



TOXIC
CHEMICAL
RELEASE
INVENTORY

STAFF ANALYSIS




FROM THE MDEQ TRI AND U.S. EPA TRIS DATABASES ♦ COMPILED AND DISTRIBUTED BY THE SARA TITLE III PROGRAM,
ENVIRONMENTAL ASSISTANCE DIVISION, MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

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1997 TOXIC CHEMICAL RELEASE INVENTORY

Staff Analysis

**SARA Title III Program
Environmental Assistance Division
Michigan Department of Environmental Quality
July 1999**

Acknowledgments

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Toxic Chemical Release Inventory Report Year 1997 Staff Analysis

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1997 Toxic Chemical Release Inventory Staff Analysis Executive Summary

The Emergency Planning and Community right to Know Act (EPCRA) of 1986, also known as Title III of the Superfund Amendment and Reauthorization Act (SARA Title III), was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety and the environment from chemical hazards. Section 313 of the Act requires facilities to report their environmental releases of listed toxic chemicals to the U.S. Environmental Protection Agency (EPA) and the states annually. Facilities also report their waste management activities under the Pollution Prevention Act (PPA) of 1990. These reports are due every year on or before July 1.

Facilities that meet the criteria report how waste is managed on- and off-site for more than 650 chemicals and chemical categories currently on the list of reportable toxic chemicals. Waste can be managed through activities including releases to air, water, land, underground injection and off-site disposal, and recycling, energy recovery and treatment. From year to year, the toxic chemical registry has been revised as specific chemicals have been removed or added by EPA.

Facilities are covered under Section 313 reporting requirements if they meet certain criteria. A facility is covered if it:

- Is within a primary Standard Industrial Classification (SIC) major group 20 through 39*,
- Employs ten or more full-time employees, and
- Manufactures, imports or processes 25,000 pounds or more, or otherwise uses 10,000 pounds or more of any of the listed toxic chemicals.

Federal facilities also must comply with Section 313 reporting requirements by Executive Order 12856.

This report summarizes information facilities submit to the state under the Toxic Chemical Release Inventory program.

In Michigan, 905 facilities reported under Section 313 for Report Year (RY) 1997. Michigan facilities reported releases (including off-site disposal) of more than 84 million pounds of listed toxic chemicals. This is a 7.8 percent reduction in the quantity of materials reported for 1996 and a 16.1 percent decrease compared to 1995.

Michigan facilities also reported transfers of almost 224 million pounds of toxic chemicals. Total transfer activities include discharges to publicly owned treatment works (POTWs) and waste management transfers for recycling, energy recovery and treatment. In 1997, there was a 7.9 percent increase in the amount of total transfers compared to 1996 and a 5.8 percent increase compared to 1995.

Table 1 aggregates RY 1997 data for the State of Michigan for each environmental medium and for total releases and transfers. Media totals for 1995 and 1996 are included as a comparison. The amounts shown for 1997 are based on data from the Michigan TRI database as of March 1, 1999. The Michigan TRI database is the source of the 1996 data and the EPA TRIS database is the source of the 1995 data; both are current as of March 1999.

The compilation of total on- and off-site releases in Table 1 and discussed further in the staff analysis is new from previous years' staff analyses. The EPA first presented data using these on- and off-site release categories in its 1996 Public Data Release; Michigan will follow suit for its 1997 TRI staff analysis. On-site releases include releases to the air, water, underground

injection and land. Off-site releases are shipments or transfers off-site for disposal. Total transfers include discharges to POTWs and waste management transfers for recycling, energy recovery and treatment. In previous years, total transfers included transfers off-site for disposal.

The EPA ranks the states each year based on releases and transfers. Michigan ranked 11th nationally in total on- and off-site releases (this includes transfers off-site for disposal) for RY 1997 compared to 9th for RY 1996. Michigan is 15th nationally for total on-site releases compared to 12th for RY 1996.

Table 1. Michigan Chemical Releases and Transfers* – 1995-1997 (lbs. of chemicals)

	1995	1996	1997
Number of Reporting Facilities	941	901	905
Total Releases	100,569,247	91,440,730	84,344,038
Total On-site Releases	71,184,362	59,761,831	53,829,265
Air Releases	56,841,812	49,323,876	45,183,168
Water Releases	789,313	736,554	717,376
Underground Injection	9,556,827	6,617,820	5,596,855
Land Releases	3,996,410	3,083,581	2,331,866
Off-site Disposal	29,384,885	31,678,899	30,514,773
Total Transfers	211,602,264	207,338,101	223,788,110
POTW	11,952,263	14,573,867	14,434,604
Waste Management Transfers	199,650,001	192,764,234	209,353,506

* Source: 1995 EPA TRIS as of 3-99; 1996 and 1997 Michigan TRI Databases as of 3-99

Table 2. Michigan Chemical Releases and Transfers – Annual Comparisons

Total On- and Off-site Releases:	1996 – 1997	Reduction:	7.8%
	1995 – 1997	Reduction:	16.1%
Total Transfers:	1996 – 1997	Increase:	7.9%
	1995 – 1997	Increase:	5.8%
Combined Releases and Transfers:	1996 – 1997	Increase:	3.3%
	1995 – 1997	Reduction	1.3%

1997 Toxic Chemical Release Inventory

Staff Analysis

Introduction

Since 1988, facilities throughout the country that manufacture (including import), process or otherwise use certain toxic chemicals, have been required to report their environmental releases and transfers of these chemicals annually to the United States Environmental Protection Agency (EPA) and the states. Such reporting is required under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, also known as SARA Title III. This law was enacted by Congress as the national legislation on community safety and was designated to help local communities protect public health, safety and the environment from chemical hazards.

Facilities must report the quantities of both controlled and accidental releases of listed toxic chemicals on-site and the amount contained in wastes transferred off-site. The facilities also must report waste management and source reduction activities under Section 6607 of the Pollution Prevention Act of 1990. This information is submitted on the Toxic Chemical Release Inventory (TRI) Form R; one form must be submitted for each chemical. Some facilities may qualify to submit an alternate Form A report, which is an abbreviated version of the Form R report. The reports must be submitted to the EPA and the states on or before July 1 of each year for activities during the previous year. The report year is based on a calendar year from January 1 through December 31.

The EPA is required to compile the information in an electronic database that is accessible to the public. This database is commonly referred to as the Toxic Chemical Release Inventory System (TRIS). A number of states maintain a comprehensive Toxic Release Chemical Inventory database of their own, including Michigan.

Nearly 650 chemicals and chemical categories are currently reported under Section 313 of SARA Title III. From year to year, the toxic chemical registry has been revised as specific chemicals have been added or removed by the EPA. For the 1997 report year, the EPA removed two chemicals from the list: 2-bromo-2-nitropropane and 2,6-dimethylphenol. The EPA also lowered the *de minimis* levels for 2,4-dinitrotoluene, 2,6-dinitrotoluene, and nitrobenzene. Appendix A shows the changes made to the list of reportable chemicals for report years 1989 through 1997.

Reporting Requirements

A facility is subject to the provisions of SARA Title III if it

- Is a manufacturing operation included in Standard Industrial Classification (SIC) major group 20 through 39 or a federal facility,
- Employs ten or more full-time employees, and
- Manufactures, imports or processes 25,000 pounds or more, or otherwise uses 10,000 pounds or more of any of the listed toxic chemicals.

Scope and Limitations of TRI Data

The Toxic Chemical Release Inventory data reported by industry represents only those chemicals contained in the toxic chemical registry and reportable under Section 313 of SARA Title III. This does not include all of the toxic substances released to the environment in

Michigan, since facilities that do not meet the provisions of SARA Title III do not report. Chemical pollutants are also generated from many sources other than the manufacturing sector. For example, automobile exhaust and the use and disposal of consumer products containing chemical substances are not accounted for under the TRI. The data reported under TRI alone do not provide sufficient information to assess the environmental and health impacts of the chemical. The relative risk of a chemical depends on many factors, such as the concentration, quantity and exposure.

In its current form, TRI is a simple pollution accounting system– not an accurate environmental performance indicator. Variations in TRI data may be attributed to changes in the economy. Furthermore, a number of factors, ranging from variations in production to different equipment lines, influence a facility's TRI data. Therefore, the numbers may not reflect a facility's true environmental performance.

The TRI data presented in this analysis for Report Year 1997 are frozen as of March 1, 1999. The data, however, is subject to change. A facility may at any time submit a revision to its original toxic chemical release report. Revisions are made for several reasons. For example, a facility may submit a revision to correct misreported data. Similarly, a facility may be unaware that a chemical is included on the list of chemicals reportable under TRI and can submit the report upon discovery of this error. However, facilities that knowingly misrepresent or fail to report data are subject to enforcement action by the EPA.

Data Uses

The Toxic Chemical Release Inventory (TRI) has become a very important source of information for those who want to know what chemicals are being released into the environment. The public can use this information to identify potential concerns, gain a better understanding of potential risks, and work with industry and government in their efforts to reduce toxic chemical releases and transfers. Nationally, facilities have reduced their total TRI releases by over 40 percent since 1988. Public availability of the data has prompted many facilities to work with their communities to develop effective strategies to reduce environmental and health risks posed by toxic chemical releases.

The TRI has also proven to be an excellent data source for government officials responsible for monitoring and inspecting facilities that use toxic chemicals or release them into the environment. It also provides information to the EPA and the states that can be used in determining the need for future regulations or revisions to current regulations.

The data can also be beneficial to industry when looking at overall plant efficiency. Industry can use the TRI data to

- Obtain an overview of their use and release of toxic chemicals,
- Identify and reduce costs associated with toxic waste,
- Identify promising areas for pollution prevention,
- Establish reduction targets, and
- Document progress toward reduction goals.

Access to TRI Data

The TRI program provides direct access to toxic chemical release and transfer data at the local, regional and national levels. All TRI submittals sent to the Michigan SARA Title III program are available to the public. The SARA Title III program makes this data available both electronically and in paper format through Section 324 of EPCRA. Furthermore, anyone can

make an appointment with the SARA Title III program to view the Form R submittals. The Michigan Department of Environmental Quality (MDEQ) also publishes the TRI data on the SARA Title III website at <http://www.deq.state.mi.us/ead/sara>. The TRI data is searchable by geographic area, chemical and facility.

The Michigan SARA Title III program publishes a summary report and an analysis of TRI data submitted by Michigan facilities for each report year. The summary report lists on-site releases to each media, off-site disposal, transfers to publicly owned treatment works (POTWs) and waste management transfers for each chemical reported by a facility. The staff analysis compares the state's current TRI report year data with previous years. The summary report and staff analysis are available on the Michigan SARA Title III website. These documents are also available through the Michigan Library and Historical Center and other public depository libraries throughout the state. Copies may be requested from the program by calling 517-373-8481.

A number of other websites also make Toxic Chemical Release Inventory data available. The EPA EnviroFacts (http://www.epa.gov/enviro/index_java.html) is a single point of access to U.S. EPA environmental data. The Right-to-Know Network (<http://www.rtk.net>) provides access to a number of environmental databases, including the Toxic Chemical Release Inventory.

Future Changes in TRI Reporting

Beginning with the 1998 report year, seven additional industry sectors will report under Section 313 of SARA Title III along with the 20 manufacturing sectors and federal facilities that already are required to report as part of EPA's industry expansion of TRI. The seven additional industry sectors are:

- Metal mining,
- Coal mining,
- Electricity generating facilities,
- Commercial hazardous waste treatment and disposal (RCRA Subtitle C) facilities,
- Chemical and allied product wholesalers,
- Petroleum bulk terminals and plants and
- Solvent recovery facilities.

This industry expansion will significantly impact the amounts of toxic chemicals reported annually under Section 313. These facilities all use or manage substantial amounts of toxic chemicals in waste streams. The expectation is that the data reported for 1998 by these new industries will significantly increase the reported environmental releases from 1997.

The EPA also is proposing changes and additions to the list of toxic chemicals that are subject to Section 313 reporting. Specifically, EPA has proposed lowering the reporting thresholds for certain listed chemicals it considers to be persistent, bioaccumulative and toxic (PBT). In addition, the proposal would add a number of new PBT chemicals with lower reporting thresholds. PBTs are chemicals of concern because they persist in the environment for a significant period of time and even relatively small releases have the potential to accumulate over time to higher levels and cause significant adverse impacts on human health and the environment. As part of this proposed rulemaking, EPA also is proposing lower reporting thresholds for dioxin and dioxin-like compounds and is reviewing the lead compound category. This change could take effect for Report Year 2000.

TRI Data Analysis

The 1997 Staff Analysis presents data on the toxic chemicals released and transferred by covered facilities in Michigan. The analysis aggregates data for each media and for total releases (on- and off-site) and total transfers (discharges to publicly owned treatment works and waste management transfers) by chemical, facility and county. Also included are chemical profiles and a discussion of source reduction and waste management activities. Appendices include rankings for chemicals, facilities, counties, cities and SIC groups. Table 3 shows the individual data categories represented by total releases, total transfers and waste management activities in this analysis.

Table 3. Total Releases, Total Transfers and Waste Management Activities Defined

Total Releases		Total Transfers	Waste Management Activities	
On-site	Off-site		On-site	Off-site
Air Releases	Disposal	POTW Discharges Recycling Energy Recovery Treatment	Recycling	Recycling
Water Releases			Energy Recovery	Energy Recovery
Underground Injection			Treatment	Treatment
Land Releases				Disposal

The RY 1997 data presented in this analysis are based on chemical reports submitted to the State of Michigan as of March 1, 1999. Data for 1996 are also from the Michigan TRI database. The 1995 data are from the EPA TRIS database. Both 1995 and 1996 data are current as of March 1999.

This analysis has three sections. Section 1 presents data for each of the media and for total releases to the environment (on- and off-site) and total transfers which, unlike prior years, excludes off-site disposal. This section includes a three-year comparison of TRI data, using 1995 as the baseline year. The baseline year is 1995 because EPA's chemical expansion added approximately 300 chemicals to the list of toxic chemicals reportable under Section 313 effective for the 1995 report year. The media are:

- Air releases,
- Water releases,
- Underground injection,
- Land releases,
- Off-site disposal,
- Discharges to publicly owned treatment works (POTWs) and
- Waste management transfers for energy recovery, recycling and treatment.

Section 2 provides a profile of the top ten chemicals for total releases on- and off-site to the environment in Michigan for 1997. Each profile includes information about the chemical structure, uses, environmental fate, and health and environmental effects. In this section a chart depicts the trend in releases from 1995-1997.

Section 3 focuses on source reduction and waste management activities. This focus includes on- and off-site recycling and energy recovery.

Section I
Releases and Transfers

Section I: Releases and Transfers

Facilities are required under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) to report the quantity of toxic chemicals released into the environment and transferred in wastes to off-site locations. This information is reported on the Toxic Chemical Release Inventory (TRI) Form R. Facilities report their environmental releases to the air, water, underground injection wells and land disposal on-site. Transfers off-site in wastes are reported as discharges to publicly owned treatment works (POTWs) and transfers to off-site locations. In the following discussion, release and transfer trends are presented in bar charts for three report years (1995-1997). The top ten chemicals, counties and facilities are shown for each medium release and transfer. A state map for each medium presents the approximate annual amount released or transferred per year by county.

Unlike prior years' staff analysis, transfers to off-site locations for disposal are considered off-site releases and are discussed in Section 1 as a single environmental medium. Total releases include on-site releases and the amount transferred off-site for disposal. Total transfers include discharges to POTWs and waste management transfers for recycling, energy recovery or waste treatment. Total transfers exclude off-site disposal. Table 4 presents the terms used when describing total releases and total transfers. Appendix B provides definitions of these terms.

Table 4. Total Releases and Transfers Defined

Total Releases		Total Transfers	Waste Management Transfers
On-site	Off-site		
Air Releases	Disposal	POTW Discharges	Recycling
Water Releases		Recycling	Energy Recovery
Underground Injection		Energy Recovery	Treatment
Land Releases		Treatment	

The Form R report is broken out into six environmental categories. Air releases are reported on the Form R as "fugitive or non-point emissions" and as "stack or point emissions." Water discharges are all facility releases to surface water bodies such as lakes or rivers. Underground injection includes releases to Class I-V wells. Land releases are releases to land on-site and are reported by five sub-categories. Discharges to POTWs and transfers to off-site locations include information about the receiving facility, the amounts transferred, and how the transfers are managed. A copy of the Form R can be found in Appendix C.

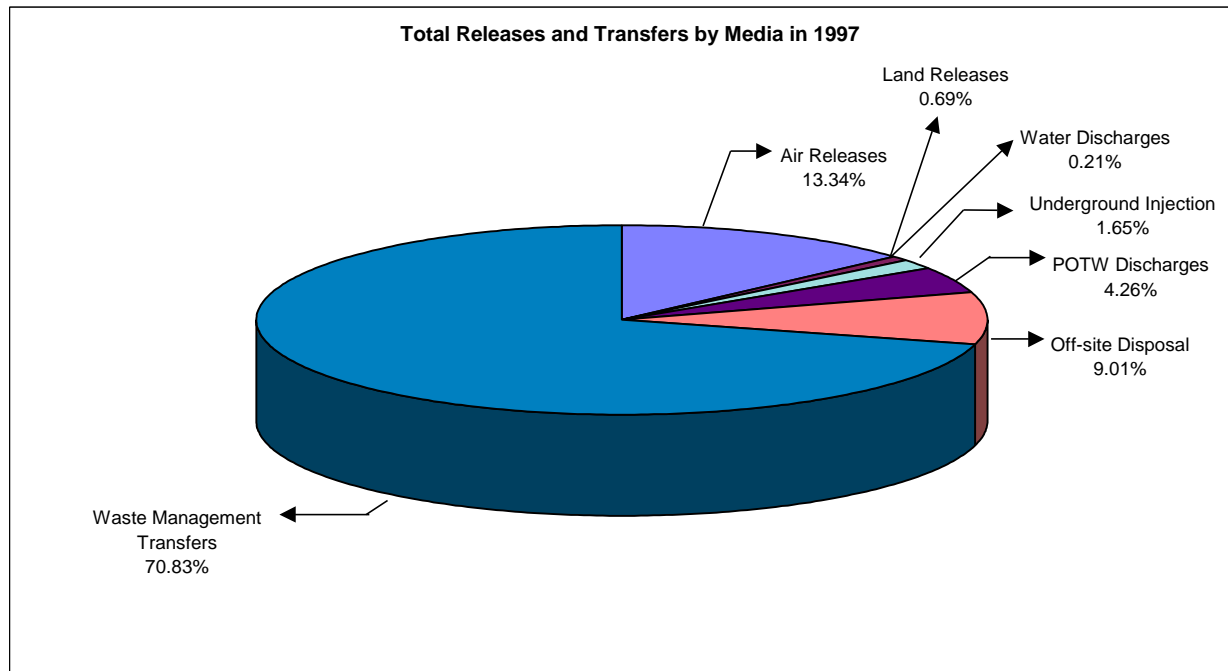
For Report Year 1997, facilities filing under TRI reported more than 308 million pounds of toxic chemicals in total releases and transfers in Michigan. These totals are shown in Table 1 in the Executive Summary and repeated in Table 5 below. Figure 1 shows each environmental medium as a percentage of this total.

Table 5. Michigan Chemical Releases and Transfers* – 1995-1997 (lbs. of chemicals)

	1995	1996	1997
Number of Reporting Facilities	941	901	905
Total Releases	100,569,247	91,440,730	84,344,038
Total On-site Releases	71,184,362	59,761,831	53,829,265
Air Releases	56,841,812	49,323,876	45,183,168
Water Releases	789,313	736,554	717,376
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Total Transfers	211,602,264	207,338,101	223,788,110
POTW	11,952,263	14,573,867	14,434,604
Waste Management Transfers	199,650,001	192,764,234	209,353,506

* Source: 1995 EPA TRIS as of 3-99; 1996 and 1997 Michigan TRI Databases as of 3-99

Figure 1. Total Releases and Transfers by Media in 1997



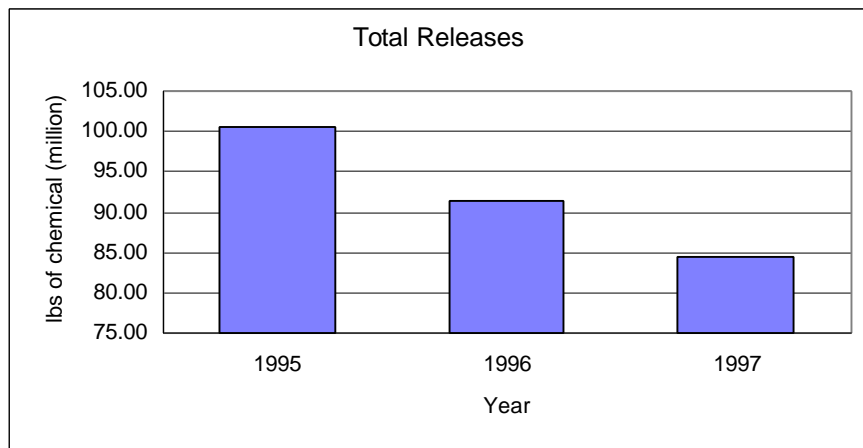
(Source: 1997 MI TRI Database)

A. Total Releases

Releases to the environment include on-site releases and disposal of waste materials off-site. In previous years, the staff analysis looked only at on-site releases to calculate total releases. This year, the staff analysis includes off-site disposal in the total release calculation, which parallels the EPA calculation of total releases.

Michigan facilities reported total releases of more than 84 million pounds of listed toxic chemicals in RY 1997. This is a 7.8 percent decrease in the quantity of toxic chemicals reported for 1996 and a 16.1 percent reduction compared to 1995.

Figure 2. Total Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

In 1997, zinc compounds represented the chemical released in the largest quantity, as it was in 1996. Releases of zinc compounds decreased by 18.9 percent since 1996 and accounted for 24.6 percent of the total in Michigan in 1997.

Table 6. Total Releases by Chemical in 1997

Chemical Name	Total Releases (lbs. of chemical)
ZINC COMPOUNDS	20,760,377
METHANOL	9,023,505
XYLENE (MIXED ISOMERS)	7,333,704
TOLUENE	6,799,541
HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	4,406,367
MANGANESE	4,221,965
STYRENE	2,144,426
N-HEXANE	2,021,467
AMMONIA	2,019,764
CERTAIN GLYCOL ETHERS	1,981,770

(Source: 1997 MI TRI Database)

Wayne County facilities released the greatest amount on- and off-site in 1997, totaling 29 million pounds. This is a 6.4 percent decrease from 1996, when Wayne County also ranked first.

Table 7. Total Releases by County in 1997

County	Total Releases (lbs. Of chemical)
WAYNE	29,070,272
MACOMB	5,000,333
KALAMAZOO	4,979,047
OAKLAND	4,829,864
KENT	4,445,340
MONROE	4,046,562
OTTAWA	3,764,452
SAINT CLAIR	3,549,114
GENESEE	2,051,897
MIDLAND	1,908,482

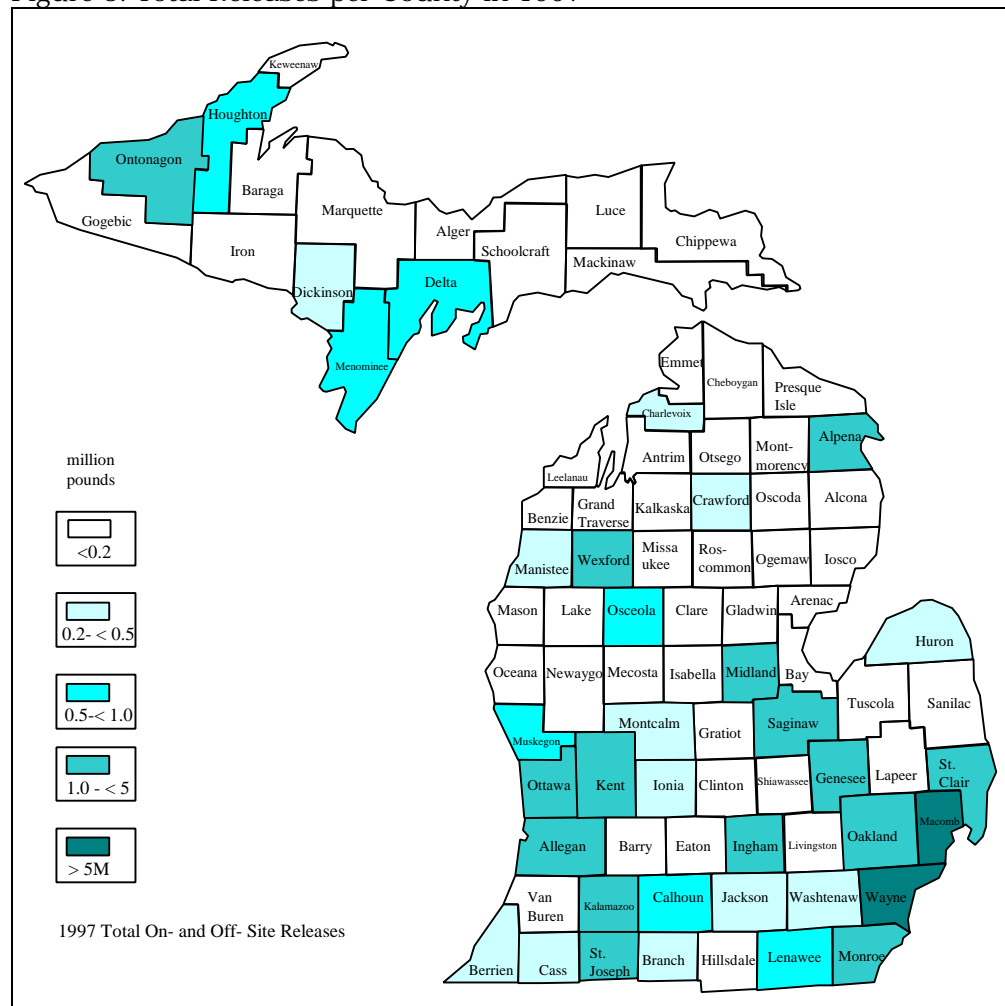
(Source: 1997 MI TRI Database)

Table 8. Total Releases by Facility in 1997

Facility Name	City	Total Releases (lbs. of chemical)
ROUGE STEEL COMPANY	DEARBORN	13,502,815
NATIONAL STEEL CORP.	ECORSE	8,036,107
PHARMACIA & UPJOHN	KALAMAZOO	3,955,383
AMERICAN TAPE CO.	MARYSVILLE	3,202,281
HOLNAM INC - DUNDEE PLANT	DUNDEE	3,147,134
NEW HAVEN FOUNDRY	NEW HAVEN	2,637,710
WARNER-LAMBERT CO.	HOLLAND	2,208,726
FIBERMARK, INC	ROCHESTER	1,617,001
DOW CHEMICAL COMPANY	MIDLAND	1,529,059
LAFARGE CORPORATION	ALPENA	1,504,412

(Source: 1997 MI TRI Database)

Figure 3. Total Releases per County in 1997



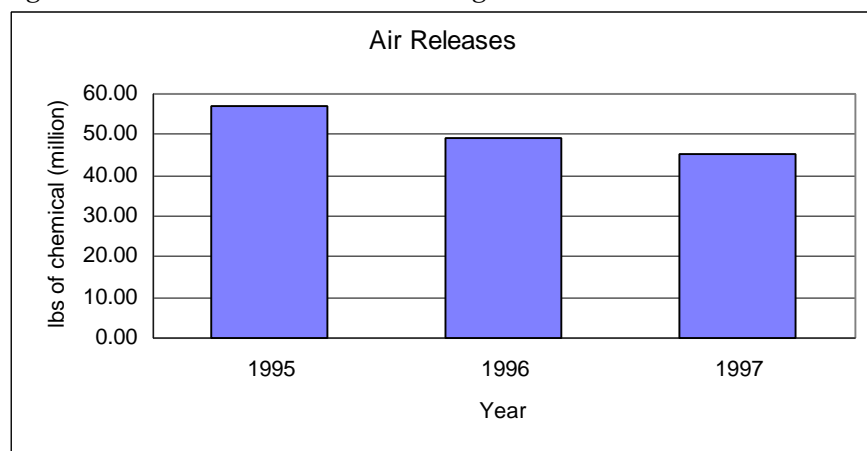
(Source: 1997 MI TRI Database)

1. Air Releases

Air releases are reported in Sections 5.1 and 5.2 of Form R. Stack or point air emissions (Section 5.2) are all releases to the air that occur through stacks, vents, ducts, pipes or any other confined air stream. Fugitive or non-point air emissions (Section 5.1) are all releases to the air other than stack emissions, such as leaks from valves.

Air releases represent 53 percent of the total releases and 83 percent of the on-site releases reported for 1997. Figure 6 shows the air releases of TRI chemicals statewide. Facilities filing under TRI reported total air releases of about 45 million pounds in 1997. This is an 8.4 percent decrease from about 49 million pounds in 1996, and a 20.5 percent decrease from almost 57 million pounds in 1995.

Figure 4. Total Air Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

Xylene (mixed isomers) was the chemical released in the greatest amount in 1997; it was also first in 1996. Releases of xylene to air have decreased by 10.3 percent since 1996.

Table 9. Air Releases by Chemical in 1997

Chemical Name	Air Releases (lbs. of chemical)
XYLENE (MIXED ISOMERS)	7,323,666
TOLUENE	6,752,255
HYDROCHLORIC ACID	4,402,402
METHANOL	4,346,887
STYRENE	2,133,136
N-HEXANE	2,020,912
CERTAIN GLYCOL ETHERS	1,937,531
AMMONIA	1,823,063
METHYL ETHYL KETONE	1,701,310
ETHYLENE	1,620,152

(Source: 1997 MI TRI Database)

As in 1996, Wayne County facilities ranked number one for air releases in 1997, with a total of 7.2 million pounds. Compared to 1996, this is a 10.5 percent reduction in air releases.

Table 10. Air Releases by County in 1997

County	Air Releases (lbs. of chemical)
WAYNE	7,223,522
OAKLAND	4,323,816
MONROE	3,936,334
SAINT CLAIR	3,543,296
KENT	3,264,218
MACOMB	2,030,694
MIDLAND	1,868,772
GENESEE	1,847,471
ALPENA	1,566,212
OTTAWA	1,486,494

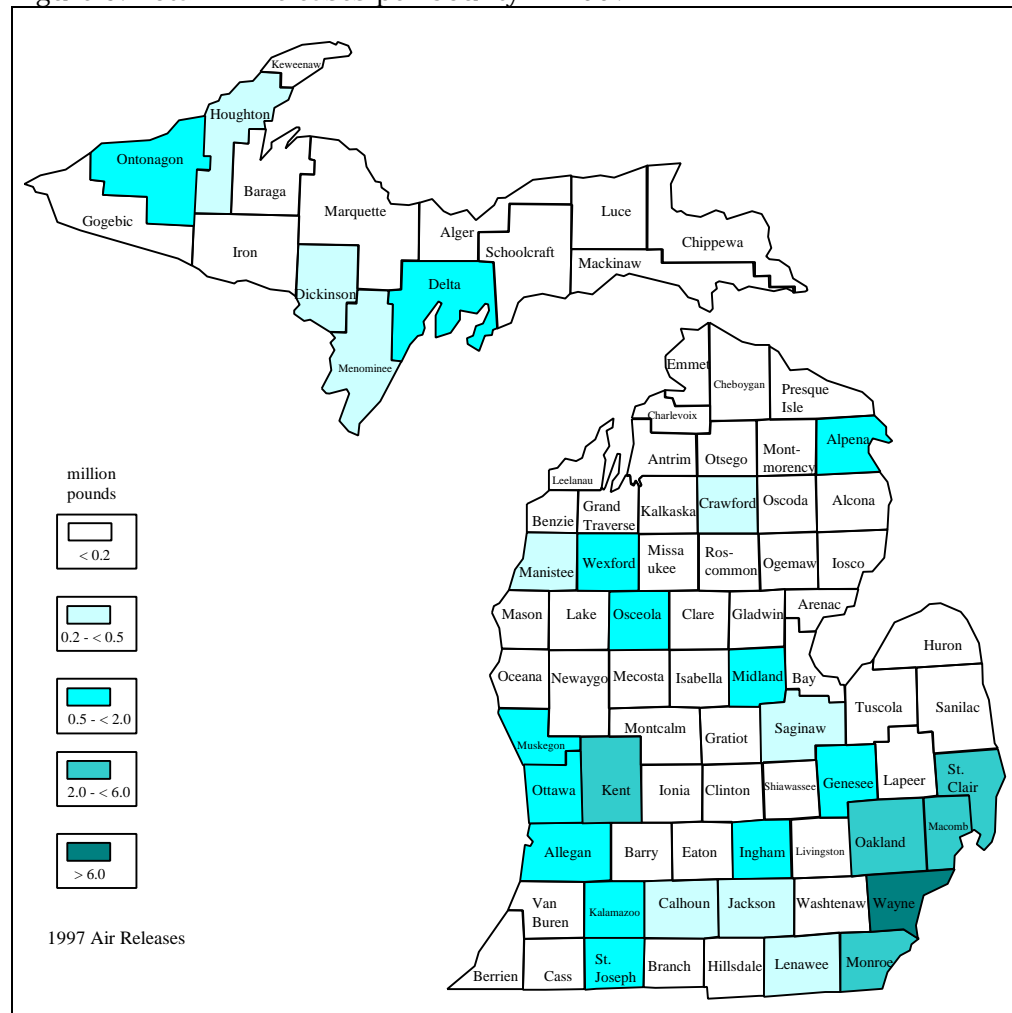
(Source: 1997 MI TRI Database)

Table 11. Air Releases by Facility in 1997

Facility Name	City	Air Releases (lbs. of chemical)
AMERICAN TAPE CO.	MARYSVILLE	3,200,046
HOLNAM INC – DUNDEE PLANT	DUNDEE	3,147,134
FIBERMARK, INC	ROCHESTER	1,617,001
LAFARGE CORPORATION	ALPENA	1,504,412
DOW CHEMICAL COMPANY	MIDLAND	1,489,525
STONE CONTAINER CORP.	ONTONAGON	1,156,012
STEELCASE INC	GRAND RAPIDS	1,151,750
MLCG DETROIT/HAMTRAMCK	DETROIT	1,050,988
FORD MOTOR CO.	WAYNE	1,039,876
VEMCO, INC.	GRAND BLANC	893,968

(Source: 1997 MI TRI Database)

Figure 5. Total Air Releases per County in 1997



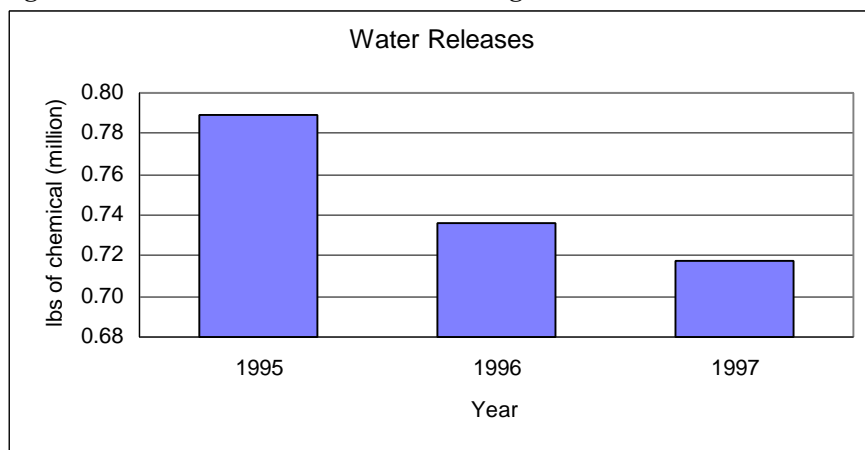
(Source: 1997 MI TRI Database)

2. Water Releases

Discharges of listed toxic chemicals released by facilities to surface waters such as rivers, lakes, ponds and streams are reported in Section 5.3 of the Form R. A facility reports the name of the water body into which it releases a listed toxic chemical as well as the amount discharged.

In 1997, TRI facilities released a total of 0.72 million pounds of toxic chemicals into Michigan surface water bodies. Compared to 1995 and 1996 water release data, this is a 9.1 percent and 2.6 percent decrease in releases, respectively. Water releases account for 0.85 percent of total releases and 1.3 percent of on-site releases.

Figure 6. Total Water Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

As in 1996, nitrate compounds was the chemical released in the greatest quantity in 1997 to surface water bodies in Michigan. Releases increased by about 22 percent in 1997, from almost 0.23 million pounds in 1996.

Table 12. Water Releases by Chemical in 1997

Chemical Name	Water Releases (lbs. of chemical)
NITRATE COMPOUNDS	281,095
METHANOL	159,984
AMMONIA	137,002
ETHYLENE GLYCOL	27,220
MANGANESE COMPOUNDS	22,564
BARIUM	18,000
DIETHANOLAMINE	14,000
ANTIMONY	7,900
ZINC (FUME OR DUST)	6,464
COPPER	5,078

(Source: 1997 MI TRI Database)

In 1997, Menominee County facilities ranked first in releases to surface waters, compared to second in 1996. Water releases for the county increased by almost 74 percent in 1997, up from 0.14 million pounds in 1996.

