United States Environmental Protection Agency

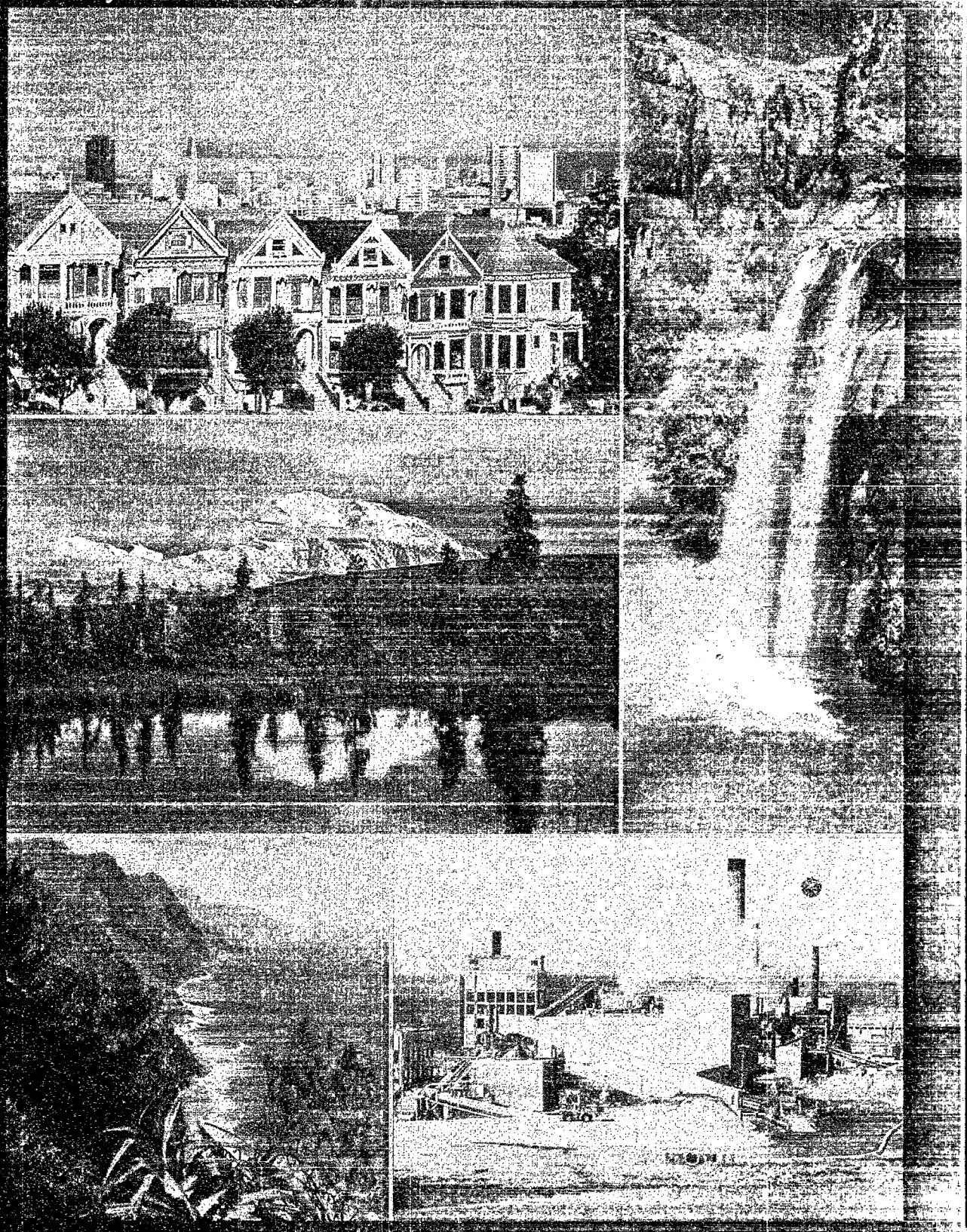
Office of Pollution Prevention and Toxics (7408)

EPA 745-R-98-018
December 1998

EPA

1996 Toxics Release Inventory

Public Data Release – Ten Years of Right-to-Know Industry Sector Analyses



PUBLIC ACCESS TO THE TOXICS RELEASE INVENTORY

TRI Reports and Data Products

Product		Supplier	Contact Information	Order Information
1996 TRI Public Data Release (annual report)		U.S. EPA EPCRA Hotline	(800) 424-9346 Fax Document Requests Only: (703) 412-3333 Hours: 9:30 a.m. - 7:30 p.m. (Eastern Time)	EPA 745-R-98-005 (**Free**)
1996 State Fact Sheets				EPA 745-F-98-001 (**Free**)
1987-1995 TRI CD-ROM		U.S. GPO	(202) 512-1800	S/N 055-000-00582-6 ($39)
		NTIS	(703) 487-4650 or (800) 553-6847	PB 97-502-587 ($45)
		NCEPI	(800) 490-9198 (513) 489-8190 Fax: (513) 489-8695	EPA 749-C-97-003 (**Free**)
1996 State Data Files	.dbf format	U.S. GPO	(202) 512-1530	$15-$25/state or free at http://www.epa.gov/opptintr/tri/disks96.htm
1996 Federal Facilities on Disk	.dbf format	U.S. GPO	(202) 512-1530	$15 or free at http://www.epa.gov/opptintr/tri/disks96.htm
TRI Information Kit		NCEPI	(800) 490-9198 (513) 489-8190 Fax: (513) 489-8695	EPA 749-K-98-001 (**Free**)
		TRI User Support Service (TRI-US)	(202) 260-1531 Fax: (202) 401-2347	EPA 749-K-98-001 (**Free**)
Chemicals in the Environment		NCEPI	(800) 490-9198 (513) 489-8190 Fax: (513) 489-8695	Toxics Release Inventory (TRI) Pamphlet EPA 749-R-97-001b

Note: The 1987-1996 CD-ROM, containing the latest available data, will be published January 1999.

Accessing TRI Data Online

Data from Online Providers	Internet Address	Special Notes
Right to Know Network (RTKNET) – Provides public access to TRI and related environmental data bases. For more information, call (202) 797-7200.	http://www.rtk.net ftp://ftp.rtknet.org	No charge for Internet access. Direct access by modem at parameters to 8,N,1 and log in as "public." Phone charge may apply.
National Library of Medicine (NLM) – Offers comprehensive, user friendly searching of complete TRI data base. For more information, call (301) 496-6531.	http://www.nlm.nih.gov	$18-$20 per hour charge. Password required.
U.S. EPA Internet Server – Access a variety of reports, data files, and TRI information from EPA. For more information, call TRI-US at (202) 260-1531.	http://www.epa.gov ftp://ftp.epa.gov gopher://gopher.epa.gov http://www.epa.gov/enviro	TRI-specific information is available at: http://www.epa.gov/opptintr/tri http://www.epa.gov/enviro/html/tris/tris_overview.html

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Washington, DC 20460

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Chapter 1

Toxics Release Inventory Data by Industry

Introduction

In May 1998, the U.S. Environmental Protection Agency published the *1996 Toxics Release Inventory Public Data Release,* summarizing the 1996 Toxics Release Inventory (TRI) data nationwide and presenting more detailed analyses by state and by chemical. The document also compared the 1996 data to earlier reporting years. It supplied background information on TRI reporting, described past and future changes in the TRI program, and provided information that TRI users need to consider in examining and analyzing these data. Expanding on previous data release reports, the release in May of the *1996 TRI Public Data Release* provided a more comprehensive view of industry data and examined more closely TRI reporting in five priority industrial sectors and federal facilities.

This volume presents the data for the remaining 15 industrial sectors, identified by Standard Industrial Classification (SIC) codes, that are presently required to report to TRI. Similar to the May release, these chapters set the TRI data in context of economic, regulatory, and technological developments that influence industry-wide releases and other waste management. They also analyze reporting by industrial activities at the four-digit SIC code level.

Industry sectors covered in the two publications appear in Box 1-1.

Box 1-1. Industry Sectors in the 1996 TRI Public Data Release

First Release, Spring 1998

26	Pulp and Paper
28	Chemical Manufacturing
29	Petroleum Refining
33	Primary Metals
36	Electrical Equipment

Second Release, Fall 1998

20	Food and Beverage Processing
21	Tobacco Products
22	Textile Mill Products
23	Apparel and Fabricated Textiles
24	Lumber and Wood Products
25	Furniture
27	Printing and Publishing
30	Rubber and Plastics Products
31	Leather and Leather Products
32	Stone, Clay, Glass, and Concrete
34	Fabricated Metals
35	Industrial Machinery
37	Transportation Equipment
38	Instruments and Photographic Equipment
39	Miscellaneous Manufacturing

Context for Presentation of Industry Data

The *1996 TRI Public Data Release* published in May 1998 provides an overview of the information collected through TRI. It describes the benefits and limitations of the data, explains key terms, and discusses factors such as toxicity and exposure that should be considered when reviewing TRI data. This section presents selected summary information from the May 1998 document to facilitate the understanding of the industry-specific analyses in the chapters that follow. This includes characteristics of TRI data, key concepts, and supplemental economic information that are specifically referred to throughout this volume. Readers are encouraged to consult the earlier publication for additional information.

Who Reports and What Must Be Reported?

Manufacturing facilities with the equivalent of 10 or more full-time employees that meet the established thresholds must report their releases, transfers, and waste management quantities to TRI. Thresholds for manufacturing and processing are currently 25,000 pounds for each listed chemical, while the threshold for "otherwise using" is 10,000 pounds per chemical. Manufacturing facilities include those in SIC codes 20 to 39 (listed in Box 1-1). Box 1-2 summarizes reporting criteria for facilities that must report to TRI. In July 1999 (for reporting year 1998), another seven industrial sectors will report to TRI for the first time; these appear in Box 1-3.

Box 1-2. Who Reported Toxic Chemical Release Inventory Reports for the 1996 Reporting Year?

Who Reported Toxic Chemical Release Inventory Reports for the 1996 Reporting Year?

A facility must report to TRI if it:

- Conducts manufacturing operations within Standard Industrial Classification (SIC) codes 20 through 39 (or is a federal facility in any SIC code),
- Has 10 or more full-time equivalent employees, and
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year.

Box 1-3. Who Will Report to TRI Starting in the 1998 Reporting Year?

Who Will Report to TRI Starting in the 1998 Reporting Year?

- Metal mining (SIC code 10 except for SIC codes 1011, 1081, and 1094)
- Coal mining (SIC code 12 except for extraction activities)
- Electrical utilities that combust coal and/or oil (SIC codes 4931 and 4939)
- Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste treatment and disposal facilities (SIC code 4953)
- Chemicals and allied products wholesale distributors (SIC code 5169)
- Petroleum bulk plants and terminals (SIC code 5171)
- Solvent recovery services (SIC code 7389)

Box 1-4 summarizes the kinds of information facilities must report. Since its inception under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), TRI has collected data on the amounts of chemicals that facilities release to the environment on-site and transfer off-site to other locations for waste management. Passage of the federal Pollution Prevention Act in 1990 expanded the information that TRI collects. The additional data on waste management include quantities recycled, burned for energy recovery, treated, and released on-site or off-site.

Box 1-4. What Must Be Reported to TRI?

What Must Be Reported?

Information reported by facilities includes:

- Basic information identifying the facility;
- Name and telephone number of a contact person;
- Environmental permits held;
- Amounts of each listed chemical released to the environment at the facility;
- Amounts of each chemical shipped from the facility to other locations for recycling, energy recovery, treatment, or disposal;
- Amounts of each chemical recycled, burned for energy recovery, or treated at the facility;
- Maximum amount of chemical present on-site at the facility during the year;
- Types of activities conducted at the facility involving the toxic chemical; and
- Source reduction activities.

SIC Codes and TRI

Standard Industrial Classification (SIC) codes are used throughout the federal government to classify economic activity by industry. Industry analyses in TRI rely on the SIC codes that facilities report on their TRI submissions to identify their business operations. Many facilities conduct manufacturing activity in more than one SIC code. Box 1-5 explains how SIC codes are used in preparing industry analyses in this book and how data on TRI forms with more than one SIC code are treated.

Form A Certification Statements

Facilities whose total annual reportable amount of a listed toxic chemical does not exceed 500 pounds can apply a higher activity threshold in determining their reporting obligations. The total annual reportable amount is defined as the sum of the waste management categories that would be reported to TRI: quantities released (including disposal), recovered as a result of on-site recycling operations, combusted on-site for energy recovery, and treated at the facility, plus amounts transferred off-site for recycling, energy recovery, treatment, and disposal. These amounts correspond to total production-related waste in this report.

If the facility does not exceed the 500-pound annual reportable amount (total production-related waste) and does not manufacture, process, or otherwise use more than 1 million pounds of the listed chemical, the facility can submit a certification statement (Form A) instead of the complete TRI reporting form (Form R). Form A certifies that the facility met the conditions outlined above for the listed chemical, but does not require reporting of any amounts of the toxic chemical released or otherwise managed as waste.

TRI Releases and Waste Management

Figure 1-1 illustrates on-site and off-site releases, on-site waste management activities, and transfers off-site for further waste management, as reportable to TRI. Box 1-6 describes reportable releases that may occur on-site at the facility or as a result of transferring chemicals off-site for disposal, and identifies types of activities that may contribute releases to various media. Box 1-7 lists on-site waste management activities that are reportable to TRI. Box 1-8 describes transfers off-site for further waste management.

Box 1-5. An Explanation of SIC Codes and TRI

An Explanation of SIC Codes and TRI

On TRI Form Rs and certification statements, Form As, facilities report the four-digit Standard Industrial Classification (SIC) codes that define their operations. A facility might report, for example, SIC code 3714, motor vehicle parts and accessories. These industries are grouped into broader categories at the three-digit and two-digit SIC code levels. For example, motor vehicle parts and accessories falls into the motor vehicles and motor vehicle equipment group at the three-digit level (SIC code 371) and the transportation equipment major group (SIC code 37). Tables in this chapter present data aggregated at the two-digit level.

TRI facilities may report up to six four-digit SIC codes that describe their operations. They submit one Form R or Form A certification statement for each chemical they are reporting. If all the processes or operations that are associated with a facility's releases or other waste management of a TRI chemical can be described by one SIC code, then only one SIC code is reported on the form. If several economic activities, designated by different SIC codes, describe the specific operations at a facility that are associated with releases or other waste management of a TRI chemical, then the facility will report those SIC codes (up to six) on the form it submits for that chemical.

Industrial facilities often conduct inter-related operations. They may, for example, manufacture distinct products using common or related feedstocks. Such products may be classified in similar but separate categories in the SIC system. Thus, many forms submitted to TRI contain more than one industrial classification. When TRI data are analyzed by industry—that is, by SIC code—forms that report more than one SIC code must be categorized separately because they do not fall into the individual industry groups. This affects analyses at the four-digit level, as presented in Chapters 2 through 16, and it affects analyses when data are aggregated at the two-digit level, as in this chapter.

Four-digit Multiple SIC Codes: Forms that report multiple SIC codes within the same two-digit SIC codes are categorized as "multiple codes" in the analyses of TRI data in Chapters 2 through 16. A facility that makes vehicle bodies for both cars and trucks will report both SIC code 3711 (motor vehicles and passenger car bodies) and SIC code 3713 (truck and bus bodies). In the analyses in Chapter 14 of TRI reporting in the transportation equipment sector (SIC code 37), data from these forms are included in the "multiple-codes" category. In some industrial sectors, such as chemical manufacturing (SIC code 28, analyzed in Chapter 6 of the May 1996 TRI Public Data Release), the majority of TRI reporting occurs on forms with multiple SIC codes at the four-digit level.

Two-digit Multiple SIC Codes: In this chapter, the "multiple codes" category represents forms that report in more than one *two-digit* SIC code. For example, a facility may manufacture motor vehicle parts (in SIC code 37) and also fabricate other metal products (in SIC code 34); it will report SIC codes in both of these sectors on its TRI forms (such as SIC codes 3714 (motor vehicle parts and accessories) and 3465 (automotive stampings). Data from these forms are classified in the "multiple codes" category in this chapter, where the tables analyze the TRI data at the two-digit level. In this chapter, TRI forms from the facility that manufactures vehicle bodies for both cars and trucks would be included in SIC code 37, because both of its four-digit SIC codes (SIC code 3711 and SIC code 3713) fall within SIC code 37.

On forms with more than one SIC code, any SIC code that is not within manufacturing (that is, not within the SIC code range 20 to 39) is ignored when assigning a form to an industry category. For example, a form with the SIC code 3241 (manufacture of hydraulic cement) and SIC code 4953 (refuse systems) would be included in SIC code 3241 in Chapter 11 and in SIC code 32 in this chapter. (In this example, the facility would be a waste incinerator that collects and burns refuse to fuel a cement kiln.)

Federal Facilities: Federal facilities report the SIC codes that describe their activity; these may or may not fall within the manufacturing categories, SIC codes 20 to 39, that have reported to TRI since its inception. (As explained earlier in this chapter, additional industries will begin reporting with the 1998 reporting year.) Tables in this chapter incorporate amounts submitted by federal facilities in the SIC codes they reported, just as is done for private sector facilities. In each table, a separate summary of federal facilities' data is presented as well, following the totals.

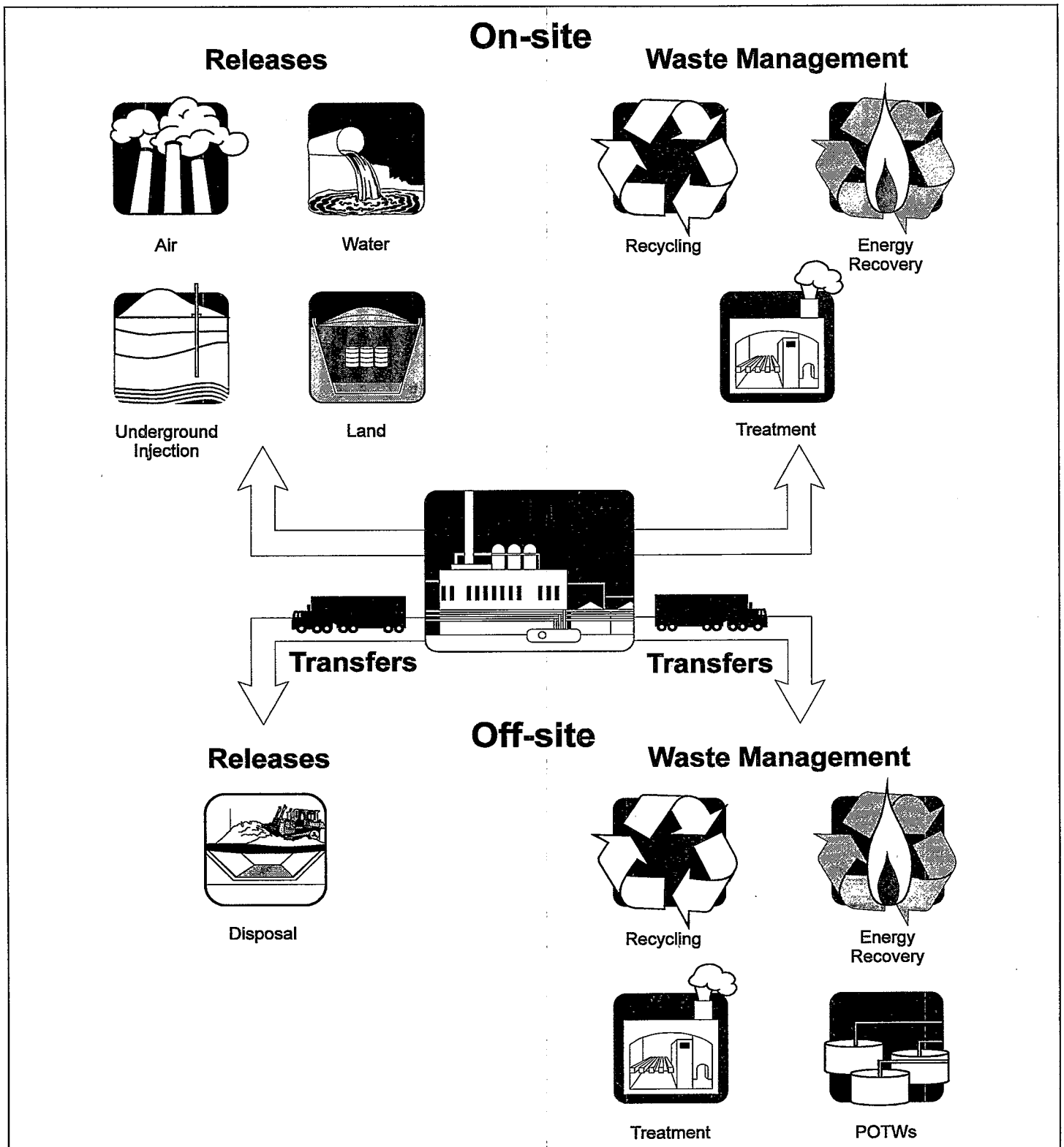


Figure 1-1. Information Collected Under TRI

Box 1-6. An Explanation of On- and Off-site Releases

An Explanation of On- and Off-site Releases

A release is a discharge of a toxic chemical to the environment. On-site releases include emissions to the air, discharges to bodies of water, releases at the facility to land, as well as into underground injection wells. Releases are reported to TRI by media type. Chemicals in waste transferred off-site for disposal are also released to the environment. On- and off-site releases thus include releases to the environment at the facility (reported in Section 5 for Form R) plus off-site transfers to disposal (reported in Section 6 of Form R).

Air Emissions. Releases to air are reported either as point source or fugitive emissions. Point source emissions, also referred to as 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.

Surface Water Discharges. Releases to water include discharges to streams, rivers, lakes, oceans, and other bodies of water. 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 to TRI.

Underground Injection. Underground injection is the subsurface emplacement of fluids through wells. TRI chemicals associated with manufacturing, the petroleum industry, mining, commercial and service industries, and Federal and municipal government related activities may be injected into Class I, II, III, IV or V wells, if they do not endanger underground sources of drinking water (USDW), public health or the environment. The different types of authorized injection activities are described below:

- Class I industrial, municipal and manufacturing wells inject fluids into deep, confined and isolated formations below potable water supplies.
- Class II oil and gas related wells which re-inject produced fluids for disposal, enhanced recovery of oil, or hydrocarbon storage.
- Class III wells are associated with the solution mining of minerals.
- Class IV wells may inject hazardous or radioactive fluids directly or indirectly into USDW, only if the injection is part of an authorized CERCLA/RCRA clean up operation.
- Class V wells, which include all types of injection wells which do not fall under I - IV, may inject only if they do not endanger USDW, public health or the environment. Class V wells are, generally, shallow drainage wells, such as floor drains connected to dry wells or drain fields.

Beginning with the 1996 reporting year, facilities separately report amounts injected into Class I wells and into all other wells.

On-site Land Releases. On-site releases to land occur within the boundaries of the reporting facility. Releases to land include disposal of toxic chemicals in landfills (in which wastes are buried), land treatment/application farming (in which a 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 waste piles) or releases to land (such as spills or leaks). Beginning with the 1996 reporting year, facilities separately report amounts released to RCRA Subtitle C landfills from amounts released to other on-site landfills.

Transfers Off-site to Disposal. Toxic chemicals in waste that are transferred to a facility for disposal generally are either released to land at an off-site facility or are injected underground.

Box 1-7. An Explanation of On-site Waste Management

An Explanation of On-site Waste Management

On-site waste management activities are reported in Section 8 of Form R. These amounts do not include one-time events such as accidental releases or remediation (clean-up).

Recycled On-site. This is the quantity of the toxic chemical recovered at the facility and made available for further use. It is not the quantity that entered an on-site recycling or recovery operation.

Used for Energy Recovery On-site. This is the quantity of the toxic chemical that was combusted in some form of energy recovery device, such as a furnace (including kilns) or boiler. The toxic chemical should have a heating value high enough to sustain combustion. To avoid double-counting, the amount reported represents the amount destroyed in the combustion process, not the amount that entered the energy recovery unit. For example, 100,000 pounds of toluene entered a boiler that, on average, combusted 98% of the toluene. Any remaining toluene was discharged to air. A total of 98,000 pounds is reported as combusted for energy recovery (the remaining 2,000 pounds is reported as released).

Treatment On-site. This is the quantity of the toxic chemical destroyed in on-site waste treatment operations, not the amount that entered any treatment operation. For example, if 100,000 pounds of benzene were combusted in an incinerator that destroyed 99% of the benzene, the facility would report 99,000 pounds as treated on-site (the remaining 1,000 pounds would be reported as released).

Box 1-8. An Explanation of Transfers Off-site for Further Waste Management

An Explanation of Transfers Off-site for Further Waste Management

An off-site transfer, reported in Section 6 of Form R, is the transfer of toxic chemicals in waste to a facility that is geographically or physically separate from the facility reporting under TRI. Chemicals reported to TRI as transferred are sent to off-site facilities for the purposes of recycling, energy recovery, treatment, or disposal. The quantities reported represent a movement of the chemical away from the reporting facility. Except for off-site transfers to disposal, these quantities do not necessarily represent entry of the chemical into the environment. Transfers to disposal represent an off-site release (see Box 1-6).

Transfers Off-site to Recycling. Toxic chemicals in waste that are sent off-site for the purposes of recycling are generally recovered by a variety of recycling methods, including solvent recovery and metals recovery. The choice of the recycling method depends on the toxic chemical being sent for recycling. Once they have been recycled, these chemicals may be returned to the originating facility for further processing or made available for use in commerce.

Transfers Off-site to Energy Recovery. Toxic chemicals in waste sent off-site for purposes of energy recovery are combusted off-site in industrial furnaces (including kilns) or boilers that generate heat or energy for use at that location. Treatment of a chemical by incineration is not considered to be energy recovery.

Transfers Off-site to Treatment. Toxic chemicals in waste that are transferred off-site may be treated through a variety of methods, including biological treatment, neutralization, incineration, and physical separation. These methods typically result in varying degrees of destruction of the toxic chemical. In some cases (such as stabilization or solidification), the chemical is not destroyed but is prepared for further waste management, such as contained disposal.

Transfers to Publicly Owned Treatment Works (POTWs). A POTW is a wastewater treatment facility that is owned by a state or municipality. Wastewaters from facilities reporting under TRI are 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.

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

Differences between Amounts Reported in Sections 5 and 6 and in Section 8 in Form R

Generally, the total of the on-site releases that a facility reports in Section 5, plus transfers off-site to disposal that it reports in Section 6 (designated off-site releases in this publication), should equal the quantity released on- and off-site that it reports in Section 8.1. Further, transfers to recycling, energy recovery, and treatment (including POTWs) reported in Section 6 should correspond to reporting of off-site recycling, energy recovery, and treatment in Section 8.

Differences arise for several reasons. Reporting in Sections 5 and 6 includes releases and transfers resulting from remedial actions or other one-time events; these are reported separately in Section 8. A release or transfer of less than 1,000 pounds of a chemical may be reported as a range rather than an exact amount in Sections 5 and 6. Furthermore, facilities can round off the quantities they report in Section 8 to two significant digits. In addition, some facilities may not understand that certain amounts or totals that a facility reports in Sections 5 and 6 should correspond to amounts reported in the current-year column of Section 8, as described above.

TRI Chemicals

In 1994, for the 1995 reporting year, EPA added nearly 300 chemicals and chemical categories to TRI. This expansion nearly doubled the TRI chemical list. Specifically, EPA added more than 150 pesticides, certain Clean Air Act chemicals, certain Clean Water Act Priority Pollutants, and certain Safe Drinking Water Act chemicals. These included carcinogens, reproductive toxicants, and developmental toxicants. The 1996 data release covers the second year in which facilities have reported on these chemicals.

OSHA Carcinogens

Some chemicals are listed in TRI because they are either known human carcinogens or suspect carcinogens. Known human carcinogens are those that have been shown to cause cancer in humans. Suspect carcinogens are those that have been shown to cause cancer in animals. TRI thresholds for reporting known and suspect carcinogens in mixtures are lower than for other substances.

When a TRI chemical occurs in a mixture, it is reportable only if the concentration of the chemical in the mixture is above a specified percentage. For non-carcinogenic TRI chemicals, this concentration is 1.0%. In establishing reporting requirements for substances designated as carcinogens, EPA adopted the limitation set by the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standards (29 CFR 1910.1200) because much of the information that industry would have relating to chemicals in a mixture would be from the material safety data sheet (MSDS).

Under OSHA standards, the "*de minimis*" concentration for substances designated as carcinogens is 0.1%. At a concentration of 0.1% or more, a TRI chemical that is an OSHA carcinogen must be included in facilities' calculations of threshold and release amounts. The OSHA limitation applies if the chemical is a known or suspect carcinogen by virtue of appearing in one of three sources:

1. National Toxicology Program (NTP), "Annual Report on Carcinogens" (Latest Edition);
2. International Agency for Research on Cancer (IARC) "Monographs" (Latest Editions); or
3. 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

Box 1-9 lists the OSHA carcinogens and the bases for their designation.

Box 1-9. Basis of OSHA Carcinogen Listing for Individual Chemicals

Chemical	IARC	NTP	OSHA	Chemical	IARC	NTP	OSHA
Acetaldehyde	2B	P	—	2,4-D chlorocrotyl ester‡	2B	—	—
Acetamide	2B	—	—	2,4-D 2-ethylhexyl ester‡	2B	—	—
2-Acetylaminofluorene	—	P	Z	2,4-D 2-ethyl-4methylpentyl ester‡	2B	—	—
Acrylamide	2A	P	—	2,4-Diaminoanisole	2B	—	—
Acrylonitrile	2A	P	Z	2,4-Diaminoanisole sulfate	—	P	—
2-Aminoanthraquinone	—	P	—	4,4'-Diaminodiphenyl ether	2B	—	—
4-Aminoazobenzene	2B	—	—	2,4-Diaminotoluene	2B	P	—
4-Aminobiphenyl	1	K	Z	Diaminotoluene (mixed isomers)	2B	P	—
1-Amino-2-methylanthraquinone	—	P	—	1,2-Dibromo-3-chloropropane	2B	P	Z
Amitrole	2B	P		1,2-Dibromoethane	2A	P	—
o-Anisidine	2B	—	—	1,4-Dichlorobenzene	2B	P	—
o-Anisidine hydrochloride	—	P	—	Dichlorobenzene (mixed isomers)	2B	P	—
Arsenic and inorganic arsenic compounds	1	K†	Z	3,3'-Dichlorobenzidine	2B	P	Z
Asbestos (friable)	1	K	Z	3,3'-Dichlorobenzidine dihydrochloride	2B	P	—
Atrazine	2B	—	—	3,3'-Dichlorobenzidine sulfate	2B	P	—
Benzene	1	K	Z	1,2-Dichloroethane	2B	P	—
Benzidine	1	K	Z	Dichloromethane	2B	P	—
Benzoic trichloride	2B	P	—	trans-1,3-Dichloropropene	2B	—	—
Beryllium and beryllium compounds	1	P†	—	1,3-Dichloropropyene	2B	P	—
Bis(chloromethyl)ether	1	K	Z	Dichlorvos	2B	—	—
1,3-Butadiene	2A	P	—	Diepoxybutane	2B	P	—
C.I. Acid Red 114	2B		—	Di-(2-ethylhexyl)phthalate	2B	P	—
C.I. Direct Black 38	2A	P	—	Diethyl sulfate	2A	P	—
C.I. Direct Blue 6	2A	P	—	Diglycidyl resorcinol ether	2B	P	—
C.I. Direct Brown 95	2A	—	—	Dihydrosafrole	2B	—	—
C.I. Food Red 5	2B	—	—	3,3'-Dimethoxybenzidine	2B	P	—
C.I. Solvent Yellow 34 (Auramine)	2B	—	—	3,3'-Dimethoxybenzidine dihydrochloride	2B	P	—
Cadmium and cadmium compounds	1	P†	—	3,3'-Dimethoxybenzidine hydrochloride	2B	P	—
Carbon tetrachloride	2B	P	—	4-Dimethylaminoazobenzene	2B	P	Z
Chlordane	2B	—	—	3,3'-Dimethylbenzidine	2B	P	—
Chlorendic acid	2B	P	—	3,3'-Dimethylbenzidine dihydrochloride	2B	P	—
p-Chloroaniline	2B	—	—	3,3'-Dimethylbenzidine dihydrofluoride	2B	P	—
Chloroform	2B	P	—	Dimethylcarbamyl chloride	2A	P	—
Chloromethyl methyl ether	1	K	Z	N,N-Dimethylformamide	2B	—	—
3-Chloro-2-methyl-1-propene	—	P	—	1,1-Dimethylhydrazine	2B	P	—
Chlorophenols	2B	—	—	Dimethyl sulfate	2A	P	—
p-Chloro-o-toluidine	2B	—	—	1,4-Dioxane	2B	P	—
Chromium (VI) compounds	1	K	—	1,2-Diphenylhydrazine	—	P	—
Cobalt and cobalt compounds	2B	—	—	2,4-D isopropyl ester‡	2B	—	—
Creosote	2A	—	—	2,4-DP‡	2B	—	—
p-Cresidine	2B	P	—	2,4-D propylene glycol butyl ether ester‡	2B	—	—
Cupferron	—	P	—	2,4-D sodium salt‡	2B	—	—
2,4-D‡	2B	—	—	Epichlorohydrin	2A	P	—
2,4-D butoxyethyl ester‡	2B	—	—	Ethyl acrylate	2B	P	—
2,4-D butyl ester‡	2B	—	—	Ethyleneimine	—	—	Z

Note: The list of TRI chemicals meeting the OSHA carcinogen standard and, therefore, reported when in a mixture at a concentration level below the *de minimis* level of 0.1%, has been updated, and this list reflects the update.

IARC: 1–The chemical is carcinogenic to humans; 2A–The chemical is probably carcinogenic to humans; 2B–The chemical is possibly carcinogenic to humans.

NTP: K–The chemical is known to be carcinogenic; P–The chemical may reasonably be anticipated to be carcinogenic.

OSHA: Z–The chemical appears at 29 CFR Part 1910 Subpart Z.

† Certain compounds.

‡ Chlorophenoxy herbicides (IARC 2B).

Box 1-9. Basis of OSHA Carcinogen Listing for Individual Chemicals, Continued

Chemical	IARC	NTP	OSHA
Ethylene oxide	1	P	Z
Ethylene thiourea	2B	P	—
Formaldehyde	2A	P	Z
Heptachlor	2B	—	—
Hexachlorobenzene	2B	P	—
Hexamethylphosphoramide	2B	P	—
Hydrazine	2B	P	—
Hydrazine sulfate	—	P	—
Lead and inorganic lead compounds	2B	—	Z
Lindane	2B	P	—
Mecoprop‡	2B	—	—
Methoxone‡	2B	—	—
Methoxone sodium salt‡	2B	—	—
4,4-Methylenebis (2-chloroaniline)	2A	P	—
4,4'-Methylenebis (N,N-dimethyl) benzeneamine	2B	P	—
4,4'-Methylenedianiline	2B	P	Z
Michler's ketone	—	P	—
Mustard gas	1	K	—
alpha-Naphthylamine	—	—	Z
beta-Naphthylamine	1	K	Z
Nickel	2B	P	—
Nickel compounds	1	P†	—
Nitrilotriacetic acid	—	P	—
4-Nitrobiphenyl	—	—	Z
Nitrofen	2B	P	—
Nitrogen mustard	2A	—	—
2-Nitropropane	2B	P	—
N-Nitrosodi-n-butylamine	2B	P	—
N-Nitrosodiethylamine	2A	P	—
N-Nitrosodimethylamine	2A	P	Z
N-Nitrosodi-n-propylamine	2B	P	—
N-Nitroso-N-ethylurea	2A	P	—
N-Nitroso-N-methylurea	2A	P	—
N-Nitrosomethylvinylamine	2B	P	—
N-Nitrosomorpholine	2B	P	—
N-Nitrosonornicotine	2B	P	—
N-Nitrosopiperidine	2B	P	—
Pentachlorophenol	2B	—	—
Phenytoin	2B	P	—
Polybrominated biphenyls (PBBs)	2B	P	—
Polychlorinated biphenyls (PCBs)	2A	P	—
Polycyclic aromatic compounds (PACs):			
Benz(a)anthracene	2A	P	—
Benzo(b)fluoranthene	2B	P	—
Benzo(j)fluoranthene	2B	P	—
Benzo(k)fluoranthene	2B	—	—
Benzo(rst)pentaphene	2B	—	—
Benzo(a)pyrene	2A	P	—
Dibenz(a,h)acridine	2A	P	—
Dibenz(a,j)acridine	2B	P	—
Dibenzo(a,h)anthracene	2B	P	—
7H-Dibenzo(c,g)carbazole	2B	P	—
Dibenzo(a,e)pyrene	2B	P	—
Dibenzo(a,h)pyrene	2B	P	—
Dibenzo(a,l)pyrene	2B	P	—
7,12-Dimethylbenz(a)anthracene	2B	—	—
Indeno[1,2,3-cd]pyrene	2B	P	—
5-Methylchrysene	2B	P	—
1-Nitropyrene	2B	—	—
Potassium bromate	2B	—	—
Propane sultone	2B	P	—
beta-Propiolactone	2B	P	Z
Propyleneimine	2B	P	—
Propylene oxide	2B	P	—
Saccharin (manufacturing)	2B	P	—
Safrole	2B	P	—
Sodium o-phenylphenoxide	2B	—	—
Styrene	2B	—	—
Styrene oxide	2A	—	—
Tetrachloroethylene	2B	P	—
Thioacetamide	2B	P	—
4,4'-Thiodianiline	2B	P	—
Thiourea	2B	P	—
Toluene-2,4-diisocyanate	2B	P	—
Toluene-2,6-diisocyanate	2B	P	—
Toluene diisocyanate (mixed isomers)	2B	P	—
o-Toluidine	2B	P	—
o-Toluidine hydrochloride	—	P	—
Toxaphene	2B	P	—
Trichloroethylene	2A	—	—
2,4,6-Trichlorophenol	2B	P	—
1,2,3-Trichloropropane	2A	—	—
Tris(2,3-dibromoprophyl)phosphate	2A	P	—
Trypan blue	2B	—	—
Urethane	2B	P	—
Vinyl acetate	2B	—	—
Vinyl bromide	2A	—	—
Vinyl chloride	1	K	Z
2,6-Xylidine	2B	—	—

Note: The list of TRI chemicals meeting the OSHA carcinogen standard and, therefore, reported when in a mixture at a concentration level below the *de minimis* level of 0.1%, has been updated, and this list reflects the update.
IARC: 1–The chemical is carcinogenic to humans; 2A–The chemical is probably carcinogenic to humans; 2B–The chemical is possibly carcinogenic to humans.
NTP: K–The chemical is known to be carcinogenic; P–The chemical may reasonably be anticipated to be carcinogenic.
OSHA: Z–The chemical appears at 29 CFR Part 1910 Subpart Z.
† Certain compounds.
‡ Chlorophenoxy herbicides (IARC 2B)

Table 1-1. TRI Facilities and Forms, by Industry, 1996

SIC Code	Industry	Total Facilities Number	Total Forms Number	Form Rs Number	Form As Number
20	Food	1,993	3,541	2,545	996
21	Tobacco	29	61	61	0
22	Textiles	307	657	622	35
23	Apparel	25	51	49	2
24	Lumber	765	1,926	1,446	480
25	Furniture	453	1,250	1,224	26
26	Paper	491	2,363	2,250	113
27	Printing	241	483	475	8
28	Chemicals	3,855	21,098	18,288	2,810
29	Petroleum	401	3,231	2,990	241
30	Plastics	1,824	3,747	3,404	343
31	Leather	89	223	209	14
32	Stone/Clay/Glass	640	1,716	1,517	199
33	Primary Metals	1,902	6,603	6,138	465
34	Fabricated Metals	2,883	7,416	6,895	521
35	Machinery	1,087	2,791	2,619	172
36	Electrical Equip.	1,233	3,121	3,031	90
37	Transportation Equip.	1,248	4,331	4,117	214
38	Measure./Photo.	291	707	661	46
39	Miscellaneous	362	766	710	56
	Multiple Codes 20-39	1,271	4,520	4,195	325
	No Codes 20-39	236	779	701	78
	Total	21,626	71,381	64,147	7,234
	Federal Facilities	133	378	350	28

Note: Facilities/forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple" category. Facilities/forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category.

Industry Overview

TRI Data by Industry, 1996

In 1996, a total of 21,626 facilities submitted 71,381 forms to TRI, as shown in Table 1-1. About one-tenth of these were Form A certifications. (Facilities submit one Form R or one Form A certification statement, explained above, for each chemical.)

On- and Off-site Releases

As shown in Table 1-2, on- and off-site releases by all industry sectors totaled 2.43 billion pounds in 1996. This included 1.45 billion pounds of air emissions (355.3 million pounds from fugitive sources and 1.10 billion pounds from stack or point sources). Discharges to surface water totaled 173.3 million pounds.

Reporting year 1996 was the first year in which facilities distinguished their releases to underground injection by type of well (Class I and Class II-V wells) and identified their releases to RCRA subtitle C landfills as a separate category among on-site

Table 1-2. TRI On-site and Off-site Releases, by Industry, 1996

		On-site Releases								Off-site Releases	
		Air			Underground Injection		On-site Releases to Land				
SIC Code	Industry	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
20	Food	21,810,437	47,255,169	8,983,229	1,010	29,548	28,506	4,438,103	82,546,002	757,393	83,303,395
21	Tobacco	61,394	3,453,344	179,701	0	0	0	0	3,694,439	458,133	4,152,572
22	Textiles	3,217,057	13,125,828	348,877	0	0	0	173,620	16,865,382	462,148	17,327,530
23	Apparel	130,287	1,663,532	7,320	0	0	0	534	1,801,673	63,177	1,864,850
24	Lumber	4,636,576	23,856,213	76,874	0	0	6,039	9,807	28,585,509	7,657,171	36,242,680
25	Furniture	4,813,779	30,910,342	43	0	0	0	26,641	35,750,805	125,858	35,876,663
26	Paper	18,227,534	185,722,017	16,008,715	0	0	602,265	4,160,489	224,721,020	2,842,352	227,563,372
27	Printing	13,782,537	14,579,092	1,670	0	0	0	13,650	28,376,949	89,070	28,466,019
28	Chemicals	93,363,107	299,070,993	90,420,803	200,317,453	197,441	2,689,697	68,276,606	754,336,100	30,842,063	785,178,163
29	Petroleum	27,968,469	24,132,610	10,567,225	2,310,233	8,664	5,685	1,236,941	66,229,827	2,657,431	68,887,258
30	Plastics	27,540,757	77,774,998	27,815	750	0	48,918	398,367	105,791,605	10,617,686	116,409,291
31	Leather	747,962	1,906,965	53,526	0	0	0	6,611	2,715,064	1,526,825	4,241,889
32	Stone/Clay/Glass	1,870,677	28,158,910	45,443	500	500	105,977	2,416,616	32,598,623	6,141,803	38,740,426
33	Primary Metals	38,722,723	105,958,141	31,988,843	930,779	0	22,192,029	193,591,686	393,384,201	171,150,982	564,535,183
34	Fabricated Metals	23,613,262	45,578,614	351,080	563	7	204,331	572,609	70,320,466	19,933,901	90,254,367
35	Machinery	6,665,652	12,373,145	34,089	0	0	7,144	121,101	19,201,131	2,859,589	22,060,720
36	Electrical Equip.	6,351,489	17,401,668	1,462,615	22	5	210,430	225,890	25,652,119	16,113,258	41,765,377
37	Transportation Equip.	28,283,393	74,410,242	224,148	0	0	86,685	618,616	103,623,084	7,729,685	111,352,769
38	Measure./Photo.	2,698,043	10,503,368	1,297,561	0	0	0	2,531	14,501,503	848,568	15,350,071
39	Miscellaneous	1,929,982	7,478,283	2,364	0	0	11,957	8,189	9,430,775	839,283	10,270,058
	Multiple Codes 20-39	26,982,381	66,599,536	10,964,363	11,400	10	180,840	5,680,956	110,419,486	10,359,532	120,779,018
	No Codes 20-39	1,854,254	4,905,200	241,905	0	520,224	74,466	628,674	8,224,723	660,188	8,884,911
	Total	355,271,752	1,096,818,210	173,288,209	203,572,710	756,399	26,454,969	282,608,237	2,138,770,486	294,736,096	2,433,506,582
	Federal Facilities	2,463,277	1,831,564	384,602	0	505,541	23,516	681,351	5,889,851	612,797	6,502,648

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms that reported more than one 2-digit SIC code within the range of 20 to 39 are assigned to the "multiple" category. Forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category.

land releases. (These are explained in Box 1-6.) Underground injection in 1996 totaled 204.3 million pounds and 99.6% of the total was reported as injected into Class I wells. Land releases were 309.1 million pounds, including 26.5 million pounds released to RCRA subtitle C landfills.

Off-site releases (transfers to disposal) totaled 294.7 million pounds in 1996.

Other On-site Waste Management

A total of 17.74 billion pounds was reported in other on-site waste management in 1996, as shown in Table 1-3. The largest amount was reported in recycling, with 7.84 billion pounds, followed by treatment, with 7.14 billion pounds. Energy recovery amounted to 2.76 billion pounds.

Transfers Off-site for Further Waste Management

TRI facilities reported a total of 3.16 billion pounds in transfers off-site for further waste management in 1996. The largest amount reported was in transfers to recycling, with 2.15 billion pounds. The amount reported as transferred to energy recovery was 477.1 million pounds. Transfers to treatment were 290.1 million pounds, and those to POTWs were 235.8 million pounds. These data appear in Table 1-4.

Table 1-3. TRI Other On-site Waste Management, by Industry, 1996

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
20	Food	216,405,632	411,710	75,715,014	292,532,356
21	Tobacco	9,753	0	1,329,064	1,338,817
22	Textiles	13,085,659	5,326,659	23,627,782	42,040,100
23	Apparel	190,976	600	1,049,762	1,241,338
24	Lumber	50,544,925	1,538,386	23,482,107	75,565,418
25	Furniture	2,841,917	37,467	1,181,030	4,060,414
26	Paper	104,481,896	184,352,318	1,022,099,101	1,310,933,315
27	Printing	168,501,410	203,536	61,721,672	230,426,618
28	Chemicals	3,731,246,814	1,348,429,666	3,254,527,247	8,334,203,727
29	Petroleum	153,400,536	603,601,392	1,305,533,526	2,062,535,454
30	Plastics	162,062,640	19,598,143	39,036,343	220,697,126
31	Leather	604,322	0	3,620,694	4,225,016
32	Stone/Clay/Glass	149,823,758	445,258,980	22,702,838	617,785,576
33	Primary Metals	2,092,485,352	49,768,460	625,844,126	2,768,097,938
34	Fabricated Metals	148,030,876	20,976,980	113,727,254	282,735,110
35	Machinery	49,613,047	130,702	9,438,553	59,182,302
36	Electrical Equip.	148,298,966	11,424,647	78,313,464	238,037,077
37	Transportation Equip.	16,523,234	1,458,959	29,517,152	47,499,345
38	Measure./Photo.	3,960,735	938,685	37,645,252	42,544,672
39	Miscellaneous	16,533,257	3,362,337	4,770,453	24,666,047
	Multiple Codes 20-39	609,928,425	40,337,718	388,721,568	1,038,987,711
	No Codes 20-39	4,021,012	24,582,100	16,257,919	44,861,031
	Total	7,842,595,142	2,761,739,445	7,139,861,921	17,744,196,508
	Federal Facilities	12,169,917	7,700	9,650,204	21,827,821

Note: Other On-site Waste Management from Section 8 of Form R. Forms that reported more than one 2-digit SIC code within the range of 20 to 39 are assigned to the "multiple" category. Forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category.

Table 1-4. TRI Transfers Off-site for Further Waste Management, by Industry, 1996

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
20	Food	1,816,235	267,672	1,286,750	20,311,887	750	23,683,294
21	Tobacco	165,113	0	56,491	267,349	0	488,953
22	Textiles	1,013,876	1,926,069	523,939	2,287,565	0	5,751,449
23	Apparel	1,440	139,653	535	255	0	141,883
24	Lumber	515,208	2,299,252	491,157	32,799	12,036	3,350,452
25	Furniture	6,453,880	5,612,741	601,162	383,502	6,295	13,057,580
26	Paper	2,180,119	7,495,656	9,983,082	40,311,407	0	59,970,264
27	Printing	3,642,455	3,670,369	382,262	242,411	0	7,937,497
28	Chemicals	256,639,247	378,369,918	154,280,145	109,463,055	104,516	898,856,881
29	Petroleum	18,553,327	657,071	2,150,251	4,788,134	1	26,148,784
30	Plastics	11,817,283	6,750,688	3,169,307	2,890,863	24,575	24,652,716
31	Leather	337,555	167,073	29,024	1,290,230	0	1,823,882
32	Stone/Clay/Glass	3,672,150	2,865,219	2,987,594	1,019,855	16,497	10,561,315
33	Primary Metals	796,078,608	5,643,584	66,153,726	7,859,057	263,705	875,998,680
34	Fabricated Metals	303,449,098	13,729,060	12,677,769	6,597,522	88,546	336,541,995
35	Machinery	64,012,061	2,530,890	1,316,961	4,168,245	2,025,681	74,053,838
36	Electrical Equip.	345,621,345	8,084,043	7,294,538	10,998,130	694,794	372,692,850
37	Transportation Equip.	164,986,403	13,944,925	8,676,026	5,577,802	8,146	193,193,302
38	Measure./Photo.	12,245,918	2,366,341	2,480,361	930,896	44,588	18,068,104
39	Miscellaneous	17,835,260	2,479,411	516,301	635,395	0	21,466,367
	Multiple Codes 20-39	135,247,125	15,615,643	14,128,226	15,248,528	15,500	180,255,022
	No Codes 20-39	4,310,288	2,441,292	911,221	508,621	750	8,172,172
	Total	2,150,593,994	477,056,570	290,096,828	235,813,508	3,306,380	3,156,867,280
	Federal Facilities	18,553,503	304,101	590,337	71,893	0	19,519,834

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Forms that reported more than one 2-digit SIC code within the range of 20-39 are assigned to the "multiple" category. Forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category. Other Off-site Transfers are transfers reported without a valid waste management code.

Table 1-5. Employees, Value of Shipments, and Total Production-related Waste, by Industry, 1996

SIC Code	Industry	Employees		Value of Shipments		TRI Total Production-related Waste		Production-related Waste per Value of Shipments
		Number	Percent	($000)	Percent	Pounds	Percent	Pounds Per Million Dollar-Value
20	Food	1,516,600	8.8	461,324,200	12.4	397,557,868	1.8	862
21	Tobacco	31,400	0.2	34,481,700	0.9	5,921,753	0.0	172
22	Textiles	576,400	3.3	80,242,000	2.2	64,609,067	0.3	805
23	Apparel	864,900	5.0	77,628,100	2.1	3,273,589	0.0	42
24	Lumber	738,700	4.3	106,518,100	2.9	110,972,285	0.5	1,042
25	Furniture	514,500	3.0	55,696,700	1.5	57,823,940	0.3	1,038
26	Paper	630,600	3.6	160,661,000	4.3	1,599,797,509	7.3	9,958
27	Printing	1,515,000	8.7	195,435,200	5.3	266,207,152	1.2	1,362
28	Chemicals	824,400	4.8	367,441,800	9.9	10,032,390,027	45.6	27,303
29	Petroleum	106,000	0.6	174,284,600	4.7	2,155,301,359	9.8	12,367
30	Plastics	1,017,900	5.9	150,467,500	4.0	369,790,262	1.7	2,458
31	Leather	77,200	0.4	9,308,500	0.3	10,168,880	0.0	1,092
32	Stone/Clay/Glass	520,400	3.0	82,441,300	2.2	668,768,984	3.0	8,112
33	Primary Metals	687,400	4.0	178,297,800	4.8	4,184,091,672	19.0	23,467
34	Fabricated Metals	1,483,000	8.6	214,006,300	5.8	716,239,652	3.3	3,347
35	Machinery	1,980,500	11.4	381,793,700	10.3	169,485,752	0.8	444
36	Electrical Equip.	1,556,500	9.0	320,614,700	8.6	679,402,239	3.1	2,119
37	Transportation Equip.	1,466,900	8.5	465,172,200	12.5	355,169,310	1.6	764
38	Measure./Photo.	820,700	4.7	151,015,900	4.1	76,477,512	0.3	506
39	Miscellaneous	397,300	2.3	48,596,800	1.3	57,640,501	0.3	1,186
	Total	17,326,300	100.0	3,715,428,100	100.0	21,981,089,313	100.0	5,916

Note: **Employees and Value of Shipments** from U.S. Census Bureau, 1996 Annual Survey of Manufacturers. **Total Production-related Waste** from Section 8 (total of 8.1 through 8.7, Column B) of TRI Form R for 1996. **Total Production-related Waste** does not include forms reporting more than one 2-digit SIC code and forms reporting SIC codes outside the 20-39 range.

Economic Overview, 1996

One limitation of TRI data is that, taken alone, they do not distinguish industry-specific factors that influence the chemicals, amounts, and types of releases and waste management facilities report. Each industry chapter in the two *1996 TRI Public Data Release* volumes offers some economic, technological, and regulatory information for that sector as a context for the data reported to TRI.

For each two-digit SIC code, Table 1-5 presents value of shipments and employment for 1996. These basic economic data suggest the relative size of the industrial sectors that now report to TRI. Economic analyses make use of value of shipments data as one way to indicate the size of industrial sectors, because no direct comparison can be drawn among products of those sectors. The dollar value of shipments provides a rough common measure between, for example, production of 10,000 pairs of shoes and production of 500,000 loaves of bread. Table 1-5 also includes total production-related waste reported to TRI for 1996 to allow approximate comparison with the economic activity of the sectors. Percentages indicate the relative contribution of each sector to total employment and production (measured by the dollar-value of shipments) and to the total quantity of TRI chemicals in production-related waste reported to TRI. The ratio of total production-related waste to shipments, in the last column, compares the reported TRI quantities in each two-digit sector with that sector's production level for 1996. Many factors influence the differences in TRI reporting among industrial sectors. Relating TRI quantities to the dollar value of each sector's products takes into account one measure of the differences among sectors in their level of production in 1996.

TRI data are reported as absolute amounts each year, not as changes in relation to production levels or other factors, such as source reduction activity, that might influence these amounts from year to year. The industry chapters presented here, however, take a very basic look at changes in production as they may relate to increases and

decreases in releases and other waste management of TRI chemicals.

Year-by-Year Comparisons, by Industry

Comparing TRI Data Across Years

Comparisons of TRI data across reporting years are made on the basis of "core" chemicals that were reportable in all years with the same reporting definitions. This assures that apparent increases or decreases from one year to another are not the result of changes in the list of TRI chemicals.

EPA has the authority to add chemicals to the reporting list if they meet the statutory toxicity criteria and to delete chemicals from the list if EPA determines that they do not meet the toxicity criteria. Since 1987, EPA has deleted a number of chemicals from the list, added others, and modified the reporting requirements for others. The largest expansion has been the chemicals added beginning with the 1995 reporting year.

Year-to-year comparisons must be based on a consistent set of chemicals to assure that any changes in releases or other waste management do not simply reflect the addition, deletion, or change in definition of reportable chemicals from one year to another. Data in tables comparing TRI information across multiple years represent facility reporting only for the "core" chemicals for the years being compared. The set of "core" chemicals differs depending on which years are represented in the tables in this book.

1995-1996 Comparisons

Tables comparing data for 1995 and 1996 include all chemicals currently reportable to TRI; there was no change in TRI's chemical coverage between these two years. Thus, these tables include the nearly 300 chemicals added to TRI beginning with reporting year 1995. Because the chemical list has not changed, 1996 totals in tables that present data for both years will be the same as in tables that present only the 1996 data.

Multi-Year Comparisons

Tables for 1988 to 1996 include only chemicals that were reportable in all years from 1988 through 1996. These tables do not include, for example, chemicals added in 1990, 1991, 1994, or 1995. Also, for 1989, non-fibrous forms of aluminum oxide were removed from the list. Because of this modification, aluminum oxide is not included in any year-to-year comparison that includes the year 1988. Reporting definitions for ammonia, hydrochloric acid and sulfuric acid have also changed, and they are therefore also not included in multi-year comparisons.

Similarly, tables that compare data for 1991 to 1996 do not include chemicals added in 1994 or 1995. These tables analyze TRI data only for the chemicals that were on the TRI list, in the same form, for all years 1991-1996.

Because of this normalization process, done to assure accurate year-to-year comparisons, totals for 1996 in the multi-year tables differ from the 1996 totals in tables that present only 1996 data or 1995-1996 data.

None of the tables include any chemical deleted from the TRI list, regardless of the year it was deleted.

Year-by-Year Comparisons of TRI Data by Industry

On- and Off-site Releases, 1995-1996

Table 1-6 summarizes on- and off-site releases by industry for 1995 and 1996. The net change for the period was a decrease of 97.3 million pounds, or 3.8%. Seven of the 20 industry groups (two-digit SIC codes), however, showed increases from 1995 to 1996.

Table 1-6. Change in Total TRI On-site and Off-site Releases, by Industry, 1995-1996

SIC Code	Industry	Total On- and Off-site Releases 1995 Pounds	1996 Pounds	Change 1995-1996 Pounds	Percent
20	Food	86,466,520	83,303,395	-3,163,125	-3.7
21	Tobacco	2,034,129	4,152,572	2,118,443	104.1
22	Textiles	18,501,494	17,327,530	-1,173,964	-6.3
23	Apparel	1,287,024	1,864,850	577,826	44.9
24	Lumber	34,834,946	36,242,680	1,407,734	4.0
25	Furniture	41,779,889	35,876,663	-5,903,226	-14.1
26	Paper	238,316,638	227,563,372	-10,753,266	-4.5
27	Printing	31,156,331	28,466,019	-2,690,312	-8.6
28	Chemicals	844,232,213	785,178,163	-59,054,050	-7.0
29	Petroleum	64,140,915	68,887,258	4,746,343	7.4
30	Plastics	127,167,993	116,409,291	-10,758,702	-8.5
31	Leather	4,475,689	4,241,889	-233,800	-5.2
32	Stone/Clay/Glass	32,323,553	38,740,426	6,416,873	19.9
33	Primary Metals	524,040,619	564,535,183	40,494,564	7.7
34	Fabricated Metals	97,038,621	90,254,367	-6,784,254	-7.0
35	Machinery	26,202,906	22,060,720	-4,142,186	-15.8
36	Electrical Equip.	40,455,697	41,765,377	1,309,680	3.2
37	Transportation Equip.	121,154,521	111,352,769	-9,801,752	-8.1
38	Measure./Photo.	17,858,774	15,350,071	-2,508,703	-14.0
39	Miscellaneous	13,868,918	10,270,058	-3,598,860	-25.9
	Multiple Codes 20-39	152,530,504	120,779,018	-31,751,486	-20.8
	No Codes 20-39	10,918,043	8,884,911	-2,033,132	-18.6
	Total	2,530,785,937	2,433,506,582	-97,279,355	-3.8
	Federal Facilities	7,801,971	6,502,648	-1,299,323	-16.7

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms that reported more than one 2-digit code within the range of 20 to 39 are assigned to the "multiple" category. Forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category.

On- and Off-site Releases, 1988 and 1994-1996

From 1988 to 1996, on- and off-site releases decreased from 3.35 billion pounds to 1.82 billion pounds, as shown in Table 1-7, which summarizes release data for all sectors. (Federal facilities were not required to report before the 1994 reporting year.) This amounted to a reduction of 1.53 billion pounds, or 45.6%. From 1988 to 1996, on- and off-site releases decreased for all but one of the sectors.

Actual and Projected Quantities of TRI Chemicals in Waste, 1991-1998

Source reduction was nationally established by the Pollution Prevention Act (PPA) of 1990 as the preferred approach to managing toxic chemicals in waste. Source reduction means preventing waste from being generated. TRI also collects information on source reduction activities at the facility during the year; these are activities undertaken to reduce the amount of toxic chemicals that enter a waste stream or are otherwise released to the environment. The PPA also established a hierarchy of waste management options as national policy for situations where source reduction is not feasible (see Figure 1-2).

Table 1-7. Change in Total On-site and Off-site Releases, by Industry, 1988 and 1994-1996

SIC Code	Industry	Total On- and Off-site Releases					
		1988 Pounds	1994 Pounds	1995 Pounds	1996 Pounds	Change 1988-1996 Pounds	Change 1988-1996 Percent
20	Food	8,377,717	6,013,560	5,120,357	5,120,503	-3,257,214	-38.9
21	Tobacco	341,927	134,771	95,226	73,415	-268,512	-78.5
22	Textiles	35,798,377	16,346,332	15,655,607	15,280,411	-20,517,966	-57.3
23	Apparel	1,025,697	1,380,947	1,259,986	1,741,831	716,134	69.8
24	Lumber	32,981,807	32,986,266	30,434,637	27,116,641	-5,865,166	-17.8
25	Furniture	62,363,120	52,134,945	41,530,300	35,651,541	-26,711,579	-42.8
26	Paper	207,603,004	185,334,196	178,774,984	172,799,131	-34,803,873	-16.8
27	Printing	61,187,518	34,386,679	30,895,852	28,269,786	-32,917,732	-53.8
28	Chemicals	1,047,782,223	537,482,685	539,600,255	513,043,111	-534,739,112	-51.0
29	Petroleum	72,780,821	46,877,100	42,593,318	43,076,652	-29,704,169	-40.8
30	Plastics	158,313,799	125,462,108	114,765,358	105,358,191	-52,955,608	-33.4
31	Leather	13,023,617	5,104,391	4,026,421	3,813,502	-9,210,115	-70.7
32	Stone/Clay/Glass	40,539,364	17,359,182	19,053,390	23,263,716	-17,275,648	-42.6
33	Primary Metals	629,353,951	433,885,649	455,029,353	496,662,641	-132,691,310	-21.1
34	Fabricated Metals	160,369,759	99,572,056	90,440,941	77,610,533	-82,759,226	-51.6
35	Machinery	69,747,296	27,120,215	22,851,633	19,162,054	-50,585,242	-72.5
36	Electrical Equip.	132,719,036	36,671,754	31,457,129	33,753,037	-98,965,999	-74.6
37	Transportation Equip.	208,391,846	128,139,353	114,746,256	105,231,558	-103,160,288	-49.5
38	Measure./Photo.	58,084,824	14,328,227	12,955,213	10,358,619	-47,726,205	-82.2
39	Miscellaneous	32,592,710	15,350,168	13,285,855	9,843,403	-22,749,307	-69.8
	Multiple Codes 20-39	308,351,079	149,011,079	122,436,826	91,157,789	-217,193,290	-70.4
	No Codes 20-39	11,229,042	17,704,243	8,281,275	5,376,979	-5,852,063	-52.1
	Total	3,352,958,534	1,982,785,906	1,895,290,172	1,823,765,044	-1,529,193,490	-45.6
	Federal Facilities	NA	7,920,210	5,907,355	4,091,563	NA	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms that reported more than one 2-digit SIC code within the range of 20 to 39 are assigned to the "multiple" category. Forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category. **NA:** Federal facilities not required to report before 1994.

