatment (Excluding POTWs) (except Metals and Metal Compounds)	Municipal Sewage Treatment Plant (except Metals and Metal Compounds)
	Underground Injection Class I Wells	Underground Injection
	Underground Injection Class II-V Wells	Land Treatment (Farm)
	RCRA Subtitle C Landfills	
	Other Landfills	
	RCRA Subtitle C Surface Impoundments	
	Other Surface Impoundments	
	Land Treatment	
	Other Land Disposal	
	Other Off-site Management	
	Transfers to Waste Broker for Disposal	
	Unknown	

Table 21 (continued). Matching NPRI and TRI Data Elements

PollutionWatch Categories	Matching TRI Categories	Matching NPRI Categories
Transfers of Metals	Storage Only	Containment: Landfill
	Solidification/Stabilization (Metals and Metal Compounds Only)	Containment: Other Storage
	Wastewater Treatment (Excluding POTWs) (Metals and Metal Compounds Only)	Municipal Sewage Treatment Plant (Metals and Metal Compounds Only)
	Transfers to POTWs (Metals and Metal Compounds Only)	Underground Injection
	Underground Injection Class I Wells	Land Treatment (Farm)
	Underground Injection Class II-V Wells	
	RCRA Subtitle C Landfills	
	Other Landfills	
	RCRA Subtitle C Surface Impoundments	
	Other Surface Impoundments	
	Land Treatment	
	Other Land Disposal	
	Other Off-site Management	
	Transfers to Waste Broker for Disposal	
	Unknown	
Other Off-site Transfers for Further Management		
Energy Recovery	Energy Recovery	Energy Recovery
(except metals)	Transfer to Waste Broker - Energy Recovery	
Treatment (except metals)	Solidification/Stabilization (except metals and metal compounds)	Physical Treatment
	Incineration/Thermal Treatment	Chemical Treatment
	Incineration/Insignificant Fuel Value	Biological Treatment
	Wastewater Treatment (excluding to POTWs and metals and metal compounds)	Incineration/Thermal
	Other Waste Treatment	
	Transfer to Waste Broker - Waste Treatment	
Sewage (except metals)	Transfers to POTWs (except metals and metal compounds)	Municipal Sewage Treatment Plant (except metals and metal compounds)
Off-site Transfers to Recycling		
Transfers to Recycling of Metals	Metals Recovery	Recovery of Metals and Metal Compounds
Transfers to Recycling	Solvents/Organics Recovery	Recovery of Solvents
	Other Reuse or Recovery	Recovery of Organic Substances (not solvents)
	Acid regeneration	Recovery of Inorganic Materials (not metals)
	Transfer to Waste Broker – Recycling	Recovery of Acids and Bases
		Recovery of Catalysts
		Recovery of Pollution Abatement Residues
		Refining or Re-use of Used Oil; Other

For example, on-site air releases are reported as point source air releases and fugitive air releases in TRI. In NPRI, they are reported as stack or point releases, storage or handling releases, fugitive releases, spills, and other non-point releases. The two TRI categories are summed and compared to the sum of the five NPRI categories to obtain a comparison of on-site air releases. The individual types of releases within the larger category of air releases cannot be compared. Similarly, the three NPRI categories of on-site surface water releases (direct discharges, spills, and leaks) are summed and compared to the one TRI category of surface water discharges. The two TRI categories of on-site underground injection are added to compare to the single NPRI category. On-site land releases are reported to NPRI as landfill, land treatment, spills, leaks, and other, while they are reported to TRI as RCRA Subtitle C landfills, other landfills, land treatment/land application, surface impoundment, and other disposal.

Off-site transfers to disposal (off-site releases) for NPRI include containment landfill, containment other storage, underground injection, and land treatment. For TRI, off-site transfers to disposal include storage, surface impoundments, landfills, land treatment, other land disposal, underground injection, other off-site management, and transfers to waste broker for disposal. For metals and their compounds, off-site transfers to disposal also include transfers to solidification/stabilization, energy recovery, sewage and other wastewater treatment and other treatment as well. (Under TRI reporting, metals reported as transferred in this manner are considered disposal.)

Transfers to treatment for NPRI include physical treatment, chemical treatment, biological treatment, and incineration/thermal treatment. For TRI, transfers to treatment include solidification/stabilization (except metals and metal compounds, incineration/thermal treatment, incineration/insignificant fuel value, wastewater treatment (excluding to sewage treatment plants and metals and metal compounds), and transfers to waste broker for treatment.

Transfers to energy recovery and to sewage do not include metals and their compounds. Transfers to recycling are tallied in separate categories for metals and their compounds and for all other chemicals.

For the purpose of this report, the data are presented in metric units (kilograms). The amounts are reported in metric units (of kilograms, tonnes, and grams) to NPRI. They are reported in pounds to TRI (with the exception of dioxins/furans which are reported in grams). Pounds are converted to kilograms by dividing by 2.205.

4.5 Limitations

In addition to the data not included in the matched data set because of reporting differences, it is important to understand the limitations of the databases themselves. Generally, PRTRs like NPRI and TRI:

- do not encompass all potentially harmful chemicals (not all toxic or greenhouse gases),
- do not address all sources of chemicals such as mobile sources, (cars, trucks, offroad vehicles), agricultural activities or natural sources such as forest fires,
- do not include all facilities - only those that meet reporting requirements (generally 10 tonnes of chemical manufactured, processed or otherwise used),
- do not generally include facilities with less than 10 employees,
- do not describe daily or weekly releases or transfers, but provide annual summaries,
- do not identify all on-site releases and off-site transfers from a facility (only for listed chemicals for which reporting thresholds are met),
- do not always represent measurements of releases and transfers—they may be estimates derived using a variety of methods,
- do not describe the ultimate environmental fate of chemical substances,
- do not indicate risks from substances released or transferred by reporting facilities,
- do not identify exposures of human or wildlife populations to substances released or transferred by reporting facilities, and
- do not indicate the amount of chemicals allowed to be released under permits, licenses or agreements.