Table 13. Water Releases by County in 1997

County	Water Releases (lbs. of chemical)
MENOMINEE	250,705
KALAMAZOO	84,435
DICKINSON	67,800
ALPENA	53,500
WAYNE	52,195
DELTA	38,720
BAY	37,006
MANISTEE	35,062
ONTONAGON	32,299
GRATIOT	30,000

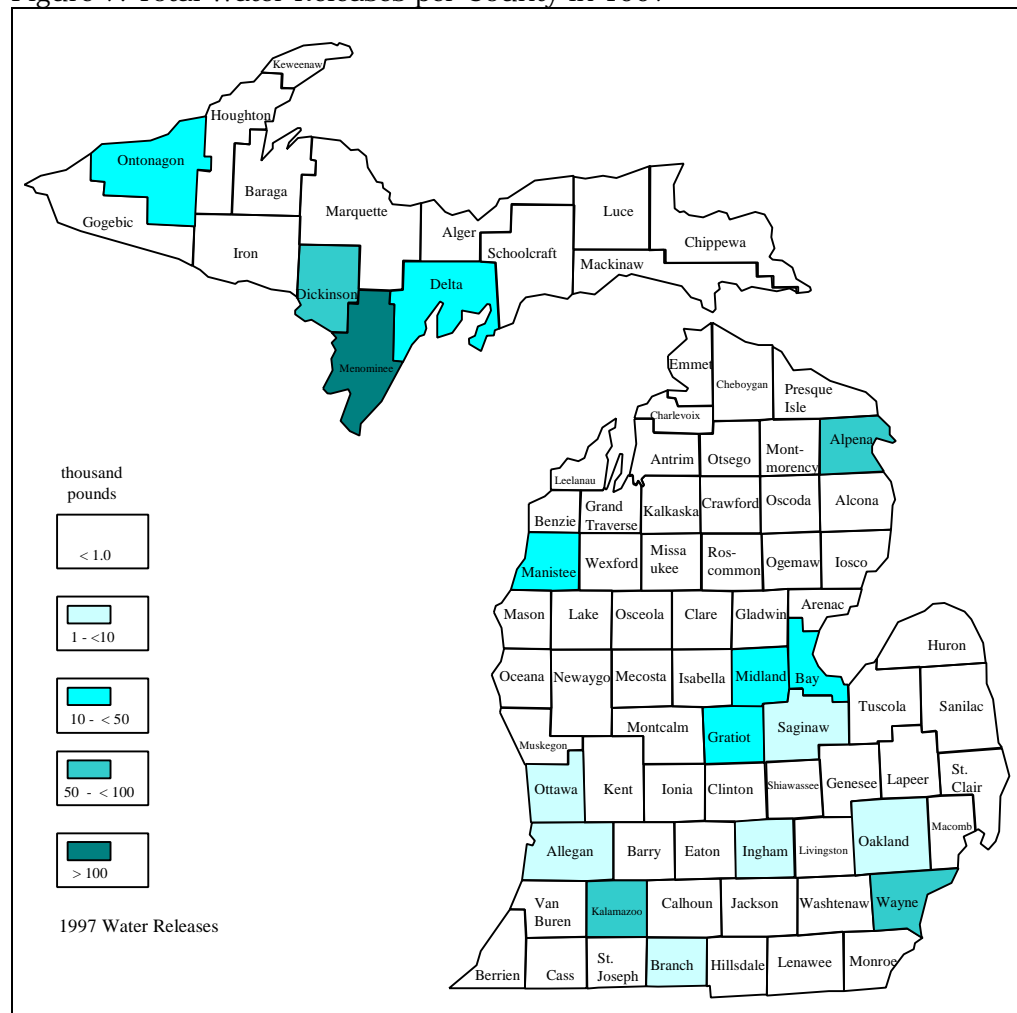
(Source: 1997 MI TRI Database)

Table 14. Water Releases by Facility in 1997

Facility Name	City	Water Releases (lbs. of chemical)
MENOMINEE PAPER CO. INC	MENOMINEE	241,005
PHARMACIA & UPJOHN	KALAMAZOO	84,435
CHAMPION INTL. CORP.	QUINNESEC	67,800
ABTCO, INC.	ALPENA	53,500
MEAD PUBLISHING PAPER DIV.	ESCANABA	38,720
MONITOR SUGAR COMPANY	BAY CITY	37,000
NATIONAL STEEL CORP.	ECORSE	36,560
TENNECO PACKAGING INC.	FILER CITY	35,062
STONE CONTAINER CORP.	ONTONAGON	32,299
TPI PETROLEUM, INC.	ALMA	30,000

(Source: 1997 MI TRI Database)

Figure 7. Total Water Releases per County in 1997



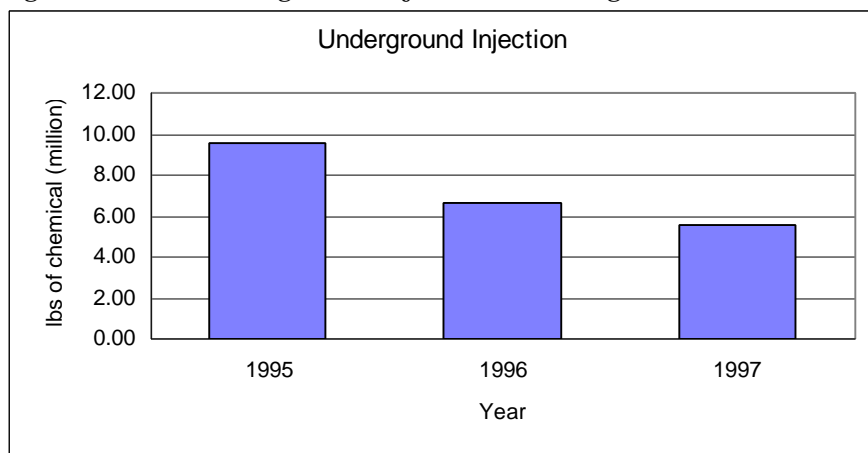
(Source: 1997 MI TRI Database)

3. Underground Injection

The disposal on-site of liquid toxic chemical waste by underground injection is reported under TRI in Section 5.4.1 and 5.4.2 of Form R. The total amount of toxic chemicals injected into Class I and Class II-V wells are entered in these sections, respectively.

Underground injection accounts for 6.7 percent of total releases and 10.4 percent of on-site releases. Facilities filing under TRI reported underground injections totaling 5.6 million pounds in 1997. This was approximately a 15 percent decrease from 1996, when underground injections totaled 6.6 million pounds, and a 41 percent decrease from 1995, when underground injections totaled 9.6 million pounds.

Figure 8. Total Underground Injection in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

Methanol was the chemical injected underground in the largest quantity, as in 1996. Underground injection of methanol decreased 9.9 percent from 1996, when injections totaled 5 million pounds.

Table 15. Underground Injection by Chemical in 1997

Chemical Name	Injection (lbs. of chemical)
METHANOL	4,506,256
N,N-DIMETHYLFORMAMIDE	600,005
TRIETHYLAMINE	217,489
ACETONITRILE	102,833
PYRIDINE	58,672
AMMONIA	27,551
ZINC COMPOUNDS	18,328
CHROMIUM COMPOUNDS	11,756
DICHLOROMETHANE	10,726
MANGANESE COMPOUNDS	10,280

(Source: 1997 MI TRI Database)

For report year 1997, only four facilities reported releases to injection wells, while five facilities reported for 1996.

Table 16. Underground Injection by County in 1997

County	Injection (lbs. of chemical)
KALAMAZOO	3,653,879
OTTAWA	1,915,310
LENAAWEE	27,546
OSCODA	120

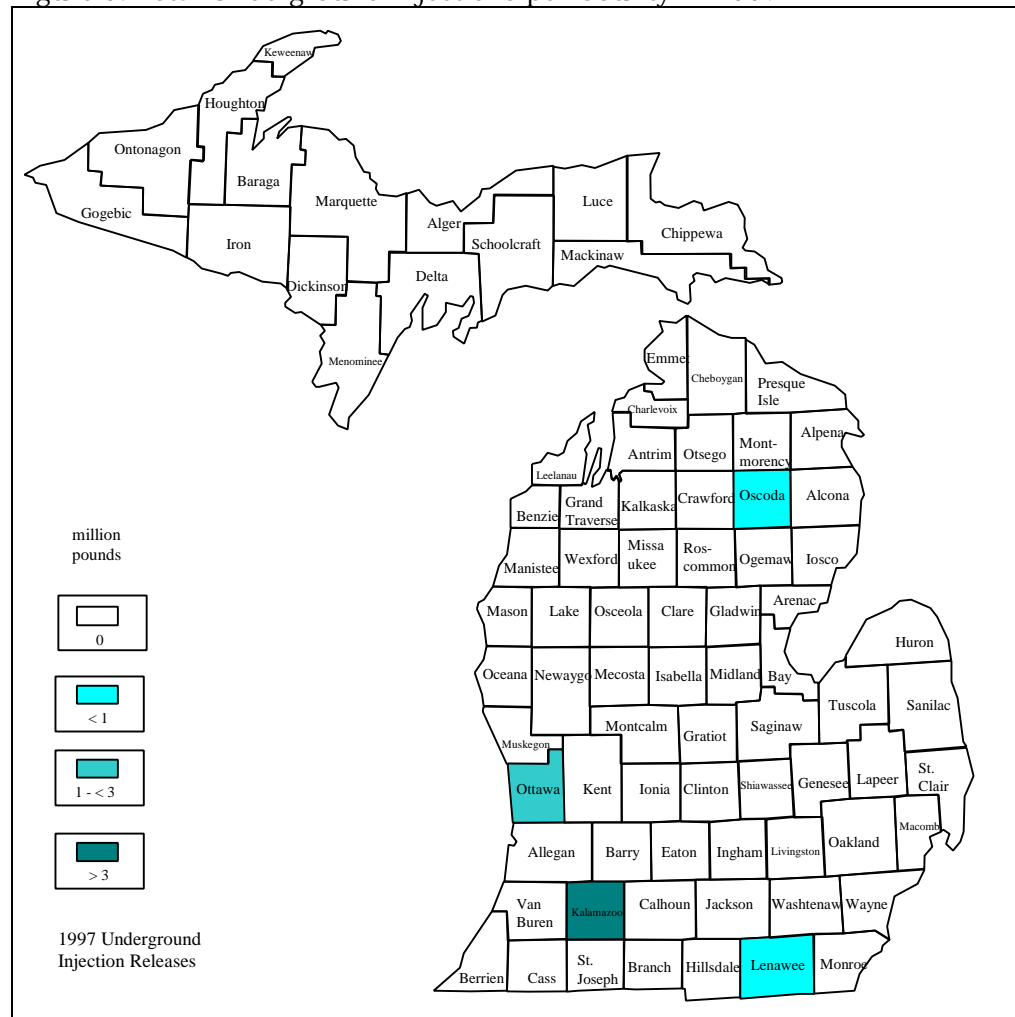
(Source: 1997 MI TRI Database)

Table 17. Underground Injection by Facility in 1997

Facility Name	City	Injection (lbs. of chemical)
PHARMACIA & UPJOHN	KALAMAZOO	3,653,879
WARNER-LAMBERT CO.	HOLLAND	1,915,310
BIOLAB INC	ADRIAN	27,546
HOSKINS MFG. CO.	MIO	120

(Source: 1997 MI TRI Database)

Figure 9. Total Underground Injections per County in 1997



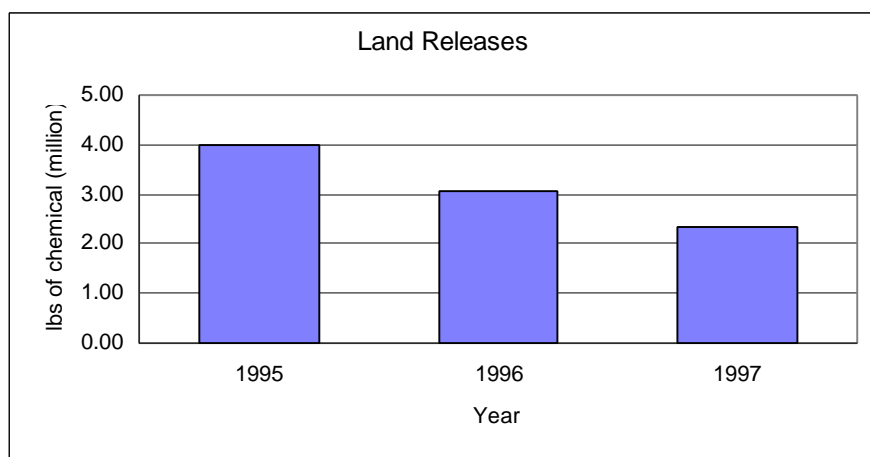
(Source: 1997 MI TRI Database)

4. Land Releases

In Section 5.5 of the Form R, facilities must report the quantities of TRI chemicals released to the land within the boundaries of the facility. Land releases on-site include releases to RCRA Subtitle C landfills, other landfills, land treatment/application farming, surface impoundment and other disposal. (Subtitle C landfills are regulated under the Resource Conservation and Recovery Act of 1976.) Disposal to landfills off-site is recorded in Section 6.2 on the Form R and is considered off-site disposal.

Land releases in 1997 totaled approximately 2.3 million pounds. This is a 24.3 percent decrease from 1996, when releases were about 3 million pounds and a 41.7 percent decrease from 1995, when releases totaled about 4 million pounds. Releases to land are approximately 2.8 percent of the total releases in Michigan and account for 4.3 percent of total on-site releases.

Figure 10. Total Land Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

The chemical manganese was released to land in the largest quantity in 1997, with a total of almost 0.66 million pounds. For 1996 it ranked second with 1.2 million pounds. This represents a 45.4 percent decrease in land releases of manganese from 1996 to 1997.

Table 18. Land Releases by Chemical in 1997

Chemical Name	Land Releases (lbs. of chemical)
MANGANESE	657,306
ZINC (FUME OR DUST)	653,773
ALUMINUM OXIDE (FIBROUS FORMS)	380,000
BARIUM	151,640
MANGANESE COMPOUNDS	110,900
LEAD	94,618
NITRATE COMPOUNDS	73,112
BARIUM COMPOUNDS	58,405
ZINC COMPOUNDS	40,210
COPPER	28,152

(Source: 1997 MI TRI Database)

Saginaw County facilities ranked first in land releases in 1996 and 1997, reducing land releases by 44 percent since 1996.

Table 19. Land Releases by County in 1997

County	Land Releases (lbs. of chemical)
SAGINAW	1,255,161
WEXFORD	385,072
DELTA	303,727
DICKINSON	154,450
WAYNE	99,705
OTTAWA	50,220
MIDLAND	29,247
ALLEGAN	16,377
MACOMB	16,325
OAKLAND	9,677

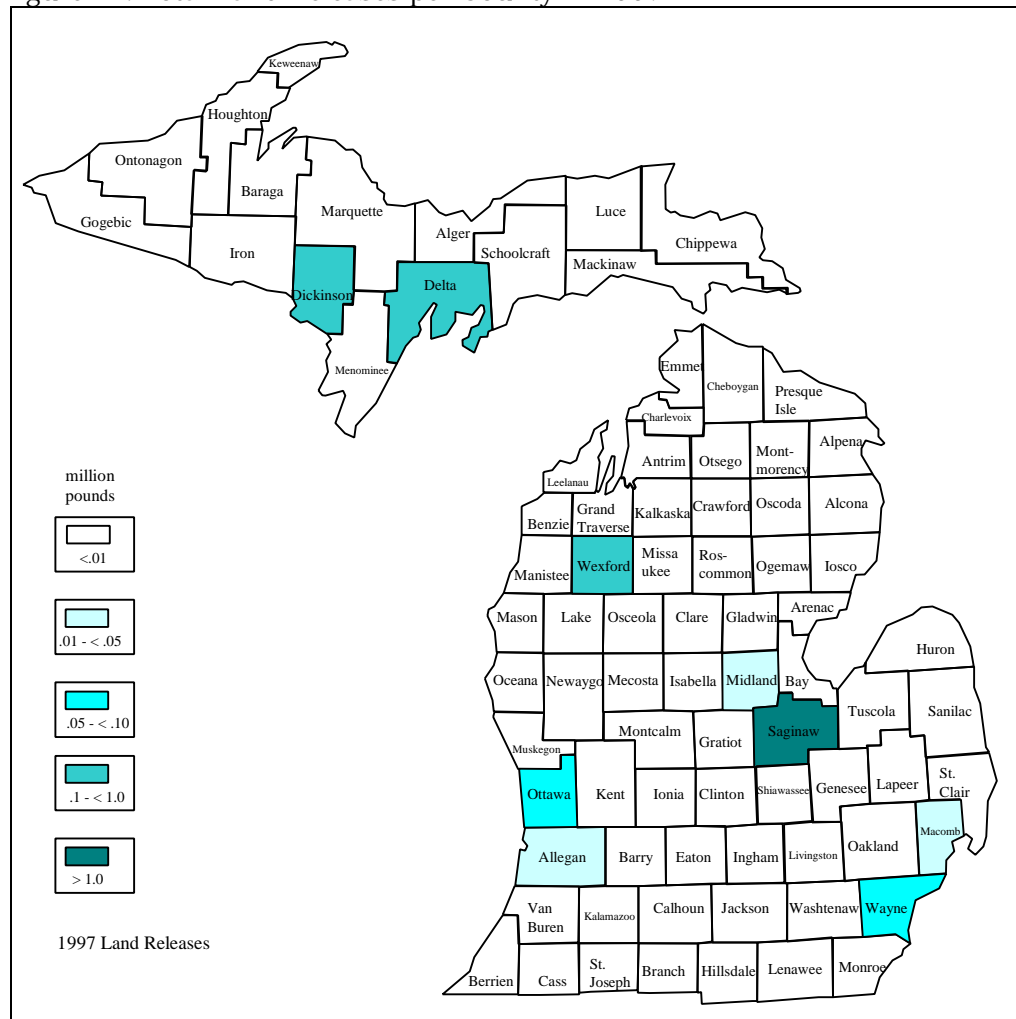
(Source: 1997 MI TRI Database)

Table 20. Land Releases by Facility in 1997

Facility Name	City	Land Releases (lbs of chemical)
GMPTG-SAGINAW METAL CASTING	SAGINAW	1,255,161
CMI-CAST PARTS, INC.	CADILLAC	382,050
MEAD PUBLISHING PAPER DIVISION	ESCANABA	303,727
CHAMPION INTL. CORP.	QUINNESEC	153,950
REILLY PLATING CO.	MELVINDALE	97,000
DONNELLY CORPORATION	HOLLAND	40,640
DOW CHEMICAL COMPANY	MIDLAND	29,247
HAWORTH, INC.	HOLLAND	16,000
JOHNSON CONTROLS	MT. CLEMENS	14,325
MICHIGAN SPECIALTY TUBE	SOUTH LYON	9,632

(Source: 1997 MI TRI Database)

Figure 11. Total Land Releases per County in 1997



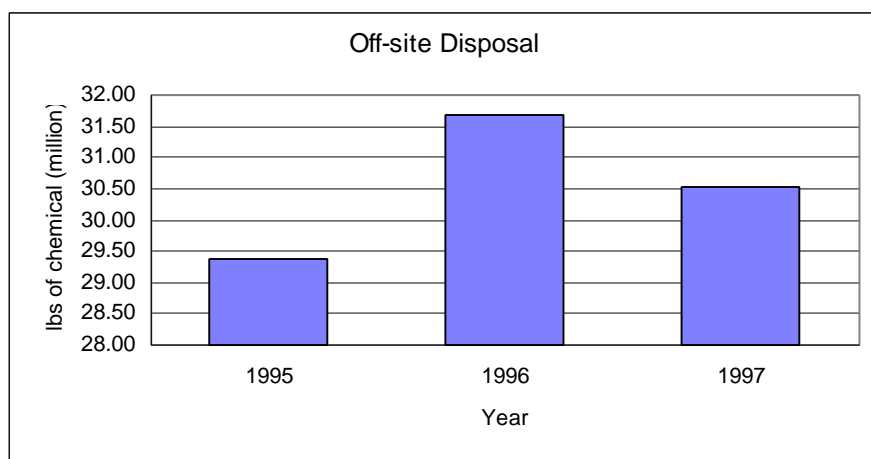
(Source: 1997 MI TRI Database)

5. Off-site Disposal

Off-site disposal is considered a release, but is reported as an off-site transfer in Section 6.2 of the Form R, along with transfers off-site for recycling, energy recovery and treatment. This discussion focuses only on transfers off-site for disposal. Transfers off-site for recycling, energy recovery and treatment are discussed under waste management transfers later in this analysis. Materials sent off-site for disposal go to landfills and surface impoundments, and for solidification/stabilization and land treatment among others.

Michigan facilities reported the off-site disposal of more than 30.5 million pounds of TRI chemicals in 1997. This is a 3.8 percent increase compared to 1995 and a 3.6 percent decrease from 1996. Off-site disposal accounts for approximately 36 percent of the total releases reported for 1997. Ninety-five percent of the materials sent off-site for disposal went to a landfill or surface impoundment.

Figure 12. Total Off-site Disposal in Michigan



(Source: 1995 EPA TRIS; 1996-97 MI TRI Database)

Zinc compounds was the chemical disposed of off-site in the largest quantity in 1997. Facilities reported the disposal of more than 20 million pounds of zinc compounds in 1997, a 19.3 percent decrease from 1996.

Table 21. Total Off-site Disposal by Chemical in 1997

Chemical Name	Off-site Disposal (lbs. of chemical)
ZINC COMPOUNDS	20,297,461
MANGANESE	3,490,917
COPPER	842,183
CHROMIUM COMPOUNDS	675,181
LEAD	658,434
ALUMINUM (FUME OR DUST)	469,827
COBALT	450,883
ARSENIC	444,705
NICKEL COMPOUNDS	389,161
ALUMINUM OXIDE (FIBROUS FORMS)	384,163

(Source: 1997 MI TRI Database)

Wayne County facilities disposed of the largest quantity of TRI chemicals, as in 1996. Wayne County facilities decreased off-site disposal by more than 20 percent from 27 million pounds in 1996.

Table 22. Total Off-site Disposal by County in 1997

County	Off-site Disposal (lbs. of chemical)
WAYNE	21,694,850
MACOMB	2,953,253
KENT	1,181,032
OAKLAND	493,944
CALHOUN	450,233
WEXFORD	381,300
BRANCH	359,558
SAINT JOSEPH	317,614
OTTAWA	302,833
LENAWEE	286,890

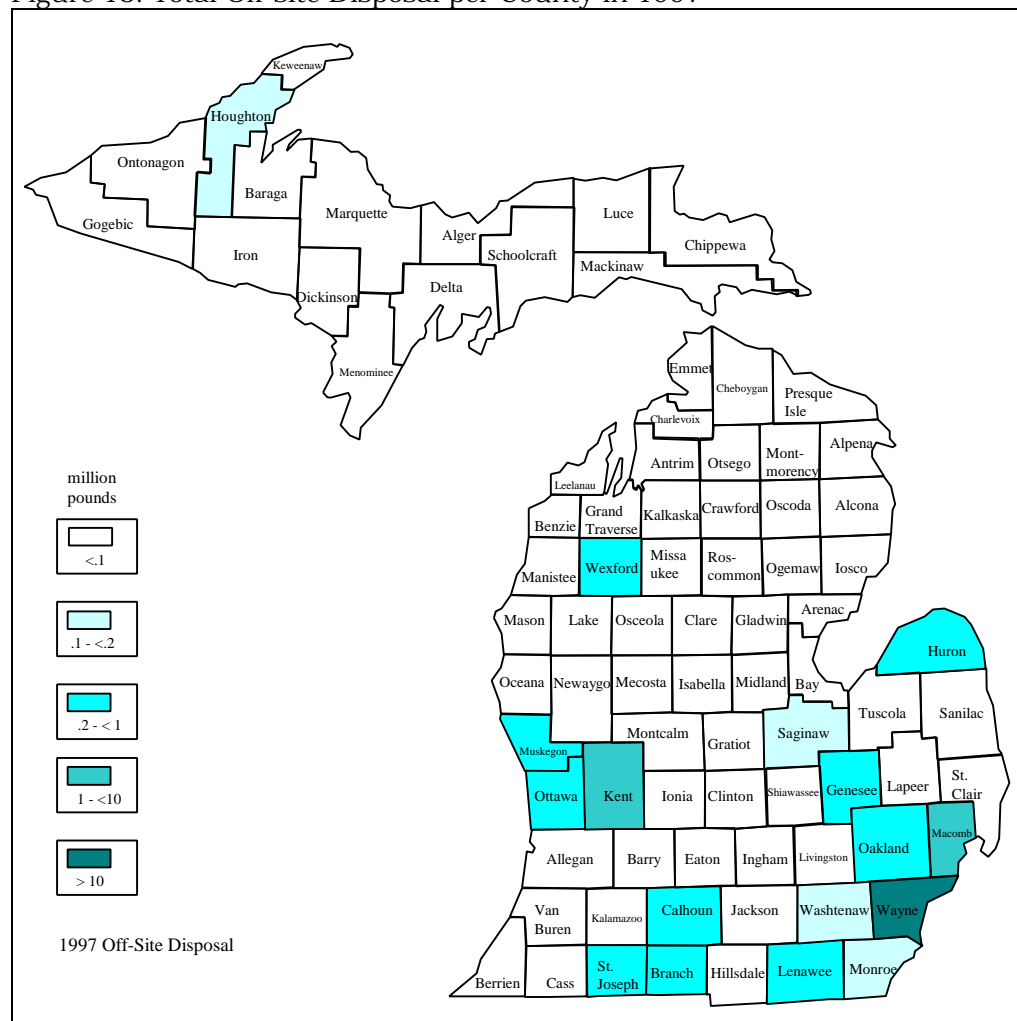
(Source: 1997 MI TRI Database)

Table 23. Total Off-site Disposal by Facility in 1997

Facility Name	City	Off-site Disposal (lbs. of chemical)
ROUGE STEEL COMPANY	DEARBORN	13,424,600
NATIONAL STEEL CORP.	ECORSE	7,682,080
NEW HAVEN FOUNDRY	NEW HAVEN	2,567,200
LACKS INDUSTRIES, INC.	KENTWOOD	633,334
CMI-CAST PARTS, INC.	CADILLAC	381,300
HAYES-ALBION CORPORATION	ALBION	319,474
IMCO RECYCLING OF MICHIGAN	COLDWATER	302,810
STURGIS FNDY. CORP.	STURGIS	293,334
ERVIN INDUSTRIES, INC.	ADRIAN	273,222
HURON CASTING INC.	PIGEON	239,000

(Source: 1997 MI TRI Database)

Figure 13. Total Off-site Disposal per County in 1997



(Source: 1997 MI TRI Database)

6. Total Releases by Standard Industrial Code (SIC)

The Standard Industrialization Classification (SIC) code identifies a facility's economic activity. The primary SIC code is one of the criteria that determines whether a facility is covered under the Toxic Chemical Release Inventory. Covered facilities are those in major SIC groups 20 through 39. SIC groups 20 through 39 represent manufacturing facilities. A very small number of facilities outside the covered SIC codes submitted reports for the 1997 report year and are included in this analysis. Additional SIC codes will be added in RY 1998.

The table below ranks the industry groups in Michigan by total releases. The top three industry groups accounted for 66 percent of total releases reported. The primary metals industry has 36 percent of total releases with 30 million pounds reported. Nationally, the primary metals industry ranks second; the chemicals industry is first in reported releases on- and off-site [1997 PDR]. Descriptions of the top ten industry groups in alphabetical order follows Table 32.

Table 24. Total Releases by SIC code in 1997

Industry	Major SIC	Number of Facilities in SIC Code Group	On-site Releases (lbs. of chemical)	Off-site Releases (lbs. of chemical)	Total Releases (lbs. of chemical)
Primary Metals	33	128	3,756,716	26,352,294	30,109,010
Transportation Equipment	37	145	12,838,080	1,362,537	14,200,617
Chemicals and Allied Products	28	114	10,754,195	323,437	11,077,632
Paper and Allied Products	26	26	9,311,665	14,644	9,326,309
Stone, Clay, Glass, Concrete Products	32	18	5,062,452	302,565	5,365,017
Fabricated Metal Products	34	181	3,079,884	675,293	3,755,177
Rubber and Misc. Plastics Products	30	91	2,345,444	933,475	3,278,919
Furniture and Fixtures	25	32	2,560,297	17,272	2,577,569
Lumber and Wood Products	24	17	993,844	4,057	997,901
Food and Kindred Products	20	48	933,552	50,711	984,263
Leather and Leather Products	31	6	316,268	334,772	651,040
Ind. / Commercial Machinery	35	36	507,817	78,963	586,780
Electric Gas Sanitary Services	49	1	550,087	12	550,099
Petroleum Refining and Related Ind.	29	11	310,593	1,793	312,386
Misc. Manufacturing Ind.	39	8	207,101	3,220	210,321
Electronic	36	20	108,802	5,154	113,956
Apparel and Other Finished Prod.	23	3	29,513	47,963	77,476
Textile Mill Products	22	2	58,233	0	58,233
Printing, Publishing, Allied Ind.	27	6	52,274	250	52,524
Automotive Repair, Services, and Parking	75	1	29,005	0	29,005
Measuring, Analyzing, and Cont. Inst.	38	5	19,344	5,700	25,044
Business Services	73	1	2,808	661	3,469
Wholesale Trade Non-durable Goods	51	1	1,291	0	1,291
Miscellaneous Retail	59	1	0	0	0
Engineering and Research	87	1	0	0	0
Transportation Service	47	2	0	0	0

Chemicals and Allied Products

This SIC code includes facilities producing basic chemicals and facilities manufacturing products by predominantly chemical processes. Facilities classified in this major group manufacture three general classes of products:

1. Basic chemicals, such as acids, alkalies, salts and organic chemicals;

2. Chemical products to be used in further manufacture, such as synthetic fibers, plastics materials, dry colors and pigments; and
3. Finished chemical products to be used for ultimate consumption, such as drugs, cosmetics, and soaps; or to be used as materials or supplies in other industries, such as paints, fertilizers and explosives.

On-site releases for this industry group accounted for 97 percent of its total releases; off-site was 3 percent.

Fabricated Metal Products

Facilities in this SIC code include those engaged in fabricating ferrous and non-ferrous metal products, such as metal cans, tinware, handtools, cutlery, general hardware, non-electric heating apparatus, fabricated structural metal products, metal forgings, metal stampings, ordnance (except vehicles and guided missiles), and a variety of metal and wire products, not elsewhere classified. On-site releases for this industry group accounted for 82 percent of its total releases; off-site disposal was 18 percent.

Food and Kindred Products

This SIC code includes facilities manufacturing or processing foods and beverages for human consumption, and certain related products, such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowls. This industry group released 95 percent of its total releases on-site.

Furniture and Fixtures

This SIC code includes facilities engaged in manufacturing household, office, public building and restaurant furniture, and office and store fixtures. On-site releases for this industry group accounted for almost 100 percent of its total releases.

Lumber and Wood Products

This SIC code includes facilities engaged in cutting timber and pulpwood; merchant sawmills, lath mills, shingle mills, cooperage stock mills, planing mills, and plywood mills and veneer mills engaged in producing lumber and wood basic materials, and facilities engaged in manufacturing finished articles made entirely or mainly of wood or related materials. On-site releases accounted for almost 100% of this industry group's total releases.

Paper and Allied Products

Facilities in this SIC code primarily engage in the manufacture of pulps from wood and other cellulose fibers and from rags; paper and paperboard; and paper and paperboard into converted products, such as paper coated off the paper machine, paper bags, paper boxes and envelopes. Also included are facilities primarily engaged in manufacturing bags of plastics film and sheet. On-site releases for this industry group accounted for almost 100 percent of its total releases.

Primary Metal Industries

Facilities in this SIC code engage primarily in smelting and refining ferrous and non-ferrous metals from ore, pig or scrap; rolling, drawing and alloying metals; manufacturing castings and other basic metal products; manufacturing nails, spikes and insulated wire and cable, and the production of coke. On-site releases for this industry group accounted for 12 percent of its total releases; off-site disposal was 88 percent.

Rubber and Miscellaneous Plastics Products

This SIC code includes facilities manufacturing products, not elsewhere classified, from plastics resins and from natural, synthetic or reclaimed rubber, gutta percha, balata, or gutta siak. This group includes facilities primarily manufacturing tires. On-site releases for this industry group accounted for 72 percent of its total releases, the rest being off-site disposal.

Stone, Clay, Glass, and Concrete Products

This SIC code includes facilities engaged in manufacturing flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, abrasive and asbestos products, and other products from materials taken principally from the earth in the form of stone, clay, and sand. On-site releases accounted for 94 percent of its total releases; off-site disposal was 6 percent.

Transportation Equipment

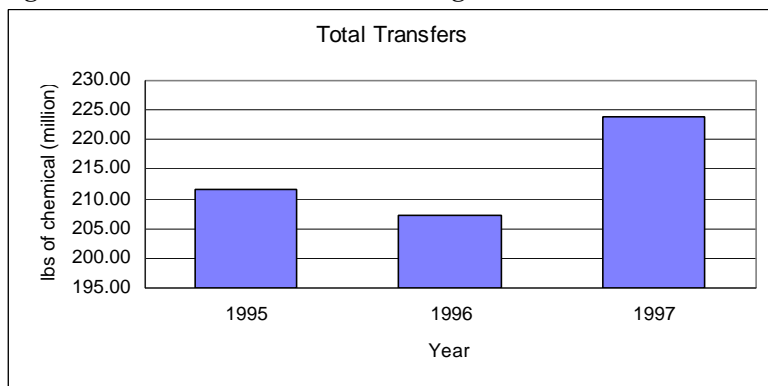
This SIC code includes facilities engaged in manufacturing equipment for transportation of passengers and cargo by land, air and water. Important products produced by facilities classified in this major group include motor vehicles, aircraft, ships, boats, railroad equipment, guided missiles and space vehicles, and miscellaneous transportation equipment, such as motorcycles, bicycles and snowmobiles. On-site releases for this industry group accounted for 90 percent of its total releases; off-site disposal was 10 percent.

B. Total Transfers

Total transfers include discharges to publicly owned treatment works (POTWs) and waste management transfers for recycling, energy recovery and treatment. In contrast to previous report years, the amount shown here for total transfers does not include transfers for disposal. The quantity of toxic chemicals disposed off-site is included in total releases.

In 1997, Michigan facilities reported almost 224 million pounds in total transfers. This is a 7.9 percent increase compared to 1996 and a 5.8 percent increase compared to 1995.

Figure 14. Total Transfers in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

Copper was the TRI chemical transferred in the largest quantity in 1997. It was also first in transfers for 1996. Total transfers of copper in 1997 increased by almost 25 percent, from almost 39 million pounds in 1996. Copper accounted for 21.7 percent of the total transfers in Michigan.

Table 25. Total Transfers by Chemical in 1997

Chemical Name	Total Transfers (lbs. of chemical)
COPPER	48,659,538
METHANOL	28,196,291
XYLENE (MIXED ISOMERS)	22,509,240
TOLUENE	17,445,305
METHYL ISOBUTYL KETONE	10,426,263
CHROMIUM	8,909,640
ZINC COMPOUNDS	8,248,190
HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	6,765,040
NICKEL	6,416,363
METHYL ETHYL KETONE	5,452,938

(Source: 1997 MI TRI Database)

Wayne County facilities transferred more than 33.5 million pounds of toxic chemicals, ranking the county number one in total transfers. This was a 32.6 percent increase from 1996, when Wayne County ranked second with 25.3 million pounds.

Table 26. Total Transfers by County in 1997

County	Total Transfers (lbs. of chemical)
WAYNE	33,583,998
KALAMAZOO	26,896,759
OAKLAND	24,978,966
ALLEGAN	21,582,178
OTTAWA	16,125,706
MACOMB	13,669,867
MUSKEGON	12,360,376
KENT	10,628,700
MIDLAND	9,807,282
MONTCALM	6,946,424

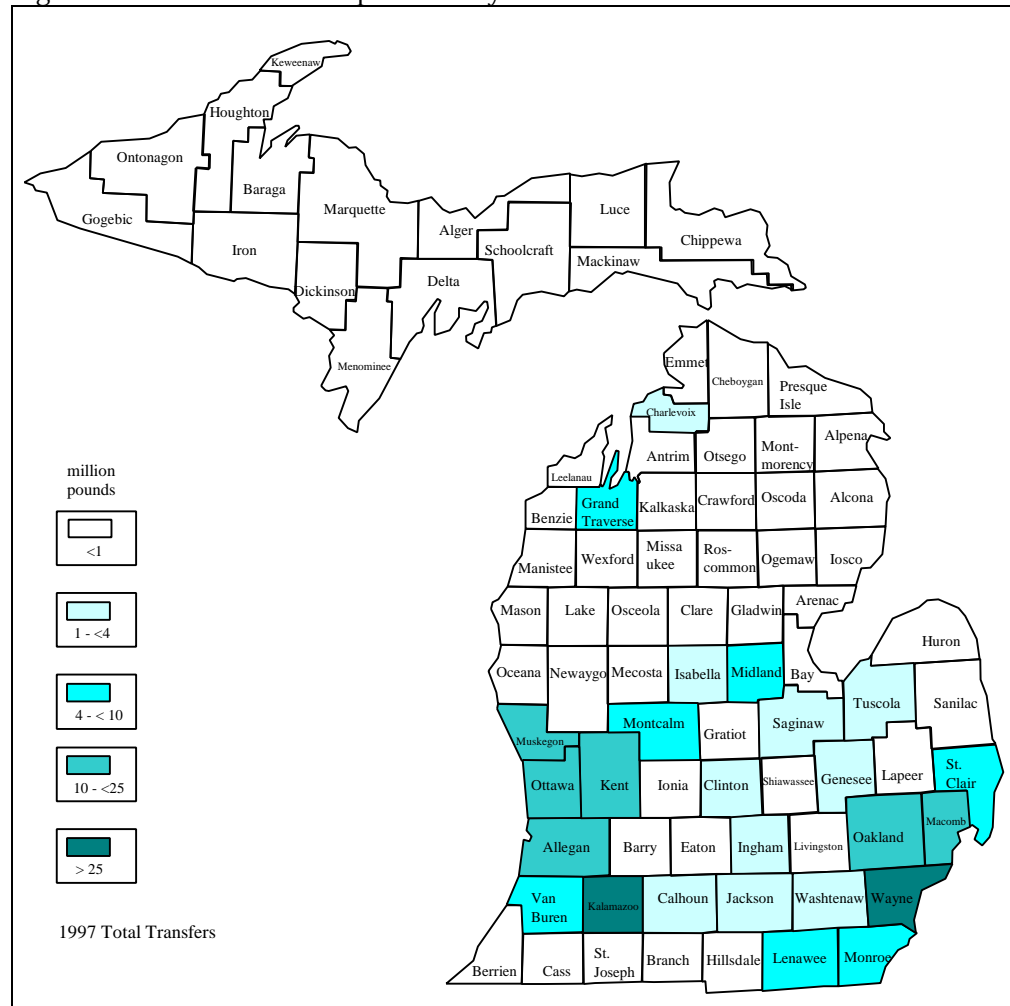
(Source: 1997 MI TRI Database)

Table 27. Total Transfers by Facility in 1997

Facility Name	City	Total Transfers (lbs. of chemical)
PHARMACIA & UPJOHN	KALAMAZOO	25,792,733
PARKER HANNIFIN CORPORATION	OTSEGO	20,632,261
GAGE PRODUCTS COMPANY	FERNDALE	14,882,379
WARNER-LAMBERT CO.	HOLLAND	11,191,770
DU PONT MT. CLEMENS PLANT	MT. CLEMENS	10,635,200
DOW CORNING CORP.	MIDLAND	8,951,303
J&L SPECIALTY STEEL, INC.	DETROIT	8,160,297
SAMUEL-WHITTAR STEEL STRIP DIV	DETROIT	6,986,400
PARKER HANNIFIN CORPORATION	LAKEVIEW	6,114,805
WYCKOFF CHEMICAL COMPANY, INC.	SOUTH HAVEN	5,701,814

(Source: 1997 MI TRI Database)

Figure 15. Total Transfers per County in 1997



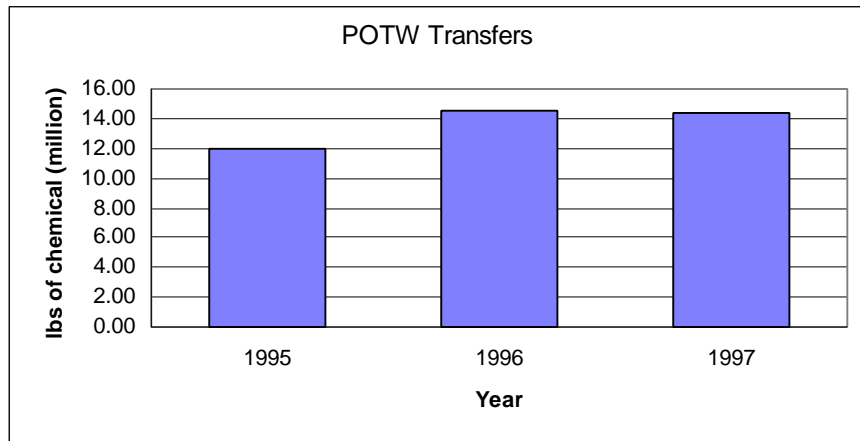
(Source: 1997 MI TRI Database)

1. Publicly Owned Treatment Works (POTW) Transfers

The quantity of toxic chemicals discharged to publicly owned treatment works (POTWs) is reported in Section 6.1 of Form R.