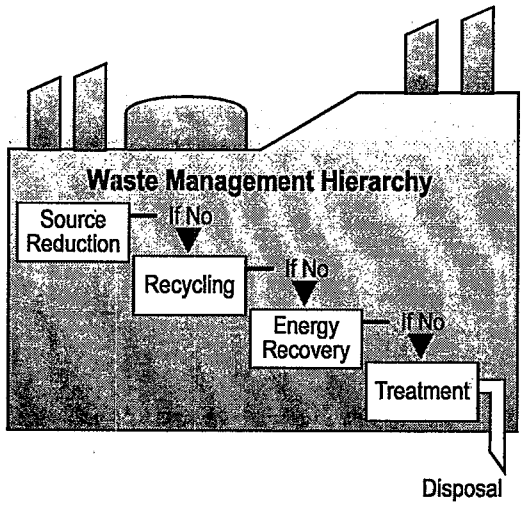


Figure 1-2. Waste Management Hierarchy

Box 1-10 provides a breakdown of the waste management information added to TRI with passage of the PPA. This includes recycling, energy recovery, and treatment both at the facility and elsewhere. It also includes the quantity released on- and off-site. Tables in the TRI data release identify the sum of these quantities as total production-related waste. Facilities report actual waste management quantities for the current and prior years and project expected quantities for the next two years.

Table 1-8 presents total production-related waste by industry for 1996 and the change in total production-related waste the industries projected through 1998. Production-related waste, which totaled 23.42 billion pounds in 1996, was projected to increase by 3.2% to 24.17 billion pounds in 1998.

Box 1-10. An Explanation of Waste Management Information

An Explanation of Waste Management Information

Information about facilities management of TRI chemicals in waste is reported in Section 8 of Form R.

Recycled On-site. This is the quantity of the toxic chemical recovered at the facility and made available for further use. It is not the quantity that entered an on-site recycling or recovery operation.

Recycled Off-site. This is the quantity of the toxic chemical that left the facility boundary for recycling, not the amount recovered at the off-site location. This quantity includes the amount(s) reported in Section 6 of Form R as transferred off-site for recycling, less any amount(s) associated with non-routine events.

Used for Energy Recovery On-site. This is the quantity of the toxic chemical that was combusted in some form of energy recovery device, such as a furnace (including kilns) or boiler. The toxic chemical should have a heating value high enough to sustain combustion. To avoid double-counting, the amount reported represents the amount destroyed in the combustion process, not the amount that entered the energy recovery unit. For example, 100,000 pounds of toluene entered a boiler that, on average, combusted 98% of the toluene. Any remaining toluene was discharged to air. A total of 98,000 pounds is reported as combusted for energy recovery (the remaining 2,000 pounds is reported as released).

Used for Energy Recovery Off-site. This is the quantity of the toxic chemical that left the facility boundary for energy recovery, not the amount combusted at the off-site location. The toxic chemical must have a significant heating value, and the off-site location must have some form of energy recovery unit in place. This quantity includes the amount(s) reported in Section 6 of Form R as transferred off-site for energy recovery, less any amount(s) associated with non-routine events.

Treated On-site. This is the quantity of the toxic chemical destroyed in on-site waste treatment operations, not the amount that entered any treatment operation. For example, if 100,000 pounds of benzene were combusted in an incinerator that destroyed 99% of the benzene, the facility would report 99,000 pounds as treated on-site (the remaining 1,000 pounds would be reported as released).

Treated Off-site. This is the quantity of the toxic chemical that left the facility boundary and was sent to POTWs or other off-site locations for treatment, not the amount that was destroyed at the off-site location(s). This quantity includes the amount(s) reported in Section 6 of Form R as transferred to POTWs or other off-site locations for treatment, less any amount(s) associated with non-routine events.

Released On- and Off-site. This is the total quantity of the toxic chemical that was released to the environment or disposed of at the facility (directly discharged to air, land, and water, and injected underground) or sent off-site for disposal. This quantity is the sum of the amounts reported in Sections 5 and 6 of Form R (releases plus transfers to disposal only) less any amount(s) associated with non-routine events.

Released to the Environment Due to One-time Events. This amount is referred to as non-production-related waste and is the quantity released to the environment or sent off-site for recycling, energy recovery, treatment, or disposal due to one-time events not associated with routine production practices. Such events include catastrophic events, such as accidental releases, as well as remedial actions (clean up). This quantity is separated from the quantities recycled, used for energy recovery, treated, and released, to distinguish between quantities that are routinely associated with production operations and are more amenable to source reduction and those that are not routinely associated with production processes and are not so amenable to source reduction because they are not readily anticipated. This separation is important in assessing progress in source reduction at facilities.

Table 1-8. Actual and Projected Total Production-related Waste, by Industry, 1996-1998

SIC Code	Industry	Total Production-related Waste: Current Year 1996 Pounds	Projected: 1997 Pounds	Projected: 1998 Pounds	Change: 1996-1997 Percent	Change: 1996-1998 Percent
20	Food	397,557,868	653,060,717	727,957,465	64.3	83.1
21	Tobacco	5,921,753	6,058,749	6,208,774	2.3	4.8
22	Textiles	64,609,067	63,000,446	59,903,878	-2.5	-7.3
23	Apparel	3,273,589	2,670,153	2,341,081	-18.4	-28.5
24	Lumber	110,972,285	112,364,213	105,247,446	1.3	-5.2
25	Furniture	57,823,940	55,286,126	55,415,684	-4.4	-4.2
26	Paper	1,599,797,509	1,607,516,198	1,592,387,416	0.5	-0.5
27	Printing	266,207,152	271,986,787	273,386,005	2.2	2.7
28	Chemicals	10,032,390,027	10,353,025,860	10,711,018,548	3.2	6.8
29	Petroleum	2,155,301,359	2,149,256,710	2,154,256,626	-0.3	-0.0
30	Plastics	369,790,262	317,102,112	279,769,639	-14.2	-24.3
31	Leather	10,168,880	9,620,096	9,379,954	-5.4	-7.8
32	Stone/Clay/Glass	668,768,984	655,757,904	661,882,280	-1.9	-1.0
33	Primary Metals	4,184,091,672	4,157,446,855	4,098,770,311	-0.6	-2.0
34	Fabricated Metals	716,239,652	686,697,161	685,478,273	-4.1	-4.3
35	Machinery	169,485,752	154,171,333	139,198,996	-9.0	-17.9
36	Electrical Equip.	679,402,239	688,507,504	709,503,469	1.3	4.4
37	Transportation Equip.	355,169,310	349,768,654	352,591,138	-1.5	-0.7
38	Measure./Photo.	76,477,512	75,297,949	75,531,810	-1.5	-1.2
39	Miscellaneous	57,640,501	57,076,721	57,369,703	-1.0	-0.5
	Multiple codes 20-39	1,344,788,998	2,035,461,325	1,328,724,148	51.4	-1.2
	No codes 20-39	90,462,402	83,350,294	86,893,334	-7.9	-3.9
	Total	23,416,340,713	24,544,483,867	24,173,215,978	4.8	3.2
	Federal Facilities	47,591,818	43,616,949	155,744,502	-8.4	227.3

Note: Data from Section 8 (Total of 8.1 through 8.7) of Form R for 1996. Prior year is Column A, current year is Column B, 1997 is Column C and 1998 is Column D. Forms that reported more than one 2-digit SIC code within the range of 20 to 39 are assigned to the "multiple" category. Forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category.

Table 1-9 summarizes total production-related waste data by industry for 1991, the first year such data were collected, and for the three most recent years (1994-1996). Over that period, production-related waste rose from 18.65 billion pounds in 1991 to 19.01 billion pounds in 1996, a net increase of 1.9%.

Economic Overview, Multi-Year Comparisons

1996 was the sixth year in a relatively long period of moderate expansion in the United States economy. The economy as a whole grew at a rate of 2.8% for the year, as measured by real gross domestic product *(Economic Report of the President,* February 1998). Manufacturing output grew at a rate of 1.0% for the year, somewhat slower than in the previous several years.

Table 1-10 presents production indexes for each industrial sector from 1989 to 1996. These indexes measure real output (unlike the value of shipments data). As shown in the table, production increased 17.6% from 1989 to 1996 for U.S. manufacturing overall. Table 1-11 compares the change in manufacturing production since 1989 with the change in TRI on- and off-site releases and transfers off-site for treatment. As shown in Table 1-11, reported amounts of these TRI releases and transfers have steadily decreased since 1989, even as manufacturing production recovered from small decreases in the early years of the period and expanded through 1996. Overall, while manufacturing production increased 17.6% from 1989 to 1996, TRI on- and off-site releases and transfers off-site for treatment decreased 39.0%.

Table 1-9. Total Production-related Waste, by Industry, 1991 and 1994-1996

SIC Code	Industry	Total Production-related Waste 1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds	Change 1995-1996 Percent	Change 1991-1996 Percent
20	Food	63,066,268	72,118,666	71,156,494	70,151,157	-1.4	11.2
21	Tobacco	51,405,093	238,686	150,596	107,615	-28.5	-99.8
22	Textiles	51,580,594	49,696,040	46,439,252	46,960,548	1.1	-9.0
23	Apparel	2,340,880	2,450,405	2,081,936	2,983,859	43.3	27.5
24	Lumber	68,482,868	62,445,982	117,713,741	108,000,702	-8.3	57.7
25	Furniture	62,158,973	69,100,903	64,657,002	57,110,926	-11.7	-8.1
26	Paper	1,401,164,200	1,390,873,031	1,317,034,610	1,305,706,645	-0.9	-6.8
27	Printing	259,904,658	238,262,543	291,227,127	265,137,838	-9.0	2.0
28	Chemicals	7,588,654,698	7,960,775,406	7,945,305,210	7,944,446,007	-0.0	4.7
29	Petroleum	1,171,406,294	1,272,138,197	1,006,857,742	1,812,421,303	80.0	54.7
30	Plastics	457,662,674	511,959,880	498,365,536	338,869,255	-32.0	-26.0
31	Leather	18,010,356	8,750,968	7,542,055	6,287,054	-16.6	-65.1
32	Stone/Clay/Glass	945,494,178	1,003,550,335	835,143,656	642,733,737	-23.0	-32.0
33	Primary Metals	2,306,289,254	3,125,155,465	3,201,648,708	3,247,781,282	1.4	40.8
34	Fabricated Metals	639,270,669	802,980,329	676,733,941	676,808,105	0.0	5.9
35	Machinery	220,732,830	168,142,108	154,403,423	159,614,838	3.4	-27.7
36	Electrical Equip.	663,918,802	547,072,102	592,043,373	612,154,741	3.4	-7.8
37	Transportation Equip.	382,686,549	413,901,849	377,430,033	334,876,290	-11.3	-12.5
38	Measure./Photo.	114,962,999	73,269,084	73,757,533	67,302,183	-8.8	-41.5
39	Miscellaneous	59,754,379	62,368,995	55,563,414	55,967,458	0.7	-6.3
	Multiple Codes 20-39	1,948,479,575	1,243,934,543	1,344,098,604	1,175,283,275	-12.6	-39.7
	No Codes 20-39	167,790,586	216,475,822	89,307,448	78,091,387	-12.6	-53.5
	Total	18,645,217,377	19,295,661,339	18,768,661,434	19,008,796,205	1.3	1.9
	Federal Facilities	NA	36,195,048	77,626,788	46,040,436	-40.7	NA

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, and ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 (Total of 8.1 through 8.7, Column B) of Form R of year indicated. Forms that reported more than one 2-digit SIC code within the range of 20 to 39 are assigned to the "multiple" category. Forms with no 2-digit SIC code within the range of 20 to 39 are assigned to the "no codes 20-39" category. **NA:** Federal facilities not required to report before 1994

Table 1-10. Industrial Production Indexes by Industry, 1989-1996

SIC Code	Industry	1989	1990	1991	1992	1993	1994	1995	1996
Total Index		100.0	99.9	97.9	101.0	104.4	109.7	113.2	116.4
Manufacturing		100.0	99.5	97.2	101.0	104.7	110.5	114.3	117.6
20	Food	100.0	101.1	102.6	104.3	106.5	108.1	110.2	110.9
21	Tobacco	100.0	100.0	93.8	94.9	79.7	98.4	100.8	100.2
22	Textiles	100.0	96.6	96.1	103.6	109.3	114.8	113.9	110.6
24	Lumber	100.0	97.4	90.6	95.9	96.7	101.5	101.8	105.3
25	Furniture	100.0	98.5	92.6	97.7	102.2	105.4	106.1	106.3
26	Paper	100.0	100.6	101.5	104.8	109.0	113.6	115.2	113.2
27	Printing	100.0	99.6	95.7	96.6	97.4	97.1	96.4	95.2
28	Chemicals	100.0	102.3	101.4	105.2	106.2	109.5	112.0	114.4
29	Petroleum	100.0	101.0	99.8	100.7	103.6	103.7	105.2	107.3
30	Plastics	100.0	101.1	99.5	109.6	117.1	127.3	130.4	132.2
31	Leather	100.0	96.3	87.9	89.4	90.3	83.6	76.6	71.5
32	Stone/Clay/Glass	100.0	97.8	90.5	93.1	95.1	100.5	101.6	103.4
33	Primary Metals	100.0	99.1	92.2	95.3	100.6	107.7	110.3	111.6
34	Fabricated Metals	100.0	96.6	91.8	95.4	99.6	106.9	110.4	113.2
35	Machinery	100.0	97.2	92.6	97.1	106.7	121.7	137.3	151.8
36	Electrical Equip.	100.0	102.2	104.4	116.6	128.2	147.2	172.7	190.3
37	Transportation Equip.	100.0	97.3	91.8	95.1	98.7	102.2	99.9	101.0
38	Measure./Photo.	100.0	100.2	101.6	101.8	102.4	101.7	102.2	104.7

Note: 1989=100. Beginning 1990, data for production indexes based on 1987 Standard Industrial Classification (SIC), earlier years based on 1997 SIC. Data not provided for apparel industry (SIC coded 23).

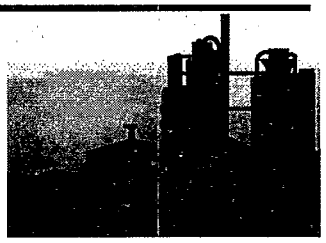
From: *1997 Statistical Abstract of the United States. No. 1227. Industrial Production Indexes, by Industry: 1980 to 1996* (Source: Board of Governors of the Federal Reserve System), *Federal Reserve Bulletin Monthly,* and *Industrial Production* and *Capacity Utilization, Statistical Release G. 17, monthly).*

Table 1-11. Cumulative Change in Manufacturing Production and in TRI Releases and Transfers Off-site to Treatment and Disposal, 1989-1996

	1989-1990	1989-1991	1989-1992	1989-1993	1989-1994	1989-1995	1989-1996
Manufacturing Production	-0.5	-2.8	1.0	4.7	10.5	14.3	17.6
TRI Releases and Transfers Off-site to Treatment and Disposal	-5.7	-19.7	-23.9	-30.1	-34.8	-37.0	-39.0

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. Cumulative change in manufacturing production based on *1997 Statistical Abstract of the United States. No. 1227. Industrial Production Indexes, by Industry: 1980 to 1996* (Source: Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin Monthly* and *Industrial Production and Capacity Utilization, Statistical Release G. 17, monthly*). **TRI Releases** from Section 5 and **Transfers Off-site to Treatment and Disposal** from Section 6 of TRI Form R (excludes transfers to recycling and energy recovery reported 1991 through 1996).

Chapter 2



Toxics Release Inventory Data for Food and Beverage Processing (SIC Code 20)

A Look at the Food and Kindred Products Industry (SIC Code 20)

Manufacturers in the food and kindred products industry (SIC code 20) produce food for people, pets, and livestock. They also make beer, wine, liquor, and soft drinks. Food and beverage processing is one of the country's most diverse manufacturing sectors, with 51 industry classifications in the system of Standard Industrial Classification (SIC) codes. Box 2-1 lists the SIC codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

Food and beverage processing is one of the country's largest manufacturing sectors. The United States is one of the world's largest sources of processed foods and beverages, accounting for about one-quarter of the industrialized world's production of these goods. In 1996, facilities in this sector shipped products valued at $461.32 billion, up from $446.87 billion in 1995 (both in current dollars). Employment in the production of food and beverages was more than 1.5 million in both years. Production in SIC code 20 increased steadily in the 1990s, rising 10.9% since 1989. Although this growth is less rapid than the national average of 17.6% for all industry sectors, food and beverage production is one of few sectors to expand production every year from 1989 to 1996 (see Chapter 1, Table 1-10). Employment also steadily increased throughout this period. Despite year-to-year changes in agricultural conditions (such as weather) and economic factors (ranging from grain prices to demand for exports), the food products sector has been one of the most stable manufacturing sectors in terms of production volume over time.

Food and beverage sector production can be divided into two groups, based on the value added to raw materials in their production. Lower value-added industries manufacture bulk foodstuff, including animal feed, which receives relatively little processing. Lower value-added products—especially those from extraction and milling operations (fats and oils, SIC code 207, and grain mill products, SIC code 204)—contribute much of the sector's reported TRI

Box 2-1. SIC Code 20, Food and Beverage Processing: Codes and Classifications

SIC Code		Industry Description
201	**Meat Products**	
2011	Meat Packing Plants	Slaughter of cattle, hogs, sheep, lambs, and calves for meat to be sold or used on the same premises in canning, cooking, curing, and freezing and in making sausage lard, and other products. Slaughter of horses for human consumption.
2013	Sausages and Other Prepared Meat Products	Manufacture of sausages and cured, smoked, canned, frozen, and other prepared meats and meat specialties, from purchased carcasses and other materials.
2015	Poultry Slaughtering and Processing	Slaughter, dressing, packaging, freezing, and canning of poultry, rabbits, and small game. Manufacture of products from such meats. Drying, freezing, and breaking of eggs.
202	**Dairy Products**	
2021	Creamery Butter	Manufacture of creamery butter.
2022	Natural, Processed, and Imitation Cheese	Manufacture of natural and processed cheese as well as cheese foods, spreads, and imitations and substitutes.
2023	Dry, Condensed, and Evaporated Dairy Products	Manufacture of dry, condensed, and evaporated dairy products. Includes manufacture of mixes for preparing frozen ice cream and ice milk and dairy and nondairy base cream substitutes and dietary supplements.
2024	Ice Cream and Frozen Desserts	Manufacture of ice cream and other frozen desserts.
2026	Fluid Milk	Processing of fluid milk, cream, and related products, including cottage cheese, non-frozen yogurt, and other fermented milk.
203	**Canned, Frozen, and Preserved Fruits, Vegetables, and Food Specialties**	
2032	Canned Specialties	Canning of baby foods, nationality specialty foods, soups (except seafood), and other specialty products.
2033	Canned Fruits, Vegetables, Preserves, Jams, and Jellies	Canning of fruits, vegetables, and juices. Manufacture of ketchup, tomato sauces, and natural or imitation preserves, jams and jellies.
2034	Dried and Dehydrated Fruits, Vegetables, and Soup Mixes	Sun drying or artificial dehydration of fruits and vegetables. Manufacture of packaged soup mixes from dehydrated ingredients.
2035	Pickled Fruits and Vegetables, Vegetable Sauces and Seasonings, and Salad Dressings	Pickling and brining of fruits and vegetables. Manufacture of salad dressings, vegetable relishes, sauces, and seasonings.
2037	Frozen Fruits, Frozen Juices, and Vegetables	Freezing of fruits, fruit juices, and vegetables. (Includes production of fresh or dried citrus pulp).
2038	Frozen Specialties, nec*	Manufacture of frozen food specialties such as frozen dinners and pizzas.
204	**Grain Mill Products**	
2041	Flour and Other Grain Mill Products	Milling of flour or meal from grain, except rice.
2043	Cereal Breakfast Foods	Manufacture of cereal breakfast foods and related preparations, except breakfast bars.
2044	Rice Milling	Cleaning and polishing of rice. Manufacture of rice flour or meal.
2045	Prepared Flour Mixes and Doughs	Preparation of flour mixes or doughs from purchased flour.
2046	Wet Corn Milling	Wet milling of corn or sorghum grain. Production of starch, syrup, oil, sugar, and byproducts such as gluten feed and meal. Manufacture of starch from other vegetable sources, such as potatoes or wheat.
2047	Dog and Cat Food	Manufacture of dog and cat food (canned, frozen, or dry) from cereal, meat, and other ingredients.
2048	Prepared Feeds and Feed Ingredients for Animals and Fowls, Except Dogs and Cats, nec*	Manufacture of prepared feeds and feed ingredients for animals and fowls, except dogs and cats. (Includes poultry and livestock feed and feed ingredients, supplements, concentrates, and pre-mixes.) Slaughter of animals for animal feed.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 2-1. SIC Code 20, Food and Beverage Processing: Codes and Classifications, Continued

SIC Code		Industry Description
205	**Bakery Products**	
2051	Bread and Other Bakery Products, Except Cookies and Crackers	Manufacture of fresh or frozen bread and bread-type rolls and fresh cakes, pies, pastries, and similar "perishable" bakery products.
2052	Cookies and Crackers	Manufacture of fresh cookies, crackers, pretzels, and similar "dry" bakery products.
2053	Frozen Bakery Products, Except Bread	Manufacture of frozen bakery products, except bread and bread-type rolls.
206	**Sugar and Confectionary Products**	
2061	Cane Sugar, Except Refining	Manufacture of raw sugar, syrup, or finished cane sugar from sugarcane.
2062	Cane Sugar Refining	Refining of purchased raw cane sugar and sugar syrup.
2063	Beet Sugar	Manufacture of sugar from sugar beets.
2064	Candy and Other Confectionery Products	Manufacture of candy, including chocolate candy, other confections, and related products.
2066	Chocolate and Cocoa Products	Shelling, roasting, and grinding of cacao beans to make chocolate liquor and thence cocoa powder and cocoa butter. Manufacture of chocolate bars, coatings, and related products.
2067	Chewing Gum	Manufacture of chewing gum or chewing gum base.
2068	Salted and Roasted Nuts and Seeds	Manufacture of salted, roasted, dried, cooked, or canned nuts. Processing of grains and seeds for snack purposes.
207	**Fats and Oils**	
2074	Cottonseed Oil Mills	Manufacture of cottonseed oil, cake, meal, and linters. Processing of purchased cottonseed oil other than into edible cooking oils.
2075	Soybean Oil Mills	Manufacture of soybean oil, cake, meal, and soybean oil isolates and concentrates. Processing of purchased soybean oil other than into edible cooking oils.
2076	Vegetable Oil Mills, Except Corn, Cottonseed, and Soybean	Manufacture of vegetable oils, cake, meal other than those derived from corn, cottonseed, or soybean. Processing similar purchased oils other than into edible cooking oils.
2077	Animal and Marine Fats and Oils	Manufacture of animals oils and meals, including fish and other marine animals. Rendering of inedible stearin, grease, and tallow from animal fat, bones, and meat scraps.
2079	Shortening, Table Oils, Margarine, and Other Edible Fats and Oils, nec*	Manufacture of shortening, table oils, margarine, and other miscellaneous edible fats and oils.
208	**Beverages**	
2082	Malt Beverages	Manufacture of malt beverages.
2083	Malt	Manufacture of malt or malt byproducts from barley or other grains.
2084	Wines, Brandy, and Brandy Spirits	Manufacture of wines, brandy, and brandy spirits. Blending of wines (by bonded wine cellars).
2085	Distilled and Blended Liquors	Manufacture of alcoholic liquors by distillation. Manufacture of blended or mixed cordials and cocktails.
2086	Bottled and Canned Soft Drinks and Carbonated Waters	Manufacture of soft drinks and carbonated waters.
2087	Flavoring Extracts and Flavoring Syrups, nec*	Manufacture of miscellaneous flavoring extracts, syrups, powders, and related products for soda fountain use or for the manufacture of soft drinks. Manufacture of colors for bakers' and confectioners' use.
209	**Miscellaneous Food Preparations and Kindred Products**	
2091	Canned and Cured Fish and Seafoods	Cooking and canning of fish, shrimp, oysters, and other seafoods, including soups. Curing (smoking, salting, drying) fish and other seafoods for the trade.
2092	Prepared Fresh or Frozen Fish and Seafoods	Preparation of fresh, raw, or cooked frozen fish and other seafoods including soups, stews, chowders, and seafood cakes. Shucking and packing of fresh oysters in nonsealed containers.

***nec:** not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 2-1. SIC Code 20, Food and Beverage Processing: Codes and Classifications, Continued

SIC Code		Industry Description
209	Miscellaneous Food Preparations and Kindred Products	
2095	Roasted Coffee	Roasting of coffee. Manufacture of coffee concentrates and extracts in powdered, liquid, or frozen form, including freeze-dried.
2096	Potato Chips, Corn Chips, and Similar Snacks	Manufacture of potato chips, corn chips, and similar snacks.
2097	Manufactured Ice	Manufacture of ice for sale.
2098	Macaroni, Spaghetti, Vermicelli, and Noodles	Manufacture of dry macaroni, spaghetti, vermicelli, and noodles.
2099	Food Preparations, nec*	Manufacture of miscellaneous prepared foods and food specialties, such as baking powder, yeast, peanut butter, packaged tea, ground spices, vinegar, and cider. Manufacture of dry preparations of pasta, rice, and similar products (excluding flour mixes), which are packaged to be prepared and cooked by the consumer.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

amounts of certain chemicals such as n-hexane, used in extraction. Solvents are essential to most extraction operations. Products of these mills do not include edible cooking oils. Other soybean oil mill products are protein isolates and concentrates used primarily in animal feed, but also in textured protein substances used to replace or extend meat in some food products.

Higher value-added industries produce packaged, consumer-brand goods that are ready for retail markets. These represent the output of sophisticated manufacturing processes. Longer shelf-life enhances the suitability for export of many higher value-added products—for example, canned fruits and vegetables (SIC code 2033), or dry, condensed, and evaporated dairy products (SIC code 2023). Most U.S. food exports are sent to Canada, Mexico, Japan, and the European Community. However, growth in export demand increases in part from expanding middle-class populations in developing countries and expanding markets in countries of the former Soviet Union.

Fundamental to the manufacture of most food products is processing to stabilize the food by heating, cooling, dehydration, freezing, or other means. Although the many types of food products require different types of processing, many include some form of preservation. Food processors cure, wash, fumigate, acidify, pasteurize, freeze, dehydrate, esterify, or apply other physical, chemical or mechanical techniques to preserve foods from microbes, enzymes, chemical deterioration, or mechanical damage.

Chemicals may be used in food processing as additives, when approved for these uses by the Food and Drug Administration (FDA). Additives

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

Food Industries Manual, 22nd ed, 1988: industry processes and technologies, environmental practices

McGraw-Hill Encyclopedia of Science and Technology, 8th ed., 1997: industry processes and technologies.

include antioxidants, colorants, emulsifiers and surfactants, enzymes, flavors and flavor enhancers, leavening agents and baking aids, pH control agents, preservatives, propellants, refrigerants, solvents, stabilizers and thickeners, and others. Nitrites and nitrates, for example, are used as preservatives in curing meat; sodium nitrate produces the characteristic cured-meat color and aids microbiological stability in low heat treatment.

In the food and beverage processing sector, air emissions may result from boiler and furnace emissions and exhausts. Discharges from extraction systems are a common wastestream in certain industries in this sector. Except for oils, solvents, and sludges, most wastes in food and beverage processing are aqueous. Food manufacturers typically remove large solid particles, trap oil and fat, use holding tanks to buffer discharge volumes, and remove finer particles by settling.

1996 TRI Data for Food and Beverage Processing

Table 2-1 summarizes TRI reporting by the food and beverage processing sector for 1996. More than 3,500 forms were submitted in this sector, and almost 1,000 of these were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. The percentage of Form A certifications in this sector (28.1%) is much larger than in most industries (11.3% for all sectors). (The Form A certification statement is explained in Chapter 1.)

Nearly one quarter (824 forms) of all forms in the food and beverage processing sector were submitted in the miscellaneous prepared feeds industry (SIC code 2048), which produces feed and related products for animals (except dogs and cats) and poultry. This industry also submitted two-thirds of the Form As in this sector (606 forms). Another 427 forms were submitted by facilities that used more than one SIC code to describe their industrial activities; these "multiple code" submissions are discussed below. Manufacturers of bottled and canned soft drinks (SIC code 2086) filed the third-largest number of forms (253).

The industry with the largest amounts of total on- and off-site releases and total production-related waste submitted relatively few forms. This was soybean oil milling (SIC code 2075), with 90 forms. This industry reported 30.2 million pounds of total releases, almost all of it on-site, and 171.0 million pounds of production-related waste, with most of that in other on-site waste management, as shown in Table 2-1.

The natural and processed cheese industry (SIC code 2022) reported the largest off-site releases reported in the food and beverage processing sector, with 164,000 pounds. Wet corn milling (SIC code 2046) reported the largest transfers off-site for further waste management, with 7.9 million pounds.

Some facilities in this sector engage in production of more than one food product, as designated in the Standard Industrial Classification (SIC) system. A facility may produce both dehydrated fruits and vegetables (SIC code 2034) and frozen fruits and vegetables (SIC code 2037). A mill might produce flour and other grain mill products (SIC code 2041) and also produce miscellaneous vegetable oils (SIC code 2076). These facilities may report multiple SIC codes on their TRI forms, to identify their line of business. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Table 2-1. Summary of TRI Information by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
12	8	2011	Meat Packing Plants	49	78	6	1,600 ,163	3,260	1,603,423
10	12	2013	Sausages & Other Prepared Meats	43	55	6	1,728,872	0	1,728,872
9	13	2015	Poultry Slaughtering & Processing	126	194	18	1,810,879	0	1,810,879
46	24	2021	Creamery Butter	6	12	0	500	0	500
6	5	2022	Cheese, Natural & Processed	103	242	7	2,527,811	164,012	2,691,823
20	10	2023	Dry, Condensed, Evaporated Products	48	94	8	296,936	18,110	315,046
21	29	2024	Ice Cream & Frozen Desserts	39	55	3	255,016	0	255,016
33	16	2026	Fluid Milk	98	139	9	92,312	6,200	98,512
26	21	2032	Canned Specialties	15	28	3	166,821	0	166,821
36	35	2033	Canned Fruits & Vegetables	20	26	5	53,863	0	53,863
24	20	2034	Dehydrated Fruits, Vegetables, Soups	13	21	1	168,776	0	168,776
45	40	2035	Pickles, Sauces, & Salad Dressings	12	13	1	518	243	761
8	11	2037	Frozen Fruits & Vegetables	60	96	5	2,028,391	86,163	2,114,554
19	30	2038	Frozen Specialties, nec*	20	31	0	523,443	0	523,443
25	33	2041	Flour & Other Grain Mill Products	53	68	24	167,979	0	167,979
37	45	2043	Cereal Breakfast Foods	7	9	1	43,960	0	43,960
34	42	2044	Rice Milling	4	4	0	93,400	0	93,400
44	50	2045	Prepared Flour Mixes & Doughs	3	3	0	3,505	0	3,505
7	4	2046	Wet Corn Milling	27	93	20	2,287,144	94,899	2,382,043
28	28	2047	Dog & Cat Food	43	51	17	144,510	4,610	149,120
5	3	2048	Prepared Feeds, nec*	329	824	606	4,146,131	44,212	4,190,343
43	48	2051	Bread, Cake, & Related Products	2	2	0	8,500	0	8,500
15	25	2052	Cookies & Crackers	21	21	0	1,089,243	0	1,089,243
31	41	2053	Frozen Bakery Products, Except Bread	7	7	0	107,517	0	107,517
16	23	2061	Raw Cane Sugar	7	17	4	737,415	0	737,415
48	27	2062	Cane Sugar Refining	4	9	4	176	0	176
4	7	2063	Beet Sugar	31	39	6	6,472,165	0	6,472,165
49	31	2064	Candy & Other Confectionery Products	3	6	1	5	0	5
47	37	2066	Chocolate & Cocoa Products	5	7	0	273	0	273
39	46	2068	Salted & Roasted Nuts & Seeds	1	1	0	25,875	0	25,875
3	9	2074	Cottonseed Oil Mills	25	27	1	8,084,252	0	8,084,252
1	1	2075	Soybean Oil Mills	60	90	5	30,243,022	431	30,243,453
11	17	2076	Vegetable Oil Mills, nec*	10	15	2	1,636,259	255	1,636,514
27	19	2077	Animal & Marine Fats & Oils	32	39	1	116,311	45,920	162,231
18	22	2079	Edible Fats & Oils, nec*	22	51	3	495,046	29,599	524,645
13	15	2082	Malt Beverages	36	77	3	1,169,822	2,617	1,172,439
42	44	2083	Malt	2	2	0	9,800	0	9,800
30	18	2084	Wines, Brandy, & Brandy Spirits	20	25	3	135,493	0	135,493
22	36	2085	Distilled & Blended Liquors	10	24	12	169,805	0	169,805
40	32	2086	Bottled & Canned Soft Drinks	205	253	124	14,655	0	14,655
14	6	2087	Flavoring Extracts & Syrups, nec*	35	54	14	1,018,948	82,515	1,101,463
41	47	2091	Canned & Cured Fish & Seafoods	4	4	3	10,500	0	10,500
35	43	2092	Fresh or Frozen Prepared Fish	8	10	3	73,658	0	73,658
50	49	2095	Roasted Coffee	3	3	0	5	0	5
38	34	2096	Potato Chips & Similar Snacks	18	27	6	24,757	4,835	29,592
29	39	2097	Manufactured Ice	12	12	1	135,592	0	135,592
23	38	2098	Macaroni & Spaghetti	9	9	0	169,049	0	169,049
17	14	2099	Food Preparations, nec*	55	119	14	527,703	24,027	551,730
2	2		Multiple within SIC Code 20	214	427	40	11,837,850	130,485	11,968,335
32	26		Invalid SIC Code within SIC Code 20	14	28	6	91,376	15,000	106,376
			Total for SIC Code 20	1,993	3,541	996	82,546,002	757,393	83,303,395

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-1. Summary of TRI Information by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2011	Meat Packing Plants	5,544,021	728,483	7,906,578	15,125
2013	Sausages & Other Prepared Meats	2,837,128	110,829	4,559,616	42,785
2015	Poultry Slaughtering & Processing	1,651,221	280,555	3,956,050	76,445
2021	Creamery Butter	1,079,840	34,554	1,115,257	11,580
2022	Cheese, Natural & Processed	11,080,420	3,057,130	15,423,603	3,860
2023	Dry, Condensed, Evaporated Products	5,041,487	1,589,738	6,928,233	7,466
2024	Ice Cream & Frozen Desserts	314,638	200,211	786,212	350
2026	Fluid Milk	1,679,662	1,205,914	2,944,107	6,895
2032	Canned Specialties	1,151,949	73,144	1,372,135	0
2033	Canned Fruits & Vegetables	83,631	40,850	176,602	610
2034	Dehydrated Fruits, Vegetables, Soups	1,102,937	409,010	1,684,486	18,015
2035	Pickles, Sauces, & Salad Dressings	65,623	69,658	133,511	0
2037	Frozen Fruits & Vegetables	2,620,144	212,492	4,817,686	16,493
2038	Frozen Specialties, nec*	141,923	125,499	767,354	14,689
2041	Flour & Other Grain Mill Products	52,293	25,468	260,168	14,740
2043	Cereal Breakfast Foods	27,325	17,225	64,896	0
2044	Rice Milling	0	0	93,750	0
2045	Prepared Flour Mixes & Doughs	0	250	3,500	0
2046	Wet Corn Milling	10,382,669	7,947,158	20,961,272	0
2047	Dog & Cat Food	132,417	541,250	816,580	0
2048	Prepared Feeds, nec*	43,672,789	223,283	48,014,983	15,326
2051	Bread, Cake, & Related Products	0	3,910	10,455	0
2052	Cookies & Crackers	0	0	1,089,493	0
2053	Frozen Bakery Products, Except Bread	0	17,469	128,095	8,328
2061	Raw Cane Sugar	430,000	0	1,167,585	0
2062	Cane Sugar Refining	831,845	0	832,021	0
2063	Beet Sugar	2,994,744	8,798	9,581,845	0
2064	Candy & Other Confectionery Products	0	240,889	564,312	0
2066	Chocolate & Cocoa Products	31,000	131,838	162,865	0
2068	Salted & Roasted Nuts & Seeds	0	0	25,875	0
2074	Cottonseed Oil Mills	0	16,384	7,681,397	131,000
2075	Soybean Oil Mills	140,591,931	201,995	171,028,043	800
2076	Vegetable Oil Mills, nec*	992,180	34,149	2,687,793	8,000
2077	Animal & Marine Fats & Oils	1,032,978	413,063	1,744,336	11
2079	Edible Fats & Oils, nec*	127,397	482,875	1,194,463	2,393
2082	Malt Beverages	2,095,971	126,464	3,376,090	8,223
2083	Malt	49,162	15,000	73,962	0
2084	Wines, Brandy, & Brandy Spirits	1,912,775	1,828	2,061,939	5,561
2085	Distilled & Blended Liquors	0	0	169,805	0
2086	Bottled & Canned Soft Drinks	226,186	133,810	372,180	310
2087	Flavoring Extracts & Syrups, nec*	10,525,432	326,436	11,944,773	7,000
2091	Canned & Cured Fish & Seafoods	0	0	10,500	0
2092	Fresh or Frozen Prepared Fish	0	3,451	83,542	6,246
2095	Roasted Coffee	6,344	109	6,459	0
2096	Potato Chips & Similar Snacks	180,501	76,282	242,108	0
2097	Manufactured Ice	9,999	0	148,891	5,750
2098	Macaroni & Spaghetti	0	0	150,374	18,675
2099	Food Preparations, nec*	1,821,322	1,326,166	3,722,320	17,697
	Multiple within SIC Code 20	39,462,745	2,898,315	53,541,628	98,828
	Invalid SIC Code within SIC Code 20	547,727	331,362	968,140	24,041
	Total for SIC Code 20	292,532,356	23,683,294	397,557,868	587,242

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

This multiple codes group—forms that reported more than one four-digit SIC code within SIC code 20—ranked second among all food and beverage processing industries for on-site releases, off-site releases, and total on- and off-site releases (nearly 12.0 million pounds total). This group also ranked third for other on-site waste management (39.5 million pounds) and for transfers off-site for further waste management (2.9 million pounds). For total production-related waste, it ranked second (53.5 million pounds).

The two industrial groups with the largest release and waste management amounts—soybean oil mills (SIC code 2075) and the multiple-codes group—together accounted for more than half of the total on- and off-site releases (50.7%) and half of the total production-related waste (56.5%) reported in this sector.

Multiple Codes within SIC Code 20

Table 2-2 further examines reporting on the forms submitted with multiple SIC codes. The most frequent combination was natural and processed cheese (SIC code 2022) and dry-condensed, and evaporated dairy products (SIC code 2023). There were 63 forms submitted with these two SIC codes. The second largest pairing of SIC codes (by number of forms) was meat packing plants (SIC code 2011) and animal and marine fats and oils (SIC code 2077); 35 forms reported this combination.

Although just 15 forms reported the combination of meat packing plants (SIC code 2011) and sausages and other prepared meats (SIC code 2013), these forms reported on- and off-site releases totaling 3.6 million pounds. This was the largest amount of releases submitted on multiple-code forms in SIC code 20, as shown in Table 2-2. One form that was submitted with SIC code 2041 (flour and other grain mill products) and SIC code 2079 (miscellaneous edible fats and oils) reported 20.9 million pounds of total production-related waste.

Table 2-2. Multiple SIC Codes, 1996: Food and Beverage Processing, SIC Code 20

SIC Codes	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2011 2013	15	2	3,591,258	5,751	3,597,009	448,519	88,135	4,137,059	5,709
2011 2013 2015	1	0	4	0	4	0	0	16,923	0
2011 2013 2038	1	0	1	0	1	0	0	56	0
2011 2013 2048	1	0	33,460	0	33,460	0	340,263	373,723	0
2011 2013 2077	7	0	76,455	5,710	82,165	349,000	55,900	486,944	490
2011 2022	3	0	0	0	0	48,558	28,166	76,724	0
2011 2023	1	0	0	0	0	18,743	0	18,743	0
2011 2048	3	1	9,210	0	9,210	52,110	0	61,320	0
2011 2077	35	0	2,589,366	63,660	2,653,026	1,690,700	357,920	4,579,971	1,011
2013 2077	3	0	3,912	0	3,912	556,000	0	559,920	2
2013 2099	2	0	29,000	0	29,000	26,000	0	55,000	160
2015 2026 2037 2086 2099	1	0	0	0	0	3,371	0	3,371	0
2015 2048	7	1	33,322	0	33,322	232,247	0	276,517	0
2015 2048 2077	5	3	64,041	0	64,041	138,000	0	202,041	0
2015 2048 2079	6	4	500,154	0	500,154	0	0	500,154	0
2015 2077	29	3	580,853	0	580,853	2,375,368	8,236	2,913,823	0
2020 2022 2023 2024	2	0	0	0	0	149,523	0	149,523	0
2020 2023	1	0	0	0	0	32,693	0	32,693	0
2021 2022	3	2	0	0	0	0	0	0	0
2021 2022 2023	10	0	20	0	20	541,177	36,922	602,543	0
2021 2022 2023 2024 2026	2	0	0	0	0	124,496	0	124,496	0

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 2-2. Multiple SIC Codes, 1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Codes						Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2021	2023					21	0	160,435	0	160,435	1,198,210	0	1,200,209	0
2021	2023	2024				2	0	0	0	0	52,279	0	52,279	0
2021	2023	2026				9	0	0	0	0	194,143	235,135	429,178	0
2022	2023					63	0	131,500	0	131,500	3,096,996	645,307	3,514,977	4,260
2022	2023	2024				3	0	0	0	0	52,520	0	52,520	0
2022	2023	2098				2	0	10,340	0	10,340	208,601	0	218,941	0
2022	2024					2	0	0	0	0	103,000	0	103,000	0
2022	2024	2026				2	0	0	23,609	23,609	17,407	70,353	111,369	0
2022	2026					3	0	250	0	250	61,249	0	61,249	595
2022	2035	2098				2	0	0	0	0	24,933	0	24,933	0
2023	2023	2032				1	0	0	0	0	31,837	8,547	31,943	0
2023	2024					2	0	0	0	0	0	37,259	37,259	0
2023	2026					17	0	51,385	0	51,385	360,911	179,518	590,839	0
2023	2045	2087				1	0	0	0	0	259	0	259	0
2023	2066					1	0	0	0	0	49,000	0	49,000	0
2024	2026					31	1	117,050	0	117,050	356,068	158,345	632,770	478
2024	2026	2051	2052	2053		3	0	25,610	0	25,610	0	143,012	167,000	0
2024	2026	2051	2052	2086	2099	3	0	0	0	0	0	0	0	0
2024	2026	2086				2	0	0	0	0	0	0	0	0
2024	2038					1	0	5,000	0	5,000	0	0	5,000	0
2024	2080					1	0	0	0	0	4,200	750	5,100	0
2026	2086					2	0	0	0	0	16,377	0	16,377	0
2033	2037					12	4	43,700	0	43,700	88,100	18,100	150,900	320
2033	2086					2	0	0	0	0	42,300	2,040	44,240	0
2034	2037					2	0	21,000	30,000	51,000	0	45,000	96,000	0
2035	2064	2079				1	1	0	0	0	0	0	0	0
2035	2079					1	0	14,000	0	14,000	0	0	14,000	0
2035	2099					1	0	0	0	0	0	0	0	0
2037	2038	2092				1	0	5	0	5	0	57,500	0	10
2038	2045					1	0	0	0	0	18,216	0	18,216	0
2038	2051					1	0	30,433	0	30,433	0	0	0	24,000
2038	2053					1	0	250	0	250	0	0	0	400
2038	2092					1	0	0	0	0	16	0	16	0
2041	2045					2	0	16,096	0	16,096	0	0	16,093	0
2041	2046					2	0	0	5	5	22	2,382	2,444	0
2041	2047	2048				1	0	0	0	0	0	0	0	0
2041	2048					1	0	11,045	0	11,045	0	0	11,045	0
2041	2076					1	0	12,637	0	12,637	0	3,617	5,861	10,393
2041	2079					1	0	58,300	0	58,300	20,807,700	0	20,866,000	10,000
2045	2096					1	0	20,000	0	20,000	0	0	20,000	0
2046	2048	2085	2099			9	0	1,032,814	0	1,032,814	2,366,590	0	3,399,404	0
2047	2048					3	0	15	1,500	1,515	0	0	255	0
2047	2048	2091				9	0	20,400	0	20,400	813,000	64,843	895,643	0
2048	2051					6	5	1,432	0	1,432	0	0	1,432	0
2048	2061					2	2	0	0	0	0	0	0	0
2048	2075					4	3	262,000	0	262,000	0	0	260,000	0
2048	2077					9	0	136,662	0	136,662	1,307,100	0	1,443,762	0
2048	2079					2	0	250	0	250	94,082	13,013	107,121	0
2048	2099					6	0	343,877	0	343,877	130,085	3,537	477,499	0
2051	2052	2053				2	0	6,433	0	6,433	0	0	6,433	0
2061	2062					5	1	235,250	0	235,250	1,068,988	0	1,304,084	0
2064	2066					5	0	18	250	268	13,051	153,600	166,832	0
2074	2075	2076	2077	2079		2	0	0	0	0	0	12,786	12,566	0
2075	2079					8	3	1,556,250	0	1,556,250	0	86,654	1,644,332	0
2082	2083					3	0	1,800	0	1,800	99,000	41,000	100,800	41,000
2084	2086					1	0	255	0	255	0	0	300	0
2086	2087					1	0	0	0	0	0	0	0	0
2087	2077	2099				1	0	302	0	302	0	475	604	0
2096	2099					4	4	0	0	0	0	0	0	0
Total for SIC Code 20						427	40	11,837,850	130,485	11,968,335	39,462,745	2,898,315	53,541,628	98,828

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 2-3. TRI On-site and Off-site Releases, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2075	Soybean Oil Mills	30,239,410	2,790	0	0	0	822	30,243,022	431	30,243,453
	Multiple within SIC Code 20	5,155,931	6,081,523	750	0	250	599,396	11,837,850	130,485	11,968,335
2074	Cottonseed Oil Mills	8,026,247	56,000	0	0	0	2,005	8,084,252	0	8,084,252
2063	Beet Sugar	5,973,257	418,992	0	0	0	79,916	6,472,165	0	6,472,165
2048	Prepared Feeds, nec*	4,060,551	410	0	0	15,206	69,964	4,146,131	44,212	4,190,343
2022	Cheese, Natural & Processed	70,205	858,152	0	0	0	1,599,454	2,527,811	164,012	2,691,823
2046	Wet Corn Milling	2,252,060	26,503	0	0	0	8,581	2,287,144	94,899	2,382,043
2037	Frozen Fruits & Vegetables	502,318	1,003,593	10	0	0	522,470	2,028,391	86,163	2,114,554
2015	Poultry Slaughtering & Processing	1,513,048	50,967	0	0	0	246,864	1,810,879	0	1,810,879
2013	Sausages & Other Prepared Meats	1,551,344	177,278	0	0	0	250	1,728,872	0	1,728,872
2076	Vegetable Oil Mills, nec*	1,636,259	0	0	0	0	0	1,636,259	255	1,636,514
2011	Meat Packing Plants	1,383,918	59,574	0	0	0	156,671	1,600,163	3,260	1,603,423
2082	Malt Beverages	1,158,155	11,667	0	0	0	0	1,169,822	2,617	1,172,439
2087	Flavoring Extracts & Syrups, nec*	985,311	0	0	0	0	33,637	1,018,948	82,515	1,101,463
2052	Cookies & Crackers	1,089,243	0	0	0	0	0	1,089,243	0	1,089,243
2061	Raw Cane Sugar	303	0	0	0	0	737,112	737,415	0	737,415
2099	Food Preparations, nec*	445,255	7,790	0	0	0	74,658	527,703	24,027	551,730
2079	Edible Fats & Oils, nec*	462,792	1,370	0	0	13,050	17,834	495,046	29,599	524,645
2038	Frozen Specialties, nec*	501,193	250	0	0	0	22,000	523,443	0	523,443
2023	Dry, Condensed, Evaporated Products	137,231	5	0	0	0	159,700	296,936	18,110	315,046
2024	Ice Cream & Frozen Desserts	255,016	0	0	0	0	0	255,016	0	255,016
2085	Distilled & Blended Liquors	129,818	39,987	0	0	0	0	169,805	0	169,805
2098	Macaroni & Spaghetti	169,049	0	0	0	0	0	169,049	0	169,049
2034	Dehydrated Fruits, Vegetables, Soups	147,521	21,250	0	0	0	5	168,776	0	168,776
2041	Flour & Other Grain Mill Products	167,979	0	0	0	0	0	167,979	0	167,979
2032	Canned Specialties	163,232	250	0	0	0	3,339	166,821	0	166,821
2077	Animal & Marine Fats & Oils	109,885	6,426	0	0	0	0	116,311	45,920	162,231
2047	Dog & Cat Food	3,985	139,325	0	0	0	1,200	144,510	4,610	149,120
2097	Manufactured Ice	135,592	0	0	0	0	0	135,592	0	135,592
2084	Wines, Brandy, & Brandy Spirits	50,741	0	0	0	0	84,752	135,493	0	135,493
2053	Frozen Bakery Products, Except Bread	107,517	0	0	0	0	0	107,517	0	107,517
	Invalid SIC Code within SIC Code 20	77,998	12,378	0	0	0	1,000	91,376	15,000	106,376
2026	Fluid Milk	90,912	0	0	0	0	1,400	92,312	6,200	98,512
2044	Rice Milling	93,400	0	0	0	0	0	93,400	0	93,400
2092	Fresh or Frozen Prepared Fish	67,159	6,499	0	0	0	0	73,658	0	73,658
2033	Canned Fruits & Vegetables	9,247	0	0	29,548	0	15,068	53,863	0	53,863
2043	Cereal Breakfast Foods	43,960	0	0	0	0	0	43,960	0	43,960
2096	Potato Chips & Similar Snacks	24,757	0	0	0	0	0	24,757	4,835	29,592
2068	Salted & Roasted Nuts & Seeds	25,875	0	0	0	0	0	25,875	0	25,875
2086	Bottled & Canned Soft Drinks	14,405	250	0	0	0	0	14,655	0	14,655
2091	Canned & Cured Fish & Seafoods	10,500	0	0	0	0	0	10,500	0	10,500
2083	Malt	9,800	0	0	0	0	0	9,800	0	9,800
2051	Bread, Cake, & Related Products	8,500	0	0	0	0	0	8,500	0	8,500
2045	Prepared Flour Mixes & Doughs	3,505	0	0	0	0	0	3,505	0	3,505
2035	Pickles, Sauces, & Salad Dressings	263	0	250	0	0	5	518	243	761
2021	Creamery Butter	500	0	0	0	0	0	500	0	500
2066	Chocolate & Cocoa Products	273	0	0	0	0	0	273	0	273
2062	Cane Sugar Refining	176	0	0	0	0	0	176	0	176
2064	Candy & Other Confectionery Products	5	0	0	0	0	0	5	0	5
2095	Roasted Coffee	5	0	0	0	0	0	5	0	5
	Total for SIC Code 20	69,065,606	8,983,229	1,010	29,548	28,506	4,438,103	82,546,002	757,393	83,303,395

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

On- and Off-site Releases

Table 2-3 and Figure 2-1 show the significance of air emissions in the releases reported in the food and beverage processing sector. Air emissions in this sector were 69.1 million pounds in 1996, 82.9% of the sector's total releases. Discharges to surface water were 9.0 million pounds, or 10.8% of the total, and releases to land other than RCRA subtitle C landfills were 4.4 million pounds, or 5.3%. The sector reported much smaller amounts of releases to RCRA subtitle C landfills and in both

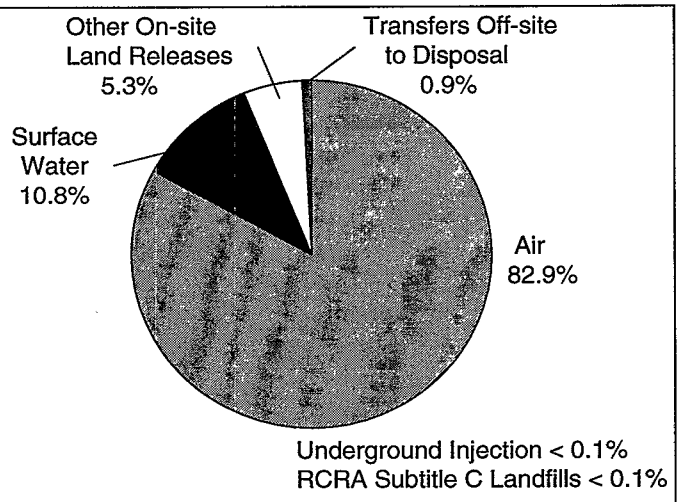


Figure 2-1. Distribution of TRI On-site and Off-site Releases, 1996: Food and Beverage Processing (SIC Code 20)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

categories of underground injection. Altogether, on-site releases were 99.1% of the sector's total releases in 1996. Off-site releases (transfers to disposal) were 757,000 pounds.

Soybean oil mills (SIC code 2075) reported 30.2 million pounds of air emissions, which was 43.8% of the air emissions reported by food and beverage processors. Almost all of the air emissions reported by soybean oil mills were for n-hexane (30.1 million pounds), commonly used in the extraction process. Additional information on this chemical and its use in extraction appears in "1996 TRI Data by Chemical for Food and Beverage Processing," later in this chapter.

The industry with the second-largest releases to air was cottonseed oil milling (SIC code 2074), with 8.0 million pounds (11.6%). The multiple-codes group reported two-thirds (67.7%) of the surface water discharges, with 6.1 million pounds. Figure 2-2 shows the distribution of on- and off-site

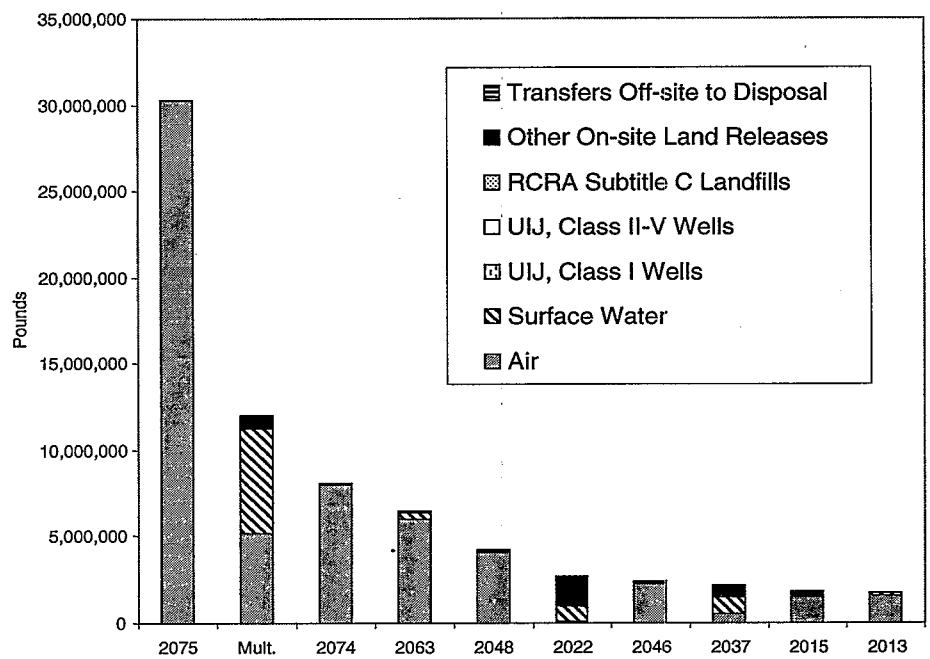


Figure 2-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Food and Beverage Processing (SIC Code 20)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

As shown in Table 2-4, soybean oil mills (SIC code 2075) reported 137.6 million pounds of on-site recycling in 1996, which was nearly half (47.0%) of all other on-site waste management reported in the food and beverage processing sector. Figure 2-3 illustrates the significant role of on-site recycling in the total other on-site waste management reported by this sector—nearly three-quarters (74.0%) of the total. A single facility, a soybean oil mill in Michigan, reported the great majority of the on-site recycling. This one facility reported 137.0 million pounds of n-hexane as being recycled on-site. Nearly all of the remaining on-site waste management consisted of treatment (25.9% of the total). Twelve industries in this sector reported no on-site waste management (see Table 2-4).

Soybean oil mills had the largest reported amounts for other on-site waste management, 140.6 million pounds. Processors of miscellaneous prepared animal feeds (SIC code 2048) had the second-largest total, 43.7 million pounds, followed by forms reporting multiple SIC codes, with 39.5 million pounds. These three groups represented three-quarters (76.5%) of other on-site waste management reported in this sector. Figure 2-4 illustrates the distribution of on-site waste management reported by the top industries.

Transfers Off-site for Further Waste Management

Food and beverage processing industries sent most of their transfers off-site for further waste management to POTWs. Transfers to POTWs were 20.3 million pounds in 1996, out of 23.7 million pounds of all transfers off-site for further waste management. This was 85.8% of the transfers, compared to 7.5% across all industries. More than one quarter (29.1%) of the POTW transfers (5.9 million pounds) consisted of ethylene glycol reported by one wet corn miller (SIC code 2046, see "Facilities with Large Increases and Decreases in Waste Management, 1991-1996," below). The second- and third-largest types of transfers reported by food and beverage processors were those to recycling (1.8 million pounds) and to treatment (1.3 million pounds). Table 2-5 and Figure 2-5 show the off-site transfers for further waste management of this sector.

Wet corn mills (SIC code 2046) reported the largest transfers off-site for further waste management. This industry reported 7.9 million pounds of transfers for further waste management, primarily in transfers to POTWs. Natural and processed cheese (SIC code 2022) ranked second with 3.1 million pounds, again principally to POTWs. Figure 2-6 illustrates the distribution of such transfers for the top industries.

1996 TRI Data by State for Food and Beverage Processing

Food processors tend to locate in food-growing regions. In each of five states, more than 150 TRI forms were submitted in food and beverage processing, and all are centers of agricultural production: California, Iowa, Wisconsin, Texas, and Illinois.

Table 2-4. TRI Other On-site Waste Management, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2075	Soybean Oil Mills	137,589,184	0	3,002,747	140,591,931
2048	Prepared Feeds, nec*	41,910,760	38,000	1,724,029	43,672,789
	Multiple within SIC Code 20	24,324,154	260,000	14,878,591	39,462,745
2022	Cheese, Natural & Processed	757,275	0	10,323,145	11,080,420
2087	Flavoring Extracts & Syrups, nec*	9,592,302	0	933,130	10,525,432
2046	Wet Corn Milling	868,148	45,691	9,468,830	10,382,669
2011	Meat Packing Plants	10,146	0	5,533,875	5,544,021
2023	Dry, Condensed, Evaporated Products	639,415	0	4,402,072	5,041,487
2063	Beet Sugar	0	0	2,994,744	2,994,744
2013	Sausages & Other Prepared Meats	1,750	0	2,835,378	2,837,128
2037	Frozen Fruits & Vegetables	14,462	0	2,605,682	2,620,144
2082	Malt Beverages	0	0	2,095,971	2,095,971
2084	Wines, Brandy, & Brandy Spirits	0	0	1,912,775	1,912,775
2099	Food Preparations, nec*	397,844	0	1,423,478	1,821,322
2026	Fluid Milk	32,921	0	1,646,741	1,679,662
2015	Poultry Slaughtering & Processing	0	0	1,651,221	1,651,221
2032	Canned Specialties	0	6,351	1,145,598	1,151,949
2034	Dehydrated Fruits, Vegetables, Soups	0	0	1,102,937	1,102,937
2021	Creamery Butter	300	0	1,079,540	1,079,840
2077	Animal & Marine Fats & Oils	0	0	1,032,978	1,032,978
2076	Vegetable Oil Mills, nec*	3,482	0	988,698	992,180
2062	Cane Sugar Refining	0	0	831,845	831,845
	Invalid SIC Code within SIC Code 20	246,450	0	301,277	547,727
2061	Raw Cane Sugar	0	0	430,000	430,000
2024	Ice Cream & Frozen Desserts	0	0	314,638	314,638
2086	Bottled & Canned Soft Drinks	10,700	9,600	205,886	226,186
2096	Potato Chips & Similar Snacks	0	0	180,501	180,501
2038	Frozen Specialties, nec*	0	0	141,923	141,923
2047	Dog & Cat Food	6,139	0	126,278	132,417
2079	Edible Fats & Oils, nec*	0	0	127,397	127,397
2033	Canned Fruits & Vegetables	0	0	83,631	83,631
2035	Pickles, Sauces, & Salad Dressings	200	0	65,423	65,623
2041	Flour & Other Grain Mill Products	0	52,068	225	52,293
2083	Malt	0	0	49,162	49,162
2066	Chocolate & Cocoa Products	0	0	31,000	31,000
2043	Cereal Breakfast Foods	0	0	27,325	27,325
2097	Manufactured Ice	0	0	9,999	9,999
2095	Roasted Coffee	0	0	6,344	6,344
2044	Rice Milling	0	0	0	0
2045	Prepared Flour Mixes & Doughs	0	0	0	0
2051	Bread, Cake, & Related Products	0	0	0	0
2052	Cookies & Crackers	0	0	0	0
2053	Frozen Bakery Products, Except Bread	0	0	0	0
2064	Candy & Other Confectionery Products	0	0	0	0
2068	Salted & Roasted Nuts & Seeds	0	0	0	0
2074	Cottonseed Oil Mills	0	0	0	0
2085	Distilled & Blended Liquors	0	0	0	0
2091	Canned & Cured Fish & Seafoods	0	0	0	0
2092	Fresh or Frozen Prepared Fish	0	0	0	0
2098	Macaroni & Spaghetti	0	0	0	0
	Total for SIC Code 20	216,405,632	411,710	75,715,014	292,532,356

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

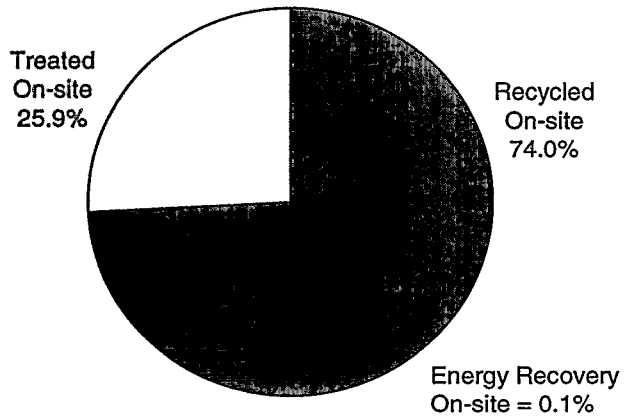


Figure 2-3. Distribution of TRI Other On-site Waste Management, 1996: Food and Beverage Processing (SIC Code 20)

Note: Data from Section 8 of Form R.

As shown in Table 2-6, Illinois contributed the largest share of total on- and off-site releases in the food and beverage processing sector (14.0 million pounds) in 1996. Iowa was second with 8.8 million pounds, and Texas was third with 4.0 million pounds.

Nebraska reported 141,000 pounds of off-site releases (transfers to disposal), the largest of any state or territory. Wisconsin was second with 130,000 pounds, and Texas ranked third with 97,000 pounds. Together they accounted for half (48.5%) of off-site releases reported in the food and beverage processing sector.