This report does not include release and transfer data from facilities that are located outside of the Great Lakes-St. Lawrence River basin but which may be significant contributors of pollution levels in this ecosystem.

4.6 Mapping

NPRI data used in this study were downloaded from Environment Canada's NPRI website at http://www.ec.gc.ca/inrp-npri/ in February, 2009. TRI data were obtained from the U.S. EPA in February, 2009 (similar data can be found at http://www.epa.gov/triexplorer). The facilities that were included in the analyses of the report had to be located in the Great Lakes-St. Lawrence River basin.

For the purposes of this report, the geographic area considered to be the Great Lakes-St. Lawrence River basin includes the geographic area beyond the international boundaries of the two countries and therefore includes the City of Montreal, Quebec, to account for the full watershed of the Great Lakes basin - where the waters of the St. Lawrence River and the Great Lakes meet. By using this watershed boundary rather than political boundaries, the

recommendations prepared in this report would support an ecosystem approach for cleaning up of the Great Lakes. In this report, the Lake Superior watershed includes St. Mary's River; the Lake Huron watershed includes Lake Simcoe and Georgian Bay; the Lake Erie watershed includes Lake St. Clair, the Detroit River and the St. Clair River; the Lake Ontario watershed includes the Niagara River; and the St. Lawrence River watershed includes the Thousand Islands in eastern Ontario.

The queries that determined facility inclusion were undertaken on the website http://itouchmap.com/latlong.html. The geographic data layer for the Great Lakes-St. Lawrence River basin boundary was downloaded from the Great Lakes Information Network website (http://gis.glin.net/) in 2008. All facilities meeting the above criteria were mapped based on facility coordinates provided in the NPRI/TRI datasets using ArcGIS 9.0 (ArcMap 9.1).

Appendix of Tables

Table A- 1. Releases and Transfers, NPRI and TRI, 2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	All Matched Chemicals					Average Per Facility		
	NPRI Number	TRI Number	All Number	NPRI as % of Total	TRI as % of Total	NPRI	TRI	Ratio NPRI/TRI
Total Facilities	1,610	2,350	3,960	41	59			
Total Forms	5,341	8,292	13,633	39	61			
Releases On- and Off-site	**Kg**	**kg**	**kg**	**%**	**%**	**kg**	**kg**	
On-site Releases	**50,978,905**	**88,509,758**	**139,488,663**	**37**	**63**	**31,664**	**37,664**	**0.84**
Air	31,295,520	43,298,362	74,593,882	42	58	19,438	18,425	1.06
Surface Water	1,360,416	4,101,849	5,462,265	25	75	845	1,745	0.48
Underground Injection	10,072	9,766,455	9,776,527	0.1	99.9	6	4,156	0.00
Land	18,228,582	31,343,092	49,571,674	37	63	11,322	13,337	0.85
Off-site Releases	**15,481,042**	**53,973,750**	**69,454,793**	**22**	**78**	**9,616**	**22,968**	**0.42**
Transfers to Disposal (except metals)	4,879,281	3,315,008	8,194,288	60	40	3,031	1,411	2.15
Transfers of Metals**	10,601,762	50,658,742	61,260,504	17	83	6,585	21,557	0.31
Total Reported Releases On- and Off-site	**66,459,947**	**142,483,508**	**208,943,455**	**32**	**68**	**41,279**	**60,631**	**0.68**
Off-site Releases Omitted for Adjustment Analysis***	5,220,327	12,266,620	17,486,947					
Total Releases On- and Off-site (adjusted)****	**61,239,621**	**130,216,888**	**191,456,508**	**32**	**68**	**38,037**	**55,411**	**0.69**
Other Off-site Transfers for Further Management	**15,081,633**	**60,526,095**	**75,607,727**	**20**	**80**	**9,367**	**25,756**	**0.36**
Energy Recovery (except metals)	4,029,235	34,350,390	38,379,625	10	90	2,503	14,617	0.17
Treatment (except metals)	6,693,414	12,835,342	19,528,756	34	66	4,157	5,462	0.76
Sewage (except metals)	4,358,983	13,340,363	17,699,346	25	75	2,707	5,677	0.48
Total Releases and Transfers (not including transfers to recycling)	**81,541,580**	**203,009,603**	**284,551,183**	**29**	**71**	**50,647**	**86,387**	**0.59**
Off-site Transfers to Recycling	**132,933,955**	**118,418,748**	**251,352,703**	**53**	**47**	**82,568**	**50,391**	**1.64**
Transfers to Recycling of Metals	120,915,446	100,129,427	221,044,873	55	45	75,103	42,608	1.76
Transfers to Recycling (except metals)	12,072,896	18,289,321	30,362,218	40	60	7,499	7,783	0.96
Total Reported Amounts of Releases and Transfers	**214,475,535**	**321,428,351**	**535,903,886**	**40**	**60**	**133,215**	**136,778**	**0.97**

Note: Canada and U.S. data only. Data include 204 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 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.

*** Off-site releases also reported as on-site releases by another NPRI or TRI facility. This amount is subtracted from total reported releases on- and off-site to get total releases on- and off-site (adjusted).