Facilities reported over 14 million pounds of chemical transfers to POTWs in 1997. This is 6.5 percent of the total transfers reported. Compared to 1995, transfers to POTWs in 1997 have increased 20.8 percent. When 1997 transfers are compared to 1996, the decrease is negligible, at almost 1 percent.

Figure 16. Total POTW Transfers in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

The chemical transferred in the greatest amount to POTWs in 1997 was methanol, as it was in 1996. The decrease in POTW transfers of methanol from 1996 to 1997 was negligible, at almost 1 percent.

Table 28. POTW Transfers by Chemical in 1997

Chemical Name	POTW Transfers (lbs. of chemical)
METHANOL	5,731,817
NITRATE COMPOUNDS	4,886,922
CERTAIN GLYCOL ETHERS	1,245,851
N-BUTYL ALCOHOL	460,850
FORMALDEHYDE	458,819
ETHYLENE GLYCOL	304,197
N,N-DIMETHYLFORMAMIDE	220,295
SODIUM NITRITE	210,490
AMMONIA	196,512
PHOSPHORIC ACID	142,634

(Source: 1997 MI TRI Database)

Muskegon County facilities ranked number one for transfers to POTWs in 1997, as in 1996. Transfers in 1997 decreased 5.1 percent from 1996.

Table 29. POTW Transfers by County in 1997

County	POTW Transfers (lbs. of chemical)
MUSKEGON	5,956,528
WAYNE	3,516,990
KALAMAZOO	2,350,462
KENT	546,737
MACOMB	517,660
OTTAWA	332,864
INGHAM	267,463
OAKLAND	227,672
GENESEE	212,453
WASHTENAW	165,648

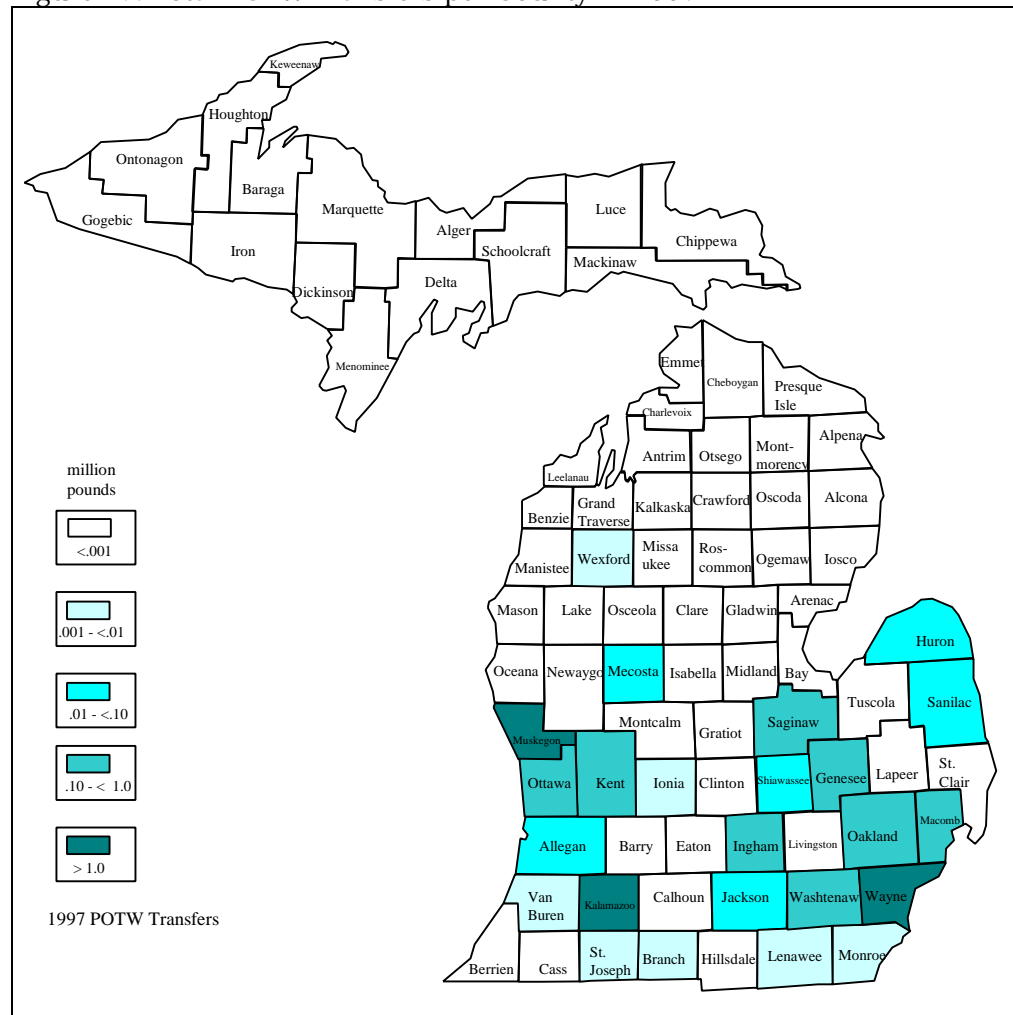
(Source: 1997 MI TRI Database)

Table 30. POTW Transfers by Facility in 1997

Facility Name	City	POTW Transfer (lbs. of chemical)
S. D. WARREN COMPANY	MUSKEGON	4,094,885
PHARMACIA & UPJOHN	KALAMAZOO	1,699,991
LOMAC, INC.	MUSKEGON	1,651,101
J&L SPECIALTY STEEL, INC.	DETROIT	1,500,297
BASF CORPORATION	WYANDOTTE	567,390
CYTEC INDUSTRIES INC.	KALAMAZOO	564,882
FORD MOTOR CO.	LIVONIA	401,600
MLCG DETROIT/HAMTRAMCK	DETROIT	278,232
GM SMALL CAR GROUP	LANSING	258,387
LEPRINO FOODS COMPANY	ALLENDALE	238,259

(Source: 1997 MI TRI Database)

Figure 17. Total POTW Transfers per County in 1997



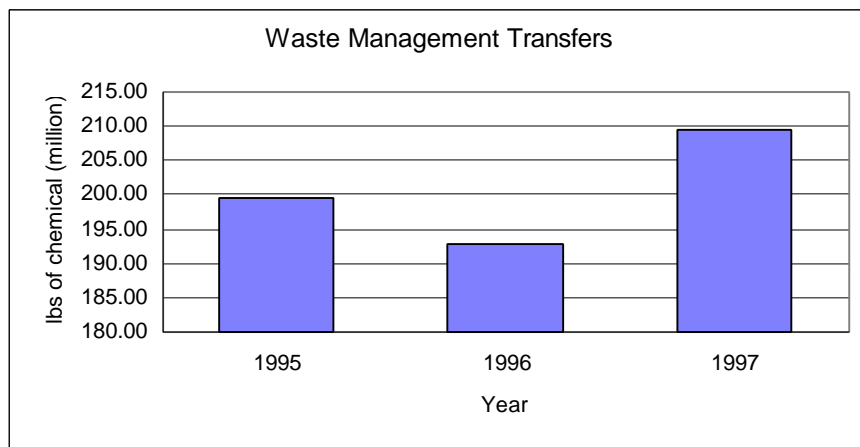
(Source: 1997 MI TRI Database)

2. Waste Management Transfers

Facilities report their off-site transfers to other locations in Section 6.2 of the Form R. Materials sent off-site for recycling, energy recovery or treatment are considered waste management transfers. Transfers off-site for disposal are considered off-site releases and are discussed previously in this analysis.

Michigan facilities sent more than 209 million pounds of toxic chemicals off-site as waste management transfers in 1997. This is 93.6 percent of the total transfers. In 1996, Michigan facilities sent almost 193 million pounds off-site in waste management transfers. Waste management transfers increased by 7.9 percent between 1996 and 1997 and by 5.8 percent between 1995 and 1997.

Figure 18. Total Waste Management Transfers in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

Waste management transfers of copper increased almost 25 percent from 1996 to more than 48 million pounds in 1997.

Table 31. Waste Management Transfers by Chemical in 1997

Chemical Name	Waste Management Transfers (lbs. of chemical)
COPPER	48,654,411
XYLENE (MIXED ISOMERS)	22,499,236
METHANOL	22,464,474
TOLUENE	17,431,771
METHYL ISOBUTYL KETONE	10,426,070
CHROMIUM	8,903,650
ZINC COMPOUNDS	8,215,413
HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	6,765,030
NICKEL	6,407,220
METHYL ETHYL KETONE	5,429,450

(Source: 1997 MI TRI Database)

Wayne County facilities transferred the largest quantity in 1997, with more than 30 million pounds in waste management transfers. This is an increase of almost 33 percent from 1996, when Wayne County facilities were ranked second with 22.7 million pounds in waste management transfers.

Table 32. Total Waste Management Transfers by County in 1997

County	Off-site Waste Management (lbs. of chemical)
WAYNE	30,067,008
OAKLAND	24,751,294
KALAMAZOO	24,546,297
ALLEGAN	21,550,993
OTTAWA	15,792,842
MACOMB	13,152,207
KENT	10,081,963
MIDLAND	9,807,282
MONTCALM	6,946,169
MUSKEGON	6,403,848

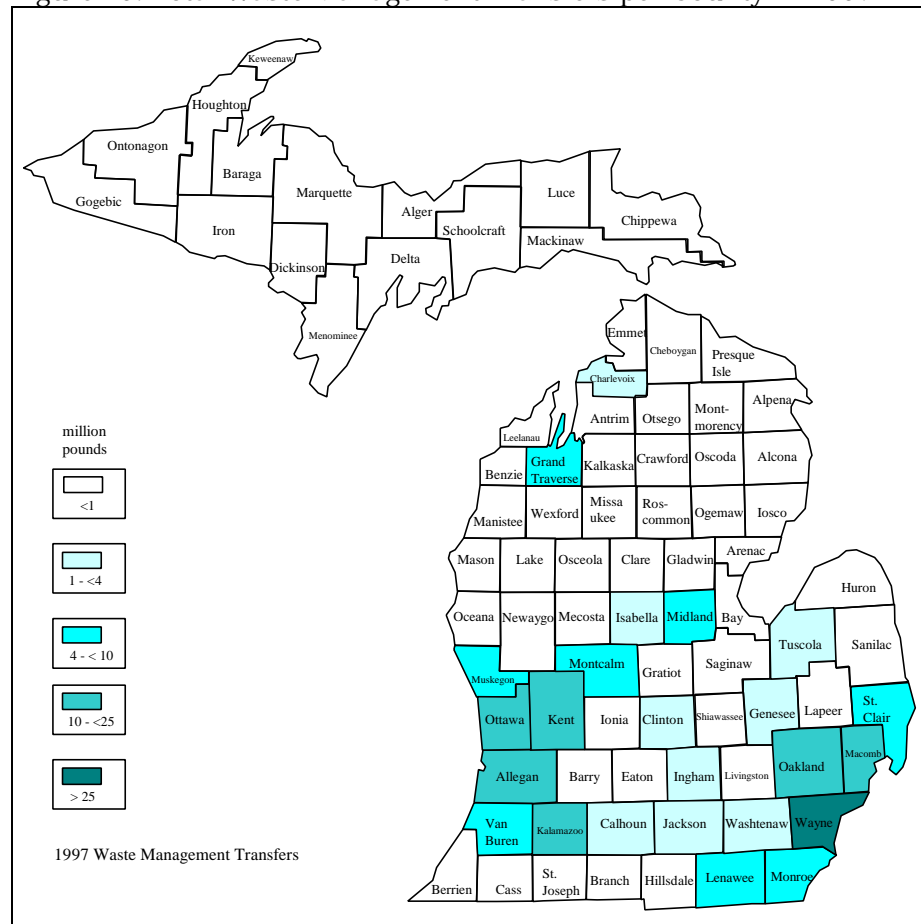
(Source: 1997 MI TRI Database)

Table 33. Total Waste Management Transfers by Facility in 1997

Facility Name	City	Off-site Waste Management (lbs. of chemical)
PHARMACIA & UPJOHN	KALAMAZOO	24,092,742
PARKER HANNIFIN CORPORATION	OTSEGO	20,631,761
GAGE PRODUCTS COMPANY	FERNDALE	14,882,173
WARNER-LAMBERT CO.	HOLLAND	11,191,770
DU PONT MT. CLEMENS PLANT	MT. CLEMENS	10,635,116
DOW CORNING CORP.	MIDLAND	8,951,303
SAMUEL-WHITTAR STEEL STRIP DIV	DETROIT	6,986,400
J&L SPECIALTY STEEL, INC.	DETROIT	6,660,000
PARKER HANNIFIN CORPORATION	LAKEVIEW	6,114,550
WYCKOFF CHEMICAL COMPANY, I	SOUTH HAVEN	5,699,268

(Source: 1997 MI TRI Database)

Figure 19. Total Waste Management Transfers per County in 1997



(Source: 1997 MI TRI Database)

Section II

Chemical Profiles

Section II: Chemical Profiles

The Emergency Planning and Community Right-to-Know Act (EPCRA) under Section 313 requires covered facilities to annually report the quantity of listed toxic chemicals released into the environment and transferred in wastes to off-site locations. More than 650 chemicals and chemical categories are currently reported under Section 313 of SARA Title III. From year to year, the toxic chemical registry has been revised as specific chemicals have been removed or added by the EPA.

Chemicals on the toxic chemical registry must meet one of the following three criteria prior to being placed on this list [EPCRA, Section 313(d)(2)]:

1. The chemical is known to cause or can reasonably be anticipated to cause significant adverse acute human health effects at concentration levels that are reasonably likely to exist beyond facility site boundaries as a result of continuous, or frequently recurring releases.
2. The chemical is known to cause or can reasonably be anticipated to cause in humans: cancer or teratogenic effects, or serious or irreversible reproductive dysfunctions, neurological disorders, heritable genetic mutations, or other chronic health effects.
3. The chemical is known to cause or can reasonably be anticipated to cause, because of
 - i. its toxicity,
 - ii. its toxicity and persistence in the environment, or
 - iii. its toxicity and tendency to bioaccumulate in the environment,
 a significant adverse effect on the environment or sufficient seriousness, in the judgement of the EPA Administrator, to warrant reporting under this section.

Section 2 provides profiles for the top ten toxic chemicals released on- and off-site in Michigan in 1997. (The table below lists the top ten chemicals.) These profiles contain general information on the chemical, its uses, its fate in the environment, and its health and environmental effects. The total releases (includes off-site disposal) for each chemical for report years 1995 through 1997 are presented in bar charts for comparison. Further information can be obtained on each chemical through the local library or the Internet. In addition, the Michigan SARA Title III program can be contacted at 517-373-8481 for more information and other resources. Appendix J contains definitions of the environmental terminology used throughout the profiles and Appendix K contains references for the chemical profiles listed in Table 33 below.

Table 34. Total Releases by Chemical in 1997

Chemical Name	Total Releases (lbs. of chemical)
ZINC COMPOUNDS	20,760,377
METHANOL	9,023,505
XYLENE (MIXED ISOMERS)	7,333,704
TOLUENE	6,799,541
HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	4,406,367
MANGANESE	4,221,965
STYRENE	2,144,426
N-HEXANE	2,021,467
AMMONIA	2,019,764
CERTAIN GLYCOL ETHERS	1,981,770

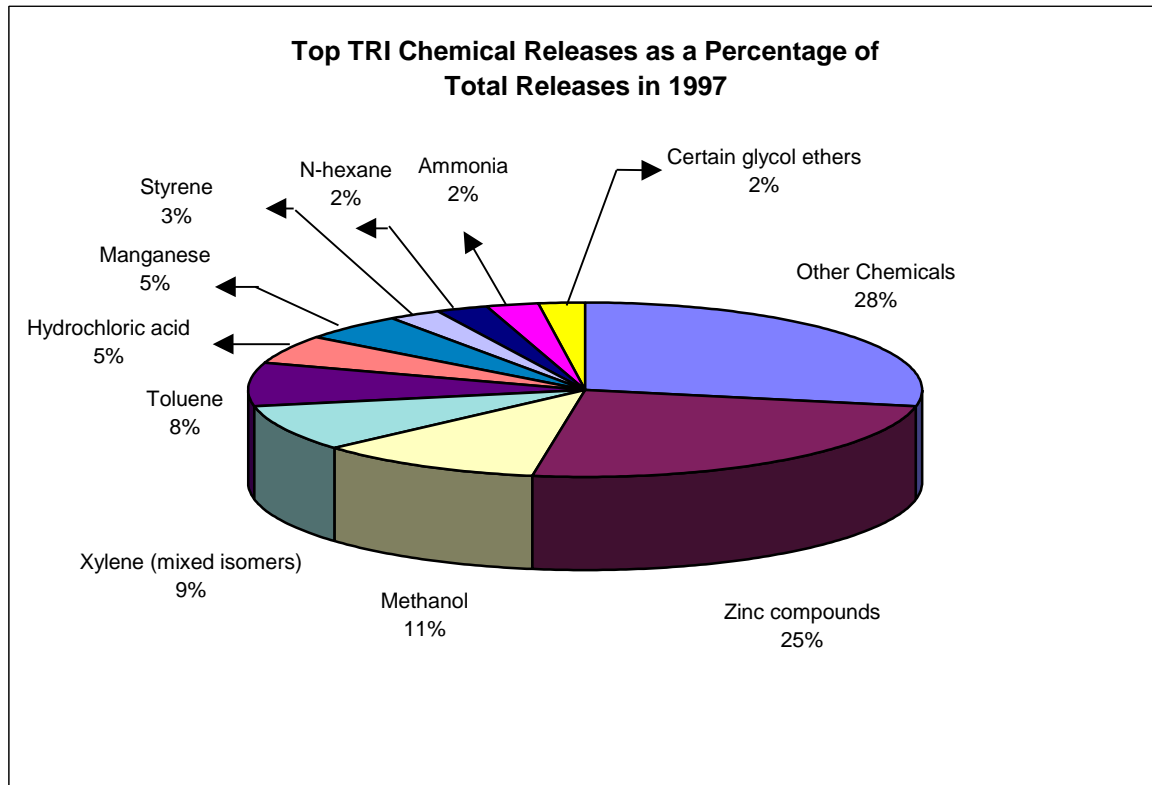
(Source: 1997 MI TRI Database)

Although these chemicals were released to the environment in the greatest amount, this is not an indication of their relative health hazard. The relative risk and health effects of a chemical depend on many factors, such as the concentration, quantity and exposure of the chemical. In most cases, the chemicals used at covered facilities are components or parts of mixtures, and are not in highly concentrated forms. The chemical profiles may not list a specific health effect because of any of the following:

1. The chemical does not represent a concern,
2. There are no reported effects, or
3. There has been no testing of the chemical to date.

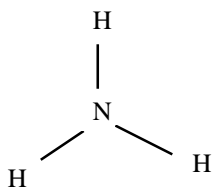
The chart below shows the top ten chemicals released to the environment in 1997 as a percentage of total releases.

Figure 20. Top TRI Chemicals Released in 1997 as Percentage of Total Releases



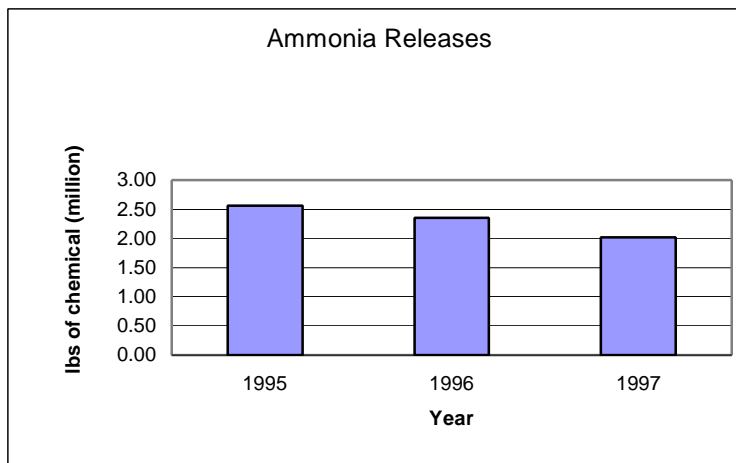
(Source: 1997 MI TRI Database)

Ammonia



CAS Number: 7664-41-7
Chemical formula: NH₃

Figure 21. Total Ammonia Releases in Michigan.



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is ammonia?

Ammonia is both a man-made and natural chemical. It is a colorless gas that possesses a unique, penetrating odor. Most of the ammonia in the environment comes from the natural breakdown of manure and dead plants and animals.

What are the uses of ammonia?

The primary use of man-made ammonia is in fertilizers. Ammonia is used in smelling salts and household cleaners. It is also used to manufacture synthetic fibers, explosives, plastics and pharmaceuticals. Ammonia is used as a refrigerant in the pulp and paper industry. In combination with chlorine, it is used to purify industrial and municipal water supplies.

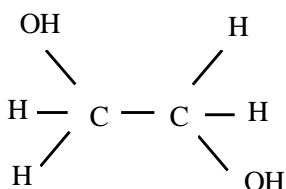
What is the fate of ammonia in the environment?

Ammonia does not persist in the environment. Ammonia is a naturally occurring compound and is continually being recycled in the environment. Because it is naturally recycled, nature has ways of incorporating and transforming ammonia. In soil or water, plants and microorganisms rapidly take up ammonia.

What are the health and environmental effects of ammonia?

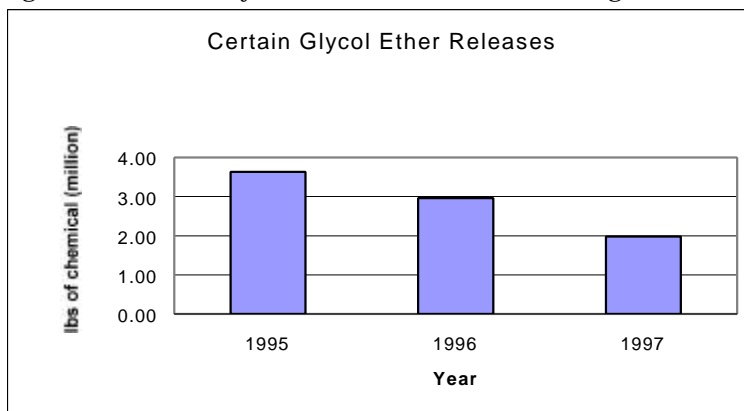
Ammonia may cause acute toxicity, chronic (system) toxicity and environmental toxicity. It appears that ammonia is neither carcinogenic nor persistent in the environment. Excessive discharges of ammonia may cause oxygen depletion in the receiving body due to eutrophication, which may be detrimental to many types of aquatic life.

Certain glycol ethers (ethylene glycol*)



CAS Number: 107-21-1
Chemical formula: C₂H₆O₂

Figure 22. Total Glycol Ether Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is ethylene glycol?

Ethylene glycol is a synthetic liquid substance that dissolves readily in water. It is a clear, colorless, slightly syrupy liquid at room temperature. Ethylene glycol is odorless and has a sweet taste.

What are the uses of ethylene glycol?

Ethylene glycol is used to make antifreeze and de-icing solutions for cars, boats and airplanes. It is used as a solvent in the paint and plastics industry and to produce polyester fibers. Ethylene glycol is an ingredient in hydraulic brake fluid. Inks for stamp pads, ballpoint pens and print shops all use ethylene glycol.

What is the fate of ethylene glycol in the environment?

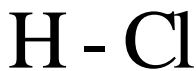
Ethylene glycol is highly soluble in water and evidence suggests it will not volatilize after release to surface water. It is not likely to exist in the air in large amounts. Certain microorganisms can break down low concentrations of ethylene glycol in water.

What are the health and environmental effects of ethylene glycol?

Ethylene glycol may cause acute and chronic (system) toxicity. It appears that ethylene glycol is neither carcinogenic nor bioaccumulative. It appears not to persist in the environment.

* There are two categories of glycol ethers, the E-series and the P-series, ethylene glycol ethers and propylene glycol ethers, respectively. The E-series members generally are more toxic. For the purpose of simplicity, this profile focuses on the E-series, more specifically, ethylene glycol.

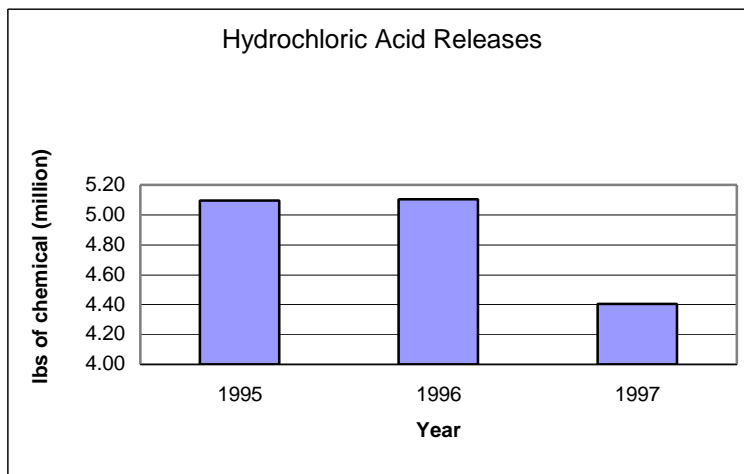
Hydrochloric acid



CAS Number: 7647-01-0

Chemical formula: HCl

Figure 23. Total Hydrochloric Acid Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is hydrochloric acid?

Hydrochloric acid is a solution of hydrogen chloride in water. Hydrochloric acid is non-combustible, highly soluble in water and highly corrosive to most metals. It is present in the digestive system of most mammals. Facilities only report on aerosol forms of hydrochloric acid, which are typically formed during the use of concentrated forms of the acid, some air scrubbers, and various incineration operations.

What are the uses of hydrochloric acid?

Hydrochloric acid is used in the production of metals, chemicals and phosphate fertilizers. It is also used to make chloride dioxide for the bleaching of pulp in the paper industry. Hydrochloric acid is used as a laboratory reagent and in analytical chemistry. It can also be used for the removal of scale from boilers and heat exchange equipment.

What is the fate of hydrochloric acid in the environment?

Hydrochloric acid is highly soluble in water and can undergo a variety of photochemical reactions in the air. However, with a few noted exceptions such as pesticides, chlorine-containing compounds are removed rapidly from the atmosphere.

What are the health hazards of hydrochloric acid?

Hydrochloric acid may cause acute toxicity and chronic (system) toxicity. It appears that hydrochloric acid does not bioaccumulate or persist in the environment.

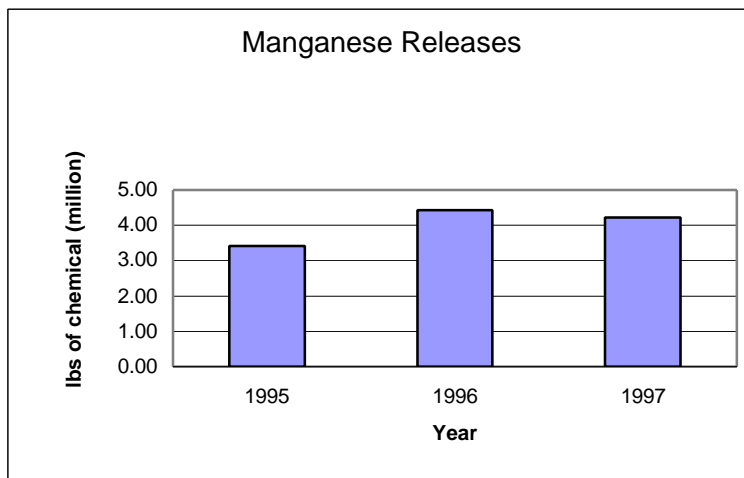
Manganese

Mn

CAS Number: 7439-96-5

Chemical Formula: Mn

Figure 24. Total Manganese Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is manganese?

Manganese is an abundant element and a naturally occurring substance found in many types of rocks. It has no particular smell or special taste associated with it. Manganese rarely occurs in the environment as pure manganese, but as a component of more than 100 minerals, including oxides, sulfides, carbonates, phosphates and borates.

What are the uses of manganese?

Manganese compounds are mined and used to produce manganese metal, which is mixed with iron to make various types of steel. It is used in carbon steel, stainless steel, high temperature steel and tool steel, along with cast iron and superalloys. Manganese is also used as a dietary supplement and in the production of batteries. It also is an ingredient in some ceramics, pesticides and fertilizers.

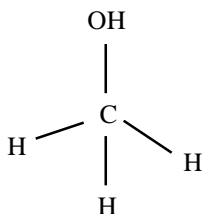
What is the fate of manganese in the environment?

Manganese and manganese compounds may exist as solids in soil, as small particles in water or as suspended particulate matter in the air. Manganese can change from one compound to another, either by natural or human processes, but it does not break down or disappear in the environment.

What are the health and environmental effects of manganese?

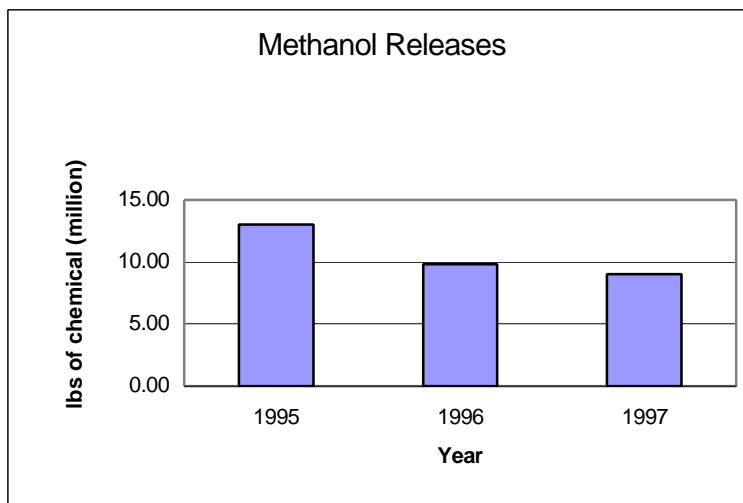
Manganese can cause reproductive, acute and chronic (system) toxicity. It is also a neurotoxin. It appears that manganese does not bioaccumulate but may persist in the environment.

Methanol



CAS Number: 67-56-1
Chemical formula: CH₃OH

Figure 25. Total Methanol Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is methanol?

Methanol is a colorless liquid with a mild characteristic alcohol odor. It is referred to as wood alcohol because it occurs naturally in wood. Methanol is also a product of decaying organic materials. Methanol fumes may explode when exposed to an open flame.

What are the uses of methanol?

Methanol is used in a variety of industrial applications. It is used as a raw material in the production of methyl t-butyl ether (MTBE), a gasoline additive. Methanol is also used in the production of other chemicals such as formaldehyde, chloromethanes and acetic acid. Methanol is often added to paint strippers, wall paints, aerosol spray paints and car windshield washer products.

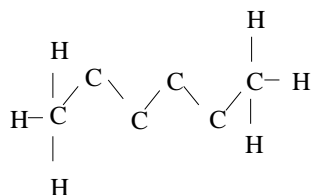
What is the fate of methanol in the environment?

The most direct release of methanol is to the air. Methanol can evaporate when exposed to the air and evaporates into the air from water and soil. Methanol does not bind well to soil and the methanol that does not evaporate moves rapidly through the ground to groundwater. Certain microorganisms can break down low concentrations of methanol in water and soil. Methanol will dissolve completely when mixed with water, and most methanol is removed from water by biodegradation.

What are the health and environmental effects of methanol?

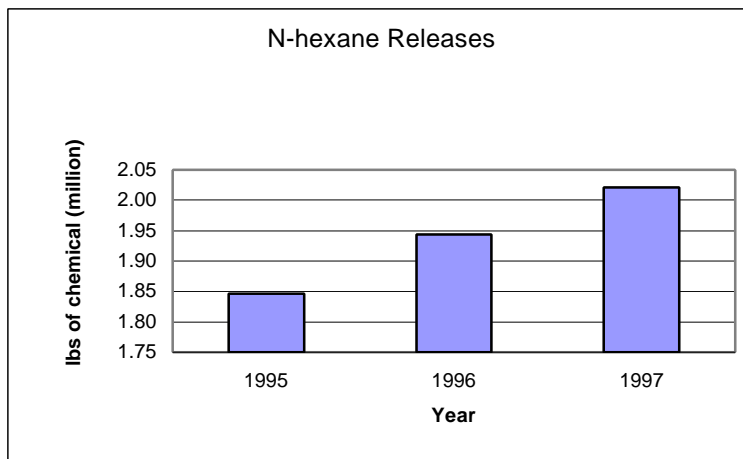
Methanol may cause acute toxicity and neurotoxicity. It appears that methanol does not bioaccumulate or persist in the environment.

N-hexane



CAS Number: 7439-96-5
Chemical formula: C₆H₁₄

Figure 26. Total N-hexane Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is n-hexane?

N-hexane is a colorless liquid with a slightly disagreeable odor. It is also referred to as hexane and hexyl hydride. The chemical is made from crude oil. N-hexane is highly flammable and its vapors can be explosive. Heat, sparks and flames may ignite it.

What are the uses of n-hexane?

N-hexane is used in laboratories, primarily when it is mixed with similar chemicals to produce solvents. Common names for these solvents are commercial hexane, mixed hexanes, petroleum ether and petroleum naphtha. The major use for solvents containing n-hexane is to extract vegetable oils from crops such as soybeans, flax, peanuts and safflower seed. N-hexane can be used as a cleaning agent in the textile, furniture, shoemaking and printing industries, particularly rotogravure printing. Gasoline, rubber cement and alcohol preparations contain n-hexane.

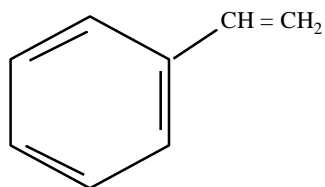
What is the fate of n-hexane in the environment?

N-hexane evaporates easily into the air and dissolves slightly in water. It is incompatible with strong oxidizers.

What are the health and environmental effects of n-hexane?

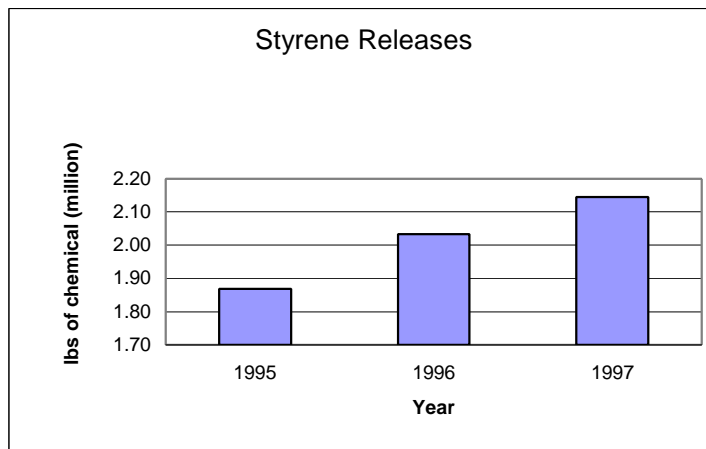
N-hexane is a suspected neurotoxin. It may cause productive and embryotoxic effects.

Styrene



CAS Number: 100-42-5
Chemical formula: C₈H₈

Figure 27. Total Styrene Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is styrene?

Styrene is a colorless, oily liquid that evaporates easily and has a sweet smell. It often contains other chemicals that give it a sharp, unpleasant smell. It is primarily a synthetic chemical. It dissolves in some liquids, but not easily in water. Low levels of styrene also occur naturally in a variety of foods, such as nuts, vegetables, fruits, meats and beverages.

What are the uses of styrene?

Commercial styrene is used almost entirely for the manufacture of polymers. Other uses are in the production of plastics, insulation, rubber, fiberglass, pipes, automobile parts, food containers and carpet backing.