Michigan was the state with the largest other on-site waste management, with 143.2 million pounds. This was nearly half (49.0%) of the total for all states. As noted above, one Michigan facility, a soybean oil mill (SIC code 2075),

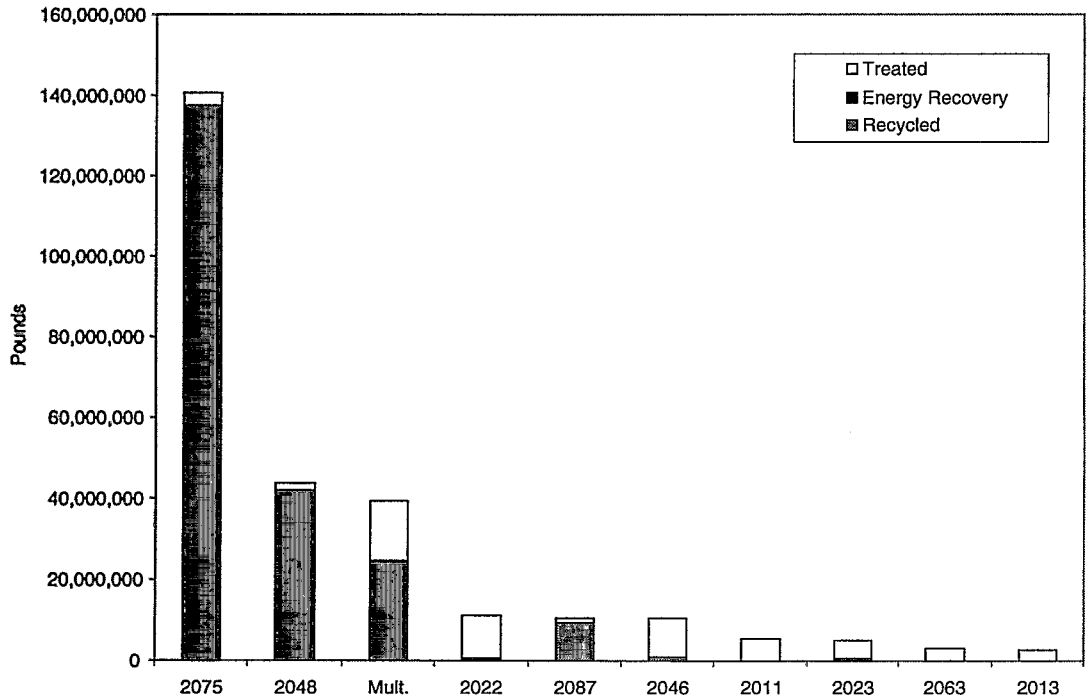


Figure 2-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Food and Beverage Processing (SIC Code 20)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

Table 2-5. TRI Transfers Off-site for Further Waste Management, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
2046	Wet Corn Milling	58,041	0	1,463	7,887,654	0	7,947,158
2022	Cheese, Natural & Processed	0	0	201,700	2,855,430	0	3,057,130
	Multiple within SIC Code 20	109,953	64,843	372,183	2,351,336	0	2,898,315
2023	Dry, Condensed, Evaporated Products	0	45,000	0	1,544,738	0	1,589,738
2099	Food Preparations, nec*	31,300	1	22,964	1,271,901	0	1,326,166
2026	Fluid Milk	31,064	0	0	1,174,100	750	1,205,914
2011	Meat Packing Plants	10,248	5,204	45,720	667,311	0	728,483
2047	Dog & Cat Food	540,000	0	0	1,250	0	541,250
2079	Edible Fats & Oils, nec*	449,006	0	0	33,869	0	482,875
2077	Animal & Marine Fats & Oils	9,000	0	0	404,063	0	413,063
2034	Dehydrated Fruits, Vegetables, Soups	270,005	250	99,500	39,255	0	409,010
	Invalid SIC Code within SIC Code 20	0	0	290,500	40,862	0	331,362
2087	Flavoring Extracts & Syrups, nec*	58,000	136,174	12,873	119,389	0	326,436
2015	Poultry Slaughtering & Processing	8,594	16,200	23,121	232,640	0	280,555
2064	Candy & Other Confectionery Products	1,933	0	0	238,956	0	240,889
2048	Prepared Feeds, nec*	0	0	55,411	167,872	0	223,283
2037	Frozen Fruits & Vegetables	21,834	0	1,410	189,248	0	212,492
2075	Soybean Oil Mills	172,675	0	0	29,320	0	201,995
2024	Ice Cream & Frozen Desserts	250	0	250	199,711	0	200,211
2086	Bottled & Canned Soft Drinks	2,255	0	425	131,130	0	133,810
2066	Chocolate & Cocoa Products	0	0	76,000	55,838	0	131,838
2082	Malt Beverages	122	0	42,245	84,097	0	126,464
2038	Frozen Specialties, nec*	0	0	2,450	123,049	0	125,499
2013	Sausages & Other Prepared Meats	14,423	0	0	96,406	0	110,829
2096	Potato Chips & Similar Snacks	0	0	0	76,282	0	76,282
2032	Canned Specialties	0	0	9,330	63,814	0	73,144
2035	Pickles, Sauces, & Salad Dressings	0	0	0	69,658	0	69,658
2033	Canned Fruits & Vegetables	0	0	27,250	13,600	0	40,850
2021	Creamery Butter	0	0	0	34,554	0	34,554
2076	Vegetable Oil Mills, nec*	26,132	0	0	8,017	0	34,149
2041	Flour & Other Grain Mill Products	0	0	0	25,468	0	25,468
2053	Frozen Bakery Products, Except Bread	1,400	0	0	16,069	0	17,469
2043	Cereal Breakfast Foods	0	0	0	17,225	0	17,225
2074	Cottonseed Oil Mills	0	0	0	16,384	0	16,384
2083	Malt	0	0	0	15,000	0	15,000
2063	Beet Sugar	0	0	0	8,798	0	8,798
2051	Bread, Cake, & Related Products	0	0	1,955	1,955	0	3,910
2092	Fresh or Frozen Prepared Fish	0	0	0	3,451	0	3,451
2084	Wines, Brandy, & Brandy Spirits	0	0	0	1,828	0	1,828
2045	Prepared Flour Mixes & Doughs	0	0	0	250	0	250
2095	Roasted Coffee	0	0	0	109	0	109
2044	Rice Milling	0	0	0	0	0	0
2052	Cookies & Crackers	0	0	0	0	0	0
2061	Raw Cane Sugar	0	0	0	0	0	0
2062	Cane Sugar Refining	0	0	0	0	0	0
2068	Salted & Roasted Nuts & Seeds	0	0	0	0	0	0
2085	Distilled & Blended Liquors	0	0	0	0	0	0
2091	Canned & Cured Fish & Seafoods	0	0	0	0	0	0
2097	Manufactured Ice	0	0	0	0	0	0
2098	Macaroni & Spaghetti	0	0	0	0	0	0
	Total for SIC Code 20	1,816,235	267,672	1,286,750	20,311,887	750	23,683,294

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

***nec:** not elsewhere classified.

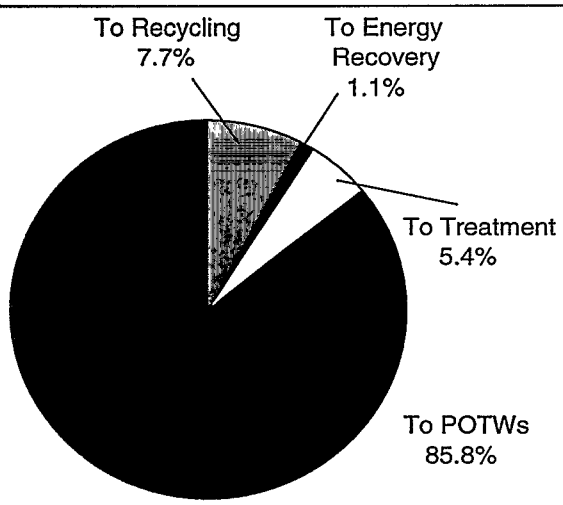


Figure 2-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Food and Beverage Processing (SIC Code 20)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

reported 137.0 million pounds of on-site recycling in 1996. Illinois was second for other on-site waste management with 68.6 million pounds, nearly one-quarter (23.4%) of the total. These two states also had the largest amounts of total production-related waste: 144.9 million pounds in Michigan and 84.0 million pounds in Illinois. Iowa was third for both on-site waste management and production-related waste, with 10.4 million pounds and 26.4 million pounds, respectively, in these two categories.

Food and beverage industries in Iowa reported 7.2 million pounds in transfers off-site for further waste management, 30.6% of the sector's total for such transfers. Wisconsin reported 2.3 million pounds and California 1.9 million pounds in transfers off-site for further waste management.

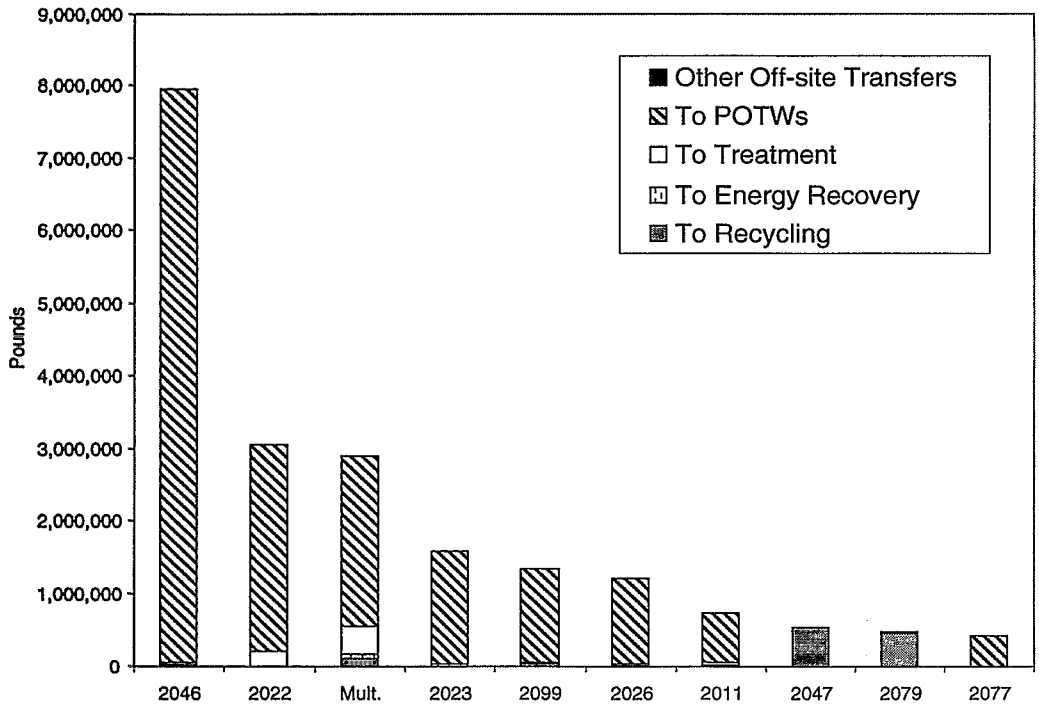


Figure 2-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Food and Beverage Processing (SIC Code 20)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

Table 2-6. Summary of TRI Information by State, 1996: Food and Beverage Processing, SIC Code 20

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	45	82	40	1,651,092	255	1,651,347	1,013,826	28,575	2,690,223	2,615
Alaska	2	4	3	1,700	0	1,700	0	0	1,700	0
American Samoa	1	1	0	10,500	0	10,500	0	0	10,500	0
Arizona	14	18	3	322,253	0	322,253	177,355	258,723	758,311	0
Arkansas	59	116	46	3,470,377	250	3,470,627	2,361,695	69,643	5,913,509	43,375
California	160	255	26	3,499,131	60,619	3,559,750	9,274,751	1,939,068	13,496,657	31,360
Colorado	26	43	15	471,848	6,200	478,048	2,311,801	244,175	3,023,549	1,792
Connecticut	4	7	0	36,310	0	36,310	710,600	320,750	1,066,480	50
Delaware	11	22	11	551,126	0	551,126	156,840	15,850	725,668	620
Florida	56	121	25	1,487,315	1,488	1,488,803	1,915,078	123,149	3,485,018	22,180
Georgia	83	133	50	2,474,154	535	2,474,689	993,438	728,519	4,019,237	9,410
Hawaii	4	4	1	29,798	0	29,798	825	5	30,430	50
Idaho	26	50	4	3,232,950	2,400	3,235,350	2,772,166	258,211	6,217,314	80
Illinois	103	210	67	13,936,917	24,294	13,961,211	68,565,874	1,327,701	83,975,099	34,181
Indiana	55	103	42	2,667,534	10,217	2,677,751	1,424,650	1,122,336	5,253,191	5,720
Iowa	114	251	69	8,784,741	29,670	8,814,411	10,448,621	7,244,323	26,448,610	1,616
Kansas	41	69	24	1,883,487	3,260	1,886,747	1,340,296	296,737	3,474,830	2,330
Kentucky	39	48	13	1,378,012	10	1,378,022	1,592,092	74,180	3,001,949	7,462
Louisiana	28	48	20	727,026	0	727,026	272,020	19,624	1,101,645	1
Maine	5	5	1	11,202	0	11,202	55	0	11,005	300
Maryland	34	64	25	528,767	0	528,767	476,060	220,086	1,058,924	21,251
Massachusetts	14	22	3	65,143	0	65,143	579,977	124,072	748,739	0
Michigan	47	69	14	1,330,197	41,609	1,371,806	143,241,326	461,308	144,893,379	9,889
Minnesota	84	148	56	3,537,721	9,035	3,546,756	3,453,792	747,831	7,692,612	44,000
Mississippi	40	65	26	2,012,572	0	2,012,572	707,239	47,957	2,846,913	50,611
Missouri	66	117	39	3,604,225	381	3,604,606	2,015,573	158,889	5,718,212	110,792
Montana	4	4	1	535,205	0	535,205	2,300	0	533,900	0
Nebraska	49	97	35	1,422,335	141,337	1,563,672	2,703,609	356,864	4,748,139	12,604
Nevada	5	8	2	470	0	470	19,168	19,549	39,013	0
New Hampshire	3	4	2	3,817	0	3,817	20,066	1,500	25,366	17
New Jersey	16	26	3	167,441	0	167,441	259,467	480,602	1,146,892	20
New Mexico	3	8	0	919,637	0	919,637	80,492	5	996,727	0
New York	52	93	14	343,357	1,086	344,443	3,391,496	578,161	3,997,024	15,060
North Carolina	70	141	63	2,530,875	94,727	2,625,602	5,661,875	500,199	8,776,466	5,613
North Dakota	12	20	7	1,342,302	0	1,342,302	3,433,085	120,717	4,901,970	8,020
Ohio	71	133	30	2,437,901	11,235	2,449,136	2,210,023	564,326	5,224,269	6,466
Oklahoma	23	30	10	939,369	15,000	954,369	11,859	139,229	1,037,028	29,000
Oregon	24	38	15	739,599	0	739,599	224,577	49,025	1,016,555	20
Pennsylvania	62	98	22	347,785	3,593	351,378	1,255,843	313,522	1,905,217	30,626
Puerto Rico	12	27	3	54,817	0	54,817	1,057,124	64,848	1,153,628	0
Rhode Island	2	3	1	0	0	0	0	12,786	12,566	0
South Carolina	15	23	7	2,036,548	250	2,036,798	1,241,652	7,726	3,282,814	740
South Dakota	16	29	6	3,757,179	5,751	3,762,930	1,665,891	1,195,044	6,626,113	1,746
Tennessee	42	68	14	1,238,150	0	1,238,150	466,958	183,115	1,905,997	500
Texas	114	187	57	3,895,087	96,539	3,991,626	3,173,056	678,063	7,844,713	44,084
Utah	14	23	5	8,315	2,368	10,683	386,073	13,898	410,169	0
Vermont	6	8	1	0	0	0	314,061	0	314,061	0
Virgin Islands	1	1	1	0	0	0	0	0	0	0
Virginia	51	87	18	966,445	1,755	968,200	1,112,934	66,966	2,150,513	12,113
Washington	33	56	13	179,457	64,000	243,457	1,152,419	182,599	1,544,954	10
West Virginia	9	17	3	39,655	0	39,655	87,357	40,449	157,048	0
Wisconsin	119	233	40	750,279	129,529	879,808	6,791,139	2,282,389	9,955,261	20,918
Wyoming	4	4	0	183,879	0	183,879	3,882	0	187,761	0
Total for SIC Code 20	1,993	3,541	996	82,546,002	757,393	83,303,395	292,532,356	23,683,294	397,557,868	587,242

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Map 2-1 illustrates the geographic distribution of total on- and off-site releases in the food and beverage processing sector.

1996 TRI Data by Chemical for Food and Beverage Processing

In the food and beverage processing sector, the 15 chemicals with the largest on- and off-site releases represented 98.3% of all releases; they appear in Table 2-7. Total releases of these chemicals were 81.9 million pounds, including 68.1 million pounds of air emissions and 9.0 million pounds of surface water discharges. Other on-site land releases of these chemicals were 4.1 million pounds.

The chemical with the largest air emissions was n-hexane, with 44.4 million pounds. This amounted to more than half (53.2%) of all releases reported in this sector. N-hexane is used in the food industry as an extraction solvent in food processing and as a solvent for certain applications in the manufacture of food-contact articles. The Food and Drug Administration (FDA) regulates n-hexane as a food additive, and the existence of the regulations signifies that FDA has determined that n-hexane is safe for the intended use.

Most n-hexane releases reported to TRI are not associated with production of food for human consumption. Soybean oil mills (SIC code 2075) and cottonseed oil mills reported the largest releases, 30.1 million pounds and 8.1 million pounds, respectively. Miscellaneous vegetable oil mills (SIC code 2076) reported 1.6 million pounds of n-hexane releases. These industries do not produce edible cooking oils. The multiple-codes group reported 2.4 million pounds of n-hexane releases; this group includes forms that combined miscellaneous vegetable oil milling (SIC code 2076) with flour and grain milling (SIC code 2046).

Ammonia ranked second for air emissions, with 18.9 million pounds. Among other applications, ammonia is used in food processing to control fungal growth on citrus fruit. Dissociated[1] ammonia also supplies hydrogen for the hydrogenation of fats and oils.

Nitrate compounds were reported with the largest discharges to surface water, 8.4 million pounds. This was 94.0% of all releases to surface water in this sector. Two forms totaling 5.3 million pounds accounted for most of this reporting; both reported multiple SIC codes related to meat processing (SIC codes 2011, 2013, and 2077). Meat processing industries use sodium nitrate and potassium nitrate to cure meats.

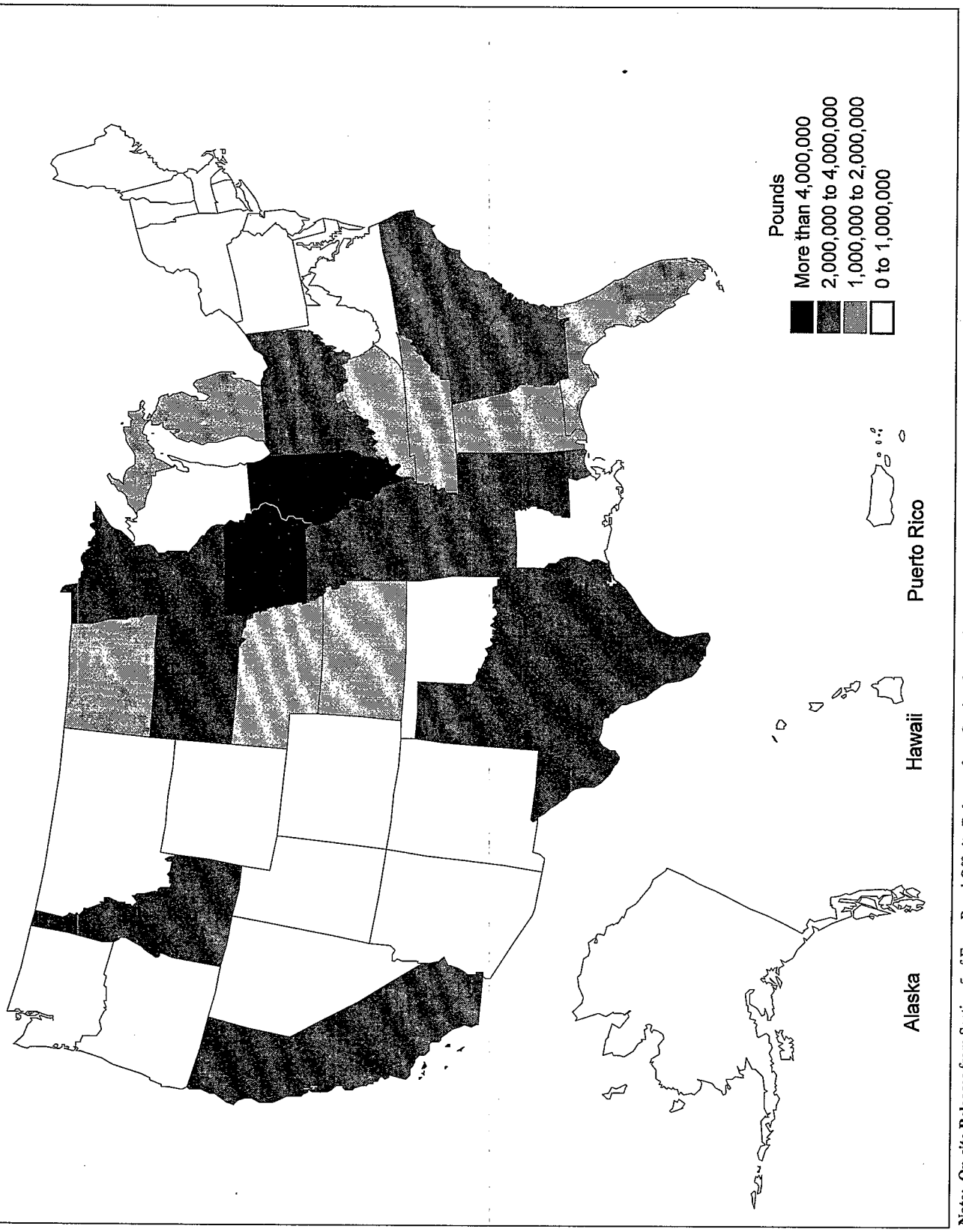
OSHA Carcinogens

Table 2-8 shows the on- and off-site releases of chemicals designated as OSHA carcinogens for the four-digit industries in the food and beverage processing sector. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.)

Two of the top 15 chemicals for total on- and off-site releases in this sector were OSHA carcinogens: atrazine with 614,000 pounds of other on-site land releases and acetaldehyde with 410,000 pounds, almost entirely in air emissions (see Table 2-7). Atrazine is a herbicide. Raw cane sugar producers (SIC code 2061) submitted two forms accounting for 424,000 pounds of this chemical; the two facilities that submitted these forms both raise and process sugar cane. Acetaldehyde is an important

[1] Dissociation uses a change in physical condition (such as pressure or temperature) or the action of a solvent to split a molecule into simpler groups of atoms, single atoms, or ions; the process is usually reversible.

Map 2-1. Total On- and Off-site Releases, 1996: Food and Beverage Processing, SIC Code 20



Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

Table 2-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
110-54-3	n-Hexane	44,287,671	59,287	0	0	250	2,265	44,349,473	660	44,350,133
7664-41-7	Ammonia	18,874,015	368,759	750	29,548	0	982,175	20,255,247	334,199	20,589,446
--	Nitrate compounds	50	8,445,095	0	0	0	1,880,709	10,325,854	81,325	10,407,179
67-56-1	Methanol	1,669,916	0	0	0	0	6,624	1,676,540	250	1,676,790
7647-01-0	Hydrochloric acid	1,553,736	0	0	0	0	0	1,553,736	0	1,553,736
1912-24-9	Atrazine	0	0	0	0	0	614,353	614,353	0	614,353
74-83-9	Bromomethane	436,139	0	0	0	0	0	436,139	0	436,139
75-07-0	Acetaldehyde	410,216	132	0	0	0	0	410,348	0	410,348
7664-93-9	Sulfuric acid	321,028	0	0	0	0	7,849	328,877	40,164	369,041
7664-38-2	Phosphoric acid	32,219	507	5	0	0	243,625	276,356	53,155	329,511
--	Manganese compounds	32,105	0	0	0	8,320	268,463	308,888	16,901	325,789
107-21-1	Ethylene glycol	214,379	634	0	0	0	35,513	250,526	0	250,526
7782-50-5	Chlorine	144,422	54,300	250	0	0	24,515	223,487	0	223,487
7697-37-2	Nitric acid	3,029	50,226	5	0	0	66,805	120,065	65,288	185,353
108-88-3	Toluene	163,242	5	0	0	0	0	163,247	18,000	181,247
	Subtotal	68,142,167	8,978,945	1,010	29,548	8,570	4,132,896	81,293,136	609,942	81,903,078
	Total for SIC Code 20	69,065,606	8,983,229	1,010	29,548	28,506	4,438,103	82,546,002	757,393	83,303,395

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.

Table 2-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2061	Raw Cane Sugar	0	0	0	0	0	424,353	424,353	0	424,353
2046	Wet Corn Milling	280,128	105	0	0	0	5	280,238	4	280,242
2099	Food Preparations, nec*	246,463	27	0	0	0	0	246,490	250	246,740
	Multiple within SIC Code 20	8,640	0	0	0	0	190,000	198,640	0	198,640
2087	Flavoring Extracts & Syrups, nec*	74,298	0	0	0	0	0	74,298	0	74,298
2079	Edible Fats & Oils, nec*	0	0	0	0	13,050	0	13,050	29,599	42,649
2048	Prepared Feeds, nec*	9,268	0	0	0	0	0	9,268	0	9,268
2034	Dehydrated Fruits, Vegetables, Soups	8,700	0	0	0	0	5	8,705	0	8,705
2011	Meat Packing Plants	1,768	0	0	0	0	0	1,768	0	1,768
2075	Soybean Oil Mills	0	306	0	0	0	567	873	31	904
2066	Chocolate & Cocoa Products	18	0	0	0	0	0	18	0	18
	Subtotal	629,283	438	0	0	13,050	614,930	1,257,701	29,884	1,287,585
	Total for SIC Code 20	69,065,606	8,983,229	1,010	29,548	28,506	4,438,103	82,546,002	757,393	83,303,395

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

component of food flavorings added to milk products, baked goods, fruit juices, candy, and soft drinks. It is also used in production of vinegar and yeast and to preserve fruit and fish. Acetaldehyde has been approved by FDA for these uses. The concentration of acetaldehyde in food is usually up to 0.047%. About half of the acetaldehyde air emissions were reported in miscellaneous food preparations (SIC code 2099, 205,000 pounds) and half in wet corn milling (SIC code 2046, 203,000 pounds).

The OSHA carcinogens with the next-largest releases in this sector were propylene oxide (82,000

pounds), dichloromethane (66,000 pounds), and chloroform (31,000 pounds), also principally in air emissions.

The industry with the largest releases of OSHA carcinogens reported only other on-site land releases. This was raw cane sugar production (SIC code 2061) by the two facilities reporting 424,000 pounds of atrazine. Forms reporting multiple SIC codes also reported most of their releases as other on-site land disposal (190,000 pounds) for these chemicals. Because of this reporting, air emissions accounted for a smaller portion of releases of OSHA carcinogens in this sector than in many others. Air emissions were less than half (48.9%) of the releases of these chemicals (629,000 pounds out of 1.3 million pounds). However, for other industry sectors, virtually all (99.9% or more) of the OSHA carcinogen releases were air emissions.

Figure 2-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Food and Beverage Processing

The food and beverage processing sector reported more than half (54.4%) of its production-related

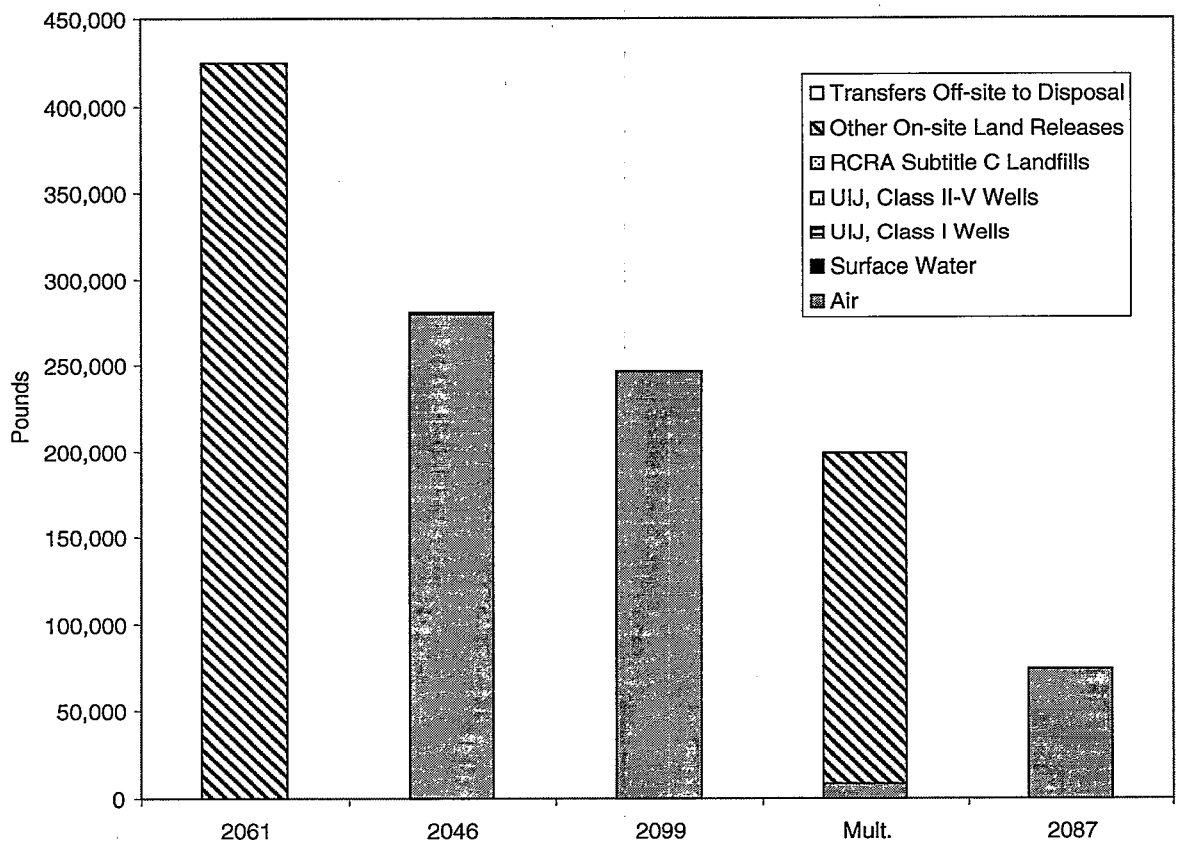


Figure 2-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Food and Beverage Processing (SIC Code 20)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

waste in 1996 as recycled on-site (216.4 million pounds out of 397.6 million pounds total), as shown in Table 2-9. Soybean oil mills (SIC code 2075) reported 137.6 million pounds of this on-site recycling; as noted earlier, the majority of this amount is attributed to one facility. Another 21.0% of the sector's production-related waste was reported as quantities released on- and off-site (83.5 million pounds). Soybean oil milling also accounted for the largest portion of these releases, 30.2 million pounds. The industrial group with the

Table 2-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Food and Beverage Processing, SIC Code 20 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2075	Soybean Oil Mills	137,589,184	0	3,002,747	172,675	0	27,363	30,236,074	171,028,043	800
	Multiple within SIC Code 20	24,324,154	260,000	14,878,591	158,211	64,300	1,998,315	11,858,057	53,541,628	98,828
2048	Prepared Feeds, nec*	41,910,760	38,000	1,724,029	0	0	215,422	4,126,772	48,014,983	15,326
2046	Wet Corn Milling	868,148	45,691	9,468,830	58,041	0	7,882,052	2,638,510	20,961,272	0
2022	Cheese, Natural & Processed	757,275	0	10,323,145	0	0	1,739,445	2,603,738	15,423,603	3,860
2087	Flavoring Extracts & Syrups, nec*	9,592,302	0	933,130	58,000	134,712	128,392	1,098,237	11,944,773	7,000
2063	Beet Sugar	0	0	2,994,744	0	0	18,811	6,568,290	9,581,845	0
2011	Meat Packing Plants	10,146	0	5,533,875	10,247	5,204	712,966	1,634,140	7,906,578	15,125
2074	Cottonseed Oil Mills	0	0	0	0	0	12,134	7,669,263	7,681,397	131,000
2023	Dry, Condensed, Evaporated Products	639,415	0	4,402,072	0	45,000	1,497,254	344,492	6,928,233	7,466
2037	Frozen Fruits & Vegetables	14,462	0	2,605,682	25,440	0	165,228	2,006,874	4,817,686	16,493
2013	Sausages & Other Prepared Meats	1,750	0	2,835,378	14,423	0	30,105	1,677,960	4,559,616	42,785
2015	Poultry Slaughtering & Processing	0	0	1,651,221	9,243	0	413,534	1,882,052	3,956,050	76,445
2099	Food Preparations, nec*	397,844	0	1,423,478	31,300	80,804	1,268,754	520,140	3,722,320	17,697
2082	Malt Beverages	0	0	2,095,971	58	0	126,720	1,153,341	3,376,090	8,223
2026	Fluid Milk	32,921	0	1,646,741	31,064	0	1,057,119	176,262	2,944,107	6,895
2076	Vegetable Oil Mills, nec*	3,482	0	988,698	16,553	0	8,039	1,671,021	2,687,793	8,000
2084	Wines, Brandy, & Brandy Spirits	0	0	1,912,775	0	0	1,828	147,336	2,061,939	5,561
2077	Animal & Marine Fats & Oils	0	0	1,032,978	9,000	0	450,690	251,668	1,744,336	11
2034	Dehydrated Fruits, Vegetables, Soups	0	0	1,102,937	270,004	490	138,470	172,585	1,684,486	18,015
2032	Canned Specialties	0	6,351	1,145,598	0	0	43,039	177,147	1,372,135	0
2079	Edible Fats & Oils, nec*	0	0	127,397	472,196	0	33,661	561,209	1,194,463	2,393
2061	Raw Cane Sugar	0	0	430,000	0	0	0	737,585	1,167,585	0
2021	Creamery Butter	300	0	1,079,540	0	0	34,554	863	1,115,257	11,580
2052	Cookies & Crackers	0	0	0	0	0	0	1,089,493	1,089,493	0
	Invalid SIC Code within SIC Code 20	246,450	0	301,277	0	0	315,831	104,582	968,140	24,041
2062	Cane Sugar Refining	0	0	831,845	0	0	0	176	832,021	0
2047	Dog & Cat Food	6,139	0	126,278	540,000	0	126	144,037	816,580	0
2024	Ice Cream & Frozen Desserts	0	0	314,638	64	0	189,100	282,410	786,212	350
2038	Frozen Specialties, nec*	0	0	141,923	22,000	0	70,848	532,583	767,354	14,689
2064	Candy & Other Confectionery Products	0	0	0	1,933	0	280,218	282,161	564,312	0
2086	Bottled & Canned Soft Drinks	10,700	9,600	205,886	1,621	0	121,214	23,159	372,180	310
2041	Flour & Other Grain Mill Products	0	52,068	225	0	0	25,463	182,412	260,168	14,740
2096	Potato Chips & Similar Snacks	0	0	180,501	0	0	585	61,022	242,108	0
2033	Canned Fruits & Vegetables	0	0	83,631	0	0	40,361	52,610	176,602	610
2085	Distilled & Blended Liquors	0	0	0	0	0	0	169,805	169,805	0
2066	Chocolate & Cocoa Products	0	0	31,000	0	0	131,838	27	162,865	0
2098	Macaroni & Spaghetti	0	0	0	0	0	0	150,374	150,374	18,675
2097	Manufactured Ice	0	0	9,999	0	0	0	138,892	148,891	5,750
2035	Pickles, Sauces, & Salad Dressings	200	0	65,423	0	0	66,448	1,440	133,511	0
2053	Frozen Bakery Products, Except Bread	0	0	0	1,400	0	15,814	110,881	128,095	8,328
2044	Rice Milling	0	0	0	0	0	0	93,750	93,750	0
2092	Fresh or Frozen Prepared Fish	0	0	0	0	0	2,701	80,841	83,542	6,246
2083	Malt	0	0	49,162	0	0	15,000	9,800	73,962	0
2043	Cereal Breakfast Foods	0	0	27,325	0	0	3,004	34,567	64,896	0
2068	Salted & Roasted Nuts & Seeds	0	0	0	0	0	0	25,875	25,875	0
2091	Canned & Cured Fish & Seafoods	0	0	0	0	0	0	10,500	10,500	0
2051	Bread, Cake, & Related Products	0	0	0	0	0	1,955	8,500	10,455	0
2095	Roasted Coffee	0	0	6,344	0	0	0	115	6,459	0
2045	Prepared Flour Mixes & Doughs	0	0	0	0	0	0	3,500	3,500	0
	Total for SIC Code 20	216,405,632	411,710	75,715,014	1,903,473	330,510	19,284,401	83,507,128	397,557,868	587,242

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

second-largest quantities in these two categories was the group reporting multiple SIC codes. These forms totaled 24.3 million pounds recycled on-site and 11.9 million pounds released.

The multiple-codes group reported the largest amount of on-site treatment. This sector reported 75.7 million pounds of on-site treatment (19.0% of total production-related waste), which included 14.9 million pounds reported on forms with multiple SIC codes. Production of natural and processed cheese (SIC code 2022) was second in this category reporting 10.3 million pounds.

Figure 2-8 illustrates the distribution of waste management types in the food and beverage processing sector's reporting for 1996. Distribution of production-related waste for the top industries in the sector appears in Figure 2-9.

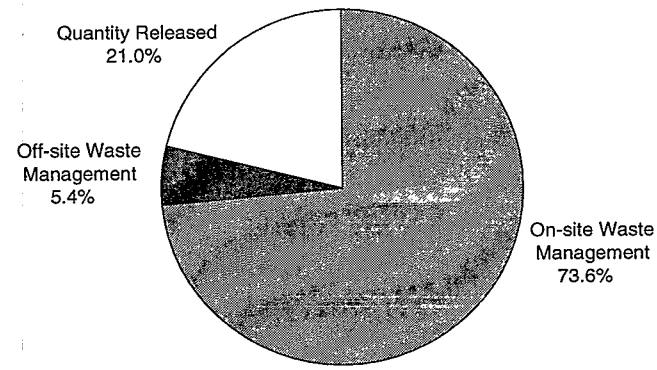


Figure 2-8. Distribution of TRI Production-related Waste, 1996: Food and Beverage Processing (SIC Code 20)

Note: Data from Section 8 of Form R.

Projected Quantities of TRI Chemicals in Waste

Food and beverage processors' current and projected data for production-related waste are summarized in Table 2-10. (As explained in Chapter 1, facilities

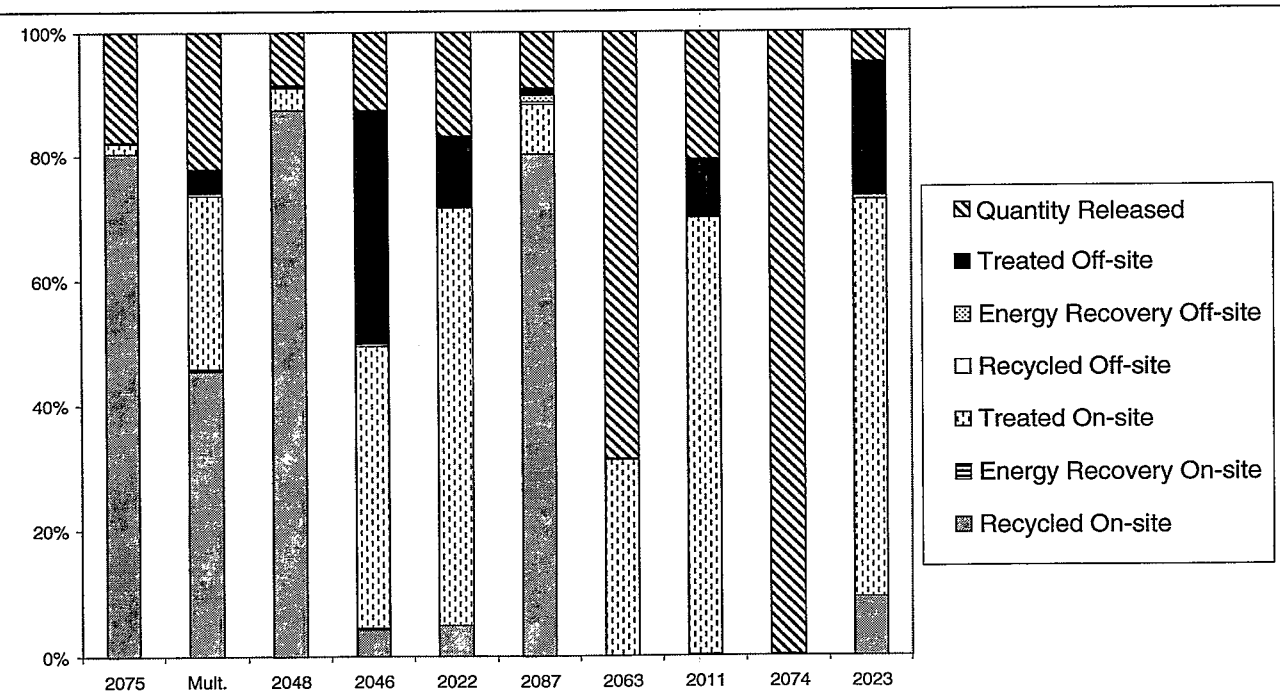


Figure 2-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Food and Beverage Processing (SIC Code 20)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category

Table 2-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Food and Beverage Processing, SIC Code 20

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	216,405,632	54.4	468,819,363	71.8	543,741,506	74.7
Energy Recovery On-site	411,710	0.1	314,951	0.0	314,951	0.0
Treated On-site	75,715,014	19.0	77,457,492	11.9	77,975,999	10.7
Off-site Waste Management						
Recycled Off-site	1,903,473	0.5	1,901,501	0.3	1,892,802	0.3
Energy Recovery Off-site	330,510	0.1	301,742	0.0	306,182	0.0
Treated Off-site	19,284,401	4.9	19,512,393	3.0	19,827,272	2.7
Quantity Released On- and Off-site	83,507,128	21.0	84,753,275	13.0	83,898,753	11.5
Total Production-related Waste for SIC Code 20	397,557,868	100.0	653,060,717	100.0	727,957,465	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	116.6	16.0	151.3
Energy Recovery On-site	-23.5	0.0	-23.5
Treated On-site	2.3	0.7	3.0
Off-site Waste Management			
Recycled Off-site	-0.1	-0.5	-0.6
Energy Recovery Off-site	-8.7	1.5	-7.4
Treated Off-site	1.2	1.6	2.8
Quantity Released On- and Off-site	1.5	-1.0	0.5
Total Production-related Waste for SIC Code 20	64.3	11.5	83.1

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

not only report current data but project waste management quantities for the next two years in their TRI submissions.) By 1998, on-site recycling was projected to increase from about half (54.4%) to three-quarters (74.7%) of total production-related waste in this sector. This would be a 151.3% increase from 216.4 million pounds to a projected 543.7 million pounds, most of it expected in the first year. Overall, total production-related waste for SIC code 20 would increase 83.1%, from 397.6 million pounds to 728.0 million pounds.

These data include large amounts reported for 1996 and projected through 1998 by one soybean oil mill mentioned in the discussion of "1996 TRI Data for Food and Beverage Processing," earlier in this chapter. This facility reported 137.0 million pounds

of on-site recycling in 1996 and projected 465.8 million pounds in 1998.

Quantities released were projected to increase slightly, from 83.5 million pounds in 1996 to 83.9 million pounds by 1998. However, with the very large increase expected in on-site recycling, releases would represent a much smaller proportion of total production-related waste, down from 21.0% in 1996 to 11.5% in 1998.

Increases were also projected in treatment: 3.0% for on-site treatment, a 2.3 million-pound increase, and 2.8% off-site, a 543,000 pound increase, by 1998. This also would result in treatment accounting for a smaller proportion of total production-related waste: On-site treatment was 19.0% of production-related waste in 1996, but would decline to 10.7% in 1998, and off-site treatment was 4.9% in 1996, declining to 2.7% in 1998.

Comparatively little change was expected in off-site recycling and in on- and off-site energy recovery.

Figure 2-10 illustrates the projected changes in waste management in this sector.

The large projected increase in on-site recycling appears to indicate improved performance in managing waste, as described in the waste management hierarchy. In that hierarchy, explained in Chapter 1, recycling is the preferred management option for TRI chemicals in waste that cannot be prevented in the first place. However, this sector's projection for recycling reflects increasing production-related waste, not decreases in other less desirable waste management options, such as releases and treatment. Thus, this forecast of the sector's performance suggests little or no real improvement.

A clearer view of projected performance by the sector as a whole can be obtained by reviewing the data without including the one facility that reported large on-site recycling (137.0 million pounds) in 1996 and projected a large increase (to 465.8 million pounds in 1998). Without that facility's data, on-site recycling and releases each amounted to nearly one-third of total production-related waste in the food and beverage processing sector in 1996, with little projected change by 1998. This represents not only little or no progress, but a continuing high proportion of releases of production-related waste, the least desirable option for handling TRI chemicals in waste under the waste management hierarchy.

Source Reduction Activity

As shown in Table 2-11, 13.8% of the forms submitted in this sector reported engaging in one or more source reduction activities during 1996. The largest number of these forms—86 forms, out of 489 reporting source reduction activity—were in the multiple-codes group (reporting more than one four-digit SIC code in SIC code 20). This was 20.1% of all multiple-codes forms in food and beverage processing, and the activity they most often cited was improving their operating practices (46 forms), followed by preventing spills and leaks (30 forms).

Cheese makers (SIC code 2022) submitted 45 forms indicating source reduction activity (18.6% of the forms in that industry). Good operating practices (20 forms) was also the category most often identified in this industry, followed by process modifications (11 forms).

Year-to-Year Comparisons for Food and Beverage Processing

1995-1996 TRI Data for Food and Beverage Processing

From 1995 to 1996, the number of forms submitted in food and beverage processing decreased 3.4%, but the number of Form A certification statements

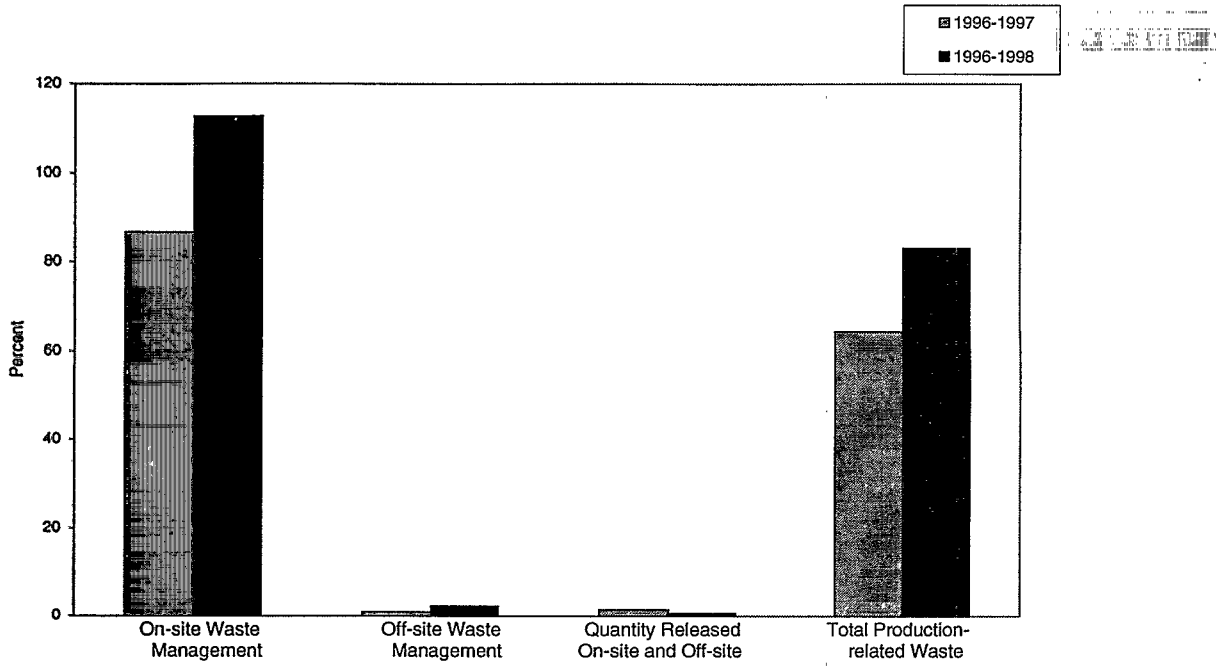


Figure 2-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Food and Beverage Processing (SIC Code 20)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

rose 8.4%, as shown in Table 2-12. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the Form A certification statement in its second year of availability.

On- and Off-site Releases

Table 2-12 presents on- and off-site releases for this sector for 1995-1996, illustrated in Figure 2-11. The total of these releases decreased from 86.5 million pounds in 1995 to 83.3 million pounds in 1996, a 3.7% reduction. The largest decrease occurred in reporting of air emissions, which were 74.5 million pounds in 1995 and 69.1 million pounds in 1996. This resulted from a 6.4 million-pound reduction in point source emissions, partly offset by a 951,000 pound increase in fugitive emissions. Together, air emissions were reduced by 7.3%.

Smaller decreases were reported in on-site land releases (from 4.7 million pounds to 4.5 million pounds) and in off-site releases (transfers to disposal, from 793,000 pounds to 757,000 pounds).

Surface water discharges increased from 6.5 million pounds in 1995 to nearly 9.0 million pounds in 1996, an increase of 39.3%. Underground injection, the smallest release type in this sector, showed an increase from 23,000 pounds to 31,000 pounds.

Other On-site Waste Management

By far the largest change in other on-site waste management appeared in on-site recycling, a reduction from 3.81 billion pounds in 1995 to 216.4 million pounds in 1996, as presented in Table 2-12. This accounted for the great majority of the reduction in total other on-site waste management for this sector, which dropped from 3.94 billion pounds to 292.5 million pounds. Both of these reductions amounted to more than 90% of the 1995 levels.

Table 2-11. Number of Forms Reporting Source Reduction Activity, 1996: Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
2011	Meat Packing Plants	78	22	28.2	11	0	7	1	11	0	0	0
2013	Sausages & Other Prepared Meats	55	13	23.6	8	0	4	1	5	1	0	0
2015	Poultry Slaughtering & Processing	194	21	10.8	16	0	7	0	4	0	2	0
2021	Creamery Butter	12	3	25.0	0	0	0	0	0	3	0	0
2022	Cheese, Natural & Processed	242	45	18.6	20	6	9	0	11	8	0	2
2023	Dry, Condensed, Evaporated Products	94	22	23.4	10	3	1	3	8	7	4	0
2024	Ice Cream & Frozen Desserts	55	15	27.3	8	0	3	1	4	1	0	0
2026	Fluid Milk	139	24	17.3	9	0	9	5	4	3	0	0
2032	Canned Specialties	28	9	32.1	7	1	1	2	0	1	0	0
2033	Canned Fruits & Vegetables	26	2	7.7	1	0	1	0	1	0	0	0
2034	Dehydrated Fruits, Vegetables, Soups	21	4	19.0	2	0	0	0	4	0	0	0
2035	Pickles, Sauces, & Salad Dressings	13	5	38.5	4	0	0	2	2	0	0	0
2037	Frozen Fruits & Vegetables	96	25	26.0	19	0	13	1	5	0	0	0
2038	Frozen Specialties, nec*	31	12	38.7	10	1	5	0	3	0	0	0
2041	Flour & Other Grain Mill Products	68	5	7.4	3	0	0	0	3	0	0	0
2043	Cereal Breakfast Foods	9	1	11.1	1	0	0	0	0	0	0	0
2044	Rice Milling	4	0	0.0	0	0	0	0	0	0	0	0
2045	Prepared Flour Mixes & Doughs	3	0	0.0	0	0	0	0	0	0	0	0
2046	Wet Corn Milling	93	9	9.7	2	1	1	0	6	0	0	0
2047	Dog & Cat Food	51	3	5.9	0	0	3	0	0	0	0	0
2048	Prepared Feeds, nec*	824	37	4.5	20	0	15	1	3	0	0	1
2051	Bread, Cake, & Related Products	2	1	50.0	1	0	0	0	1	0	0	0
2052	Cookies & Crackers	21	3	14.3	1	0	0	0	0	0	0	2
2053	Frozen Bakery Products, Except Bread	7	1	14.3	1	0	0	0	1	0	0	0
2061	Raw Cane Sugar	17	9	52.9	9	0	0	0	0	0	0	0
2062	Cane Sugar Refining	9	0	0.0	0	0	0	0	0	0	0	0
2063	Beet Sugar	39	2	5.1	0	0	0	1	1	0	0	0
2064	Candy & Other Confectionery Products	6	0	0.0	0	0	0	0	0	0	0	0
2066	Chocolate & Cocoa Products	7	1	14.3	0	0	0	0	1	0	0	0
2068	Salted & Roasted Nuts & Seeds	1	0	0.0	0	0	0	0	0	0	0	0
2074	Cottonseed Oil Mills	27	4	14.8	1	0	2	0	3	0	0	0
2075	Soybean Oil Mills	90	12	13.3	4	0	1	1	7	0	0	0
2076	Vegetable Oil Mills, nec*	15	7	46.7	2	0	0	2	5	0	0	0
2077	Animal & Marine Fats & Oils	39	0	0.0	0	0	0	0	0	0	0	0
2079	Edible Fats & Oils, nec*	51	6	11.8	4	0	2	0	3	0	0	0
2082	Malt Beverages	77	14	18.2	9	0	7	0	6	0	0	0
2083	Malt	2	1	50.0	0	0	1	0	0	0	0	0
2084	Wines, Brandy, & Brandy Spirits	25	5	20.0	3	0	1	0	2	0	0	0
2085	Distilled & Blended Liquors	24	2	8.3	0	2	0	0	0	0	0	0
2086	Bottled & Canned Soft Drinks	253	11	4.3	6	1	3	0	3	1	0	0
2087	Flavoring Extracts & Syrups, nec*	54	11	20.4	5	2	2	1	6	1	0	1
2091	Canned & Cured Fish & Seafoods	4	1	25.0	1	0	1	0	0	0	0	0
2092	Fresh or Frozen Prepared Fish	10	2	20.0	2	0	0	0	0	0	0	0
2095	Roasted Coffee	3	0	0.0	0	0	0	0	0	0	0	0
2096	Potato Chips & Similar Snacks	27	4	14.8	1	0	3	0	0	1	0	0
2097	Manufactured Ice	12	3	25.0	3	0	1	0	0	0	0	0
2098	Macaroni & Spaghetti	9	1	11.1	1	0	0	0	0	0	0	0
2099	Food Preparations, nec*	119	18	15.1	10	0	4	1	11	0	0	0
	Multiple within SIC Code 20	427	86	20.1	46	3	30	5	17	13	5	0
	Invalid SIC Code within SIC Code 20	28	7	25.0	3	0	0	0	5	0	0	0
	Total for SIC Code 20	3,541	489	13.8	264	20	137	28	146	40	11	6

Note: Forms with more than one 4-digit SIC code within code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-12. Comparison of TRI On-site and Off-Site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Food and Beverage Processing, SIC Code 20

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	2,050	1,993	-2.8
Total Forms	3,664	3,541	-3.4
Form Rs	2,745	2,545	-7.3
Form As	919	996	8.4
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	74,491,223	69,065,606	-7.3
Fugitive Air	20,859,651	21,810,437	4.6
Point Source Air	53,631,572	47,255,169	-11.9
Surface Water Discharges	6,446,608	8,983,229	39.3
Underground Injection	23,010	30,558	32.8
On-site Land Releases	4,712,880	4,466,609	-5.2
Total On-site Releases	85,673,721	82,546,002	-3.7
Off-site Releases			
Transfers Off-site to Disposal	792,799	757,393	-4.5
Total On- and Off-site Releases	86,466,520	83,303,395	-3.7
Other On-site Waste Management			
Recycled On-site	3,809,604,478	216,405,632	-94.3
Energy Recovery On-site	149,252	411,710	175.8
Treated On-site	135,009,546	75,715,014	-43.9
Total Other On-site Waste Management	3,944,763,276	292,532,356	-92.6
Transfers Off-site for Further Waste Management			
Transfers to Recycling	1,375,035	1,816,235	32.1
Transfers to Energy Recovery	191,257	267,672	40.0
Transfers to Treatment	1,006,508	1,286,750	27.8
Transfers to POTWs	23,342,285	20,311,887	-13.0
Other Off-site Transfers	2,448	750	-69.4
Total Transfers Off-site for Further Waste Management	25,917,533	23,683,294	-8.6

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

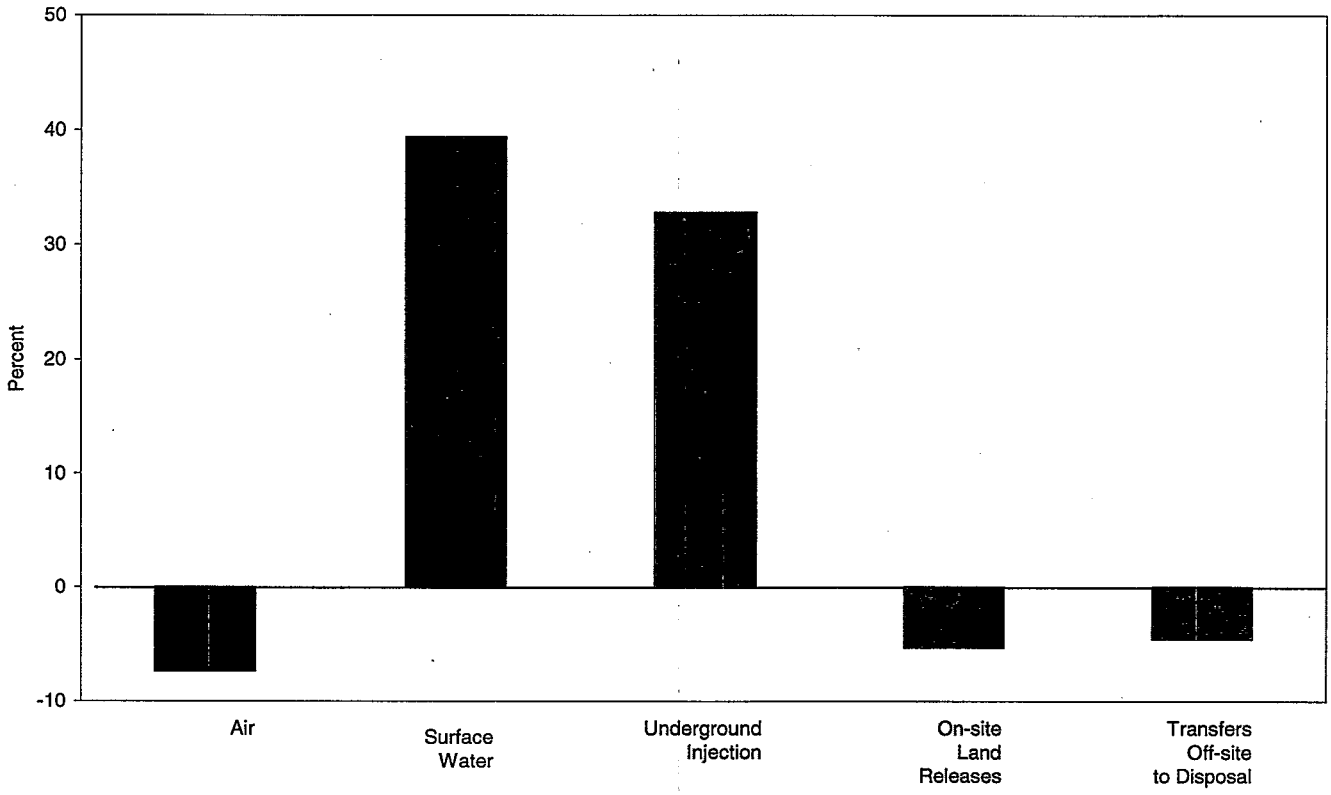


Figure 2-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Food and Beverage Processing (SIC Code 20)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

Seven facilities in SIC code 20 reported from 50 million to 1 billion pounds each in on-site recycling of n-hexane in 1995, but none in 1996. Each year, as noted in Chapter 1, TRI facilities report production-related waste quantities for the prior year as well as the current year (along with projections for the next two years). On their 1996 TRI Form Rs, these facilities also reported zero amounts for the prior year (1995), although they did not submit revisions of their actual 1995 data. These changes generally indicate that facilities have revised their interpretation of on-site recycling. There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

The seven facilities also projected no recycling of n-hexane in future years, and projections for this sector discussed earlier in this chapter (in "Projected Quantities of TRI Chemicals in Waste") are not influenced by their reporting.

Data for 1996 in this comparison include the soybean oil mill that reported 137.0 million pounds of on-site recycling of n-hexane, discussed in the section on "1996 TRI Data for Food and Beverage Processing" above. This facility did not report in 1995. Comparison data for on-site recycling for 1995 to 1996 in Table 2-12 thus include a 137.0 million-pound increase for this facility. However, the large reduction by the seven facilities who no longer report n-hexane recycling overshadows this increase, when data are presented for the sector as in Table 2-12.

On-site treatment also showed a sizable decrease for this period, although largely masked by the numbers for on-site recycling. In 1995, on-site treatment was 135.0 million pounds, and in 1996, it was 75.7 million pounds, a 43.9% reduction.

Transfers Off-site for Further Waste Management

Table 2-12 also presents 1995-1996 data for transfers off-site for further waste management in the food and beverage processing sector. The total decreased from 25.9 million pounds to 23.7 million pounds (8.6% reduction), driven by a 13.0% reduction in transfers to POTWs, the transfer type with the largest amounts in this sector. Food and beverage processors reported sending 23.3 million pounds to POTWs in 1995 and 20.3 million pounds in 1996.

Other types of transfers increased, but the amounts involved were smaller, as shown in Table 2-12.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Food and Beverage Processing

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

From 1988 to 1996, food and beverage industries' reporting of total releases decreased from 8.4 million pounds to 5.1 million pounds, a 38.9% reduction. All types of releases decreased. The largest component of the 3.3 million-pound overall reduction was surface water discharges, which decreased 1.3 million pounds (from 1.4 million pounds to 107,000 pounds) during this period. Air emissions decreased by 904,000 pounds (from 4.7 million pounds to 3.8 million pounds), primarily in fugitive emissions, although both types of air emissions rose in the last year. Off-site releases went from 1.1 million pounds in 1988 to 298,000 pounds in 1996, a 787,000 pound decrease.

These data appear in Table 2-13, and percentage changes are illustrated in Figure 2-12.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, a reduction in on-site recycling from 12.0 million pounds to 10.0 million pounds was partly offset by an increase in on-site treatment from 41.2 million pounds to 42.6 million pounds. Relatively little was reported in energy recovery. The net change in other on-site waste management for 1988-1996 was a reduction of 497,000 pounds, from 53.4 million pounds to 52.9 million pounds.