**** Does not include off-site releases also reported as on-site releases by another NPRI or TRI facility.

Table A- 2. Releases and Transfers of Known Carcinogens, NPRI and TRI, 2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	Carcinogens					Average Per Facility		
	NPRI Number	TRI Number	All Number	NPRI as % of Total	TRI as % of Total	NPRI	TRI	Ratio NPRI/TRI
Total Facilities	778	1,496	2,274	34	66			
Total Forms	1,301	2,569	3,870	34	66			
Releases On- and Off-site	**Kg**	**kg**	**kg**	**%**	**%**	**kg**	**kg**	
On-site Releases	**10,268,144**	**4,991,802**	**15,259,946**	**67**	**33**	**13,198**	**3,337**	**3.96**
Air	2,469,113	1,648,798	4,117,910	60	40	3,174	1,102	2.88
Surface Water	35,073	15,391	50,464	70	30	45	10	4.38
Underground Injection	0	872,811	872,811	0.0	100.0	0	583	0.00
Land	7,752,141	2,454,802	10,206,943	76	24	9,964	1,641	6.07
Off-site Releases	**4,520,232**	**2,861,163**	**7,381,395**	**61**	**39**	**5,810**	**1,913**	**3.04**
Transfers to Disposal (except metals)	2,950,922	435,344	3,386,266	87	13	3,793	291	13.03
Transfers of Metals**	1,569,310	2,425,819	3,995,129	39	61	2,017	1,622	1.24
Total Reported Releases On- and Off-site	**14,788,376**	**7,852,965**	**22,641,341**	**65**	**35**	**19,008**	**5,249**	**3.62**
Off-site Releases Omitted for Adjustment Analysis***	2,491,694	272,137	2,763,831					
Total Releases On- and Off-site (adjusted)****	12,296,682	7,580,828	19,877,509	**62**	**38**	**15,806**	**5,067**	**3.12**
Other Off-site Transfers for Further Management	**955,291**	**4,440,337**	**5,395,628**	**18**	**82**	**1,228**	**2,968**	**0.41**
Energy Recovery (except metals)	352,742	1,070,054	1,422,796	25	75	453	715	0.63
Treatment (except metals)	593,772	3,049,835	3,643,607	16	84	763	2,039	0.37
Sewage (except metals)	8,777	320,448	329,225	3	97	11	214	0.05
Total Releases and Transfers (not including transfers to recycling)	**15,743,667**	**12,293,302**	**28,036,968**	56	44	20,236	8,217	2.46
Off-site Transfers to Recycling	**8,168,429**	**19,132,473**	**27,300,902**	**30**	**70**	**10,499**	**12,789**	**0.82**
Transfers to Recycling of Metals	7,656,584	17,898,797	25,555,380	30	70	9,841	11,964	0.82
Transfers to Recycling (except metals)	511,845	1,233,677	1,745,522	29	71	658	825	0.80
Total Reported Amounts of Releases and Transfers	**23,912,096**	**31,425,775**	**55,337,871**	**43**	**57**	**30,735**	**21,007**	**1.46**

Note: Canada and U.S. data only. Data include 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 list of 67 carcinogens is based on the California Proposition 65 List (see http://www.oehha.ca.gov/prop65.html).

* 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.

*** 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.

Table A- 3. Releases and Transfers of Known Reproductive/Developmental Toxins, NPRI and TRI, 2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	Reproductive/Developmental Toxicants					Average Per Facility		
	NPRI Number	TRI Number	All Number	NPRI as % of Total	TRI as % of Total	NPRI	TRI	Ratio NPRI/TRI
Total Facilities	604	1,230	1,834	33	67			
Total Forms	797	1,680	2,477	32	68			
Releases On- and Off-site	**Kg**	**kg**	**kg**	**%**	**%**	**kg**	**kg**	
On-site Releases	**8,569,673**	**4,444,435**	**13,014,108**	**66**	**34**	**14,188**	**3,613**	**3.93**
Air	3,513,788	2,674,767	6,188,555	57	43	5,818	2,175	2.68
Surface Water	2,287	7,829	10,117	23	77	4	6	0.59
Underground Injection	0	13,165	13,165	0.0	100.0	0	11	0.00
Land	5,046,021	1,748,673	6,794,694	74	26	8,354	1,422	5.88
Off-site Releases	**1,219,851**	**1,585,532**	**2,805,383**	**43**	**57**	**2,020**	**1,289**	**1.57**
Transfers to Disposal (except metals)	224,147	241,990	466,137	48	52	371	197	1.89
Transfers of Metals**	995,704	1,343,543	2,339,246	43	57	1,649	1,092	1.51
Total Reported Releases On- and Off-site	**9,789,524**	**6,029,967**	**15,819,491**	**62**	**38**	**16,208**	**4,902**	**3.31**
Off-site Releases Omitted for Adjustment Analysis***	227,428	208,020	435,448					
Total Releases On- and Off-site (adjusted)****	**9,562,096**	**5,821,947**	**15,384,044**	**62**	**38**	**15,831**	**4,733**	**3.34**
Other Off-site Transfers for Further Management	**2,007,174**	**9,807,622**	**11,814,796**	**17**	**83**	**3,323**	**7,974**	**0.42**
Energy Recovery (except metals)	889,374	8,098,378	8,987,752	10	90	1,472	6,584	0.22
Treatment (except metals)	1,070,581	1,695,485	2,766,066	39	61	1,772	1,378	1.29
Sewage (except metals)	47,219	13,759	60,978	77	23	78	11	6.99
Total Releases and Transfers (not including transfers to recycling)	**11,796,698**	**15,629,570**	**27,426,268**	**43**	**57**	**19,531**	**12,707**	**1.54**
Off-site Transfers to Recycling	**5,729,101**	**11,446,137**	**17,175,238**	**33**	**67**	**9,485**	**9,306**	**1.02**
Transfers to Recycling of Metals	2,610,605	9,533,959	12,144,564	21	79	4,322	7,751	0.56
Transfers to Recycling (except metals)	3,118,496	1,912,178	5,030,674	62	38	5,163	1,555	3.32
Total Reported Amounts of Releases and Transfers	**17,525,799**	**27,283,727**	**44,809,526**	**39**	**61**	**29,016**	**22,182**	**1.31**

Note: Canada and U.S. data only. Data include 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 list of 19 reproductive/developmental toxins is based on the California Proposition 65 List (see http://www.oehha.ca.gov/prop65.html).