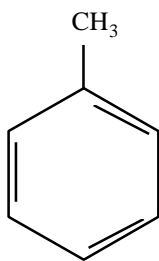
What is the fate of styrene in the environment?

Styrene evaporates when exposed to air. In the air, styrene can break down into other chemicals. It evaporates from shallow soils and surface water. Styrene does not bind well to soil and eventually moves to groundwater. Microorganisms can break down low concentrations of styrene in water and soil.

What are the health and environmental effects of styrene?

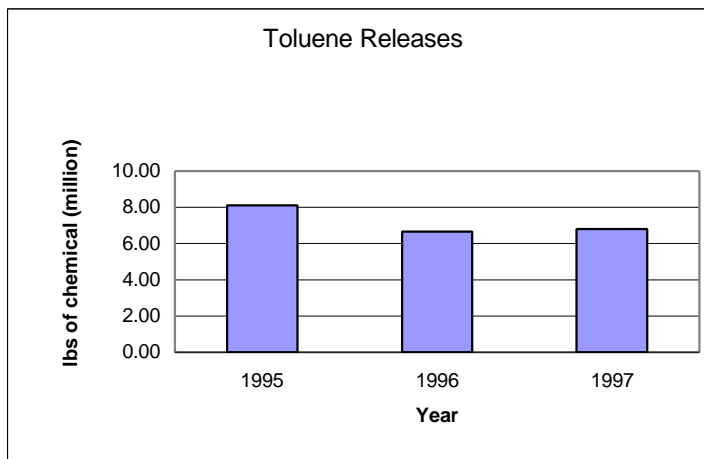
Styrene is a suspected carcinogen. It may cause heritable genetic and chromosomal mutations, developmental toxicity and chronic (system) toxicity. Styrene can be moderately persistent in the environment but does not appear to bioaccumulate.

Toluene



CAS Number: 108-88-3
Chemical formula: C₇H₈

Figure 28. Total Toluene Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is toluene?

Toluene is a colorless liquid with a distinctive sweet and pungent odor. Its name is derived from a natural resin from the tolu tree. Toluene also occurs naturally in crude oil.

What are the uses of toluene?

The largest use of toluene is in the production of benzene. It is also used as a solvent in making paints, inks, adhesives and lacquers. As a solvent, it may be used in a number of consumer products, such as cosmetics, perfumes and spot removers. Toluene may be used in the leather tanning process and is also blended into automotive fuels as an additive.

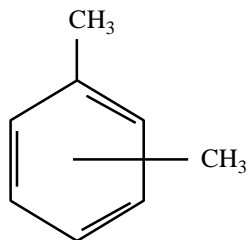
What is the fate of toluene in the environment?

Toluene is predominately released to the air. It dissolves very slowly in water. Toluene will evaporate when exposed to the air and it evaporates from water and soil exposed to air. Once in the air, toluene can break down into other chemicals. Most of the toluene deposited in water will volatilize. Certain microorganisms can break down low concentrations of toluene in water and soil.

What are the health and environmental effects of toluene?

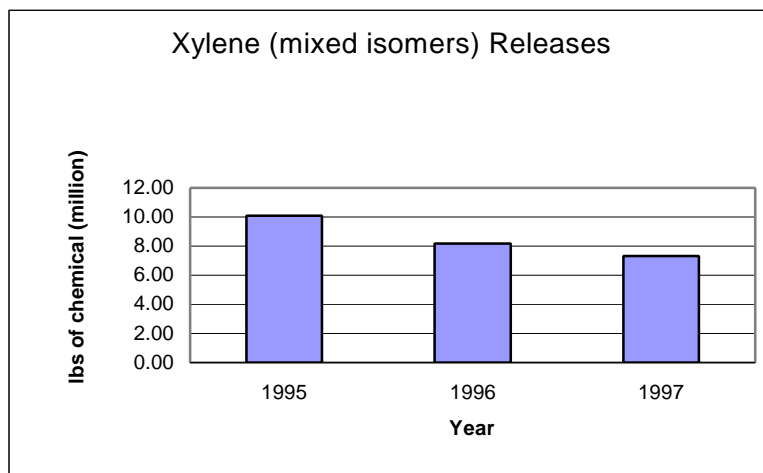
Toluene may cause developmental toxicity, reproductive toxicity and environmental toxicity. It appears that toluene does not persist or bioaccumulate.

Xylene (mixed isomers*)



CAS Number: 1330-20-7
Chemical formula: C₈H₁₀

Figure 29. Total Xylene (mixed isomers) Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is xylene (mixed isomers)?

Xylene is a colorless, sweet-smelling liquid that is very flammable. It occurs naturally in coal tar and petroleum and is formed during forest fires.

What are the uses of xylene?

Xylene is used as a solvent and in the printing, rubber and leather industries. It is also used as a cleaning agent. Xylene is used as a paint thinner and in paints and varnishes. It is also found in small amounts in airplane gasoline and fuel.

What is the fate of xylene in the environment?

Upon entering the air, xylene is broken down by sunlight into other less harmful chemicals. If deposited in oil or water, xylene will evaporate quickly into the air. Certain microorganisms can break down low concentrations of xylene in water and soil.

What are the health and environmental effects of xylene?

Xylene may cause developmental toxicity, reproductive toxicity, chronic (system) toxicity and environmental toxicity. It appears that xylene does not bioaccumulate or persist in the environment.

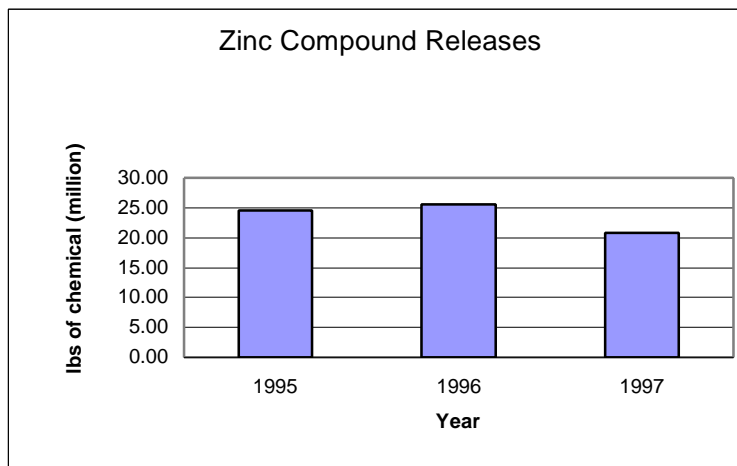
* Xylene can occur in three different forms depending on the locations of the two CH₃ groups. These different forms of xylene are called isomers and are referred to as ortho-, meta- or para-xylene. For the purpose of simplicity, this profile will only refer to xylene (mixed isomers) as xylene.

Zinc compounds



CAS Number: 7440-66-6
Chemical formula: Zn-X (where x represents another compound)

Figure 30. Annual Zinc Compound Releases in Michigan



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

What is zinc compounds?

Zinc is a bluish-white metal that combines with other elements, such as chlorine, oxygen and sulfur, to form zinc compounds. Zinc is widely used in industry.

What are the uses of zinc compounds?

The main application of zinc compounds is to protect other metals, such as iron and steel, from corrosion. Zinc is also used as a structural material in alloys for pressure die castings. Zinc is used in electroplating, producing rubber and preserving wood, and in wet batteries. Zinc dust is used in paint coatings. Zinc is a major component of smoke from smoke bombs. It is also used in the drug industry as an ingredient in common products such as ointments, deodorants and sun blocks.

What is the fate of zinc compounds in the environment?

Most of the zinc released to land is bound to soil and does not appear to dissolve readily in water. In the air, zinc is present mostly as fine dust particles that eventually settle over the land. When zinc enters bodies of water, such as lakes or rivers, most will settle to the bottom. A small amount might also dissolve in water or remain as fine suspended particles.

What are the health and environmental effects of zinc compounds?

Zinc may cause developmental toxicity, reproductive toxicity, chronic (system) toxicity and environmental toxicity. It can also bioaccumulate in the environment. Zinc may also persist in certain environmental media.

Section III
Waste Management and Source Reduction

Section III: Waste Management and Source Reduction

The Pollution Prevention Act (PPA) of 1990 established the pollution prevention hierarchy as national policy, declaring that pollution should be prevented or reduced at the source whenever feasible (i.e., source reduction). Pollution prevention should be followed by environmentally sound recycling and then treatment. Disposal or other releases to the environment should only be used as a last resort. Michigan incorporates the national policy as part of the Pollution Prevention Strategy of the Michigan Department of Environmental Quality.

The PPA requires facilities to provide information on their source reduction and recycling activities related to the specific toxic chemical being reported. Facilities report source reduction activities for the report year in which they were implemented. Source reduction activity reporting does not carry over from one report year to the next. This information is reported in Section 8 of the Form R and was first reported for 1991.

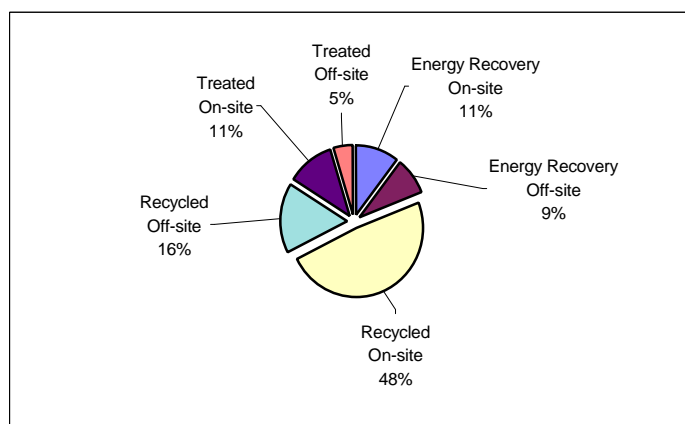
The amounts of TRI chemicals managed in waste both on- and off-site, including energy recovery, are also reported in Section 8 of the Form R. Waste can be managed through activities including releases to air, water, land, underground injection and off-site disposal, and recycling, energy recovery and treatment. The following discussion on waste management activities and source reduction uses data from Section 8 of the Form R. It also uses data provided in Section 7, where facilities report the methods used for on-site treatment, energy recovery and recycling, but not the quantities.

For RY 1997, Michigan facilities reported more than 874 million pounds in total production-related waste (Table 34). Total production-related waste (TPRW) is the total of all waste managed, on- and off-site, by the reporting facility *excluding* any amounts reported for accidental releases or remediation (clean-up). TPRW is the total of Sections 8.1-8.7 of the Form R– the quantities released, recycled, used for energy recovery and treated.

Facilities reported recycling a little more than 513 million pounds of materials in 1997, or 58.7 percent of the TPRW. Energy recovery was second, with 151 million pounds or 17.3 percent, and treatment was third with 128 million pounds or 14.6 percent of the total production waste. The quantity released was almost 82 million pounds, or 9.4 percent of the total production-related waste.

When comparing only the amounts of waste materials reported for recycling, energy recovery or treatment, the quantity of materials managed on-site was greater than the quantity managed off-site. Recycling was the largest quantity both on- and off-site. Figure 31 shows each on- and off-site quantity as a percentage of the total for recycling, energy recovery and treatment for 1997.

Figure 31. On- and Off-site Waste Management As Percentage (Excluding Quantity Released)



(Source: 1997 MI TRI Database)

Total production-related waste increased each year since 1995. The largest increase for TPRW was from 1996 to 1997 when it increased by 137 million pounds, or 18.6 percent. However, the increase in total production waste did not translate into an increase in releases, as can be seen in Table 34 below. Releases have decreased by 11.6 million pounds or almost 12.5 percent since 1996 and by 17.4 million pounds or 18 percent since 1995.

Table 35. Total Waste Management Activity (lbs. of chemical)– RY 1995-1997

Waste Management Activity	1995	1996	1997
Released	99,220,308	93,534,137	81,849,795
Energy Recovery	174,613,548	158,327,883	151,283,158
Recycling *	291,084,762	356,807,024	513,306,490
Treatment	170,825,947	128,469,082	127,946,979
Total Production Related Waste Managed	735,744,565	737,138,126	874,386,422

(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

* The large increase in recycling can be attributed to Zeeland Farm Soya which first reported in 1996. Zeeland Farm Soya reported 77.4 million pounds of material recycled on-site in 1996; for 1997, it reported 220.6 million pounds of chemical recycled on-site. This significant increase in recycling affects the TPRW accordingly.

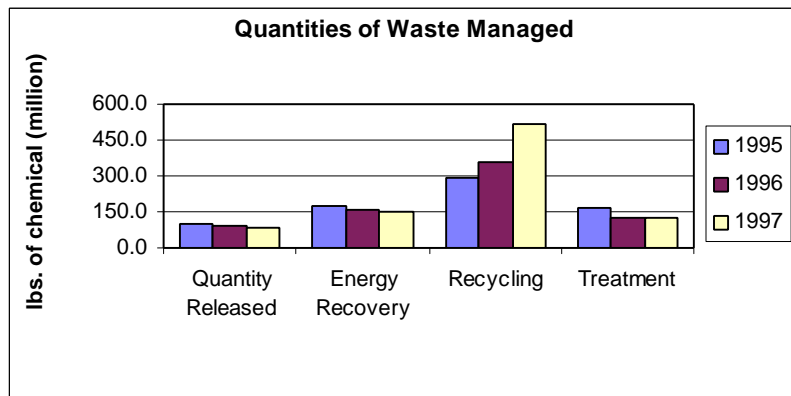
Changes in waste management activities from 1995 to 1997 can be seen in the table below. Each waste management activity is represented as a percentage of the total production-related waste. Energy recovery was more than 23 percent of the TPRW in 1995 and 17 percent in 1997. Treatment was 23 percent of the total in 1995 compared to 14 percent for 1997. The amount of production waste released similarly went from a little more than 13 percent of the total in 1995 to nine percent of the total in 1997. For 1995, recycling represented almost 40 percent of the total production waste managed; for 1997, it was almost 59 percent of the total.

Table 36. Waste Management Activity as Percent of TPRW– RY 1995-1997

Waste Management Activity	Percent of Total Production-related Waste		
	1995	1996	1997
Released	13	13	9
Recycling	40	48	59
Energy Recovery	23	21	17
Treatment	23	17	14

Figure 32 also compares data reported in Section 8 and represents the total amounts for each waste management activity for Report Years 1995-1997. Recycling, with the largest quantity reported, increased by 156 million pounds or 43.9 percent from 1996. Compared to 1995, the increase is 222 million pounds, or 76 percent. The national trend shows a decrease in recycling between 1995-1996 and a modest increase in recycling from 1996-1997. Contrary to the national trend, Michigan has seen a steady increase in recycling. The other waste management activities, i.e., quantity released, energy recovery and treatment, have steadily

Figure 32 TRI Waste Management Quantities– RY 1995-1997



(Source: 1995 EPA TRIS Database; 1996-97 MI TRI Database)

decreased from one year to the next. The quantity released has decreased each year– by 12 percent from 1996 and by 18 percent compared to 1995. Energy recovery and treatment decreased slightly from 1996, by 4.45 percent and 0.41 percent respectively. Compared to 1995 data, energy recovery and treatment decreased by 13 percent and 25 percent respectively. As mentioned earlier, the increase seen in recycling results from one facility reporting 220.6 million pounds recycled in 1997.

Source Reduction

Source reduction is any activity that reduces the amount of any hazardous substance, pollutant or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment or disposal. Source reduction is at the top of the national pollution prevention hierarchy, and facilities are required under the Pollution Prevention Act to report all source reduction activities initiated during the reporting year for the toxic chemical being reported. However, facilities are not required to report the net change in the amount of toxic waste generated at their facility as a result of any implemented source reduction activity. Therefore, only indirect measures of the effectiveness of these source reduction efforts can be generated from the EPCRA Section 313 data.

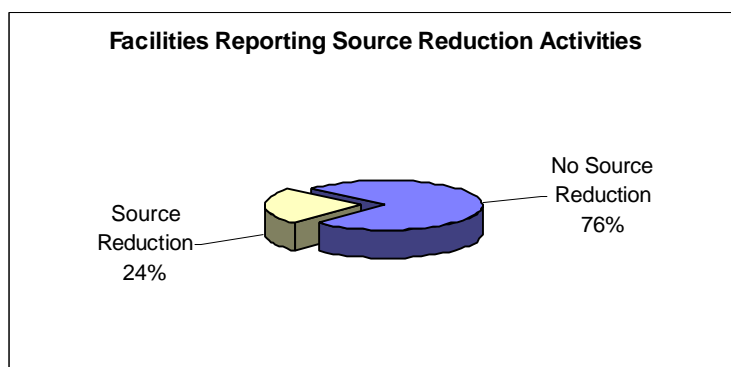
There are more than 40 source reduction activities that facilities can report. These activities are grouped into eight categories (good operating practices, inventory control, spill and leak prevention, raw material modifications, process modifications, cleaning and degreasing, surface preparation and finishing, and product modifications). Facilities that report source reduction activities must also identify the method or methods used for the source reduction activity. The methods of source reduction activity include pollution prevention opportunity audits, internal or external, materials balance audits, participative team management, employee recommendation, and technical assistance programs (state or federal government or industry), among others.

In 1997, 218 facilities, or almost 25 percent, reported implementing new source reduction activities on 517 chemical reports.

These facilities reported a total of 946 source reduction activities. Good operating practices and process modifications accounted for more than half of all source reduction activities reported. More than half the time, facilities reported improved maintenance scheduling,

recordkeeping or procedures as the source reduction activity for good operating practices. Facilities were not as precise in identifying the activity used for process modifications. Forty percent of the activity was reported as “other” for the process modifications category; “instituted recirculation within a process” was the identified activity for 25 percent. Table 37 shows the number of activities reported for each source reduction category in descending order.

Figure 33. Percentage of Facilities Reporting Source Reduction Activities



Source: 1997 MI TRI Database

Table 37. Source Reduction Activities Reported for Each Category

Source Reduction Category	Number of Activities Reported
Good Operating Practices	289
Process Modifications	229
Spill and Leak Prevention	122
Raw Material Modifications	83
Cleaning and Degreasing	74
Product Modifications	58
Inventory Control	54
Surface Preparation and Finishing	37

Participative team management and internal pollution prevention audits were the two methods identified most frequently for the source reduction category “good operating practices“, as shown in Table 38. For the process modifications category, internal pollution prevention audits and participative team management are the two methods most frequently identified.

Table 38. Source Reduction Methods Reported for Each Category

Source Reduction Category	Source Reduction Method	Number of Methods Per Category
Good Operating Practices	Participative team management	113
Good Operating Practices	Internal pollution prevention opportunity audit(s)	95
Good Operating Practices	Employee recommendation (independent of formal company program)	19
Good Operating Practices	Materials balance audits	18
Good Operating Practices	Other	18
Good Operating Practices	Employee recommendation (under a formal company program)	10
Good Operating Practices	External pollution prevention opportunity audit(s)	6
Good Operating Practices	Vendor assistance	5
Good Operating Practices	Trade association/industrial technical assistance program	5
Process Modifications	Internal pollution prevention opportunity audit(s)	81
Process Modifications	Participative team management	68
Process Modifications	Other	29
Process Modifications	Employee recommendation (independent of formal company program)	15
Process Modifications	Employee recommendation (under a formal company program)	12
Process Modifications	Vendor assistance	10
Process Modifications	Materials balance audits	10
Process Modifications	Trade association/industrial technical assistance program	4

Source reduction activities were identified for almost 80 chemicals. Table 39 on the following page lists those chemicals with 20 or more source reduction activities reported. For toluene, almost 70 percent of the source reduction activities were reported for the categories “good operating practices“, “process modifications” and “raw material modifications.”

Table 40 shows the number of source reduction activities reported by industry sector. Facilities in the Chemicals and Allied Products industry accounted for 36 percent of all reported source reduction activities. Facilities in the Fabricated Metal Products industry group reported 14 percent of all source reduction activities for 1997.

Table 39. Chemicals with 20 or More Reported Source Reduction Activities

Chemical Name	Number of Activities Reported
TOLUENE	77
METHYL ETHYL KETONE	62
XYLENE (MIXED ISOMERS)	52
CERTAIN GLYCOL ETHERS	46
ZINC COMPOUNDS	46
NITRIC ACID	39
COPPER	38
METHANOL	35
CHROMIUM COMPOUNDS	34
NICKEL COMPOUNDS	30
ETHYLBENZENE	27
COPPER COMPOUNDS	25
NICKEL	25
TRICHLOROETHYLENE	24
DIISOCYANATES	22
N-BUTYL ALCOHOL	22
FORMALDEHYDE	20

Table 40. Source Reduction Activities Reported by Industry Group

Major SIC	Industry Group	Number of Activities Reported
28	Chemicals and Allied Products	345
34	Fabricated Metal Products	137
30	Rubber and Misc. Plastics Products	111
33	Primary Metals	103
37	Transportation Equipment	79
25	Furniture and Fixtures	37
35	Ind. / Commercial Machinery	29
32	Stone, Clay, Glass, Concrete Products	29
26	Paper and Allied Products	21
20	Food and Kindred Products	16
36	Electronic	11
39	Misc. Manufacturing Ind.	9
27	Printing, Publishing, Allied Ind.	6
24	Lumber and Wood Products	5
49	Electric Gas Sanitary Services	1
23	Apparel and Other Finished Prod.	1
22	Textile Mill Products	1

* Five reported source reduction activities had no major SIC group code.

Recycling

On-site recycling is reported by facilities that participate in some form of recovery, regeneration or separation of toxic chemicals. Off-site recycling is reported for “solvents/organics recovery,” “metals recovery,” “other reuse or recovery,” “acid regeneration” and “transfer to waste broker-recycling.” Table 40 below shows the amounts of both on- and off-site recycling by SIC codes in pounds of chemical. Three hundred ninety-two facilities reported recycling of waste materials for 1997; this is 43 percent of the reporting facilities. Of the amount of wastes managed by recycling, almost 75 percent was recycled on-site. Facilities most frequently reported “other reuse or recovery” as the on-site recycling method, followed by “solvents/organics recovery by batch still distillation” and “metals recovery-other.”

Table 41. Amounts of Recycling Reported by Industry Group in Pounds of Chemical

Industry Group	Major SIC	On-site Recycling (lbs. of chemical)	Off-site Recycling (lbs. of chemical)	Total Recycling (lbs. of chemical)
Food and Kindred Products	20	224,451,204	0	224,451,204
Primary Metals	33	91,995,316	29,450,303	121,445,619
Fabricated Metal Products	34	9,807,675	52,250,232	62,057,907
Chemicals and Allied Products	28	32,428,489	21,436,797	53,865,286
Transportation Equipment	37	2,649,468	18,382,038	21,031,506
Paper and Allied Products	26	14,682,927	0	14,682,927
Furniture and Fixtures	25	3,346,533	2,751,332	6,097,865
Ind. / Commercial Machinery	35	1,856,647	2,696,675	4,553,322
Electronic	36	1,179	2,791,910	2,793,089
Misc. Manufacturing Ind.	39	868,114	5,600	873,714
Rubber and Misc. Plastics Products	30	477,314	218,201	695,515
Stone, Clay, Glass, Concrete Products	32	12,742	289,091	301,833
Petroleum Refining and Related Ind.	29	23,480	133,000	156,480
Wholesale Trade Non-durable Goods	51	93,238	0	93,238
Apparel and Other Finished Prod.	23	58,000	0	58,000
Measuring, Analyzing, and Cont. Inst.	38	0	53,653	53,653
Leather and Leather Products	31	49,000	4,600	53,600
Printing, Publishing, Allied Ind.	27	26,186	10,000	36,186
Lumber and Wood Products	24	720	4,820	5,540
Electric Gas Sanitary Services	49	0	6	6

Energy Recovery

Waste materials that provide a significant amount of energy upon combustion can be used in energy recovery operations. A unit for energy recovery would include an industrial furnace, kiln or boiler. In Table 41 on the following page, the amount of energy recovery in pounds of chemical is reported by SIC code. In 1997, a little more than half of the waste materials reported for energy recovery was for on-site energy recovery operations. Eighteen facilities reported on-site energy recovery, while 187 facilities reported sending materials off-site for energy recovery as waste management transfers. Facilities most frequently reported "other energy recovery methods" as their on-site energy recovery activity.

Table 42. Energy Recovery Reported by Industry Group in Pounds of Chemical

Industry Group	Major SIC	On-site Recovery (lbs. of chemical)	Off-site Recovery (lbs. of chemical)	Total Energy Recovery (lbs. of chemical)
Chemicals and Allied Products	28	3,004,040	55,177,895	58,181,935
Petroleum Refining and Related Ind.	29	40,022,000	0	40,022,000
Stone, Clay, Glass, Concrete Products	32	32,690,000	264,810	32,954,810
Paper and Allied Products	26	6,955,573	35,518	6,991,091
Primary Metals	33	0	6,657,241	6,657,241
Furniture and Fixtures	25	0	2,415,085	2,415,085
Transportation Equipment	37	1,000	1,483,728	1,484,728
Rubber and Misc. Plastics Products	30	189,000	615,791	804,791
Misc. Manufacturing Ind.	39	612,483	118,866	731,349
Fabricated Metal Products	34	212,978	418,329	631,307
Business Services	73	0	211,068	211,068
Food and Kindred Products	20	0	54,000	54,000
Leather and Leather Products	31	0	51,937	51,937
Electronic	36	0	36,284	36,284
Lumber and Wood Products	24	0	29,300	29,300
Ind. / Commercial Machinery	35	0	15,000	15,000
Printing, Publishing, Allied Ind.	27	0	5,824	5,824
Measuring, Analyzing, and Cont. Inst.	38	0	5,405	5,405
Wholesale Trade Non-durable Goods	51	0	3	3

Waste Treatment

On-site waste treatment includes only the amount of toxic chemical destroyed on-site in waste treatment operations. Any amount not destroyed in the operation must be reported as a release. Off-site waste treatment methods include “solidification/stabilization,” “incineration–thermal treatment” or “incineration– insignificant fuel value,” and “wastewater treatment–excluding POTWs,” “other wastewater treatment,” or “transfer to waste broker-waste treatment.” In Table 43, treatment in pounds of chemical by industry group is shown. Approximately 40 percent of the facilities that reported for 1997 engaged in some form of waste treatment activity.

Table 43. Treatment Reported by Industry Group in Pounds of Chemical

Industry Group	Major SIC	On-site Treatment (lbs. of chemical)	Off-site Treatment (lbs. of chemical)	Total Treatment (lbs. of chemical)
Chemicals and Allied Products	28	43,679,203	18,621,515	62,300,718
Paper and Allied Products	26	16,163,536	4,187,460	20,350,996
Primary Metals	33	6,454,069	8,760,626	15,214,695
Transportation Equipment	37	7,084,463	2,762,871	9,847,334
Petroleum Refining and Related Ind.	29	6,874,100	72,174	6,946,274
Fabricated Metal Products	34	5,588,209	1,288,652	6,876,861
Rubber and Misc. Plastics Products	30	894,161	1,119,772	2,013,933
Leather and Leather Products	31	910,904	119,153	1,030,057
Food and Kindred Products	20	809,252	190,107	999,359
Stone, Clay, Glass, Concrete Products	32	373,849	259,418	633,267
Furniture and Fixtures	25	332,898	227,039	559,937
Misc. Manufacturing Ind.	39	271,755	95,711	367,466
Ind. / Commercial Machinery	35	185,000	61,691	246,691
Printing, Publishing, Allied Ind.	27	121,000	31,246	152,246
Measuring, Analyzing, and Cont. Inst.	38	84,800	45,140	129,940
Lumber and Wood Products	24	106,000	0	106,000
Apparel and Other Finished Prod.	23	74,000	0	74,000
Business Services	73	0	51,006	51,006
Electronic	36	34,427	5,183	39,610
Textile Mill Products	22	0	6,561	6,561
Wholesale Trade Non-durable Goods	51	0	28	28

1997 TOXIC CHEMICAL RELEASE INVENTORY

Staff Analysis

Appendices

Appendix A: Changes to List of Reportable Chemicals Report Years 1989 through 1997

Report Year 1997

- 2-Bromo-2-nitropropane (bronopol) delisted.
- 2,6-Dimethylphenol delisted.
- *De minimis* level lowered for 2,4-dinitrotoluene, 2,6-dinitrotoluene, and nitrobenzene.

Report Year 1996

- Diethyl phthalate delisted.
- Bis (2-ethylhexyl) adipate delisted.
- Hydrochloric acid modified; non-aerosol forms no longer reportable.
- *De minimis* level for a number of chemicals changed.

Report Year 1995

- Two hundred eighty-two (282) new chemicals and chemical categories added.
- Acetone delisted.
- Ammonium sulfate delisted, but ammonia from ammonium sulfate reportable under ammonia listing.
- Ammonium nitrate delisted, but ammonia from ammonium nitrate reportable under ammonia and ammonium nitrate also reportable under new nitrate compounds category.
- Ammonia modified; modifier is "includes anhydrous ammonia and aqueous ammonia from water dissociable salts and other sources; 10 percent of total aqueous ammonia reportable".
- Sulfuric acid modified; modifier is "acid aerosols, including mists, vapors, gas fog, and other airborne forms of any particle size".
- Methylene bis (phenylisocyanate) (MDI) moved from individual listing to new diisocyanates category.

Report Year 1994

- Thirty (30) new chemicals added.
- Copper phthalocyanine compounds that are substituted only with hydrogen and/or chlorine and/or bromine from the copper compounds category delisted.
- Butyl benzyl phthalate (BBP) delisted.

Report Year 1993

- N-Dioctyl phthalate (CAS #117-84-0) delisted.
- *De minimis* level changed for C.I. Basic Red 1 (CAS #989-38-8) and p-Nitrosodiphenylamine (CAS #156-10-5).

Report Year 1992

- No changes to the chemical list.

Report Year 1991

- Eleven (11) chemicals delisted: Terephthalic acid, Melamine, C.I. Pigment Blue 15, Sodium hydroxide (solution), C.I. Pigment Green 7, Aluminum oxide (non-fibrous forms), C.I. Acid Blue 9 diammonium salt, C.I. Acid Blue 9 disodium salt, Sodium sulfate (solution), Titanium dioxide, and C.I. Pigment Green 36.
Note: C.I. Pigment Blue 15, C.I. Pigment Green 7 and C.I. Pigment Green 36 were delisted from the copper compounds category.

- Seven (7) chemicals added: Bromotrifluoromethane (Halon 1301), Trichlorofluoromethane (CFC-11), Dichlorodifluoromethane (CFC-114), Monochloropentafluoroethane (CFC-115), Dibromotetrafluoroethane (Halon 2402) and Bromochlorodifluoromethane (Halon 1211).

Report Year 1990

- Two (2) chemicals delisted: Aluminum oxide (non-fibrous forms), and Terephthalic acid.
- Nine (9) chemicals added: Allyl alcohol, Creosote, 2,3-Dichloropropene, m-Dinitrobenzene, o-Dinitrobenzene, p-Dinitrobenzene, Dinitrotoluene (mixed isomers), Isosafrole, and Toluenediisocyanate (mixed isomers).

Report Year 1989

- Six (6) chemicals delisted: Titanium dioxide, C.I. Acid Blue 9 diammonium salt, C.I. Acid Blue 9 disodium salt, Melamine, Sodium sulfate (solution), and Sodium hydroxide (solution).

Appendix B: Definition of Releases and Transfers and Pollution Prevention

Toxic Chemical Releases

Releases. A release is a discharge of a toxic chemical to the environment. On-site releases include emissions to the air, discharges to surface water bodies, releases at the facility to land (including placement in a controlled on-site landfill), and contained disposal into underground injection wells. Off-site releases are toxic chemicals in waste that are transferred off-site for disposal.

Releases to Air. Releases to air are reported either as stack or fugitive emissions. Stack emissions occur through confined air streams, such as stacks, vents, ducts or pipes. Fugitive emissions are all releases to air that are not released through a confined air stream. Fugitive emissions include equipment leaks, evaporative losses from surface impoundments and spills, and releases from building ventilation systems.

Releases to Water. Releases to water include discharges to streams, rivers, lakes, oceans and other surface water bodies. This includes releases from contained sources, such as industrial process outflow pipes or open trenches. Releases due to runoff, including stormwater runoff, are also reportable under TRI.

Underground Injection. Underground injection is a contained release of waste fluid via a subsurface well for the purpose of disposal. Wastes containing TRI chemicals are injected into either Class I wells or Class II-V wells. Class I wells are used to inject liquid hazardous wastes or dispose of industrial and municipal wastewater beneath the lowermost underground layer of drinking water. Class II-V wells are generally used to inject non-hazardous fluid into or above an underground source of drinking water.

Releases to Land On-site. On-site releases to land occur within the boundaries of the reporting facility. These releases include disposal of toxic chemicals in RCRA Subtitle C or other landfills (in which wastes are buried); land treatment/application farming (in which waste containing a listed chemical is applied to or incorporated into soil); surface impoundments (which are uncovered holding areas used to volatilize and/or settle waste materials); and other land disposal methods (such as spills, leaks or waste piles).

Off-site Disposal. Toxic chemicals in wastes that are transferred off-site for disposal are also considered to be a release. Waste sent off-site for disposal is generally either placed in a controlled landfill or injected underground into a well. Off-site transfers for land treatment, other land treatment, or transfer to a waste broker for disposal are also considered off-site disposal. Metals and metal compounds transferred off-site for solidification/stabilization or wastewater treatment are also classified as off-site disposal.

Toxic Chemical Transfers

Off-site Transfers. An off-site transfer is a transfer of toxic chemicals in wastes to a facility that is geographically or physically separate from the reporting facility. Chemicals reported

under TRI as transferred are sent to off-site facilities for the purposes of recycling, energy recovery, treatment or disposal, or are discharged to publicly owned treatment works (POTWs). The quantities reported represent a movement of the wastes away from the reporting facility. Materials sent off-site for recycling, energy recovery or treatment are defined in this analysis as waste management transfers and are discussed separately below. Transfers off-site for disposal are considered releases and are defined above.

Publicly Owned Treatment Works (POTWs) Transfers. A POTW is a wastewater treatment facility that is owned by a state or municipality. Wastewater from facilities reporting under TRI is transferred through pipes or sewers to a POTW. Treatment or removal of a chemical from the wastewater depends upon the nature of the chemical, as well as the treatment methods present at the POTW. In general, chemicals that are easily utilized as nutrients by microorganisms, or have a low solubility in water, are likely to be removed to some extent. Chemicals that are volatile and have a low solubility in water may evaporate into the atmosphere. Not all TRI chemicals can be treated or removed by a POTW. Some chemicals, such as metals, may be removed, but are not destroyed and may be disposed of in landfills or discharged to receiving waters.

Waste Management Transfers

Off-site Recycling. Toxic chemicals in wastes are sent off-site for the purposes of recycling. Recycling is the recovery or regeneration of toxic chemicals in wastes by a variety of methods, including solvent recovery, metals recovery and acid regeneration. The choice of the recycling method depends on the toxic chemical being sent for recycling. Once chemicals have been recycled, they may be returned to the originating facility for further processing or used in commerce.

Off-site Energy Recovery. Toxic chemicals in wastes are transferred off-site for energy recovery. Energy recovery is the use of waste material as an energy source. Toxic materials in waste are combusted in industrial furnaces or boilers that generate heat or energy for use at that location.

Off-site Treatment. Toxic chemicals in wastes transferred off-site for treatment. Treatment occurs through various means, including biological treatment, neutralization, incineration and physical separation. These methods typically result in varying degrees of destruction of the toxic chemical. In some cases, the chemical is not destroyed but is prepared for further waste management, such as contained disposal.

Other Off-site Transfers. Toxic chemicals in wastes that were reported as transferred off-site but for which the off-site activity (i.e., disposal, recycling, energy recovery or treatment) was not specified or was not an accepted code have been classified as "other off-site transfers."

Pollution Prevention

Pollution prevention means source reduction and environmentally sound on-site or off-site reuse or recycling. Waste treatment, control, management and disposal are not considered pollution prevention.

Source reduction means any practice which reduces

- reduces the amount of any hazardous substance, pollutant or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment or disposal; and

- reduces the hazards to public health and the environment associated with the release of such substances, pollutants or contaminants. The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training or inventory control.

The term "source reduction" does not include any practice which alters the physical, chemical or biological characteristics or the volume of a hazardous substance, pollutant or contaminant through a process or activity which itself is not integral to and necessary for the production of a product or the providing of a service.

Appendix C:
Toxic Chemical Release Inventory Reporting Form
1997 EPA Form R

Appendix D:
Releases and Transfers by Chemical
Comparison of 1995 through 1997

1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Air Releases by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	XYLENE (MIXED ISOMERS)	10,090,970	8,162,253	7,323,666
2	TOLUENE	8,061,674	6,636,957	6,752,255
3	HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	4,992,655	5,102,430	4,406,362
4	METHANOL	4,976,334	4,598,857	4,345,925
5	STYRENE	1,856,405	2,016,118	2,133,136
6	N-HEXANE	1,841,166	1,943,201	2,020,912
7	CERTAIN GLYCOL ETHERS	3,622,667	2,955,261	1,937,531
8	AMMONIA	2,358,519	2,146,638	1,823,063
9	METHYL ETHYL KETONE	2,856,403	2,242,757	1,701,310
10	ETHYLENE	1,357,004	1,569,423	1,620,152
11	METHYL ISOBUTYL KETONE	2,054,211	1,725,431	1,487,583
12	N-BUTYL ALCOHOL	1,702,529	1,247,645	1,300,991
13	ETHYLBENZENE	1,258,785	1,215,104	1,281,840
14	1,2,4-TRIMETHYLBENZENE	905,654	781,144	888,332
15	TRICHLOROETHYLENE	1,569,320	1,066,037	802,485
16	N-METHYL-2-PYRROLIDONE	198,044	391,947	444,082
17	ZINC COMPOUNDS	276,830	347,217	400,786
18	DICHLOROMETHANE	1,128,848	451,119	381,746
19	ACETALDEHYDE	221,703	260,208	323,063
20	CREOSOTE	8,490	8,490	291,557
21	SULFURIC ACID	514,397	469,358	284,780
22	CHLOROETHANE	121,018	226,602	237,776
23	FORMALDEHYDE	243,208	205,766	233,016
24	PHENOL	219,131	218,670	207,454
25	BENZENE	460,678	440,694	172,948
26	PROPYLENE	198,317	200,919	171,625
27	NAPHTHALENE	108,904	183,257	169,442
28	1,1-DICHLORO-1-FLUOROETHANE	322,061	278,780	142,961
29	CARBONYL SULFIDE		1	132,672
30	TRIETHYLAMINE	202,312	147,093	129,266
31	METHYL TERT-BUTYL ETHER	29,639	88,973	121,976
32	MANGANESE	49,630	99,757	72,817
33	CHLORINE	65,785	106,918	72,594
34	CHLOROBENZENE	191,871	89,326	67,528
35	NITRIC ACID	66,723	63,027	61,284
36	TETRACHLOROETHYLENE	69,974	61,148	61,017
37	1,1,1-TRICHLOROETHANE	259,647	86,372	60,739
38	CARBON DISULFIDE		1	59,501
39	ZINC (FUME OR DUST)	82,368	76,511	58,657
40	CYCLOHEXANE	18,665	34,982	57,455
41	COPPER	26,301	33,083	57,110
42	ETHYLENE GLYCOL	58,988	31,743	56,004
43	DIISOCYANATES	27,618	315,059	50,241
44	ACETONITRILE	42,901	26,662	35,713
45	CHLOROMETHANE	72,367	43,260	35,168
46	ALUMINUM (FUME OR DUST)	31,921	38,772	32,805
47	DIETHANOLAMINE	28,850	86,140	31,598
48	POLYCYCLIC AROMATIC COMPOUNDS	2,914	110,256	27,526
49	BIPHENYL	1,487	7,366	26,972
50	METHYL METHACRYLATE	58,250	19,372	26,465

A blank value indicates that the chemical was not reported in the respective year.