Among categories reported in all years, transfers off-site to POTWs decreased from 14.0 million pounds to 10.4 million pounds, a 25.8% reduction. Transfers to treatment increased from 238,000 pounds to 431,000 pounds; although the absolute amounts were relatively small, this represented an 81.5% increase.

Table 2-13. Comparison of TRI On-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	1,185	1,532	1,550	1,522	28.4
Total Forms	1,777	2,451	2,469	2,473	39.2
Form Rs	1,777	2,451	1,655	1,560	-12.2
Form As	NA	NA	814	913	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	4,749,078	4,062,676	3,521,930	3,844,770	-19.0
Fugitive Air	2,505,922	1,838,885	1,587,224	1,779,364	-29.0
Point Source Air	2,243,156	2,223,791	1,934,706	2,065,406	-7.9
Surface Water Discharges	1,395,632	51,424	120,025	107,203	-92.3
Underground Injection	12,800	260	10	260	-98.0
On-site Land Releases	1,134,750	1,314,805	1,163,061	869,825	-23.3
Total On-site Land Releases	7,292,260	5,429,165	4,805,026	4,822,058	-33.9
Off-site Releases					
Transfers Off-site to Disposal	1,085,457	584,395	315,331	298,445	-72.5
Total On- and Off-site Releases	8,377,717	6,013,560	5,120,357	5,120,503	-38.9
Other On-site Waste Management					
Recycled On-site	NA	12,020,355	9,176,780	9,971,687	NA
Energy Recovery On-site	NA	205,930	149,252	359,642	NA
Treated On-site	NA	41,208,559	44,285,763	42,606,959	NA
Other On-site Waste Management	NA	53,434,844	53,611,795	52,938,288	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	1,174,803	878,895	1,500,904	NA
Transfers to Energy Recovery	NA	144,835	174,671	212,474	NA
Transfers to Treatment	237,511	679,937	441,457	431,005	81.5
Transfers to POTWs	14,027,014	12,495,923	11,745,510	10,401,096	-25.8
Other Off-site Transfers	122,933	5,004	250	750	-99.4
Total Transfers Off-site for Further Waste Management	NA	14,500,502	13,240,783	12,546,229	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. **NA:** not required to be reported in that year.

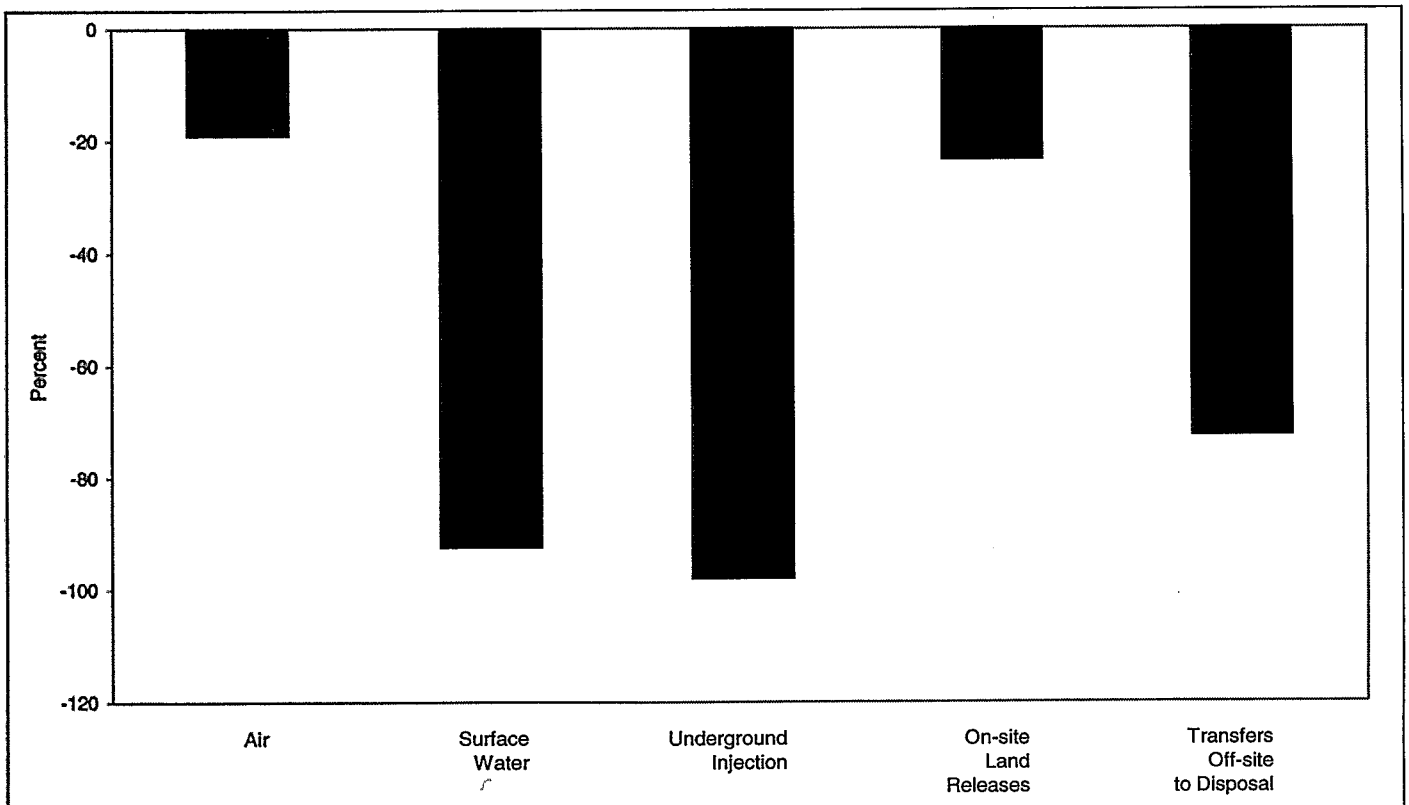


Figure 2-12. Percentage Change in On-site and Off-site Releases,1988-1996: Food and Beverage Processing (SIC Code 20)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

From 1988 to 1996, the number of forms submitted in food and beverage processing rose 39.2%, in contrast to a 4.2% decline for all industry sectors over the same period.

1988-1996 Data for Four-Digit Industries in Food and Beverage Processing

Tables 2-14 through 2-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 20. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The industry with the largest increase in releases from 1988 to 1996 was miscellaneous flavoring extracts and syrups (SIC code 2087), whose total on- and off-site releases rose from 62,000 pounds to 556,000 pounds. This came from increases in reported air emissions, on-site land releases and off-site releases (transfers to disposal). Two other industry groups had increases of more than 200,000 pounds: the multiple SIC codes category (from 1.5 million pounds to 1.8 million pounds) and poultry slaughtering and processing (SIC code 2015, from 44,000 pounds to 251,000 pounds). Both represented a number of changes partly off-setting one another, including increases in air emissions

and decreases in surface water discharges in both cases.

The industry with the largest decrease was miscellaneous food preparations (SIC code 2099). This industry reported 1.1 million pounds in total releases in 1988 and 382,000 pounds in 1996; this reduction was attributable primarily to air emissions and secondarily to off-site releases (transfers to disposal). The next largest reduction was in frozen fruits and vegetables (SIC code 2037), from 548,000 pounds in 1988 to 159,000 pounds in 1996. On-site land releases and air emissions, as well as off-site releases (transfers to disposal), decreased in this industry. Third for reductions was beet sugar (SIC code 2063), which reported 385,000 pounds in 1988 and none in 1996.

Table 2-14 provides release data for all four-digit SIC codes in the food and beverage processing sector, for 1988-1996.

Other On-site Waste Management

The multiple-codes group accounted for the largest reduction in other on-site waste management for 1994-1996 (on-site waste management data were not collected in 1988). TRI forms in this group reported 17.9 million pounds of such waste management in 1994 and 14.1 million pounds in 1996, a 3.7 million-pound reduction. About two-thirds of this reported decrease in on-site waste management occurred in recycling and the rest in treatment, with a small increase in energy recovery.

Three industries had decreases of more than 1 million pounds each. These were miscellaneous food preparations (SIC code 2099), with a reduction of 1.2 million pounds; miscellaneous edible fats and oils (SIC code 2079), 1.2 million-pound reduction; and potato chips and similar snacks (SIC code 2096), 1.1 million-pound reduction. For the miscellaneous food products and miscellaneous fats and oils, these decreases were attributable to treatment. For chip and snack products, the largest reduction occurred in recycling.

The largest increase was reported in production of natural and processed cheese (SIC code 2022), which increased from 8.0 million pounds in 1994 to 10.1 million pounds in 1996. On-site treatment accounted for this increase, partly offset by a smaller decrease in on-site recycling.

The miscellaneous flavoring extracts and syrups (SIC code 2087) reported an increase of 1.8 million pounds, and the dry, condensed, evaporated products (SIC code 2023, a dairy products industry) reported an increase of 1.3 million pounds. Both arose from increases in on-site recycling and treatment; the larger portion of the increase for flavorings was in recycling and the larger portion of the increase for dry dairy products was in treatment. No other industry reported an increase of more than 1 million pounds.

On-site waste management data for 1994-1996 appear in Table 2-15.

Transfers Off-site for Further Waste Management

As shown in Table 2-16, the miscellaneous food preparations industry (SIC code 2099) reported a decrease in transfers off-site for further waste management from 1.8 million pounds in 1994 to 344,000 pounds in 1996 (data for some types of off-site transfers were not collected in 1988). This was the largest reduction, 1.5 million pounds, posted in the food and beverage processing sector, and it represented a decrease of 978,000 pounds in transfers to POTWs with smaller reductions in other transfer types.

Production of natural and processed cheese (SIC code 2022) was second with a 1.2 million-pound reduction, entirely in transfers to POTWs.

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2011	Meat Packing Plants	96	29,545	27,823	0	0	57,368	0	57,368
		95	11,428	78,404	0	0	89,832	0	89,832
		94	30,609	1,005	0	0	31,614	0	31,614
		88	40,660	38,348	0	750	79,758	0	79,758
2013	Sausages & Other Prepared Meats	96	16,383	5	0	0	16,388	0	16,388
		95	25,688	5	0	13,004	38,697	0	38,697
		94	48,650	5	0	0	48,655	0	48,655
		88	79,130	250	0	0	79,380	0	79,380
2015	Poultry Slaughtering & Processing	96	73,919	2,167	0	174,453	250,539	0	250,539
		95	52,818	1,750	0	238,868	293,436	0	293,436
		94	48,736	1,250	0	191,262	241,248	0	241,248
		88	750	40,762	0	2,700	44,212	0	44,212
2021	Creamery Butter	96	500	0	0	0	500	0	500
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	250	0	0	0	250	0	250
2022	Cheese, Natural & Processed	96	2,024	10	0	24,342	26,376	83,307	109,683
		95	431	55	5	132,854	133,345	44,319	177,664
		94	434	54	0	359,409	359,897	121,804	481,701
		88	3,548	106,619	250	20,870	131,287	0	131,287
2023	Dry, Condensed, Evaporated Products	96	127,160	5	0	5,900	133,065	18,000	151,065
		95	128,971	5	0	500	129,476	16,540	146,016
		94	123,196	10	0	10	123,216	16,304	139,520
		88	164,231	16,000	0	92,677	272,908	98,377	371,285
2024	Ice Cream & Frozen Desserts	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	23,000	0	0	0	23,000	0	23,000
		88	5,900	0	0	0	5,900	0	5,900
2026	Fluid Milk	96	2,045	0	0	500	2,545	6,200	8,745
		95	2,030	0	0	0	2,030	24,985	27,015
		94	4,092	20,795	0	20,795	45,682	17,540	63,222
		88	22,530	198,671	0	109,464	330,665	0	330,665
2032	Canned Specialties	96	134,372	250	0	3,339	137,961	0	137,961
		95	129,685	750	0	3,339	133,774	0	133,774
		94	148,779	750	0	1,965	151,494	250	151,744
		88	238,652	8,350	0	21,306	268,308	2,252	270,560
2033	Canned Fruits & Vegetables	96	2,215	0	0	0	2,215	0	2,215
		95	1,260	0	0	0	1,260	0	1,260
		94	2,015	250	0	0	2,265	0	2,265
		88	2,750	7,050	12,300	74,481	96,581	51,807	148,388

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2034	Dehydrated Fruits, Vegetables, Soups	96	19,863	0	0	5	19,868	0	19,868
		95	768	0	0	0	768	0	768
		94	36,263	0	0	5	36,268	0	36,268
		88	59,712	1,400	0	0	61,112	0	61,112
2035	Pickles, Sauces, & Salad Dressings	96	258	0	250	5	513	242	755
		95	8	0	0	0	8	0	8
		94	12	0	250	5	267	0	267
		88	250	1,917	250	0	2,417	0	2,417
2037	Frozen Fruits & Vegetables	96	75,281	0	10	83,370	158,661	0	158,661
		95	81,430	0	5	59,432	140,867	0	140,867
		94	122,289	0	10	74,618	196,917	0	196,917
		88	163,395	6,027	0	255,699	425,121	122,687	547,808
2038	Frozen Specialties, nec*	96	49,572	0	0	0	49,572	0	49,572
		95	51,700	0	0	0	51,700	0	51,700
		94	83,882	324	0	0	84,206	0	84,206
		88	88,889	66,500	0	0	155,389	0	155,389
2041	Flour & Other Grain Mill Products	96	167,979	0	0	0	167,979	0	167,979
		95	170,370	0	0	0	170,370	0	170,370
		94	186,934	0	0	0	186,934	5	186,939
		88	42,889	0	0	0	42,889	0	42,889
2043	Cereal Breakfast Foods	96	34,460	0	0	0	34,460	0	34,460
		95	21,200	0	0	0	21,200	0	21,200
		94	30,700	0	0	0	30,700	0	30,700
		88	31,000	0	0	0	31,000	2,700	33,700
2044	Rice Milling	96	93,400	0	0	0	93,400	0	93,400
		95	90,000	0	0	0	90,000	0	90,000
		94	20,205	0	0	0	20,205	0	20,205
		88	17,640	0	0	0	17,640	0	17,640
2045	Prepared Flour Mixes & Doughs	96	5	0	0	0	5	0	5
		95	5	0	0	0	5	0	5
		94	5	0	0	0	5	0	5
		88	10,750	0	0	0	10,750	0	10,750
2046	Wet Corn Milling	96	382,334	105	0	5	382,444	254	382,698
		95	469,758	365	0	5	470,128	278	470,406
		94	318,773	1,020	0	0	319,793	761	320,554
		88	301,424	58,300	0	1,250	360,974	275	361,249
2047	Dog & Cat Food	96	3,985	1,072	0	1,200	6,257	1,750	8,007
		95	35,786	250	0	0	36,036	250	36,286
		94	54,201	250	0	0	54,451	1,810	56,261
		88	37,761	2,926	0	0	40,687	68,742	109,429

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2048	Prepared Feeds, nec*	96	66,560	410	0	15,231	82,201	44,212	126,413
		95	54,883	35	0	3,146	58,064	36,127	94,191
		94	106,992	1,149	0	2,425	110,566	90,793	201,359
		88	50,481	1,265	0	169,381	221,127	41,814	262,941
2051	Bread, Cake, & Related Products	96	0	0	0	0	0	0	0
		95	1,015	0	0	0	1,015	0	1,015
		94	0	0	0	0	0	0	0
		88	0	0	0	0	0	0	0
2052	Cookies & Crackers	96	No reports received						
		95	No reports received						
		94	58,839	0	0	0	58,839	0	58,839
		88	23,500	0	0	0	23,500	15,840	39,340
2053	Frozen Bakery Products, Except Bread	96	30,000	0	0	0	30,000	0	30,000
		95	18,848	0	0	0	18,848	0	18,848
		94	19,840	0	0	0	19,840	0	19,840
		88	No reports received						
2061	Raw Cane Sugar	96	303	0	0	203,826	204,129	0	204,129
		95	5,047	0	0	331,978	337,025	0	337,025
		94	12,863	0	0	217,769	230,632	0	230,632
		88	3,052	0	0	107,050	110,102	0	110,102
2062	Cane Sugar Refining	96	176	0	0	0	176	0	176
		95	7,755	0	0	0	7,755	0	7,755
		94	7	0	0	0	7	0	7
		88	750	750	0	750	2,250	0	2,250
2063	Beet Sugar	96	No reports received						
		95	0	0	0	0	0	0	0
		94	5	0	0	0	5	0	5
		88	384,508	0	0	0	384,508	0	384,508
2064	Candy & Other Confectionery Products	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	0	0	0	0	0	0	0
2066	Chocolate & Cocoa Products	96	273	0	0	0	273	0	273
		95	12,949	0	0	0	12,949	0	12,949
		94	53,000	0	0	0	53,000	0	53,000
		88	206,991	0	0	0	206,991	0	206,991
2067	Chewing Gum	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	0	0

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2068	Salted & Roasted Nuts & Seeds	96	No reports received						
		95	14,700	0	0	0	14,700	0	14,700
		94	10,110	0	0	0	10,110	0	10,110
		88	No reports received						
2074	Cottonseed Oil Mills	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	0	0	0	0	0	0	0
2075	Soybean Oil Mills	96	524	306	0	567	1,397	31	1,428
		95	774	1,011	0	10,931	12,716	4,348	17,064
		94	1,432	2,273	0	15,343	19,048	4,776	23,824
		88	750	6,686	0	22,202	29,638	13,917	43,555
2076	Vegetable Oil Mills, nec*	96	257	0	0	0	257	0	257
		95	0	0	0	0	0	0	0
		94	2,589	0	0	0	2,589	0	2,589
		88	0	0	0	0	0	0	0
2077	Animal & Marine Fats & Oils	96	280	0	0	0	280	0	280
		95	755	0	0	0	755	0	755
		94	1,134	0	0	0	1,134	0	1,134
		88	4,505	754	0	0	5,259	0	5,259
2079	Edible Fats & Oils, nec*	96	500	0	0	13,050	13,550	29,599	43,149
		95	750	0	0	6,005	6,755	110,450	117,205
		94	500	0	0	7,800	8,300	132,251	140,551
		88	138,119	30,250	0	94,075	262,444	121,754	384,198
2082	Malt Beverages	96	30,101	417	0	0	30,518	1,086	31,604
		95	30,420	58	0	0	30,478	1,967	32,445
		94	29,024	64	0	0	29,088	0	29,088
		88	24,469	6,317	0	0	30,786	380	31,166
2083	Malt	96	9,800	0	0	0	9,800	0	9,800
		95	13,000	0	0	0	13,000	0	13,000
		94	10,000	0	0	0	10,000	0	10,000
		88	27,650	0	0	0	27,650	0	27,650
2084	Wines, Brandy, & Brandy Spirits	96	0	0	0	35,292	35,292	0	35,292
		95	0	0	0	26,469	26,469	0	26,469
		94	0	0	0	36,849	36,849	0	36,849
		88	9,750	0	0	0	9,750	0	9,750
2085	Distilled & Blended Liquors	96	37,818	634	0	0	38,452	0	38,452
		95	1,500	250	0	0	1,750	0	1,750
		94	4,026	299	0	0	4,325	0	4,325
		88	2,412	275	0	0	2,687	0	2,687
2086	Bottled & Canned Soft Drinks	96	255	250	0	0	505	0	505
		95	255	500	0	0	755	5	760
		94	1,583	500	0	0	2,083	327	2,410
		88	5,484	5,910	0	0	11,394	1,179	12,573

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2087	Flavoring Extracts & Syrups, nec*	96	448,833	0	0	25,067	473,900	82,515	556,415
		95	483,256	0	0	153,439	636,695	1,003	637,698
		94	33,906	0	0	0	33,906	0	33,906
		88	61,674	0	0	0	61,674	500	62,174
2091	Canned & Cured Fish & Seafoods	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	0	0
2092	Fresh or Frozen Prepared Fish	96	0	0	0	0	0	0	0
		95	0	0	0	0	0	0	0
		94	10	5	0	0	15	0	15
		88	0	5	0	0	5	0	5
2095	Roasted Coffee	96	5	0	0	0	5	0	5
		95	0	0	0	0	0	0	0
		94	0	0	0	0	0	0	0
		88	55,470	0	0	94,697	150,167	72,000	222,167
2096	Potato Chips & Similar Snacks	96	24,757	0	0	0	24,757	4,835	29,592
		95	35,700	0	0	0	35,700	0	35,700
		94	207,855	0	0	189,200	397,055	0	397,055
		88	190,005	0	0	1,100	191,105	1,100	192,205
2097	Manufactured Ice	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	0	0
2098	Macaroni & Spaghetti	96	169,049	0	0	0	169,049	0	169,049
		95	105,747	0	0	0	105,747	0	105,747
		94	139,260	0	0	0	139,260	0	139,260
		88	84,896	0	0	0	84,896	0	84,896
2099	Food Preparations, nec*	96	308,921	46	0	72,143	381,110	1,300	382,410
		95	506,225	755	0	0	506,980	48,589	555,569
		94	839,778	10	0	0	839,788	126,820	966,608
		88	998,460	2,700	0	0	1,001,160	117,674	1,118,834
	Multiple within SIC Code 20	96	1,468,115	63,453	0	211,030	1,742,598	25,114	1,767,712
		95	949,860	705	0	182,591	1,133,156	26,470	1,159,626
		94	1,242,943	3,461	0	196,850	1,443,254	70,954	1,514,208
		88	717,641	619,811	0	50,898	1,388,350	159,586	1,547,936
	Invalid SIC Code within SIC Code 20	96	32,943	10,250	0	500	43,693	0	43,693
		95	5,155	35,127	0	500	40,782	0	40,782
		94	4,205	17,950	0	500	22,655	0	22,655
		88	446,400	167,789	0	15,400	629,589	192,873	822,462
	Total for SIC Code 20	96	3,844,770	107,203	260	869,825	4,822,058	298,445	5,120,503
		95	3,521,930	120,025	10	1,163,061	4,805,026	315,331	5,120,357
		94	4,062,676	51,424	260	1,314,805	5,429,165	584,395	6,013,560
		88	4,749,078	1,395,632	12,800	1,134,750	7,292,260	1,085,457	8,377,717

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2011	Meat Packing Plants	96	0	0	891,546	891,546
		95	0	0	951,666	951,666
		94	0	0	743,265	743,265
		88	NA	NA	NA	NA
2013	Sausages & Other Prepared Meats	96	0	0	493,267	493,267
		95	0	0	621,252	621,252
		94	0	0	584,300	584,300
		88	NA	NA	NA	NA
2015	Poultry Slaughtering & Processing	96	0	0	1,350,173	1,350,173
		95	0	0	1,868,657	1,868,657
		94	0	0	1,957,240	1,957,240
		88	NA	NA	NA	NA
2021	Creamery Butter	96	300	0	1,079,540	1,079,840
		95	290	0	70,872	71,162
		94	290	0	242,227	242,517
		88	NA	NA	NA	NA
2022	Cheese, Natural & Processed	96	729,675	0	9,338,450	10,068,125
		95	906,409	0	8,824,435	9,730,844
		94	1,115,368	0	6,926,288	8,041,656
		88	NA	NA	NA	NA
2023	Dry, Condensed, Evaporated Products	96	636,415	0	3,386,556	4,022,971
		95	237,000	0	2,500,210	2,737,210
		94	196,370	0	2,510,643	2,707,013
		88	NA	NA	NA	NA
2024	Ice Cream & Frozen Desserts	96	0	0	292,369	292,369
		95	0	0	483,059	483,059
		94	0	0	321,804	321,804
		88	NA	NA	NA	NA
2026	Fluid Milk	96	6,400	0	1,358,828	1,365,228
		95	40,797	0	1,456,327	1,497,124
		94	38,606	0	1,573,910	1,612,516
		88	NA	NA	NA	NA
2032	Canned Specialties	96	0	6,351	1,132,598	1,138,949
		95	0	35,285	1,008,113	1,043,398
		94	0	27,580	1,036,278	1,063,858
		88	NA	NA	NA	NA
2033	Canned Fruits & Vegetables	96	0	0	83,631	83,631
		95	0	0	77,144	77,144
		94	0	0	65,316	65,316
		88	NA	NA	NA	NA
2034	Dehydrated Fruits, Vegetables, Soups	96	0	0	361,210	361,210
		95	0	0	244,172	244,172
		94	0	0	89,569	89,569
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2035	Pickles, Sauces, & Salad Dressings	96	200	0	65,366	65,566
		95	0	0	6,864	6,864
		94	0	0	36,563	36,563
		88	NA	NA	NA	NA
2037	Frozen Fruits & Vegetables	96	0	0	1,236,210	1,236,210
		95	7,300	0	1,077,299	1,084,599
		94	9,000	0	611,788	620,788
		88	NA	NA	NA	NA
2038	Frozen Specialties, nec*	96	0	0	104,308	104,308
		95	0	0	114,006	114,006
		94	0	0	156,912	156,912
		88	NA	NA	NA	NA
2041	Flour & Other Grain Mill Products	96	0	0	225	225
		95	0	0	11,775	11,775
		94	0	0	1	1
		88	NA	NA	NA	NA
2043	Cereal Breakfast Foods	96	0	0	11,100	11,100
		95	0	0	21,625	21,625
		94	0	0	26,680	26,680
		88	NA	NA	NA	NA
2044	Rice Milling	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2045	Prepared Flour Mixes & Doughs	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2046	Wet Corn Milling	96	35,688	45,691	3,309,070	3,390,449
		95	89,642	36,185	3,022,781	3,148,608
		94	799	8,633	2,763,288	2,772,720
		88	NA	NA	NA	NA
2047	Dog & Cat Food	96	6,139	0	68,778	74,917
		95	6,024	0	5,165	11,189
		94	0	0	27,049	27,049
		88	NA	NA	NA	NA
2048	Prepared Feeds, nec*	96	116,908	38,000	781,762	936,670
		95	100,142	0	559,680	659,822
		94	121,463	0	691,910	813,373
		88	NA	NA	NA	NA
2051	Bread, Cake, & Related Products	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2052	Cookies & Crackers	96	No reports received			
		95	No reports received			
		94	0	0	0	0
		88	NA	NA	NA	NA
2053	Frozen Bakery Products, Except Bread	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			
2061	Raw Cane Sugar	96	0	0	0	0
		95	0	789	0	789
		94	0	717	0	717
		88	NA	NA	NA	NA
2062	Cane Sugar Refining	96	0	0	831,845	831,845
		95	0	0	691,739	691,739
		94	0	0	829,401	829,401
		88	NA	NA	NA	NA
2063	Beet Sugar	96	No reports received			
		95	0	0	0	0
		94	0	0	9,650	9,650
		88	NA	NA	NA	NA
2064	Candy & Other Confectionery Products	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2066	Chocolate & Cocoa Products	96	0	0	31,000	31,000
		95	0	0	597	597
		94	0	0	2,450	2,450
		88	NA	NA	NA	NA
2067	Chewing Gum	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2068	Salted & Roasted Nuts & Seeds	96	No reports received			
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			
2074	Cottonseed Oil Mills	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2075	Soybean Oil Mills	96	0	0	1,378,396	1,378,396
		95	0	0	1,616,602	1,616,602
		94	0	0	1,715,007	1,715,007
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2076	Vegetable Oil Mills, nec*	96	3,482	0	8,698	12,180
		95	4,584	0	16,019	20,603
		94	3,670	0	18,150	21,820
		88	NA	NA	NA	NA
2077	Animal & Marine Fats & Oils	96	0	0	230,252	230,252
		95	0	0	180,360	180,360
		94	0	0	202,181	202,181
		88	NA	NA	NA	NA
2079	Edible Fats & Oils, nec*	96	0	0	116,546	116,546
		95	5,964	0	782,716	788,680
		94	6,414	0	1,294,641	1,301,055
		88	NA	NA	NA	NA
2082	Malt Beverages	96	0	0	1,776,542	1,776,542
		95	0	0	1,645,801	1,645,801
		94	0	0	1,794,311	1,794,311
		88	NA	NA	NA	NA
2083	Malt	96	0	0	49,162	49,162
		95	0	0	74,100	74,100
		94	0	0	51,800	51,800
		88	NA	NA	NA	NA
2084	Wines, Brandy, & Brandy Spirits	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2085	Distilled & Blended Liquors	96	0	0	0	0
		95	0	0	45	45
		94	0	0	45	45
		88	NA	NA	NA	NA
2086	Bottled & Canned Soft Drinks	96	10,700	9,600	178,000	198,300
		95	10,623	9,600	70,138	90,361
		94	10,730	22,000	63,049	95,779
		88	NA	NA	NA	NA
2087	Flavoring Extracts & Syrups, nec*	96	4,306,182	0	827,940	5,134,122
		95	6,826,177	0	892,553	7,718,730
		94	3,178,772	0	182,543	3,361,315
		88	NA	NA	NA	NA
2091	Canned & Cured Fish & Seafoods	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2092	Fresh or Frozen Prepared Fish	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2095	Roasted Coffee	96	0	0	6,344	6,344
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2096	Potato Chips & Similar Snacks	96	0	0	180,501	180,501
		95	0	0	142,229	142,229
		94	970,000	0	297,839	1,267,839
		88	NA	NA	NA	NA
2097	Manufactured Ice	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2098	Macaroni & Spaghetti	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2099	Food Preparations, nec*	96	363,844	0	1,030,452	1,394,296
		95	330,815	0	2,712,935	3,043,750
		94	126,150	0	2,475,002	2,601,152
		88	NA	NA	NA	NA
	Multiple within SIC Code 20	96	3,524,154	260,000	10,317,145	14,101,299
		95	486,113	67,393	12,019,666	12,573,172
		94	6,115,123	147,000	11,588,245	17,850,368
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 20	96	231,600	0	299,149	530,749
		95	124,900	0	515,161	640,061
		94	127,600	0	319,214	446,814
		88	0	0	0	0
	Total for SIC Code 20	96	9,971,687	359,642	42,606,959	52,938,288
		95	9,176,780	149,252	44,285,763	53,611,795
		94	12,020,355	205,930	41,208,559	53,434,844
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2011	Meat Packing Plants	96	0	5,204	0	6,927	0	12,131
		95	0	0	0	11,044	0	11,044
		94	0	0	0	111,154	0	111,154
		88	NA	NA	0	286,303	0	NA
2013	Sausages & Other Prepared Meats	96	14,423	0	0	14,900	0	29,323
		95	12,814	0	0	2,678	0	15,492
		94	0	0	0	3,760	0	3,760
		88	NA	NA	0	11,200	0	NA
2015	Poultry Slaughtering & Processing	96	250	0	0	105,394	0	105,644
		95	250	0	0	110,782	0	111,032
		94	750	0	0	247,925	0	248,675
		88	NA	NA	0	93,174	0	NA
2021	Creamery Butter	96	0	0	0	34,554	0	34,554
		95	0	0	0	52,273	0	52,273
		94	0	0	0	55,947	0	55,947
		88	NA	NA	0	163,756	0	NA
2022	Cheese, Natural & Processed	96	0	0	500	270,964	0	271,464
		95	0	0	500	909,716	0	910,216
		94	0	0	500	1,423,981	0	1,424,481
		88	NA	NA	47,698	2,625,251	0	NA
2023	Dry, Condensed, Evaporated Products	96	0	45,000	0	548,199	0	593,199
		95	0	39,294	0	52,284	0	91,578
		94	0	33,646	5,354	220,053	0	259,053
		88	NA	NA	34,800	707,123	0	NA
2024	Ice Cream & Frozen Desserts	96	0	0	0	161,446	0	161,446
		95	0	0	23,913	218,852	0	242,765
		94	0	0	31,137	193,345	0	224,482
		88	NA	NA	0	422,640	0	NA
2026	Fluid Milk	96	31,064	0	0	1,145,080	750	1,176,894
		95	38,937	0	33,800	1,256,288	0	1,329,025
		94	30,300	0	23,000	1,286,735	0	1,340,035
		88	NA	NA	75,500	2,666,224	0	NA
2032	Canned Specialties	96	0	0	9,330	63,814	0	73,144
		95	0	0	10,275	57,351	0	67,626
		94	0	0	7,340	40,319	0	47,659
		88	NA	NA	0	53,554	0	NA
2033	Canned Fruits & Vegetables	96	0	0	250	250	0	500
		95	14,414	0	0	0	0	14,414
		94	0	0	0	15,090	0	15,090
		88	NA	NA	0	95,747	0	NA
2034	Dehydrated Fruits, Vegetables, Soups	96	5	0	0	255	0	260
		95	0	0	0	5	0	5
		94	0	0	0	5	0	5
		88	NA	NA	0	50,000	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2035	Pickles, Sauces, & Salad Dressings	96	0	0	0	13,332	0	13,332
		95	0	0	0	16,440	0	16,440
		94	0	0	0	11,000	0	11,000
		88	NA	NA	0	92,840	0	NA
2037	Frozen Fruits & Vegetables	96	0	0	1,410	37,988	0	39,398
		95	0	0	1,034	12,283	0	13,317
		94	0	0	2,900	14,551	0	17,451
		88	NA	NA	10,990	14,162	0	NA
2038	Frozen Specialties, nec*	96	0	0	0	28,603	0	28,603
		95	1,352	0	0	19,727	0	21,079
		94	2,315	0	0	18,485	0	20,800
		88	NA	NA	0	19,998	0	NA
2041	Flour & Other Grain Mill Products	96	0	0	0	25,468	0	25,468
		95	0	0	0	11,784	0	11,784
		94	0	0	0	18,998	0	18,998
		88	NA	NA	0	0	0	NA
2043	Cereal Breakfast Foods	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	250	0	NA
2044	Rice Milling	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2045	Prepared Flour Mixes & Doughs	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2046	Wet Corn Milling	96	58,041	0	1,463	6,013,371	0	6,072,875
		95	77,668	0	1,064	6,587,295	0	6,666,027
		94	164,464	0	250	6,186,122	4	6,350,840
		88	NA	NA	0	2,966,112	0	NA
2047	Dog & Cat Food	96	540,000	0	0	1,250	0	541,250
		95	0	0	0	1,250	0	1,250
		94	263,000	0	0	1,750	0	264,750
		88	NA	NA	0	2,608	0	NA
2048	Prepared Feeds, nec*	96	0	0	3,627	7,872	0	11,499
		95	25,556	0	2,375	11,544	0	39,475
		94	0	0	4,271	28,611	0	32,882
		88	NA	NA	0	89,292	1,500	NA
2051	Bread, Cake, & Related Products	96	0	0	0	0	0	0
		95	0	0	0	950	0	950
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2052	Cookies & Crackers	96	No reports received					
		95	No reports received					
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2053	Frozen Bakery Products, Except Bread	96	0	0	0	13,814	0	13,814
		95	0	0	0	35,590	0	35,590
		94	0	0	0	24,100	0	24,100
		88	No reports received					
2061	Raw Cane Sugar	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2062	Cane Sugar Refining	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2063	Beet Sugar	96	No reports received					
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2064	Candy & Other Confectionery Products	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2066	Chocolate & Cocoa Products	96	0	0	76,000	30,409	0	106,409
		95	0	0	76,612	31,367	0	107,979
		94	0	0	27,746	21,720	0	49,466
		88	NA	NA	0	18,268	0	NA
2067	Chewing Gum	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	6,257	0	0	NA
2068	Salted & Roasted Nuts & Seeds	96	No reports received					
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	No reports received					
2074	Cottonseed Oil Mills	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2075	Soybean Oil Mills	96	172,675	0	0	1,005	0	173,680
		95	109,555	0	0	1,255	0	110,810
		94	132,305	0	0	16,255	0	148,560
		88	NA	NA	1,488	84,512	0	NA

Note: **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2076	Vegetable Oil Mills, nec*	96	26,132	0	0	250	0	26,382
		95	13,280	0	0	250	0	13,530
		94	17,239	2,500	0	250	0	19,989
		88	NA	NA	0	0	0	NA
2077	Animal & Marine Fats & Oils	96	9,000	0	0	0	0	9,000
		95	9,000	0	0	0	0	9,000
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2079	Edible Fats & Oils, nec*	96	449,006	0	0	1,075	0	450,081
		95	419,044	0	0	8,315	0	427,359
		94	226,853	0	0	7,430	0	234,283
		88	NA	NA	10,203	6,500	96,300	NA
2082	Malt Beverages	96	0	0	80	2,859	0	2,939
		95	0	0	69	78,829	0	78,898
		94	0	0	386	62,062	0	62,448
		88	NA	NA	0	15,989	0	NA
2083	Malt	96	0	0	0	15,000	0	15,000
		95	0	0	0	20,000	0	20,000
		94	0	0	0	38,500	0	38,500
		88	NA	NA	0	28,688	0	NA
2084	Wines, Brandy, & Brandy Spirits	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	51,326	0	NA
2085	Distilled & Blended Liquors	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2086	Bottled & Canned Soft Drinks	96	2,255	0	425	116,759	0	119,439
		95	14,305	0	750	125,480	0	140,535
		94	0	0	0	86,948	5,000	91,948
		88	NA	NA	36,142	196,798	250	NA
2087	Flavoring Extracts & Syrups, nec*	96	58,000	97,427	12,873	115,981	0	284,281
		95	500	109,221	15,033	115,155	0	239,909
		94	0	84,791	23,305	53,093	0	161,189
		88	NA	NA	750	45,570	0	NA
2091	Canned & Cured Fish & Seafoods	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA
2092	Fresh or Frozen Prepared Fish	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 2-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Food and Beverage Processing, SIC Code 20, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2095	Roasted Coffee	96	0	0	0	109	0	109
		95	0	0	0	0	0	0
		94	0	0	0	250	0	250
		88	NA	NA	0	88,638	1,600	NA
2096	Potato Chips & Similar Snacks	96	0	0	0	76,282	0	76,282
		95	0	0	8	143,540	0	143,548
		94	0	0	0	190,844	0	190,844
		88	NA	NA	0	189,500	0	NA
2097	Manufactured Ice	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	500	NA
2098	Macaroni & Spaghetti	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2099	Food Preparations, nec*	96	30,100	0	9,714	303,869	0	343,683
		95	46,689	0	71,627	947,296	250	1,065,862
		94	190,044	0	344,100	1,282,022	0	1,816,166
		88	NA	NA	183	373,896	0	NA
	Multiple within SIC Code 20	96	109,953	64,843	34,733	1,211,172	0	1,420,701
		95	95,531	26,156	71,697	887,289	0	1,080,673
		94	147,533	23,898	82,048	723,808	0	977,287
		88	NA	NA	13,500	1,710,116	22,780	NA
	Invalid SIC Code within SIC Code 20	96	0	0	280,600	32,845	0	313,445
		95	0	0	132,700	18,598	0	151,298
		94	0	0	127,600	110,810	0	238,410
		88	NA	NA	0	567,335	3	NA
	Total for SIC Code 20	96	1,500,904	212,474	431,005	10,401,096	750	12,546,229
		95	878,895	174,671	441,457	11,745,510	250	13,240,783
		94	1,174,803	144,835	679,937	12,495,923	5,004	14,500,502
		88	NA	NA	237,511	14,027,014	122,933	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.
*nec: not elsewhere classified.

The largest increases were in dry, condensed, evaporated products (SIC code 2023, a dairy products industry), with a 334,000 pound increase; dog and cat food production (SIC code 2047), with a 277,000 pound increase; and miscellaneous edible fats and oils (SIC code 2079), with a 216,000 pound increase. For the dry dairy products, the increase occurred primarily in reporting of transfers to POTWs, while transfers to recycling accounted for the change in the other two industries.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Grain Processing Corporation in Muscatine, Iowa (SIC codes 2046, 2948, 2085 and 2099), ranked first for increases in releases with a 717,000 pound

overall change due to a production increase. This facility, a wet corn miller, has several product lines including food grade and regular grade starches, corn sweeteners, beverage alcohol, and animal feeds. A desiccant product, used in commercial goods such as baby diapers and batteries, requires the use of methanol as a processing aid. The desiccant is manufactured in a water solution, and methanol is used to remove water from the product. Point-source air emissions of methanol accounted for most of the facility's increase.

Kalsec, Inc., in Kalamazoo, Michigan (SIC code 2096 in 1988 and 2087 in 1996), ranked second in increases with an overall 167,000 pound increase. The facility, a producer of natural flavors and natural colors, uses methanol in extraction processes. Most of the change was reported as fugitive air emissions of methanol. A production increase was cited as the reason for the change.

The third-ranked facility for increases was U.S. Sugar in Canal Point, Florida (SIC code 2061). This sugar cane farm uses manganese compounds as a nutrient in its fertilizer formulations. No data were reported for manganese compounds in 1988, and the 1996 total was 100,000 pounds, all in the category of releases to land. The manganese content of the fertilizer varies from application to application and is formulated on the basis of the perceived need. The manganese content of the fertilizer is low enough to miss the TRI reporting threshold in some years. This is the reason that no data were reported for the chemical in 1988.

Crossroads Farms Dairy in Indianapolis, Indiana (SIC codes 2024 and 2026), was first in decreases with a 441,000 pound increase. Surface water discharges of phosphoric acid accounted for 87% of the reported reduction. Phosphoric acid is used at the dairy to clean stainless steel tanks and to lower the pH of city water used in cottage cheese production. No data for phosphoric acid were reported in 1996. The decrease in the phosphoric acid content of wastewater is due to improved estimation methods, according to the facility.

Hops Extract Corporation of America in Yakima, Washington (SIC 2099 in 1988, did not report in 1996), ranked second in decreases. Dichloromethane, with 261,000 pounds of emissions to air, was the only chemical reported by this facility in 1988. This chemical accounts for 100% of the decrease since no report was filed in 1996. Dichloromethane was used as an extracting agent to remove specific organic substances from hops prior to brewing for beer. Removal of certain acids, oils, and waxes from hops improves the flavor of beer. The facility converted to a carbon dioxide extraction process.

Red Star Yeast in Baltimore, Maryland (SIC code 2099), was third for decreases with an overall reduction of 256,000 pounds. Acetaldehyde is a byproduct of a yeast fermentation process and the chemical primarily responsible for the decrease. The facility made changes in several processes that reduced point-source air emissions of the chemical by 92%. Some process changes were mandated by the Clean Air Act, according to Red Star Yeast, and some were made voluntarily.

1991-1996 Waste Management Data for Food and Beverage Processing

Table 2-17 summarizes on- and off-site waste management data for the food and beverage processing sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste increased 11.2% from 63.1 million pounds in 1991 to 70.2 million pounds in 1996. All types of waste management increased, except quantities released on- and off-site.

The largest reported increase (in pounds) occurred in on-site recycling, which more than tripled (239.7% increase) from 2.9 million pounds in 1991 to 10.0 million pounds in 1996. In 1991, on-site

Table 2-17. TRI Waste Management Data, 1991, 1994-1996: Food and Beverage Processing, SIC Code 20

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	2,935,394	12,020,355	9,176,780	9,971,687
Energy Recovery On-site	192,593	205,930	149,252	359,642
Treated On-site	39,154,542	41,208,559	44,285,763	42,606,959
Total On-site Waste Management	42,282,529	53,434,844	53,611,795	52,938,288
Off-site Waste Management				
Recycled Off-site	1,241,954	1,198,175	986,249	1,547,348
Energy Recovery Off-site	126,004	145,449	244,351	296,473
Treated Off-site	8,333,160	11,421,366	11,310,388	9,960,419
Total Off-site Waste Management	9,701,118	12,764,990	12,540,988	11,804,240
Quantity Released On- and Off-site	11,082,621	5,918,832	5,003,711	5,408,629
Total Production-related Waste	63,066,268	72,118,666	71,156,494	70,151,157
Non-Production-related Waste	48,307	77,532	40,229	63,946

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-23.7	8.7	239.7
Energy Recovery On-site	-27.5	141.0	86.7
Treated On-site	7.5	-3.8	8.8
Total On-site Waste Management	0.3	-1.3	25.2
Off-site Waste Management			
Recycled Off-site	-17.7	56.9	24.6
Energy Recovery Off-site	68.0	21.3	135.3
Treated Off-site	-1.0	-11.9	19.5
Total Off-site Waste Management	-1.8	-5.9	21.7
Quantity Released On- and Off-site	-15.5	8.1	-51.2
Total Production-related Waste	-1.3	-1.4	11.2
Non-Production-related Waste	-48.1	59.0	32.4

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

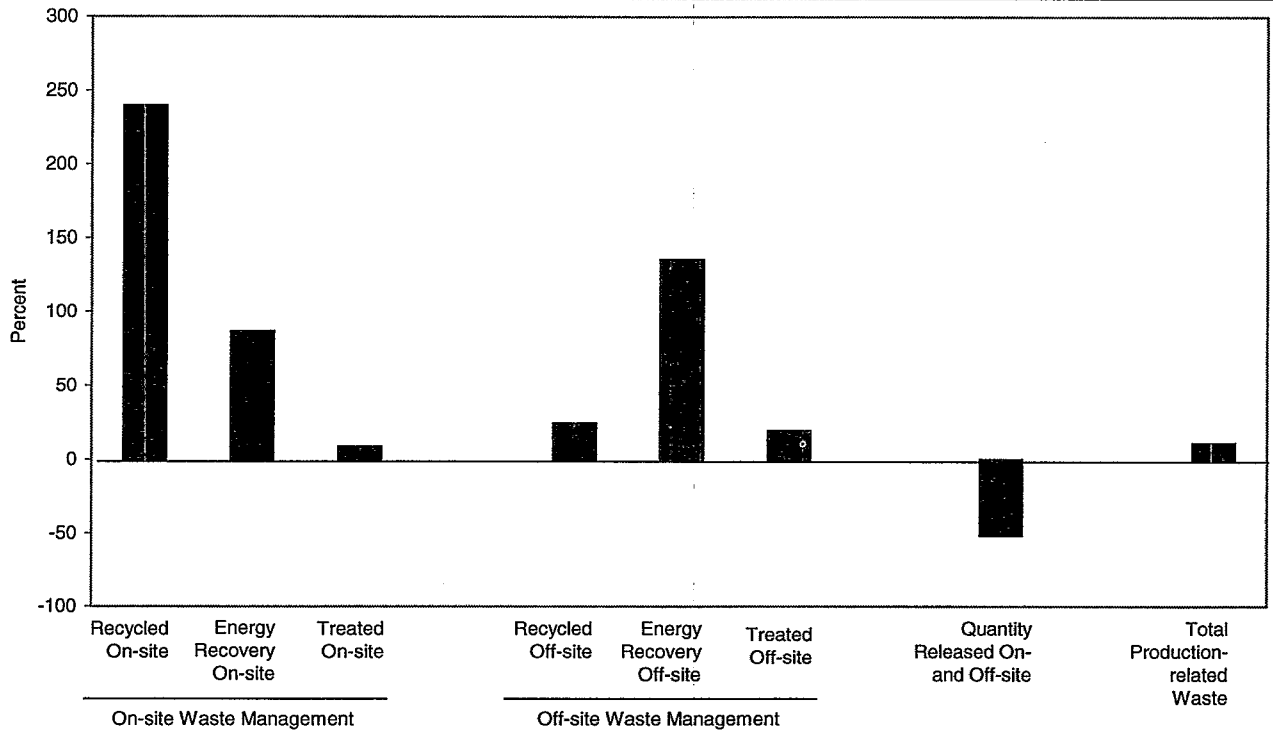


Figure 2-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Food and Beverage Processing (SIC Code 20)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

recycling represented 4.7% of total production-related waste in this sector; by 1996, it was 14.2% of total production-related waste.

On-site treatment, the largest waste management option in this sector, rose 8.8% from 39.2 million pounds in 1991 to 42.6 million pounds in 1996.

Food and beverage processing industries reported a reduction of more than half (51.2%) in on- and off-site releases, from 11.1 million pounds to 5.4 million pounds in this period. This decrease, combined with increases in other categories, served to reduce the role of releases in this sector's reported waste management from 17.6% of total production-related waste in 1991 to 7.7% in 1996.

Figure 2-13 illustrates the percentage change in the waste management types reported in this sector for 1991-1996.

The fact that releases decreased while total production-related waste increased indicates improvement in how the food and beverage processing industries manage their TRI chemicals in waste, although it does not point to success in reducing such waste by preventing it. In terms of the waste management hierarchy (explained in Chapter 1), releases are the least desirable option for managing toxic waste.

The sector's reporting of total production-related waste decreased, while production steadily increased. TRI facilities report absolute amounts of waste managed and environmental releases, not amounts adjusted for changes in production levels. Individual facilities with large increases in production-related waste and in releases attribute those changes to increasing production. At the same time, several facilities with large decreases cite process changes that reduced or eliminated the use

of chemicals they had previously reported in large amounts. (See "Facilities with Large Increases and Decreases in Releases, 1988-1996" and the section below.)

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

R.J. Reynolds Tobacco Company in Merry Hill, North Carolina (SIC code 2087), ranked first for increases. On-site recycling of methanol, used in several processes at the facility, was primarily responsible for the overall 2.44 million-pound increase. The main use of the chemical at the Merry Hill plant is in the extraction of sclareol, an organic wax found in the clary sage plant. Sclareol is extracted from the sage plant itself as well as from a clary sage "concrete." The concrete is a byproduct of clary sage oil extraction and is purchased from manufacturers outside of the United States. On-site recycling of methanol has grown due to several reasons: a production increase of sclareol extracted from the sage plant, the initiation of the process where sclareol is extracted from the concrete, and the addition of new products whose manufacture involve the use of methanol.

Penford Products Company in Cedar Rapids, Iowa (SIC code 2046), ranked second with a 2.4 million-pound increase. The facility, a wet corn miller, is one of the nation's largest manufacturers of hydroxy-ethylated starches (used in paper coatings). A byproduct of hydroxy-ethylated starch production is ethylene glycol, which accounted for 95% of the overall increase. Wastewater containing the ethylene glycol is sent to a publicly owned treatment works (POTW). Penford stated that most of the ethylene glycol is destroyed as it is pumped to the POTW due to the anaerobic environment in the trunk line. The facility attributes the increase in waste managed to increasing production.

Grain Processing Corporation in Muscatine, Iowa (SIC codes 2046, 2948, 2085 and 2099), was third for increases with a 2.3 million-pound change. The facility was also ranked as the number-one increaser in releases due to increases in methanol reporting. The facility attributes an increase in on-site recycling of methanol to a production increase as well as improved efficiency in recovering and reusing the chemical. (See "Facilities with Large Increases and Decreases in Releases, 1988-1996" for more information.)

First in decreases was U.S. Sugar in Clewiston, Florida (SIC code 2061), with a 2.9 million-pound reduction. Phosphoric acid, responsible for all of the facility's decrease, was used as a clarification agent in raw sugar production. Wastewater from the process was treated on-site. The facility stopped using the chemical in this process prior to the 1996 reporting year.

Red Star Yeast in Baltimore, Maryland (SIC code 2099), was second in decreases. The facility, also ranked as a top decreaser in releases, reported a 2.8 million-pound reduction in waste managed. Phosphoric acid accounted for nearly all of the decrease and is used to supply phosphorus to yeast as a nutrient. The facility attributes the change to an improved method of estimating phosphoric acid content of wastewater treated on-site.

The number three facility for decreases was IBP, Inc., in Waterloo, Iowa (SIC codes 2011, 2013 and 2077), with a 1.9 million pound overall decrease. The meat packing and processing facility has two primary uses of phosphoric acid: for production area and equipment cleaning and as an aid in separating water from rendered lard and grease. A decrease in reported on-site treatment of phosphoric acid accounted for all of the decrease. This was due to the installation of equipment that mechanically separates water from rendered lard and grease, reducing the need for the chemical separation process.

Facilities Contacted for Explanations (alphabetical by facility):

Crossroad Farms Dairy, Indianapolis, Indiana: John Wurgler, July 28, 1998 (explanation provided)

Grain Processing Corporation, Muscatine, Iowa: Daniel A. Huss, July 23, 1998 (explanation provided)

Hops Extract Corporation of America, Yakima, Washington: Tai Y. Yum, July 23, 1998 (explanation provided)

IBP, Inc., Waterloo, Iowa: Dove Mullins, July 23 and August 3, 1998 and Kim Dirks, August 4, 1998 (explanation provided)

Kalsec, Inc., Kalamazoo, Michigan: Stephen Kuhnert, July 23 and 28, 1998 (explanation provided)

Penford Products Company, Cedar Rapids, Iowa: Otto J. Rajtora, July 23, 1998 (explanation provided)

R.J. Reynolds Tobacco Company, Merry Hill, North Carolina: Richard S. Krell, July 23 and July 31, 1998 (explanation provided)

Red Star Yeast, Baltimore, Maryland: Alan Bahl, July 23, 1998 (explanation provided)

U.S. Sugar Corporation, Canal Point, Florida: Jose M. Porro, July 23, 1998 (explanation provided)

U.S. Sugar Corporation/Western Division, Clewiston, Florida: Peter Briggs, July 28 and July 29, 1998 (explanation provided)

Chapter 3

Toxics Release Inventory Data for Tobacco Products (SIC Code 21)

A Look at the Tobacco Products Industry (SIC Code 21)

The tobacco products industry manufactures cigarettes (from tobacco or other materials), cigars, smoking and chewing tobacco, snuff, and reconstituted tobacco. (Byproducts of tobacco processing are used to manufacture insecticides; this is classified in chemical manufacturing, SIC code 28.) Box 3-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

Industry shipments of tobacco products were valued at $34.48 billion in 1996 and $32.98 billion in 1995 (in current dollars). This was just under 1% of the nation's total value of manufacturing shipments; among manufacturing sectors, only the leather products sector (SIC code 31) had smaller shipments in total dollars. Employment in the tobacco products sector was 31,000 in both years, less than any other manufacturing sector.

Production in the tobacco products sector declined sharply through the early 1990s, but recovered by 1996 (see Chapter 1, Table 1-10). Although this sector represents a small segment of U.S. industry, it is concentrated in few states, where its economic (and environmental) activity may assume greater importance.

The largest shipments and employment in the sector related to cigarette production (SIC code 2111), which had $28.99 billion in shipments and nearly 21,000 employees in 1996. The stemming and redrying industry (SIC code 2141) contributed $3.23 billion in shipments and employed nearly 6,000.

In addition to physical processes (stripping, stemming, shredding), much of the processing of tobacco involves moistening and drying the leaves. Tobacco is cured in natural, artificial, or wood-fire heat, and cured leaves are moistened and stripped before sale. Manufacturers redry the tobacco and add uniform moisture before fermentation. The tobacco is then aged in hogshead barrels for up to three years. Aged tobacco is again moistened, stalks and other wastes are removed, and various tobaccos are blended. Reconstituted tobacco

Box 3-1. SIC Code 21, Tobacco Products: Codes and Classifications

SIC Code		Industry Description
211	**Cigarettes**	
	2111 Cigarettes	Manufacture of cigarettes from tobacco or other materials.
212	**Cigars**	
	2121 Cigars	Manufacture of cigars.
213	**Chewing and Smoking Tobacco and Snuff**	
	2131 Chewing and Smoking Tobacco and Snuff	Manufacture of chewing and smoking tobacco and snuff.
214	**Tobacco Stemming and Redrying**	
	2141 Tobacco Stemming and Redrying	Stemming and redrying of tobacco. Manufacture of reconstituted tobacco.

(ground-up tobacco with binding agents) may also be blended with tobacco leaves. Specific processes include vacuum or hot air conditioning, threshing, and the cutting, drying, and expanding of lamina (thin sheets of tobacco). Additives may be sprayed into the dryers or introduced at other stages. In the production of cigarettes, cakes of blended tobacco are shredded, and the tobacco blend is scattered over continuous tobacco paper. The cigarettes are then rolled, cut, fitted with filters, and packaged.

The processes of heating and cooling and the use of agents, conditioners, and other additives may result in chemical releases. Cigarette papers are also coated and treated. Some facilities perform only certain processing services, such as fermentation and stemming or threshing. Facilities that specialize in stemming and redrying (SIC code 2141) accounted for some of the largest amounts reported to TRI in this sector in 1996.

Because the industry is small, changes in TRI reporting by a few facilities have a large effect on the sector's data.

1996 TRI Data for Tobacco Products

Table 3-1 summarizes TRI reporting by the tobacco products sector for 1996. Sixty-one forms were submitted in this sector, 70.5% of them (43 forms) were submitted by cigarette manufacturers (SIC code 2111). This was the only sector that did not submit any Form A certification statements, which certify that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

Various tobacco industry equipment manufacturers: industry processes and technologies.

On- and off-site releases totaled 4.2 million pounds in this sector in 1996, including 3.7 million pounds released on-site. The largest total on- and off-site releases were reported in the tobacco stemming and redrying industry (SIC code 2141). This was 2.4 million pounds, or 57.8% of the sector's total. The second-largest source of total releases was cigarette manufacture (SIC code 2111), with 1.6 million pounds or 37.7% of the total. Smaller amounts were reported in cigar manufacture (SIC code 2121) and in the production of chewing and smoking tobacco (SIC code 2131).

Other on-site waste management in this sector was 1.3 million pounds. Only the tobacco stemming and redrying industry (SIC code 2141), with 741,000 pounds, and the cigarette industry (SIC code 2111), with 598,000 pounds, reported other on-site waste management.

Cigarette production accounted for the largest reporting of transfers off-site for further waste management, 406,000 pounds out of the sector's total of 489,000 pounds.

For production-related waste, which totaled 5.9 million pounds in this sector, tobacco stemming and redrying accounted for 3.2 million pounds (53.7% of the total) and cigarette production for 2.5 million pounds (42.4%).

None of the TRI forms received in this sector reported more than one SIC code within SIC code 21, as explained in Box 3-2.

On- and Off-site Releases

As shown in Table 3-3, this sector's on- and off-site releases consisted primarily of air emissions, which were 3.5 million pounds in 1996. Tobacco stemming and redrying (SIC code 2141) accounted for 2.1 million pounds and cigarette production (SIC code 2111) for 1.2 million pounds. One facility in the stemming and redrying industry (SIC code 2141) reported 1.7 million pounds of air emissions of ammonia.

Surface water discharges of 180,000 pounds in this sector were almost exclusively reported in the

Box 3-2. Data Not Appearing in This Chapter

Facilities that engage in more than one kind of manufacturing activity may report more than one SIC code on their TRI forms to describe their activities. Most industrial sectors discussed in the *1996 TRI Public Data Release* include such "multiple-code" reporting. No forms were received, however, with multiple SIC codes within SIC code 21 in 1996. (Multiple code reporting is further explained in Box 1-5 in Chapter 1.)

There were also no forms in SIC code 21 for chemicals designated as OSHA carcinogens. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.)

This chapter, therefore, does not contain the following tables and figures:

Table 3-2. Multiple SIC Codes, 1996: Tobacco Products, SIC Code 21

Table 3-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code 1996: Tobacco Products, SIC Code 21

Figure 3-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals: Tobacco Products, SIC Code 21

Industry-specific chapters in both volumes of the *1996 TRI Public Data Release* present comparable data tables, numbered consistently from chapter to chapter. The remaining tables and figures in this chapter conform to that numbering system.

Table 3-1. Summary of TRI Information by 4-digit SIC Code, 1996: Tobacco Products, SIC Code 21

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
2	2	2111	Cigarettes	21	43	0	1,203,696	362,519	1,566,215
3	3	2121	Cigars	1	2	0	171,300	0	171,300
4	4	2131	Chewing & Smoking Tobacco	3	4	0	1,651	13,316	14,967
1	1	2141	Tobacco Stemming & Redrying	4	12	0	2,317,792	82,298	2,400,090
			Total for SIC Code 21	29	61	0	3,694,439	458,133	4,152,572

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 3-3. TRI On-site and Off-site Releases, 1996: Tobacco Products, SIC Code 21 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2141	Tobacco Stemming & Redrying	2,138,092	179,700	0	0	0	0	2,317,792	82,298	2,400,090
2111	Cigarettes	1,203,695	1	0	0	0	0	1,203,696	362,519	1,566,215
2121	Cigars	171,300	0	0	0	0	0	171,300	0	171,300
2131	Chewing & Smoking Tobacco	1,651	0	0	0	0	0	1,651	13,316	14,967
	Total for SIC Code 21	3,514,738	179,701	0	0	0	0	3,694,439	458,133	4,152,572

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

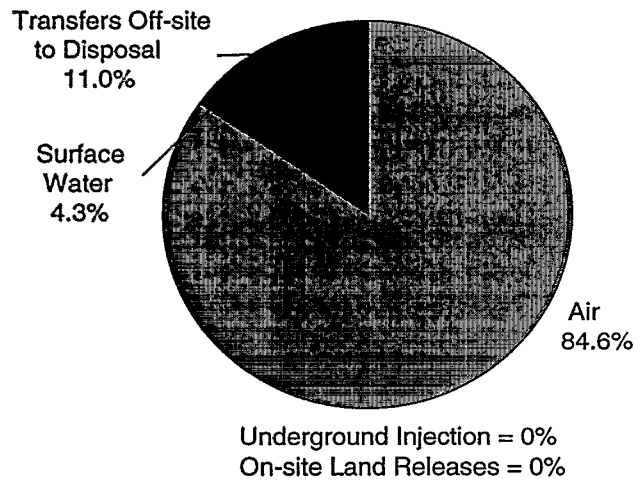


Figure 3-1. Distribution of TRI On-site and Off-site Releases, 1996: Tobacco Products (SIC Code 21)

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R

tobacco stemming and redrying industry, and the chemical with the largest discharges was nitrate compounds (168,000 pounds all reported by one facility). The sector reported no underground injection or on-site land releases.

Off-site releases (transfers to disposal) were 458,000 pounds in SIC code 21. The cigarette industry (SIC code 2111) reported 363,000 pounds in such transfers. The chemical with the largest such transfers was nicotine and its salts (432,000 pounds).

Figure 3-1 illustrates the distribution of on- and off-site releases in this sector by the type of release. Figure 3-2 shows the industrial distribution of these releases.