* 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.

*** Off-site releases also reported as on-site releases by another NPRI or TRI facility. This amount is subtracted from total reported releases on- and off-site to get total releases on- and off-site (adjusted).

**** Does not include off-site releases also reported as on-site releases by another NPRI or TRI facility.

Table A- 4. Releases and Transfers, NPRI, 2003-2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	NPRI 2003 Number	NPRI 2004 Number	NPRI 2005 Number	NPRI 2006 Number	NPRI 2007 Number	Change 2003-2007 Number	Change 2003-2007 %
Total Facilities	1,694	1,720	1,703	1,657	1,610	-84	-5
Total Forms	5,726	5,677	5,675	5,478	5,341	-385	-7
Releases On- and Off-site	**kg**	**kg**	**kg**	**kg**	**kg**	**kg**	**%**
On-site Releases	**57,593,165**	**60,357,082**	**55,152,236**	**56,072,719**	**50,978,905**	**-6,614,260**	**-11**
Air	44,586,454	43,804,055	38,781,696	34,227,282	31,295,520	-13,290,934	-30
Surface Water	2,174,476	2,081,041	2,206,132	1,683,522	1,360,416	-814,059	-37
Underground Injection	1,300	0	0	10,660	10,072	8,772	675
Land	10,756,269	14,382,267	14,081,716	20,067,360	18,228,582	7,472,313	69
Off-site Releases	**20,998,840**	**20,523,549**	**16,405,657**	**17,851,582**	**15,481,042**	**-5,517,798**	**-26**
Transfers to Disposal (except metals)	5,292,296	4,674,297	3,545,411	4,161,443	4,879,281	-413,015	-8
Transfers of Metals**	15,706,544	15,849,252	12,860,246	13,690,138	10,601,762	-5,104,783	-33
Total Reported Releases On- and Off-site	**78,592,005**	**80,880,631**	**71,557,893**	**73,924,300**	**66,459,947**	**-12,132,058**	**-15**
Off-site Releases Omitted for Adjustment Analysis***	3,662,887	5,843,059	3,612,686	4,608,912	5,220,327		
Total Releases On- and Off-site (adjusted)****	**74,929,119**	**75,037,572**	**67,945,207**	**69,315,388**	**61,239,621**	**-13,689,498**	**-18**
Other Off-site Transfers for Further Management	**29,443,701**	**25,543,111**	**23,654,623**	**21,152,037**	**15,081,633**	**-14,362,068**	**-49**
Energy Recovery (except metals)	13,129,185	10,627,812	7,550,019	7,055,398	4,029,235	-9,099,950	-69
Treatment (except metals)	10,480,341	9,422,324	10,604,437	9,759,369	6,693,414	-3,786,927	-36
Sewage (except metals)	5,834,174	5,492,976	5,500,167	4,337,270	4,358,983	-1,475,191	-25
Total Releases and Transfers (not including transfers to recycling)	**108,035,706**	**106,423,742**	**95,212,515**	**95,076,337**	**81,541,580**	**-26,494,126**	**-25**
Off-site Transfers to Recycling	**191,115,514**	**133,538,412**	**134,789,699**	**135,178,255**	**132,933,955**	**-58,181,558**	**-30**
Transfers to Recycling of Metals	181,169,193	122,836,737	123,099,232	113,863,997	120,915,446	-60,253,746	-33
Transfers to Recycling (except metals)	9,997,090	10,795,684	11,785,210	21,383,231	12,072,896	2,075,806	21
Total Reported Amounts of Releases and Transfers	**299,151,220**	**239,962,154**	**230,002,215**	**230,254,593**	**214,475,535**	**-84,675,684**	**-28**

Note: Canada and U.S. data only. Data include 204 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 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.

*** 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.

Table A- 5. Releases and Transfers, TRI, 2003-2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	TRI 2003 Number	TRI 2004 Number	TRI 2005 Number	TRI 2006 Number	TRI 2007 Number	Change 2003-2007 Number	Change 2003-2007 %
Total Facilities	2,976	2,854	2,793	2,637	2,350	-626	-21
Total Forms	9,151	9,195	9,104	8,792	8,292	-859	-9
Releases On- and Off-site	**kg**	**kg**	**kg**	**kg**	**kg**	**kg**	**%**
On-site Releases	**98,070,449**	**81,868,645**	**88,896,854**	**96,886,335**	**88,509,758**	**-9,560,691**	**-10**
Air	47,704,921	46,023,967	47,003,051	45,941,752	43,298,362	-4,406,559	-9
Surface Water	5,085,857	4,438,903	4,699,903	4,197,238	4,101,849	-984,008	-19
Underground Injection	13,303,087	10,149,003	10,595,904	11,140,888	9,766,455	-3,536,631	-27
Land	31,976,585	21,256,772	26,597,995	35,606,456	31,343,092	-633,493	-2
Off-site Releases	**42,160,880**	**44,739,155**	**54,774,630**	**56,505,743**	**53,973,750**	**11,812,870**	**28**
Transfers to Disposal (except metals)	2,708,694	2,558,431	2,961,846	2,771,178	3,315,008	606,314	22
Transfers of Metals**	39,452,187	42,180,724	51,812,784	53,734,564	50,658,742	11,206,556	28
Total Reported Releases On- and Off-site	**140,231,329**	**126,607,800**	**143,671,484**	**153,392,078**	**142,483,508**	**2,252,179**	**2**
Off-site Releases Omitted for Adjustment Analysis***	4,135,599	8,755,166	8,865,800	12,657,186	12,266,620		
Total Releases On- and Off-site (adjusted)****	**136,095,731**	**117,852,634**	**134,805,684**	**140,734,892**	**130,216,888**	**-5,878,843**	**-4**
Other Off-site Transfers for Further Management	**100,249,487**	**103,376,404**	**85,920,481**	**66,758,848**	**60,526,095**	**-39,723,393**	**-40**
Energy Recovery (except metals)	74,688,861	74,972,375	53,653,448	40,710,242	34,350,390	-40,338,471	-54
Treatment (except metals)	12,529,385	13,173,596	15,621,811	11,078,131	12,835,342	305,957	2
Sewage (except metals)	13,031,242	15,230,434	16,645,222	14,970,475	13,340,363	309,121	2
Total Releases and Transfers (not including transfers to recycling)	**240,480,817**	**229,984,204**	**229,591,965**	**220,150,926**	**203,009,603**	**-37,471,214**	**-16**
Off-site Transfers to Recycling	**126,423,496**	**140,243,946**	**134,054,967**	**132,820,115**	**118,418,748**	**-8,004,748**	**-6**
Transfers to Recycling of Metals	101,435,663	114,805,518	110,729,086	114,829,716	100,129,427	-1,306,236	-1
Transfers to Recycling (except metals)	24,987,833	25,438,428	23,325,881	17,990,400	18,289,321	-6,698,512	-27
Total Reported Amounts of Releases and Transfers	**366,904,313**	**370,228,150**	**363,646,931**	**352,971,042**	**321,428,351**	**-45,475,962**	**-12**