A "0" value indicates that the chemical was reported but there was no reported release to the respective media.

1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Water Releases by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	NITRATE COMPOUNDS	115,864	229,837	281,095
2	METHANOL	202,281	219,159	159,984
3	AMMONIA	144,946	139,328	137,002
4	ETHYLENE GLYCOL	11,869	29,466	27,220
5	MANGANESE COMPOUNDS	409	763	22,564
6	BARIUM	0	0	18,000
7	DIETHANOLAMINE	180,000	20,000	14,000
8	ANTIMONY	0	0	7,900
9	ZINC (FUME OR DUST)	19,391	510	6,464
10	COPPER	5,337	5,329	5,078
11	BARIUM COMPOUNDS	1,055	1,455	4,878
12	TRIETHYLAMINE	3,446	3,028	4,356
13	FORMALDEHYDE	2,396	3,396	4,026
14	ACETALDEHYDE	3,885	3,967	3,611
15	ZINC COMPOUNDS	21,734	8,578	3,592
16	CERTAIN GLYCOL ETHERS	566	2,551	3,046
17	CHLORINE	11,685	19,457	2,499
18	TRICHLOROETHYLENE	6	12	1,700
19	NICKEL	826	1,128	1,390
20	MANGANESE	1,453	5,001	925
21	LEAD	974	335	875
22	COPPER COMPOUNDS	322	46	775
23	MOLYBDENUM TRIOXIDE	750	432	611
24	PHENOL	5,583	7,651	563
25	CHROMIUM COMPOUNDS	1,175	752	517
26	ALUMINUM (FUME OR DUST)	260	260	505
27	SODIUM NITRITE	297	535	505
28	TOLUENE	458	379	387
29	ACETONITRILE	4	5	359
30	NICKEL COMPOUNDS	23	1,424	266
31	DIAMINOTOLUENE (MIXED ISOMERS)	250	5	250
32	ETHYLENE OXIDE	250	250	250
33	PROPYLENE OXIDE	250	250	250
34	STYRENE	1,119	250	250
35	DICHLOROMETHANE	826	395	244
36	DIMETHYLAMINE	2,285	200	180
37	CHLOROFORM	199	226	160
38	CHROMIUM	341	542	156
39	VINYLDENE CHLORIDE	150	150	150
40	BENZENE	58	159	140
41	2,4-DICHLOROPHENOL	245	53	134
42	ACRYLAMIDE	354	706	67
43	CHLORINE DIOXIDE	0	0	58
44	TETRACHLOROETHYLENE	53	85	53
45	2,4-D	1,073	827	51
46	NAPHTHALENE	113	47	45
47	METHYL ACRYLATE	50	59	40
48	XYLENE (MIXED ISOMERS)	48	286	38
49	METHYL METHACRYLATE	17	23	28
50	2,4,6-TRICHLOROPHENOL	210	28	27

A blank value indicates that the chemical was not reported in the respective year.
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1997 TRI DATA - STATE OF MICHIGAN
 Releases via Underground Injection by Chemical 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	METHANOL	7,800,000	5,000,000	4,506,256
2	N,N-DIMETHYLFORMAMIDE	1,000,000	1,100,000	600,005
3	TRIETHYLAMINE	5,900	98,000	217,489
4	ACETONITRILE	219,000	111,800	102,833
5	PYRIDINE	13,000	17,000	58,672
6	AMMONIA	26,318	24,896	27,551
7	ZINC COMPOUNDS	100,000	46,000	18,328
8	CHROMIUM COMPOUNDS	43,000	31,000	11,756
9	DICHLOROMETHANE	83,000	21,500	10,726
10	MANGANESE COMPOUNDS	0	11,000	10,280
11	N-METHYL-2-PYRROLIDONE	10,000	11,000	8,000
12	N-BUTYL ALCOHOL	6,600	18,000	7,838
13	TOLUENE	9,100	3,650	6,142
14	CYANIDE COMPOUNDS	2,800	3,450	5,614
15	COPPER COMPOUNDS	0	1,300	1,733
16	METHYL ETHYL KETONE	31,000	750	1,179
17	METHYL TERT-BUTYL ETHER	12,000	10,750	843
18	TERT-BUTYL ALCOHOL	36,000	16,000	730
19	CYCLOHEXANE	33,000	250	308
20	N-HEXANE	5,300	250	303
21	NICKEL	54	39	112
22	FORMALDEHYDE	0	250	87
23	XYLENE (MIXED ISOMERS)	0	0	27
24	FORMIC ACID	1,400	250	20
25	COPPER	12	9	8
26	MALEIC ANHYDRIDE	5	10	5
27	HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	102,063	5	5
28	BENZENE	760	1,400	5

A blank value indicates that the chemical was not reported in the respective year.
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1997 TRI DATA - STATE OF MICHIGAN
 Releases to Land On-site by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	MANGANESE	992,715	1,203,912	657,306
2	ZINC (FUME OR DUST)	1,602,100	1,303,414	653,773
3	ALUMINUM OXIDE (FIBROUS FORMS)	590,000	0	380,000
4	BARIUM	15,900	54,640	151,640
5	MANGANESE COMPOUNDS	0	0	110,900
6	LEAD	220,100	140,651	94,618
7	NITRATE COMPOUNDS	128	67,508	73,112
8	BARIUM COMPOUNDS	0	16,000	58,405
9	ZINC COMPOUNDS	17,670	67,620	40,210
10	COPPER	40,340	49,919	28,152
11	DIISOCYANATES	27	255	14,340
12	CHROMIUM	27,511	78,712	12,147
13	CHROMIUM COMPOUNDS	16,717	12,262	11,109
14	DI(2-ETHYLHEXYL) PHTHALATE	9,421	11,000	8,580
15	PHENOL	15,365	5,559	6,714
16	METHANOL	8,436	9,073	6,557
17	COPPER COMPOUNDS	333,860	15,705	5,890
18	ANTIMONY COMPOUNDS	85	15	5,704
19	NICKEL	15,113	8,161	3,994
20	TOLUENE	14	0	3,022
21	ALUMINUM (FUME OR DUST)	0	0	2,400
22	MOLYBDENUM TRIOXIDE	0	0	750
23	NAPHTHALENE	780	35	723
24	STYRENE	3,871	12,803	555
25	AMMONIA	18,250	15,475	450
26	PROPYLENE OXIDE	250	26	250
27	CERTAIN GLYCOL ETHERS	0	0	250
28	BENZENE	36	11	141
29	ACETALDEHYDE	24	106	76
30	COBALT	5	1,232	45
31	TOLUENE DIISOCYANATE (MIXED ISOMERS)	250	19	15
32	ACRYLONITRILE	5	5	5
33	DIAMINOTOLUENE (MIXED ISOMERS)	5	5	5
34	ETHYLENE OXIDE	5	5	5
35	O-TOLUIDINE	5	5	5
36	SEC-BUTYL ALCOHOL	5	5	5
37	SODIUM NITRITE	0	0	5
38	ETHYLENE GLYCOL	0	5	5
39	CUMENE	0	3	3

A blank value indicates that the chemical was not reportable in the respective year.
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1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Releases to Off-site Disposal by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	ZINC COMPOUNDS	24,136,305	25,135,451	20,297,461
2	MANGANESE	2,366,281	3,120,243	3,490,917
3	COPPER	354,854	287,497	842,183
4	CHROMIUM COMPOUNDS	508,959	334,866	675,181
5	LEAD	109,319	116,925	658,434
6	ALUMINUM (FUME OR DUST)	27,730	216,988	469,827
7	COBALT	3,580	5,969	450,883
8	ARSENIC	1,130	130	444,705
9	NICKEL COMPOUNDS	109,605	60,256	389,161
10	ALUMINUM OXIDE (FIBROUS FORMS)	18,553	295,610	384,163
11	COPPER COMPOUNDS	251,047	34,065	360,185
12	CHROMIUM	353,528	284,110	327,587
13	NICKEL	152,093	234,143	285,220
14	MANGANESE COMPOUNDS	280,363	196,998	250,810
15	SODIUM NITRITE	29,647	26,125	142,092
16	BARIUM COMPOUNDS	87,812	101,915	121,177
17	TRICHLOROETHYLENE	0	0	101,904
18	ETHYLENE GLYCOL	48,307	57,176	98,501
19	PHOSPHORIC ACID	57,451	331,175	84,774
20	PHENOL	67,615	205,883	84,059
21	BARIUM	60,674	104,497	79,583
22	DIISOCYANATES	26,265	55,628	58,338
23	CERTAIN GLYCOL ETHERS	5,339	4,566	40,943
24	TOLUENE	39,105	35,771	37,735
25	METHYL ETHYL KETONE	1,060	4,465	33,255
26	DECABROMODIPHENYL OXIDE	25,405	36,026	33,077
27	AMMONIA	16,839	29,907	31,698
28	LEAD COMPOUNDS	16,156	7,259	30,661
29	ZINC (FUME OR DUST)	55,767	3,733	27,624
30	METHYL ISOBUTYL KETONE	4,026	3,795	25,960
31	FORMALDEHYDE	6,073	185,695	17,513
32	ANTIMONY	6,726	9,860	15,036
33	POLYCHLORINATED ALKANES	0	1,450	13,864
34	PHENYTOIN	19,300	3,400	12,420
35	DI(2-ETHYLHEXYL) PHTHALATE	9,421	11,023	11,944
36	STYRENE	8,391	3,265	10,485
37	XYLENE (MIXED ISOMERS)	7,366	8,100	9,973
38	1,2,4-TRIMETHYLBENZENE	11,078	10,188	9,382
39	3,3'-DICHLOROBENZIDINE	2,400	5,550	7,400
40	ANTIMONY COMPOUNDS	4,515	5,778	7,140
41	CUMENE HYDROPEROXIDE	4,900	2,800	5,200
42	METHANOL	20,440	3,438	4,783
43	CADMIUM	5,315	4,505	4,605
44	CYANIDE COMPOUNDS	510	5,537	3,488
45	COBALT COMPOUNDS	500	2,254	3,365
46	N-BUTYL ALCOHOL	1,401	1,599	2,871
47	DICHLOROMETHANE	265	9,472	2,516
48	NITRIC ACID	250	6,412	2,345
49	NITRATE COMPOUNDS	516	1,218	2,257
50	CADMIUM COMPOUNDS	1,056	1,455	2,022

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1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Transfers to POTWs by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	METHANOL	5,451,808	5,776,813	5,731,817
2	NITRATE COMPOUNDS	2,426,376	3,724,571	4,886,922
3	CERTAIN GLYCOL ETHERS	1,896,038	2,527,092	1,245,851
4	N-BUTYL ALCOHOL	82,223	53,335	460,850
5	FORMALDEHYDE	460,988	493,193	458,819
6	ETHYLENE GLYCOL	204,861	275,627	304,197
7	SODIUM NITRITE	164,441	271,615	222,490
8	N,N-DIMETHYLFORMAMIDE	6,255	141,005	220,295
9	AMMONIA	336,243	196,933	196,512
10	PHOSPHORIC ACID	290,615	195,609	142,634
11	STYRENE	35	76,504	102,280
12	DICHLOROMETHANE	114,305	80,600	64,956
13	PHENOL	69,788	65,089	57,096
14	DIETHANOLAMINE	65,467	48,800	43,445
15	NITRIC ACID	32,240	15,177	39,199
16	ZINC COMPOUNDS	45,023	38,203	32,777
17	SULFURIC ACID	29,804	71,096	26,840
18	METHYL ETHYL KETONE	30,265	24,018	23,488
19	MANGANESE COMPOUNDS	19,421	14,368	19,559
20	TOLUENE	37,987	50,224	13,534
21	BARIUM COMPOUNDS	9,440	9,338	12,543
22	N-METHYL-2-PYRROLIDONE	2,177	64,429	12,217
23	XYLENE (MIXED ISOMERS)	25,899	13,974	10,004
24	ACETALDEHYDE	10,200	9,791	9,831
25	NICKEL	6,261	7,411	9,143
26	BENZENE	8,245	8,879	8,720
27	CHROMIUM COMPOUNDS	9,766	8,316	7,449
28	NICKEL COMPOUNDS	11,221	8,854	6,632
29	PROPYLENE OXIDE	5,800	9,158	6,275
30	CHROMIUM	7,878	7,106	5,990
31	COPPER COMPOUNDS	5,220	5,472	5,721
32	COPPER	3,889	9,405	5,127
33	MANGANESE	2,538	4,221	4,280
34	CHLORINE	4,905	4,995	3,370
35	ALUMINUM (FUME OR DUST)	2,810	2,510	2,955
36	N-HEXANE	2,200	2,430	2,635
37	DIMETHYLAMINE	2,880	2,230	2,414
38	VINYL ACETATE	2,200	2,100	2,300
39	DI(2-ETHYLHEXYL) PHTHALATE	2,032	2,016	2,207
40	ETHYLBENZENE	2,292	2,947	2,187
41	ISOPROPYL ALCOHOL (MANUFACTURING, STRON	0	0	1,644
42	MOLYBDENUM TRIOXIDE	250	309	1,601
43	ZINC (FUME OR DUST)	2,320	1,845	1,514
44	LEAD	1,655	1,648	1,250
45	ACETONITRILE	250	250	1,167
46	LEAD COMPOUNDS	1,072	1,187	1,004
47	CYANIDE COMPOUNDS	1,017	788	929
48	POLYCHLORINATED ALKANES	0	1,424	921
49	CYCLOHEXANE	1,505	2,005	755
50	TERT-BUTYL ALCOHOL	3,020	210,450	690

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1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Waste Management Transfers by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	COPPER	39,994,039	38,928,423	48,654,411
2	XYLENE (MIXED ISOMERS)	24,437,956	24,252,240	22,499,236
3	METHANOL	20,308,476	23,618,386	22,464,474
4	TOLUENE	19,340,229	18,457,672	17,431,771
5	METHYL ISOBUTYL KETONE	14,758,837	12,047,838	10,426,070
6	CHROMIUM	10,096,007	9,105,690	8,903,650
7	ZINC COMPOUNDS	7,747,981	8,847,733	8,215,413
8	HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	349,877	3,130	6,765,030
9	NICKEL	5,772,935	5,696,911	6,407,220
10	METHYL ETHYL KETONE	7,153,760	5,792,515	5,429,450
11	MANGANESE	5,741,552	4,707,297	4,899,088
12	N-HEXANE	5,330,626	4,811,545	4,890,871
13	N-BUTYL ALCOHOL	3,713,433	3,479,913	4,680,043
14	DICHLOROMETHANE	3,087,649	4,002,557	4,628,339
15	ETHYLBENZENE	4,168,340	4,201,357	3,741,300
16	LEAD	2,106,869	1,640,984	2,519,030
17	MANGANESE COMPOUNDS	2,054,824	2,336,954	2,504,065
18	N,N-DIMETHYLFORMAMIDE	1,547,250	2,146,695	2,415,637
19	METHYL TERT-BUTYL ETHER	862,268	1,148,144	2,348,216
20	COPPER COMPOUNDS	1,409,418	1,296,561	2,245,179
21	CHROMIUM COMPOUNDS	768,072	1,054,684	1,839,957
22	CERTAIN GLYCOL ETHERS	2,720,153	2,006,376	1,830,190
23	ALUMINUM (FUME OR DUST)	102,841	1,477,166	1,685,909
24	1,2,4-TRIMETHYLBENZENE	1,175,634	1,271,185	1,155,124
25	ACETONITRILE	955,405	729,852	1,102,489
26	ZINC (FUME OR DUST)	1,211,270	676,365	948,660
27	CHLOROMETHANE	70,500	51,368	825,513
28	NICKEL COMPOUNDS	910,087	899,994	745,685
29	LEAD COMPOUNDS	529,204	558,256	724,280
30	TERT-BUTYL ALCOHOL	402,489	630,643	510,889
31	DIISOCYANATES	218,604	254,915	462,845
32	COBALT	2,290,436	535,807	406,122
33	NITRIC ACID	427,948	580,426	389,618
34	BENZENE	450,292	219,249	370,038
35	TRIETHYLAMINE	307,199	282,485	357,723
36	AMMONIA	94,628	127,406	351,346
37	ETHYLENE GLYCOL	652,061	331,440	312,365
38	TRICHLOROETHYLENE	824,800	373,369	306,446
39	PHOSPHORIC ACID	1,034,335	1,131,707	274,429
40	SULFURIC ACID	1,122,419	672,271	226,569
41	ANILINE	20,550	92,040	206,002
42	BIPHENYL	135,456	179,229	185,285
43	POLYCHLORINATED ALKANES	25,152	60,470	178,591
44	CHLOROBENZENE	170,283	122,881	168,389
45	SEC-BUTYL ALCOHOL	4,801	123,038	137,058
46	BARIUM	140,772	20,445	129,246
47	HYDROGEN FLUORIDE	55,267	81,091	108,651
48	HEXACHLOROETHANE	75,132	71,034	103,469
49	STYRENE	42,952	48,420	101,930
50	PHTHALIC ANHYDRIDE	70,500	42,000	100,000

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1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Total Releases by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
Rank	Chemical Name	1995	1996	1997
1	ZINC COMPOUNDS	24,552,539	25,604,866	20,760,377
2	METHANOL	13,007,491	9,830,527	9,023,505
3	XYLENE (MIXED ISOMERS)	10,098,384	8,170,639	7,333,704
4	TOLUENE	8,110,351	6,676,757	6,799,541
5	HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	5,096,768	5,102,435	4,406,367
6	MANGANESE	3,410,079	4,428,913	4,221,965
7	STYRENE	1,869,786	2,032,436	2,144,426
8	N-HEXANE	1,846,716	1,943,703	2,021,467
9	AMMONIA	2,564,872	2,356,244	2,019,764
10	CERTAIN GLYCOL ETHERS	3,628,572	2,962,378	1,981,770
11	METHYL ETHYL KETONE	2,888,463	2,247,972	1,735,744
12	ETHYLENE	1,379,772	1,591,613	1,620,152
13	METHYL ISOBUTYL KETONE	2,064,738	1,729,226	1,513,543
14	N-BUTYL ALCOHOL	1,710,530	1,267,244	1,311,701
15	ETHYLBENZENE	1,259,075	1,215,858	1,283,375
16	COPPER	426,844	375,837	932,531
17	TRICHLOROETHYLENE	1,569,326	1,066,049	906,089
18	1,2,4-TRIMETHYLBENZENE	927,332	800,445	897,714
19	LEAD	341,132	278,569	774,245
20	ALUMINUM OXIDE (FIBROUS FORMS)	609,053	295,610	764,668
21	ZINC (FUME OR DUST)	1,759,626	1,384,168	746,518
22	CHROMIUM COMPOUNDS	583,148	390,119	707,799
23	N,N-DIMETHYLFORMAMIDE	1,002,254	1,101,011	602,951
24	ALUMINUM (FUME OR DUST)	59,911	256,020	505,537
25	COBALT	6,115	16,534	464,109
26	ARSENIC	1,155	32,905	455,510
27	N-METHYL-2-PYRROLIDONE	209,174	407,665	452,622
28	MANGANESE COMPOUNDS	295,948	234,698	418,255
29	NICKEL COMPOUNDS	122,856	73,510	406,699
30	DICHLOROMETHANE	1,212,939	482,486	395,232
31	COPPER COMPOUNDS	1,383,874	56,918	375,785
32	CHROMIUM	402,628	383,732	359,701
33	NITRATE COMPOUNDS	117,088	301,935	358,542
34	TRIETHYLAMINE	228,158	268,321	351,611
35	ACETALDEHYDE	225,620	264,294	326,757
36	NICKEL	215,095	263,726	317,090
37	PHENOL	307,694	437,763	298,790
38	CREOSOTE	8,490	8,490	291,557
39	SULFURIC ACID	514,412	469,618	284,785
40	FORMALDEHYDE	251,951	395,144	254,642
41	BARIUM	77,094	159,707	250,353
42	CHLOROETHANE	121,018	226,602	237,776
43	BARIUM COMPOUNDS	90,478	124,034	186,650
44	ETHYLENE GLYCOL	119,164	207,390	181,730
45	BENZENE	461,610	443,458	173,865
46	PROPYLENE	198,317	200,919	171,625
47	NAPHTHALENE	109,802	183,389	170,225
48	SODIUM NITRITE	49,217	30,596	145,771
49	1,1-DICHLORO-1-FLUOROETHANE	323,781	283,720	142,961
50	ACETONITRILE	261,910	138,467	138,910

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1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Total Transfers by Chemical for 1997
 with 1995 and 1996 Comparisons

1997		----- (lbs/year) -----		
<u>Rank</u>	<u>Chemical Name</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	COPPER	39,997,928	38,937,828	48,659,538
2	METHANOL	25,760,284	29,395,199	28,196,291
3	XYLENE (MIXED ISOMERS)	24,463,855	24,266,214	22,509,240
4	TOLUENE	19,378,216	18,507,896	17,445,305
5	METHYL ISOBUTYL KETONE	14,763,852	12,049,382	10,426,263
6	CHROMIUM	10,103,885	9,112,796	8,909,640
7	ZINC COMPOUNDS	7,793,004	8,885,936	8,248,190
8	HYDROCHLORIC ACID ("ACID AEROSOLS" ONLY)	361,492	3,885	6,765,040
9	NICKEL	5,779,196	5,704,322	6,416,363
10	METHYL ETHYL KETONE	7,184,025	5,816,533	5,452,938
11	N-BUTYL ALCOHOL	3,795,656	3,533,248	5,140,893
12	MANGANESE	5,744,090	4,711,518	4,903,368
13	N-HEXANE	5,332,826	4,813,975	4,893,506
14	NITRATE COMPOUNDS	2,435,029	3,730,051	4,888,831
15	DICHLOROMETHANE	3,201,954	4,083,157	4,693,295
16	ETHYLBENZENE	4,170,632	4,204,304	3,743,487
17	CERTAIN GLYCOL ETHERS	4,616,191	4,533,468	3,076,041
18	N,N-DIMETHYLFORMAMIDE	1,553,505	2,287,700	2,635,932
19	MANGANESE COMPOUNDS	2,074,245	2,351,322	2,523,624
20	LEAD	2,108,524	1,642,632	2,520,280
21	METHYL TERT-BUTYL ETHER	874,568	1,148,560	2,348,596
22	COPPER COMPOUNDS	1,414,638	1,302,033	2,250,900
23	CHROMIUM COMPOUNDS	777,838	1,063,000	1,847,406
24	ALUMINUM (FUME OR DUST)	105,651	1,479,676	1,688,864
25	1,2,4-TRIMETHYLBENZENE	1,176,156	1,271,210	1,155,453
26	ACETONITRILE	955,655	730,102	1,103,656
27	ZINC (FUME OR DUST)	1,213,590	678,210	950,174
28	CHLOROMETHANE	71,000	51,869	826,063
29	NICKEL COMPOUNDS	921,308	908,848	752,317
30	LEAD COMPOUNDS	530,276	559,443	725,284
31	ETHYLENE GLYCOL	856,922	607,067	616,562
32	AMMONIA	430,871	324,339	547,858
33	TERT-BUTYL ALCOHOL	405,509	841,093	511,579
34	FORMALDEHYDE	529,841	546,092	495,970
35	DIISOCYANATES	218,609	262,568	463,095
36	NITRIC ACID	460,188	595,603	428,817
37	PHOSPHORIC ACID	1,324,950	1,327,316	417,063
38	COBALT	2,290,691	536,328	406,632
39	BENZENE	458,537	228,128	378,758
40	TRIETHYLAMINE	307,971	282,757	358,349
41	TRICHLOROETHYLENE	825,619	373,629	306,454
42	SODIUM NITRITE	169,901	275,890	265,411
43	SULFURIC ACID	1,152,223	743,367	253,409
44	ANILINE	20,550	92,290	206,002
45	STYRENE	42,987	124,924	204,210
46	BIPHENYL	135,456	179,229	185,285
47	POLYCHLORINATED ALKANES	25,152	61,894	179,512
48	CHLOROBENZENE	170,283	123,131	168,589
49	SEC-BUTYL ALCOHOL	4,833	123,043	137,308
50	BARIUM	140,829	20,494	129,251

A blank value indicates that the chemical was not reported in the respective year.

A "0" value indicates that the chemical was reported but there was no reported transfer to the respective media.

Appendix E:

**Releases and Transfers by Facility
Comparison of 1995 through 1997**

1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Air Releases by Facility for 1997
 with 1995 and 1996 Comparisons

						----- (lbs/year) -----		
1997						1995	1996	1997
Rank	Facility Name	Facility Name 2	City	County				
1	AMERICAN TAPE CO.		MARYSVILLE	ST CLAIR		2,922,269	2,819,079	3,200,046
2	HOLNAM INC - DUNDEE PLANT		DUNDEE	MONROE		3,142,286	3,097,962	3,147,134
3	FIBERMARK, INC	ROCHESTER MILL	ROCHESTER	OAKLAND		1,260,115	1,730,189	1,617,001
4	LAFARGE CORPORATION	(INCLUDING SYSTECH ENV. CORP.)	ALPENA	ALPENA		2,676,262	2,724,122	1,504,412
5	DOW CHEMICAL COMPANY	MIDLAND OPERATIONS	MIDLAND	MIDLAND		1,160,115	1,455,193	1,489,525
6	STONE CONTAINER CORP.		ONTONAGON	ONTONAGON		616,627	969,395	1,156,012
7	STEELCASE INC		GRAND RAPIDS	KENT		1,133,192	1,254,830	1,151,750
8	MLCG DETROIT/HAMTRAMCK	ASSEMBLY CENTER	DETROIT	WAYNE		1,621,201	921,586	1,050,988
9	FORD MOTOR CO.	MICHIGAN TRUCK PLANT	WAYNE	WAYNE		1,904,922	800,459	1,039,876
10	VEMCO, INC.		GRAND BLANC	GENESEE		798,150		893,968
11	GMC MIDSIZE/LUXURY CAR GROUP	ORION ASSEMBLY PLANT	ORION	OAKLAND		980,859	601,972	850,392
12	GM SMALL CAR GROUP	LANSING BODY PLANT	LANSING	INGHAM		970,000	513,130	844,833
13	FORD MOTOR CO. WAYNE ASSEMBLY		WAYNE	WAYNE		853,895	1,198,097	838,370
14	TOMKINS INDUSTRIES, INC. LASCO		THREE RIVERS	ST JOSEPH		617,437	800,410	777,400
15	GENERAL MOTORS TRUCK GROUP	PONTIAC EAST ASSEMBLY	PONTIAC	OAKLAND		1,148,220	1,769,822	667,297
16	FORD MOTOR CO.	MILAN PLASTICS PLANT	MILAN	MONROE		457,337	814,600	606,350
17	TEXTRON AUTOMOTIVE PRODUCTS		EVART	OSCEOLA		232,850	451,945	582,779
18	KALSEC, INC.		KALAMAZOO	KALAMAZOO		615,700	689,000	582,000
19	FORD MOTOR COMPANY	DEARBORN ASSEMBLY PLANT	DEARBORN	WAYNE		1,021,277	455,169	581,757
20	DAIMLERCHRYSLER CORP.	WARREN TRUCK ASSEMBLY PLANT	WARREN	MACOMB		904,742	562,887	580,331
21	MEAD PUBLISHING PAPER DIVISION		ESCANABA	DELTA		759,142	728,982	577,525
22	AFCO INDUSTRIES, INC.		HOLLAND	ALLEGAN		438,160	505,050	571,410
23	FORD MOTOR CO.	ROUGE POWER & UTILITIES OPS.	DEARBORN	WAYNE		449,104	630,129	550,087
24	ALLIED SIGNAL, INC		DETROIT	WAYNE		41,484	291,294	495,420
25	GMC TRUCK & BUS GROUP - FLINT	ASSEMBLY PLANT	FLINT	GENESEE		941,525	257,297	453,369
26	TENNECO PACKAGING INC.		FILER CITY	MANISTEE		375,632	394,286	443,079
27	FORD MOTOR CO. UTICA PLANT		SHELBY TWP.	MACOMB		433,554	409,257	410,038
28	MCLAREN ENGINES, INC.		LIVONIA	WAYNE			167,855	398,800
29	PENINSULA COPPER IND. INC.		HUBBELL	HOUGHTON		706,785	508,880	381,700
30	DOW CORNING CORP.	MIDLAND SITE	MIDLAND	MIDLAND		545,318	546,855	379,247
31	ZEELAND CHEMICALS, INC.		ZEELAND	OTTAWA		225,371	212,279	372,710
32	FORD WIXOM ASSEMBLY PLANT		WIXOM	OAKLAND		648,235	512,095	366,666
33	GM SMALL CAR GROUP	LANSING PLANT #1	LANSING	INGHAM		410,680	340,044	340,458
34	GMC NAO FLINT OPERATIONS		FLINT	GENESEE		742,779	955,592	336,062
35	CHRYSLER CORP.	JEFFERSON NORTH ASSEMBLY PLANT	DETROIT	WAYNE		475,488	447,021	334,359
36	OMC RECREATIONAL BOAT GROUP	LP-MI (SPORT DIVISION)	CADILLAC	WEXFORD		296,053	255,470	323,730
37	NATIONAL STEEL CORP.	GREAT LAKES DIVISION	ECORSE	WAYNE		312,034	323,303	317,467
38	S. D. WARREN COMPANY		MUSKEGON	MUSKEGON		423,120	303,848	314,857
39	VENTURE GRAND RAPIDS, LLC		GRAND RAPIDS	KENT			1,867	306,698
40	CHRYSLER CORP.	STERLING HEIGHTS ASSEMBLY	STERLING HEIGHTS	MACOMB		441,623	337,269	295,369
41	GEORGIA-PACIFIC CORPORATION		KALAMAZOO	KALAMAZOO		202,250	190,472	293,723
42	WARNER-LAMBERT CO.	PARKE-DAVIS DIV.	HOLLAND	OTTAWA		249,401	258,966	280,986
43	DAY INTERNATIONAL		THREE RIVERS	ST JOSEPH		245,255	228,777	270,820
44	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE		1,362,052	1,429,798	263,706
45	STEELCASE WOOD		KENTWOOD	KENT		147,735	210,339	238,456
46	LOMAC, INC.		MUSKEGON	MUSKEGON		291,236	210,728	219,618
47	HAWORTH, INC.		HOLLAND	ALLEGAN		175,920	185,200	217,730
48	MARATHON OIL CO.		DETROIT	WAYNE		120,837	118,321	209,391
49	QUANEX CORPORATION, MACSTEEL	MICHIGAN DIVISION	JACKSON	JACKSON		70,233	176,870	208,240
50	STEELCASE INC		KENTWOOD	KENT		393,007	358,914	205,861

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1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Air Releases by Facility for 1997
 with 1995 and 1996 Comparisons

						----- (lbs/year) -----		
1997 Rank	Facility Name	Facility Name 2	City	County	1995	1996	1997	
51	CHAMPION INTL. CORP.		QUINNESEC	DICKINSON	326,156	279,160	203,860	
52	MENOMINEE PAPER CO. INC		MENOMINEE	MENOMINEE	190,005	200,005	200,000	
53	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW	255,010	201,531	198,211	
54	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	1,104,910	326,175	195,247	
55	OMC RECREATIONAL BOAT GROUP	LP-MI (CRUISER DIVISION)	CADILLAC	WEXFORD	219,283	203,555	191,315	
56	WEYERHAEUSER CO.		GRAYLING	CRAWFORD	188,715	204,508	190,723	
57	KEELER BRASS COMPANY	FKI HARDWARE GROUP	GRAND RAPIDS	KENT	302,300	227,406	187,774	
58	GEORGIE BOY MANUFACTURING, INC		EDWARDSBURG	CASS	133,266	276,959	184,345	
59	PAULSTRA CRC CADILLAC DIVISION		CADILLAC	WEXFORD	42,950	152,461	170,845	
60	FKI AUTOMOTIVE KENTWOOD PLANT		KENTWOOD	KENT	160,660	134,022	164,900	
61	COMMERCIAL STEEL TREATING CORP		MADISON HEIGHTS	OAKLAND	129,496		161,351	
62	MENASHA CORP.		OTSEGO	ALLEGAN	328,574	159,204	160,245	
63	MAYCO PLASTICS, INC.		STERLING HEIGHTS	MACOMB	55,025	68,164	153,714	
64	PERFECT CIRCLE SEALED POWER DI	OF DANA CORPORATION	ST. JOHNS	CLINTON	142,318	270,731	145,310	
65	ITW CODING PRODUCTS		KALKASKA	KALKASKA	337,614	266,756	137,511	
66	HUNTSMAN CORPORATION		MARYSVILLE	ST CLAIR	174,752	194,240	135,940	
67	WOLVERINE COIL COATING, INC.		LINCOLN PARK	WAYNE	61,050	120,400	131,800	
68	ELF ATOCHEM NORTH AMERICA, INC	RIVERVIEW PLANT	RIVERVIEW	WAYNE	155,875	156,899	128,895	
69	MERIDIAN, INC. - PLANT A & D		SPRING LAKE	OTTAWA	71,450	81,650	124,650	
70	BASF CORPORATION		DETROIT	WAYNE	271,240	132,312	123,234	
71	DELPHI INTERIOR & LGHTNG SYSTS	ADRIAN OPERATIONS	ADRIAN	LENAWEE	94,250	106,530	120,620	
72	AUTOMOTIVE COMPOSITES COMPANY		STERLING HEIGHTS	MACOMB	256,512	196,037	120,034	
73	DECO'PLATE MFG. CO		LAPEER	LAPEER	81,915	63,330	110,422	
74	LEXAMAR CORPORATION		BOYNE CITY	CHARLEVOIX	43,807	87,774	109,947	
75	DU PONT MT. CLEMENS PLANT		MT. CLEMENS	MACOMB	140,859	117,940	109,743	
76	KIMBERLY-CLARK CORP.		MUNISING	ALGER	89,250	110,250	109,250	
77	HOWARD MILLER COMPANY		ZEELAND	OTTAWA	115,100	92,300	108,394	
78	DELPHI SAGINAW STEERING SYSTEM		SAGINAW	SAGINAW	162,010	136,100	104,940	
79	DOTT MFG. CO.		DECKERVILLE	SANILAC	92,859	83,840	100,406	
80	GUARDIAN FIBERGLASS INC.		ALBION	CALHOUN	97,300	93,108	93,996	
81	BORROUGHS CORPORATION		KALAMAZOO	KALAMAZOO	246,447		88,000	
82	GREAT LAKES PLASTICS CORP.		HANCOCK	HOUGHTON	70,400	74,472	83,500	
83	MASCOTECH COATINGS, INC.		CHINA TWP.	ST CLAIR	218,553	98,700	82,430	
84	WOLVERINE WORLD WIDE INC. SOLE		ROCKFORD	KENT	48,955	102,439	81,558	
85	BELDING TANK TECHNOLOGIES, INC		BELDING	IONIA		19,420	75,580	
86	KENT FOUNDRY		GREENVILLE	MONTCALM	42,000	37,982	74,332	
87	ROUGE STEEL COMPANY		DEARBORN	WAYNE	45,775	51,755	73,560	
88	ALBAR INDUSTRIES, INC.		LAPEER	LAPEER	79,013	70,320	71,657	
89	EAGLE OTTAWA LEATHER COMPANY		GRAND HAVEN	OTTAWA	89,161	94,660	71,360	
90	FORD MOTOR CO.	SALINE PLANT	SALINE	WASHTENAW	118,296	79,173	70,826	
91	DONNELLY CORPORATION		NEWAYGO	NEWAYGO	96,259	47,927	70,792	
92	R. J. MARSHALL COMPANY		ERIE	MONROE		58	70,540	
93	NEW HAVEN FOUNDRY		NEW HAVEN	MACOMB		121,550	70,500	
94	WOLVERINE WORLD WIDE INC. FACT		BIG RAPIDS	MECOSTA	56,090	74,906	68,824	
95	TPI PETROLEUM, INC.		ALMA	GRATIOT	62,299	79,275	68,234	
96	VENTURE INDUSTRIES BAILEY MFG,		HILLSDALE	HILLSDALE	66,039	87,028	67,853	
97	DONNELLY CORPORATION		HOLLAND	OTTAWA	10,214	73,592	65,977	
98	GEORGIA-PACIFIC CORP.	(GAYLORD PARTICLEBOARD PLANT)	GAYLORD	OTSEGO	53,100	58,500	64,706	
99	HI-TECH COATINGS, INC.		WARREN	MACOMB		22,808	64,073	
100	E. B. EDDY PAPER, INC.		PORT HURON	ST CLAIR	31,600	33,850	63,250	