Table 3-1. Summary of TRI Information by 4-digit SIC Code, 1996: Tobacco Products, SIC Code 21, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2111	Cigarettes	598,117	406,499	2,511,416	0
2121	Cigars	0	9,920	185,000	0
2131	Chewing & Smoking Tobacco	0	27,910	42,933	0
2141	Tobacco Stemming & Redrying	740,700	44,624	3,182,404	0
	Total for SIC Code 21	1,338,817	488,953	5,921,753	0

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

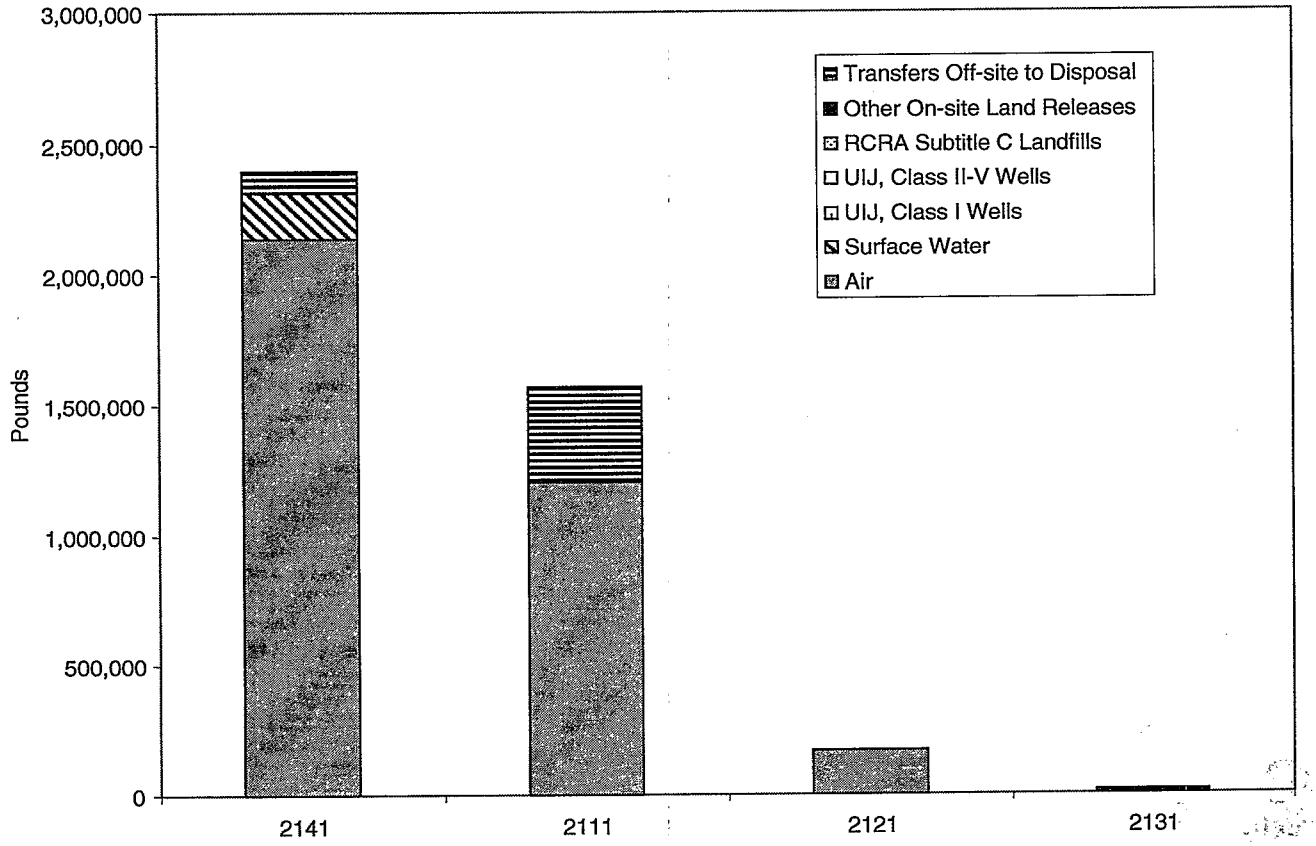


Figure 3-2. TRI On-site and Off-site Releases, by SIC Code, 1996: Tobacco Products (SIC Code 21)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal). **UIJ** = underground injection.

Table 3-4. TRI Other On-site Waste Management, 1996: Tobacco Products, SIC Code 21 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2141	Tobacco Stemming & Redrying	0	0	740,700	740,700
2111	Cigarettes	9,753	0	588,364	598,117
2121	Cigars	0	0	0	0
2131	Chewing & Smoking Tobacco	0	0	0	0
	Total for SIC Code 21	9,753	0	1,329,064	1,338,817

Note: Other On-site Waste Management from Section 8 of Form R.

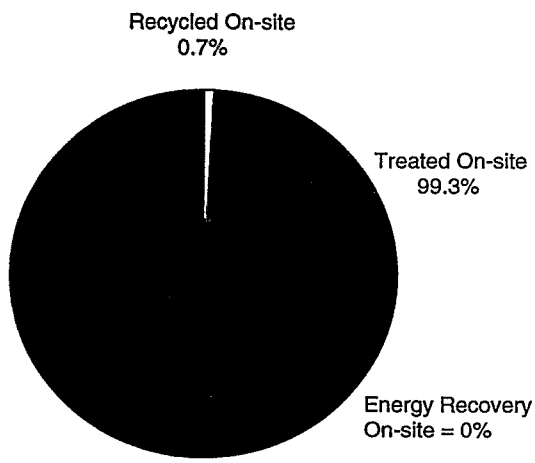


Figure 3-3. Distribution of TRI Other On-site Waste Management, 1996: Tobacco Products (SIC Code 21)

Note: Data from Section 8 of Form R.

Other On-site Waste Management

Table 3-4 and Figure 3-3 show the tobacco products sector's reporting of other on-site waste management, which totaled 1.3 million pounds in 1996. Tobacco stemming and redrying (SIC code 2141) reported 741,000 pounds of this total, and cigarette producers (SIC code 2111) reported 598,000. All of this was in on-site treatment, except for 10,000 pounds of on-site recycling reported in cigarette manufacturing. One facility in SIC code 2141 reported 561,000 pounds of on-site treatment of nitrate compounds. The chemical with the next-largest on-site treatment was nicotine and its salts (570,000 pounds); three facilities in SIC code 2111 reported more than 100,000 pounds each of on-site treatment of this chemical.

Figure 3-4 illustrates the distribution of on-site waste management reporting for industries by the four-digit SIC codes.

Transfers Off-site for Further Waste Management

The tobacco products sector reported 489,000 pounds in transfers off-site for further waste management in 1996, as shown in Table 3-5. POTWs received the largest portion (267,000 pounds) of these transfers, and the cigarette manufacturing industry (SIC code 2111) reported the largest amount (241,000 pounds) of these transfers to POTWs. The second-largest transfer type was recycling. The 165,000 pounds sent to recycling was reported entirely by the cigarette industry (SIC code 2111).

For both types of transfers, the chemical with the largest amounts reported was nicotine and its salts. The cigarette industry reported sending a total of 218,000 pounds of this chemical to POTWs and 159,000 pounds to off-site recycling.

Figure 3-5 shows the distribution of types of off-site transfers for further waste management, and Figure 3-6 illustrates the distribution by industry in this sector.

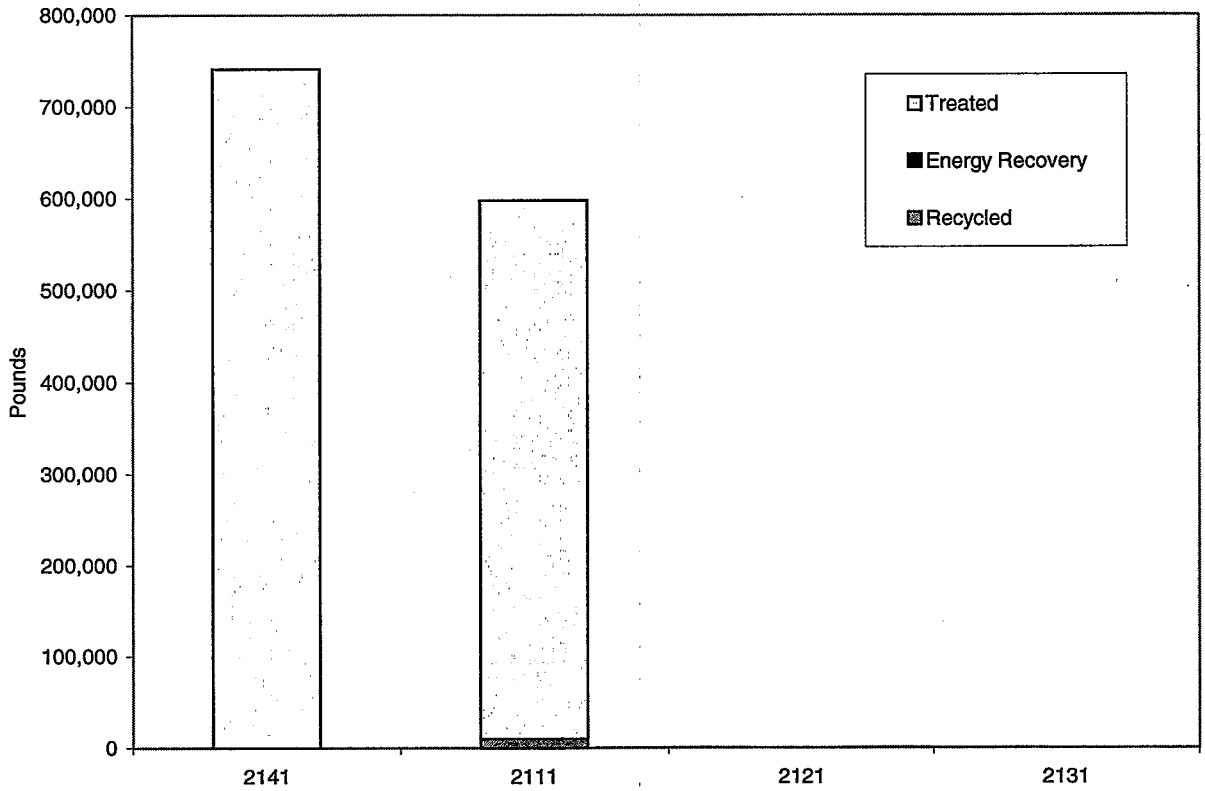


Figure 3-4. TRI Other On-site Waste Management, by SIC Code, 1996: Tobacco Products (SIC Code 21)

Note: Other On-site Waste Management from Section 8 of Form R.

Table 3-5. TRI Transfers Off-site for Further Waste Management, 1996: Tobacco Products, SIC Code 21 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
2111	Cigarettes	165,113	0	50	241,336	0	406,499
2141	Tobacco Stemming & Redrying	0	0	21,500	23,124	0	44,624
2131	Chewing & Smoking Tobacco	0	0	27,341	569	0	27,910
2121	Cigars	0	0	7,600	2,320	0	9,920
	Total for SIC Code 21	165,113	0	56,491	267,349	0	488,953

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

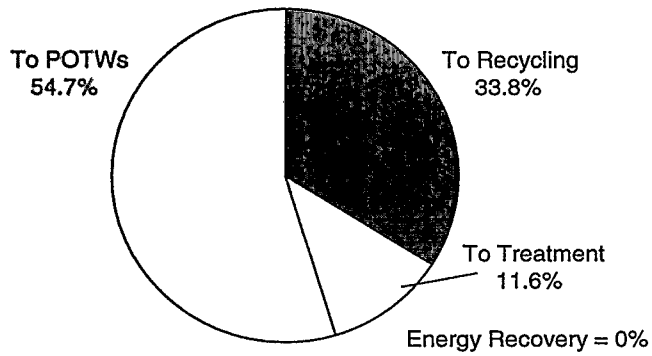


Figure 3-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Tobacco Products (SIC Code 21)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

1996 TRI Data by State for Tobacco Products

The tobacco products sector submitted TRI forms in eight states in 1996. This was the lowest number of states in any industrial sector. Tobacco processors have generally located in tobacco growing states. Table 3-6 presents summary release and waste management data for the eight states in which tobacco processing was reported in 1996.

Of the 61 forms submitted in this sector, 38 were in North Carolina and 13 in Virginia. These two states also reported the largest amounts in most of the

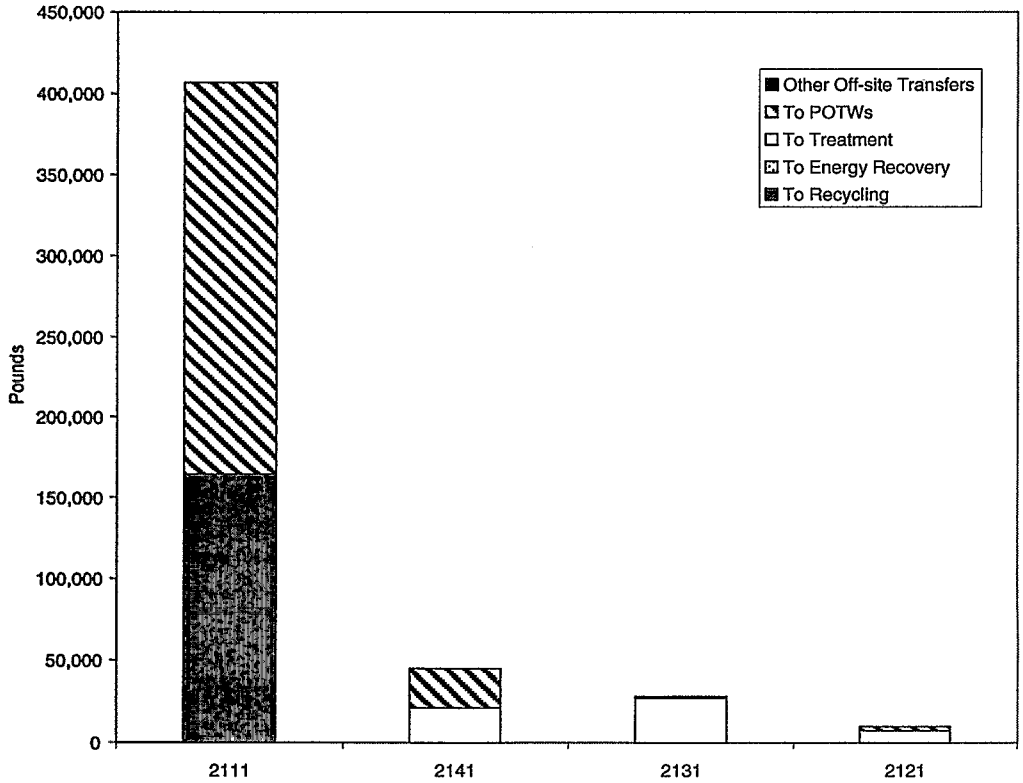


Figure 3-6. TRI Transfers Off-site for Further Waste Management, by SIC Code, 1996: Tobacco Products (SIC Code 21)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R.

Table 3-6. Summary of TRI Information by State, 1996: Tobacco Products, SIC Code 21

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Georgia	1	3	0	98,100	158,440	256,540	208,700	640	469,340	0
Illinois	1	1	0	78	12,592	12,670	0	168	12,838	0
Kentucky	2	2	0	8,525	14,388	22,913	8,900	21,824	53,637	0
North Carolina	18	38	0	1,086,755	252,700	1,339,455	153,453	341,753	1,777,772	0
Pennsylvania	1	2	0	171,300	0	171,300	0	9,920	185,000	0
Puerto Rico	1	1	0	1,366	17,243	18,609	959	0	10,628	0
Tennessee	1	1	0	123	270	393	0	27,198	27,591	0
Virginia	4	13	0	2,328,192	2,500	2,330,692	966,805	87,450	3,384,947	0
Total for SIC Code 21	29	61	–	3,694,439	458,133	4,152,572	1,338,817	488,953	5,921,753	–

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

summary categories in Table 3-6. Virginia had the largest total on- and off-site releases, 2.3 million pounds, or 56.1% of the releases in this sector. North Carolina was second with 1.3 million pounds, or 32.3% of the total. Total production-related waste was also led by these two states, with Virginia reporting 3.4 million pounds, or 57.2% of the total, and North Carolina reporting 1.8 million pounds, or 30.0% of the total. Georgia was third in both categories with 257,000 pounds in on- and off-site releases and 469,000 pounds in production-related waste.

Almost all of Virginia's releases were reported as on-site releases, but North Carolina reported off-site releases (transfers to disposal) of 253,000 pounds, the largest amount among the eight states. In other on-site waste management, Virginia reported 967,000 pounds, nearly three-quarters (72.2%) of the total in that category. North Carolina had the largest transfers off-site for further waste management, with 342,000 pounds, or 69.9% of all such transfers.

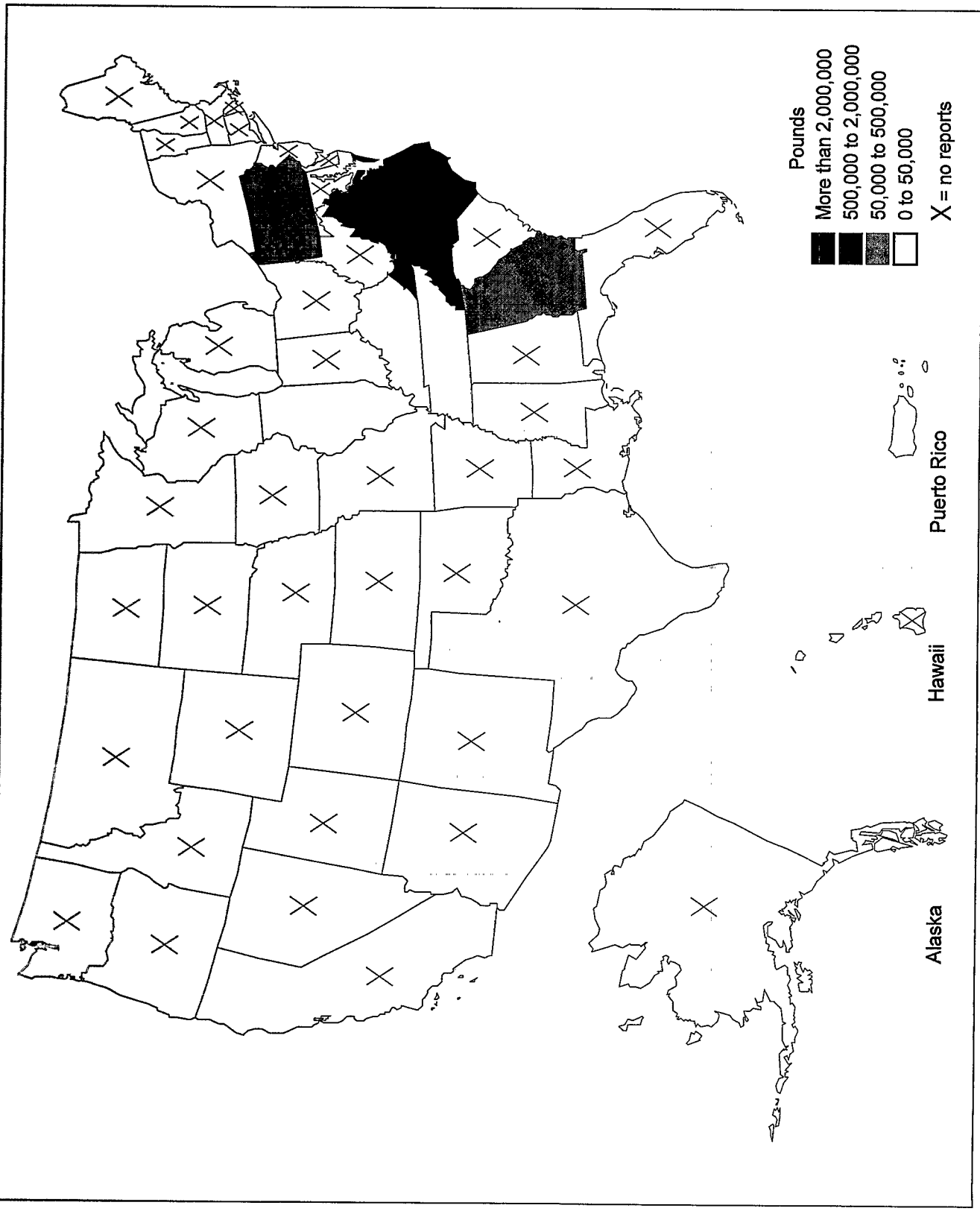
Map 3-1 illustrates the geographic distribution of total on- and off-site releases in the tobacco products sector.

1996 TRI Data by Chemical for Tobacco Products

The tobacco products sector reported on- and off-site releases of 11 chemicals in 1996; these appear in Table 3-7. Ammonia had the largest releases, 2.0 million pounds, mostly in air emissions. The chemical with the second-largest releases was hydrochloric acid; these were all air emissions (898,000 pounds), as would be expected, since only aerosol forms of hydrochloric acid are reportable. About equal amounts of nicotine and its salts were released on-site to air (432,000 pounds) and transferred off-site to disposal (off-site releases, 423,000 pounds).

None of the chemicals reported in this sector are designated as OSHA carcinogens, as noted in Box 3-2. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.)

Map 3-1. Total On- and Off-site Releases, 1996: Tobacco Products, SIC Code 21



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

Table 3-7. Chemicals with On-site and Off-site Releases, 1996: Tobacco Products, SIC Code 21 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
7664-41-7	Ammonia	1,948,185	500	0	0	0	0	1,948,685	34,653	1,983,338
7647-01-0	Hydrochloric acid	898,083	0	0	0	0	0	898,083	0	898,083
--	Nicotine and salts	431,545	1	0	0	0	0	431,546	423,480	855,026
7664-93-9	Sulfuric acid	174,410	0	0	0	0	0	174,410	0	174,410
--	Nitrate compounds	0	168,300	0	0	0	0	168,300	0	168,300
7664-39-3	Hydrogen fluoride	61,590	0	0	0	0	0	61,590	0	61,590
7782-50-5	Chlorine	300	10,700	0	0	0	0	11,000	0	11,000
107-21-1	Ethylene glycol	300	200	0	0	0	0	500	0	500
7664-38-2	Phosphoric acid	300	0	0	0	0	0	300	0	300
108-88-3	Toluene	24	0	0	0	0	0	24	0	24
78-93-3	Methyl ethyl ketone	1	0	0	0	0	0	1	0	1
	Total for SIC Code 21	3,514,738	179,701	0	0	0	0	3,694,439	458,133	4,152,572

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

Table 3-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Tobacco Products, SIC Code 21 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2141	Tobacco Stemming & Redrying	0	0	740,700	0	0	45,424	2,396,280	3,182,404	0
2111	Cigarettes	9,753	0	588,364	165,113	0	241,386	1,506,800	2,511,416	0
2121	Cigars	0	0	0	0	0	10,000	175,000	185,000	0
2131	Chewing & Smoking Tobacco	0	0	0	0	0	27,910	15,023	42,933	0
	Total for SIC Code 21	9,753	0	1,329,064	165,113	0	324,720	4,093,103	5,921,753	0

Note: Data from Section 8 of Form R.

1996 TRI Chemicals in Waste for Tobacco Products

As shown in Table 3-9, releases were the largest constituent of production-related waste in the tobacco products sector. Total production-related waste in 1996 was 5.9 million pounds for SIC code 21. Of that, 4.1 million pounds was reported in quantities released on- and off-site. Tobacco stemming and redrying (SIC code 2141) and cigarette production (SIC code 2111) together accounted for 96.2% of production-related waste, and 95.4% of the quantities released.

Another 1.3 million pounds was reported in on-site treatment, followed by 325,000 pounds in off-site treatment. Recycling off-site was 165,000 pounds, while on-site recycling was 10,000 pounds. There were no tobacco product manufacturing reports submitted for energy recovery, either on- or off-site.

Figure 3-8 illustrates the percentages of on- and off-site waste management and quantities released, as reported in the tobacco products sector. Distribution of production-related waste by industry appears in Figure 3-9.

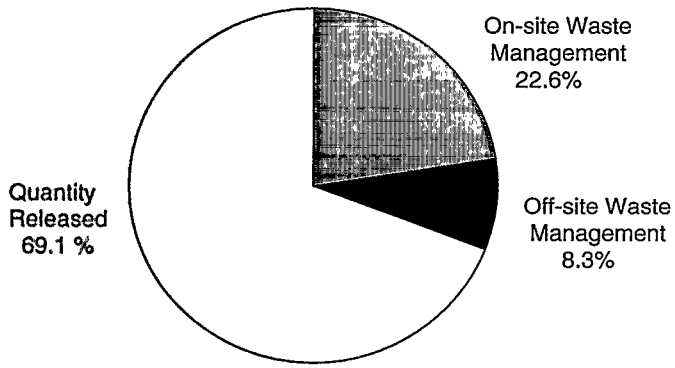


Figure 3-8. Distribution of TRI Production-related Waste, 1996: Tobacco Products (SIC Code 21)

Note: Data from Section 8 of Form R.

Projected Quantities of TRI Chemicals in Waste

Table 3-10 and Figure 3-10 present waste management projections for the tobacco products sector through 1998. Overall, facilities reporting in this sector expect to make little change in the overall distribution of the types of waste management practiced. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.)

All waste management options were expected to increase. Quantities released on- and off-site were projected to rise from 4.1 million pounds in 1996 to

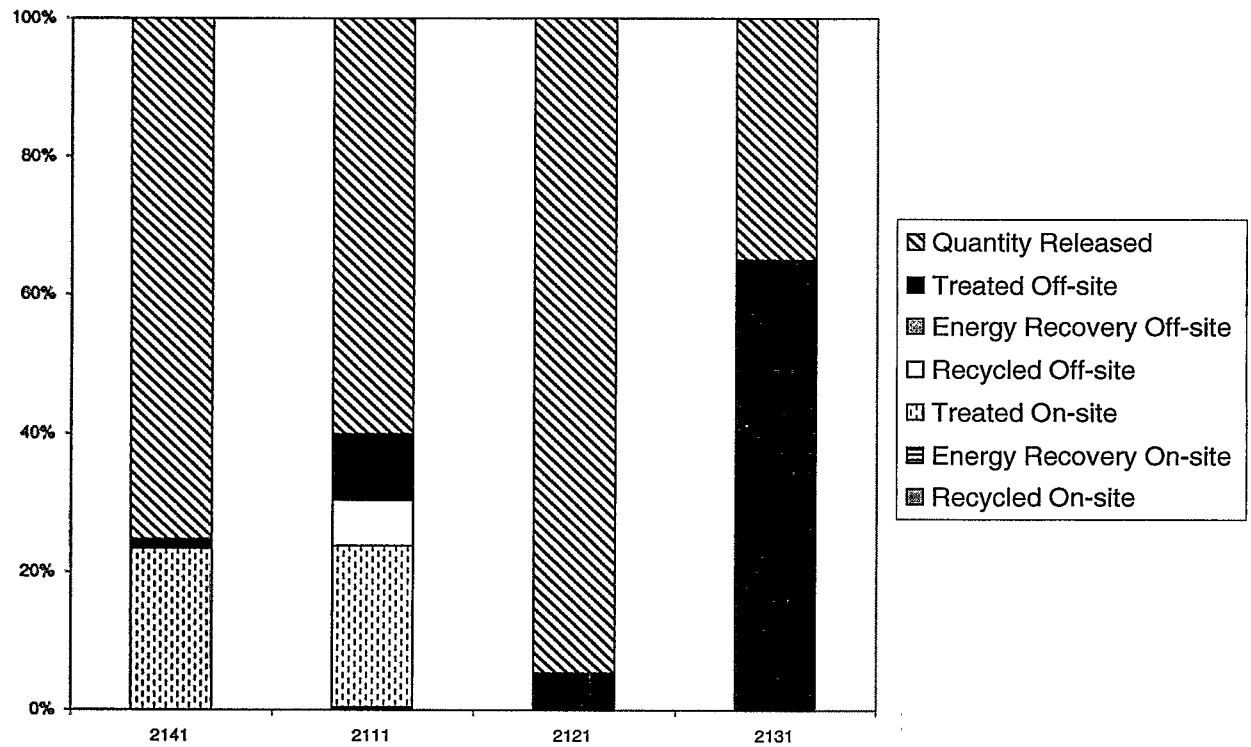


Figure 3-9. Distribution of Production-related Waste, by SIC Code, 1996: Tobacco Products (SIC Code 21)

Note: Data from Section 8 of Form R.

Table 3-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Tobacco Products, SIC Code 21

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	9,753	0.2	9,900	0.2	9,900	0.2
Energy Recovery On-site	0	0.0	0	0.0	0	0.0
Treated On-site	1,329,064	22.4	1,349,764	22.3	1,397,019	22.5
Off-site Waste Management						
Recycled Off-site	165,113	2.8	163,800	2.7	179,800	2.9
Energy Recovery Off-site	0	0.0	0	0.0	0	0.0
Treated Off-site	324,720	5.5	358,674	5.9	377,604	6.1
Quantity Released On- and Off-site	4,093,103	69.1	4,176,611	68.9	4,244,451	68.4
Total Production-related Waste for SIC Code 21	5,921,753	100.0	6,058,749	100.0	6,208,774	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	1.5	0.0	1.5
Energy Recovery On-site	--	--	--
Treated On-site	1.6	3.5	5.1
Off-site Waste Management			
Recycled Off-site	-0.8	9.8	8.9
Energy Recovery Off-site	--	--	--
Treated Off-site	10.5	5.3	16.3
Quantity Released On- and Off-site	2.0	1.6	3.7
Total Production-related Waste for SIC Code 21	2.3	2.5	4.8

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

4.2 million pounds in 1998, releases would decrease slightly, from 69.1% to 68.4%, as a percentage of total production-related waste. This is still a much larger percentage of total production-related waste than in most industrial sectors.

These data suggest no progress toward environmentally preferable options for managing TRI chemicals in waste, as established in the waste management hierarchy, explained in Chapter 1.

Source Reduction Activity

Of the 61 forms submitted in the tobacco products sector in 1996, two indicated that source reduction activity had taken place during the year, as shown in Table 3-11. Both forms were in the cigarette industry (SIC code 2111), and both identified the activity as process modifications. This level of source reduction activity—3.3% of all forms—is considerably lower than in many other industrial sectors.

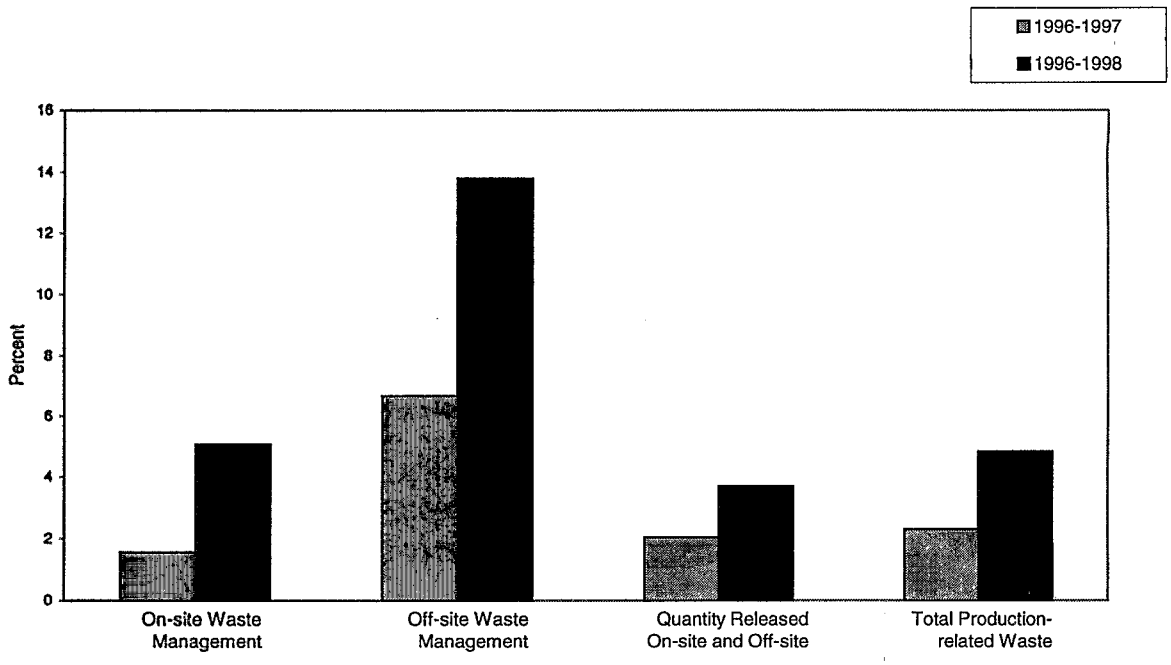


Figure 3-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Tobacco Products (SIC Code 21)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

Table 3-11. Number of Forms Reporting Source Reduction Activity, 1996: Tobacco Products, SIC Code 21

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
2111	Cigarettes	43	2	4.7	0	0	0	0	2	0	0	0
2121	Cigars	2	0	0.0	0	0	0	0	0	0	0	0
2131	Chewing & Smoking Tobacco	4	0	0.0	0	0	0	0	0	0	0	0
2141	Tobacco Stemming & Redrying	12	0	0.0	0	0	0	0	0	0	0	0
	Total for SIC Code 21	61	2	3.3	0	0	0	0	2	0	0	0

Year-to-Year Comparisons for Tobacco Products

1995-1996 TRI Data for Tobacco Products

Tobacco products manufacturers submitted 10 more forms in 1996 than in 1995, as shown in Table 3-12.

On- and Off-site Releases

Table 3-12 also presents on- and off-site releases for this sector for 1995 and 1996. Air emissions, which constituted the great majority of the sector's releases, doubled in this period, from 1.7 million pounds in 1995 to 3.5 million pounds in 1996. In both years, the bulk of the reported releases to air came from point sources.

Surface water discharges also increased substantially from 1995 to 1996, although the amounts involved were smaller. Releases to surface water were 10,000 pounds in 1995 and 180,000 pounds in 1996. Off-site releases (transfers to disposal) increased by more than half, from 289,000 pounds to 458,000 pounds.

Figure 3-11 illustrates the percentage change in on- and off-site releases in this sector for 1995-1996.

Other On-site Waste Management

On-site treatment in the tobacco products sector increased nearly three-fold from 1995 to 1996, from 347,000 pounds to 1.3 million pounds. As shown in Table 3-12, this waste management type accounts for almost all the on-site waste management reported in this sector.

Transfers Off-site for Further Waste Management

Table 3-12 also presents the sector's transfers off-site for further waste management for 1995 and 1996. Generally, changes in these off-site transfers represented smaller amounts and smaller percentages than the categories of data summarized above. Transfers off-site for further waste management decreased 0.9% overall, from 493,000 to 489,000.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Tobacco Products

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

Table 3-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Tobacco Products, SIC Code 21

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	26	29	11.5
Total Forms	51	61	19.6
Form Rs	51	61	19.6
Form As	0	0	--
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	1,734,393	3,514,738	102.6
Fugitive Air	60,060	61,394	2.2
Point Source Air	1,674,333	3,453,344	106.3
Surface Water Discharges	10,105	179,701	1,678.3
Underground Injection	0	0	--
On-site Land Releases	135	0	-100.0
Total On-site Releases	1,744,633	3,694,439	111.8
Off-site Releases			
Transfers Off-site to Disposal	289,496	458,133	58.3
Total On- and Off-site Releases	2,034,129	4,152,572	104.1
Other On-site Waste Management			
Recycled On-site	0	9,753	--
Energy Recovery On-site	0	0	--
Treated On-site	347,339	1,329,064	282.6
Total Other On-site Waste Management	347,339	1,338,817	285.4
Transfers Off-site for Further Waste Management			
Transfers to Recycling	99,383	165,113	66.1
Transfers to Energy Recovery	1,000	0	-100.0
Transfers to Treatment	28,575	56,491	97.7
Transfers to POTWs	364,507	267,349	-26.7
Other Off-site Transfers	0	0	--
Total Transfers Off-site for Further Waste Management	493,465	488,953	-0.9

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

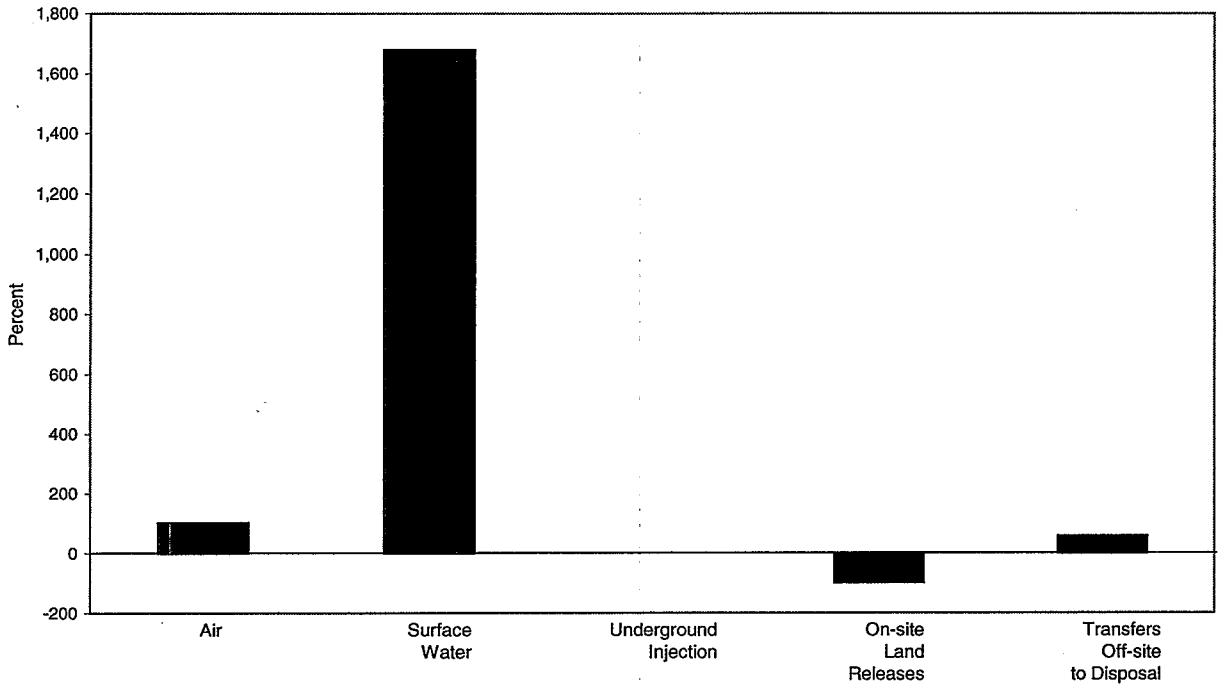


Figure 3-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Tobacco Products (SIC Code 21)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

From 1988 to 1996, reporting in the tobacco products sector of on- and off-site releases of the "core" chemicals decreased by about three-quarters (78.5%), from 342,000 pounds to 73,000 pounds. The largest component of this change was air emissions, which were reduced by 81.1%, from 330,000 pounds to 63,000 pounds. About two-thirds of this reduction occurred in point source emissions and the remainder in fugitive emissions. These data appear in Table 3-13 and are illustrated in Figure 3-12.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, on-site treatment—the only type of other on-site waste management with amounts reported for the "core" chemicals—declined from 97,000 pounds to 34,000 pounds (or 65.0%), as shown in Table 3-13. Transfers to treatment for these chemicals were 121,000 pounds in 1988, and transfers to POTWs were 81,000 pounds. In 1996, little or no transfers to treatment and POTWs were reported.

1988-1996 Data for Four-Digit Industries in Tobacco Products

Tables 3-14 through 3-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 21. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

SIC code 2131, chewing and smoking tobacco and snuff, does not appear in these tables because in 1996 this industry reported only chemicals that are not among the "core" chemicals reportable in all years (1988-1996) and having the same reporting definitions. This industry filed three forms for nicotine and its salts, added to TRI in reporting year 1995, and one for ammonia, for which the reporting

Table 3-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Tobacco Products, SIC Code 21

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	18	6	7	6	-66.7
Total Forms	38	10	13	9	-76.3
Form Rs	38	10	13	9	-76.3
Form As	NA	NA	0	0	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	330,227	124,897	85,526	62,515	-81.1
Fugitive Air	84,157	57,218	23,739	925	-98.9
Point Source Air	246,070	67,679	61,787	61,590	-75.0
Surface Water Discharges	10,950	9,874	9,700	10,900	-0.5
Underground Injection	0	0	0	0	--
On-site Land Releases	750	0	0	0	-100.0
Total On-site Releases	341,927	134,771	95,226	73,415	-78.5
Off-site Releases					
Transfers Off-site to Disposal	0	0	0	0	--
Total On- and Off-site Releases	341,927	134,771	95,226	73,415	-78.5
Other On-site Waste Management					
Recycled On-site	NA	0	0	0	NA
Energy Recovery On-site	NA	0	0	0	NA
Treated On-site	NA	96,608	53,850	33,800	NA
Total Other On-site Waste Management	NA	96,608	53,850	33,800	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	0	0	0	NA
Transfers to Energy Recovery	NA	0	1,000	0	NA
Transfers to Treatment	120,996	5	521	400	-99.7
Transfers to POTWs	81,110	0	0	0	-100.0
Other Off-site Transfers	0	0	0	0	--
Total Transfers Off-site for Further Waste Management	NA	5	1,521	400	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. **NA:** not required to be reported in that year.

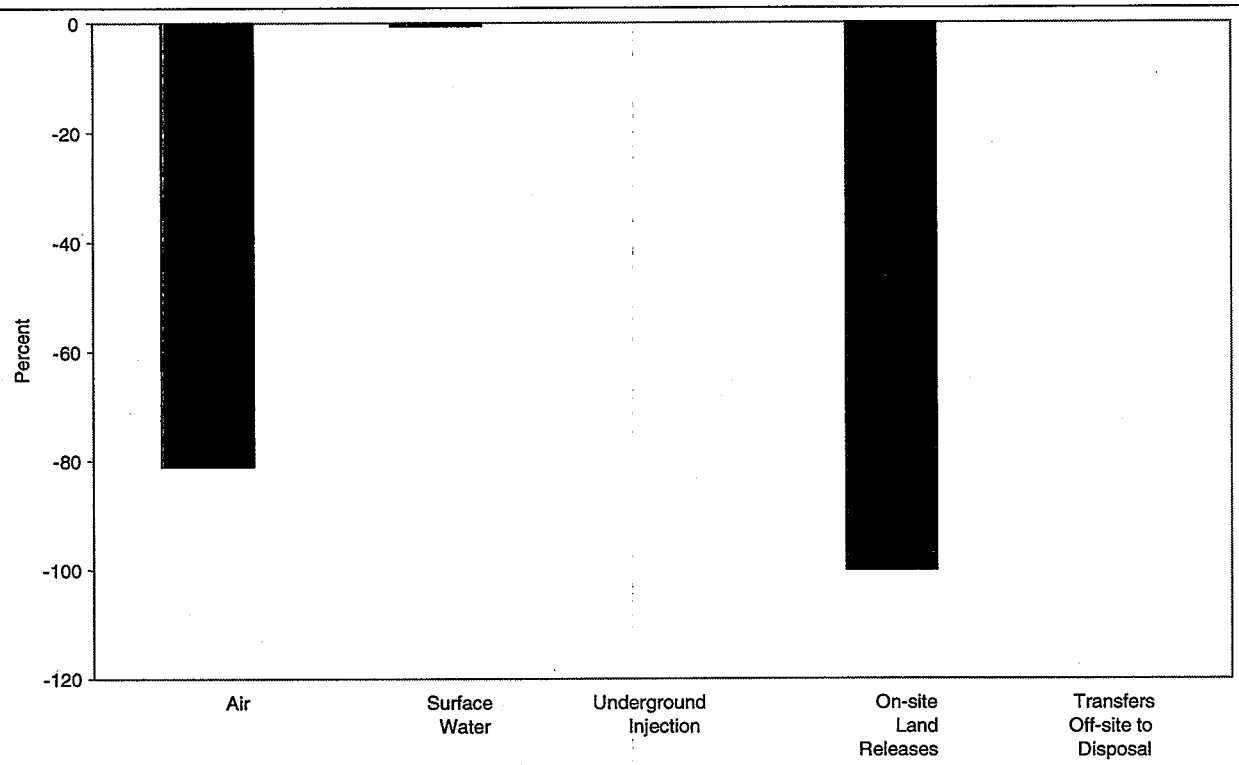


Figure 3-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Tobacco Products (SIC Code 21)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

definition has changed. Facilities in other manufacturing sectors submitted 28 forms in SIC code 21 in 1988, but have reported in later years in the SIC codes that describe their manufacturing operations. This accounts for the "invalid SIC code" data in Tables 3-14 through 3-16.

On- and Off-site Releases

Table 3-14 provides release data for all four-digit SIC codes in the tobacco products sector, for 1988-1996. Total on- and off-site releases for manufacturers of cigarettes (SIC code 2111) decreased 50,000 pounds (44.7%), from 111,000 pounds to 62,000 pounds. In releases, the industry reported only air emissions for the "core" chemicals for this period. Cigar manufacturers (SIC code 2121) reported 92,000 pounds of releases in 1988, but submitted no reports for the "core" chemicals in 1996. Amounts reported in the tobacco stemming and redrying industry (SIC code 2141) showed little change from 1988 to 1996.

Other On-site Waste Management

Cigarette producers (SIC code 2111) reported other on-site waste management of 33,000 pounds in 1994 and 15,000 pounds in 1996 (on-site waste management data were not collected in 1988). This was a reduction of 54.7%. Cigar producers (SIC code 2121) reported 63,000 pounds in 1994, but as noted above, no forms were submitted in this industry for the "core" chemicals in 1996. Tobacco stemming and redrying (SIC code 2141) reported zero amounts for all on-site waste management in these years except for 19,000 pounds of on-site treatment in 1996.

Table 3-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Tobacco Products, SIC Code 21

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2111	Cigarettes	96	61,615	0	0	0	61,615	0	61,615
		95	58,919	0	0	0	58,919	0	58,919
		94	60,161	0	0	0	60,161	0	60,161
		88	111,374	0	0	0	111,374	0	111,374
2121	Cigars	96	No reports received						
		95	25,707	0	0	0	25,707	0	25,707
		94	64,226	0	0	0	64,226	0	64,226
		88	91,640	0	0	0	91,640	0	91,640
2141	Tobacco Stemming and Recycling	96	900	10,900	0	0	11,800	0	11,800
		95	900	9,700	0	0	10,600	0	10,600
		94	510	9,874	0	0	10,384	0	10,384
		88	500	10,950	0	0	11,450	0	11,450
	Invalid SIC Code within SIC Code 21	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	126,713	0	0	750	127,463	0	127,463
	Total for SIC Code 21	96	62,515	10,900	0	0	73,415	0	73,415
		95	85,526	9,700	0	0	95,226	0	95,226
		94	124,897	9,874	0	0	134,771	0	134,771
		88	330,227	10,950	0	750	341,927	0	341,927

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Two facilities reported incorrectly under an invalid SIC code in SIC code 21 for 1988. They should have reported in SIC code 26. The incorrectly reported amount was 90,231 pounds of total releases.

On-site waste management data for these years appear in Table 3-15.

Transfers Off-site for Further Waste Management

Little was reported in this sector for transfers off-site for further waste management in the years that can be compared for the "core" chemicals that were reportable in all years (data for some types of off-site transfers were not collected in 1988). In 1994, these transfers totaled 5 pounds, and in 1996 they totaled 400 pounds. Table 3-16 provides multi-year data by four-digit SIC codes for these transfer types.

Facilities with Large Increases and Decreases in Releases, 1988-1996

The top-ranked facility for increases was R.J. Reynolds Tobacco Company in King, North Carolina (SIC code 2111). This auxiliary facility is a coal-burning power plant that provides electricity to the tobacco facility and also sells power locally. Hydrogen fluoride, a byproduct of coal combustion, accounted for 100% of the plant's increase, with point-source air emissions of 62,000 pounds.

Philip Morris USA in Chester, Virginia (SIC code 2141), ranked second in increases of releases with an overall increase of 600 pounds. Over 80% of the increase at the tobacco processing facility was attributable to fugitive air emissions and surface water discharges of ethylene glycol. The facility did not report this chemical in 1988. Ethylene glycol is used as a coolant in a chiller system at this tobacco

Table 3-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Tobacco Products, SIC Code 21

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2111	Cigarettes	96	0	0	15,000	15,000
		95	0	0	29,400	29,400
		94	0	0	33,131	33,131
		88	NA	NA	NA	NA
2121	Cigars	96	No reports received			
		95	0	0	24,450	24,450
		94	0	0	63,477	63.477
		88	NA	NA	NA	NA
2141	Tobacco Stemming and Redrying	96	0	0	18,800	18.800
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 21	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
	Total for SIC Code 21	96	0	0	33,800	33,800
		95	0	0	53,850	53,850
		94	0	0	96,608	96,608
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R.

stemming and redrying facility. In 1993, ethylene glycol losses were discovered, and the facility began reporting the releases to TRI.

Third in increases was R.J. Reynolds Tobacco Company in Winston-Salem (Reynolds Blvd.), North Carolina (did not report in 1988, SIC code 2111 in 1996). This site is a large complex where many types of activities take place. One of these is the fifth largest gravure printing operation in the country. The printing operation uses toluene in excess of the TRI reporting threshold and therefore makes any toluene released from the complex reportable, according to the R.J. Reynolds contact. In 1996, the facility reported toluene fugitive air emissions of 20 pounds. A building not connected with the printing operation was painted and toluene was a constituent of the paint. The 20 pounds of toluene emissions was both the total for the chemical and the total overall increase for the facility.

Brown & Williamson Tobacco in Lancaster, Pennsylvania (SIC code 2121), had the largest decrease with 84,000 pounds. Brown & Williamson purchased the Lancaster facility from General Cigar in 1991. One of General Cigar's products was a cigar wrapper. A cellulose film coating was applied to the cigar wrapper to function as a moisture barrier. This prevented the cigar from decomposing in the smoker's mouth. Toluene was used as a solvent in the coating process and represented 100% of the facility's 1988 releases, all as air emissions. When Brown & Williamson bought the facility from General Cigar, the cigar wrapper product continued to be produced under contract with General Cigar. Implementation of new volatile organic carbon (VOC) restrictions and maximum achievable control technology (MACT) regulations would have required the facility to purchase new emissions control equipment. The cost of the new equipment would have raised the cost of the cigar

Table 3-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Tobacco Products, SIC Code 21

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2111	Cigarettes	96	0	0	0	0	0	0
		95	0	0	1	0	0	1
		94	0	0	0	0	0	0
		88	NA	NA	99,346	22,319	0	NA
2121	Cigars	96	No reports received					
		95	0	1,000	510	0	0	1,510
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2141	Tobacco Stemming and Redrying	96	0	0	400	0	0	400
		95	0	0	10	0	0	10
		94	0	0	5	0	0	5
		88	NA	NA	0	0	0	NA
	Invalid SIC Code within SIC Code 21	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	21,650	58,791	0	NA
	Total for SIC Code 21	96	0	0	400	0	0	400
		95	0	1,000	521	0	0	1,521
		94	0	0	5	0	0	5
		88	NA	NA	120,996	81,110	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Two facilities reported incorrectly under an invalid SIC code in SIC code 21 for 1988. They should have reported in SIC code 26. The incorrectly reported amounts were 21,650 pounds of transfers to treatment and 3,551 pounds of transfers to POTWs.

wrapper and General Cigar opted out of the contract with Brown & Williamson. There were no data reported for toluene in 1996.

Liggett Group, Inc., in Durham, North Carolina (SIC code 2111), was second in decreases with a 75,000 pound reduction. Toluene was responsible for 100% of the reduction. The cigarette-manufacturing facility houses printing operations that use toluene. The facility formerly used a top lacquer, containing toluene, on printed cartons and labels, but has now switched to a water-based top lacquer. Toluene is still used in small amounts at the facility, but not in a quantity exceeding the TRI reporting threshold. Therefore the facility did not report toluene in 1996.

The third-ranked facility for decreases was R.J. Reynolds Tobacco Company in Winston-Salem (Shorefair & 30th), North Carolina (SIC code 2111), with an overall decrease of 36,000 pounds. The facility manufactured a smokeless-cigarette product during the 1988 reporting year. Since that time, the product line has been discontinued and other processes now take place at the plant. Freon 113 was used by the facility when it produced the smokeless cigarettes. The facility contact did not know how the chemical was used. There were no data reported for Freon 113 in 1996.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not

discussed in detail here. There are two such facilities in the tobacco products sector:

Little Falls Color Print, Little Falls, New York, decrease of 46,000 pounds, reported incorrect SIC code.

Sullivan Paper Company, Inc., West Springfield, Massachusetts, decrease of 42,000 pounds, reported incorrect SIC code.

1991-1996 Waste Management Data for Tobacco Products

Table 3-17 summarizes on- and off-site waste management data for the tobacco products sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996).

Total production-related waste fell from 51.4 million pounds in 1991 to 108,000 pounds in 1996 in the tobacco products sector. The largest decrease was in on-site waste management, which was 49.9 million pounds in 1991, almost all of this in on-site recycling. For 1994 through 1996, on-site recycling was zero. One facility in SIC code 2111, cigarette production, reported 49.7 million pounds of on-site recycling in 1991, but has since closed, accounting for this large reduction in the sector's waste management data. This plant closure also explains part of the large reduction in quantities released on- and off-site in this sector. Tobacco products manufacturing reported 1.4 million pounds in quantities released in 1991, including 502,000 pounds from the facility that has since closed. By 1996, the sector's total had declined to 73,000 pounds, a reduction of nearly 95%.

On-site treatment declined from 93,000 pounds to 34,000 pounds from 1991 to 1996, a 63.7% reduction.

Off-site waste management in this sector decreased from 7,000 pounds in 1991 to 400 pounds in 1996. Off-site recycling and energy recovery were both more than 3,000 pounds in 1991, but dropped to zero by 1996.

Figure 3-13 presents the percentage change in the types of waste management in this sector for 1991-1996.

The very large apparent reductions in on-site recycling and in quantities released obscure the picture of waste management in this sector over the comparison period. Excluding the data from the closed facility, however, recycling on-site still dropped to zero, and quantities released and total production-related waste both showed substantial decreases. For quantities released, this was a 92.0% reduction from 915,000 pounds to 73,000 pounds, and for total production-related waste, the reduction was 90.8%, from 1.2 million pounds to 108,000 pounds. These are much larger percentage decreases than in most industrial sectors, and these decreases continued while the tobacco products sector regained production levels it had lost in the early 1990s. More than two-thirds (68.2%) of the remaining level of production-related waste, however, was reported as released in 1996. In the waste management hierarchy (explained in Chapter 1), this is the option of last resort, to be implemented only when toxic chemicals cannot be recycled, burned for energy recovery, or treated.

As indicated in the following section, restrictions on ozone-depleting chemicals that were implemented as a result of the Montreal Protocol led tobacco products facilities to eliminate uses of trichlorofluoromethane (CFC-11) during this period. This has contributed significantly to the sector's reductions in production-related waste.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

The number-one facility for increases in waste management was also the number-one facility for increases of releases, R.J. Reynolds Tobacco Company in King, North Carolina (SIC code 2111).

Table 3-17. TRI Waste Management Data, 1991, 1994-1996: Tobacco Products, SIC Code 21

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	49,888,442	0	0	0
Energy Recovery On-site	0	0	0	0
Treated On-site	93,020	96,608	53,850	33,800
Total On-site Waste Management	49,981,462	96,608	53,850	33,800
Off-site Waste Management				
Recycled Off-site	3,615	0	0	0
Energy Recovery Off-site	3,207	0	1,000	0
Treated Off-site	186	5	510	400
Total Off-site Waste Management	7,008	5	1,510	400
Quantity Released On- and Off-site	1,416,623	142,073	95,236	73,415
Total Production-related Waste	51,405,093	238,686	150,596	107,615
Non-Production-related Waste	14,118	12,500	0	0

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	--	--	-100.0
Energy Recovery On-site	--	--	--
Treated On-site	-44.3	-37.2	-63.7
Total On-site Waste Management	-44.3	-37.2	-99.9
Off-site Waste Management			
Recycled Off-site	--	--	-100.0
Energy Recovery Off-site	--	-100.0	-100.0
Treated Off-site	10,100.0	-21.6	115.1
Total Off-site Waste Management	30,100.0	-73.5	-94.3
Quantity Released On- and Off-site	-33.0	-22.9	-94.8
Total Production-related Waste	-36.9	-28.5	-99.8
Non-Production-related Waste	-100.0	--	-100.0

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

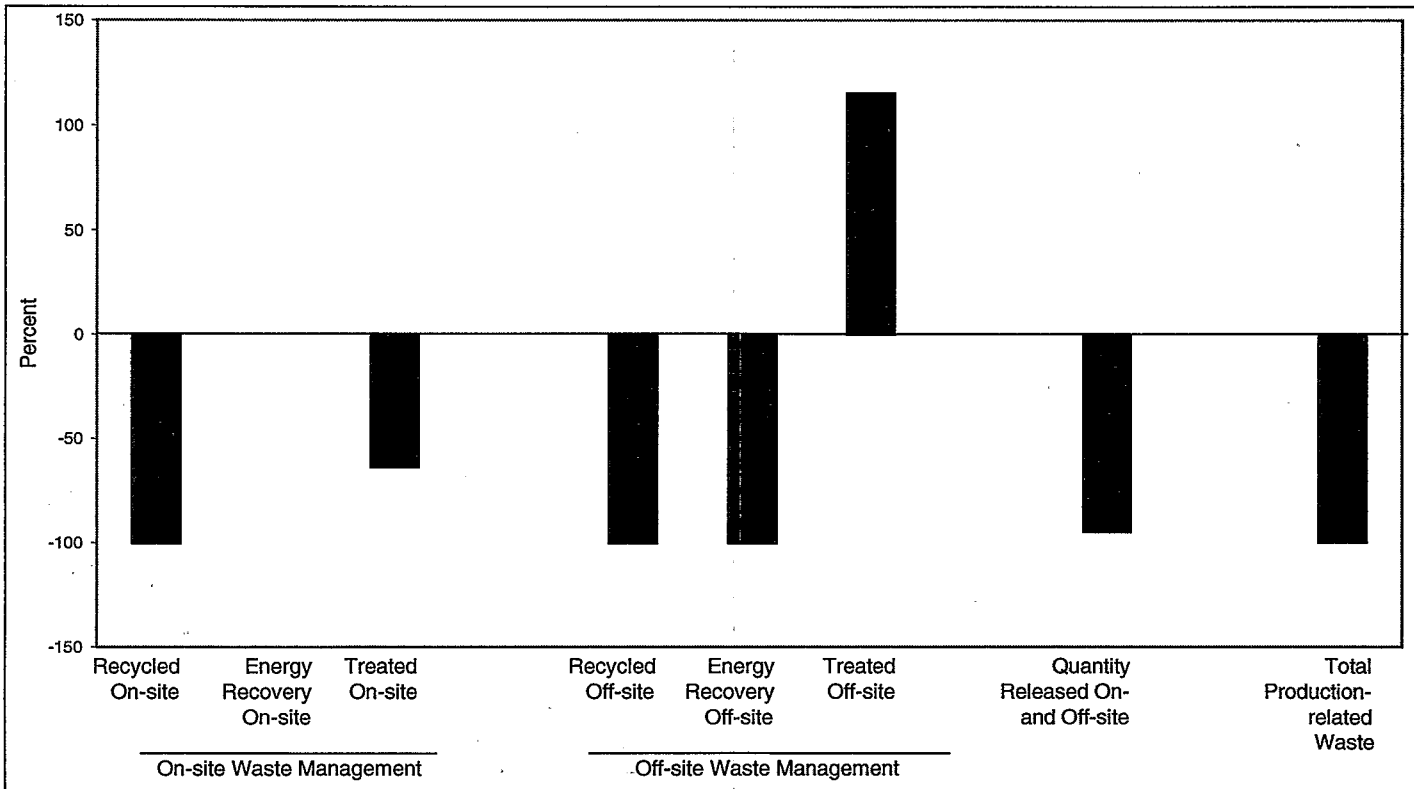


Figure 3-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Tobacco Products (SIC Code 21)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

The facility reported a 29,000 pound increase in quantity of hydrogen fluoride released. No other waste management data were reported for this or any other chemical. Hydrogen fluoride released by the facility is a by-product of coal combustion for electricity generation. (See also "Facilities with Large Increases and Decreases in Releases, 1988-1996.")

Philip Morris USA in Chester, Virginia (SIC code 2111 in 1991 and 2141 in 1996), reported the second largest increase with 20,000 pounds. The facility, also ranked second for increases in releases, reported no production-related waste data for ethylene glycol in 1991 and 20,000 pounds in 1996. The chemical is used as a coolant in a chiller system. Lost coolant is treated in an on-site waste-water treatment system. In 1996, 19,000 pounds of ethylene glycol were treated on-site. The facility did not report ethylene glycol in 1991 because the losses were not discovered until 1993.

Third in increases was R.J. Reynolds Tobacco Company in Winston-Salem (Reynolds Blvd.), North Carolina (did not report in 1991, SIC code 2111 in 1996). This facility was also third for increases of releases. The only reported chemical in 1996 was toluene. There were no data for 1991. The total increase was 20 pounds, equaling the 20 pound increase in toluene releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996.").

First in decreases was Commonwealth Brands, Inc. in Reidsville, North Carolina (SIC code 2111), with an overall reduction of 362,000 pounds. The cigarette manufacturer used CFC-11, trichlorofluoromethane, as an expansion agent for tobacco. A substitute process was found as a result of the Montreal Protocol, which calls for the phase-out of ozone-depleting chemicals, and the facility stopped using the chemical after 1994.

Liggett Group, Inc., in Durham, North Carolina (SIC code 2111), was second in decreases with a 312,000 pound reduction. The plant used trichlorofluoromethane (CFC-11) in its tobacco expanding process. The process was completely shut down after the United States adopted provisions implementing the Montreal Protocol's ban on ozone-depleting chemicals.

Lorillard Tobacco Company in Greensboro, North Carolina (SIC code 2111), had the third largest decrease with a 280,000 pound reduction. Similar to the number-one decreaser, 100% of the Lorillard's reduction was the result of the phase-out of CFC-11 in a tobacco-expanding process. The CFC-11 process was substituted with a carbon dioxide process.

Other Apparent Increases and Decreases in Production-Related Waste, 1991-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the tobacco products sector:

R.J. Reynolds Tobacco Company, Winston-Salem (5th and Linden), North Carolina, decrease of 50.2 million pounds, plant closure

Facilities Contacted for Explanations (alphabetical by facility):

Brown & Williamson Tobacco, Lancaster, Pennsylvania: Bob Walquist, July 28, 1998 (explanation provided)

Commonwealth Brands, Inc., Reidsville, North Carolina: Richard A. Filbey, July 28, 1998 (explanation provided)

Liggett Group, Inc., Durham, North Carolina: Thomas W. Newsom, August 10, 1998 (explanation provided)

Little Falls Color Print, Little Falls, New York: Joseph Sullivan, August 4, 1998 (explanation provided)

Lorillard Tobacco Company, Greensboro, North Carolina: R.L. Thomas, August 4, 1998 (explanation provided)

Philip Morris USA, Chester, Virginia: Ethel G. Tatum, July 28 and August 5, 1998 (explanation provided)

R.J. Reynolds Tobacco Company, facilities in Winston-Salem and King, North Carolina: Carl L. Martin, July 28 and August 5, 1998 (explanation provided)

Sullivan Paper Company, Inc., West Springfield, Massachusetts: Joseph Sullivan, August 4, 1998 (explanation provided)

Chapter 4

Toxics Release Inventory Data for Textile Mill Products (SIC Code 22)

A Look at the Textile Mill Products Industry (SIC Code 22)

Textile mills (SIC code 22) prepare fiber and produce yarn, thread, braids, twine, and cordage. They manufacture various fabrics—broadwoven, narrow woven, and knit. Facilities in this sector dye and finish fiber, yarn, fabrics, and knit apparel. They also coat and treat fabrics. Facilities that manufacture knit apparel and other finished products from their own yarn are classified in this sector. Broadwoven fabrics are generally more than 12 inches wide, and narrow woven fabrics less than 12 inches wide. The latter category includes, for example, fabrics for the production of men's ties. Miscellaneous products of this sector (SIC code 229) include non-rubberized coated fabrics, tire cord and fabrics, and other goods. Box 4-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

Textile mills constitute one of the smaller segments of the United States manufacturing economy. In 1996, textile mills shipped products valued at $80.24 billion, up slightly from $79.87 billion in 1995 (both in current dollars). Employment in SIC code 22 was 576,000 in 1996. Textile mill employment declined steadily from 1988 to 1991. Although employment in this sector fluctuated in the mid-1990s, the 1996 level was the lowest recorded throughout the 1988-1996 period.