Note: Canada and U.S. data only. Data include 204 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 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.

*** 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.

Table A- 6. Releases and Transfers, 2003-2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	All 2003 Number	All 2004 Number	All 2005 Number	All 2006 Number	All 2007 Number	Change 2003-2007 Number	Change 2003-2007 %
Total Facilities	4,670	4,574	4,496	4,294	3,960	-710	-15
Total Forms	14,877	14,872	14,779	14,270	13,633	-1,244	-8
Releases On- and Off-site	**kg**	**kg**	**kg**	**kg**	**kg**	**kg**	**%**
On-site Releases	**155,663,614**	**142,225,727**	**144,049,090**	**152,959,054**	**139,488,663**	**-16,174,951**	**-10**
Air	92,291,375	89,828,022	85,784,747	80,169,035	74,593,882	-17,697,493	-19
Surface Water	7,260,333	6,519,944	6,906,035	5,880,760	5,462,265	-1,798,067	-25
Underground Injection	13,304,387	10,149,003	10,595,904	11,151,548	9,776,527	-3,527,859	-27
Land	42,732,854	35,639,039	40,679,711	55,673,817	49,571,674	6,838,820	16
Off-site Releases	**63,159,721**	**65,262,704**	**71,180,287**	**74,357,325**	**69,454,793**	**6,295,072**	**10**
Transfers to Disposal (except metals)	8,000,990	7,232,727	6,507,257	6,932,622	8,194,288	193,299	2
Transfers of Metals**	55,158,731	58,029,976	64,673,030	67,424,703	61,260,504	6,101,773	11
Total Reported Releases On- and Off-site	**218,823,335**	**207,488,430**	**215,229,377**	**227,316,379**	**208,943,455**	**-9,879,879**	**-5**
Off-site Releases Omitted for Adjustment Analysis***	7,798,485	14,598,225	12,478,486	17,266,098	17,486,947		
Total Releases On- and Off-site (adjusted)****	**211,024,849**	**192,890,206**	**202,750,891**	**210,050,281**	**191,456,508**	**-19,568,341**	**-9**
Other Off-site Transfers for Further Management	**129,693,188**	**128,919,515**	**109,575,104**	**87,910,885**	**75,607,727**	**-54,085,461**	**-42**
Energy Recovery (except metals)	87,818,047	85,600,187	61,203,468	47,765,640	38,379,625	-49,438,421	-56
Treatment (except metals)	23,009,726	22,595,919	26,226,247	20,837,500	19,528,756	-3,480,970	-15
Sewage (except metals)	18,865,416	20,723,409	22,145,389	19,307,745	17,699,346	-1,166,070	-6
Total Releases and Transfers (not including transfers to recycling)	**348,516,523**	**336,407,945**	**324,804,480**	**315,227,264**	**284,551,183**	**-63,965,340**	**-18**
Off-site Transfers to Recycling	**317,539,009**	**273,782,358**	**268,844,666**	**267,998,371**	**251,352,703**	**-66,186,306**	**-21**
Transfers to Recycling of Metals	282,604,855	237,642,255	233,828,318	228,693,713	221,044,873	-61,559,982	-22
Transfers to Recycling (except metals)	34,984,923	36,234,112	35,111,090	39,373,631	30,362,218	-4,622,706	-13
Total Reported Amounts of Releases and Transfers	**666,055,532**	**610,190,303**	**593,649,146**	**583,225,635**	**535,903,886**	**-130,151,646**	**-20**

Note: Canada and U.S. data only. Data include 204 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 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.