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1997 TRI DATA - STATE OF MICHIGAN
Water Releases by Facility for 1997
with 1995 and 1996 Comparisons

						----- (lbs/year) -----		
1997						1995	1996	1997
Rank	Facility Name	Facility Name 2	City	County				
1	MENOMINEE PAPER CO. INC		MENOMINEE	MENOMINEE		58,005	140,005	241,005
2	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO		128,550	150,505	84,435
3	CHAMPION INTL. CORP.		QUINNESEC	DICKINSON		91,700	118,800	67,800
4	ABTCO, INC.		ALPENA	ALPENA		17,005	26,600	53,500
5	MEAD PUBLISHING PAPER DIVISION		ESCANABA	DELTA		17,957	17,724	38,720
6	MONITOR SUGAR COMPANY		BAY CITY	BAY		91,000	75,000	37,000
7	NATIONAL STEEL CORP.	GREAT LAKES DIVISION	ECORSE	WAYNE		16,766	30,667	36,560
8	TENNECO PACKAGING INC.		FILER CITY	MANISTEE		7,427	4,526	35,062
9	STONE CONTAINER CORP.		ONTONAGON	ONTONAGON		35,980	37,195	32,299
10	TPI PETROLEUM, INC.		ALMA	GRATIOT		189,420	23,200	30,000
11	DOW CHEMICAL COMPANY	MIDLAND OPERATIONS	MIDLAND	MIDLAND		48,274	13,314	10,287
12	GREAT LAKES PULP CO.		MENOMINEE	MENOMINEE			4,100	9,700
13	CDR PIGMENTS & DISPERSIONS		HOLLAND	OTTAWA		7,305	10,355	7,617
14	ELF ATOCHEM NORTH AMERICA, INC	RIVERVIEW PLANT	RIVERVIEW	WAYNE		27,406	27,264	5,127
15	ROUGE STEEL COMPANY		DEARBORN	WAYNE		12,060	5,800	4,655
16	MICHIGAN SUGAR COMPANY	CARROLLTON FACTORY	CARROLLTON	SAGINAW		0	3,960	3,158
17	BASF CORPORATION	CHEMICAL ENGINEERING. R & D	WYANDOTTE	WAYNE		1,520	2,236	2,235
18	GM POWERTRAIN	LIVONIA ENGINE PLANT	LIVONIA	WAYNE		3	505	2,000
19	COMMERCIAL STEEL TREATING CORP		MADISON HEIGHTS	OAKLAND		0		1,694
20	GM METAL FAB DIVISION	LANSING PLANT #3	LANSING	INGHAM		30	15	1,665
21	MONSANTO - TRENTON, MI		TRENTON	WAYNE		2,300	1,600	1,500
22	CSM INDUSTRIES, INC.		COLDWATER	BRANCH		1,000	469	1,406
23	MENASHA CORP.		OTSEGO	ALLEGAN		1,379	1,150	1,274
24	BIL MAR FOODS		ZEELAND	OTTAWA		250	6,394	1,000
25	GRAND HAVEN BRASS FNDY.		GRAND HAVEN	OTTAWA		0	0	966
26	MICHIGAN SUGAR COMPANY	SEBEWAING PLANT	SEBEWAING	HURON		0	830	887
27	HITACHI MAGNETICS CORP.		EDMORE	MONTCALM		760	760	750
28	MICHIGAN SPECIALTY TUBE		SOUTH LYON	OAKLAND		491	261	422
29	NATIONAL STANDARD CO LAKE ST P		NILES	BERRIEN		260	505	349
30	QUANEX CORPORATION, MACSTEEL	MICHIGAN DIVISION	JACKSON	JACKSON		111	78	307
31	E. B. EDDY PAPER, INC.		PORT HURON	ST CLAIR		3	126	300
32	SULZER METCO (US), TROY		TROY	OAKLAND		25	25	270
33	BOSCH BRAKING SYSTEMS		ST. JOSEPH	BERRIEN		0	250	255
34	HAYES-ALBION CORPORATION		ALBION	CALHOUN		1,700	17	255
35	WEST MICHIGAN STEEL FOUNDRY		MUSKEGON	MUSKEGON		5	255	255
36	BRONSON PLATING CO.		BRONSON	BRANCH		250	250	250
37	SIMPSON PLAINWELL PAPER CO.		PLAINWELL	ALLEGAN		500	500	250
38	ALLEGAN METAL FINISHING CO.		ALLEGAN	ALLEGAN		250	250	250
39	CROWN PAPER COMPANY	DBA CROWN VANTAGE	PORT HURON	ST CLAIR		250	250	250
40	KIMBERLY-CLARK CORP.		MUNISING	ALGER		250	250	250
41	METALLOY CORP. HUDSON FNDRY. D		HUDSON	LENAWEE		250	250	250
42	FEDERAL-MOGUL CORP.		GREENVILLE	MONTCALM			143	144
43	GM SMALL CAR GROUP	LANSING PLANT #1	LANSING	INGHAM		31	6	120
44	GMPT-FLINT V8 ENGINE PLANT		FLINT	GENESEE		593	573	106
45	NATIONAL COPPER PRODS. INC.		DOWAGIAC	CASS		113	109	99
46	NORTH STAR STEEL COMPANY	MICHIGAN DIVISION	MONROE	MONROE		0	0	90
47	GM POWERTRAIN	DELTA ENGINE PLANT	LANSING	EATON		0	0	89
48	UNISTRUT CORP.		WAYNE	WAYNE		38	63	67
49	DELPHI AUTOMOTIVE SYSTEMS		GRAND RAPIDS	KENT		84	54	44
50	GMC POWERTRAIN WARREN		WARREN	MACOMB			50	41

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1997 TRI DATA - STATE OF MICHIGAN
 Water Releases by Facility for 1997
 with 1995 and 1996 Comparisons

1997					----- (lbs/year) -----		
<u>Rank</u>	<u>Facility Name</u>	<u>Facility Name 2</u>	<u>City</u>	<u>County</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
51	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE	8,452	7,672	39
52	GMC POWERTRAIN, WILLOW RUN		YPSILANTI	WASHTENAW	92	116	38
53	BEKAERT CORPORATION		MUSKEGON	MUSKEGON	10	10	28
54	FREIBORNE INDUSTRIES INC.		PONTIAC	OAKLAND			25
55	DOW CORNING CORP.	MIDLAND SITE	MIDLAND	MIDLAND	9	8	25
56	BANGOR INDUSTRIES INC.		BANGOR	VAN BUREN	0	27	24
57	FLEET ENGINEERS INC		MUSKEGON	MUSKEGON		255	20
58	QUINCY PRODUCTS		QUINCY	BRANCH	15	15	19
59	ALLIED FINISHING INC.		KENTWOOD	KENT	19	15	16
60	EXTRUDED METALS		BELDING	IONIA	19	21	16
61	SUPREME MACHINED PRODUCTS		SPRING LAKE	OTTAWA	0	250	12
62	GM PONTIAC SITE OPERATIONS		PONTIAC	OAKLAND	0	33	11
63	NEW HAVEN FOUNDRY		NEW HAVEN	MACOMB		10	10
64	BORG-WARNER AUTOMOTIVE		ROMULUS	WAYNE	10	10	10
65	PERFECT CIRCLE SEALED POWER DI	OF DANA CORPORATION	MUSKEGON HEIGHTS	MUSKEGON	6	7	6
66	GM POWERTRAIN BAY CITY PLANT		BAY CITY	BAY	0	4	6
67	EFTEC NORTH AMERICA, L.L.C.		WARREN	MACOMB	0	0	5
68	OSBORNE TRANSFORMER CORP		CLINTON TWP.	MACOMB	5	5	5
69	MICHNER PLATING COMPANY		JACKSON	JACKSON	5	5	5
70	K.C. JONES PLATING COMPANY		HAZEL PARK	OAKLAND	5	5	5
71	CARMET COMPANY		BAD AXE	HURON	5	5	5
72	TRELLEBORG YSH, INC.	SANDUSKY PLANT	SANDUSKY	SANILAC	5	5	5
73	WHIRLPOOL CORP. BENTON HARBOR		BENTON HARBOR	BERRIEN	27	0	5
74	HYDRO ALUMINUM ADRIAN, INC.		ADRIAN	LENAWEE	250	250	5
75	S. D. WARREN COMPANY		MUSKEGON	MUSKEGON	9	3	4
76	DELPHI ENERGY & ENGINE MGT.	SYSTEMS, FLINT WEST	FLINT	GENESEE	7	6	4
77	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW	0	2	3
78	GM LANSING CRAFT CENTRE		LANSING	INGHAM	0	0	3
79	DELPHI CHASSIS LIVONIA		LIVONIA	WAYNE	250	5	2

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1997 TRI DATA - STATE OF MICHIGAN
 Releases via Underground Injection by Facility for 1997
 with 1995 and 1996 Comparisons

1997					----- (lbs/year) -----		
<u>Rank</u>	<u>Facility Name</u>	<u>Facility Name 2</u>	<u>City</u>	<u>County</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	7,084,000	4,662,100	3,653,879
2	WARNER-LAMBERT CO.	PARKE-DAVIS DIV.	HOLLAND	OTTAWA	2,344,370	1,930,525	1,915,310
3	BIOLAB INC		ADRIAN	LENAWEE	26,318	24,891	27,546
4	HOSKINS MFG. CO.		MIO	OSCODA	71	54	120

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1997 TRI DATA - STATE OF MICHIGAN
Land Releases On-site by Facility for 1997
with 1995 and 1996 Comparisons

1997					----- (lbs/year) -----		
Rank	Facility Name	Facility Name 2	City	County	1995	1996	1997
1	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW	2,454,754	2,223,279	1,255,161
2	CMI-CAST PARTS, INC.		CADILLAC	WEXFORD	596,100	0	382,050
3	MEAD PUBLISHING PAPER DIVISION		ESCANABA	DELTA	7,736	8,341	303,727
4	CHAMPION INTL. CORP.		QUINNESEC	DICKINSON	15,470	21,000	153,950
5	REILLY PLATING CO.		MELVINDALE	WAYNE	0	89,000	97,000
6	DONNELLY CORPORATION		HOLLAND	OTTAWA	0	40,640	40,640
7	DOW CHEMICAL COMPANY	MIDLAND OPERATIONS	MIDLAND	MIDLAND	20,240	54,907	29,247
8	HAWORTH, INC.		HOLLAND	ALLEGAN	0	16,000	16,000
9	JOHNSON CONTROLS		MT. CLEMENS	MACOMB	0	0	14,325
10	MICHIGAN SPECIALTY TUBE		SOUTH LYON	OAKLAND	0	10,599	9,632
11	GRAND HAVEN BRASS FNDY.		GRAND HAVEN	OTTAWA	0	0	8,960
12	REHAU INCORPORATED		STURGIS	ST JOSEPH	9,421	11,000	8,580
13	AAR CADILLAC MANUFACTURING		CADILLAC	WEXFORD	0	0	3,022
14	AAR CARGO SYSTEMS		LIVONIA	WAYNE	0		2,400
15	EXTRUDED METALS		BELDING	IONIA	0	399	2,023
16	FORD MOTOR CO.	VAN DYKE PLANT	STERLING HEIGHTS	MACOMB	0	2,300	2,000
17	R. W. FERNSTRUM & COMPANY		MENOMINEE	MENOMINEE	0	0	750
18	M.J. ELECTRIC INC. SYSTEMS CON		IRON MOUNTAIN	DICKINSON	5	500	500
19	MENASHA CORP.		OTSEGO	ALLEGAN	144	356	377
20	BASF CORPORATION	CHEMICAL ENGINEERING. R & D	WYANDOTTE	WAYNE	1,035	90	305
21	DONNELLY CORPORATION		HOLLAND	OTTAWA	0	1,161	261
22	BIL MAR FOODS		ZEELAND	OTTAWA	250	250	255
23	BRUNSWICK INDOOR RECREATION	GROUP	MUSKEGON	MUSKEGON	0	0	230
24	CANNON MUSKEGON CORPORATION		MUSKEGON	MUSKEGON	0	113	188
25	ZEELAND CHEMICALS, INC.		ZEELAND	OTTAWA	0	0	50
26	DME COMPANY	DIV. OF CINCINNATI MILACEON	CHARLEVOIX	CHARLEVOIX	0	50	50
27	SUPREME MACHINED PRODUCTS		SPRING LAKE	OTTAWA	0	0	49
28	CARDELL CORPORATION		AUBURN HILLS	OAKLAND			40
29	UNC JOHNSON TECHNOLOGY		MUSKEGON	MUSKEGON	0	20	20
30	UNC JOHNSON TECHNOLOGY		MUSKEGON	MUSKEGON	20	20	20
31	FLEET ENGINEERS INC		MUSKEGON	MUSKEGON		0	19
32	A.E. GOETZE - SPARTA		SPARTA	KENT	15	15	15
33	VENTURE GRAND RAPIDS, LLC		GRAND RAPIDS	KENT		0	10
34	MELLING FORGING CO.		LANSING	INGHAM	10	5	5
35	UNITED TECHNOLOGIES AUTOMOTIVE		WEST OLIVE	OTTAWA		5	5
36	SUN STEEL TREATING INC.		SOUTH LYON	OAKLAND	0	0	5
37	UNITED TECHS. AUTOMOTIVE INC.		TRAVERSE CITY	GRAND TRAVERSE	5	0	5
38	UNITED TECHS. AUTOMOTIVE INC.		TRAVERSE CITY	GRAND TRAVERSE	5	0	5
39	MICHIGAN WHEEL CORP.		GRAND RAPIDS	KENT		20	5

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1997						1995	1996	1997
Rank	Facility Name	Facility Name 2	City	County				
1	ROUGE STEEL COMPANY		DEARBORN	WAYNE		11,189,875	13,086,300	13,424,600
2	NATIONAL STEEL CORP.	GREAT LAKES DIVISION	ECORSE	WAYNE		13,316,367	13,731,412	7,682,080
3	NEW HAVEN FOUNDRY		NEW HAVEN	MACOMB			630,720	2,567,200
4	LACKS INDUSTRIES, INC.	AIRLANE PLANT	KENTWOOD	KENT		0	0	633,334
5	CMI-CAST PARTS, INC.		CADILLAC	WEXFORD		6,100	342,160	381,300
6	HAYES-ALBION CORPORATION		ALBION	CALHOUN		457,505	509,466	319,474
7	IMCO RECYCLING OF MICHIGAN LLC		COLDWATER	BRANCH				302,810
8	STURGIS FNDY. CORP.		STURGIS	ST JOSEPH		83,062	38,573	293,334
9	ERVIN INDUSTRIES, INC.		ADRIAN	LENAWEE		243,366	0	273,222
10	HURON CASTING INC.		PIGEON	HURON		271,000	220,000	239,000
11	EAGLE OTTAWA LEATHER COMPANY		GRAND HAVEN	OTTAWA		178,002	182,710	199,650
12	GMC MIDSIZE/LUXURY CAR GROUP	ORION ASSEMBLY PLANT	ORION	OAKLAND		42,146	12,297	148,437
13	WOLVERINE LEATHERS		ROCKFORD	KENT		87,236	102,988	134,602
14	PENINSULA COPPER IND. INC.		HUBBELL	HOUGHTON		216,882	156,263	127,970
15	Delphi Energy & Engine Mgt	Systems, Flint East	FLINT	GENESEE		64,080	54,064	120,182
16	AUSTEMPER, INC.		CLINTON TWP.	MACOMB		0	0	118,800
17	PLASTIC PLATE, INC. PLANT 1		GRAND RAPIDS	KENT		0	750	116,815
18	GMC POWERTRAIN, WILLOW RUN		YPSILANTI	WASHTENAW		300,600	91,001	107,890
19	NORTH STAR STEEL COMPANY	MICHIGAN DIVISION	MONROE	MONROE		15,758	207	104,262
20	AUTOMOTIVE COMPOSITES COMPANY		STERLING HEIGHTS	MACOMB		0	0	101,824
21	COMMONWEALTH INDUSTRIES		DETROIT	WAYNE		51,840	76,900	101,322
22	HOWARD PLATING INDUSTRIES, INC		MADISON HEIGHTS	OAKLAND		159,523	169,100	94,727
23	SUN STEEL TREATING INC.		SOUTH LYON	OAKLAND		450	54,746	90,485
24	FEDERAL-MOGUL CORP.		GREENVILLE	MONTCALM			0	86,915
25	FREIBORNE INDUSTRIES INC.		PONTIAC	OAKLAND				82,030
26	J&L SPECIALTY STEEL, INC.		DETROIT	WAYNE		82,000	83,000	78,000
27	CENTURY SUN METAL TREATING INC		TRAVERSE CITY	GRAND TRAVERSE		58,375	63,852	77,868
28	CHROME CRAFT CORP.		HIGHLAND PARK	WAYNE		0	0	70,000
29	TEXTRON AUTOMOTIVE FUNCTIONAL	COMPONENTS - CWC DIVISION	MUSKEGON	MUSKEGON		78,615	56,750	68,500
30	KEELER BRASS COMPANY	FKI HARDWARE GROUP	GRAND RAPIDS	KENT		21,680	0	66,491
31	AMERICAN BUMPER & MFG. CO.		IONIA	IONIA		0	101,393	64,909
32	EATON CORPORATION		SAGINAW	SAGINAW		85,448	66,427	62,208
33	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE		7,938	57,674	56,413
34	GREAT LAKES CASTING CORP.		LUDINGTON	MASON		33,000	49,000	54,430
35	J & M PLATING		ALBION	CALHOUN		0	0	53,160
36	FKI AUTOMOTIVE KENTWOOD PLANT		KENTWOOD	KENT		0	0	48,642
37	GM POWERTRAIN SAGINAW	MALLEABLE IRON PLANT	SAGINAW	SAGINAW		207,170	92,320	47,520
38	DELPHI SAGINAW STEERING SYSTEM		SAGINAW	SAGINAW		66,410	54,769	46,640
39	FORD MOTOR CO.	MICHIGAN TRUCK PLANT	WAYNE	WAYNE		23,399	20,005	46,630
40	UNITED TECHNOLOGIES AUTOMOTIVE		WEST OLIVE	OTTAWA			29,000	46,000
41	VOLTEK, DIV. SEKISUI AMERICA		COLDWATER	BRANCH		30,446	46,287	44,442
42	FITZSIMONS MFG.		BIG RAPIDS	MECOSTA		0	0	43,450
43	KURDZIEL IRON OF ROTHBURY		ROTHBURY	OCEANA		0	0	38,612
44	SANDVIK STEEL COMPANY		BENTON HARBOR	BERRIEN		19,738	51,600	35,200
45	MASCOTECH BRAUN COMPANY		DETROIT	WAYNE		13,787	12,303	33,952
46	EAST JORDAN IRON WORKS, INC.		EAST JORDAN	CHARLEVOIX		25	20	33,448
47	UNITED TECHNOLOGIES AUTOMOTIV		NILES	BERRIEN		0	0	32,419
48	DAIMLERCHRYSLER CORP.	WARREN TRUCK ASSEMBLY PLANT	WARREN	MACOMB		19,605	3,023	32,102
49	STANDARD PRODS. CO.		GAYLORD	OTSEGO		112,600	58,950	31,300
50	UNIFORM COLOR COMPANY		HOLLAND	ALLEGAN		21,900	27,500	30,530

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51	HY-LIFT,L.L.C.	MUSKEGON FACILITY	MUSKEGON	MUSKEGON	20,679	29,000	30,005	
52	DIAMOND CHROME PLATING INC.		HOWELL	LIVINGSTON		15,680	29,700	
53	DENSO MANUFACTURING, MICH, INC		BATTLE CREEK	CALHOUN	0	4,941	29,085	
54	GMC NAO FLINT OPERATIONS		FLINT	GENESEE	84,718	67,420	28,790	
55	MIDWEST PLATING COMPANY, INC		GRAND RAPIDS	KENT	24,000	10,150	28,550	
56	BENTELER AUTOMOTIVE, INC.		GRAND RAPIDS	KENT	26,863	11,510	28,308	
57	FORD MOTOR CO. WAYNE ASSEMBLY		WAYNE	WAYNE	14,710	21,450	27,354	
58	BRIGGS & STRATTON CORPORATION	RAVENNA FOUNDRY	RAVENNA	MUSKEGON	190	185	26,822	
59	COLLINS AND AIKMAN PLASTICS.		HOMER	CALHOUN	0	2,530	25,500	
60	BLACKMER-A DOVER RESOURCES CO.	FOUNDRY DIV.	GRAND RAPIDS	KENT	10,647	11,572	25,469	
61	REILLY PLATING CO.		MELVINDALE	WAYNE	56,400	0	25,150	
62	GM SMALL CAR GROUP	LANSING BODY PLANT	LANSING	INGHAM	3,785	18,478	25,125	
63	SPX CORP.	CONTECH DIVISION	DOWAGIAC	CASS	25,470	250	24,470	
64	GMC POWERTRAIN WARREN		WARREN	MACOMB		16,000	24,366	
65	COUNTRY FRESH INC.		GRAND RAPIDS	KENT	24,279	23,339	23,301	
66	UNIVERSAL APPLICATORS INC.		GRAND BLANC	GENESEE		5,000	23,049	
67	BEKAERT CORPORATION		MUSKEGON	MUSKEGON	9,360	7,094	22,345	
68	MICHIGAN SPECIALTY TUBE		SOUTH LYON	OAKLAND	16,650	26,364	22,103	
69	FORD MOTOR CO.	DEARBORN ENGINE PLANT	DEARBORN	WAYNE	39	33	21,917	
70	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	17,445	20,238	21,822	
71	WYMAN-GORDON FORGINGS INC. BRI		BRIGHTON	LIVINGSTON	10,063	19,900	20,774	
72	MEAD JOHNSON & COMPANY		ZEELAND	OTTAWA	16,540	18,000	20,000	
73	CHRYSLER CORP.	JEFFERSON NORTH ASSEMBLY PLANT	DETROIT	WAYNE	66,641	45,438	19,700	
74	ATMOSPHERE ANNEALING, INC.		LANSING	INGHAM	7,150	10,787	19,540	
75	UNC JOHNSON TECHNOLOGY		MUSKEGON	MUSKEGON	11,010	18,025	18,770	
76	UNC JOHNSON TECHNOLOGY		MUSKEGON	MUSKEGON	11,010	18,025	18,770	
77	DELPHI AUTOMOTIVE SYSTEMS		GRAND RAPIDS	KENT	16,517	12,890	18,762	
78	WEST MICHIGAN STEEL FOUNDRY		MUSKEGON	MUSKEGON	15,231	9,955	17,650	
79	SUPER STEEL TREATING CO.		WARREN	MACOMB	5,880	14,000	17,000	
80	SIMONDS INDUSTRIES INC.		BIG RAPIDS	MECOSTA	26,759	12,316	16,299	
81	GM POWERTRAIN BAY CITY PLANT		BAY CITY	BAY	44,634	53,547	15,890	
82	CHRYSLER CORP.	STERLING HEIGHTS ASSEMBLY	STERLING HEIGHTS	MACOMB	0	2,040	14,660	
83	IEM		IONIA	IONIA			14,652	
84	GUARDIAN FIBERGLASS INC.		ALBION	CALHOUN	7,321	14,139	14,594	
85	CANNON MUSKEGON CORPORATION		MUSKEGON	MUSKEGON	17,221	19,529	13,474	
86	MICHIGAN WHEEL CORP.		GRAND RAPIDS	KENT		0	13,430	
87	CHRYSLER CORP.	DETROIT AXLE PLANT	DETROIT	WAYNE	14,604	35	13,351	
88	WARNER-LAMBERT CO.	PARKE-DAVIS DIV.	HOLLAND	OTTAWA	19,320	3,405	12,430	
89	MLCG DETROIT/HAMTRAMCK	ASSEMBLY CENTER	DETROIT	WAYNE	11	33	12,327	
90	GMC TRUCK & BUS GROUP - FLINT	ASSEMBLY PLANT	FLINT	GENESEE	18,131	2,352	12,124	
91	CHRYSLER CORP.	TRENTON ENGINE PLANT	TRENTON	WAYNE		4,202	11,702	
92	FORD MOTOR CO.	RAWSONVILLE PLANT	YPSILANTI	WASHTENAW	250	250	11,250	
93	GM POWERTRAIN	DELTA ENGINE PLANT	LANSING	EATON	7,500	8,601	11,185	
94	FORD WIXOM ASSEMBLY PLANT		WIXOM	OAKLAND	8,255	8,500	11,042	
95	KEELER DIE CAST STEVENS STREET		GRAND RAPIDS	KENT	0	3,228	11,000	
96	FORD MOTOR CO.	LIVONIA TRANSMISSION PLANT	LIVONIA	WAYNE	23,600	2,300	10,200	
97	ITW FOAMSEAL		LAPEER	LAPEER	6,944	32,261	10,000	
98	HOOVER STEEL TREATING CO.		WARREN	MACOMB	5,650	5,050	9,450	
99	FORD MOTOR CO.	ROMEO ENGINE PLANT	ROMEO	MACOMB	7,220	8,100	9,095	
100	GM POWERTRAIN ROMULUS	ENGINE OPERATIONS	ROMULUS	WAYNE	0	3,450	8,817	

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1	S. D. WARREN COMPANY		MUSKEGON	MUSKEGON	4,210,284	4,077,983	4,094,885	
2	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	1,006,655	1,493,050	1,699,991	
3	LOMAC, INC.		MUSKEGON	MUSKEGON	423,655	1,440,755	1,651,101	
4	J&L SPECIALTY STEEL, INC.		DETROIT	WAYNE	900,394	1,000,750	1,500,297	
5	BASF CORPORATION	CHEMICAL ENGINEERING. R & D	WYANDOTTE	WAYNE	488,906	531,375	567,390	
6	CYTEC INDUSTRIES INC.		KALAMAZOO	KALAMAZOO	620,419	742,573	564,882	
7	FORD MOTOR CO.	LIVONIA TRANSMISSION PLANT	LIVONIA	WAYNE	281,956	281,700	401,600	
8	MLCG DETROIT/HAMTRAMCK	ASSEMBLY CENTER	DETROIT	WAYNE	37,204	74,637	278,232	
9	GM SMALL CAR GROUP	LANSING BODY PLANT	LANSING	INGHAM	1,906	22,161	258,387	
10	LEPRINO FOODS COMPANY		ALLENDALE	OTTAWA	203,722	168,802	238,259	
11	CURTIS METAL FINISHING CO.		STERLING HEIGHTS	MACOMB	898,993	1,365,162	182,839	
12	FORD MOTOR CO.	RAWSONVILLE PLANT	YPSILANTI	WASHTENAW	56,031	100,037	165,030	
13	GMC MIDSIZE/LUXURY CAR GROUP	ORION ASSEMBLY PLANT	ORION	OAKLAND	26,568	505,177	140,089	
14	FORD MOTOR CO.	MICHIGAN TRUCK PLANT	WAYNE	WAYNE	21,727	58,705	139,870	
15	DELPHI SAGINAW STEERING SYSTEM		SAGINAW	SAGINAW	5,741	70,060	117,180	
16	ESCO COMPANY LIMITED PARTNERSH		MUSKEGON	MUSKEGON	131,095	89,652	110,728	
17	CHRYSLER CORP.	JEFFERSON NORTH ASSEMBLY PLANT	DETROIT	WAYNE	107,482	124,749	104,996	
18	BEHR INDUSTRIES CORPORATION		COMSTOCK PARK	KENT	505	76,734	102,481	
19	GMC POWERTRAIN WARREN		WARREN	MACOMB		112,320	101,191	
20	LACKS INDUSTRIES, INC.	AIRLANE PLANT	KENTWOOD	KENT	81,950	54,825	93,150	
21	FORD MOTOR CO. WAYNE ASSEMBLY		WAYNE	WAYNE	30,610	40,620	82,600	
22	DAIMLERCHRYSLER CORP.	WARREN TRUCK ASSEMBLY PLANT	WARREN	MACOMB	105,520	97,110	79,270	
23	GMC NAO FLINT OPERATIONS		FLINT	GENESEE	6,249	7,178	75,830	
24	KALSEC, INC.		KALAMAZOO	KALAMAZOO	77,500	85,000	75,400	
25	WOLVERINE LEATHERS		ROCKFORD	KENT	49,232	69,819	72,219	
26	HART & COOLEY, INC.		HOLLAND	OTTAWA	65,000	82,900	70,593	
27	LEPRINO FOODS COMPANY		REMUS	MECOSTA	16,333	16,333	69,411	
28	CHRYSLER CORP.	STERLING HEIGHTS ASSEMBLY	STERLING HEIGHTS	MACOMB	48,850	63,671	62,620	
29	STEELCASE INC		GRAND RAPIDS	KENT	1,755	28,112	60,174	
30	MARATHON OIL CO.		DETROIT	WAYNE	64,918	76,916	59,472	
31	SUN CHEMICAL CORPORATION MUSKE		MUSKEGON	MUSKEGON	31,520	31,500	52,500	
32	DETROIT DIESEL CORPORATION		DETROIT	WAYNE	45,000	40,999	52,475	
33	FORD MOTOR CO. UTICA PLANT		SHELBY TWP.	MACOMB	63,190	37,095	50,510	
34	Delphi Energy & Engine Mgt	Systems, Flint East	FLINT	GENESEE	3,637	43,796	46,924	
35	PLASTIC PLATE, INC. PLANT 1		GRAND RAPIDS	KENT	40,550	31,585	46,153	
36	DELPHI CHASSIS LIVONIA		LIVONIA	WAYNE	89,550	24,750	45,380	
37	PLASTIC PLATE, INC. PLANT 2		KENTWOOD	KENT	38,300	48,500	42,725	
38	DIFCO LABORATORIES, INC		DETROIT	WAYNE	35,620	31,738	37,770	
39	GM POWERTRAIN ROMULUS	ENGINE OPERATIONS	ROMULUS	WAYNE	24,523	32,950	37,148	
40	EMBEST INC.		LIVONIA	WAYNE	31,195	24,797	34,717	
41	FORD MOTOR CO.	DEARBORN FRAME PLANT	DEARBORN	WAYNE	29,143	38,503	34,105	
42	UNISTRUT CORP.		WAYNE	WAYNE	25,846	29,289	33,942	
43	FKI AUTOMOTIVE KENTWOOD PLANT		KENTWOOD	KENT	545	22,426	30,069	
44	FORD MOTOR COMPANY	DEARBORN ASSEMBLY PLANT	DEARBORN	WAYNE	57,683	45,306	29,793	
45	NATIONAL STEEL CORP.	GREAT LAKES DIVISION	ECORSE	WAYNE	31,453	30,254	29,250	
46	GM METAL FABRICATING DIVISION	GRAND BLANC PLANT	GRAND BLANC	GENESEE	4,882	250	28,020	
47	HAWORTH, INC.		HOLLAND	ALLEGAN	45,400	30,000	27,400	
48	MCDONALD DAIRY		FLINT	GENESEE	45,497	37,061	25,821	
49	MACDERMID INC.	FERNDAL E LOCATION	FERNDAL E	OAKLAND	1,397	19,790	23,723	
50	COUNTRY FRESH INC.		GRAND RAPIDS	KENT	109,406	46,127	23,648	

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51	DOW AGRO SCIENCES		HARBOR BEACH	HURON		3,030	8,298	22,926
52	AGREVO U.S.A. COMPANY		MUSKEGON	MUSKEGON		2,293	2,551	22,843
53	DELPHI AUTOMOTIVE SYSTEMS		GRAND RAPIDS	KENT		46,219	41,189	22,325
54	NUMATICS INC.		OWOSSO	SHIAWASSEE		27,784	36,078	21,231
55	EAGLE OTTAWA LEATHER COMPANY		GRAND HAVEN	OTTAWA		16,154	13,500	20,950
56	VEMCO, INC.		GRAND BLANC	GENESEE		0		20,644
57	IMMUNO-U.S., INC.		ROCHESTER	OAKLAND		31,008	25,600	19,896
58	SUPER STEEL TREATING CO.		WARREN	MACOMB		16,550	15,675	19,005
59	AMWAY CORPORATION		ADA	KENT		23,350	19,050	17,550
60	WHITEHALL LEATHER CO.		WHITEHALL	MUSKEGON		18,400	17,080	17,080
61	HAYES-ALBION CORPORATION		JACKSON	JACKSON		31,000	18,000	16,800
62	QUAKER CHEMICAL CORPORATION	(2)	DETROIT	WAYNE		7,256	10,621	15,730
63	GENERAL MOTORS TRUCK GROUP	PONTIAC EAST ASSEMBLY	PONTIAC	OAKLAND		176,750	300,750	15,671
64	NUMATICS INC.		SANDUSKY	SANILAC		12,058	13,412	14,990
65	DELPHI SAGINAW STEERING SYSTEM		SAGINAW	SAGINAW		0	0	14,000
66	VENTURE GRAND RAPIDS, LLC		GRAND RAPIDS	KENT			0	13,287
67	FORD MOTOR CO. STERLING PLANT		STERLING HEIGHTS	MACOMB		10,395	3,000	12,959
68	MASTERCRAFT LEATHER COMPANY		ROCHESTER HILLS	OAKLAND			5,055	10,549
69	RICHARD-ALLAN SCIENTIFIC		KALAMAZOO	KALAMAZOO		31,087	17,929	9,679
70	HOWARD PLATING INDUSTRIES, INC		MADISON HEIGHTS	OAKLAND		9,981	8,336	8,608
71	KNOLL INC.		GRAND RAPIDS	KENT		5,900	5,575	8,212
72	HENKEL SURFACE TECHNOLOGIES		WARREN	MACOMB		1,015	2,180	6,045
73	MONSANTO - TRENTON, MI		TRENTON	WAYNE		2,860	3,130	5,460
74	CHRYSLER CORP.	DETROIT AXLE PLANT	DETROIT	WAYNE		13,234	111,111	5,415
75	GMC TRUCK & BUS GROUP - FLINT	ASSEMBLY PLANT	FLINT	GENESEE		25,794	9,738	5,290
76	AMERICAN LITHO, INC.		GRAND RAPIDS	KENT		0	4,065	5,163
77	METOKOTE CORPORATION PLANT 8		GRAND BLANC	GENESEE		12,467		5,157
78	PARK METALLURGICAL CORPORATION		DETROIT	WAYNE		4,280	4,390	5,020
79	GM SMALL CAR GROUP	LANSING PLANT #1	LANSING	INGHAM		850	632	4,407
80	KEELER BRASS COMPANY	FKI HARDWARE GROUP	GRAND RAPIDS	KENT		5,270	7,423	4,295
81	CSM INDUSTRIES, INC.		COLDWATER	BRANCH		404	72	4,071
82	GM METAL FAB DIVISION	LANSING PLANT #3	LANSING	INGHAM		22	1,029	3,741
83	KAYDON CORPORATION		MUSKEGON	MUSKEGON		4,100	3,700	3,500
84	FORD WIXOM ASSEMBLY PLANT		WIXOM	OAKLAND		114,910	43,120	3,287
85	FORD MOTOR CO.	MONROE STAMPING PLANT	MONROE	MONROE		11,450	16,365	3,000
86	AVON AUTOMOTIVE	PLANT 1	CADILLAC	WEXFORD		3,032	3,079	2,816
87	METALLOY CORP. HUDSON FNDRY. D		HUDSON	LENAWEE		2,800	2,500	2,700
88	LOCKHART CHEMICAL COMPANY		FLINT	GENESEE		2	1,745	2,692
89	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW		1,093	1,104	2,630
90	WYCKOFF CHEMICAL COMPANY, I		SOUTH HAVEN	VAN BUREN		14,548	7,214	2,546
91	GM PONTIAC SITE OPERATIONS		PONTIAC	OAKLAND		160	2,932	2,480
92	COCA-COLA BOTTLING COMPANY OF		DETROIT	WAYNE		0	780	2,230
93	BROOKS BEVERAGE MGT.		HOLLAND	ALLEGAN		2,365	1,068	2,020
94	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE		61,270	16,740	1,816
95	CHROME CRAFT CORP.		HIGHLAND PARK	WAYNE		1,500	1,500	1,500
96	MICHNER PLATING COMPANY		JACKSON	JACKSON		1,348	210	1,500
97	AMERICAN BUMPER & MFG. CO.		IONIA	IONIA		1,500	9,558	1,296
98	GM POWERTRAIN SAGINAW	MALLEABLE IRON PLANT	SAGINAW	SAGINAW		1,390	1,000	1,290
99	ZEELAND CHEMICALS, INC.		ZEELAND	OTTAWA		13,620	13,343	1,275
100	COCA-COLA BOTTLING COMPANY OF		FLINT	GENESEE		761	1,293	1,248