Knitting mills (SIC code 225) accounted for about one-fourth of the economic activity in this sector in 1996. Knitting mills had $19.52 billion in shipments and employed 169,000. A number of other industry groups contributed roughly equal amounts to the sector's output, as measured in value of shipments. Yarn and thread mills (SIC code 228), carpets and rugs (SIC code 227), broadwoven synthetic fabric mills (SIC code 222), and miscellaneous textile goods (SIC code 229) all had shipments valued at approximately $10 billion to $13 billion. Textile mill production rose 10.6% from 1989 to 1996, compared to an increase of 17.6% for all U.S. manufacturing (see Chapter 1, Table 1-10).

Box 4-1. SIC Code 22, Textile Mill Products: Codes and Classifications

SIC Code		Industry Description
221	**Broadwoven Fabric Mills, Cotton**	
2211	Broadwoven Fabric Mills, Cotton	Weaving of fabrics more than 12 inches wide, wholly or chiefly of cotton.
222	**Broadwoven Fabric Mills, Manmade Fiber and Silk**	
2221	Broadwoven Fabric Mills, Manmade Fiber and Silk	Weaving of fabrics more than 12 inches wide, wholly or chiefly of silk and manmade fibers including glass.
223	**Broadwoven Fabric Mills, Wool (Including Dyeing and Finishing)**	
2231	Broadwoven Fabric Mills, Wool (Including Dyeing and Finishing)	Weaving of fabrics more than 12 inches wide, wholly or chiefly of wool, mohair, or similar animal fibers. Dyeing and finishing all woven wool fabrics. Dyeing wool, tops, or yarn. Shrinking and sponging of wool goods for the trade.
224	**Narrow Fabric and Other Smallwares Mills: Cotton, Wool, Silk, and Manmade Fiber**	
2241	Narrow Fabric and Other Smallwares Mills: Cotton, Wool, Silk, and Manmade Fiber	Weaving or braiding narrow fabrics of cotton, wool, silk, and manmade fibers (including glass). Manufacture of fabric-covered elastic yarn or thread.
225	**Knitting Mills**	
2251	Women's Full-Length and Knee-Length Hosiery, Except Socks	Knitting, dyeing, or finishing women's and misses' full-length and knee-length hosiery (except socks) and panty hose.
2252	Hosiery, nec*	Knitting, dyeing, or finishing miscellaneous hosiery.
2253	Knit Outerwear Mills	Knitting outerwear from yarn. Manufacturing outerwear from knit fabrics produced in the same establishment.
2254	Knit Underwear and Nightwear Mills	Knitting underwear and nightwear from yarn. Manufacturing underwear and nightwear from knit fabrics produced in the same establishment.
2257	Weft Knit Fabric Mills	Knitting weft (circular) fabrics. Dyeing or finishing weft knit fabrics.
2258	Lace and Warp Knit Fabric Mills	Knitting, dyeing, or finishing warp (flat) knit fabrics. Manufacturing, dyeing, or finishing lace goods.
2259	Knitting Mills, nec*	Knitting gloves and other miscellaneous articles, including bedspreads, curtains, and towels.
226	**Dyeing and Finishing Textiles, except Wool, Fabrics and Knit Goods**	
2261	Finishers of Broadwoven Fabrics of Cotton	Finishing cotton broadwoven fabrics, either purchased or on a commission basis. (Includes bleaching, dyeing, printing, shrinking, and chemical finishing for water repellency, fire resistance, and mildew proofing.)
2262	Finishers of Broadwoven Fabrics of Manmade Fiber and Silk	Finishing manmade fiber and silk broadwoven fabrics, either purchased or on a commission basis (as above).
2269	Finishers of Textiles, nec*	Dyeing and finishing of miscellaneous textiles (purchased or on commission), including raw stock, yarn, braided goods, and narrow fabrics.
227	**Carpets and Rugs**	
2273	Carpets and Rugs	Manufacture of woven, tufted, and other carpets and rugs, such as art squares, floor mattings, and needle punch carpeting. Manufacture of door mats and mattings from textile materials or from twisted paper, grasses, sisal, rags, and other materials.
228	**Yarn and Thread Mills**	
2281	Yarn Spinning Mills	Spinning yarn wholly or chiefly of cotton, manmade fibers, silk, wool, mohair, or similar animal fibers.
2282	Yarn Texturizing, Throwing, Twisting, and Winding Mills	Texturizing, throwing, twisting, winding, or spooling yarns or manmade fiber filaments, purchased or on commission.
2284	Thread Mills	Manufacture of thread, including handicraft threads.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 4-1. SIC Code 22, Textile Mill Products: Codes and Classifications, Continued

SIC Code		Industry Description
229	**Miscellaneous Textile Goods**	
2295	Coated Fabrics, Not Rubberized	Manufacture of coated, impregnated, or laminated textiles. Finishing of textiles, such as varnishing and waxing.
2296	Tire Cord and Fabrics	Manufacture of cord and fabric for use in reinforcing rubber tires, industrial belting, fuel cells, and similar uses.
2297	Nonwoven Fabrics	Manufacture of nonwoven fabrics (by bonding or interlocking of fibers) by mechanical, chemical, thermal, and/or solvent means.
2298	Cordage and Twine	Manufacture of rope, cable, cordage, twine, and related products.
2299	Textile Goods, nec*	Manufacture of miscellaneous textile goods, including goods of linen, jute, or felt; padding and upholstery filling; and recovered fibers and flock. Processing textile fibers for spinning, such as scouring and carbonizing wool or combing and converting wool tow to top.

***nec:** not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Unlike some sectors such as pulp and paper milling, where integrated manufacturing processes and materials are common, textile mills and related establishments generally engage in one process or produce one product. Mills may weave cotton or synthetic fabrics, but seldom do both. Some mills spin yarn, but do not weave. Mills that spin and weave may not dye or finish their fabrics. Dyeing and finishing plants may process purchased materials, although many process fabrics for the mills on a commission basis.

Processes in textile milling begin with cleaning, carding and combing, and reblending staples (natural fibers) before spinning them into yarn. Synthetic fibers do not require these preliminary steps, but spinning processes are similar for both natural and manmade fibers. Yarns are then woven or knit into fabrics. Finishing, also known as wet processing, may be mechanical, chemical, or both. This may include scouring and bleaching to prepare for further finishing steps such as dyeing, treating (for example, durable-press treatment), or coating. Finishing (industries in SIC code 226) and coating (SIC code 2295) make up the majority of the sector's TRI reporting.

Chemicals used in finishing textile products include wetting and cleaning agents, surfactants, and others with functional roles in processing, plus substances such as dyes and finishes that are intended to remain on the processed fibers and fabrics. In bleaching processes, hydrogen peroxide has largely replaced sodium hypochlorite and sodium chlorite.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Textile Industry,* Sector Notebook project, EPA/310-R-97-009, September 1997 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

McGraw-Hill Encyclopedia of Science and Technology, 8th ed., 1997: industry processes and technologies.

Table 4-1. Summary of TRI Information by 4-digit SIC Code, 1996: Textile Mill Products, SIC Code 22

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
8	13	2211	Broadwoven Fabric Mills, Cotton	9	19	0	343,254	250	343,504
5	8	2221	Broadwoven Fabric Mills, Manmade	8	22	0	466,466	48,713	515,179
13	12	2231	Broadwoven Fabric Mills, Wool	13	25	0	145,622	6,322	151,944
22	24	2251	Women's Hosiery, Except Socks	3	3	0	181	0	181
23	18	2252	Hosiery, nec*	4	4	0	2	0	2
18	20	2253	Knit Outerwear Mills	8	13	0	19,595	12	19,607
24	21	2254	Knit Underwear Mills	1	1	0	0	0	0
17	16	2257	Weft Knit Fabric Mills	3	3	0	40,011	0	40,011
15	15	2258	Lace & Warp Knit Fabric Mills	3	3	0	105,565	0	105,565
21	22	2259	Knitting Mills, nec*	1	2	0	0	7,395	7,395
10	10	2261	Finishing Plants, Cotton	18	34	1	219,065	0	219,065
9	4	2262	Finishing Plants, Manmade	19	34	0	289,444	42,763	332,207
3	2	2269	Finishing Plants, nec*	31	67	5	1,482,755	5	1,482,760
6	5	2273	Carpets & Rugs	35	59	9	413,221	5,813	419,034
20	23	2281	Yarn Spinning Mills	2	2	1	12,300	0	12,300
16	19	2282	Throwing & Winding Mills	5	5	2	42,197	0	42,197
4	6	2284	Thread Mills	5	9	0	1,120,795	0	1,120,795
1	1	2295	Coated Fabrics, Not Rubberized	44	158	6	9,908,417	236,305	10,144,722
7	9	2296	Tire Cord & Fabrics	11	25	2	334,448	59,102	393,550
12	7	2297	Nonwoven Fabrics	9	12	0	166,120	0	166,120
14	17	2298	Cordage & Twine	2	5	0	106,331	0	106,331
11	11	2299	Textile Goods, nec*	17	27	3	174,596	14,066	188,662
2	3		Multiple within SIC Code 22	54	120	5	1,455,976	41,402	1,497,378
19	14		Invalid SIC Code within SIC Code 22	2	5	1	19,021	0	19,021
			Total for SIC Code 22	307	657	35	16,865,382	462,148	17,327,530

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 2269 for 1996. The facility should have reported under SIC code 2869. The incorrectly reported amounts were the following: 51,735 pounds of total releases, 4,437,287 pounds of other on-site waste management, 61,342 pounds of transfers off-site for further waste management and 4,552,414 pounds of total production-related waste. Another facility incorrectly reported 393,101 pounds of total releases under SIC code 2269. The correct amount is 42,493 pounds. Accounting for these two facility errors, the total releases rank of SIC code 2269 changes from 3 to 4. Another facility incorrectly reported 10,679,852 pounds of other on-site waste management and total production-related waste under SIC code 2269. The correct amount is 0 pounds.
*nec: not elsewhere classified.

Noncresylic surfactants have similarly been substituted for cresol-based surfactants in surfactants in mercerization processes that enhance luster and smoothness. Dyes may be reactive (reacting with fiber molecules to form chemical bonds), or direct (not requiring an affixing agent). Dyes for polyesters are disperse (requiring dye carriers, pressure, and heat). Printing operations typically rely on resin binders to apply pigments to fibers; solvents transport the resin-pigment mixture to the chemically treated fiber surface. Dyeing and printing processes may involve other chemical aids (to speed or retard dye penetration, for example), as well as after-treatment to prevent fading. Polyvinyl and urea-formaldehyde resins are applied as stiffeners in some fabrics. Fabrics may also be treated to obtain fire-retardant or water-repellent characteristics.

1996 TRI Data for Textile Mill Products

Table 4-1 summarizes TRI reporting by the textile mills sector for 1996. Textile mill products industries submitted 657 forms in 1996. Of these, 35 were Form A certification statements, certifying that a facility's total annual reportable amount of a

Table 4-1. Summary of TRI Information by 4-digit SIC Code, 1996: Textile Mill Products, SIC Code 22, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2211	Broadwoven Fabric Mills, Cotton	10,037	152,400	506,198	0
2221	Broadwoven Fabric Mills, Manmade	102,619	168,920	853,636	0
2231	Broadwoven Fabric Mills, Wool	388,371	25,807	552,119	0
2251	Women's Hosiery, Except Socks	0	0	181	0
2252	Hosiery, nec*	0	108,891	109,011	0
2253	Knit Outerwear Mills	23,000	17,738	62,547	0
2254	Knit Underwear Mills	0	24,153	24,153	0
2257	Weft Knit Fabric Mills	56,798	72,293	119,259	0
2258	Lace & Warp Knit Fabric Mills	495	14,000	119,297	0
2259	Knitting Mills, nec*	6,800	38	14,233	0
2261	Finishing Plants, Cotton	141,048	424,132	818,995	0
2262	Finishing Plants, Manmade	5,087,269	79,604	5,499,715	0
2269	Finishing Plants, nec*	20,326,972	927,188	22,365,755	0
2273	Carpets & Rugs	651,381	265,252	1,388,550	0
2281	Yarn Spinning Mills	0	0	12,300	0
2282	Throwing & Winding Mills	0	19,144	73,788	0
2284	Thread Mills	77,022	160,564	1,309,328	0
2295	Coated Fabrics, Not Rubberized	9,895,645	2,414,583	22,453,748	0
2296	Tire Cord & Fabrics	447,621	19,696	829,926	490
2297	Nonwoven Fabrics	871,039	4,711	1,043,510	0
2298	Cordage & Twine	0	3,069	109,400	0
2299	Textile Goods, nec*	352,045	94,319	635,610	0
	Multiple within SIC Code 22	3,475,454	754,947	5,562,785	468
	Invalid SIC Code within SIC Code 22	126,484	0	145,023	200
	Total for SIC Code 22	42,040,100	5,751,449	64,609,067	1,158

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 2269 for 1996. The facility should have reported under SIC code 2869. The incorrectly reported amounts were the following: 51,735 pounds of total releases, 4,437,287 pounds of other on-site waste management, 61,342 pounds of transfers off-site for further waste management and 4,552,414 pounds of total production-related waste. Another facility incorrectly reported 393,101 pounds of total releases under SIC code 2269. The correct amount is 42,493 pounds. Accounting for these two facility errors, the total releases rank of SIC code 2269 changes from 3 to 4. Another facility incorrectly reported 10,679,852 pounds of other on-site waste management and total production-related waste under SIC code 2269. The correct amount is 0 pounds.
***nec:** not elsewhere classified.

TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. This represented 5.3% of all submissions from this industry, which was about half the percentage (10.1%) of Form As submitted for all industries in 1996. (The Form A certification statement is explained in Chapter 1.)

The textile mill products industry that submitted the most forms was coated fabrics (SIC code 2295). This industry submitted 158 forms, one-quarter of the sector's total. Forms that reported more than one SIC code in SIC code 22 to describe their operations (explained below) was the second largest group, with 120 forms. Miscellaneous finishing plants (SIC code 2269) was third, with 67 forms.

Some facilities in this sector manufacture products classified in distinct, but related SIC codes. A few textile mills weave both cotton and synthetic fabrics; such facilities would report SIC codes 2211 (broadwoven fabric mills, cotton) and 2221 (broadwoven fabric mills, manmade) to describe their activities. Other facilities might finish manmade fabrics (SIC code 2262) and also perform

operations such as bleaching and finishing raw stock, yarn, and narrow fabrics (SIC code 2269, miscellaneous finishing plants). Such facilities also may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

As shown in Table 4-1, on- and off-site releases in the textile mills sector totaled 17.3 million pounds in 1996. Production of coated fabrics (SIC code 2295) reported the largest releases. This industry reported 9.9 million pounds of on-site releases and 236,000 pounds of off-site releases. Both amounts were the largest reported in this sector for these categories. Together, they represented 58.5% of the all releases reported in this sector.

Forms with multiple SIC codes reported the second-largest amounts of total on- and off-site releases, 1.5 million pounds, or 8.6% of the sector's total. Miscellaneous finishing plants (SIC code 2269) was third, with 1.5 million pounds, also 8.6%. However, taking into account two facility reporting errors in SIC code 2269 would reduce this amount to 1.1 million pounds. One facility submitted an incorrect amount for releases of methanol and another facility that should have reported in SIC code 2869 not SIC code 2269 (further described below).

Other on-site waste management reported in the textile mills sector totaled 42.0 million pounds in 1996. Miscellaneous finishing plants (SIC code 2269) reported nearly half (48.4%) of this amount, 20.3 million pounds. However, two forms indicating SIC code 2269 have been identified as containing reporting errors. These two forms accounted for 15.1 million pounds of the other on-site waste management reported in SIC code 2269. One of these forms was submitted by a facility that correctly stopped reporting non-aerosol forms of sulfuric acid in 1995, because EPA had modified the reporting definition for that chemical to require reporting of aerosol forms only. However, this facility erroneously submitted a form for non-aerosol forms of sulfuric acid for 1996, for 10.7 million pounds that it treated on-site. Secondly, an inorganic chemical manufacturing facility, which files in SIC code 2869, inadvertently submitted one form for xylenes in SIC code 2269. This form included 4.4 million pounds of on-site recycling of xylenes. After correcting for these errors, amounts of other on-site waste management for SIC code 2269 were 5.2 million pounds.

Manufacturing of coated fabrics (SIC code 2295) ranked second for other on-site waste management with 9.9 million pounds, or 23.5% of the sector's total, and finishing of manmade fabrics (SIC code 2262) was third with 5.5 million pounds, or 12.1%.

Coated fabrics (SIC code 2295) reported the largest transfers off-site for further waste management in this sector, 2.4 million pounds, 42.0% of the sector's 5.8 million-pound total. Miscellaneous finishing plants (SIC code 2269) was second with 927,000 pounds (16.1%). Forms reporting multiple codes ranked third with 755,000 pounds (13.1%).

Coated fabrics (SIC code 2295) also reported the largest production-related waste in 1996, 22.5 million pounds. The miscellaneous finishing plants industry (SIC code 2269) ranked second for total production-related waste, with 22.4 million pounds; the reporting errors described above reduce this industry's total to 7.1 million pounds, which was still the second-largest amount in this sector. The multiple-codes group was third, with 5.6 million pounds.

Reporting Errors in 1996 Data for SIC Code 22

As mentioned above, some reports submitted to EPA contained errors. These included:

- reporting an incorrect amount for releases of methanol in SIC code 2269 (393,101 pounds instead of 42,493 pounds),
- reporting of 10.7 million pounds of sulfuric acid treated on-site in SIC code 2269 (the facility should not have submitted a form for this chemical), and

- reporting of 4.4 million pounds of xylenes recycled on-site in SIC code 2269 (this form should have been reported in SIC code 2869).

EPA is working with these facilities to correct their reporting errors. These facility errors are footnoted in the appropriate tables and figures and incorporated where there are comparisons in the text.

Multiple SIC Codes in SIC Code 22

Table 4-2 further examines reporting on the forms submitted with multiple SIC codes. The most frequent combination, reported on 26 of the 120 forms with multiple SIC codes, was finishing broadwoven cotton fabrics (SIC code 2261) and finishing broadwoven manmade fabrics (SIC code 2262). This combination also reported the largest total on- and off-site releases (196,000 pounds) and the largest total production-related waste (1.2 million pounds) among multiple-codes forms in SIC code 22.

Twelve forms reported the combination of broadwoven cotton fabric mills (SIC code 2211) and finishing of broadwoven cotton fabrics (SIC code 2261), the second-largest number of multiple-codes forms in SIC code 20. This combination

Table 4-2. Multiple SIC Codes, 1996: Textile Mill Products, SIC Code 22

SIC Codes						Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2211	2221					2	0	37,905	0	37,905	0	250	38,293	0
2211	2221	2259	2281	2282	2296	4	0	37,402	207	37,609	0	1,984	41,534	0
2211	2221	2261				4	1	15,604	0	15,604	0	55,579	71,183	0
2211	2221	2261	2262			1	0	16,370	0	16,370	0	0	16,370	0
2211	2221	2261	2262	2269	2281	4	0	162,227	0	162,227	0	6,768	168,996	0
2211	2221	2281				1	0	14,250	0	14,250	0	0	14,250	0
2211	2261					12	0	48,238	1,808	50,046	551,695	8,000	609,709	0
2211	2261	2262				2	0	59,791	0	59,791	0	250	59,923	0
2211	2261	2269				1	0	40,500	0	40,500	39,000	0	79,500	0
2211	2261	2281				1	0	13,100	0	13,100	69,000	0	69,000	0
2221	2257	2262	2295	2297		1	0	20	7,000	7,020	0	0	7,500	0
2221	2262					5	0	22,065	3,900	25,965	0	36,605	62,520	0
2221	2262	2269				2	0	30	0	30	1,988	1,988	5,964	0
2231	2262	2281				2	0	13,502	1	13,503	45,000	0	58,680	0
2231	2262	2295				7	1	170,355	1,500	171,855	886,600	0	1,057,200	0
2231	2283					2	0	46	0	46	55,539	1,659	57,244	0
2253	2254	2258				1	0	5,300	0	5,300	88,000	0	93,300	0
2253	2254	2269				1	0	3,300	0	3,300	0	0	3,300	0
2258	2261					1	0	1,521	0	1,521	0	13,693	15,214	0
2258	2262					3	0	23,768	3,577	27,345	17,455	0	44,800	0
2258	2269					2	0	2,185	0	2,185	0	29,019	31,204	0
2259	2262					2	0	159,000	0	159,000	275,580	0	275,580	0
2259	2262	2295	2299			3	0	9,549	9,886	19,435	0	104,910	122,728	0
2259	2269					2	0	11,620	0	11,620	313,800	1,170	326,600	0
2261	2262					26	1	196,377	1	196,378	767,559	204,845	1,171,649	350
2261	2262	2269				3	0	118,250	0	118,250	55,300	0	173,300	0
2261	2262	2295				6	0	1,832	0	1,832	86,343	254,627	342,802	0
2262	2269					7	0	27,600	0	27,600	140,000	11,350	179,250	118
2262	2269	2299				1	0	0	0	0	0	8,125	8,100	0
2262	2295					1	0	10,060	0	10,060	0	1,399	11,459	0
2269	2295	2297				3	0	32,920	13,522	46,442	0	750	49,743	0
2273	2297	2299				2	2	0	0	0	0	0	0	0
2281	2295					4	0	10,289	0	10,289	82,595	11,976	104,890	0
2282	2284	2298				1	0	191,000	0	191,000	0	0	191,000	0
Total for SIC Code 22						120	5	1,455,976	41,402	1,497,378	3,475,454	754,947	5,562,785	468

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 4-3. TRI On-site and Off-site Releases, 1996: Textiles, SIC Code 22 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2295	Coated Fabrics, Not Rubberized	9,908,147	270	0	0	0	0	9,908,417	236,305	10,144,722
	Multiple within SIC Code 22	1,147,765	149,787	0	0	0	158,424	1,455,976	41,402	1,497,378
2269	Finishing Plants, nec*	1,471,712	11,038	0	0	0	5	1,482,755	5	1,482,760
2284	Thread Mills	1,120,795	0	0	0	0	0	1,120,795	0	1,120,795
2221	Broadwoven Fabric Mills, Manmade	466,136	330	0	0	0	0	466,466	48,713	515,179
2273	Carpets & Rugs	372,361	40,860	0	0	0	0	413,221	5,813	419,034
2296	Tire Cord & Fabrics	334,078	360	0	0	0	10	334,448	59,102	393,550
2211	Broadwoven Fabric Mills, Cotton	287,100	55,904	0	0	0	250	343,254	250	343,504
2262	Finishing Plants, Manmade	289,244	200	0	0	0	0	289,444	42,763	332,207
2261	Finishing Plants, Cotton	201,294	17,771	0	0	0	0	219,065	0	219,065
2299	Textile Goods, nec*	173,796	800	0	0	0	0	174,596	14,066	188,662
2297	Nonwoven Fabrics	166,120	0	0	0	0	0	166,120	0	166,120
2231	Broadwoven Fabric Mills, Wool	72,514	71,307	0	0	0	1,801	145,622	6,322	151,944
2298	Cordage & Twine	106,331	0	0	0	0	0	106,331	0	106,331
2258	Lace & Warp Knit Fabric Mills	105,310	250	0	0	0	5	105,565	0	105,565
2282	Throwing & Winding Mills	42,197	0	0	0	0	0	42,197	0	42,197
2257	Weft Knit Fabric Mills	40,011	0	0	0	0	0	40,011	0	40,011
2253	Knit Outerwear Mills	6,470	0	0	0	0	13,125	19,595	12	19,607
	Invalid SIC Code within SIC Code 22	19,021	0	0	0	0	0	19,021	0	19,021
2281	Yarn Spinning Mills	12,300	0	0	0	0	0	12,300	0	12,300
2259	Knitting Mills, nec*	0	0	0	0	0	0	0	7,395	7,395
2251	Women's Hosiery, Except Socks	181	0	0	0	0	0	181	0	181
2252	Hosiery, nec*	2	0	0	0	0	0	2	0	2
2254	Knit Underwear Mills	0	0	0	0	0	0	0	0	0
	Total for SIC Code 22	16,342,885	348,877	0	0	0	173,620	16,865,382	462,148	17,327,530

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 2269. The facility should have reported under SIC code 2869. The incorrectly reported amount was 51,735 pounds of total releases. Another facility incorrectly reported 393,101 pounds of total releases under SIC code 2269. The correct amount is 42,493 pounds. Accounting for these two facility errors, the total releases rank of SIC code 2269 changes from 3 to 4.
*nec: not elsewhere classified.

reported on- and off-site releases totaling 50,000 pounds and production-related waste totaling 610,000 pounds.

The group that combined throwing and winding mills (SIC coded 2282), thread mills (SIC code 2284), and cordage and twine (SIC code 2298) ranked second among multiple-codes forms for total on- and off-site releases with 191,000 pounds. The combination of broadwoven wool fabric mills (SIC code 2231), finishing broadwoven manmade fabrics (SIC code 2262), and coated fabrics (SIC code 2295) ranked second for total production-related waste, reporting 1.1 million pounds.

On- and Off-site Releases

Air emissions reported in the textile mills sector totaled 16.3 million pounds in 1996, 94.3% of the sector's total releases of 17.3 million pounds, as shown in Table 4-3. Surface water discharges were reported as 349,000 pounds. Although textile milling and finishing are water-intensive processes, releases to surface water was a smaller percentage (2.0%) of the sector's total releases than the average for all manufacturing industries (7.1%). Amounts reported for other on-site land releases (174,000 pounds) and off-site releases (transfers to disposal, 462,000 pounds) were also relatively small. Figure 4-1 makes clear the dominant role of air emissions among on- and off-site releases in this sector.

The industry reporting the largest total releases was coated fabrics (SIC code 2295), with 10.1 million pounds. This industry also had the largest air emissions (9.9 million pounds) and off-site releases (transfers to disposal, 236,000 pounds). The coated fabrics industry reported releases to air of 5.5 million pounds of methyl ethyl ketone and 2.8

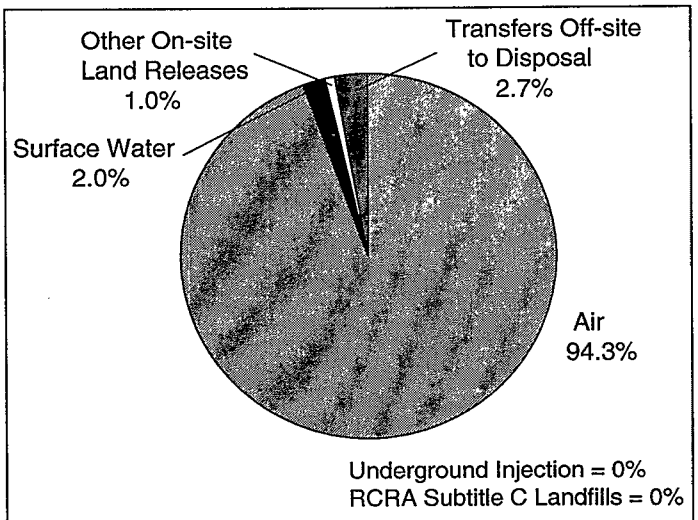


Figure 4-1. Distribution of TRI On-site and Off-site Releases, 1996: Textile Mill Products (SIC Code 22)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

million pounds of toluene. This industry's transfers to disposal included 104,000 pounds of antimony compounds.

Forms reporting more than one SIC code in SIC code 22 reported 1.5 million pounds of total on- and off-site releases. These multiple-codes forms reported 1.1 million pounds of air emissions. This group had the largest surface water discharges (150,000 pounds) and also accounted for most of the sector's on-site land releases (158,000 pounds). Taking into account reporting errors previously described, the miscellaneous finishing plants industry (SIC code 2269) reported 1.08 million pounds of total releases, entirely as air emissions.

Figure 4-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

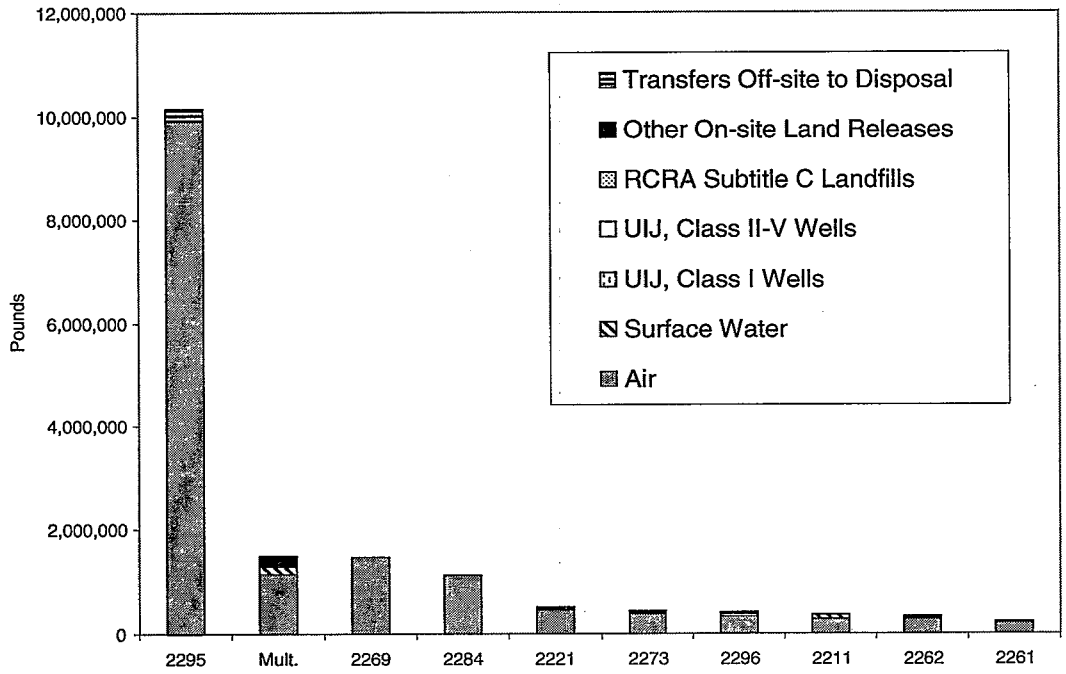


Figure 4-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Textile Mill Products (SIC Code 22)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 2269. The facility should have reported under SIC code 2869. The incorrectly reported amount was 51,735 pounds of total releases. Another facility incorrectly reported 393,101 pounds of total releases under SIC code 2269. The correct amount is 42,493 pounds. Accounting for these two facility errors, the total releases rank of SIC code 2269 changes from 3 to 4.

Other On-site Waste Management

Table 4-4 shows the other on-site waste management reported in the textile mills sector. More than half of the sector's total of 42.0 million pounds of other on-site waste management was reported as treated on-site (23.6 million pounds); this quantity includes 10.7 million pounds reported in error, as noted above. A total of 13.1 million pounds was reported in on-site recycling, including 4.4 million pounds reported in error, also as noted above. The sector also reported 5.3 million pounds of on-site energy recovery. Figure 4-3 illustrates this distribution of types of on-site waste management.

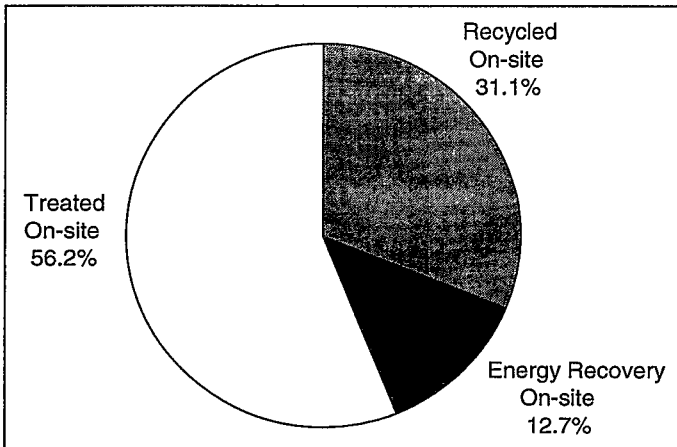


Figure 4-3. Distribution of TRI Other On-site Waste Management, 1996: Textile Mill Products (SIC Code 22)

Note: Data from Section 8 of Form R.

Table 4-4. TRI Other On-site Waste Management, 1996: Textile Mill Products, SIC Code 22 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2269	Finishing Plants, nec*	6,282,304	981,867	13,062,801	20,326,972
2295	Coated Fabrics, Not Rubberized	1,982,438	3,221,289	4,691,918	9,895,645
2262	Finishing Plants, Manmade	3,849,529	1,114,500	123,240	5,087,269
	Multiple within SIC Code 22	303,000	3	3,172,451	3,475,454
2297	Nonwoven Fabrics	520,839	0	350,200	871,039
2273	Carpets & Rugs	6,000	0	645,381	651,381
2296	Tire Cord & Fabrics	0	0	447,621	447,621
2231	Broadwoven Fabric Mills, Wool	0	0	388,371	388,371
2299	Textile Goods, nec*	5,000	0	347,045	352,045
2261	Finishing Plants, Cotton	9,000	9,000	123,048	141,048
	Invalid SIC Code within SIC Code 22	0	0	126,484	126,484
2221	Broadwoven Fabric Mills, Manmade	82,273	0	20,346	102,619
2284	Thread Mills	0	0	77,022	77,022
2257	Weft Knit Fabric Mills	38,476	0	18,322	56,798
2253	Knit Outerwear Mills	0	0	23,000	23,000
2211	Broadwoven Fabric Mills, Cotton	0	0	10,037	10,037
2259	Knitting Mills, nec*	6,800	0	0	6,800
2258	Lace & Warp Knit Fabric Mills	0	0	495	495
2251	Women's Hosiery, Except Socks	0	0	0	0
2252	Hosiery, nec*	0	0	0	0
2254	Knit Underwear Mills	0	0	0	0
2281	Yarn Spinning Mills	0	0	0	0
2282	Throwing & Winding Mills	0	0	0	0
2298	Cordage & Twine	0	0	0	0
	Total for SIC Code 22	13,085,659	5,326,659	23,627,782	42,040,100

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 2269. The facility should have reported under SIC code 2869. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling on-site, 10,475 pounds of treatment on-site and 4,437,287 pounds of total other on-site waste management. Another facility incorrectly reported 10,679,852 pounds of treatment on-site and total on-site waste management in SIC code 2269 for 1996. The correct amount is 0 pounds. Accounting for these two facility errors, the rank of SIC code 2269 for total on-site waste management changes from 1 to 2.
*nec: not elsewhere classified.

Miscellaneous finishing plants (SIC code 2269) reported the largest amounts of on-site recycling and on-site treatment in the textile mills sector, but these data included the reporting errors discussed earlier in this chapter. Taking these errors into account, finishing of manmade fabrics (SIC code 2262) ranked first for on-site recycling with 3.8 million pounds, and coated fabrics (SIC code 2295) ranked first for on-site treatment with 4.7 million pounds. Coated fabrics ranked second for on-site recycling with 2.0 million pounds, and the multiple-codes group ranked second for on-site treatment with 3.2 million pounds.

Coated fabrics (SIC code 2295) reported the largest amount of on-site energy recovery, 3.2 million pounds. Finishing of manmade fabrics (SIC code 2262) was second with 1.1 million pounds.

Figure 4-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

Reporting of transfers off-site for further waste management in the textile mills sector was more diverse than was the case for on- and off-site releases and other on-site waste management. The total of such transfers was 5.8 million pounds. As shown in Table 4-5, the sector reported 2.3 million pounds of transfers to POTWs (39.8% of total transfers for further waste management), 1.9 million pounds to energy recovery (33.5%), and 1.0 million pounds to recycling (17.6%). The category with the smallest reported transfers was treatment, with 524,000 pounds (9.1% of the total transfers).

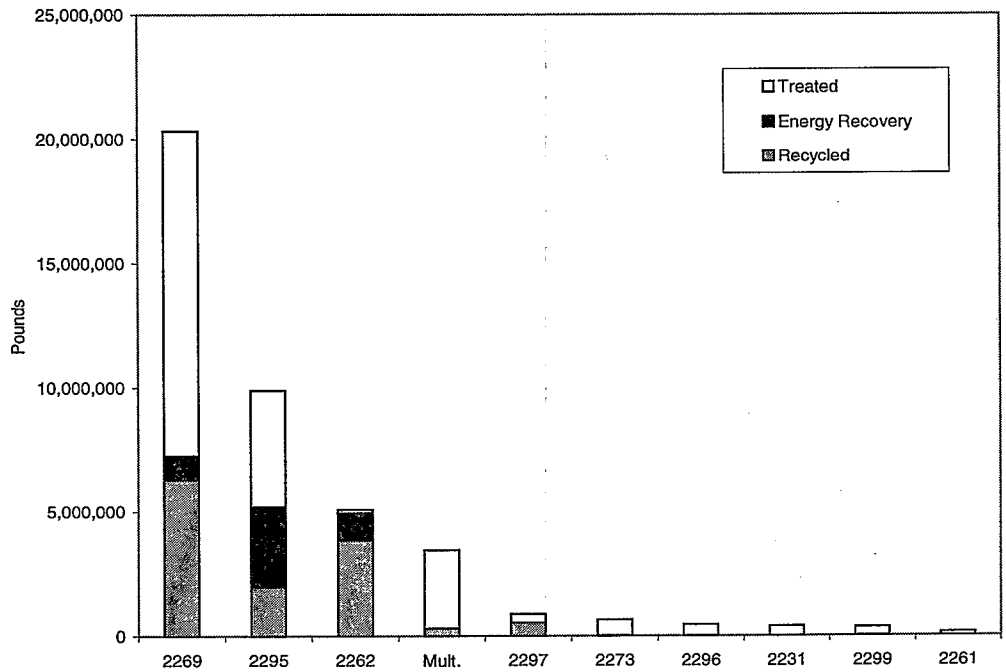


Figure 4-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Textile Mill Products (SIC Code 22)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC Code 22 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 2269. The facility should have reported under SIC code 2869. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling on-site, 10,475 pounds of treatment on-site and 4,437,287 pounds of total other on-site waste management. Another facility incorrectly reported 10,679,852 pounds of treatment on-site and total on-site waste management in SIC code 2269 for 1996. The correct amount is 0 pounds. Accounting for these two facility errors, the rank of SIC code 2269 for total on-site waste management changes from 1 to 2.

Table 4-5. TRI Transfers Off-site for Further Waste Management, 1996: Textile Mill Products, SIC Code 22 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
2295	Coated Fabrics, Not Rubberized	637,305	1,429,441	337,052	10,785	0	2,414,583
2269	Finishing Plants, nec*	331,005	397,046	94,078	105,059	0	927,188
	Multiple within SIC Code 22	0	2,649	13,757	738,541	0	754,947
2261	Finishing Plants, Cotton	0	0	0	424,132	0	424,132
2273	Carpets & Rugs	336	0	842	264,074	0	265,252
2221	Broadwoven Fabric Mills, Manmade	43,230	16,400	30	109,260	0	168,920
2284	Thread Mills	2,000	63,262	3,200	92,102	0	160,564
2211	Broadwoven Fabric Mills, Cotton	0	0	0	152,400	0	152,400
2252	Hosiery, nec*	0	0	0	108,891	0	108,891
2299	Textile Goods, nec*	0	7,875	0	86,444	0	94,319
2262	Finishing Plants, Manmade	0	0	4,455	75,149	0	79,604
2257	Weft Knit Fabric Mills	0	0	50,288	22,005	0	72,293
2231	Broadwoven Fabric Mills, Wool	0	0	5,172	20,635	0	25,807
2254	Knit Underwear Mills	0	0	0	24,153	0	24,153
2296	Tire Cord & Fabrics	0	0	12,491	7,205	0	19,696
2282	Throwing & Winding Mills	0	6,327	0	12,817	0	19,144
2253	Knit Outerwear Mills	0	0	0	17,738	0	17,738
2258	Lace & Warp Knit Fabric Mills	0	0	0	14,000	0	14,000
2297	Nonwoven Fabrics	0	0	2,574	2,137	0	4,711
2298	Cordage & Twine	0	3,069	0	0	0	3,069
2259	Knitting Mills, nec*	0	0	0	38	0	38
2251	Women's Hosiery, Except Socks	0	0	0	0	0	0
2281	Yarn Spinning Mills	0	0	0	0	0	0
	Invalid SIC Code within SIC Code 22	0	0	0	0	0	0
	Total for SIC Code 22	1,013,876	1,926,069	523,939	2,287,565	0	5,751,449

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category.
*nec: not elsewhere classified.

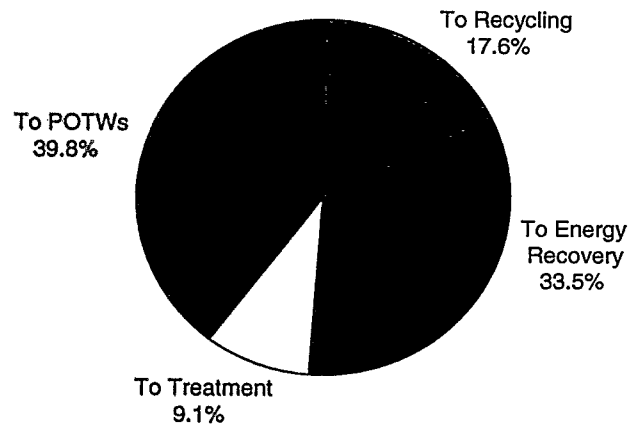


Figure 4-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Textile Mill Products (SIC Code 22)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

Figure 4-5 shows the distribution of these types of transfers off-site.

The textile milling industry with the largest transfers off-site for further waste management was coated fabrics (SIC code 2295), with a total of 2.4 million pounds. Miscellaneous finishing plants (SIC code 2269) was second, with 927,000 pounds. Both industries reported amounts in all four types of transfers off-site for further waste management, and for both industries, transfers to energy recovery was the largest type (1.4 million pounds for the coated fabrics industry and 397,000 pounds for the miscellaneous finishing plants).

Forms with multiple SIC codes within SIC code 22 ranked third for transfers off-site for further waste management, with 755,000 pounds, which was principally comprised of transfers to POTWs.

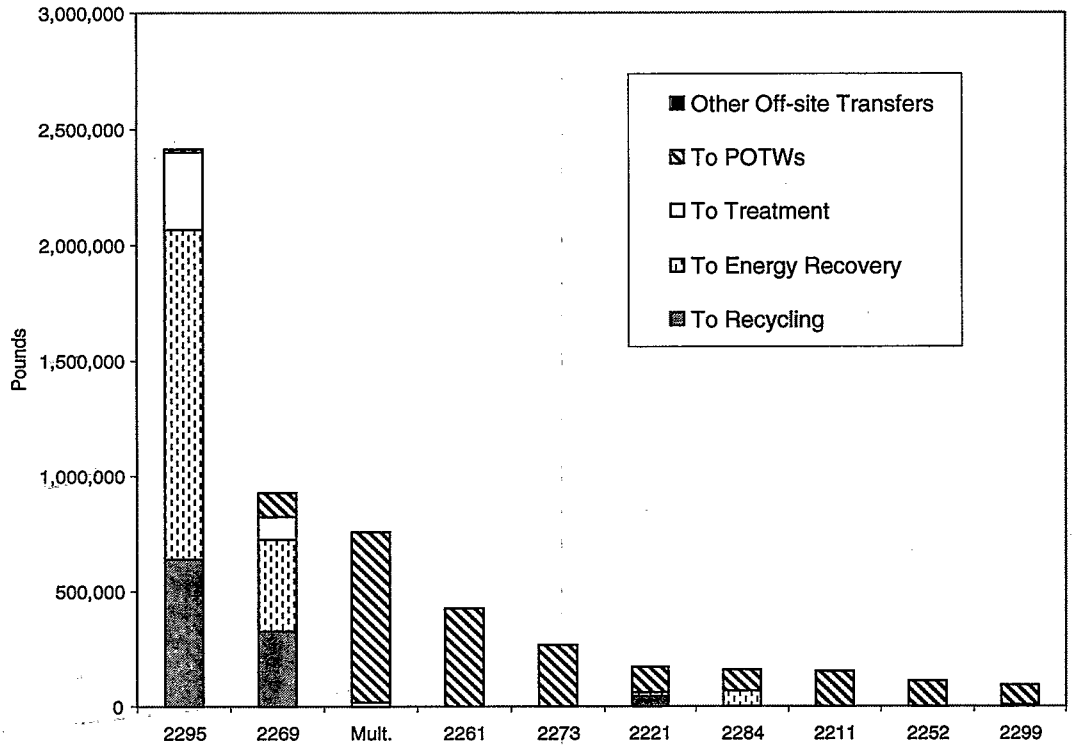


Figure 4-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Textile Mill Products (SIC Code 22)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other off-site transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category.

Figure 4-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

1996 TRI Data by State for Textile Mill Products

Table 4-6 presents summary data for the textile mills sector by state. Historically centered in New England, a substantial segment of the sector has migrated to the southeast. More than 10% of the forms in this sector were submitted in each of three states: North Carolina (117 forms, 17.8% of the total), South Carolina (86 forms, 13.1%), and Georgia (78 forms, 11.9%).

Other states, however, ranked first for the largest total releases and largest amounts of total production-related waste in this sector.

The largest total on- and off-site releases were reported in Mississippi, with 4.0 million pounds, or 23.0% of the sector's total releases. Mississippi also had the largest on-site releases, 3.9 million pounds, or 23.3% of the sector's total on-site releases. North Carolina was second in both categories, with 2.8 million pounds of total releases, including 2.7 million pounds of on-site releases. These amounts were 15.9% of the sector's total in these categories. Tennessee was third with 1.7 million pounds in both total releases and on-site releases, approximately 10% of these categories.

Table 4-6. Summary of TRI Information by State, 1996: Textile Mill Products, SIC Code 22

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	13	32	7	583,708	45,345	629,053	483,766	102,274	1,202,129	350
Arkansas	3	9	0	79,202	44,935	124,137	165,113	8,610	269,036	0
California	7	15	0	143,701	0	143,701	1,179,406	451,625	1,775,255	200
Connecticut	8	19	0	390,693	0	390,693	1,966,576	82,139	2,439,153	0
Florida	1	1	0	1,262	0	1,262	240,000	0	241,257	0
Georgia	47	78	10	780,146	9,228	789,374	911,711	424,705	2,024,771	0
Illinois	3	5	1	99,700	0	99,700	0	50,405	150,300	0
Indiana	1	2	0	31,481	0	31,481	0	0	31,481	0
Kentucky	2	3	0	28,788	0	28,788	520,839	525	550,557	0
Maine	2	3	0	10,904	0	10,904	330	20,130	31,164	0
Maryland	3	6	0	145,544	0	145,544	49,503	194,941	378,563	0
Massachusetts	19	50	3	677,259	25,637	702,896	4,041,110	564,822	5,281,702	0
Michigan	2	2	0	43,109	0	43,109	0	8,101	50,947	0
Minnesota	1	4	0	124,940	0	124,940	645,482	91,354	861,776	0
Mississippi	3	11	0	3,930,020	51,450	3,981,470	2,111,300	146,870	6,217,668	0
Missouri	1	1	0	11,641	0	11,641	12,207	0	12,207	0
New Hampshire	2	2	0	12,858	0	12,858	42,750	255	57,899	0
New Jersey	16	32	0	131,942	0	131,942	554,119	173,690	795,535	0
New York	5	8	1	55,320	0	55,320	50,625	3,069	93,191	0
North Carolina	68	117	4	2,677,248	80,268	2,757,516	3,414,418	1,297,922	7,516,495	118
Ohio	10	31	3	1,380,418	43,070	1,423,488	1,707,996	343,122	3,462,172	0
Oklahoma	1	1	1	0	0	0	0	0	0	0
Oregon	1	2	0	35,750	0	35,750	0	0	36,000	0
Pennsylvania	7	10	3	92,731	9,604	102,335	3,612,134	42,081	3,756,335	0
Puerto Rico	1	6	0	6,060	0	6,060	23,000	101	29,061	0
Rhode Island	9	31	0	679,633	1,700	681,333	1,691,595	114,720	2,155,113	0
South Carolina	38	86	0	1,347,117	38,083	1,385,200	5,732,725	807,752	7,934,733	0
Tennessee	6	18	1	1,717,401	21,268	1,738,669	10,959,439	268,707	12,966,969	0
Texas	5	6	0	16,605	0	16,605	277,225	42,661	332,759	0
Vermont	1	1	0	3,320	0	3,320	19,000	5	22,300	0
Virginia	17	52	1	755,549	78,691	834,240	1,472,321	121,297	2,507,278	490
Washington	2	5	0	33,131	0	33,131	18,130	377,977	429,238	0
Wisconsin	2	8	0	838,201	12,869	851,070	137,280	11,589	996,023	0
Total for SIC Code 22	307	657	35	16,865,382	462,148	17,327,530	42,040,100	5,751,449	64,609,067	1,158

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). One facility in South Carolina reported incorrectly in SIC code 22 for 1996. The facility should have reported in SIC code 28. The incorrectly reported amounts were as follows: 51,735 pounds of total releases, 4,437,287 pounds of other on-site waste management, 61,342 pounds of transfers off-site for further waste management and 4,552,414 pounds of total production-related waste. The rank of South Carolina for total other on-site waste management changes from 2 to 10 and for total production-related waste from 2 to 7. Another facility, in Rhode Island, incorrectly reported 393,101 pounds of total releases. The correct amount is 42,493 pounds. One facility in Ohio incorrectly reported 10,679,852 pounds of other on-site waste management and total production-related waste. The rank of Ohio for total other on-site waste management changes from 1 to 14 and for total production-related waste changes from 1 to 9.

The largest off-site releases (transfers to disposal) were reported in North Carolina (80,000 pounds), Virginia (79,000 pounds), and Mississippi (51,000 pounds).

Excluding reporting errors, Massachusetts ranked first for on-site waste management, with a total of 4.0 million pounds. Pennsylvania followed with 3.6 million pounds and North Carolina with 3.4 million pounds. Ranking first for total production-related waste was North Carolina, with 7.5 million pounds. Other states where production-related waste was reported in large quantities in this sector were Mississippi with 6.2 million pounds and Massachusetts with 5.3 million pounds.

For transfers off-site for further waste management, North Carolina reported the largest amount, 1.3 million pounds. South Carolina reported 746,000 pounds (excluding a reporting error) and

Massachusetts 565,000 pounds, placing them second and third in this category.

Map 4-1 illustrates the geographic distribution of total on- and off-site releases in the textile mills sector.

1996 TRI Data by Chemical for Textile Mill Products

The 15 chemicals with the largest on- and off-site releases in the textile mills sector appear in Table 4-7. Releases of these chemicals totaled 15.7 million pounds, or 90.7% of all releases reported in textile milling. The majority of this reporting was for air emissions, which totaled 15.0 million pounds. Air emissions accounted for 85% or more of the releases of 13 of the 15 chemicals. Surface water discharges were 317,000 pounds, and other on-site land releases were 158,000 pounds. Off-site releases (transfers to disposal) of 203,000 pounds were reported for these chemicals.

The chemical with the largest total releases was methyl ethyl ketone (MEK), with 5.7 million pounds. Ranking second and third were toluene with 3.7 million pounds and methanol with 2.4 million pounds. Air emissions accounted for nearly 100% of the releases of all three chemicals. All three are widely used in fabric coating and are also used in finishing operations. One facility in the coated fabrics industry reported air emissions of 2.8 million pounds of MEK, used in printing processes. This facility is changing to water-based inks and phasing out this use of MEK (see "Facilities with Largest Increases and Decreases in Releases, 1988-1996," later in this chapter.)

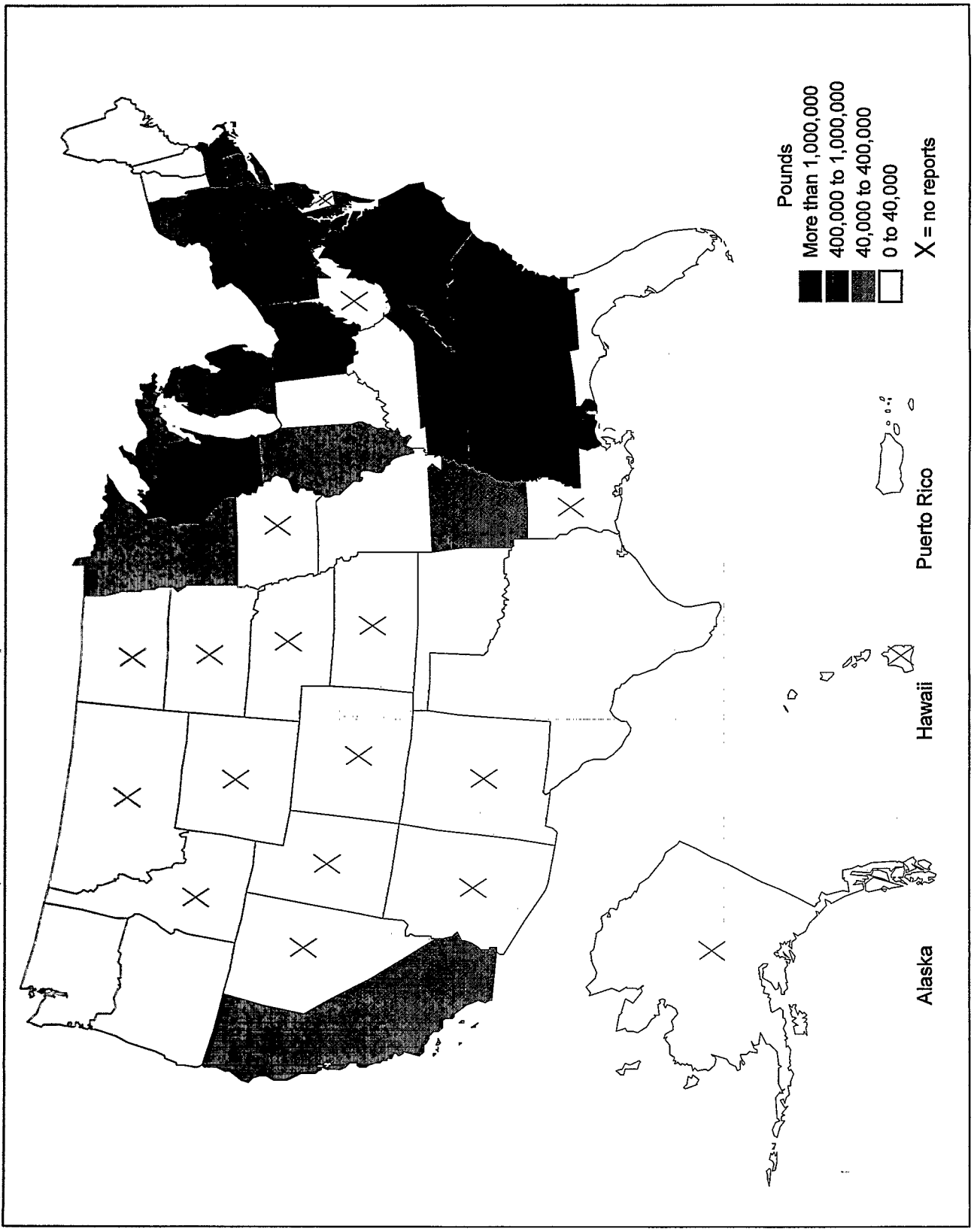
The two chemicals with large releases other than air emissions were nitrate compounds and antimony compounds. For nitrate compounds, which had total releases of 444,000 pounds, discharges to surface water were 284,000 pounds and other on-site land releases were 158,000 pounds. Forms with multiple SIC codes in SIC code 22 reported the largest amounts of nitrate compounds in both categories: 117,000 pounds of the surface water discharges and all of the other on-site land releases. For antimony compounds, with 174,000 pounds of total releases, the primary type of release was off-site (transfers to disposal). Antimony trioxide is used in the textile industry as a flame retardant in fabrics. Antimony compounds may also be used as solvents. The coated fabrics industry (SIC code 2295) reported 104,000 pounds of the off-site releases of antimony compounds.

OSHA Carcinogens

On- and off-site releases of chemicals designated as OSHA carcinogens totaled 1.0 million pounds in the textile mills sector in 1996. This was 5.9% of the sector's total on- and off-site releases, a smaller percentage than in many sectors that report to TRI. Table 4-8 shows the releases of these chemicals by four-digit industry in this sector. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) Thread mills (SIC code 2284) reported the largest releases of OSHA carcinogens in this sector, 273,000 pounds. Miscellaneous finishing plants (SIC code 2269) reported 164,000 pounds, ranking second, and coated fabrics (SIC code 2295), reported 119,000 pounds, ranking third.

Two of the top 15 chemicals for total releases in this sector were OSHA carcinogens: dichloromethane and trichloroethylene. Total releases of these two chemicals were 469,000 pounds and 157,000 pounds, respectively (see Table 4-7). OSHA carcinogens with the next-largest amounts released on- and off-site were formaldehyde with 107,000 pounds, N,N-dimethylformamide with 98,000 pounds, and styrene with 87,000 pounds.

Map 4-1. Total On- and Off-site Releases, 1996: Textile Mill Products, SIC Code 22



Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

Table 4-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Textile Mill Products, SIC Code 22 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
78-93-3	Methyl ethyl ketone	5,672,423	250	0	0	0	0	5,672,673	9,400	5,682,073
108-88-3	Toluene	3,648,784	5	0	0	0	0	3,648,789	2,200	3,650,989
67-56-1	Methanol	2,387,251	1,650	0	0	0	0	2,388,901	665	2,389,566
7664-41-7	Ammonia	765,182	6,894	0	0	0	0	772,076	4,953	777,029
108-10-1	Methyl isobutyl ketone	510,132	0	0	0	0	0	510,132	250	510,382
1330-20-7	Xylene (mixed isomers)	505,752	1,669	0	0	0	0	507,421	0	507,421
75-09-2	Dichloromethane	468,680	0	0	0	0	0	468,680	0	468,680
--	Nitrate compounds	500	284,407	0	0	0	158,000	442,907	1,401	444,308
872-50-4	N-Methyl-2-pyrrolidone	290,774	26	0	0	0	0	290,800	1,099	291,899
91-20-3	Naphthalene	215,666	5,100	0	0	0	0	220,766	0	220,766
--	Antimony compounds	1,188	1,157	0	0	0	0	2,345	171,987	174,332
--	Glycol ethers	161,027	4,891	0	0	0	0	165,918	250	166,168
79-01-6	Trichloroethylene	156,528	0	0	0	0	0	156,528	0	156,528
107-21-1	Ethylene glycol	130,119	11,150	0	0	0	0	141,269	10,800	152,069
110-54-3	n-Hexane	123,765	0	0	0	0	0	123,765	0	123,765
	Subtotal	15,037,771	317,199	0	0	0	158,000	15,512,970	203,005	15,715,975
	Total for SIC Code 22	16,342,885	348,877	0	0	0	173,620	16,865,382	462,148	17,327,530

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. One facility reported incorrectly in SIC code 22 for 1996. The facility should have reported in SIC code 28. The incorrectly reported amount was 51,735 pounds of total releases of xylene (mixed isomers). The total releases rank of xylene (mixed isomers) changes from 6 to 7.

Table 4-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Textile Mill Products, SIC Code 22 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2284	Thread Mills	272,595	0	0	0	0	0	272,595	0	272,595
2269	Finishing Plants, nec*	163,878	0	0	0	0	0	163,878	0	163,878
2295	Coated Fabrics, Not Rubberized	86,344	0	0	0	0	0	86,344	32,558	118,902
2221	Broadwoven Fabric Mills, Manmade	98,734	0	0	0	0	0	98,734	0	98,734
2262	Finishing Plants, Manmade	91,142	0	0	0	0	0	91,142	0	91,142
	Multiple within SIC Code 22	80,710	100	0	0	0	0	80,810	340	81,150
2273	Carpets & Rugs	39,388	660	0	0	0	0	40,048	390	40,438
2257	Weft Knit Fabric Mills	40,000	0	0	0	0	0	40,000	0	40,000
2297	Nonwoven Fabrics	21,188	0	0	0	0	0	21,188	0	21,188
2261	Finishing Plants, Cotton	20,702	0	0	0	0	0	20,702	0	20,702
2299	Textile Goods, nec*	19,800	0	0	0	0	0	19,800	0	19,800
2296	Tire Cord & Fabrics	13,995	0	0	0	0	0	13,995	1,849	15,844
2298	Cordage & Twine	15,132	0	0	0	0	0	15,132	0	15,132
2231	Broadwoven Fabric Mills, Wool	11,754	187	0	0	0	0	11,941	0	11,941
2282	Throwing & Winding Mills	10,500	0	0	0	0	0	10,500	0	10,500
2253	Knit Outerwear Mills	171	0	0	0	0	0	171	0	171
	Subtotal	986,033	947	0	0	0	0	986,980	35,137	1,022,117
	Total for SIC Code 22	16,342,885	348,877	0	0	0	173,620	16,865,382	462,148	17,327,530

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

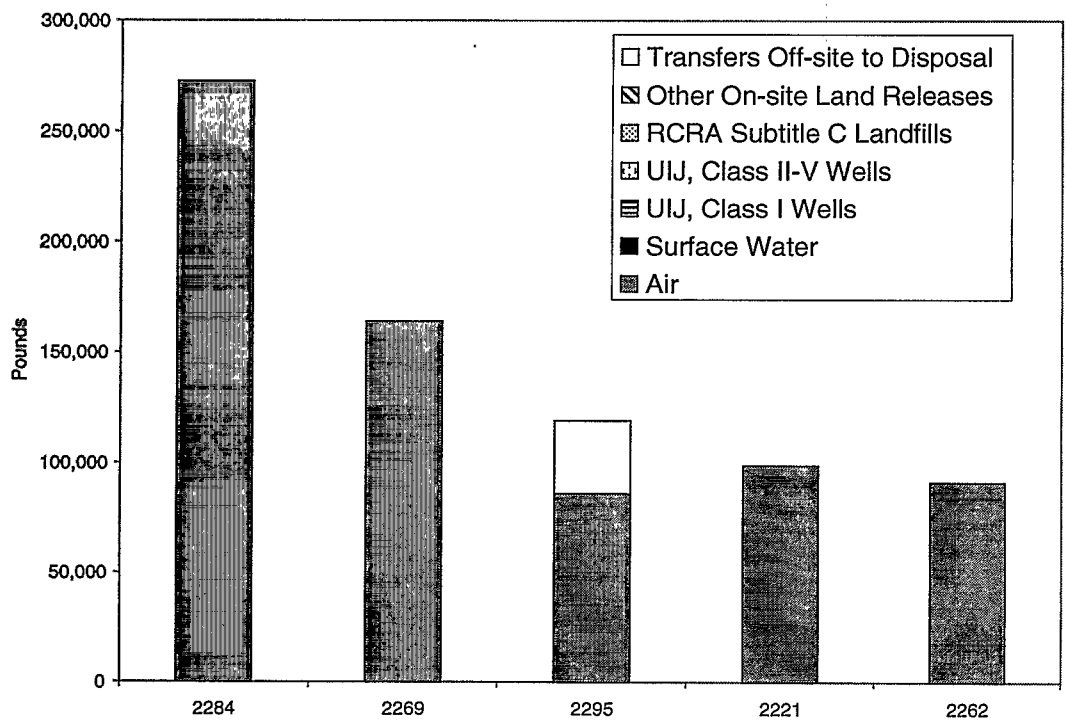


Figure 4-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Textile Mill Products (SIC Code 22)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) for Form R. UIJ = underground injection.