*** 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.

Table A- 7. Releases and Transfers, Known Carcinogens, 2003 and 2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	NPRI 2003	NPRI 2007	Change 2003-2007		TRI 2003	TRI 2007	Change 2003-2007		All 2003	All 2007	Change 2003-2007	
	Number	Number	Number	%	Number	Number	Number	%	Number	Number	Number	%
Total Facilities	808	778	-30	-4	1,740	1,496	-244	-14	2,548	2,274	-274	-11
Total Forms	1,392	1,301	-91	-7	2,820	2,569	-251	-9	4,212	3,870	-342	-8
Releases On- and Off-site	**kg**	**kg**	**kg**	**%**	**kg**	**kg**	**kg**	**%**	**kg**	**kg**	**kg**	**%**
On-site Releases	**5,669,884**	**10,268,144**	**4,598,260**	**81**	**6,948,319**	**4,991,802**	**-1,956,517**	**-28**	**12,618,203**	**15,259,946**	**2,641,743**	**21**
Air	3,828,541	2,469,113	-1,359,429	-36	2,570,905	1,648,798	-922,107	-36	6,399,446	4,117,910	-2,281,536	-36
Surface Water	32,816	35,073	2,257	7	22,757	15,391	-7,366	-32	55,573	50,464	-5,109	-9
Underground Injection	0	0	0	--	1,267,625	872,811	-394,814	-31	1,267,625	872,811	-394,814	-31
Land	1,794,993	7,752,141	5,957,148	332	3,087,033	2,454,802	-632,230	-20	4,882,026	10,206,943	5,324,918	109
Off-site Releases	**2,326,548**	**4,520,232**	**2,193,683**	**94**	**2,433,224**	**2,861,163**	**427,939**	**18**	**4,759,773**	**7,381,395**	**2,621,622**	**55**
Transfers to Disposal (except metals)	744,776	2,950,922	2,206,146	296	251,922	435,344	183,422	73	996,698	3,386,266	2,389,568	240
Transfers of Metals**	1,581,772	1,569,310	-12,463	-1	2,181,302	2,425,819	244,517	11	3,763,074	3,995,129	232,054	6
Total Reported Releases On- and Off-site	**7,996,433**	**14,788,376**	**6,791,943**	**85**	**9,381,543**	**7,852,965**	**-1,528,579**	**-16**	**17,377,976**	**22,641,341**	**5,263,365**	**30**
Off-site Releases Omitted for Adjustment Analysis***	483,531	2,491,694			276,884	272,137			760,415	2,763,831		
Total Releases On- and Off-site (adjusted)****	**7,512,901**	**12,296,682**	**4,783,780**	**64**	**9,104,660**	**7,580,828**	**-1,523,832**	**-17**	**16,617,561**	**19,877,509**	**3,259,948**	**20**
Other Off-site Transfers for Further Management	**2,255,142**	**955,291**	**-1,299,851**	**-58**	**5,848,756**	**4,440,337**	**-1,408,419**	**-24**	**8,103,898**	**5,395,628**	**-2,708,270**	**-33**
Energy Recovery (except metals)	1,618,570	352,742	-1,265,828	-78	1,727,861	1,070,054	-657,806	-38	3,346,431	1,422,796	-1,923,634	-57
Treatment (except metals)	605,627	593,772	-11,855	-2	3,712,214	3,049,835	-662,379	-18	4,317,841	3,643,607	-674,234	-16
Sewage (except metals)	30,945	8,777	-22,168	-72	408,681	320,448	-88,234	-22	439,626	329,225	-110,402	-25
Total Releases and Transfers (not including transfers to recycling)	**10,251,575**	**15,743,667**	**5,492,092**	**54**	**15,230,299**	**12,293,302**	**-2,936,997**	**-19**	**25,481,874**	**28,036,968**	**2,555,095**	**10**
Off-site Transfers to Recycling	**11,219,846**	**8,168,429**	**-3,051,417**	**-27**	**18,282,239**	**19,132,473**	**850,234**	**5**	**29,502,086**	**27,300,902**	**-2,201,184**	**-7**
Transfers to Recycling of Metals	10,744,708	7,656,584	-3,088,124	-29	16,797,303	17,898,797	1,101,494	7	27,542,011	25,555,380	-1,986,631	-7
Transfers to Recycling (except metals)	475,138	511,845	36,707	8	1,484,936	1,233,677	-251,260	-17	1,960,074	1,745,522	-214,553	-11
Total Reported Amounts of Releases and Transfers	**21,471,421**	**23,912,096**	**2,440,675**	**11**	**33,512,538**	**31,425,775**	**-2,086,763**	**-6**	**54,983,959**	**55,337,871**	**353,911**	**1**

Note: Canada and U.S. data only. Data include 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 list of 67 carcinogens is based on the California Proposition 65 List (see http://www.oehha.ca.gov/prop65.html).

* 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.

*** 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.

Table A- 8. Releases and Transfers, Known Reproductive/Developmental Toxins, 2003-2007: Facilities in the Great Lakes-St. Lawrence River Basin (Matched Chemicals and Industries)