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1997 Rank	Facility Name	Facility Name 2	City	County	(lbs/year)		
					1995	1996	1997
1	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	25,413,565	28,773,853	24,092,742
2	PARKER HANNIFIN CORPORATION	BRASS PRODUCTS DIVISION	OTSEGO	ALLEGAN	14,399,100	12,749,308	20,631,761
3	GAGE PRODUCTS COMPANY		FERNDALE	OAKLAND	16,644,387	16,856,070	14,882,173
4	WARNER-LAMBERT CO.	PARKE-DAVIS DIV.	HOLLAND	OTTAWA	7,931,795	6,710,345	11,191,770
5	DU PONT MT. CLEMENS PLANT		MT. CLEMENS	MACOMB	14,292,407	10,879,923	10,635,116
6	DOW CORNING CORP.	MIDLAND SITE	MIDLAND	MIDLAND	9,476,634	8,708,882	8,951,303
7	SAMUEL-WHITTAR STEEL STRIP DIV		DETROIT	WAYNE		271,000	6,986,400
8	J&L SPECIALTY STEEL, INC.		DETROIT	WAYNE	6,660,000	6,550,000	6,660,000
9	PARKER HANNIFIN CORPORATION	BRASS PRODUCTS DIVISION	LAKEVIEW	MONTCALM		4,283,580	6,114,550
10	WYCKOFF CHEMICAL COMPANY, I		SOUTH HAVEN	VAN BUREN	3,212,327	5,511,833	5,699,268
11	CARDELL CORPORATION		AUBURN HILLS	OAKLAND			5,454,000
12	NORTH STAR STEEL COMPANY	MICHIGAN DIVISION	MONROE	MONROE	5,334,306	4,974,571	5,156,564
13	ANDERSON DEVELOPMENT CO.		ADRIAN	LENAWEE	4,430,390	4,661,161	4,241,406
14	MUELLER BRASS CO.		PORT HURON	ST CLAIR	3,152,550	3,219,920	3,409,895
15	ROUGE STEEL COMPANY		DEARBORN	WAYNE	1,179,964	4,598,156	3,086,102
16	BASF CORPORATION		DETROIT	WAYNE	3,157,350	1,803,020	2,638,682
17	UNITED TECHS. AUTOMOTIVE INC.		TRAVERSE CITY	GRAND TRAVERSE	2,489,700	2,588,388	2,621,877
18	ESCO COMPANY LIMITED PARTNERSH		MUSKEGON	MUSKEGON	1,561,800	1,350,100	2,590,220
19	STEELCASE INC		KENTWOOD	KENT	1,744,535	2,460,695	2,354,184
20	QUANEX CORPORATION, MACSTEEL	MICHIGAN DIVISION	JACKSON	JACKSON	1,700,737	1,715,507	2,068,171
21	AUGAT WIRING SYSTEMS & COMPONE		BOYNE CITY	CHARLEVOIX		2,036,297	2,054,351
22	BENTELER AUTOMOTIVE, INC.		GRAND RAPIDS	KENT	4,635,041	2,115,292	1,934,974
23	STEELCASE INC		GRAND RAPIDS	KENT	2,371,539	2,111,554	1,886,493
24	GRAND HAVEN BRASS FNDY.		GRAND HAVEN	OTTAWA	425,245	447,206	1,867,000
25	GRAND TRAVERSE STAMPING		TRAVERSE CITY	GRAND TRAVERSE	892,680	1,393,028	1,774,907
26	FEDERAL-MOGUL CORP.		ST. JOHNS	CLINTON	1,441,922	1,560,504	1,738,907
27	AMERICAN AXLE & MFG. INC.		DETROIT	WAYNE	264,050	314,644	1,723,264
28	LOMAC, INC.		MUSKEGON	MUSKEGON	626,525	1,048,570	1,343,053
29	DRAWFORM INC.		ZEELAND	OTTAWA		1,165,499	1,200,490
30	GENERAL MOTORS TRUCK GROUP	PONTIAC EAST ASSEMBLY	PONTIAC	OAKLAND	779,455	1,064,135	1,187,469
31	FORD MOTOR CO.	MICHIGAN TRUCK PLANT	WAYNE	WAYNE	1,051,654	962,007	1,091,002
32	GENERAL CABLE CORPORATION		CASS CITY	TUSCOLA	984,724	1,039,055	1,016,898
33	THE DELFIELD COMPANY		MT. PLEASANT	ISABELLA		741,342	865,490
34	DOW CHEMICAL COMPANY	MIDLAND OPERATIONS	MIDLAND	MIDLAND	0	25,650	855,979
35	H & H TUBE & MFG. CO.		VANDEBILT	OTSEGO	866,322	859,570	839,380
36	HOWMET CORPORATION - WHITEHALL	CASTING	WHITEHALL	MUSKEGON	653,453	837,922	838,236
37	FORD WIXOM ASSEMBLY PLANT		WIXOM	OAKLAND	517,656	1,260,349	834,088
38	UNISTRUT CORP.		WAYNE	WAYNE	59,555	863,186	771,800
39	FORD MOTOR CO. WAYNE ASSEMBLY		WAYNE	WAYNE	716,216	677,214	768,300
40	LIFT-TECH INTERNATIONAL INC.		MUSKEGON HEIGHTS	MUSKEGON	155,600	918,000	741,600
41	FORD MOTOR CO.	YPSILANTI PLANT	YPSILANTI	WASHTENAW	1,160,400	1,341,748	736,786
42	CHRYSLER CORP.	JEFFERSON NORTH ASSEMBLY PLANT	DETROIT	WAYNE	793,675	974,735	735,033
43	DAIMLERCHRYSLER CORP.	WARREN TRUCK ASSEMBLY PLANT	WARREN	MACOMB	1,121,918	429,875	725,276
44	FORD MOTOR COMPANY	DEARBORN ASSEMBLY PLANT	DEARBORN	WAYNE	1,237,599	19	684,104
45	Delphi Energy & Engine Mgt	Systems, Flint East	FLINT	GENESEE	643,649	665,740	681,562
46	MASCOTECH FORMING TECHNOLOGIES		ROYAL OAK	OAKLAND	427,100	604,100	663,203
47	GM SMALL CAR GROUP	LANSING BODY PLANT	LANSING	INGHAM	287,832	190,480	640,550
48	DENSO MANUFACTURING, MICH, INC		BATTLE CREEK	CALHOUN	643,258	145,938	614,138
49	DECO'PLATE MFG. CO		LAPEER	LAPEER	136,970	249,491	559,154
50	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE	709,341	396,188	558,446

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Rank	Facility Name	Facility Name 2	City	County				
51	MARSHALL EXCELSIOR		MARSHALL	CALHOUN		350,655	411,697	547,048
52	BENTELER AUTOMOTIVE COMPANY	CLAY AVENUE	GRAND RAPIDS	KENT				517,800
53	HITACHI MAGNETICS CORP.		EDMORE	MONTCALM		437,170	337,925	502,460
54	BENTELER AUTOMOTIVE, INC.		GRAND RAPIDS	KENT		277,217	194,074	479,990
55	ZEELAND CHEMICALS, INC.		ZEELAND	OTTAWA		781,701	575,885	479,704
56	AUTOCAM CORPORATION		KENTWOOD	KENT		519,823	384,283	445,940
57	STEELCASE WOOD		KENTWOOD	KENT		268,459	434,439	443,021
58	BASF CORPORATION	CHEMICAL ENGINEERING, R & D	WYANDOTTE	WAYNE		194,778	549,664	431,409
59	SEIBERT OXIDERMO INC		ROMULUS	WAYNE		305,131	338,864	426,468
60	AKZO NOBEL COATINGS INC.		PONTIAC	OAKLAND		97,947	92,162	418,167
61	HOSKINS MFG. CO.		MIO	OSCODA		180,076	265,130	385,275
62	FORD MOTOR CO. UTICA PLANT		SHELBY TWP.	MACOMB		381,330	210,926	381,230
63	RED SPOT WESTLAND, INC.		WESTLAND	WAYNE		212,571	304,255	381,063
64	WIRTZ MFG CO., INC. PLANT 2		PORT HURON	ST CLAIR		86,054	138,372	361,230
65	FORD MOTOR CO. STERLING PLANT		STERLING HEIGHTS	MACOMB		233,938	238,152	354,523
66	FORD MOTOR CO.	RAWSONVILLE PLANT	YPSILANTI	WASHTENAW		347,880	384,650	346,250
67	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW		1,679,847	115,851	339,065
68	DONNELLY CORPORATION		NEWAYGO	NEWAYGO		4,263	266,832	334,838
69	FORD MOTOR CO.	LIVONIA TRANSMISSION PLANT	LIVONIA	WAYNE		455,541	372,090	327,505
70	BENTELER AUTOMOTIVE, INC.		GALESBURG	KALAMAZOO		347,310	310,851	321,122
71	MARSHALL BRASS		MARSHALL	CALHOUN		4,347,698	4,425,996	309,387
72	METAL FLOW CORPORATION		HOLLAND	OTTAWA		245,000	257,000	308,000
73	HUNTSMAN CORPORATION		MARYSVILLE	ST CLAIR		182,373	265,862	307,800
74	HYDRO ALUMINUM ADRIAN, INC.		ADRIAN	LENAWEE		149,937	168,000	307,109
75	HAWORTH, INC.		HOLLAND	ALLEGAN		237,886	288,700	299,039
76	ESSEX SPECIALTY PRODS. INC.		HILLSDALE	HILLSDALE		108,700	269,200	284,075
77	ELECTRO-VOICE INC.		BUCHANAN	BERRIEN		284,500	320,380	282,180
78	HOSKINS MFG. COMPANY		CHARLEVOIX	CHARLEVOIX		0	0	279,413
79	SHERWIN-WILLIAMS DIVERSIFIED B		HOLLAND	ALLEGAN		120,613	168,528	262,074
80	FORD MOTOR CO.	WOODHAVEN FORGING	WOODHAVEN	WAYNE			110,000	260,000
81	TRANS-MATIC MFG. CO. INCORPORA		HOLLAND	ALLEGAN		202,925	193,200	259,200
82	DELPHI ENERGY & ENGINE MGT.	SYSTEMS, FLINT WEST	FLINT	GENESEE		297,714	386,707	249,018
83	TRUMARK, INC.		LANSING	EATON		353,897	404,606	244,505
84	BASF CORP. COATINGS DIVISION		GRAND RAPIDS	KENT		444,500	824,400	242,454
85	FEDERAL-MOGUL CORP.		GREENVILLE	MONTCALM			507,049	235,110
86	POLYMER PRODUCTS, INC.		GRAND RAPIDS	KENT			2,783,678	233,861
87	FORD MOTOR CO.	MILAN PLASTICS PLANT	MILAN	MONROE		88,205	177,785	229,645
88	EATON CORPORATION		SAGINAW	SAGINAW		205,356	253,201	225,229
89	PRECISION COATINGS, INC.		WALLED LAKE	OAKLAND		179,100	133,000	221,000
90	ALCHEM ALUMINUM, INC.		COLDWATER	BRANCH		592,097	290,054	207,923
91	RANDELL MANUFACTURING, INC.		WEIDMAN	ISABELLA		215,022	181,900	202,593
92	WOLVERINE COIL COATING, INC.		LINCOLN PARK	WAYNE		94,800	177,200	201,900
93	FORD MOTOR CO.	ROMEO ENGINE PLANT	ROMEO	MACOMB		193,990	179,828	199,000
94	GM SMALL CAR GROUP	LANSING PLANT #1	LANSING	INGHAM		60,224	183,176	198,801
95	CANNON MUSKEGON CORPORATION		MUSKEGON	MUSKEGON		146,795	252,454	197,387
96	IEM		IONIA	IONIA				195,907
97	SUPERIOR BRASS & ALUMINUM CAST		EAST LANSING	INGHAM		160,207	169,117	195,700
98	AMERICAN BUMPER & MFG. CO.		IONIA	IONIA		413,562	235,816	194,167
99	GMC MIDSIZE/LUXURY CAR GROUP	ORION ASSEMBLY PLANT	ORION	OAKLAND		246,939	191,568	188,183
100	MLCG DETROIT/HAMTRAMCK	ASSEMBLY CENTER	DETROIT	WAYNE		376,427	290,555	183,035

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1	ROUGE STEEL COMPANY		DEARBORN	WAYNE	11,247,710	13,143,855	13,502,815	
2	NATIONAL STEEL CORP.	GREAT LAKES DIVISION	ECORSE	WAYNE	13,645,167	14,085,382	8,036,107	
3	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	8,334,905	5,159,018	3,955,383	
4	AMERICAN TAPE CO.		MARYSVILLE	ST CLAIR	2,922,519	2,819,579	3,202,281	
5	HOLNAM INC - DUNDEE PLANT		DUNDEE	MONROE	3,144,300	3,097,962	3,147,134	
6	NEW HAVEN FOUNDRY		NEW HAVEN	MACOMB		752,280	2,637,710	
7	WARNER-LAMBERT CO.	PARKE-DAVIS DIV.	HOLLAND	OTTAWA	2,613,091	2,192,896	2,208,726	
8	FIBERMARK, INC	ROCHESTER MILL	ROCHESTER	OAKLAND	1,260,115	1,730,189	1,617,001	
9	DOW CHEMICAL COMPANY	MIDLAND OPERATIONS	MIDLAND	MIDLAND	1,228,629	1,523,414	1,529,059	
10	LAFARGE CORPORATION	(INCLUDING SYSTECH ENV. CORP.)	ALPENA	ALPENA	2,676,262	2,724,122	1,504,412	
11	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW	2,712,824	2,428,425	1,456,588	
12	STONE CONTAINER CORP.		ONTONAGON	ONTONAGON	652,607	1,006,590	1,188,311	
13	STEELCASE INC		GRAND RAPIDS	KENT	1,133,192	1,254,831	1,151,750	
14	FORD MOTOR CO.	MICHIGAN TRUCK PLANT	WAYNE	WAYNE	1,928,321	820,464	1,086,506	
15	MLCG DETROIT/HAMTRAMCK	ASSEMBLY CENTER	DETROIT	WAYNE	1,621,212	923,895	1,063,315	
16	GMC MIDSIZE/LUXURY CAR GROUP	ORION ASSEMBLY PLANT	ORION	OAKLAND	1,023,005	614,269	998,829	
17	MEAD PUBLISHING PAPER DIVISION		ESCANABA	DELTA	784,835	755,047	919,972	
18	VEMCO, INC.		GRAND BLANC	GENESEE	798,150		893,968	
19	GM SMALL CAR GROUP	LANSING BODY PLANT	LANSING	INGHAM	973,785	531,608	869,958	
20	FORD MOTOR CO. WAYNE ASSEMBLY		WAYNE	WAYNE	868,605	1,219,547	865,724	
21	CMI-CAST PARTS, INC.		CADILLAC	WEXFORD	610,200	616,519	779,600	
22	TOMKINS INDUSTRIES, INC. LASCO		THREE RIVERS	ST JOSEPH	617,437	800,410	777,400	
23	GENERAL MOTORS TRUCK GROUP	PONTIAC EAST ASSEMBLY	PONTIAC	OAKLAND	1,160,490	1,775,527	669,439	
24	LACKS INDUSTRIES, INC.	AIRLANE PLANT	KENTWOOD	KENT	2,520	2,020	634,854	
25	DAIMLERCHRYSLER CORP.	WARREN TRUCK ASSEMBLY PLANT	WARREN	MACOMB	924,347	565,910	612,433	
26	FORD MOTOR CO.	MILAN PLASTICS PLANT	MILAN	MONROE	457,337	814,600	606,350	
27	FORD MOTOR COMPANY	DEARBORN ASSEMBLY PLANT	DEARBORN	WAYNE	1,027,810	455,169	589,976	
28	TEXTRON AUTOMOTIVE PRODUCTS		EVART	OSCEOLA	232,850	451,945	582,779	
29	KALSEC, INC.		KALAMAZOO	KALAMAZOO	615,700	689,000	582,000	
30	AFCO INDUSTRIES, INC.		HOLLAND	ALLEGAN	438,160	505,050	571,410	
31	FORD MOTOR CO.	ROUGE POWER & UTILITIES OPS.	DEARBORN	WAYNE	449,425	630,129	550,099	
32	PENINSULA COPPER IND. INC.		HUBBELL	HOUGHTON	923,917	665,143	509,670	
33	ALLIED SIGNAL, INC		DETROIT	WAYNE	41,484	291,294	495,420	
34	TENNECO PACKAGING INC.		FILER CITY	MANISTEE	388,951	410,470	483,824	
35	GMC TRUCK & BUS GROUP - FLINT	ASSEMBLY PLANT	FLINT	GENESEE	959,999	261,169	465,493	
36	MENOMINEE PAPER CO. INC		MENOMINEE	MENOMINEE	248,260	340,260	442,705	
37	CHAMPION INTL. CORP.		QUINNESEC	DICKINSON	433,326	418,960	425,610	
38	FORD MOTOR CO. UTICA PLANT		SHELBY TWP.	MACOMB	433,554	409,257	410,038	
39	MCLAREN ENGINES, INC.		LIVONIA	WAYNE		167,855	398,800	
40	DOW CORNING CORP.	MIDLAND SITE	MIDLAND	MIDLAND	545,560	546,891	379,423	
41	ZEELAND CHEMICALS, INC.		ZEELAND	OTTAWA	226,141	212,330	378,117	
42	FORD WIXOM ASSEMBLY PLANT		WIXOM	OAKLAND	656,490	520,595	377,708	
43	HAYES-ALBION CORPORATION		ALBION	CALHOUN	966,197	1,095,388	374,353	
44	GMC NAO FLINT OPERATIONS		FLINT	GENESEE	827,497	1,023,012	364,852	
45	CHRYSLER CORP.	JEFFERSON NORTH ASSEMBLY PLANT	DETROIT	WAYNE	542,129	492,459	354,059	
46	GM SMALL CAR GROUP	LANSING PLANT #1	LANSING	INGHAM	411,813	340,853	341,268	
47	OMC RECREATIONAL BOAT GROUP	LP-MI (SPORT DIVISION)	CADILLAC	WEXFORD	296,053	255,470	323,730	
48	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE	1,378,442	1,495,144	320,158	
49	S. D. WARREN COMPANY		MUSKEGON	MUSKEGON	423,129	303,851	314,861	
50	CHRYSLER CORP.	STERLING HEIGHTS ASSEMBLY	STERLING HEIGHTS	MACOMB	441,623	339,309	310,029	

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51	IMCO RECYCLING OF MICHIGAN LLC		COLDWATER	BRANCH			308,254
52	VENTURE GRAND RAPIDS, LLC		GRAND RAPIDS	KENT		1,867	306,708
53	GEORGIA-PACIFIC CORPORATION		KALAMAZOO	KALAMAZOO	202,250	190,472	293,723
54	STURGIS FNDY. CORP.		STURGIS	ST JOSEPH	84,489	77,199	293,381
55	DAY INTERNATIONAL		THREE RIVERS	ST JOSEPH	251,955	232,777	276,220
56	ERVIN INDUSTRIES, INC.		ADRIAN	LENAWEE	243,866	500	273,722
57	EAGLE OTTAWA LEATHER COMPANY		GRAND HAVEN	OTTAWA	267,163	277,370	271,010
58	KEELER BRASS COMPANY	FKI HARDWARE GROUP	GRAND RAPIDS	KENT	323,980	227,406	254,265
59	HURON CASTING INC.		PIGEON	HURON	324,255	229,555	248,655
60	STEELCASE WOOD		KENTWOOD	KENT	147,735	210,339	238,456
61	HAWORTH, INC.		HOLLAND	ALLEGAN	175,920	217,200	236,530
62	LOMAC, INC.		MUSKEGON	MUSKEGON	297,581	217,648	227,638
63	AUTOMOTIVE COMPOSITES COMPANY		STERLING HEIGHTS	MACOMB	256,512	196,037	221,858
64	FKI AUTOMOTIVE KENTWOOD PLANT		KENTWOOD	KENT	160,660	134,022	213,542
65	MARATHON OIL CO.		DETROIT	WAYNE	120,837	119,715	211,174
66	QUANEX CORPORATION, MACSTEEL	MICHIGAN DIVISION	JACKSON	JACKSON	70,344	176,948	208,547
67	STEELCASE INC		KENTWOOD	KENT	393,007	358,914	205,861
68	OMC RECREATIONAL BOAT GROUP	LP-MI (CRUISER DIVISION)	CADILLAC	WEXFORD	219,283	203,555	191,315
69	WEYERHAEUSER CO.		GRAYLING	CRAWFORD	188,715	204,508	190,723
70	GEORGIE BOY MANUFACTURING, INC		EDWARDSBURG	CASS	133,266	276,959	184,345
71	WOLVERINE LEATHERS		ROCKFORD	KENT	116,566	135,505	181,118
72	PAULSTRA CRC CADILLAC DIVISION		CADILLAC	WEXFORD	42,950	152,461	170,845
73	COMMERCIAL STEEL TREATING CORP		MADISON HEIGHTS	OAKLAND	129,496		163,045
74	MENASHA CORP.		OTSEGO	ALLEGAN	330,097	160,710	161,896
75	Delphi Energy & Engine Mgt	Systems, Flint East	FLINT	GENESEE	157,750	111,687	156,854
76	MAYCO PLASTICS, INC.		STERLING HEIGHTS	MACOMB	55,025	68,164	153,714
77	DELPHI SAGINAW STEERING SYSTEM		SAGINAW	SAGINAW	228,420	190,869	151,580
78	PERFECT CIRCLE SEALED POWER DI	OF DANA CORPORATION	ST. JOHNS	CLINTON	142,318	270,731	145,310
79	ITW CODING PRODUCTS		KALKASKA	KALKASKA	337,614	266,756	137,511
80	HUNTSMAN CORPORATION		MARYSVILLE	ST CLAIR	174,752	194,240	135,940
81	ELF ATOCHEM NORTH AMERICA,INC	RIVERVIEW PLANT	RIVERVIEW	WAYNE	183,281	184,163	134,022
82	WOLVERINE COIL COATING, INC.		LINCOLN PARK	WAYNE	61,050	120,400	131,800
83	HOWARD PLATING INDUSTRIES, INC		MADISON HEIGHTS	OAKLAND	190,254	206,838	130,885
84	DELPHI INTERIOR & LGHTNG SYSTS	ADRIAN OPERATIONS	ADRIAN	LENAWEE	94,750	108,030	126,868
85	MERIDIAN, INC. - PLANT A & D		SPRING LAKE	OTTAWA	72,455	82,650	126,805
86	BASF CORPORATION		DETROIT	WAYNE	271,240	132,452	124,699
87	REILLY PLATING CO.		MELVINDALE	WAYNE	56,400	89,000	122,150
88	NORTH STAR STEEL COMPANY	MICHIGAN DIVISION	MONROE	MONROE	28,872	19,966	121,859
89	AUSTEMPER, INC.		CLINTON TWP.	MACOMB	1,200	1,200	120,000
90	PLASTIC PLATE, INC. PLANT 1		GRAND RAPIDS	KENT	2,520	2,770	118,335
91	DECO'PLATE MFG. CO		LAPEER	LAPEER	81,915	63,330	112,304
92	DU PONT MT. CLEMENS PLANT		MT. CLEMENS	MACOMB	144,579	117,940	110,574
93	LEXAMAR CORPORATION		BOYNE CITY	CHARLEVOIX	43,807	87,774	109,947
94	KIMBERLY-CLARK CORP.		MUNISING	ALGER	89,500	110,500	109,500
95	GUARDIAN FIBERGLASS INC.		ALBION	CALHOUN	104,621	107,247	108,590
96	HOWARD MILLER COMPANY		ZEELAND	OTTAWA	115,100	92,300	108,394
97	J&L SPECIALTY STEEL, INC.		DETROIT	WAYNE	100,089	103,088	108,090
98	GMC POWERTRAIN, WILLOW RUN		YPSILANTI	WASHTENAW	300,692	91,117	107,928
99	COMMONWEALTH INDUSTRIES		DETROIT	WAYNE	52,336	76,900	101,322
100	DOTT MFG. CO.		DECKERVILLE	SANILAC	92,859	83,840	100,406

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1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Total Transfers by Facility for 1997
 with 1995 and 1996 Comparisons

1997 Rank	Facility Name	Facility Name 2	City	County	(lbs/year)		
					1995	1996	1997
1	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	26,420,220	30,266,903	25,792,733
2	PARKER HANNIFIN CORPORATION	BRASS PRODUCTS DIVISION	OTSEGO	ALLEGAN	14,399,600	12,749,808	20,632,261
3	GAGE PRODUCTS COMPANY		FERNDALE	OAKLAND	16,644,760	16,856,308	14,882,379
4	WARNER-LAMBERT CO.	PARKE-DAVIS DIV.	HOLLAND	OTTAWA	7,931,795	6,710,345	11,191,770
5	DU PONT MT. CLEMENS PLANT		MT. CLEMENS	MACOMB	14,292,598	10,880,140	10,635,200
6	DOW CORNING CORP.	MIDLAND SITE	MIDLAND	MIDLAND	9,476,634	8,708,882	8,951,303
7	J&L SPECIALTY STEEL, INC.		DETROIT	WAYNE	7,560,394	7,550,750	8,160,297
8	SAMUEL-WHITTAR STEEL STRIP DIV		DETROIT	WAYNE		271,000	6,986,400
9	PARKER HANNIFIN CORPORATION	BRASS PRODUCTS DIVISION	LAKEVIEW	MONTCALM		4,283,590	6,114,805
10	WYCKOFF CHEMICAL COMPANY, I		SOUTH HAVEN	VAN BUREN	3,226,875	5,519,047	5,701,814
11	CARDELL CORPORATION		AUBURN HILLS	OAKLAND			5,454,000
12	NORTH STAR STEEL COMPANY	MICHIGAN DIVISION	MONROE	MONROE	5,335,556	4,974,959	5,156,789
13	ANDERSON DEVELOPMENT CO.		ADRIAN	LENAWEE	4,430,390	4,661,161	4,241,406
14	S. D. WARREN COMPANY		MUSKEGON	MUSKEGON	4,210,284	4,077,983	4,094,885
15	MUELLER BRASS CO.		PORT HURON	ST CLAIR	3,153,555	3,220,680	3,410,410
16	ROUGE STEEL COMPANY		DEARBORN	WAYNE	1,179,964	4,598,156	3,086,102
17	LOMAC, INC.		MUSKEGON	MUSKEGON	1,050,180	2,489,325	2,994,154
18	ESCO COMPANY LIMITED PARTNERSH		MUSKEGON	MUSKEGON	1,692,895	1,439,752	2,700,948
19	BASF CORPORATION		DETROIT	WAYNE	3,157,640	1,803,550	2,639,093
20	UNITED TECHS. AUTOMOTIVE INC.		TRAVERSE CITY	GRAND TRAVERSE	2,489,700	2,588,388	2,621,877
21	STEELCASE INC		KENTWOOD	KENT	1,746,285	2,460,695	2,354,184
22	QUANEX CORPORATION, MACSTEEL	MICHIGAN DIVISION	JACKSON	JACKSON	1,700,737	1,715,507	2,068,171
23	AUGAT WIRING SYSTEMS & COMPONE		BOYNE CITY	CHARLEVOIX		2,036,297	2,054,351
24	STEELCASE INC		GRAND RAPIDS	KENT	2,373,294	2,139,666	1,946,667
25	BENTELER AUTOMOTIVE, INC.		GRAND RAPIDS	KENT	4,635,041	2,115,292	1,934,974
26	GRAND HAVEN BRASS FNDY.		GRAND HAVEN	OTTAWA	425,995	447,956	1,867,014
27	GRAND TRAVERSE STAMPING		TRAVERSE CITY	GRAND TRAVERSE	892,680	1,393,028	1,774,907
28	FEDERAL-MOGUL CORP.		ST. JOHNS	CLINTON	1,441,932	1,560,516	1,738,924
29	AMERICAN AXLE & MFG. INC.		DETROIT	WAYNE	265,080	318,044	1,723,792
30	FORD MOTOR CO.	MICHIGAN TRUCK PLANT	WAYNE	WAYNE	1,073,381	1,020,712	1,230,872
31	GENERAL MOTORS TRUCK GROUP	PONTIAC EAST ASSEMBLY	PONTIAC	OAKLAND	956,205	1,364,885	1,203,140
32	DRAWFORM INC.		ZEELAND	OTTAWA		1,165,499	1,200,490
33	GENERAL CABLE CORPORATION		CASS CITY	TUSCOLA	984,724	1,039,055	1,016,898
34	BASF CORPORATION	CHEMICAL ENGINEERING. R & D	WYANDOTTE	WAYNE	683,684	1,081,039	998,799
35	GM SMALL CAR GROUP	LANSING BODY PLANT	LANSING	INGHAM	289,738	212,641	898,937
36	THE DELFIELD COMPANY		MT. PLEASANT	ISABELLA		741,342	865,490
37	DOW CHEMICAL COMPANY	MIDLAND OPERATIONS	MIDLAND	MIDLAND	0	25,650	855,979
38	FORD MOTOR CO. WAYNE ASSEMBLY		WAYNE	WAYNE	746,826	717,834	850,900
39	CHRYSLER CORP.	JEFFERSON NORTH ASSEMBLY PLANT	DETROIT	WAYNE	901,157	1,099,484	840,029
40	H & H TUBE & MFG. CO.		VANDEBILT	OTSEGO	866,322	859,570	839,380
41	HOWMET CORPORATION - WHITEHALL	CASTING	WHITEHALL	MUSKEGON	654,453	838,922	839,236
42	FORD WIXOM ASSEMBLY PLANT		WIXOM	OAKLAND	632,566	1,303,469	837,375
43	UNISTRUT CORP.		WAYNE	WAYNE	85,401	892,475	805,742
44	DAIMLERCHRYSLER CORP.	WARREN TRUCK ASSEMBLY PLANT	WARREN	MACOMB	1,227,438	526,985	804,546
45	LIFT-TECH INTERNATIONAL INC.		MUSKEGON HEIGHTS	MUSKEGON	155,600	918,000	741,600
46	FORD MOTOR CO.	YPSILANTI PLANT	YPSILANTI	WASHTENAW	1,160,400	1,341,748	736,786
47	FORD MOTOR CO.	LIVONIA TRANSMISSION PLANT	LIVONIA	WAYNE	737,497	653,790	729,105
48	Delphi Energy & Engine Mgt	Systems, Flint East	FLINT	GENESEE	647,286	709,536	728,486
49	FORD MOTOR COMPANY	DEARBORN ASSEMBLY PLANT	DEARBORN	WAYNE	1,295,282	45,325	713,897
50	MASCOTECH FORMING TECHNOLOGIES		ROYAL OAK	OAKLAND	427,100	604,100	663,203

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1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Total Transfers by Facility for 1997
 with 1995 and 1996 Comparisons

						----- (lbs/year) -----		
1997						1995	1996	1997
Rank	Facility Name	Facility Name 2	City	County				
51	DENSO MANUFACTURING, MICH, INC		BATTLE CREEK	CALHOUN		658,201	146,905	614,725
52	CYTEC INDUSTRIES INC.		KALAMAZOO	KALAMAZOO		639,308	745,105	572,425
53	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE		770,611	412,928	560,262
54	DECO'PLATE MFG. CO		LAPEER	LAPEER		137,230	249,746	559,479
55	MARSHALL EXCELSIOR		MARSHALL	CALHOUN		350,655	411,697	547,048
56	BENTELER AUTOMOTIVE COMPANY	CLAY AVENUE	GRAND RAPIDS	KENT				517,800
57	FORD MOTOR CO.	RAWSONVILLE PLANT	YPSILANTI	WASHTENAW		403,911	484,687	511,280
58	HITACHI MAGNETICS CORP.		EDMORE	MONTCALM		437,170	337,925	502,460
59	ZEELAND CHEMICALS, INC.		ZEELAND	OTTAWA		795,321	589,228	480,979
60	BENTELER AUTOMOTIVE, INC.		GRAND RAPIDS	KENT		277,227	194,088	479,999
61	MLCG DETROIT/HAMTRAMCK	ASSEMBLY CENTER	DETROIT	WAYNE		413,631	365,192	461,267
62	AUTOCAM CORPORATION		KENTWOOD	KENT		519,823	384,283	445,940
63	STEELCASE WOOD		KENTWOOD	KENT		268,459	434,439	443,021
64	FORD MOTOR CO. UTICA PLANT		SHELBY TWP.	MACOMB		444,520	248,021	431,740
65	SEIBERT OXIDERMO INC		ROMULUS	WAYNE		305,131	338,864	426,468
66	AKZO NOBEL COATINGS INC.		PONTIAC	OAKLAND		97,956	92,162	418,167
67	HOSKINS MFG. CO.		MIO	OSCODA		180,076	265,130	385,275
68	RED SPOT WESTLAND, INC.		WESTLAND	WAYNE		212,571	304,255	381,063
69	FORD MOTOR CO. STERLING PLANT		STERLING HEIGHTS	MACOMB		244,333	241,152	367,482
70	WIRTZ MFG CO., INC. PLANT 2		PORT HURON	ST CLAIR		86,054	138,372	361,230
71	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW		1,680,940	116,955	341,695
72	DONNELLY CORPORATION		NEWAYGO	NEWAYGO		4,263	266,832	334,838
73	GMC MIDSIZE/LUXURY CAR GROUP	ORION ASSEMBLY PLANT	ORION	OAKLAND		273,507	696,745	328,272
74	HAWORTH, INC.		HOLLAND	ALLEGAN		283,286	318,700	326,439
75	BENTELER AUTOMOTIVE, INC.		GALESBURG	KALAMAZOO		347,315	310,862	321,126
76	MARSHALL BRASS		MARSHALL	CALHOUN		4,347,703	4,426,001	309,392
77	METAL FLOW CORPORATION		HOLLAND	OTTAWA		245,015	257,015	308,025
78	HUNTSMAN CORPORATION		MARYSVILLE	ST CLAIR		182,373	265,862	307,800
79	HYDRO ALUMINUM ADRIAN, INC.		ADRIAN	LENAWEE		150,187	168,250	307,114
80	ESSEX SPECIALTY PRODS. INC.		HILLSDALE	HILLSDALE		108,700	269,200	284,075
81	ELECTRO-VOICE INC.		BUCHANAN	BERRIEN		284,500	320,380	282,180
82	HOSKINS MFG. COMPANY		CHARLEVOIX	CHARLEVOIX		0	0	279,413
83	SHERWIN-WILLIAMS DIVERSIFIED B		HOLLAND	ALLEGAN		120,613	168,528	262,074
84	FORD MOTOR CO.	WOODHAVEN FORGING	WOODHAVEN	WAYNE			110,000	260,000
85	TRANS-MATIC MFG. CO. INCORPORA		HOLLAND	ALLEGAN		202,925	193,200	259,200
86	DELPHI ENERGY & ENGINE MGT.	SYSTEMS, FLINT WEST	FLINT	GENESEE		297,913	386,763	249,037
87	GMC NAO FLINT OPERATIONS		FLINT	GENESEE		416,607	186,900	247,487
88	TRUMARK, INC.		LANSING	EATON		353,897	404,606	244,505
89	BASF CORP. COATINGS DIVISION		GRAND RAPIDS	KENT		444,500	824,400	242,454
90	LEPRINO FOODS COMPANY		ALLENDALE	OTTAWA		203,722	168,802	238,259
91	FEDERAL-MOGUL CORP.		GREENVILLE	MONTCALM			507,049	235,110
92	POLYMER PRODUCTS, INC.		GRAND RAPIDS	KENT			2,783,678	233,861
93	FORD MOTOR CO.	MILAN PLASTICS PLANT	MILAN	MONROE		88,205	177,785	229,645
94	EATON CORPORATION		SAGINAW	SAGINAW		205,861	253,711	225,739
95	PRECISION COATINGS, INC.		WALLED LAKE	OAKLAND		179,100	133,000	221,000
96	CHRYSLER CORP.	STERLING HEIGHTS ASSEMBLY	STERLING HEIGHTS	MACOMB		188,900	309,752	212,952
97	ALCHEM ALUMINUM, INC.		COLDWATER	BRANCH		592,097	290,054	207,923
98	CURTIS METAL FINISHING CO.		STERLING HEIGHTS	MACOMB		955,069	1,403,257	204,750
99	GM SMALL CAR GROUP	LANSING PLANT #1	LANSING	INGHAM		61,074	183,808	203,208
100	RANDELL MANUFACTURING, INC.		WEIDMAN	ISABELLA		215,022	181,900	202,593

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Appendix F:
Changes in Facility Releases
from 1996 to 1997