Figure 4-7 illustrates the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Textile Mill Products

The textile mills sector reported total production-related waste in 1996 of 64.6 million pounds, as shown in Table 4-9. The waste management reported in the largest amount was on-site treatment, with 23.6 million pounds. As noted earlier in this chapter, this included 10.7 million pounds, identified as a reporting error. The sector also reported 13.1 million pounds of on-site recycling, including a 4.4 million-pound reporting error.

Quantities reported as released on- and off-site were 16.8 million pounds. Other waste management types each accounted for 5 million pounds or less of the total. Figure 4-8 illustrates the distribution of waste management types in this sector.

Coated fabrics (SIC code 2295) reported the largest quantities of total production-related waste (22.5 million pounds) and the largest quantities of on- and off-site releases (10.1 million pounds). This industry's reporting accounted for 60.0% of the sector's quantities released.

Distribution of production-related waste for the top industries in the sector appears in Figure 4-9.

Table 4-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Textile Mill Products, SIC Code 22 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2295	Coated Fabrics, Not Rubberized	1,982,438	3,221,289	4,691,918	632,699	1,469,329	348,260	10,107,815	22,453,748	0
2269	Finishing Plants, nec*	6,282,304	981,867	13,062,801	331,000	399,096	192,882	1,115,805	22,365,755	0
	Multiple within SIC Code 22	303,000	3	3,172,451	0	2,649	750,527	1,334,155	5,562,785	468
2262	Finishing Plants, Manmade	3,849,529	1,114,500	123,240	0	0	85,561	326,885	5,499,715	0
2273	Carpets & Rugs	6,000	0	645,381	0	0	263,741	473,428	1,388,550	0
2284	Thread Mills	0	0	77,022	0	63,254	83,992	1,085,060	1,309,328	0
2297	Nonwoven Fabrics	520,839	0	350,200	0	0	4,846	167,625	1,043,510	0
2221	Broadwoven Fabric Mills, Manmade	82,273	0	20,346	110,491	16,400	109,033	515,093	853,636	0
2296	Tire Cord & Fabrics	0	0	447,621	6,027	0	7,261	369,017	829,926	490
2261	Finishing Plants, Cotton	9,000	9,000	123,048	0	0	457,601	220,346	818,995	0
2299	Textile Goods, nec*	5,000	0	347,045	0	7,875	85,796	189,894	635,610	0
2231	Broadwoven Fabric Mills, Wool	0	0	388,371	0	0	25,525	138,223	552,119	0
2211	Broadwoven Fabric Mills, Cotton	0	0	10,037	0	0	152,645	343,516	506,198	0
	Invalid SIC Code within SIC Code 22	0	0	126,484	0	0	0	18,539	145,023	200
2258	Lace & Warp Knit Fabric Mills	0	0	495	0	0	14,000	104,802	119,297	0
2257	Weft Knit Fabric Mills	38,476	0	18,322	0	0	22,375	40,086	119,259	0
2298	Cordage & Twine	0	0	0	0	3,069	0	106,331	109,400	0
2252	Hosiery, nec*	0	0	0	0	0	17,891	91,120	109,011	0
2282	Throwing & Winding Mills	0	0	0	0	6,237	12,677	54,874	73,788	0
2253	Knit Outerwear Mills	0	0	23,000	0	0	17,144	22,403	62,547	0
2254	Knit Underwear Mills	0	0	0	0	0	24,153	0	24,153	0
2259	Knitting Mills, nec*	6,800	0	0	0	0	0	7,433	14,233	0
2281	Yarn Spinning Mills	0	0	0	0	0	0	12,300	12,300	0
2251	Women's Hosiery, Except Socks	0	0	0	0	0	0	181	181	0
	Total for SIC Code 22	13,085,659	5,326,659	23,627,782	1,080,217	1,967,909	2,675,910	16,844,931	64,609,067	1,158

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 2269 for 1996. The facility should have reported in SIC code 2869. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling on-site and 4,552,414 pounds of total production-related waste. The rank for recycling on-site for SIC code 2269 changes from 1 to 4. Another facility incorrectly reported 10,679,852 pounds of treatment on-site and total production-related waste under SIC code 2269. The correct amount is 0 pounds. The rank for treatment on-site of SIC code 2269 changes from 1 to 3.
***nec:** not elsewhere classified.

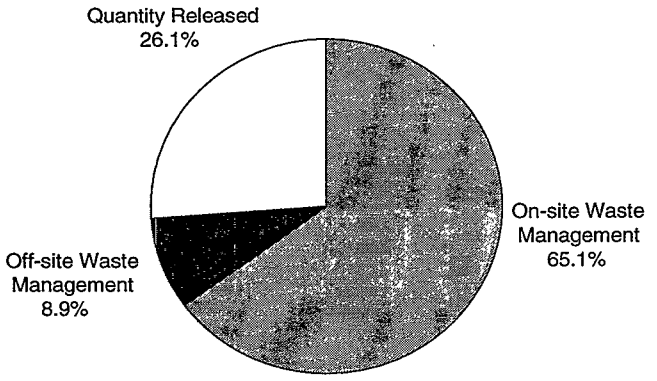


Figure 4-8. Distribution of TRI Production-related Waste, 1996: Textile Mill Products (SIC Code 22)

Note: Data from Section 8 of Form R.

Projected Quantities of TRI Chemicals in Waste

As shown in Table 4-10, waste management quantities in the textile mills sector were projected to decrease 7.3% by 1998. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) Forms in this sector reported total production-related waste of 64.6 million pounds in 1996 and projected total production-related waste of 59.9 million pounds in 1998. These projections, however, include the two forms that represent large reporting errors in this sector for on-site recycling and on-site treatment.

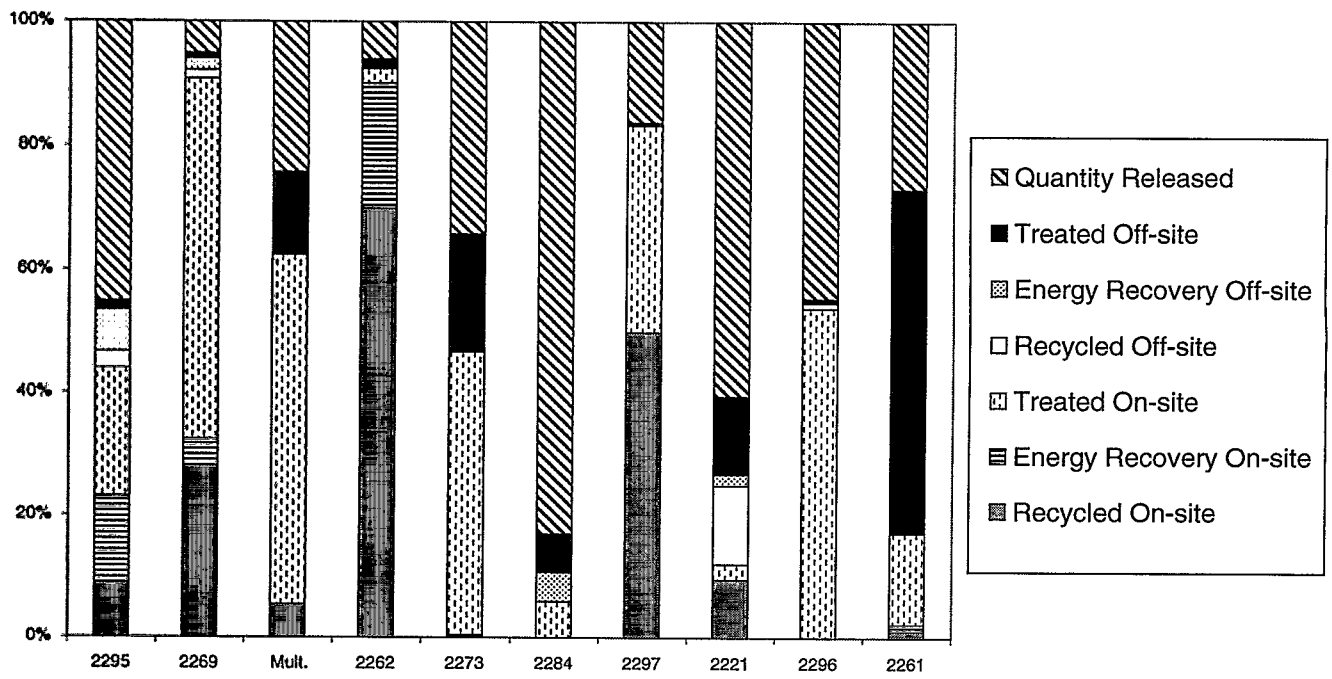


Figure 4-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Textile Mill Products (SIC Code 22)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC Code within SIC code 22 are assigned to the "multiple" category.

Excluding the data from those two forms, total production-related waste for the textile mills sector would decrease 12.7% from 49.4 million pounds in 1996 to a projected 43.1 million pounds in 1998. The great majority of this projected 6.3 million-pound reduction was expected in quantities released on- and off-site. The projection for this category was a decrease of 5.8 million pounds.

Figure 4-10 illustrates the projected percentage changes in waste management in this sector.

When data from the two reporting errors are excluded, the quantities released for this sector are projected to decrease from one-third (34.0%) of the 1996 total production-related waste to one-fourth (25.4%) of the total in 1998. This indicates that improvement is expected in the textile mills sector's management of TRI chemicals in waste, as measured by the waste management hierarchy, explained in Chapter 1. In the terms of the hierarchy, release or disposal is the least environmentally desirable option.

Source Reduction Activity

Of the 657 forms submitted by the textile mills sector, 144 reported undertaking one or more source reduction activities in 1996. Reporting of source reduction activities in this sector appears in Table 4-11.

In the coated fabrics industry (SIC code 2295), 58 forms reported source reduction activity, more than one-third (36.7%) of the forms submitted in this industry. In the miscellaneous finishing plants industry (SIC code 2669), 19 forms indicated source reduction activity, which was 28.4% of the industry's forms. These were the industries with the largest number of such forms.

Table 4-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Textile Mill Products, SIC Code 22

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	13,085,659	20.3	13,388,910	21.3	12,637,308	21.1
Energy Recovery On-site	5,326,659	8.2	5,483,169	8.7	5,612,342	9.4
Treated On-site	23,627,782	36.6	25,282,626	40.1	25,452,438	42.5
Off-site Waste Management						
Recycled Off-site	1,080,217	1.7	1,117,078	1.8	1,139,546	1.9
Energy Recovery Off-site	1,967,909	3.0	1,670,560	2.7	1,593,535	2.7
Treated Off-site	2,675,910	4.1	2,467,935	3.9	2,471,827	4.1
Quantity Released On- and Off-site	16,844,931	26.1	13,590,168	21.6	10,996,882	18.4
Total Production-related Waste for SIC Code 22	64,609,067	100.0	63,000,446	100.0	59,903,878	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	2.3	-5.6	-3.4
Energy Recovery On-site	2.9	2.4	5.4
Treated On-site	7.0	0.7	7.7
Off-site Waste Management			
Recycled Off-site	3.4	2.0	5.5
Energy Recovery Off-site	-15.1	-4.6	-19.0
Treated Off-site	-7.8	0.2	-7.6
Quantity Released On- and Off-site	-19.3	-19.1	-34.7
Total Production-related Waste for SIC Code 22	-2.5	-4.9	-7.3

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996. One facility reported incorrectly in SIC code 22 for 1996. The facility should have reported in SIC code 28. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling on-site, 63,392 pounds of energy recovery off-site, 10,475 pounds of treatment on-site and 51,735 pounds of quantity released on- and off-site for 1996 and projections of 4,500,000 pounds of recycling on-site, 60,000 pounds of energy recovery off-site, 10,000 pounds of treatment on-site and 50,000 pounds of quantity released on- and off-site for 1997 and 1998. Another facility incorrectly reported 10,679,852 pounds of treatment on-site for 1996 and projected 12,016,010 pounds for 1997 and 12,200,000 pounds for 1998. The correct amounts are 0 pounds. The percentage change from 1996 to 1997 in recycling on-site changes from 2.3% to 2.7%, in treatment on-site changes from 7.0% to 2.5%, and in total production-related waste changes from -2.5% to -6.1%. The percentage change from 1997 to 1998 in recycling on-site changes from -5.6% to -8.5%, in treatment on-site changes from 0.7% to -0.1%, and in total production-related waste changes from -4.9% to -7.1%. The percentage change from 1996 to 1998 in recycling on-site changes from -3.4% to -6.0%, in treatment on-site changes from 7.7% to 2.4%, and in total production-related waste changes from -7.5% to -12.7%.

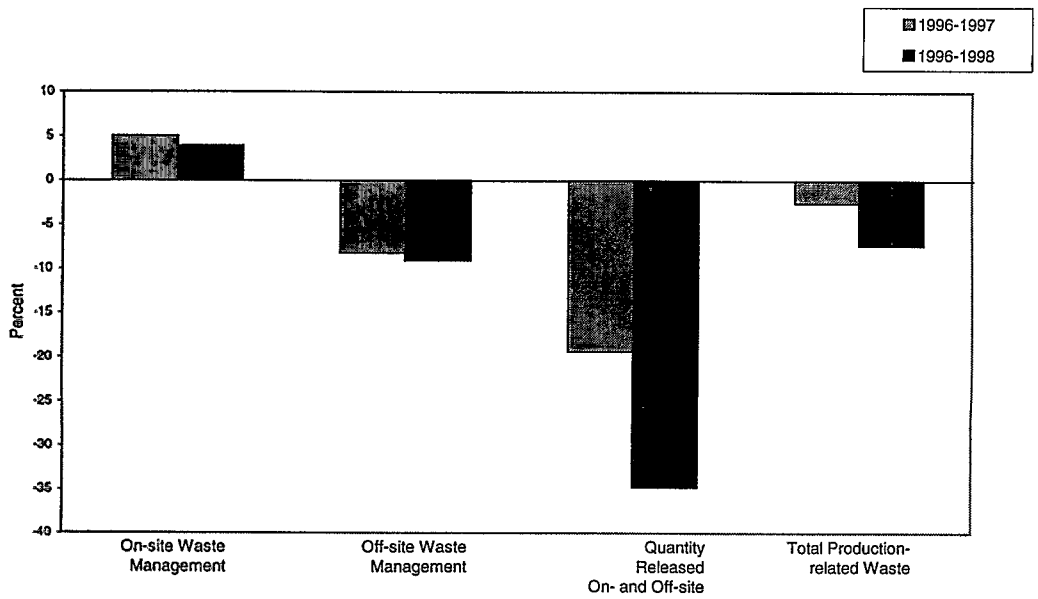


Figure 4-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Textile Mill Products (SIC Code 22)

Note: Current year and projected year amount are all taken from Section 8 of Form R for 1996. One facility reported incorrectly in SIC code 22 for 1996. The facility should have reported in SIC code 28. Another facility incorrectly reported amounts and projections for on-site treatment. (See note on Table 4-10.) The percentage change from 1996 to 1997 in on-site waste management changes from 5.0% to 2.6% and in total production-related waste changes from -2.5% to -6.1%. The percentage change from 1996 to 1998 in on-site waste management changes from 4.0% to 0.3% and in total production-related waste changes from -7.3% to -12.7%.

Table 4-11. Number of Forms Reporting Source Reduction Activity, 1996: Textile Mill Products, SIC Code 22

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
2211	Broadwoven Fabric Mills, Cotton	19	0	0.0	0	0	0	0	0	0	0	0
2221	Broadwoven Fabric Mills, Manmade	22	6	27.3	4	0	0	4	0	0	2	0
2231	Broadwoven Fabric Mills, Wool	25	4	16.0	2	0	0	2	0	0	0	0
2251	Women's Hosiery, Except Socks	3	0	0.0	0	0	0	0	0	0	0	0
2252	Hosiery, nec*	4	0	0.0	0	0	0	0	0	0	0	0
2253	Knit Outerwear Mills	13	0	0.0	0	0	0	0	0	0	0	0
2254	Knit Underwear Mills	1	0	0.0	0	0	0	0	0	0	0	0
2257	Weft Knit Fabric Mills	3	0	0.0	0	0	0	0	0	0	0	0
2258	Lace & Warp Knit Fabric Mills	3	1	33.3	1	0	0	0	0	0	0	0
2259	Knitting Mills, nec*	2	2	100.0	2	2	0	2	0	0	0	0
2261	Finishing Plants, Cotton	34	3	8.8	0	0	0	1	2	0	0	0
2262	Finishing Plants, Manmade	34	9	26.5	3	2	1	4	0	0	2	1
2269	Finishing Plants, nec*	67	19	28.4	9	0	2	8	1	0	0	0
2273	Carpets & Rugs	59	10	16.9	0	0	0	6	3	0	0	1
2281	Yarn Spinning Mills	2	0	0.0	0	0	0	0	0	0	0	0
2282	Throwing & Winding Mills	5	1	20.0	1	0	0	0	0	0	0	0
2284	Thread Mills	9	6	66.7	2	0	0	1	1	0	1	2
2295	Coated Fabrics, Not Rubberized	158	58	36.7	28	9	2	14	17	0	7	7
2296	Tire Cord & Fabrics	25	2	8.0	0	0	2	0	0	0	0	2
2297	Nonwoven Fabrics	12	3	25.0	3	0	0	0	0	0	0	0
2298	Cordage & Twine	5	0	0.0	0	0	0	0	0	0	0	0
2299	Textile Goods, nec*	27	6	22.2	1	0	0	4	0	1	0	0
	Multiple within SIC Code 22	120	14	11.7	2	1	3	6	3	0	2	3
	Invalid SIC Code within SIC Code 22	5	0	0.0	0	0	0	0	0	0	0	0
	Total for SIC Code 22	657	144	21.9	58	14	10	52	27	1	14	16

Note: Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category.
*nec: not elsewhere classified.

In both these industries, as in the sector as a whole, good operating practices was the source reduction activity most often reported. In the coated fabrics industry, process modifications was the next most frequent activity indicated. For miscellaneous finishing plants, raw material modifications ranked second, as shown in Table 4-11.

Year-to-Year Comparisons for Textile Mill Products

1995-1996 TRI Data for Textile Mill Products

From 1995 to 1996, the number of forms submitted in the textile mills sector decreased 11.9% from 746 forms to 657. Submissions of both Form Rs and Form As declined, as shown in Table 4-12. In most of the other sectors reporting to TRI, the number of Form As increased. (The Form A certification statement is explained in Chapter 1.)

On- and Off-site Releases

Table 4-12 shows the textile mills sector's reporting of on- and off-site releases in 1995 and 1996. Total releases for the sector decreased 6.3%, from 18.5 million pounds in 1995 to 17.3 million pounds in 1996. Figure 4-11 displays the percentage change from 1995 to 1996 in the types of release.

The largest reduction in absolute terms, 1.3 million pounds, occurred in reported air emissions. Decreases in both fugitive and point source emissions contributed to this reduction. Among other on-site release types, both surface water discharges and on-site land releases showed small increases. A small decrease was reported in off-site releases (transfers to disposal).

Other On-site Waste Management

All three methods of other on-site waste management showed increases from 1995 to 1996 in textile mills reporting. Total other on-site waste management was 32.6 million pounds in 1995 and 42.0 million pounds in 1996, an increase of 29.0%. These data also appear in Table 4-12. The largest change, in both pounds and percent, was reported in on-site treatment, which increased from 17.0 million pounds to 23.6 million pounds, a 39.4% increase. However, the facility that erroneously reported on-site treatment of sulfuric acid in 1996 did not report in 1995; thus the 1995-1996 change reflects an apparent increase for one form from no data in 1995 to 10.7 million pounds in 1996. Another facility also reported a smaller amount (11,000 pounds) of on-site treatment in error. When adjusted for these reporting errors, on-site treatment shows a decrease of 23.7%.

On-site recycling increased from 10.7 million pounds to 13.1 million pounds, or 22.2%. This category also reflects an apparent increase from a reporting error, from no data in 1995 to 4.4 million pounds in 1996. Taking this error into account, on-site recycling decreased 19.1%.

The textile mills sector reported 4.9 million pounds of on-site energy recovery in 1995 and 5.3 million pounds in 1996, an increase of 8.2%.

Transfers Off-site for Further Waste Management

Table 4-12 also presents transfers off-site for further waste management reported in the textile mills sector in 1995 and 1996. These transfers decreased from 6.5 million pounds to 5.8 million pounds during this period, an 11.3% reduction. All types of off-site transfers for further waste management decreased, except transfers to recycling, which rose from 798,000 pounds in 1995 to 1.0 million pounds in 1996. The largest absolute reduction was reported in transfers to POTWs, from 2.9 million pounds to 2.3 million pounds.

Table 4-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Textile Mill Products, SIC Code 22

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	359	307	-14.5
Total Forms	746	657	-11.9
Form Rs	695	622	-10.5
Form As	51	35	-31.4
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	17,644,007	16,342,885	-7.4
Fugitive Air	3,923,841	3,217,057	-18.0
Point Source Air	13,720,166	13,125,828	-4.3
Surface Water Discharges	268,850	348,877	29.8
Underground Injection	0	0	--
On-site Land Releases	6,903	173,620	2,415.1
Total On-site Releases	17,919,760	16,865,382	-5.9
Off-site Releases			
Transfers Off-site to Disposal	581,734	462,148	-20.6
Total On- and Off-site Releases	18,501,494	17,327,530	-6.3
Other On-site Waste Management			
Recycled On-site	10,705,090	13,085,659	22.2
Energy Recovery On-site	4,924,870	5,326,659	8.2
Treated On-site	16,955,300	23,627,782	39.4
Total Other On-site Waste Management	32,585,260	42,040,100	29.0
Transfers Off-site for Further Waste Management			
Transfers to Recycling	797,741	1,013,876	27.1
Transfers to Energy Recovery	2,078,319	1,926,069	-7.3
Transfers to Treatment	731,874	523,939	-28.4
Transfers to POTWs	2,877,882	2,287,565	-20.5
Other-Off-site Transfers	0	0	--
Total Transfers Off-site for Further Waste Management	6,485,816	5,751,449	-11.3

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code. One facility reported incorrectly in SIC code 22 for 1996. The facility should have reported in SIC code 28. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling and 10,475 pounds of treatment on-site. One facility incorrectly reported 10,679,852 pounds of treatment on-site for 1996. The correct amount is 0 pounds. The percentage change from 1995 to 1996 in recycling on-site changes from 22.2% to -19.1%, in treatment on-site changes from 39.4% to -23.7%, and in total other on-site waste management changes from 29.0% to -17.4%.

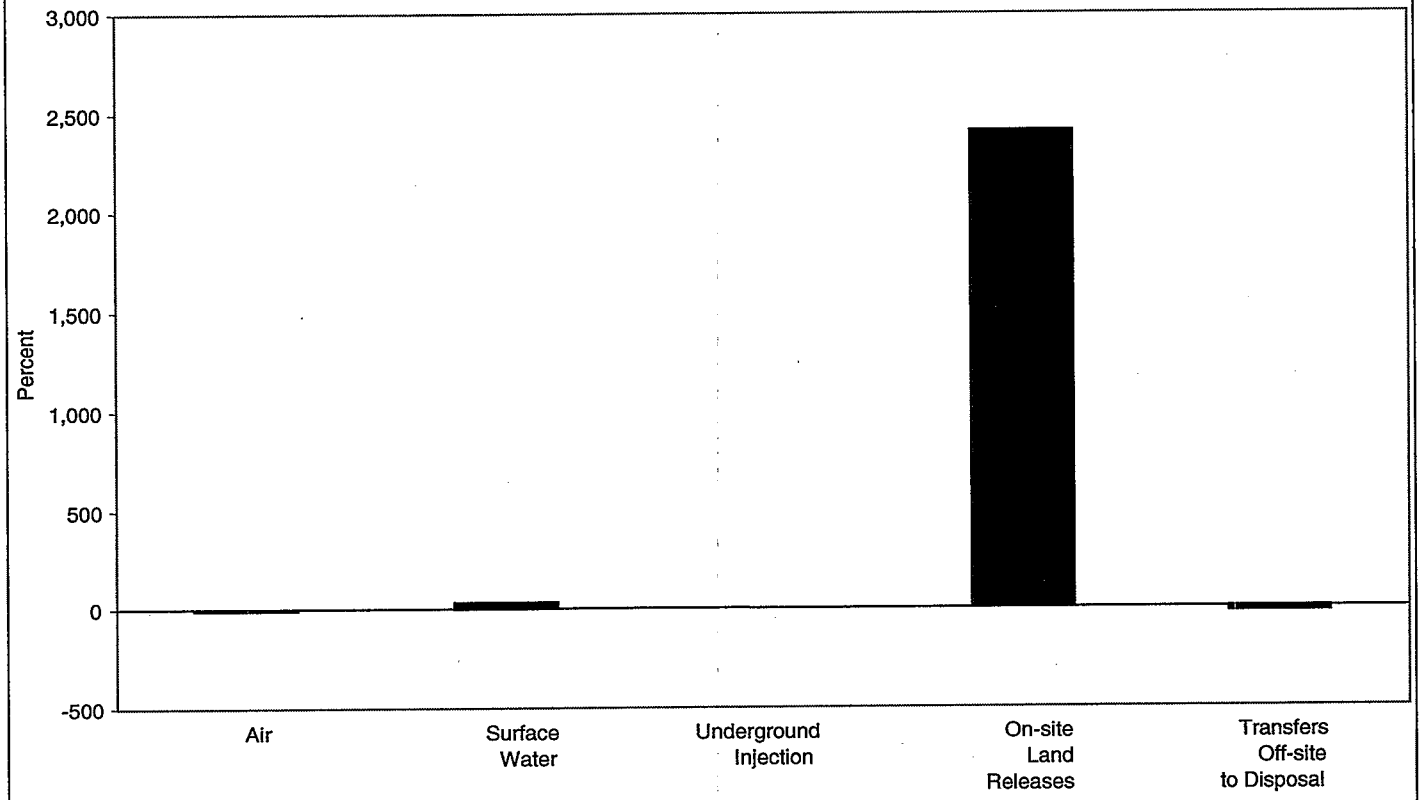


Figure 4-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Textile Mill Products (SIC Code 22)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Textile Mill Products

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells.

On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

The number of forms submitted by the textile mill products decreased from 664 in 1988 to 509 in 1996, a 23.3% reduction, as shown in Table 4-13.

From 1988 to 1996, total on- and off-site releases reported in SIC code 22 decreased by more than half (57.3%). As shown in Table 4-13, the sector reported 35.8 million pounds of releases in 1988 and 15.3 million pounds in 1996. All categories of releases decreased by 50.0% or more. The largest reduction in pounds was reported in air emissions, from 33.6 million pounds in 1988 to 14.8 million pounds in 1996, a decrease of 18.8 million pounds. Approximately two-thirds of this reduction occurred in reporting of point source emissions. Smaller absolute reductions were reported in surface water discharges (from 468,000 pounds in 1988 to 58,000 pounds in 1996) and in on-site releases (from 80,000 pounds to 16,000 pounds).

Figure 4-12 displays the percentage reductions in on- and off-site releases from 1988 to 1996.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, the net reduction in other on-site waste management in this sector was 1.3 million pounds, from 28.6 million pounds to 27.3 million pounds. However, the 1996 total includes a reporting error of 4.4 million pounds in on-site recycling. Taking into account this error, on-site waste management decreased by 5.7 million pounds, from 28.6 million pounds in 1994 to 22.9 million pounds in 1996.

For the types of transfers off-site for further waste management that were reported in all years, 1988-1996, transfers to treatment decreased from 1.4 million pounds to 512,000 pounds, and transfers to POTWs decreased from 9.8 million pounds to 1.7 million pounds. These were reductions of 62.7% and 83.0%, respectively.

1988-1996 Data for Four-Digit Industries in Textile Mill Products

Tables 4-14 through 4-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 22. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Table 4-14 provides release data for 1988 to 1996 for all four-digit SIC codes in the textile mills sector. The largest 1988-1996 increase in on- and off-site releases in the textile mills sector was reported by the coated fabrics industry (SIC code 2295). This industry's releases totaled 18.9 million pounds in 1988 and 9.7 million pounds in 1996. Almost all of this 9.1 million-pound reduction was reported in air emissions.

The multiple-codes group (forms with more than one SIC code in SIC code 22) had a 2.3 million-pound reduction, from 3.3 million pounds to 925,000 pounds. Most of this reduction also was reported in air emissions. Carpets and rugs (SIC code 2273) had a reduction of 2.0 million pounds, from 2.3 million pounds in 1988 to 274,000 pounds in 1996. More than half of this reduction occurred in off-site releases (transfers to disposal) and the balance was principally in air emissions.

Thread mills (SIC code 2284) reported an increase in on- and off-site releases of 1.0 million pounds. This industry reported 26,000 pounds in 1988 and 1.1 million pounds in 1996, mostly released to air. However, reporting of releases by thread mills has decreased over the last three years. No other industry in this sector had an increase of more than 150,000 pounds.

Table 4-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Textile Mill Products, SIC Code 22

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	336	328	311	259	-22.9
Total Forms	664	617	589	509	-23.3
Form Rs	664	617	548	480	-27.7
Form As	NA	NA	41	29	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	33,605,487	15,667,454	15,061,062	14,756,746	-56.1
Fugitive Air	9,473,343	3,237,526	3,121,677	2,775,116	-70.7
Point Source Air	24,132,144	12,429,928	11,939,385	11,981,630	-50.3
Surface Water Discharges	468,191	110,838	74,205	57,550	-87.7
Underground Injection	0	4	0	0	--
On-site Land Releases	79,850	14,892	6,898	15,620	-80.4
Total On-site Releases	34,153,528	15,793,188	15,142,165	14,829,916	-56.6
Off-site Releases					
Transfers Off-site to Disposal	1,644,849	553,144	513,442	450,495	-72.6
Total On- and Off-site Releases	35,798,377	16,346,332	15,655,607	15,280,411	-57.3
Other On-site Waste Management					
Recycled On-site	NA	13,274,492	10,519,581	13,069,987	NA
Energy Recovery On-site	NA	4,001,813	4,205,406	4,613,222	NA
Treated On-site	NA	11,335,942	10,936,222	9,616,522	NA
Total Other On-site Waste Management	NA	28,612,247	25,661,209	27,299,731	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	719,188	724,971	905,873	NA
Transfers to Energy Recovery	NA	1,269,996	1,879,711	1,691,264	NA
Transfers to Treatment	1,373,980	503,222	553,910	512,220	-62.7
Transfers to POTWs	9,763,696	2,091,126	2,037,329	1,659,240	-83.0
Other Off-site Transfers	109,478	0	0	0	-100.0
Total Transfers Off-site for Further Waste Management	NA	4,583,532	5,195,921	4,768,597	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. One facility reported incorrectly in SIC code 22 for 1996. The facility should have reported in SIC code 28. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling on-site, 10,475 pounds of treatment on-site and 4,437,287 pounds of total other on-site waste management. **NA:** not required to be reported in that year.

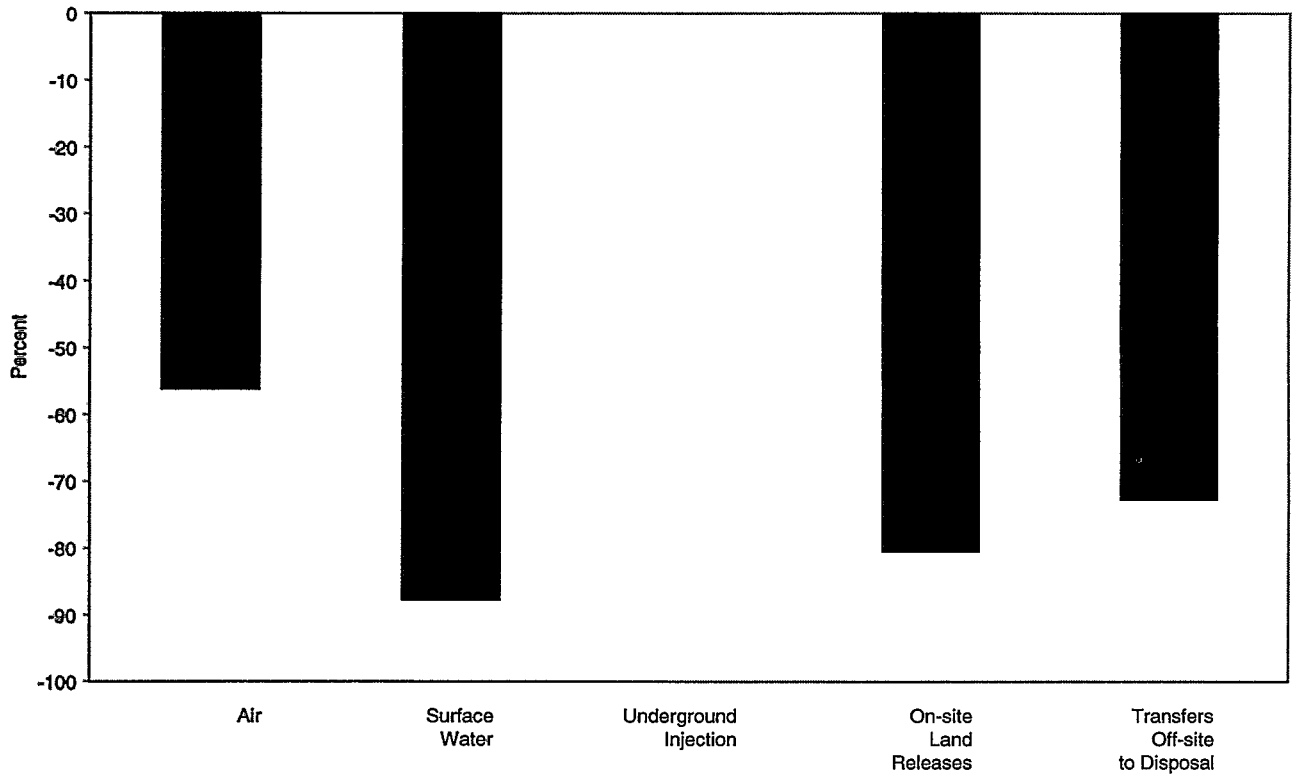


Figure 4-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Textile Mill Products (SIC Code 22)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

Other On-site Waste Management

For 1994-1996, the largest reduction in other on-site waste management in the textile mills sector was reported by the multiple SIC codes group (on-site waste management data were not collected in 1988). This group reported 6.4 million pounds of other on-site waste management in 1994 and 1.9 million pounds in 1996. This 4.5 million-pound reduction reflected a 3.5 million-pound reduction in on-site recycling and a 1.0 million-pound reduction in on-site treatment. The carpet and rug industry (SIC code 2273) had a reduction of 1.4 million pounds, from 2.0 million pounds in 1994 to 648,000 pounds in 1996. This decrease occurred in the reporting of on-site treatment. Coated fabrics (SIC code 2295) reported a 1.0 million-pound reduction, from 9.6 million pounds in 1994 to 8.6 million pounds in 1996. This represented a larger reduction in on-site recycling, partly offset by increases in on-site energy recovery and treatment.

The largest reported increase in on-site waste management reflected reporting errors, previously described, in the miscellaneous finishing plants industry (SIC code 2269). Taking into account the errors, the industry ranking first for increases in other on-site waste management was finishing plants, manmade (SIC code 2262). This industry reported 4.3 million pounds in 1994 and 5.0 million pounds in 1996, a difference of 670,000 pounds. This change consisted of an increase in recycling, which was partly offset by decreases in energy recovery and treatment. Other industry increases for 1994-1996 were less than 100,000 pounds each.

Table 4-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2211	Broadwoven Fabric Mills, Cotton	96	215,100	0	0	250	215,350	250	215,600
		95	266,762	250	0	500	267,512	1,450	268,962
		94	542,272	505	0	0	542,777	0	542,777
		88	589,761	12,000	0	0	601,761	0	601,761
2221	Broadwoven Fabric Mills, Manmade	96	466,136	330	0	0	466,466	48,713	515,179
		95	278,355	540	0	0	278,895	4,720	283,615
		94	378,519	3,010	0	0	381,529	18,049	399,578
		88	927,453	44	0	0	927,497	7,660	935,157
2231	Broadwoven Fabric Mills, Wool	96	58,103	14,854	0	1,801	74,758	2,093	76,851
		95	57,071	3,202	0	1,811	62,084	752	62,836
		94	53,176	15,018	0	3,010	71,204	829	72,033
		88	1,331,321	6,271	0	7,620	1,345,212	500	1,345,712
2241	Narrow Fabric Mills	96	No reports received						
		95	11,000	0	0	0	11,000	0	11,000
		94	91,177	0	0	0	91,177	0	91,177
		88	73,188	0	0	0	73,188	0	73,188
2251	Women's Hosiery, Except Socks	96	181	0	0	0	181	0	181
		95	173	0	0	0	173	0	173
		94	0	0	0	0	0	0	0
		88	0	0	0	0	0	0	0
2252	Hosiery, nec*	96	2	0	0	0	2	0	2
		95	465	0	0	0	465	0	465
		94	3,997	0	0	0	3,997	0	3,997
		88	0	0	0	0	0	0	0
2253	Knit Outerwear Mills	96	6,470	0	0	13,125	19,595	12	19,607
		95	401	0	0	0	401	0	401
		94	7,140	0	0	0	7,140	0	7,140
		88	85,558	0	0	0	85,558	0	85,558
2254	Knit Underwear Mills	96	0	0	0	0	0	0	0
		95	5,437	0	0	0	5,437	0	5,437
		94	26,566	0	4	0	26,570	0	26,570
		88	0	839	0	0	839	0	839
2257	Weft Knit Fabric Mills	96	40,011	0	0	0	40,011	0	40,011
		95	54,045	0	0	0	54,045	31,889	85,934
		94	62,480	0	0	0	62,480	41,000	103,480
		88	424,455	11,225	0	0	435,680	9,136	444,816
2258	Lace & Warp Knit Fabric Mills	96	10	250	0	5	265	0	265
		95	1,450	1,237	0	0	2,687	0	2,687
		94	1,000	660	0	0	1,660	0	1,660
		88	335,205	0	0	0	335,205	0	335,205
2259	Knitting Mills, nec*	96	0	0	0	0	0	7,395	7,395
		95	No reports received						
		94	No reports received						
		88	587,087	3,005	0	750	590,842	4,388	595,230

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility incorrectly reported 393,101 pounds of air emissions and total releases under SIC code 2269 for 1996. The correct amount is 42,493 pounds. Another facility reporting in SIC code 2295 did not report for 1988, but should have. The correct amounts are 687,336 pounds of total air emissions and total releases.
***nec:** not elsewhere classified.

Table 4-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2261	Finishing Plants, Cotton	96	81,882	0	0	0	81,882	0	81,882
		95	40,676	0	0	0	40,676	0	40,676
		94	30,976	5	0	0	30,981	7,000	37,981
		88	230,169	13,272	0	4,450	247,891	3,500	251,391
2262	Finishing Plants, Manmade	96	261,041	196	0	0	261,237	42,763	304,000
		95	376,936	30	0	1,499	378,465	11,366	389,831
		94	450,783	3,030	0	0	453,813	7,003	460,816
		88	986,737	48,711	0	0	1,035,448	21,660	1,057,108
2269	Finishing Plants, nec*	96	1,392,352	4,869	0	5	1,397,226	5	1,397,231
		95	762,394	4,002	0	286	766,682	10	766,692
		94	1,041,602	6,236	0	4	1,047,842	20	1,047,862
		88	1,218,675	133,262	0	58,080	1,410,017	1,252	1,411,269
2273	Carpets and Rugs	96	265,374	2,860	0	0	268,234	5,493	273,727
		95	240,688	3,862	0	0	244,550	4,430	248,980
		94	233,064	3,905	0	0	236,969	3,400	240,369
		88	1,197,119	5,600	0	0	1,202,719	1,072,657	2,275,376
2281	Yarn Spinning Mills	96	12,300	0	0	0	12,300	0	12,300
		95	39,541	0	0	0	39,541	0	39,541
		94	36,791	0	0	0	36,791	0	36,791
		88	74,001	0	0	0	74,001	0	74,001
2282	Throwing and Winding Mills	96	42,197	0	0	0	42,197	0	42,197
		95	107,429	0	0	0	107,429	0	107,429
		94	177,759	0	0	3,650	181,409	0	181,409
		88	241,412	0	0	0	241,412	23,000	264,412
2284	Thread Mills	96	1,059,110	0	0	0	1,059,110	0	1,059,110
		95	1,772,812	0	0	0	1,772,812	1,847	1,774,659
		94	2,397,654	0	0	0	2,397,654	283	2,397,937
		88	25,950	0	0	0	25,950	0	25,950
2295	Coated Fabrics, Not Rubberized	96	9,506,419	270	0	0	9,506,689	233,806	9,740,495
		95	9,062,104	285	0	0	9,062,389	293,691	9,356,080
		94	7,683,950	290	0	750	7,684,990	278,664	7,963,654
		88	18,571,457	4,250	0	0	18,575,707	301,215	18,876,922
2296	Tire Cord and Fabrics	96	124,328	360	0	10	124,698	55,997	180,695
		95	124,375	976	0	10	125,361	51,007	176,368
		94	109,111	902	0	0	110,013	38,424	148,437
		88	65,147	0	0	0	65,147	250	65,397
2297	Nonwoven Fabrics	96	139,675	0	0	0	139,675	0	139,675
		95	77,179	0	0	0	77,179	750	77,929
		94	66,962	0	0	0	66,962	0	66,962
		88	284,920	55	0	0	284,975	32,550	317,525
2298	Cordage and Twine	96	106,331	0	0	0	106,331	0	106,331
		95	105,220	0	0	3	105,223	5	105,228
		94	130,191	0	0	3	130,194	5	130,199
		88	142,381	0	0	0	142,381	0	142,381

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility incorrectly reported 393,101 pounds of air emissions and total releases under SIC code 2269 for 1996. The correct amount is 42,493 pounds. Another facility reporting in SIC code 2295 did not report for 1988, but should have. The correct amounts are 687,336 pounds of total air emissions and total releases.
*nec: not elsewhere classified.

Table 4-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2299	Textile Goods, nec*	96	125,901	800	0	0	126,701	13,316	140,017
		95	134,193	800	0	0	134,993	40,480	175,473
		94	160,073	3,102	0	0	163,175	7,359	170,534
		88	629,324	70,208	0	1,200	700,732	10,281	711,013
	Multiple within SIC Code 22	96	851,039	32,761	0	424	884,224	40,652	924,876
		95	1,480,107	59,011	0	2,789	1,541,907	71,045	1,612,952
		94	1,787,616	74,160	0	7,470	1,869,246	151,103	2,020,349
		88	3,057,451	56,949	0	7,500	3,121,900	146,926	3,268,826
	Invalid SIC Code within SIC Code 22	96	2,784	0	0	0	2,784	0	2,784
		95	62,249	10	0	0	62,259	0	62,259
		94	194,595	15	0	5	194,615	5	194,620
		88	2,526,716	102,500	0	250	2,629,466	9,874	2,639,340
	Total for SIC Code 22	96	14,756,746	57,550	0	15,620	14,829,916	450,495	15,280,411
		95	15,061,062	74,205	0	6,898	15,142,165	513,442	15,655,607
		94	15,667,454	110,838	4	14,892	15,793,188	553,144	16,346,332
		88	33,605,487	468,191	0	79,850	34,153,528	1,644,849	35,798,377

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility incorrectly reported 393,101 pounds of air emissions and total releases under SIC code 2269 for 1996. The correct amount is 42,493 pounds. Another facility reporting in SIC code 2295 did not report for 1988, but should have. The correct amounts are 687,336 pounds of total air emissions and total releases.
***nec:** not elsewhere classified.

On-site waste management data for 1994-1996 appear in Table 4-15.

Transfers Off-site for Further Waste Management

The multiple SIC codes group reported the largest decrease in transfers off-site for further waste management in this sector for 1994-1996 (data for some types of off-site transfers were not collected in 1988). This was a reduction from 864,000 pounds in 1994 to 664,000 pounds in 1996, despite an increase in 1995. The net reduction of 200,000 pounds was attributable primarily to transfers to POTWs. The sector's reported transfers off-site for further waste management are shown in Table 4-16.

Reported transfers off-site for further waste management in the miscellaneous finishing plants industry (SIC code 2269) decreased from 995,000 pounds in 1994 to 877,000 pounds in 1996, a reduction of 118,000 pounds. The transfer type with the largest reduction in this industry's reporting was transfers to POTWs.

The coated fabrics industry (SIC code 2295) had the largest reported increase of any industry in the textile mills sector for transfers off-site for further waste management, from 1.6 million pounds in 1994 to 2.1 million pounds in 1996. This 437,000 pound increase was due to increases in transfers to energy recovery and to recycling. Carpets and rugs (SIC code 2273) had an increase of 110,000 pounds for the 1994-1996 period, from 129,000 pounds to 239,000 pounds. This was entirely attributable to reported transfers to POTWs.

No other industry had a decrease or increase in such transfers of more than 100,000 pounds from 1994 to 1996.

Table 4-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2211	Broadwoven Fabric Mills, Cotton	96	0	0	1,037	1,037
		95	0	0	3,053	3,053
		94	0	0	32,341	32,341
		88	NA	NA	NA	NA
2221	Broadwoven Fabric Mills, Manmade	96	82,273	0	20,346	102,619
		95	28,207	1,000	32,213	61,420
		94	0	0	82,766	82,766
		88	NA	NA	NA	NA
2231	Broadwoven Fabric Mills, Wool	96	0	0	213,283	213,283
		95	0	0	161,148	161,148
		94	0	0	153,342	153,342
		88	NA	NA	NA	NA
2241	Narrow Fabric Mills	96	No reports received			
		95	0	0	0	0
		94	0	0	21,000	21,000
		88	NA	NA	NA	NA
2251	Women's Hosiery, Except Socks	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2252	Hosiery, nec*	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2253	Knit Outerwear Mills	96	0	0	22,100	22,100
		95	0	0	14,110	14,110
		94	0	0	28,000	28,000
		88	NA	NA	NA	NA
2254	Knit Underwear Mills	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2257	Weft Knit Fabric Mills	96	38,476	0	18,322	56,798
		95	55,084	0	19,604	74,688
		94	34,526	0	18,030	52,556
		88	NA	NA	NA	NA
2258	Lace & Warp Knit Fabric Mills	96	0	0	420	420
		95	0	0	13,304	13,304
		94	0	0	12,540	12,540
		88	NA	NA	NA	NA
2259	Knitting Mills, nec*	96	6,800	0	0	6,800
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 2269 for 1996. The facility should have reported in SIC code 2869. The incorrectly reported amount was 4,437,287 pounds of other on-site waste management.
*nec: not elsewhere classified.

Table 4-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2261	Finishing Plants, Cotton	96	9,000	9,000	49,300	67,300
		95	8,000	8,000	97,100	113,100
		94	10,000	10,000	19,500	39,500
		88	NA	NA	NA	NA
2262	Finishing Plants, Manmade	96	3,849,529	1,114,500	46,532	5,010,561
		95	4,146,394	1,053,500	16,499	5,216,393
		94	2,967,489	1,250,600	122,133	4,340,222
		88	NA	NA	NA	NA
2269	Finishing Plants, nec*	96	6,269,432	949,096	2,159,078	9,377,606
		95	2,212,196	915,866	1,794,358	4,922,420
		94	1,675,862	749,740	2,016,061	4,441,663
		88	NA	NA	NA	NA
2273	Carpets and Rugs	96	6,000	0	642,381	648,381
		95	15,000	0	790,001	805,001
		94	351	0	2,007,685	2,008,036
		88	NA	NA	NA	NA
2281	Yarn Spinning Mills	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2282	Throwing and Winding Mills	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2284	Thread Mills	96	0	0	77,022	77,022
		95	0	0	262,339	262,339
		94	0	0	94,100	94,100
		88	NA	NA	NA	NA
2295	Coated Fabrics, Not Rubberized	96	1,979,638	2,540,623	4,040,614	8,560,875
		95	2,816,766	2,225,969	4,408,646	9,451,381
		94	4,350,620	1,991,473	3,214,443	9,556,536
		88	NA	NA	NA	NA
2296	Tire Cord and Fabrics	96	0	0	229,723	229,723
		95	0	0	189,213	189,213
		94	0	0	173,922	173,922
		88	NA	NA	NA	NA
2297	Nonwoven Fabrics	96	520,839	0	100,000	620,839
		95	408,946	0	174,200	583,146
		94	442,000	0	151,370	593,370
		88	NA	NA	NA	NA
2298	Cordage and Twine	96	0	0	0	0
		95	0	0	0	0
		94	0	0	91,245	91,245
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 2269 for 1996. The facility should have reported in SIC code 2869. The incorrectly reported amount was 4,437,287 pounds of other on-site waste management.
***nec:** not elsewhere classified.

Table 4-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2299	Textile Goods, nec*	96	5,000	0	342,320	347,320
		95	0	0	394,201	394,201
		94	0	0	437,810	437,810
		88	NA	NA	NA	NA
	Multiple within SIC Code 22	96	303,000	3	1,593,061	1,896,064
		95	828,788	1,071	2,414,171	3,244,030
		94	3,789,405	0	2,640,497	6,429,902
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 22	96	0	0	60,983	60,983
		95	200	0	152,062	152,262
		94	4,239	0	19,157	23,396
		88	NA	NA	NA	NA
	Total for SIC Code 22	96	13,069,987	4,613,222	9,616,522	27,299,731
		95	10,519,581	4,205,406	10,936,222	25,661,209
		94	13,274,492	4,001,813	11,335,942	28,612,247
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 2269 for 1996. The facility should have reported in SIC code 2869. The incorrectly reported amount was 4,437,287 pounds of other on-site waste management.
*nec: not elsewhere classified.

Facilities with Large Increases and Decreases in Releases, 1988-1996

American & Efird, Inc., in Mount Holly, North Carolina (SIC code 2221 in 1988 and 2284 in 1996), ranked first for increases with an overall 191,000 pound increase. This facility produces threads used in air bag production, the shoe industry, and other manufacturing. Air emissions of dichloromethane, which is used in a coating process, accounted for 59% of the increase. A production increase was cited as the reason for the increase.

Uniroyal Engineered Products in Port Clinton, Ohio (SIC code 2295), was second for increases with a 140,000 pound total. Toluene accounted for 65% of the plant's increase. The facility manufactures a flexible PVC, Naugahyde®-like product used in automobile upholstery. Two reasons were cited for the increase: a switch was made to a urethane top finish in which toluene is a solvent and a machine was installed that bonds a polypropylene foam backing to the PVC product. The bonding process involves the use of a polyester resin in toluene solution.

Fil-Tec, Inc., in Cavetown, Maryland (did not report in 1988, SIC code 2284 in 1996), ranked third with an overall 134,000 pound increase. Fil-Tec, which began operation after the 1988 reporting year, produces bonded sewing threads used in wire and cable products, upholstered furniture, shoes, bedding, canvas goods, and other products. Methanol was the only chemical reported in 1996, and because the company did not report in 1988, this chemical's 1996 releases accounted for 100% of the facility's increase. Methanol is used as a solvent in bonded thread production. A facility contact stated that the 1998 data for methanol stack emissions will drop to 14% of the 1996 amount due to the installation o f new emissions control equipment.

Table 4-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2211	Broadwoven Fabric Mills, Cotton	96	0	0	0	50,400	0	50,400
		95	0	0	0	21,800	0	21,800
		94	0	0	19,900	64,429	0	84,329
		88	NA	NA	0	20,848	0	NA
2221	Broadwoven Fabric Mills, Manmade	96	43,230	16,400	30	67,260	0	126,920
		95	86,900	21,505	45	68,533	0	176,983
		94	2,250	21,700	14,015	4,266	0	42,231
		88	NA	NA	750	3,489,641	0	NA
2231	Broadwoven Fabric Mills, Wool	96	0	0	5,172	20,630	0	25,802
		95	614	0	454	25,720	0	26,788
		94	0	0	0	26,800	0	26,800
		88	NA	NA	4,845	82,289	0	NA
2241	Narrow Fabric Mills	96	No reports received					
		95	0	0	0	0	0	0
		94	0	0	2,750	0	0	2,750
		88	NA	NA	0	10,542	0	NA
2251	Women's Hosiery, Except Socks	96	0	0	0	0	0	0
		95	0	0	0	480	0	480
		94	0	0	0	686	0	686
		88	NA	NA	0	231,201	0	NA
2252	Hosiery, nec*	96	0	0	0	108,891	0	108,891
		95	0	0	0	6,981	0	6,981
		94	0	0	0	88,777	0	88,777
		88	NA	NA	0	457,751	0	NA
2253	Knit Outerwear Mills	96	0	0	0	17,738	0	17,738
		95	0	0	0	21,870	0	21,870
		94	1,861	0	0	92,380	0	94,241
		88	NA	NA	0	345,549	0	NA
2254	Knit Underwear Mills	96	0	0	0	24,153	0	24,153
		95	0	0	0	98,509	0	98,509
		94	0	0	0	62,413	0	62,413
		88	NA	NA	0	0	0	NA
2257	Weft Knit Fabric Mills	96	0	0	50,288	22,005	0	72,293
		95	0	0	45,327	19,305	0	64,632
		94	0	0	260	44,505	0	44,765
		88	NA	NA	0	229,357	250	NA
2258	Lace & Warp Knit Fabric Mills	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	8	149,473	0	NA
2259	Knitting Mills, nec*	96	0	0	0	38	0	38
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 4-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2261	Finishing Plants, Cotton	96	0	0	0	156,216	0	156,216
		95	0	0	0	64,629	0	64,629
		94	0	0	0	77,331	0	77,331
		88	NA	NA	0	46,653	0	NA
2262	Finishing Plants, Manmade	96	0	0	4,455	63,761	0	68,216
		95	0	0	9,478	86,140	0	95,618
		94	0	0	5,729	60,539	0	66,268
		88	NA	NA	1,850	400,322	2,010	NA
2269	Finishing Plants, nec*	96	331,005	393,796	92,708	59,567	0	877,076
		95	326,000	222,382	36,272	93,234	0	677,888
		94	379,000	245,496	4,900	365,909	0	995,305
		88	NA	NA	11,540	572,951	0	NA
2273	Carpets and Rugs	96	336	0	842	237,593	0	238,771
		95	240	0	25,871	319,255	0	345,366
		94	0	0	1,072	127,614	0	128,686
		88	NA	NA	17,000	1,473,710	0	NA
2281	Yarn Spinning Mills	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2282	Throwing and Winding Mills	96	0	6,327	0	12,817	0	19,144
		95	0	5,459	0	51,335	0	56,794
		94	0	6,856	0	47,303	0	54,159
		88	NA	NA	0	60,672	250	NA
2284	Thread Mills	96	0	63,262	0	78,792	0	142,054
		95	0	89,349	0	89,204	0	178,553
		94	0	72,054	0	96,180	0	168,234
		88	NA	NA	0	0	0	NA
2295	Coated Fabrics, Not Rubberized	96	531,302	1,197,886	334,562	10,535	0	2,074,285
		95	305,168	1,409,596	410,121	29,452	0	2,154,337
		94	328,502	857,888	432,283	18,742	0	1,637,415
		88	NA	NA	1,172,523	119,871	44,263	NA
2296	Tire Cord and Fabrics	96	0	0	11,162	2,036	0	13,198
		95	3,306	0	2,954	988	0	7,248
		94	4,178	0	1,942	2,530	0	8,650
		88	NA	NA	9,388	0	0	NA
2297	Nonwoven Fabrics	96	0	0	520	2,097	0	2,617
		95	0	0	5	1,005	0	1,010
		94	0	5	5	10	0	20
		88	NA	NA	48,500	250	49,570	NA
2298	Cordage and Twine	96	0	3,069	0	0	0	3,069
		95	0	4,388	5	250	0	4,643
		94	0	3,249	5	250	0	3,504
		88	NA	NA	3,106	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 4-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Textile Mill Products, SIC Code 22, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2299	Textile Goods, nec*	96	0	7,875	0	76,020	0	83,895
		95	0	3,020	1,765	71,750	0	76,535
		94	3,397	0	1,712	106,207	0	111,316
		88	NA	NA	8,100	158,686	12,000	NA
	Multiple within SIC Code 22	96	0	2,649	12,481	648,691	0	663,821
		95	2,743	124,012	15,920	915,789	0	1,058,464
		94	0	62,748	16,899	783,895	0	863,542
		88	NA	NA	75,345	803,518	885	NA
	Invalid SIC Code within SIC Code 22	96	0	0	0	0	0	0
		95	0	0	5,693	51,100	0	56,793
		94	0	0	1,750	20,360	0	22,110
		88	NA	NA	21,025	1,110,412	250	NA
	Total for SIC Code 22	96	905,873	1,691,264	512,220	1,659,240	0	4,768,597
		95	724,971	1,879,711	553,910	2,037,329	0	5,195,921
		94	719,188	1,269,996	503,222	2,091,126	0	4,583,532
		88	NA	NA	1,373,980	9,763,696	109,478	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 22 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Gencorp in Columbus, Mississippi (SIC code 2295), ranked first in decreases with an overall 1.4 million-pound decrease. The manufacturer of vinyl upholstery and wall coverings uses methyl ethyl ketone (MEK) in printing processes. Since 1995, the plant has been converting from organic-solvated inks to water-based inks. This accounted for a 544,000 pound reduction in MEK usage, 40% of the overall decrease, through the 1996 reporting year.

Reeves International in Rutherfordton, North Carolina (SIC code 2295 in 1988; codes 2295, 3053, and 3069 in 1996), was second in decreases with 1.2 million pounds. The facility coats rubber and plastic onto textile substrates. Toluene, used as a solvent in several processes, accounted for 57% of the total decrease. One reason given for the reduction was a switch from neoprene to silicon rubber in some processes. Less toluene is required to process silicone rubber. Also cited were solvent recovery and coating equipment upgrades that resulted in increased efficiency in solvent use and recovery.

Collins & Aikman in Old Fort, North Carolina (SIC codes 2270 and 2273 in 1988, did not report in 1996), ranked third in decreases with 1.1 million pounds. Reported transfers off-site to disposal of barium compounds were responsible for 86% of the decrease. Automotive carpet manufactured at the facility is backed by resin that contains barium sulfate. Prior to 1994, carpet was trimmed, packaged, and shipped from this Collins & Aikman facility. Carpet scrap was sent off-site to a landfill. Beginning in 1994, untrimmed carpet was sent to another facility for trimming and packaging. This facility also ranked third in decreases of waste managed. See "Facilities with Large Increases and Decreases in Waste Management, 1991-1996," below.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There are seven such facilities in the textiles sector:

Coats American, Bristol, Rhode Island, increase of 393,000 pounds, reporting error.

Excello Fabric Finishers, Inc., Coshocton, Ohio, increase of 335,000 pounds, reporting error.

Fieldcrest Cannon, Inc., Kannapolis, North Carolina, increase of 246,000 pounds, reporting error.

Neese Coated Fabrics, Saint Louis, Missouri, decrease of 1.2 million pounds, plant closure.

Paxar Corporation, Orangeburg, New York, decrease of 1.7 million pounds, reporting error.

Reeves Brothers, Inc., Buena Vista, Virginia, decrease of 1.2 million pounds, plant closure.

Uniroyal Engineered Products, Stoughton, Wisconsin, increase of 181,000 pounds, reporting error.

1991-1996 Waste Management Data for Textile Mill Products

Table 4-17 summarizes on- and off-site waste management data for the textile mills sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste reported in this sector decreased 9.0%, from 51.6 million pounds in 1991 to 47.0 million pounds in 1996. This change reflects a larger decrease, in pounds and percent, in quantities released on- and off-site. Releases were reported as 24.2 million pounds in 1991 and 14.9 million pounds in 1996, a 38.2% reduction. Smaller reductions (in pounds) were reported in off-site energy recovery and treatment.

Increases in all types of on-site waste management partly offset these reductions. Total on-site waste management was 22.4 million pounds in 1991 and 27.3 million pounds in 1996, an increase of 4.9 million pounds, or 22.0%. Increases ranged from 20.5% for on-site recycling to 28.4% for on-site energy recovery. However, one reporting error previously discussed in this chapter affects the 1991-1996 analysis of production-related waste; this was a 4.4 million-pound error in on-site recycling for 1996. When adjusted for this error, on-site recycling decreased by 20.3% from 1991 to 1996.

Off-site recycling increased 32.6% in this period, although this was a much smaller increase in absolute terms.

Figure 4-13 illustrates the percentage changes in on-site waste management, off-site waste management, quantities released, and total production-related waste for the textile mills sector from 1991 to 1996.

Production levels for the textile mill sector increased throughout this period, as noted earlier in this chapter. TRI facilities report absolute amounts of waste managed and of environmental releases, not adjusted for changes in production levels. Reductions in production-related waste reported to TRI were accomplished as production levels in this sector rose. Furthermore, the reductions were largely attributable to decreases reported in quantities released, the least desirable option in the waste management hierarchy (explained in Chapter 1). These changes indicate substantial improvement in the sector's management of TRI chemicals in waste.

Table 4-17. TRI Waste Management Data, 1991, 1994-1996: Textile Mill Products, SIC Code 22

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	10,848,820	13,274,492	10,519,581	13,069,987
Energy Recovery On-site	3,594,145	4,001,813	4,205,406	4,613,222
Treated On-site	7,927,547	11,335,942	10,936,222	9,616,522
Total On-site Waste Management	22,370,512	28,612,247	25,661,209	27,299,731
Off-site Waste Management				
Recycled Off-site	734,661	730,626	720,145	974,214
Energy Recovery Off-site	2,167,180	1,237,494	1,896,966	1,733,282
Treated Off-site	2,155,617	2,333,073	2,553,964	2,025,327
Total Off-site Waste Management	5,057,458	4,301,193	5,171,075	4,732,823
Quantity Released On- and Off-site	24,152,624	16,782,600	15,606,968	14,927,994
Total Production-related Waste	51,580,594	49,696,040	46,439,252	46,960,994
Non-Production-related Waste	5,701	34,227	17,847	958

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-20.8	24.2	20.5
Energy Recovery On-site	5.1	9.7	28.4
Treated On-site	-3.5	-12.1	21.3
Total On-site Waste Management	-10.3	6.4	22.0
Off-site Waste Management			
Recycled Off-site	-1.4	35.3	32.6
Energy Recovery Off-site	53.3	-8.6	-20.0
Treated Off-site	9.5	-20.7	-6.0
Total Off-site Waste Management	20.2	-8.5	-6.4
Quantity Released On- and Off-site	-7.0	-4.4	-38.2
Total Production-related Waste	-6.6	1.1	-9.0
Non-Production-related Waste	-47.9	-94.6	-83.2

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated. One facility reported incorrectly in SIC code 2269 for 1996. The facility should have reported in SIC code 2869. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling on-site, 63,392 pounds of energy recovery off-site, 10,475 pounds of treatment on-site and 51,735 pounds of quantity released on- and off-site. The percentage change from 1995 to 1996 in recycling on-site changes from 24.2% to –17.8% and from 1991 to 1996 changes from 20.5% to –20.3%.