	NPRI 2003	NPRI 2007	Change 2003-2007		TRI 2003	TRI 2007	Change 2003-2007		All 2003	All 2007	Change 2003-2007	
	Number	Number	Number	%	Number	Number	Number	%	Number	Number	Number	%
Total Facilities	661	604	-57	-9	1,398	1,230	-168	-12	2,059	1,834	-225	-11
Total Forms	888	797	-91	-10	1,901	1,680	-221	-12	2,789	2,477	-312	-11
Releases On- and Off-site	**kg**	**kg**	**kg**	**%**	**kg**	**kg**	**kg**	**%**	**kg**	**kg**	**kg**	**%**
On-site Releases	**7,353,990**	**8,569,673**	**1,215,683**	**17**	**5,321,073**	**4,444,435**	**-876,638**	**-16**	**12,675,063**	**13,014,108**	**339,045**	**3**
Air	6,094,230	3,513,788	-2,580,443	-42	3,259,482	2,674,767	-584,715	-18	9,353,713	6,188,555	-3,165,158	-34
Surface Water	4,719	2,287	-2,432	-52	9,121	7,829	-1,292	-14	13,840	10,117	-3,724	-27
Underground Injection	1,300	0	-1,300	--	17,517	13,165	-4,352	-25	18,817	13,165	-5,652	-30
Land	1,245,558	5,046,021	3,800,463	305	2,034,953	1,748,673	-286,279	-14	3,280,511	6,794,694	3,514,184	107
Off-site Releases	**1,275,986**	**1,219,851**	**-56,136**	**-4**	**1,586,859**	**1,585,532**	**-1,327**	**-0.1**	**2,862,845**	**2,805,383**	**-57,462**	**-2**
Transfers to Disposal (except metals)	365,485	224,147	-141,338	-39	375,645	241,990	-133,655	-36	741,130	466,137	-274,993	-37
Transfers of Metals**	910,501	995,704	85,202	9	1,211,214	1,343,543	132,329	11	2,121,715	2,339,246	217,531	10
Total Reported Releases On- and Off-site	**8,629,977**	**9,789,524**	**1,159,547**	**13**	**6,907,932**	**6,029,967**	**-877,965**	**-13**	**15,537,909**	**15,819,491**	**281,583**	**2**
Off-site Releases Omitted for Adjustment Analysis***	128,431	227,428			171,918	208,020			300,349	435,448		
Total Releases On- and Off-site (adjusted)****	**8,501,545**	**9,562,096**	**1,060,551**	**12**	**6,736,014**	**5,821,947**	**-914,067**	**-14**	**15,237,560**	**15,384,044**	**146,484**	**1**
Other Off-site Transfers for Further Management	**5,805,392**	**2,007,174**	**-3,798,218**	**-65**	**18,976,044**	**9,807,622**	**-9,168,422**	**-48**	**24,781,436**	**11,814,796**	**-12,966,640**	**-52**
Energy Recovery (except metals)	3,682,700	889,374	-2,793,326	-76	16,857,728	8,098,378	-8,759,350	-52	20,540,428	8,987,752	-11,552,676	-56
Treatment (except metals)	1,859,395	1,070,581	-788,814	-42	2,102,114	1,695,485	-406,629	-19	3,961,509	2,766,066	-1,195,443	-30
Sewage (except metals)	263,297	47,219	-216,078	-82	16,202	13,759	-2,443	-15	279,499	60,978	-218,521	-78
Total Releases and Transfers (not including transfers to recycling)	**14,435,369**	**11,796,698**	**-2,638,671**	**-18**	**25,883,976**	**15,837,590**	**-10,046,386**	**-39**	**40,319,344**	**27,634,288**	**-12,685,057**	**-31**
Off-site Transfers to Recycling	**6,377,252**	**5,729,101**	**-648,152**	**-10**	**11,953,199**	**11,446,137**	**-507,062**	**-4**	**18,330,452**	**17,175,238**	**-1,155,213**	**-6**
Transfers to Recycling of Metals	3,690,399	2,610,605	-1,079,794	-29	8,748,970	9,533,959	784,989	9	12,439,369	12,144,564	-294,805	-2
Transfers to Recycling (except metals)	2,686,853	3,118,496	431,643	16	3,204,229	1,912,178	-1,292,051	-40	5,891,082	5,030,674	-860,408	-15
Total Reported Amounts of Releases and Transfers	**20,812,621**	**17,525,799**	**-3,286,822**	**-16**	**37,837,175**	**27,283,727**	**-10,553,448**	**-28**	**58,649,796**	**44,809,526**	**-13,840,270**	**-24**

Note: Canada and U.S. data only. Data include 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 list of 19 reproductive/developmental toxins is based on the California Proposition 65 List (see http://www.oehha.ca.gov/prop65.html).

* 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.

*** 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.

Table A- 9. Releases and Transfers of Known Carcinogens by Basin for Facilities in the Great Lakes-St. Lawrence River Basin, 2007 (Matched Chemicals and Industries)

	Facilities Number	Air kg	Surface Water kg	Under-ground Injection kg	Land kg	Total On-site Releases* kg	Off-site Releases** kg	Total Releases kg	Rank	Energy Recovery (except metals) kg	Treatment (except metals) kg	Sewage (except metals) kg	Total Other Off-site Transfers for Further Manage-ment kg	Total Releases and Transfers (not including transfers to recycling) kg	Rank	Off-site Transfers to Recycling kg
NPRI																
Erie	179	412,522	1,660	0	1,383,048	1,798,847	807,138	2,605,985	3	1,678	78,374	5,402	85,454	2,691,439	3	1,571,758
Huron	63	275,761	3,255	0	697	280,116	308,498	588,614	4	11,443	44,398	0	55,841	644,455	4	1,418,565
Lawrence	220	934,590	22,138	0	3,758,719	4,719,654	560,558	5,280,212	2	91,590	194,008	1,604	287,202	5,567,414	2	2,422,623
Ontario	305	609,294	2,199	0	2,608,774	3,225,859	2,836,562	6,062,422	1	248,031	276,992	1,771	526,794	6,589,216	1	2,755,483
Superior	11	236,945	5,822	0	902	243,669	7,475	251,144	5	0	0	0	0	251,144	5	0
Total	778	2,469,113	35,073	0	7,752,141	10,268,144	4,520,232	14,788,376		352,742	593,772	8,777	955,291	15,743,667		8,168,429
TRI																
Erie	663	883,504	6,595	825,184	1,800,944	3,516,227	1,519,380	5,035,607	1	583,053	787,345	80,520	1,450,918	6,486,525	1	10,354,142
Huron	51	114,653	807	0	52,182	167,642	20,582	188,224	4	260,036	257,128	0	517,164	705,388	4	219,452
Lawrence	6	16,664	17	0	0	16,680	895	17,575	6	340	7	0	347	17,922	6	1,651
Michigan	609	452,233	6,945	47,627	277,775	784,580	1,258,556	2,043,136	2	208,383	1,442,800	210,665	1,861,848	3,904,984	2	7,439,996
Ontario	137	146,346	949	0	317,176	464,471	53,638	518,109	3	16,703	562,555	6,013	585,271	1,103,380	3	1,080,958
Superior	30	35,399	78	0	6,724	42,201	8,113	50,313	5	1,540	0	23,250	24,790	75,103	5	36,274
Total	1,496	1,648,798	15,391	872,811	2,454,802	4,991,802	2,861,163	7,852,965		1,070,054	3,049,835	320,448	4,440,337	12,293,302		19,132,473
NPRI and TRI																
Erie	842	1,296,026	8,255	825,184	3,183,993	5,315,074	2,326,518	7,641,592	1	584,731	865,719	85,922	1,536,372	9,177,964	1	11,925,900
Huron	114	390,414	4,062	0	52,879	447,757	329,080	776,838	5	271,479	301,526	0	573,005	1,349,842	5	1,638,017
Lawrence	226	951,254	22,155	0	3,758,719	4,736,334	561,453	5,297,787	3	91,930	194,015	1,604	287,549	5,585,336	3	2,424,274
Michigan	609	452,233	6,945	47,627	277,775	784,580	1,258,556	2,043,136	4	208,383	1,442,800	210,665	1,861,848	3,904,984	4	7,439,996
Ontario	442	755,640	3,148	0	2,925,950	3,690,330	2,890,200	6,580,531	2	264,734	839,547	7,784	1,112,065	7,692,595	2	3,836,440
Superior	41	272,343	5,900	0	7,627	285,870	15,587	301,457	6	1,540	0	23,250	24,790	326,247	6	36,274
Total	2,274	4,117,910	50,464	872,811	10,206,943	15,259,946	7,381,395	22,641,341		1,422,796	3,643,607	329,225	5,395,628	28,036,968		27,300,902