1997 TRI DATA - STATE OF MICHIGAN
 Top 50 Decreases in Total Releases
 by Facility from 1996 to 1997

					----- (lbs/year) -----		
1997 Rank	Facility Name	Facility Name 2	City	County	1996 Releases	1997 Releases	Decrease
1	NATIONAL STEEL CORP.	GREAT LAKES DIVISION	ECORSE	WAYNE	14,085,382	8,036,107	-6,049,275
2	LAFARGE CORPORATION	(INCLUDING SYSTECH ENV. CORP.)	ALPENA	ALPENA	2,724,122	1,504,412	-1,219,710
3	PHARMACIA & UPJOHN	PRODUCTION FACILITY	KALAMAZOO	KALAMAZOO	5,159,018	3,955,383	-1,203,635
4	AUTOALLIANCE INTERNATIONAL INC		FLAT ROCK	WAYNE	1,495,144	320,158	-1,174,986
5	GENERAL MOTORS TRUCK GROUP	PONTIAC EAST ASSEMBLY	PONTIAC	OAKLAND	1,775,527	669,439	-1,106,088
6	GMPTG-SAGINAW METAL CASTING		SAGINAW	SAGINAW	2,428,425	1,456,588	-971,837
7	HAYES-ALBION CORPORATION		ALBION	CALHOUN	1,095,388	374,353	-721,035
8	GMC NAO FLINT OPERATIONS		FLINT	GENESEE	1,023,012	364,852	-658,160
9	FORD MOTOR CO. WAYNE ASSEMBLY		WAYNE	WAYNE	1,219,547	865,724	-353,823
10	METALWORKS INC		LUDINGTON	MASON	248,853	39,084	-209,769
11	FORD MOTOR CO.	MILAN PLASTICS PLANT	MILAN	MONROE	814,600	606,350	-208,250
12	DOW CORNING CORP.	MIDLAND SITE	MIDLAND	MIDLAND	546,891	379,423	-167,468
13	CURTIS METAL FINISHING CO.		STERLING HEIGHTS	MACOMB	197,070	33,535	-163,535
14	PENINSULA COPPER IND. INC.		HUBBELL	HOUGHTON	665,143	509,670	-155,473
15	STEELCASE INC		KENTWOOD	KENT	358,914	205,861	-153,053
16	FORD WIXOM ASSEMBLY PLANT		WIXOM	OAKLAND	520,595	377,708	-142,887
17	CHRYSLER CORP.	JEFFERSON NORTH ASSEMBLY PLANT	DETROIT	WAYNE	492,459	354,059	-138,400
18	ITW CODING PRODUCTS		KALKASKA	KALKASKA	266,756	137,511	-129,245
19	PERFECT CIRCLE SEALED POWER DI	OF DANA CORPORATION	ST. JOHNS	CLINTON	270,731	145,310	-125,421
20	DELPHI ENERGY & ENGINE MGT.	SYSTEMS, FLINT WEST	FLINT	GENESEE	134,097	15,005	-119,092
21	PAULSTRA CRC CORPORATION		GRAND RAPIDS	KENT	128,722	15,022	-113,700
22	FIBERMARK, INC	ROCHESTER MILL	ROCHESTER	OAKLAND	1,730,189	1,617,001	-113,188
23	KALSEC, INC.		KALAMAZOO	KALAMAZOO	689,000	582,000	-107,000
24	STEELCASE INC		GRAND RAPIDS	KENT	1,254,831	1,151,750	-103,081
25	GEORGIE BOY MANUFACTURING, INC		EDWARDSBURG	CASS	276,959	184,345	-92,614
26	GM POWERTRAIN SAGINAW	MALLEABLE IRON PLANT	SAGINAW	SAGINAW	167,952	86,124	-81,828
27	FORD MOTOR CO.	ROUGE POWER & UTILITIES OPS.	DEARBORN	WAYNE	630,129	550,099	-80,030
28	FORD MOTOR CO.	MONROE STAMPING PLANT	MONROE	MONROE	118,040	40,423	-77,617
29	MONITOR SUGAR COMPANY		BAY CITY	BAY	150,000	74,000	-76,000
30	HOWARD PLATING INDUSTRIES, INC		MADISON HEIGHTS	OAKLAND	206,838	130,885	-75,953
31	FORD MOTOR CO.	RAWSONVILLE PLANT	YPSILANTI	WASHTENAW	105,366	32,205	-73,161
32	CHEMREX, INC.		MATTAWAN	VAN BUREN	97,529	27,443	-70,086
33	CROWN GROUP ECORSE MI PLANT		ECORSE	WAYNE	113,598	46,993	-66,605
34	LACKS INDUSTRIES, INC.	RALEIGH PLANT	KENTWOOD	KENT	110,612	46,302	-64,310
35	AAR CADILLAC MANUFACTURING		CADILLAC	WEXFORD	75,755	12,022	-63,733
36	THE WORDEN COMPANY		HOLLAND	OTTAWA	83,000	20,900	-62,100
37	ACHESON COLLOIDS COMPANY		PORT HURON	ST CLAIR	73,959	13,736	-60,223
38	WHITEHALL LEATHER CO.		WHITEHALL	MUSKEGON	59,000	0	-59,000
39	HUNTSMAN CORPORATION		MARYSVILLE	ST CLAIR	194,240	135,940	-58,300
40	MOTOR PRODS.-OWOSSO CORP.		OWOSSO	SHIAWASSEE	53,018	1,995	-51,023
41	ELF ATOCHEM NORTH AMERICA,INC	RIVERVIEW PLANT	RIVERVIEW	WAYNE	184,163	134,022	-50,141
42	ALMOND CORPORATION		MUSKEGON	MUSKEGON	52,970	8,934	-44,036
43	AMERICAN BUMPER & MFG. CO.		IONIA	IONIA	105,666	65,414	-40,252
44	DELPHI SAGINAW STEERING SYSTEM		SAGINAW	SAGINAW	190,869	151,580	-39,289
45	LTV STEEL COMPANY, INC	FERNDALE PLANT	FERNDALE	OAKLAND	74,610	35,768	-38,842
46	BASF CORPORATION	CHEMICAL ENGINEERING. R & D	WYANDOTTE	WAYNE	54,535	15,934	-38,601
47	STANDARD PRODS. CO.		GAYLORD	OTSEGO	69,660	31,310	-38,350
48	GM POWERTRAIN BAY CITY PLANT		BAY CITY	BAY	53,551	15,896	-37,655
49	LOUISIANA PACIFIC CORPORATION		SAGOLA	DICKINSON	61,766	24,276	-37,490
50	CDR PIGMENTS & DISPERSIONS		HOLLAND	OTTAWA	45,610	8,372	-37,238

1997 TRI DATA - STATE OF MICHIGAN
Top 50 Increases in Total Releases by Facility
from 1996 to 1997

					----- (lbs/year) -----		
1997 Rank	Facility Name	Facility Name 2	City	County	1996 Releases	1997 Releases	Increase
1	NEW HAVEN FOUNDRY		NEW HAVEN	MACOMB	752,280	2,637,710	1,885,430
2	LACKS INDUSTRIES, INC.	AIRLANE PLANT	KENTWOOD	KENT	2,020	634,854	632,834
3	GMC MIDSIZE/LUXURY CAR GROUP	ORION ASSEMBLY PLANT	ORION	OAKLAND	614,269	998,829	384,560
4	AMERICAN TAPE CO.		MARYSVILLE	ST CLAIR	2,819,579	3,202,281	382,702
5	ROUGE STEEL COMPANY		DEARBORN	WAYNE	13,143,855	13,502,815	358,960
6	GM SMALL CAR GROUP	LANSING BODY PLANT	LANSING	INGHAM	531,608	869,958	338,350
7	VENTURE GRAND RAPIDS, LLC		GRAND RAPIDS	KENT	1,867	306,708	304,841
8	ERVIN INDUSTRIES, INC.		ADRIAN	LENAWEE	500	273,722	273,222
9	FORD MOTOR CO.	MICHIGAN TRUCK PLANT	WAYNE	WAYNE	820,464	1,086,506	266,042
10	MCLAREN ENGINES, INC.		LIVONIA	WAYNE	167,855	398,800	230,945
11	STURGIS FNDY. CORP.		STURGIS	ST JOSEPH	77,199	293,381	216,182
12	GMC TRUCK & BUS GROUP - FLINT	ASSEMBLY PLANT	FLINT	GENESEE	261,169	465,493	204,324
13	ALLIED SIGNAL, INC		DETROIT	WAYNE	291,294	495,420	204,126
14	STONE CONTAINER CORP.		ONTONAGON	ONTONAGON	1,006,590	1,188,311	181,721
15	ZEELAND CHEMICALS, INC.		ZEELAND	OTTAWA	212,330	378,117	165,787
16	MEAD PUBLISHING PAPER DIVISION		ESCANABA	DELTA	755,047	919,972	164,925
17	CMI-CAST PARTS, INC.		CADILLAC	WEXFORD	616,519	779,600	163,081
18	MLCG DETROIT/HAMTRAMCK	ASSEMBLY CENTER	DETROIT	WAYNE	923,895	1,063,315	139,420
19	FORD MOTOR COMPANY	DEARBORN ASSEMBLY PLANT	DEARBORN	WAYNE	455,169	589,976	134,807
20	TEXTRON AUTOMOTIVE PRODUCTS		EVART	OSCEOLA	451,945	582,779	130,834
21	AUSTEMPER, INC.		CLINTON TWP.	MACOMB	1,200	120,000	118,800
22	PLASTIC PLATE, INC. PLANT 1		GRAND RAPIDS	KENT	2,770	118,335	115,565
23	GEORGIA-PACIFIC CORPORATION		KALAMAZOO	KALAMAZOO	190,472	293,723	103,251
24	MENOMINEE PAPER CO. INC		MENOMINEE	MENOMINEE	340,260	442,705	102,445
25	NORTH STAR STEEL COMPANY	MICHIGAN DIVISION	MONROE	MONROE	19,966	121,859	101,893
26	MARATHON OIL CO.		DETROIT	WAYNE	119,715	211,174	91,459
27	FEDERAL-MOGUL CORP.		GREENVILLE	MONTCALM	450	87,366	86,916
28	MAYCO PLASTICS, INC.		STERLING HEIGHTS	MACOMB	68,164	153,714	85,550
29	FKI AUTOMOTIVE KENTWOOD PLANT		KENTWOOD	KENT	134,022	213,542	79,520
30	TENNECO PACKAGING INC.		FILER CITY	MANISTEE	410,470	483,824	73,354
31	R. J. MARSHALL COMPANY		ERIE	MONROE	348	71,126	70,778
32	CHROME CRAFT CORP.		HIGHLAND PARK	WAYNE	2,000	72,000	70,000
33	OMC RECREATIONAL BOAT GROUP	LP-MI (SPORT DIVISION)	CADILLAC	WEXFORD	255,470	323,730	68,260
34	AFCO INDUSTRIES, INC.		HOLLAND	ALLEGAN	505,050	571,410	66,360
35	S2 YACHTS, INC		HOLLAND	ALLEGAN	8	59,266	59,258
36	BELDING TANK TECHNOLOGIES, INC		BELDING	IONIA	19,420	75,580	56,160
37	J & M PLATING		ALBION	CALHOUN	149	53,319	53,170
38	HOLNAM INC - DUNDEE PLANT		DUNDEE	MONROE	3,097,962	3,147,134	49,172
39	DECO'PLATE MFG. CO		LAPEER	LAPEER	63,330	112,304	48,974
40	DAIMLERCHRYSLER CORP.	WARREN TRUCK ASSEMBLY PLANT	WARREN	MACOMB	565,910	612,433	46,523
41	FITZSIMONS MFG.		BIG RAPIDS	MECOSTA	30	45,971	45,941
42	WOLVERINE LEATHERS		ROCKFORD	KENT	135,505	181,118	45,613
43	Delphi Energy & Engine Mgt	Systems, Flint East	FLINT	GENESEE	111,687	156,854	45,167
44	MERIDIAN, INC. - PLANT A & D		SPRING LAKE	OTTAWA	82,650	126,805	44,155
45	DAY INTERNATIONAL		THREE RIVERS	ST JOSEPH	232,777	276,220	43,443
46	HI-TECH COATINGS, INC.		WARREN	MACOMB	22,808	64,073	41,265
47	SUN STEEL TREATING INC.		SOUTH LYON	OAKLAND	55,746	91,490	35,744
48	MASTERCRAFT LEATHER COMPANY		ROCHESTER HILLS	OAKLAND	13,670	48,530	34,860
49	REILLY PLATING CO.		MELVINDALE	WAYNE	89,000	122,150	33,150
50	UNITED TECHNOLOGIES AUTOMOTIVE		WEST OLIVE	OTTAWA	42,943	75,476	32,533

Appendix G:
Releases and Transfers by
Standard Industrial Classification (SIC) Code Groups
Comparison of 1995 through 1997

1997 TRI DATA - STATE OF MICHIGAN
 Total Releases by SIC Code Group for 1997
 with 1995 and 1996 Comparisons

1997 Rank	Major SIC Code	Major SIC Category	----- (lbs/year) -----		
			1995	1996	1997
1	33	Primary Metals	31,903,678	34,599,241	30,109,010
2	37	Transportation Equipment	21,420,079	14,864,014	14,200,617
3	28	Chemicals and Allied Products	16,672,012	12,382,366	11,077,632
4	26	Paper and Allied Products	8,336,238	8,419,875	9,326,309
5	32	Stone, Clay, Glass, Concrete Products	6,630,741	6,258,270	5,365,017
6	34	Fabricated Metal Products	3,416,534	4,257,688	3,755,177
7	30	Rubber and Misc. Plastics Products	3,144,378	2,458,604	3,278,919
8	25	Furniture and Fixtures	2,816,820	2,855,913	2,577,569
9	24	Lumber and Wood Products	1,113,543	1,043,537	997,901
10	20	Food and Kindred Products	1,091,211	1,168,489	984,263
11	31	Leather and Leather Products	516,774	662,890	651,040
12	35	Ind. / Commercial Machinery	414,806	348,270	586,780
13	49	Electric Gas Sanitary Services	449,425	630,129	550,099
14	29	Petroleum Refining and Related Ind.	400,600	223,992	312,386
15	39	Misc. Manufacturing Ind.	543,711	330,508	210,321
16	36	Electronic	261,072	164,077	113,956
17	23	Apparel and Other Finished Prod.	1,140	43,015	77,476
18	22	Textile Mill Products	5	43,109	58,233
19	27	Printing, Publishing, Allied Ind.	148,411	59,366	52,524
20	75	Automotive Repair, Services, and Parking	27,286	39,512	29,005
21	38	Measuring, Analyzing, and Cont. Inst.	6,851	22,565	25,044
22	73	Business Services	36,961	5,349	3,469
23	51	Wholesale Trade Non-durable Goods	2,604	2,817	1,291
24	59	Miscellaneous Retail		0	0
25	87	Engineering and Research	11	0	0
26	47	Transportation Service		0	0

A blank value indicates that no facilities in the SIC group reported in the respective year.
 A "0" value indicates that facilities in the SIC group did report, but there was no reported releases on the Form R.

1997 TRI DATA - STATE OF MICHIGAN
 Total Transfers by SIC Code Group for 1997
 with 1995 and 1996 Comparisons

1997 Major SIC			----- (lbs/year) -----		
<u>Rank</u>	<u>Code</u>	<u>Major SIC Category</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
1	28	Chemicals and Allied Products	98,450,926	98,886,815	96,826,698
2	34	Fabricated Metal Products	46,239,773	38,952,784	48,763,631
3	33	Primary Metals	27,676,056	28,689,388	37,436,025
4	37	Transportation Equipment	22,530,996	20,856,416	22,136,604
5	25	Furniture and Fixtures	5,223,525	5,609,944	5,389,379
6	26	Paper and Allied Products	4,306,667	4,181,349	4,187,990
7	36	Electronic	1,275,062	2,696,093	2,792,336
8	35	Ind. / Commercial Machinery	2,022,120	2,369,731	2,755,344
9	30	Rubber and Misc. Plastics Products	1,722,850	1,585,910	1,088,754
10	32	Stone, Clay, Glass, Concrete Products	553,148	1,006,410	823,024
11	20	Food and Kindred Products	590,692	476,416	529,861
12	73	Business Services	120,613	168,528	262,074
13	39	Misc. Manufacturing Ind.	267,751	250,910	220,141
14	29	Petroleum Refining and Related Ind.	200,012	174,789	204,673
15	31	Leather and Leather Products	107,291	146,781	177,595
16	38	Measuring, Analyzing, and Cont. Inst.	154,124	118,256	105,762
17	27	Printing, Publishing, Allied Ind.	116,991	65,634	47,498
18	24	Lumber and Wood Products	24,010	56,946	34,111
19	22	Textile Mill Products	390	8,101	6,561
20	51	Wholesale Trade Non-durable Goods	0	0	43
21	49	Electric Gas Sanitary Services	22	14	6
22	23	Apparel and Other Finished Prod.	0	0	0
23	59	Miscellaneous Retail		0	0
24	87	Engineering and Research	0	0	0
25	47	Transportation Service		0	0
26	75	Automotive Repair, Services, and Parking	0	0	0

A blank value indicates that no facilities in the SIC group reported in the respective year.
 A "0" value indicates that facilities in the SIC group did report, but there was no reported transfer on the Form R.

Appendix H:

**Releases and Transfers by County
Comparison of 1995 through 1997**

1997 TRI DATA - STATE OF MICHIGAN
 Total Releases by County for 1997
 with 1995 and 1996 Comparisons

1997 Rank	County Name	1997 Facilities per County	----- (lbs/year) -----		
			1995	1996	1997
1	WAYNE	149	35,332,026	35,454,959	29,070,272
2	MACOMB	61	3,002,756	3,036,836	5,000,333
3	KALAMAZOO	24	9,624,250	6,120,572	4,979,047
4	OAKLAND	65	5,232,238	5,636,208	4,829,864
5	KENT	89	4,386,976	3,784,098	4,445,340
6	MONROE	11	3,807,399	4,122,240	4,046,562
7	OTTAWA	41	3,998,947	3,678,214	3,764,452
8	ST CLAIR	21	3,396,661	3,273,690	3,549,114
9	GENESEE	25	3,210,868	1,701,485	2,051,897
10	MIDLAND	2	1,774,939	2,080,835	1,908,482
11	SAGINAW	14	3,484,270	2,938,026	1,806,258
12	ALPENA	4	3,286,211	2,881,534	1,619,962
13	ST JOSEPH	18	1,113,709	1,271,189	1,513,322
14	WEXFORD	8	1,322,869	1,321,919	1,480,974
15	INGHAM	15	1,473,803	935,599	1,269,662
16	ONTONAGON	1	1,863,257	1,006,590	1,188,311
17	ALLEGAN	22	1,031,873	942,320	1,106,882
18	MUSKEGON	34	1,683,829	1,077,335	988,100
19	DELTA	1	784,835	755,047	919,972
20	CALHOUN	23	1,316,426	1,414,780	725,994
21	HOUGHTON	2	994,317	739,615	593,170
22	OSCEOLA	2	233,850	452,945	582,779
23	LENAWEE	13	510,836	262,788	528,005
24	MENOMINEE	9	351,806	397,222	509,158
25	MANISTEE	3	491,096	410,470	486,574
26	DICKINSON	6	709,543	514,933	470,577
27	BRANCH	12	186,335	140,560	434,380
28	WASHTENAW	18	618,768	395,190	311,060
29	HURON	5	348,059	255,709	280,127
30	JACKSON	18	206,528	260,809	256,407
31	MONTCALM	7	197,527	130,934	236,175
32	CHARLEVOIX	6	87,626	116,053	220,340
33	CRAWFORD	3	207,638	222,707	213,885
34	CASS	7	172,135	290,408	210,385
35	IONIA	9	123,625	165,622	210,242
36	BERRIEN	23	446,460	306,220	207,598
37	MECOSTA	7	92,003	98,752	195,894
38	LAPEER	4	245,131	176,925	194,461
39	CLINTON	3	144,707	273,136	152,645
40	HILLSDALE	8	186,231	147,716	148,500
41	SANILAC	6	130,524	119,742	139,428
42	KALKASKA	2	341,322	272,569	137,861
43	GRAND TRAVERSE	7	109,435	87,437	118,700
44	LIVINGSTON	17	194,848	90,449	110,075
45	ALGER	1	89,500	110,500	109,500
46	VAN BUREN	8	101,681	173,313	99,659
47	GRATIOT	2	265,090	112,468	98,333
48	OTSEGO	3	165,955	128,415	96,031
49	MASON	3	283,916	299,206	94,906
50	BAY	6	229,642	205,281	90,926

A blank value indicates that there were no facilities from the county that reported in the respective year.
 A "0" value indicates that facilities from the county reported but there were no reported releases on the Form R.

1997 TRI DATA - STATE OF MICHIGAN
 Total Releases by County for 1997
 with 1995 and 1996 Comparisons

1997 Rank	County Name	1997 Facilities per County	----- (lbs/year) -----		
			1995	1996	1997
51	OCEANA	2	253,779	107,798	89,339
52	NEWAYGO	4	101,440	53,253	79,551
53	EATON	9	132,930	63,515	69,040
54	BARRY	5	27,315	45,859	60,207
55	ISABELLA	4	31,924	67,043	44,885
56	LUCE	1	116,005	77,306	41,156
57	IOSCO	3	36,039	35,831	38,164
58	TUSCOLA	6	132,671	62,730	37,007
59	OGEMAW	3	54,692	47,709	33,539
60	SHIAWASSEE	9	88,018	67,005	28,014
61	ANTRIM	2	16,150	10,450	9,540
62	MONTMORENCY	2	6,000	6,000	6,000
63	MISSAUKEE	2	811	2,995	2,995
64	MARQUETTE	1		1,000	1,000
65	CLARE	1	238	557	613
66	CHEBOYGAN	1	0	0	260
67	OSCODA	1	129	109	147
68	SCHOOLCRAFT	1	0	0	0

A blank value indicates that there were no facilities from the county that reported in the respective year.
 A "0" value indicates that facilities from the county reported but there were no reported releases on the Form R.

1997 TRI DATA - STATE OF MICHIGAN
 Total Transfers by County for 1997
 with 1995 and 1996 Comparisons

1997 Rank	County Name	1997 Facilities per County	----- (lbs/year) -----		
			1995	1996	1997
1	WAYNE	149	25,266,894	25,331,612	33,583,998
2	KALAMAZOO	24	28,379,372	32,443,772	26,896,759
3	OAKLAND	65	21,329,564	22,083,551	24,978,966
4	ALLEGAN	22	15,140,056	13,577,106	21,582,178
5	OTTAWA	41	11,688,137	10,192,450	16,125,706
6	MACOMB	61	19,701,704	15,127,240	13,669,867
7	MUSKEGON	34	9,207,244	10,856,633	12,360,376
8	KENT	89	15,044,942	13,911,325	10,628,700
9	MIDLAND	2	9,521,034	8,735,092	9,807,282
10	MONTCALM	7	6,547,437	5,219,658	6,946,424
11	VAN BUREN	8	3,300,625	5,638,897	5,725,590
12	MONROE	11	5,627,816	5,178,183	5,390,934
13	LENAWEE	13	5,037,377	5,404,400	4,928,034
14	GRAND TRAVERSE	7	3,577,732	4,124,190	4,531,528
15	ST CLAIR	21	3,716,748	4,211,255	4,384,596
16	CHARLEVOIX	6	6,127	2,043,581	2,340,764
17	JACKSON	18	1,820,770	1,832,173	2,323,154
18	CLINTON	3	1,592,738	1,591,802	1,813,208
19	CALHOUN	23	5,575,368	5,121,887	1,670,341
20	GENESEE	25	3,769,404	2,233,714	1,620,250
21	INGHAM	15	3,367,368	683,704	1,383,214
22	WASHTENAW	18	1,854,132	2,051,068	1,309,938
23	ISABELLA	4	724,918	1,051,351	1,180,799
24	TUSCOLA	6	1,137,227	1,186,102	1,159,433
25	SAGINAW	14	2,560,518	745,998	1,024,530
26	OTSEGO	3	870,322	864,270	842,480
27	LAPEER	4	216,812	361,981	755,148
28	BERRIEN	23	1,086,284	690,344	580,968
29	IONIA	9	468,574	316,324	479,605
30	LIVINGSTON	17	503,541	305,326	461,358
31	NEWAYGO	4	42,974	297,712	418,252
32	OSCODA	1	180,076	265,130	385,275
33	EATON	9	8,764	419,341	323,153
34	HILLSDALE	8	304,420	337,365	323,057
35	BRANCH	12	632,030	325,486	237,000
36	MASON	3	227,403	277,010	177,885
37	OSCEOLA	2	68,319	458,626	172,915
38	ST JOSEPH	18	82,976	180,754	162,844
39	CHEBOYGAN	1	129,991	141,113	153,724
40	GRATIOT	2	34,094	64,305	144,201
41	MENOMINEE	9	74,143	120,278	124,016
42	KALKASKA	2	130,078	108,984	100,740
43	WEXFORD	8	173,553	170,179	100,366
44	SANILAC	6	29,334	32,316	85,641
45	MECOSTA	7	23,805	181,888	76,695
46	CASS	7	126,435	122,076	68,500
47	SHIAWASSEE	9	76,767	73,949	68,044
48	ANTRIM	2	50,410	46,650	49,520
49	HURON	5	20,230	45,296	33,982
50	MANISTEE	3	0	155	25,832

A blank value indicates that there were no facilities from the county that reported in the respective year.
 A "0" value indicates that facilities from the county reported but there were no reported transfers on the Form R.

1997 TRI DATA - STATE OF MICHIGAN
 Total Transfers by County for 1997
 with 1995 and 1996 Comparisons

1997 Rank	County Name	1997 Facilities per County	----- (lbs/year) -----		
			1995	1996	1997
51	DICKINSON	6	55,292	19,711	24,522
52	BARRY	5	10,624	15,450	19,910
53	IOSCO	3	21,355	34,310	16,170
54	ALPENA	4	22,534	14,015	8,460
55	CRAWFORD	3	250	250	750
56	BAY	6	512,157	447,745	432
57	OCEANA	2	2,721	0	86
58	OGEMAW	3	23,614	23,018	10
59	CLARE	1	0	0	0
60	LUCE	1	0	0	0
61	SCHOOLCRAFT	1	0	0	0
62	MISSAUKEE	2	0	0	0
63	HOUGHTON	2	0	0	0
64	ONTONAGON	1	0	0	0
65	MARQUETTE	1	0	0	0
66	ALGER	1	0	0	0
67	MONTMORENCY	2	0	0	0
68	DELTA	1	0	0	0

A blank value indicates that there were no facilities from the county that reported in the respective year.
 A "0" value indicates that facilities from the county reported but there were no reported transfers on the Form R.

Appendix I:

**Releases and Transfers by City
Comparison of 1995 through 1997**

1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Total Releases by City for 1997
 with 1995 and 1996 Comparisons

1997 Rank	City Name	1997 Facilities per City	----- (lbs/year) -----		
			1995	1996	1997
1	DEARBORN	10	12,759,572	14,256,302	14,696,597
2	ECORSE	2	13,725,983	14,198,980	8,083,100
3	KALAMAZOO	15	1,269,558	6,105,401	4,967,107
4	HOLLAND	28	3,722,229	3,466,402	3,425,834
5	MARYSVILLE	3	3,099,571	3,016,119	3,340,232
6	DUNDEE	1	3,144,300	3,097,962	3,147,134
7	DETROIT	62	3,278,790	2,401,351	2,741,302
8	GRAND RAPIDS	60	2,964,883	2,308,791	2,647,947
9	NEW HAVEN	1		752,280	2,637,710
10	WAYNE	6	2,829,401	2,058,598	1,973,574
11	MIDLAND	2	1,774,939	2,080,835	1,908,482
12	SAGINAW	8	3,362,452	2,867,674	1,787,651
13	ALPENA	4	3,286,211	2,881,534	1,619,962
14	ROCHESTER	2	1,264,065	1,734,139	1,619,693
15	CADILLAC	8	1,322,869	1,321,919	1,480,974
16	KENTWOOD	13	997,827	933,871	1,410,580
17	LANSING	14	1,449,571	910,070	1,257,278
18	ONTONAGON	1	652,607	1,006,590	1,188,311
19	FLINT	17	2,393,927	1,662,354	1,077,454
20	THREE RIVERS	3	871,292	1,034,487	1,055,020
21	ORION	2	1,035,510	614,341	998,829
22	GRAND BLANC	4	802,986	5,000	949,187
23	ESCANABA	1	784,835	755,047	919,972
24	PONTIAC	8	1,280,422	1,872,742	868,904
25	MUSKEGON	25	1,310,094	900,086	868,805
26	WARREN	18	1,186,744	800,206	809,687
27	STERLING HEIGHTS	13	995,770	811,179	732,971
28	MILAN	3	484,623	854,112	635,355
29	ZEELAND	10	427,433	464,298	635,115
30	EVART	2	232,850	451,945	582,779
31	ALBION	4	1,082,762	1,205,614	540,607
32	HUBBELL	1	923,917	665,143	509,670
33	MENOMINEE	9	351,806	397,222	509,158
34	LIVONIA	17	122,555	211,048	486,112
35	FILER CITY	1	388,951	410,470	483,824
36	ADRIAN	8	407,469	174,254	459,846
37	QUINNESEC	2	433,326	418,960	425,610
38	SHELBY TWP.	1		409,257	410,038
39	COLDWATER	6	142,925	114,788	400,364
40	WIXOM	2	702,648	548,402	391,597
41	STURGIS	9	176,738	166,493	380,896
42	GRAND HAVEN	7	426,072	373,454	376,828
43	MADISON HEIGHTS	8	417,217	231,177	327,970
44	FLAT ROCK	1	1,378,442	1,495,144	320,158
45	ROCKFORD	2	165,521	237,944	262,676
46	PIGEON	1	324,255	229,555	248,655
47	JACKSON	16	147,878	216,239	238,026
48	GREENVILLE	5	194,727	128,134	233,075
49	GRAYLING	3	207,638	222,707	213,885
50	LAPEER	4	245,131	176,925	194,461

A blank value indicates that there were no facilities from the city that reported in the respective year.
 A "0" value indicates that facilities from the city reported but there were no reported releases on the Form R.

1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Total Releases by City for 1997
 with 1995 and 1996 Comparisons

1997 Rank	City Name	1997 Facilities per City	----- (lbs/year) -----		
			1995	1996	1997
51	BIG RAPIDS	5	82,853	87,252	184,894
52	EDWARDSBURG	2	134,786	276,959	184,345
53	MONROE	5	149,682	152,312	177,292
54	YPSILANTI	6	372,755	212,572	162,930
55	OTSEGO	2	334,797	160,960	162,151
56	ST. JOHNS	2			152,645
57	KALKASKA	2	341,322	272,569	137,861
58	SPRING LAKE	4	86,311	83,251	135,978
59	RIVERVIEW	3	183,305	194,887	135,112
60	LINCOLN PARK	1	61,050	120,400	131,800
61	BELDING	5	35,385	59,687	129,653
62	MT. CLEMENS	2		117,940	124,899
63	SOUTH LYON	2	21,996	95,308	124,227
64	MELVINDALE	2	71,400	99,000	122,150
65	CLINTON TWP.	3	1,200	1,200	120,265
66	PORT HURON	11	69,775	144,744	119,046
67	TRAVERSE CITY	7	109,435	23,528	118,700
68	NILES	4	252,426	127,573	112,651
69	BOYNE CITY	2	43,807	87,890	110,064
70	MUNISING	1	89,500	110,500	109,500
71	DECKERVILLE	1	92,859	83,840	100,406
72	ALMA	2	265,090	112,468	98,333
73	GAYLORD	2	165,705	128,160	96,016
74	LUDINGTON	3	283,916	299,206	94,906
75	BAY CITY	6	229,642	205,281	90,926
76	FERNDALE	6	104,177	122,731	90,701
77	HANCOCK	1	70,400	74,472	83,500
78	TROY	10	101,048	106,077	82,500
79	CHINA TWP.	1			82,430
80	MARSHALL	8	61,525	71,341	81,494
81	IONIA	2	86,431	105,666	80,316
82	HOWELL	7	43,742	56,473	78,952
83	HILLSDALE	4	102,551	98,582	78,903
84	MUSKEGON HEIGHTS	4	74,527	96,560	77,696
85	BATTLE CREEK	9	171,467	135,293	77,627
86	WEST OLIVE	1		42,943	75,476
87	CHARLEVOIX	3	32,504	22,800	72,769
88	HIGHLAND PARK	1	2,000	2,000	72,000
89	WESTLAND	5	35,993	79,499	71,780
90	ERIE	1	2,300	348	71,126
91	SALINE	1	119,400	80,541	70,826
92	NEWAYGO	1	96,259	47,927	70,792
93	BENTON HARBOR	10	38,354	76,346	65,537
94	ROMEO	6	20,869	15,610	61,955
95	TRENTON	2	235,747	95,745	61,268
96	JONESVILLE	2	53,381	0	59,219
97	WALLED LAKE	4	81,282	62,560	58,726
98	GRAND LEDGE	2	125,180	54,704	57,761
99	ROSEVILLE	5	56,455	65,304	56,175
100	COMSTOCK PARK	1	29,750	24,238	54,940

A blank value indicates that there were no facilities from the city that reported in the respective year.
 A "0" value indicates that facilities from the city reported but there were no reported releases on the Form R.

1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Total Transfers by City for 1997
 with 1995 and 1996 Comparisons

1997 Rank	City Name	1997 Facilities per City	----- (lbs/year) -----		
			1995	1996	1997
1	KALAMAZOO	15	908,937	31,180,239	26,574,433
2	DETROIT	62	15,036,193	12,964,626	21,792,374
3	OTSEGO	2	14,425,380	12,749,808	20,632,261
4	FERNDALE	6	16,893,897	16,940,633	14,926,115
5	HOLLAND	28	9,043,220	7,964,176	12,635,599
6	MT. CLEMENS	2		10,880,140	10,635,200
7	MUSKEGON	25	8,040,945	8,948,188	10,561,965
8	MIDLAND	2	9,521,034	8,735,092	9,807,282
9	GRAND RAPIDS	60	10,922,731	8,917,709	6,219,295
10	LAKEVIEW	1	5,958,610	4,283,590	6,114,805
11	SOUTH HAVEN	1	3,260,675	5,568,667	5,701,814
12	AUBURN HILLS	3	30,071	27,277	5,520,232
13	MONROE	5	5,358,611	5,000,318	5,161,219
14	ADRIAN	8	4,931,998	5,348,615	4,849,282
15	TRAVERSE CITY	7	3,577,732	2,731,162	4,531,528
16	DEARBORN	10	2,992,102	5,030,756	4,158,252
17	KENTWOOD	13	3,613,597	4,462,157	3,914,013
18	PORT HURON	11	3,255,613	3,739,183	3,884,867
19	WAYNE	6	2,264,438	2,631,537	2,954,555
20	JACKSON	16	1,763,494	1,774,041	2,250,295
21	GRAND HAVEN	7	701,330	651,429	2,072,527
22	BOYNE CITY	2	0	2,036,297	2,054,351
23	ST. JOHNS	2			1,813,208
24	PONTIAC	8	1,158,330	1,623,940	1,764,514
25	ZEELAND	10	1,839,712	1,812,781	1,759,446
26	LANSING	14	1,029,950	918,748	1,498,066
27	FLINT	17	3,596,332	2,217,903	1,372,922
28	YPSILANTI	6	1,722,650	1,978,347	1,248,684
29	STERLING HEIGHTS	13	2,040,819	2,505,911	1,152,315
30	LIVONIA	17	1,229,711	969,233	1,079,709
31	WARREN	18	2,273,130	969,270	1,050,679
32	WHITEHALL	4	782,590	981,493	1,022,807
33	CASS CITY	1	984,724	1,039,055	1,016,898
34	WYANDOTTE	6	694,994	1,084,065	1,006,242
35	MT. PLEASANT	3		869,451	978,206
36	MARSHALL	8	4,715,406	4,867,539	889,384
37	SAGINAW	8	2,393,170	521,683	878,752
38	ROMULUS	10	588,703	563,289	845,484
39	VANDERBILT	1	866,322	859,570	839,380
40	WIXOM	2	633,571	1,304,474	837,875
41	MUSKEGON HEIGHTS	4	210,219	924,272	773,251
42	LAPEER	4	216,812	361,981	755,148
43	BATTLE CREEK	9	793,622	220,253	719,810
44	ROYAL OAK	1	427,100	604,100	663,203
45	FLAT ROCK	1	770,611	412,928	560,262
46	EDMORE	1	437,170	337,925	502,460
47	SHELBY TWP.	1		248,021	431,740
48	IONIA	2	415,062	245,374	391,370
49	WESTLAND	5	219,571	313,565	388,205
50	MIO	1	180,076	265,130	385,275

A blank value indicates that there were no facilities from the city that reported in the respective year.
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1997 TRI DATA - STATE OF MICHIGAN
 Top 100 Total Transfers by City for 1997
 with 1995 and 1996 Comparisons

1997 Rank	City Name	1997 Facilities per City	----- (lbs/year) -----		
			1995	1996	1997
51	MARYSVILLE	3	246,521	316,863	357,047
52	NEWAYGO	1	4,263	266,832	334,838
53	GREENVILLE	5	151,657	598,143	329,159
54	ORION	2	296,989	696,745	328,272
55	GALESBURG	1	347,315	310,862	321,126
56	SPRING LAKE	4	533,370	335,472	309,122
57	HILLSDALE	4	193,233	275,332	287,754
58	CHARLEVOIX	3	3	6,400	285,970
59	BUCHANAN	1	323,018	320,380	282,180
60	WOODHAVEN	2	250	113,900	263,793
61	WALLED LAKE	4	337,835	181,000	257,344
62	GRAND BLANC	4	172,822	13,611	246,035
63	ALLENDALE	1	203,722	168,802	238,259
64	MILAN	3	88,205	177,785	229,645
65	COLDWATER	6	601,720	297,133	211,994
66	ROMEO	6	199,510	179,906	210,601
67	WEIDMAN	1	215,022	181,900	202,593
68	LINCOLN PARK	1	94,800	177,200	201,900
69	HAMBURG	2	121,881	666	197,946
70	EAST LANSING	2	160,448	171,317	197,800
71	BENTON HARBOR	10	385,869	168,337	184,801
72	LUDINGTON	3	227,403	277,010	177,885
73	EVART	2	68,319	458,626	172,915
74	ROCHESTER	2	51,578	54,213	164,645
75	HOWELL	7	273,910	209,871	163,528
76	HIGHLAND	1	54,231	54,688	153,776
77	CHEBOYGAN	1	129,991	141,113	153,724
78	HEMLOCK	2	167,348	166,315	145,778
79	ALMA	2	34,094	64,305	144,201
80	VASSAR	4	152,503	147,047	142,535
81	COMSTOCK PARK	1	32,210	92,191	126,791
82	TROY	10	74,620	108,872	125,580
83	MENOMINEE	9	74,143	120,278	124,016
84	CALEDONIA	1	43,328		116,900
85	KALKASKA	2	130,078	108,984	100,740
86	CADILLAC	8	173,553	170,179	100,366
87	BRIGHTON	8	104,390	94,789	99,884
88	ROSEVILLE	5	56,010	54,703	98,542
89	CHINA TWP.	1			96,436
90	NEW HUDSON	1	31,187	17,026	94,489
91	FREMONT	2	37,701	29,620	82,664
92	NILES	4	242,858	179,292	82,573
93	WYOMING	4	106,499	101,863	79,055
94	ROCKFORD	2	59,242	83,641	77,727
95	RIVERVIEW	3	20,170	130,537	76,926
96	PORTLAND	2	46,835	57,124	76,840
97	REMUS	2	16,333	16,338	69,416
98	PARMA	1	55,376	55,239	68,159
99	OWOSSO	9	76,767	73,949	68,044
100	ECORSE	2	391,778	155,030	67,327

A blank value indicates that there were no facilities from the city that reported in the respective year.
 A "0" value indicates that facilities from the city reported but there were no reported transfers on the Form R.

Appendix J: Definitions for Section 2

Acute toxicity: Causes death after short-term exposure.

Bioaccumulation: Retention or accumulation of a chemical in an organism.

Biodegradation: The ability to be decomposed by natural biological processes.

CAS Number: The chemical abstract service registry which associates a number to a given chemical.

Carcinogenicity: The potential to cause cancer.

Chronic (system) toxicity: Causes adverse effects (other than cancer) after long-term exposure, such as damage to the kidneys, lungs, liver, or bone.

Developmental toxicity: Damages development in the womb or after birth, causing such problems as structural defects, prenatal death, learning disorders, and growth retardation.

Environmental toxicity: Seriously damages the environment and harms wildlife or plants.

Heritable genetic and chromosomal mutations: Mutations in human reproductive cells that can be passed from generation to generation.

Neurotoxicity: Damages the central or peripheral nervous system after long-term exposure.

Persistence in the environment: The tendency of a chemical to remain for a long time in the air, water or land.

Reproductive toxicity: Damages ability to reproduce, causing such problems as sterility, inability to have sex, and inability to produce milk.

Toxicity: The nature or condition of something being harmful or destructive.

Appendix K: References

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