Note: Canada and U.S. data only. Data include 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 list of 67 carcinogens is based on the California Proposition 65 List (see http://www.oehha.ca.gov/prop65.html).

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

Table A- 10. Releases and Transfers of Known Reproductive/Developmental Toxins by Basin for Facilities in the Great Lakes-St. Lawrence River Basin, 2007 (Matched Chemicals and Industries)

	Facilities	Air	Surface Water	Under-ground Injection	Land	Total On-site Releases*	Off-site Releases**	Total Releases		Energy Recovery (except metals)	Treatment (except metals)	Sewage (except metals)	Total Other Off-site Transfers for Further Manage-ment	Total Releases and Transfers (not including transfers to recycling)		Off-site Transfers to Recycling
	Number	kg	kg	kg	kg	kg	kg	kg	Rank	kg	kg	kg	kg	kg	Rank	kg
NPRI																
Erie	110	893,223	529	0	1,228,656	2,123,651	135,983	2,259,634	3	13,856	397,905	1	411,762	2,671,396	3	873,560
Huron	43	172,679	72	0	376	174,522	15,775	190,297	4	0	23,263	0	23,263	213,560	4	210,110
Lawrence	190	951,810	1,226	0	3,606,856	4,560,802	269,154	4,829,956	1	395,673	331,583	13	727,269	5,557,225	1	1,964,927
Ontario	251	1,478,863	248	0	209,230	1,692,372	791,463	2,483,835	2	479,845	314,516	47,205	841,566	3,325,401	2	2,680,504
Superior	10	17,212	213	0	902	18,327	7,475	25,802	5	0	3,314	0	3,314	29,116	5	0
Total	604	3,513,788	2,287	0	5,046,021	8,569,673	1,219,851	9,789,524		889,374	1,070,581	47,219	2,007,174	11,796,698		5,729,101
TRI																
Erie	532	1,557,576	3,108	4,363	1,515,349	3,080,397	840,103	3,920,500	1	3,269,580	648,854	5,092	3,923,526	7,844,026	1	6,348,968
Huron	38	119,080	14	0	29,109	148,203	4,378	152,581	4	664,767	363,773	1	1,028,541	1,181,122	3	840,957
Lawrence	6	16,238	3	0	0	16,241	772	17,013	6	113	2	0	116	17,129	6	1,106
Michigan	507	661,790	3,641	8,802	103,629	777,861	703,249	1,481,110	2	4,099,725	445,059	5,110	4,549,895	6,031,005	2	3,730,731
Ontario	120	305,708	988	0	94,472	401,168	32,888	434,056	3	51,036	237,797	3,556	292,389	726,444	4	517,459
Superior	27	14,376	75	0	6,114	20,565	4,143	24,708	5	13,156	0	0	13,156	37,864	5	6,916
Total	1,230	2,674,767	7,829	13,165	1,748,673	4,444,435	1,585,532	6,029,967		8,098,378	1,695,485	13,759	9,807,622	15,837,590		11,446,137
NPRI and TRI																
Erie	642	2,450,800	3,637	4,363	2,744,006	5,204,048	976,086	6,180,134	1	3,283,436	1,046,759	5,093	4,335,288	10,515,422	1	7,222,528
Huron	81	291,760	85	0	29,486	322,725	20,153	342,878	5	664,767	387,036	1	1,051,804	1,394,682	5	1,051,067
Lawrence	196	968,048	1,229	0	3,606,856	4,577,042	269,927	4,846,969	2	395,786	331,585	13	727,385	5,574,353	3	1,966,033
Michigan	507	661,790	3,641	8,802	103,629	777,861	703,249	1,481,110	4	4,099,725	445,059	5,110	4,549,895	6,031,005	2	3,730,731
Ontario	371	1,784,570	1,236	0	303,702	2,093,539	824,351	2,917,891	3	530,881	552,313	50,761	1,133,955	4,051,845	4	3,197,963
Superior	37	31,587	288	0	7,016	38,892	11,618	50,510	6	13,156	3,314	0	16,470	66,979	6	6,916
Total	1,834	6,188,555	10,117	13,165	6,794,694	13,014,108	2,805,383	15,819,491		8,987,752	2,766,066	60,978	11,814,796	27,634,288		17,175,238

Note: Canada and U.S. data only. Data include 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 list of 19 reproductive/developmental toxins is based on the California Proposition 65 List (see http://www.oehha.ca.gov/prop65.html).

* 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.

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