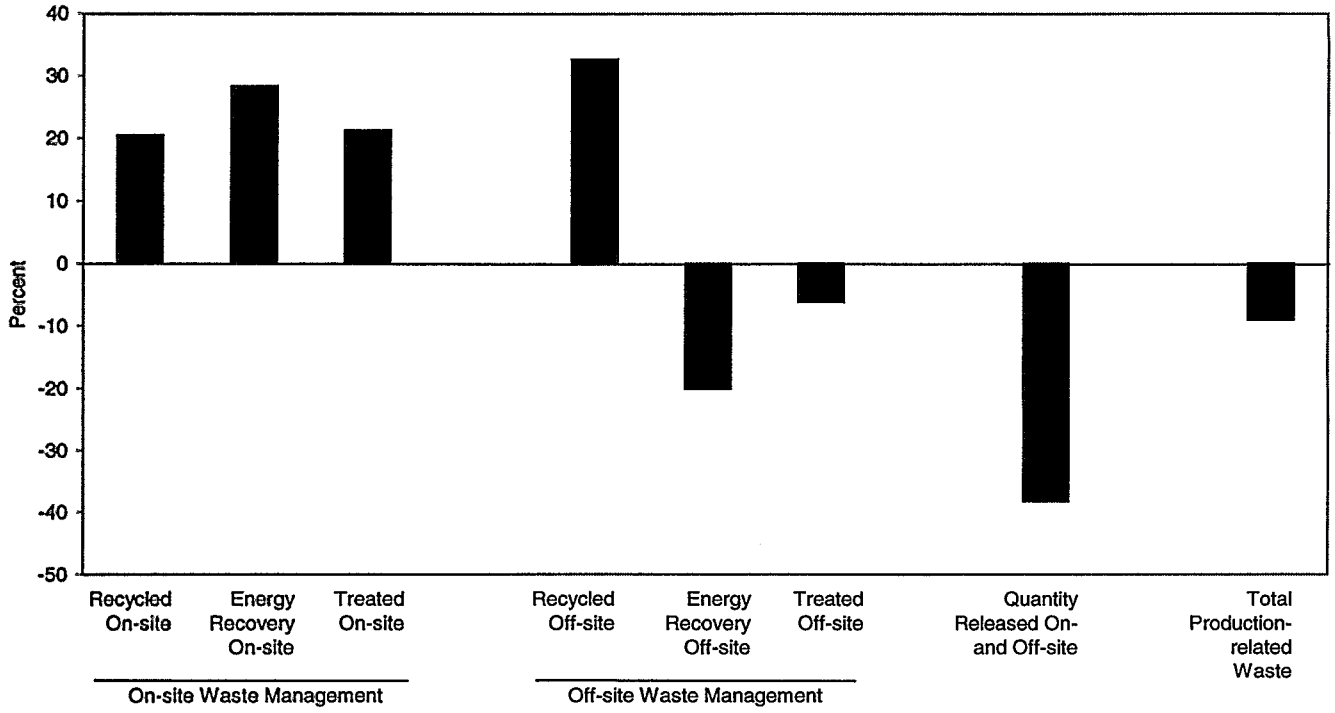


Figure 4-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Textile Mill Products (SIC Code 22)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated. One facility reported incorrectly in SIC code 22 for 1996. The facility should have reported in SIC code 28. The incorrectly reported amounts were as follows: 4,426,812 pounds of recycling on-site, 63,392 pounds of energy recovery off-site, 10,475 pounds of treatment on-site and 51,735 pounds of quantity released on- and off-site. The percentage change from 1991 to 1996 in recycling on-site changes from 20.5% to –20.3%.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Synfin Industries in North Wales, Pennsylvania (SIC code 2262), was the top increaser for waste management with an overall 2.4 million pounds. A custom finisher of upholstery fabrics and other textiles, this facility's increase consisted wholly of an increase in on-site recycling of trichloroethylene, a processing aid. The facility contact cited a production increase as the reason for the change.

Highland Industries, Inc., in Kernersville, North Carolina (SIC code 2269), ranked second for increases with 834,000 pounds. The facility manufactures fabrics for tires, fabrics for automotive air bags, and industrial and automotive v-belts (such as fan belts). The plant is undergoing a transition from neoprene rubber to silicone-based materials for its production of air bags. A coating process in air bag production involves the use of toluene as a solvent. In manufacturing air bags from neoprene rubber, the facility could efficiently recover toluene from solvated neoprene by carbon bed absorption. However, this is not a viable system for recovering toluene from solvated silicone. As its operations shifted to silicone, the facility installed a thermal oxidizer to treat toluene waste in air emissions. As a result, 67% of the plant's increase is accounted for by on-site treatment of toluene. On-site recycling of toluene did not decrease, however, due to a concurrent

production increase of other neoprene rubber products at the facility.

Kenyon Industries in Kenyon, Rhode Island (SIC codes 2269 and 2295 in 1991 and 2269 in 1996), ranked third for increases with 691,000 pounds. This facility is a commissioned finisher of fabrics. The primary processes involve dying and coating nylon fabric according to customer specifications. The fabrics are sold to manufacturers of commercial goods such as backpacks and luggage. Toluene, a solvent in urethane coating processes, was responsible for 94% of the facility's increase. The biggest changes for this chemical were reported in on-site treatment. Following an EPA audit of Kenyon's TRI reporting practices, the Agency provided guidance for improving estimation methods. This is cited by the facility as the primary reason for the increase.

Synthetic Finishing, Inc., in Longview, North Carolina (SIC code 2262), ranked first for decreases with an overall 3.2 million-pound reduction. Also a commissioned finisher of textile fabrics, the plant's processes include application of specialty coatings and finishes to woven and non-woven fabrics. Trichloroethylene accounted for 90% of the decrease. The chemical, used as a solvent, has been largely replaced by aqueous solutions.

Gencorp in Columbus, Mississippi (SIC code 2295), was second in decreases with a 2.0 million-pound change. Reductions in quantities released of methyl ethyl ketone accounted for 69% of the total decrease in production-related waste. This facility also ranked second in decreases of releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996"). As noted, Gencorp attributes its decreases to its conversion from organic-solvated inks to water-based inks.

Collins & Aikman in Old Fort, North Carolina (SIC code 2273 in 1991, did not report in 1996), was third for decreases with 1.8 million pounds. A change in the reported amounts of barium compounds constituted 95% of the facility's overall reduction. Collins & Aikman manufactures automotive carpeting which is backed by a resin containing barium sulfate. Scrap carpet, trimmed from the product, was sent off-site for disposal. Beginning in 1994, the plant began shipping unfinished carpets to another facility for trimming and packaging. As a result, the Old Fort plant no longer produced the scrap waste material. Collins & Aikman in Old Fort also ranked as the third largest decreaser in releases due to a reduction in reported releases of barium compounds. See "Facilities with Large Increases and Decreases in Releases, 1988-1996," above, for more information.

Other Apparent Increases and Decreases in Production-Related Waste, 1991-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the textiles sector:

American & Efird, Inc., Mount Holly, North Carolina, increase of 726,000 pounds, reporting error.

Facilities Contacted for Explanations (alphabetical by facility):

3V Inc., Georgetown, South Carolina: Matt Birdsong, August 17, 1998 (explanation provided)

American & Efird, Inc., Mount Holly, North Carolina: John Eapen, August 20, 1998 (explanation provided)

Coats American, Bristol, Rhode Island: Mike Bell, August 3, 1998 (explanation provided)

Collins & Aikman, Old Fort, North Carolina: Pat McCabe, August 5 and August 17, 1998 (explanation provided)

Dixie Yarns, Inc., Chattanooga, Tennessee: Don Huffman, August 17, 1998 (explanation provided)

Excello Fabric Finishers, Inc., Coshocton, Ohio: Jerry Stenner, August 4, 1998 (explanation provided)

Fieldcrest Cannon Inc., Kannapolis, North Carolina: Josh Chandler, August 13, 1998 (explanation provided)

Fil-Tec, Inc., Cavetown, Maryland: Andy Dubnik, August 24, 1998 and Ted Schoek, September 8 and September 9, 1998 (explanation provided)

Gencorp, Columbus, Mississippi: Mike Stierwalt, August 3, 1998 (explanation provided)

Highland Industries, Inc., Kernersville, North Carolina: Gary Voss, August 4, 1998 and Earl Crouch, August 5, 1998 (explanation provided)

Kenyon Industries, Inc., Kenyon, Rhode Island: Barbara Burdick, August 13, 1998 (explanation provided)

Neese Coated Fabrics, Saint Louis, Missouri: Plant Closure. No contact person available.

Paxar Corporation, Orangeburg, New York: Kevin Finnegan, August 11 and August 27, 1998 (no explanation provided)

Reeves Brothers, Inc., Buena Vista, Virginia: Plant closure. No contact person available.

Reeves International, Rutherfordton, North Carolina: Robert H. Emmel, Ph.D., August 27, 1998 (explanation provided)

Synfin Industries, North Wales, Pennsylvania: Bert Ross, August 3, August 27, September 8, and September 15, 1998 (explanation provided)

Synthetics Finishing, Inc., Longview, North Carolina: Mark Stultz, August 5, 1998 (explanation provided)

Uniroyal Engineered Products, Port Clinton, Ohio: Jeffrey A. Hinchman, August 27, 1998 (explanation provided)

Uniroyal Engineered Products, Stoughton, Wisconsin: Frank Krawcek, August 18, 1998 (explanation provided)

Chapter 5

Apparel and Fabricated Textiles (SIC Code 23)

A Look at the Apparel and Fabricated Textiles Industry (SIC Code 23)

The apparel and other finished products industry (SIC code 23) includes not only production of clothing, but also fabrication of other products by cutting and sewing of fabrics or related materials. This includes household furnishings such as curtains and draperies. Clothing made by cutting and joining (for example, by adhesives) paper, nonwoven textiles, and similar materials is also classified in SIC code 23. These are referred to as the cutting trades, a term that distinguishes this sector from the fabric production sector (in SIC code 22, textile mill products). Miscellaneous products that are produced in this sector range from sleeping bags to non-disposable diapers to flags. Box 5-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

In 1996, the value of shipments of apparel and fabricated textile products was $77.63 billion, down from $78.10 billion in 1995 (both in current dollars). Employment fell from 947,000 to 865,000 from 1995 to 1996, the largest one-year decrease in this sector in the last decade. Apparel manufacturing is highly labor intensive, and much of the production has shifted abroad to lower-wage countries, a trend that began more than twenty years ago. Since the late 1980s, U.S. employment in the sector has decreased by about 25,000 per year. Facilities still operating in the United States—nearly 25,000 apparel manufacturing establishments—tend to be small or mid-sized, averaging 40 employees. Apparel companies also seldom produce their own goods, contracting out the various phases of garment production. Fabricated textile products such as home furnishings require less sewing and therefore less labor; manufacture of these products has been less likely to shift overseas.

The apparel and fabricated textiles sector reports the smallest amounts to TRI, and some of its industries have submitted no TRI forms, very few forms, or forms in some years and not others. This pattern is consistent with changes in the sector, particularly in relocating production outside the United States and shifting manufacturing operations from the northeast states to the south. Also, new owners may not report in the same ways or in the same SIC codes, when facilities change hands.

Box 5-1. SIC Code 23, Apparel and Other Finished Products Made from Fabrics and Similar Materials: Codes and Classifications

SIC Code			Industry Description
231	**Men's and Boy's Suits, Coats, and Overcoats**		
	2311	Men's and Boys' Suits, Coats, and Overcoats	Manufacture of men's and boys' tailored suits, coats, and overcoats from purchased woven or knit fabrics. Manufacture of uniforms (except athletic and work uniforms).
232	**Men's and Boys' Furnishings, Work Clothing, and Allied Garments**		
	2321	Men's and Boys' Shirts, Except Work Shirts	Manufacture of men's and boys' shirts (including polo and sport shirts) from purchased woven or knit fabrics.
	2322	Men's and Boys' Underwear and Nightwear	Manufacture of men's and boys' underwear and nightwear from purchased woven or knit fabrics.
	2323	Men's and Boys' Neckwear	Manufacture of men's and boys' neckties, scarves, and mufflers from purchased woven or knit fabrics.
	2325	Men's and Boys' Separate Trousers and Slacks	Manufacture of men's and boys' separate trousers and slacks from purchased woven or knit fabrics, including jeans, dungarees, and jean-cut casual slacks.
	2326	Men's and Boys' Work Clothing	Manufacture of men's and boys' work shirts, workpants (excluding jeans and dungarees), other work clothing, and washable service apparel.
	2329	Men's and Boys' Clothing, nec*	Manufacture of miscellaneous men's and boys' clothing (including athletic wear, down-filled clothing, nontailored jackets, sports clothing, swimsuits, and others) from purchased woven or knit fabrics.
233	**Women's, Misses', and Juniors' Outerwear**		
	2331	Women's, Misses', and Juniors' Blouses and Shirts	Manufacture of women's, misses', and juniors' blouses and shirts from purchased woven or knit fabrics.
	2335	Women's, Misses', and Juniors' Dresses	Manufacture of women's, misses', and juniors' dresses from purchased woven or knit fabrics.
	2337	Women's, Misses', and Juniors' Suits, Skirts, and Coats	Manufacture of women's, misses', and juniors' suits, pantsuits, skirts, coats (except fur coats and raincoats), and tailored jackets and vests, from purchased woven or knit fabrics.
	2339	Women's, Misses', and Juniors' Outerwear, nec*	Manufacture of miscellaneous women's, misses', and juniors' outerwear (including athletic uniforms, down-filled coats, jeans, scarves, slacks, swimsuits, and others), from purchased woven or knit fabrics.
234	**Women's, Misses', Children's, and Infants' Undergarments**		
	2341	Women's, Misses', Children's, and Infants' Underwear and Nightwear	Manufacture of women's, misses', children's, and infants' underwear and nightwear from purchased woven or knit fabrics.
	2342	Brassieres, Girdles, and Allied Garments	Manufacture of brassieres, girdles, and allied garments.
235	**Hats, Caps, and Millinery**		
	2353	Hats, Caps, and Millinery	Manufacture of hats, caps, millinery, and hat bodies.
236	**Girls', Children's, and Infants' Outerwear**		
	2361	Girls', Children's, and Infants' Dresses, Blouses, and Shirts	Manufacture of girls', children's, and infants' dresses, blouses, and shirts from purchased woven or knit fabrics.
	2369	Girls', Children's, and Infants' Outerwear, nec*	Manufacture of miscellaneous girls', children's, and infants' outerwear from purchased woven or knit fabrics.
237	**Fur Goods**		
	237	Fur Goods	Manufacture of fur coats and other clothing, accessories, and trimmings made of fur.
238	**Miscellaneous Apparel and Accessories**		
	2381	Dress and Work Gloves, Except Knit and All-Leather	Manufacture of dress, semidress, and work gloves and mittens from purchased woven or knit materials, alone or combined with leather or plastics.
	2384	Robes and Dressing Gowns	Manufacture of men's, boys', and women's robes and dressing gowns from purchased woven or knit fabrics.
	2385	Waterproof Outerwear	Manufacture of raincoats and other waterproof outerwear from purchased rubberized fabrics, plastics, and similar materials. Manufacture of waterproof or water-repellant outerwear from purchased woven or knit fabrics other than wool.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 5-1. SIC Code 23, Apparel and Other Finished Products Made from Fabrics and Similar Materials: Codes and Classifications, Continued

SIC Code			Industry Description
238	**Miscellaneous Apparel and Accessories, Continued**		
	2386	Leather and Sheep-Lined Clothing	Manufacture of leather and sheep-lined clothing.
	2387	Apparel Belts	Manufacture of apparel belts of any material.
	2389	Apparel and Accessories, nec*	Manufacture of suspenders, garters, handkerchiefs, and other miscellaneous apparel, including academic caps and gowns, vestments, and theatrical costumes. Manufacture of clothing by cutting and joining (for example, by adhesives) materials such as paper and nonwoven textiles.
239	**Miscellaneous Fabricated Textile Products**		
	2391	Curtains and Draperies	Manufacture of curtains and draperies from purchased materials.
	2392	Housefurnishings, Except Curtains and Draperies	Manufacture of housefurnishings, such as blankets, bedspreads, sheets, tablecloths, towels, and shower curtains.
	2393	Textile Bags	Manufacture of shipping and other industrial bags from purchased fabrics.
	2394	Canvas and Related Products	Manufacture of awnings, tents, and related products from purchased fabrics.
	2395	Pleating, Decorative and Novelty Stitching, and Tucking for the Trade	Pleating, decorative and novelty stitching, and tucking for the trade.
	2396	Automotive Trimmings, Apparel Findings, and Related Products	Manufacture of automotive trimmings, apparel findings, and related products. Printing and stamping on fabric articles.
	2397	Schiffli Machine Embroideries	Manufacture of Schiffli machine embroideries.
	2399	Fabricated Textile Products, nec*	Manufacture of miscellaneous fabricated textile products, such as sleeping bags, banners, fabric belting, automobile tire and seat covers, non-disposable diapers, parachutes, automobile and aircraft seat belts, and others.

***nec:** not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Although some products, such as fusing nonwoven textiles, may involve chemical and mechanical processes, the basic operations of this sector—cutting and sewing—are less likely to lead to releases and waste management of TRI chemicals. Some garments are prepared, dyed, and finished after assembly, but these are a small segment of overall production. Because processes such as these are usually performed as fabric is made, they are described in Chapter 4 (Textile Mill Products). Textile fabricating processes that are more associated with TRI reporting are printing, stamping, and embossing fabrics and related materials. Solvents, dyes, and finishes applied in such processes account for the majority of TRI reporting in this sector.

1996 TRI Data for Apparel and Fabricated Textiles

Table 5-1 summarizes TRI reporting by the apparel and fabricated textiles sector for 1996. Of the 47 forms submitted in this sector, just two were

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

McGraw-Hill Encyclopedia of Science and Technology, 8th ed., 1997: industry process and technologies.

Table 5-1. Summary of TRI Information by 4-digit SIC Code, 1996: Apparel and Fabricated Textiles, SIC Code 23

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
10	11	2321	Men's & Boys' Shirts	1	3	0	72	0	72
11	9	2325	Men's & Boys' Trousers & Slacks	1	1	0	2	0	2
7	8	2329	Men's & Boys' Clothing, nec*	2	2	0	24,400	7,872	32,272
9	7	2337	Women's & Misses' Suits & Coats	1	2	0	2,005	0	2,005
4	4	2353	Hats, Caps, & Millinery	3	7	0	145,138	0	145,138
6	6	2389	Apparel & Accessories, nec*	5	5	0	64,239	505	64,744
3	3	2392	Household Furnishings, nec*	1	3	0	176,205	0	176,205
8	10	2393	Textile Bags	1	2	0	9,610	500	10,110
1	1	2396	Automotive & Apparel Trimmings	6	14	2	508,761	42,600	551,361
5	5	2399	Fabricated Textile Products, nec*	3	4	0	69,597	11,700	81,297
2	2		Invalid SIC Code within SIC Code 23	1	4	0	252,495	0	252,495
			Total for SIC Code 23	25	47	2	1,252,524	63,177	1,315,701

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).
*nec: not elsewhere classified.

Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The automotive and apparel trimmings industry (SIC code 2396) submitted 14 forms, the largest number of forms in this sector. Seven forms were submitted in the hats, caps, and millinery industry (SIC code 2353). Other industries in the sector filed five or fewer forms each. The automotive and apparel trimmings (SIC code 2396) industry dominated reporting of releases and production-related waste in this sector in 1996.

As shown in Table 5-1, the apparel and fabricated textiles sector reported 1.32 million pounds of total on- and off-site releases in 1996, including 1.25 million pounds of on-site releases. The automotive and apparel trimmings industry (SIC code 2396) reported 551,000 pounds of total releases in 1996, including 509,000 pounds on-site and 43,000 pounds off-site. Facilities reporting invalid SIC codes within SIC code 23 were second for reported releases with 252,000 pounds in both on-site releases and total releases. Miscellaneous household furnishings (SIC code 2392) was third for reported releases, with 176,000 pounds in both on-site releases and total releases. The industry that reported the second-largest off-site releases (transfers to disposal) was miscellaneous fabricated textile products (SIC code 2399) with 12,000 pounds, and the miscellaneous men's and boy's clothing industry (SIC code 2329) was third with 8,000 pounds of off-site releases.

The apparel and fabricated textiles sector reported 834,000 pounds of other on-site waste management in 1996, as well as 2.3 million pounds of total

One facility reported incorrectly under SIC code 23 for 1996. The correct SIC code is 26. Because this facility accounted for 30% or more of total releases, total other on-site waste management and total production-related waste in this sector, its forms have been omitted from all tables in this chapter. Therefore, the totals in the tables and figures in this chapter do not match the summary for SIC code 23 in Chapter 1. The incorrectly reported amounts were as follows: 549,149 on-site releases, 549,149 pounds total releases, 407,100 pounds total other on-site waste management and 950,700 pounds total production-related waste.

Table 5-1. Summary of TRI Information by 4-digit SIC Code, 1996: Apparel and Fabricated Textiles, SIC Code 23, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2321	Men's & Boys' Shirts	0	0	72	0
2325	Men's & Boys' Trousers & Slacks	19,915	0	19,917	0
2329	Men's & Boys' Clothing, nec*	0	978	33,250	0
2337	Women's & Misses' Suits & Coats	42,000	250	44,000	3
2353	Hats, Caps, & Millinery	0	64,058	209,196	0
2389	Apparel & Accessories, nec*	0	1,255	65,065	0
2392	Household Furnishings, nec*	47,864	0	224,069	0
2393	Textile Bags	0	0	9,935	0
2396	Automotive & Apparel Trimmings	712,587	59,152	1,320,758	0
2399	Fabricated Textile Products, nec*	0	16,190	132,040	0
	Invalid SIC Code within SIC Code 23	11,872	0	264,587	0
	Total for SIC Code 23	834,238	141,883	2,322,889	3

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).
***nec:** not elsewhere classified.

production-related waste. The automotive and apparel trimmings industry (SIC code 2396) reported the largest amounts of other on-site waste management, 713,000 pounds, and total production-related waste, 1.3 million pounds. Miscellaneous household furnishings (SIC code 2392) ranked second for both categories, reporting 48,000 pounds of other on-site waste management and 224,000 pounds of total production-related waste. Hats, caps, and millinery (SIC code 2353) ranked third for total production-related waste with 209,000 pounds, but women's and misses' suits and coats (SIC code 2337) ranked third for other on-site waste management with 42,000 pounds.

The apparel and fabricated textiles sector reported 142,000 pounds of transfers off-site for further waste management in 1996. Of that amount, 64,000 pounds was reported in the hats, caps, and millinery industry (SIC code 2353). Another 59,000 pounds was reported in automotive and apparel trimmings (SIC code 2396).

None of the TRI forms received in this sector reported more than one SIC code within SIC code 23, as explained in Box 5-2.

On- and Off-site Releases

As shown in Table 5-3 and Figure 5-1, air emissions were by far the largest release type in the apparel and fabricated textiles sector. The sector's total of 1.32 million pounds of total on- and off-site releases included 1.25 million pounds of air emissions.

Box 5-2. Data Not Appearing in This Chapter

Facilities that engage in more than one kind of manufacturing activity may report more than one SIC code on their TRI forms to describe their activities. Most industrial sectors discussed in the *1996 TRI Public Data Release* include such "multiple-code" reporting. No forms were received, however, with multiple SIC codes within SIC code 23 in 1996. (Multiple code reporting is further explained in Box 1-5 in Chapter 1.)

This chapter, therefore, does not contain **Table 5-2. Multiple SIC Codes, 1996: Apparel and Fabricated Textiles, SIC Code 23.**

Industry-specific chapters in both volumes of the *1996 TRI Public Data Release* present comparable data tables, numbered consistently from chapter to chapter. The remaining tables and figures in this chapter conform to that numbering system.

Table 5-3. TRI On-site and Off-site Releases, 1996: Apparel and Fabricated Textiles, SIC Code 23 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2396	Automotive & Apparel Trimmings	508,756	0	0	0	0	5	508,761	42,600	551,361
	Invalid SIC Code within SIC Code 23	252,495	0	0	0	0	0	252,495	0	252,495
2392	Household Furnishings, nec*	176,205	0	0	0	0	0	176,205	0	176,205
2353	Hats, Caps, & Millinery	145,138	0	0	0	0	0	145,138	0	145,138
2399	Fabricated Textile Products, nec*	69,597	0	0	0	0	0	69,597	11,700	81,297
2389	Apparel & Accessories, nec*	64,239	0	0	0	0	0	64,239	505	64,744
2329	Men's & Boys' Clothing, nec*	24,400	0	0	0	0	0	24,400	7,872	32,272
2393	Textile Bags	9,610	0	0	0	0	0	9,610	500	10,110
2337	Women's & Misses' Suits & Coats	2,005	0	0	0	0	0	2,005	0	2,005
2321	Men's & Boys' Shirts	72	0	0	0	0	0	72	0	72
2325	Men's & Boys' Trousers & Slacks	2	0	0	0	0	0	2	0	2
	Total for SIC Code 23	1,252,519	0	0	0	0	5	1,252,524	63,177	1,315,701

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.
*nec: not elsewhere classified.

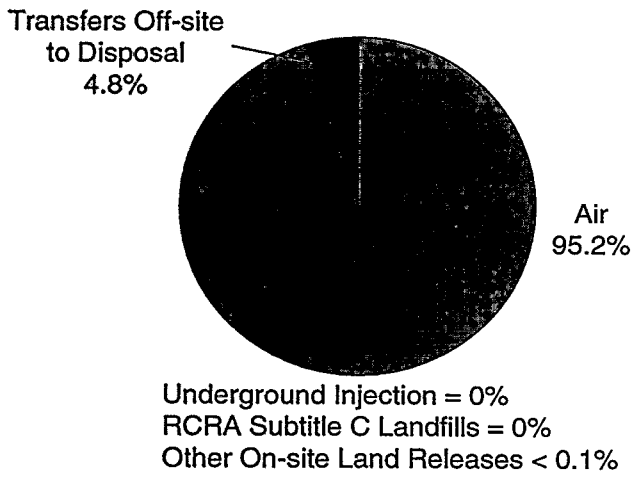


Figure 5-1. Distribution of TRI On-site and Off-site Releases, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

Ranking first for total releases, the automotive and apparel trimmings industry (SIC code 2396) reported 509,000 pounds released to air, including 314,000 pounds of methyl ethyl ketone and 121,000 pounds of 1,1,1-trichlorethane, largely by one facility. This industry also reported 43,000 pounds of off-site releases.

Figure 5-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

The majority of the 834,000 pounds of other on-site waste management reported in apparel and fabricated textiles for 1996 was on-site treatment—643,000 pounds. This sector also reported 191,000 pounds of on-site recycling. Table 5-4 and Figure 5-3 present the sector's other on-site waste management reporting.

The automotive and apparel trimmings industry (SIC code 2396) reported the largest amount of on-site treatment with 581,000 pounds, including 450,000 pounds of methyl ethyl ketone recycling reported by one facility.

The automotive and apparel trimmings industry also reported most of the sector's on-site recycling, 131,000 pounds out of 191,000 pounds for all apparel and fabricated textiles industries. This industry reported on-site recycling of 46,000 pounds of methyl ethyl ketone, 40,000 pounds of antimony compounds, and 33,000 pounds of phenol.

Figure 5-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

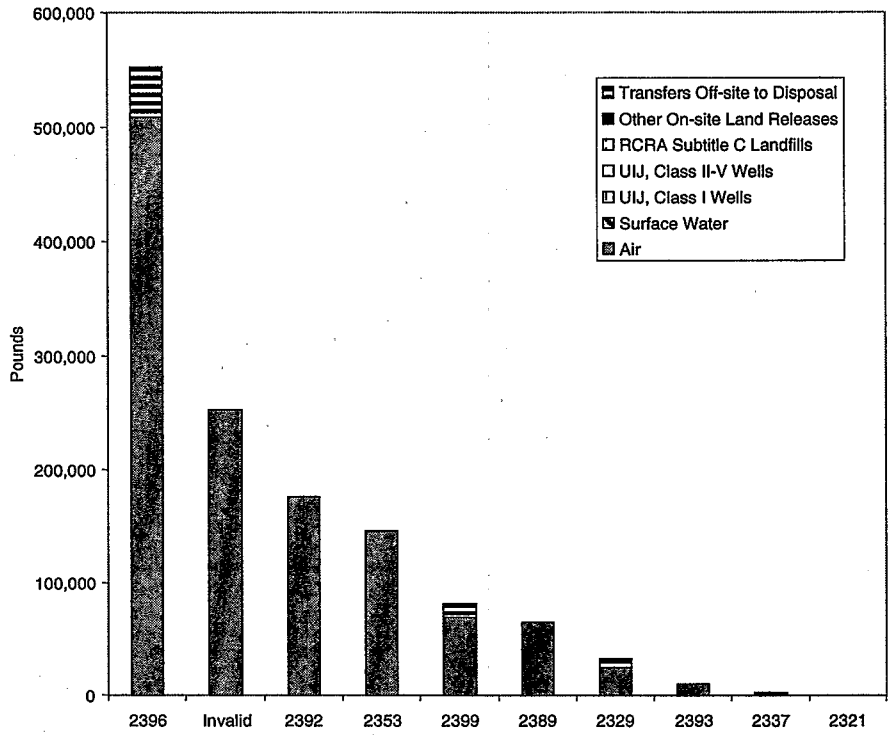


Figure 5-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Invalid SIC codes are codes beginning "23" that do not exist in the current Standard Industrial Classification code system.

Table 5-4. TRI Other On-site Waste Management, 1996: Apparel and Fabricated Textiles, SIC Code 23 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2396	Automotive & Apparel Trimmings	131,240	0	581,347	712,587
2392	Household Furnishings, nec*	47,864	0	0	47,864
2337	Women's & Misses' Suits & Coats	0	0	42,000	42,000
2325	Men's & Boys' Trousers & Slacks	0	0	19,915	19,915
	Invalid SIC Code within SIC Code 23	11,872	0	0	11,872
2321	Men's & Boys' Shirts	0	0	0	0
2329	Men's & Boys' Clothing, nec*	0	0	0	0
2353	Hats, Caps, & Millinery	0	0	0	0
2389	Apparel & Accessories, nec*	0	0	0	0
2393	Textile Bags	0	0	0	0
2399	Fabricated Textile Products, nec*	0	0	0	0
	Total for SIC Code 23	190,976	0	643,262	834,238

Note: Other On-site Waste Management from Section 8 of Form R.
***nec:** not elsewhere classified.

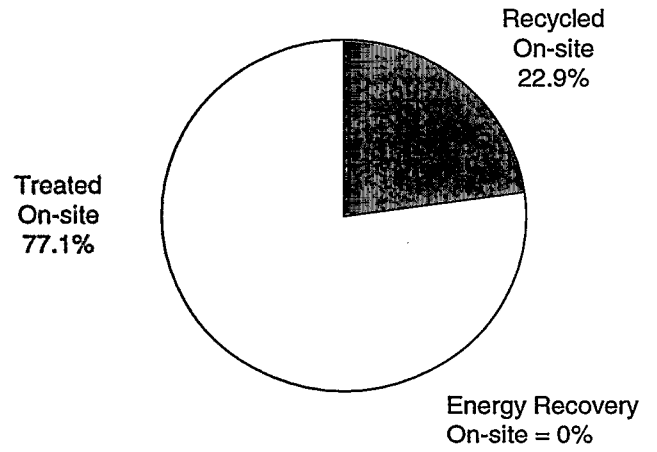


Figure 5-3. Distribution of TRI Other On-site Waste Management, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: Data from Section 8 of Form R.

Transfers Off-site for Further Waste Management

As shown in Table 5-5, the type of off-site transfer for further waste management with the largest amount reported in apparel and fabricated textiles was transfers to energy recovery. This category totaled 140,000 pounds, or 98.4% of the sector's total of 142,000 pounds for off-site transfers for further waste management. Figure 5-5 illustrates the dominance of this transfer type in the apparel and fabricated textiles sector's reporting.

The hats, caps, and millinery industry (SIC code 2353) reported the largest amounts in transfers to energy recovery, with 63,000 pounds. The automotive and apparel trimmings industry (SIC code 2396) ranked second with 59,000 pounds. In

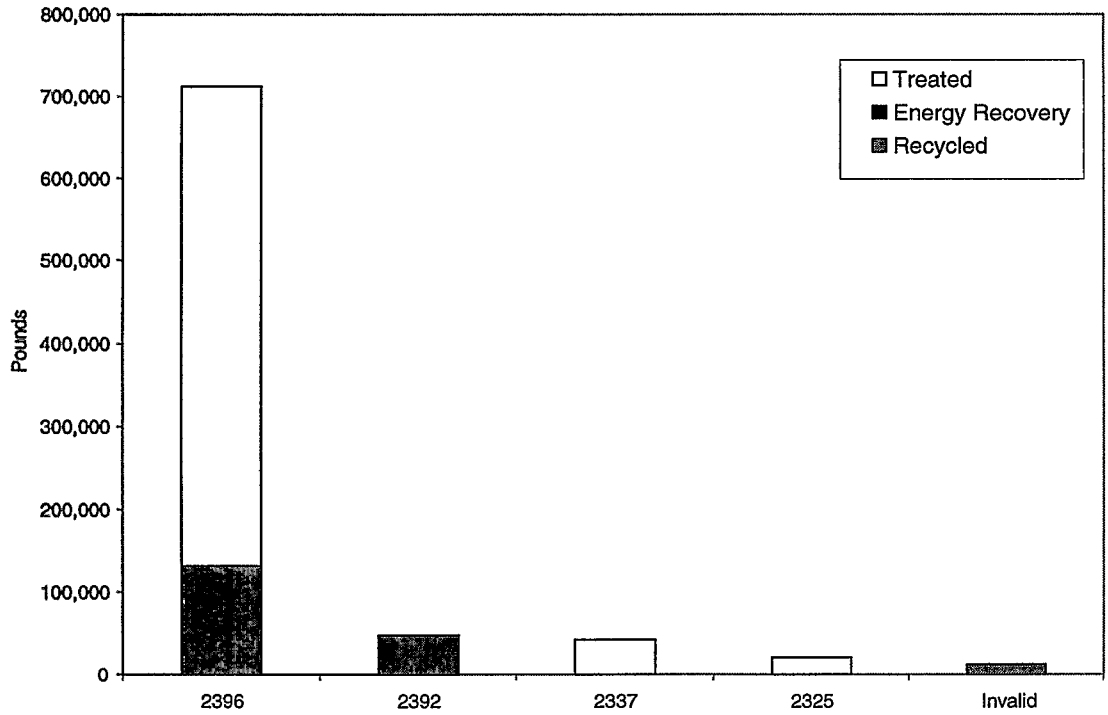


Figure 5-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: Other On-site Waste Management from Section 8 of Form R. Invalid SIC codes are codes beginning "23" that do not exist in the current Standard Industrial Classification code system.

Table 5-5. TRI Transfers Off-site for Further Waste Management, 1996: Apparel and Fabricated Textiles, SIC Code 23 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
2353	Hats, Caps, & Millinery	754	63,304	0	0	0	64,058
2396	Automotive & Apparel Trimmings	0	59,152	0	0	0	59,152
2399	Fabricated Textile Products, nec*	0	16,185	0	5	0	16,190
2389	Apparel & Accessories, nec*	0	755	500	0	0	1,255
2329	Men's & Boys' Clothing, nec*	686	257	35	0	0	978
2337	Women's & Misses' Suits & Coats	0	0	0	250	0	250
2321	Men's & Boys' Shirts	0	0	0	0	0	0
2325	Men's & Boys' Trousers & Slacks	0	0	0	0	0	0
2392	Household Furnishings, nec*	0	0	0	0	0	0
2393	Textile Bags	0	0	0	0	0	0
	Invalid SIC Code within SIC Code 23	0	0	0	0	0	0
	Total for SIC Code 23	1,440	139,653	535	255	0	141,883

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.
***nec:** not elsewhere classified.

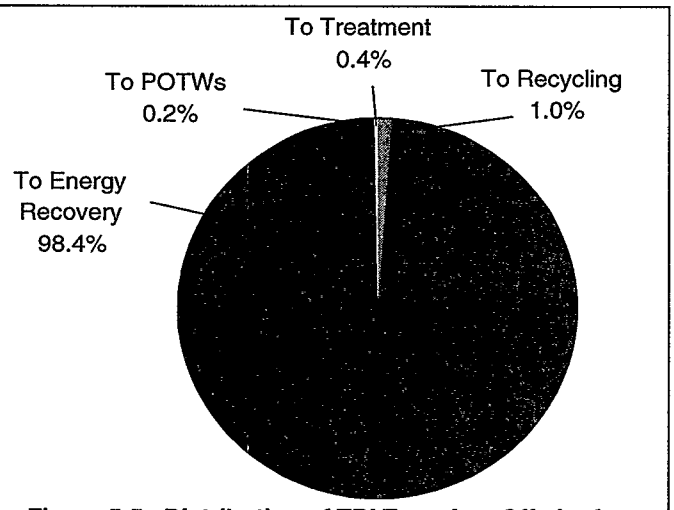


Figure 5-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

the hats, caps, and millinery industry, methyl isobutyl ketone was the chemical with the largest reported transfers to energy recovery, with 55,000 pounds. In the automotive and apparel trimmings industry, methyl ethyl ketone was the chemical with the largest such transfers, with 51,000 pounds.

Figure 5-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

1996 TRI Data by State for Apparel and Fabricated Textiles

In 1996, TRI forms reporting SIC codes in the apparel and fabricated textiles sector were submitted in 16 states, as listed in Table 5-6. Four states had more than 10% of the forms in this sector: Ohio with eight (17.0%), and Michigan and North Carolina with six (12.8%) each, and Pennsylvania with five (10.6%).

North Carolina reported the largest on-site releases and total on- and off-site releases in this sector, with 450,000 pounds in both categories. North Carolina also ranked second for transfers off-site for further waste management, with 57,000 pounds, and second for total production-related waste with 507,000 pounds.

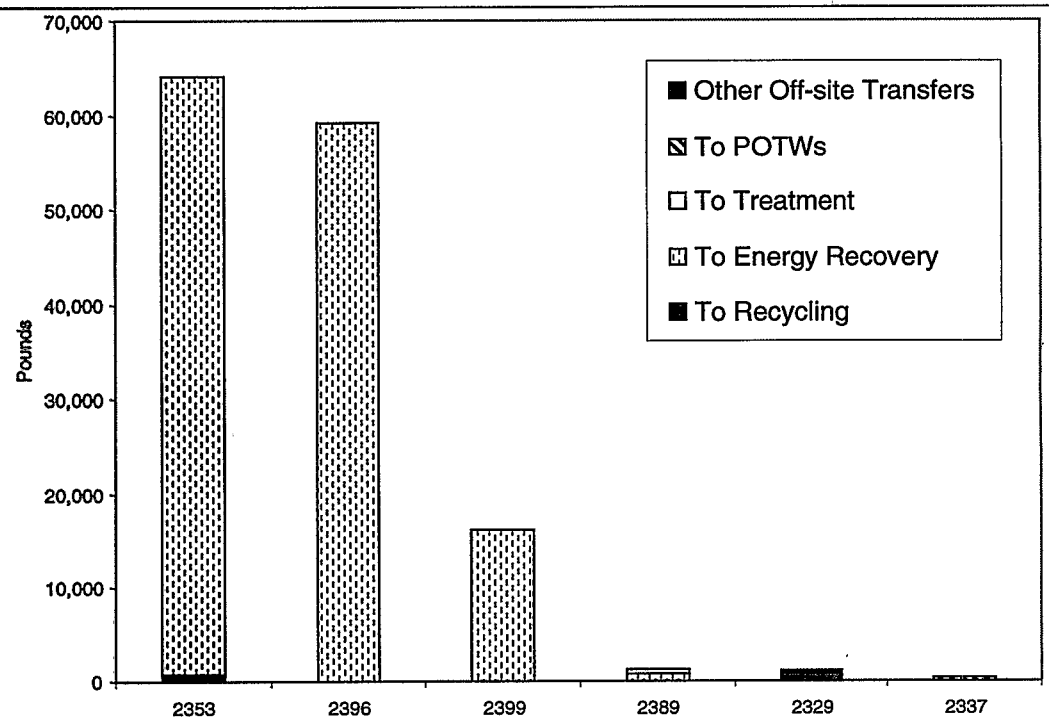


Figure 5-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: **Off-site Transfers for Further Waste Management** from Section 6 (excluding off-site transfers to disposal) of Form R.

Table 5-6. Summary of TRI Information by State, 1996: Apparel and Fabricated Textiles, SIC Code 23

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	1	2	0	2,005	0	2,005	42,000	250	44,000	3
Illinois	1	1	0	10,164	0	10,164	0	0	10,164	0
Indiana	1	1	0	0	0	0	0	686	686	0
Iowa	1	1	0	14,362	0	14,362	0	0	14,362	0
Kansas	1	1	0	0	0	0	38,347	0	38,347	0
Maine	1	1	0	16,375	255	16,630	0	1,255	17,191	0
Michigan	3	6	1	14,015	29,000	43,015	82,000	0	125,072	0
Missouri	1	4	0	252,495	0	252,495	11,872	0	264,587	0
New York	2	4	0	190,814	250	191,064	47,864	0	238,688	0
North Carolina	3	6	0	450,446	0	450,446	600	56,672	506,606	0
Ohio	3	8	1	87,225	14,100	101,325	591,640	2,480	693,985	0
Pennsylvania	3	5	0	42,030	11,700	53,730	0	759	54,484	0
Tennessee	1	1	0	12	0	12	0	0	10	0
Texas	2	4	0	103,110	0	103,110	19,915	63,304	186,329	0
Washington	1	1	0	24,400	7,872	32,272	0	292	32,564	0
Wisconsin	0	1	0	45,071	0	45,071	0	16,185	95,814	0
Total for SIC Code 23	25	47	2	1,252,524	63,177	1,315,701	834,238	141,883	2,322,889	3

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). There may be forms but no facilities in a single state because a facility reported different 4-digit SIC codes in the range of SIC codes 20 to 39 on its individual forms.

The largest off-site releases (transfers to disposal) were reported in Michigan, which had 29,000 pounds in this category. Michigan was also the state with the second-largest amount reported for other on-site waste management, with 82,000 pounds.

Ohio reported the largest other on-site waste management, with 592,000 pounds, and the largest total production-related waste, with 694,000 pounds. Texas was the state with the largest amount reported for transfers off-site for further waste management, with 63,000 pounds.

Missouri ranked second for total on- and off-site releases, with 252,000 pounds, and third for total production-related waste, with 265,000 pounds. New York was third for both total releases (191,000 pounds) and other on-site waste management (48,000 pounds).

Map 5-1 illustrates the geographic distribution of total on- and off-site releases in the apparel and fabricated textiles sector.

1996 TRI Data by Chemical for Apparel and Fabricated Textiles

The 15 chemicals with the largest on- and off-site releases accounted for all but a tiny portion of the apparel and fabricated textiles sector's total reported releases in 1996, as shown in Table 5-7. Reported releases of these 15 chemicals totaled 1.3 million pounds, or 99.98% of the sector's total releases.

Methyl ethyl ketone ranked first with reported releases of 440,000 pounds. 1,1,1-Trichloroethane (TCA) was second with 249,000 pounds. Under the United States' implementation of the Montreal Protocol to reduce ozone-depleters, production of TCA, an ozone-depleting chemical, was banned effective January 1, 1996. One facility in the automotive and apparel trimmings industry (SIC code 2396) reported 121,000 pounds of TCA air emissions for 1996. This facility projected releases of 20,000 pounds of TCA in 1997 and none in 1998. (Projected data for this sector are presented in "Projected Quantities of TRI Chemicals in Waste," later in this chapter. Facility projections are explained in Chapter 1.) Toluene was the third ranked chemical for on- and off-site releases, with 177,000 pounds.

The solvents reported in large amounts in this sector have uses in the cleaning and processing of textiles and fabrics or in fabric coatings. However, for most fabrics used in garment-making, these processes are generally conducted in the textile mills sector (SIC code 22). In the apparel and fabricated textiles sector, these chemicals are used in printing, stamping, and embossing fabric articles. Among these are automotive door and dashboard panels (automotive trimmings in SIC code 2396) and automotive tire and seat covers (miscellaneous fabricated textile products, SIC code 2399).

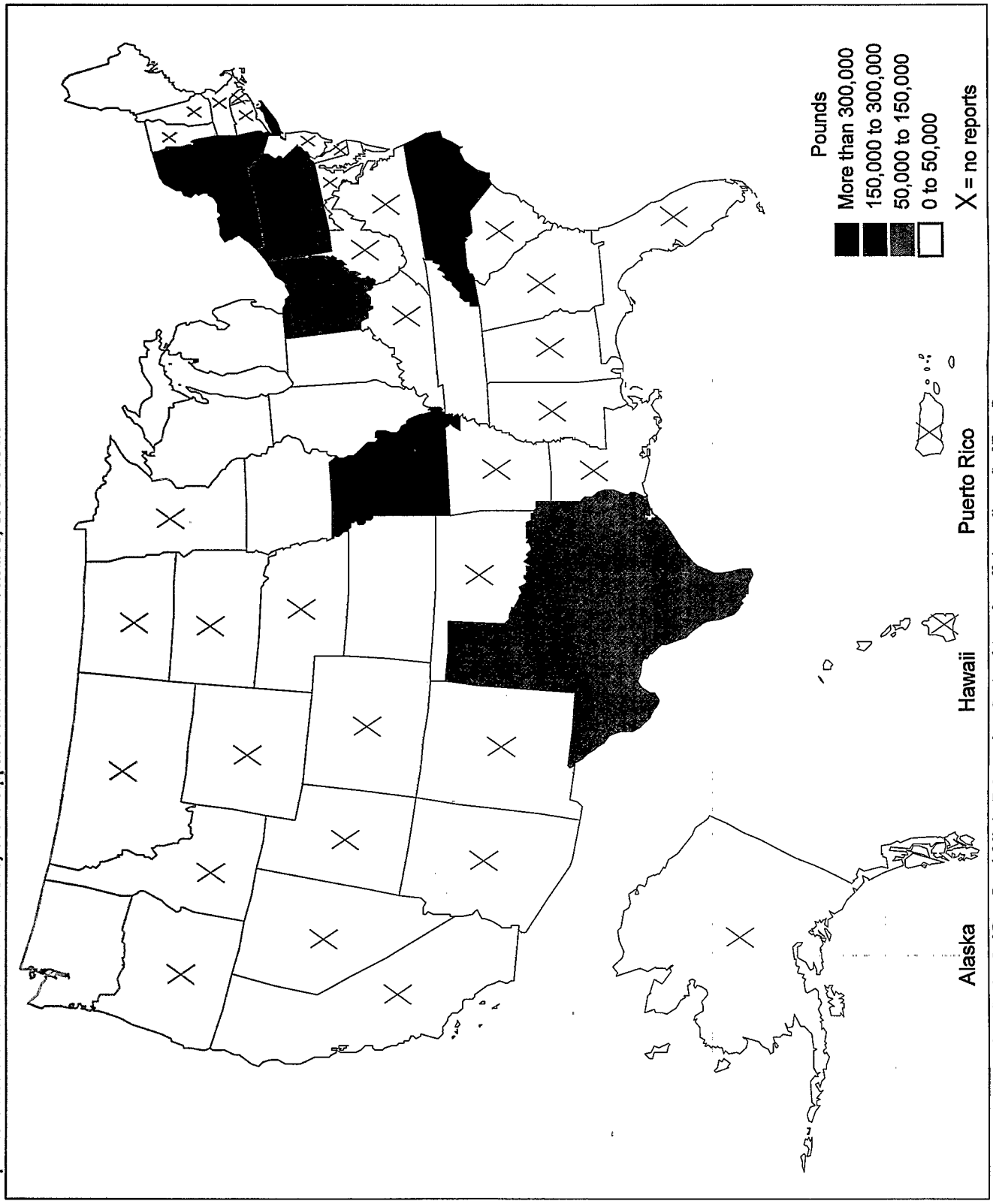
OSHA Carcinogens

In the apparel and fabricated textiles sector, on- and off-site releases of chemicals designated as OSHA carcinogens totaled 59,000 pounds in 1996, as shown in Table 5-8. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) This was 4.5% of all reported releases in the sector for the year.

Miscellaneous apparel and accessories (SIC code 2389) reported 44,000 pounds of releases of OSHA carcinogens, the largest amount in this sector. The miscellaneous fabricated textiles products industry (SIC code 2399) reported releases of 14,000 pounds of OSHA carcinogens.

Two of the 15 chemicals with the largest total releases reported in this sector were OSHA carcinogens: dichloromethane with 59,000 pounds and formaldehyde with 500 pounds (see Table 5-7). One other OSHA carcinogen was also reported in this sector: toluene diisocyanate with 12 pounds of total releases.

Map 5-1. Total On- and Off-site Releases, 1996: Apparel and Fabricated Textiles, SIC Code 23



Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

Table 5-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Apparel and Fabricated Textiles, SIC Code 23 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
78-93-3	Methyl ethyl ketone	439,675	0	0	0	0	0	439,675	0	439,675
71-55-6	1,1,1-Trichloroethane	248,883	0	0	0	0	0	248,883	0	248,883
108-88-3	Toluene	176,357	0	0	0	0	0	176,357	255	176,612
108-10-1	Methyl isobutyl ketone	132,100	0	0	0	0	0	132,100	0	132,100
110-54-3	n-Hexane	84,180	0	0	0	0	0	84,180	0	84,180
75-09-2	Dichloromethane	58,596	0	0	0	0	0	58,596	250	58,846
67-56-1	Methanol	46,576	0	0	0	0	0	46,576	0	46,576
108-95-2	Phenol	4,848	0	0	0	0	5	4,853	29,000	33,853
1330-20-7	Xylene (mixed isomers)	24,400	0	0	0	0	0	24,400	7,872	32,272
--	Antimony compounds	319	0	0	0	0	0	319	23,700	24,019
7664-41-7	Ammonia	18,690	2,100	0	0	0	0	18,690	250	18,940
--	Diisocyanates	12,012	0	0	0	0	0	12,012	0	12,012
872-50-4	N-Methyl-2-pyrrolidone	5,273	0	0	0	0	0	5,273	0	5,273
--	Zinc compounds	66	0	0	0	0	0	66	1,600	1,666
50-00-0	Formaldehyde	500	0	0	0	0	0	500	0	500
	Subtotal	1,252,475	0	0	0	0	5	1,252,480	62,927	1,315,407
	Total for SIC Code 23	1,252,519	0	0	0	0	5	1,252,524	63,177	1,315,701

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

Table 5-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Apparel and Fabricated Textiles, SIC Code 23 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2389	Apparel & Accessories, nec*	44,234	0	0	0	0	0	44,234	250	44,484
2399	Fabricated Textile Products, nec*	14,362	0	0	0	0	0	14,362	0	14,362
2337	Women's & Misses' Suits & Coats	500	0	0	0	0	0	500	0	500
2321	Men's & Boys' Shirts	12	0	0	0	0	0	12	0	12
	Subtotal	59,108	0	0	0	0	0	59,108	250	59,358
	Total for SIC Code 23	1,252,519	0	0	0	0	5	1,252,524	63,177	1,315,701

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.
***nec:** not elsewhere classified.

Figure 5-7 shows the on- and off-site releases of OSHA carcinogens by industries in the apparel and fabricated textiles sector.

1996 TRI Chemicals in Waste for Apparel and Fabricated Textiles

As shown in Table 5-9, most of the total production-related waste in the apparel and fabricated textiles sector for 1996 was reported as released. Quantities released on- and off-site totaled 1.3 million pounds, or 57.7% of the sector's 2.3 million pounds of total production-related waste. Another 27.7% (643,000 pounds) was reported as treated on-site. The automotive and apparel trimmings industry (SIC code 2396) reported the largest quantities in both categories, with 549,000 pounds of releases and 581,000 pounds of on-site treatment.

Figure 5-8 displays the distribution of production-related waste in the apparel and fabricated textiles sector's 1996 reporting by waste

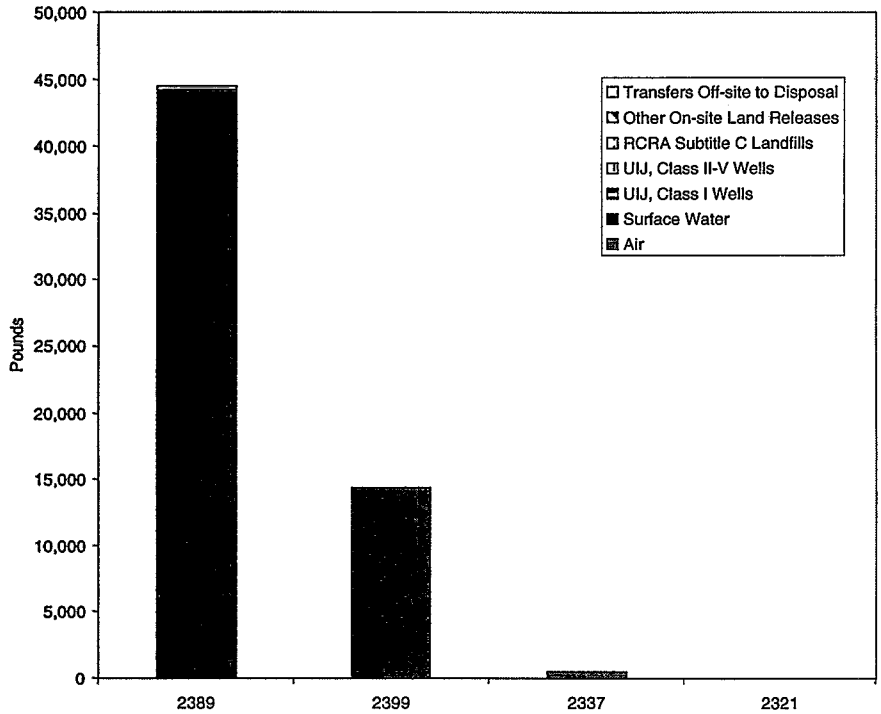


Figure 5-7. TRI On-site and Off-site Releases of OSHA Carcinogens, by SIC Code, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. UIJ = underground injection.

Table 5-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Apparel and Fabricated Textiles, SIC Code 23 (In Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2396	Automotive & Apparel Trimmings	131,240	0	581,347	0	59,152	0	549,019	1,320,758	0
	Invalid SIC Code within SIC Code 23	11,872	0	0	0	0	0	252,715	264,587	0
2392	Household Furnishings, nec*	47,864	0	0	0	0	0	176,205	224,069	0
2353	Hats, Caps, & Millinery	0	0	0	754	63,304	0	145,138	209,196	0
2399	Fabricated Textile Products, nec*	0	0	0	0	16,185	0	115,855	132,040	0
2389	Apparel & Accessories, nec*	0	0	0	0	532	195	64,338	65,065	0
2337	Women's & Misses' Suits & Coats	0	0	42,000	0	0	0	2,000	44,000	3
2329	Men's & Boys' Clothing, nec*	0	0	0	686	257	7,907	24,400	33,250	0
2325	Men's & Boys' Trousers & Slacks	0	0	19,915	0	0	0	2	19,917	0
2393	Textile Bags	0	0	0	0	0	0	9,935	9,935	0
2321	Men's & Boys' Shirts	0	0	0	0	0	0	72	72	0
	Total for SIC Code 23	190,976	0	643,262	1,440	139,430	8,102	1,339,679	2,322,889	3

Note: Data from Section 8 of Form R.
*nec: not elsewhere classified.

management option. Distribution of production-related waste for the top industries in the sector appears in Figure 5-9.

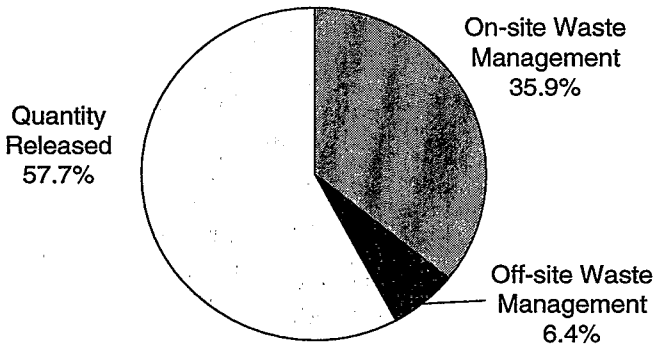


Figure 5-8. Distribution of TRI Production-related Waste, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: Data from Section 8 of Form R.

Projected Quantities of TRI Chemicals in Waste

Projections by the apparel and fabricated textiles sector, presented in Table 5-10, show that quantities released on- and off-site were expected to decrease by 65.7%, or 880,000 pounds, through 1998. Decreases were projected for all categories including off-site treatment (43.3% or 3,500 pounds), on-site recycling (27.4% or 52,000 pounds) and off-site energy recovery (17.7% or 25,000 pounds). Overall, these reductions were expected to bring about a 42.9% decrease (997,000 pounds) in total production-related waste by 1998. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) Figure 5-10 shows the sector's projected change in waste management through 1998.

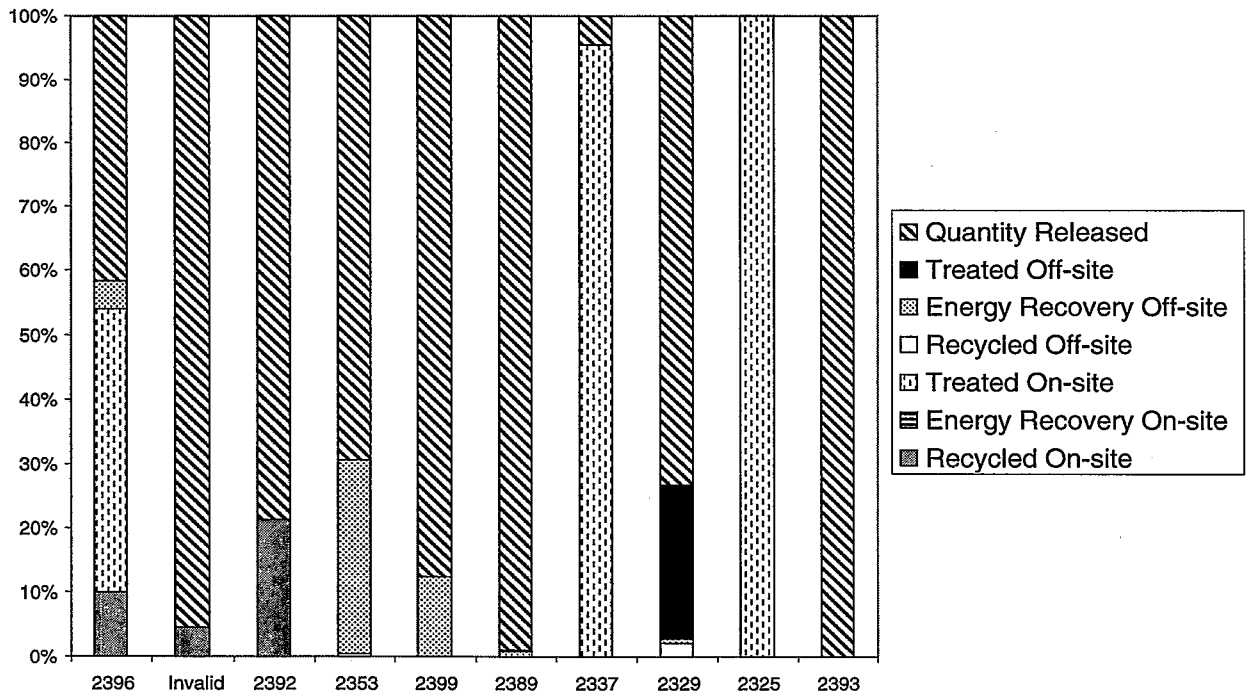


Figure 5-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: Data from Section 8 of Form R. Invalid SIC codes are codes beginning "23" that do not exist in the current Standard Industrial Classification code system.

Table 5-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Apparel and Fabricated Textiles, SIC Code 23

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	190,976	8.2	170,389	10.1	138,640	10.5
Energy Recovery On-site	0	0.0	0	0.0	0	0.0
Treated On-site	643,262	27.7	612,500	36.3	606,300	45.7
Off-site Waste Management						
Recycled Off-site	1,440	0.1	1,400	0.1	1,400	0.1
Energy Recovery Off-site	139,430	6.0	124,864	7.4	114,814	8.7
Treated Off-site	8,102	0.3	5,390	0.3	4,590	0.3
Quantity Released On- and Off-site	1,339,679	57.7	772,590	45.8	459,997	34.7
Total Production-related Waste for SIC Code 23	2,322,889	100.0	1,687,133	100.0	1,325,741	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-10.8	-18.6	-27.4
Energy Recovery On-site	--	--	--
Treated On-site	-4.8	-1.0	-5.7
Off-site Waste Management			
Recycled Off-site	-2.8	0.0	-2.8
Energy Recovery Off-site	-10.4	-8.0	-17.7
Treated Off-site	-33.5	-14.8	-43.3
Quantity Released On- and Off-site	-42.3	-40.5	-65.7
Total Production-related Waste for SIC Code 23	-27.4	-21.4	-42.9

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

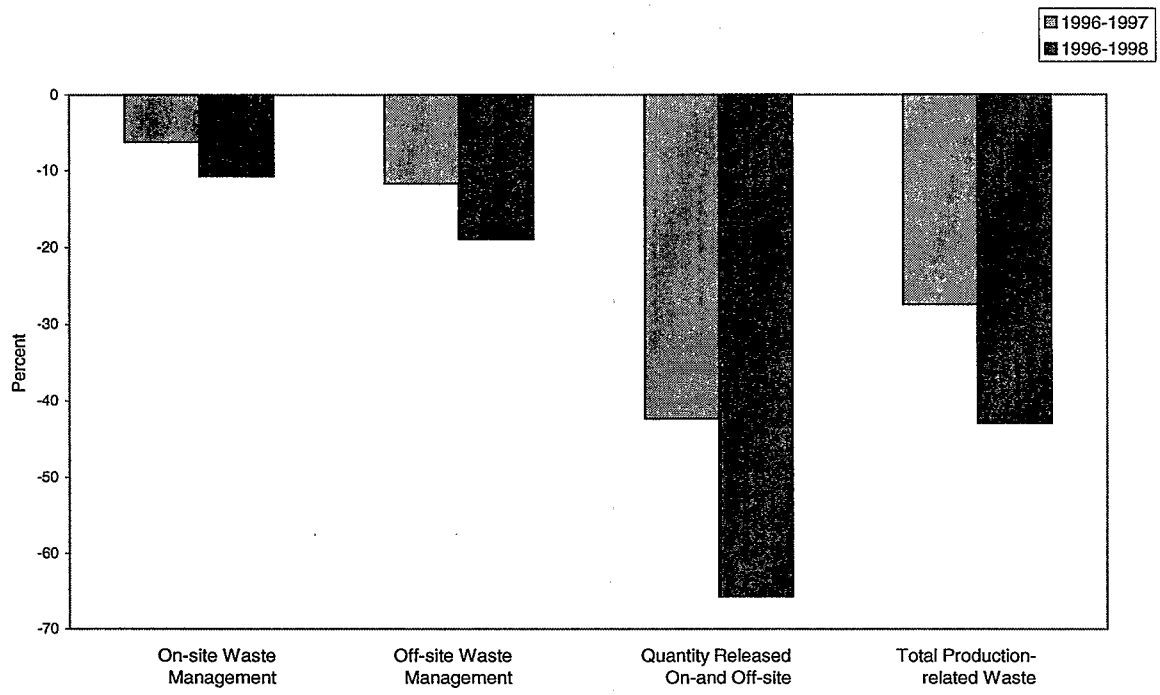


Figure 5-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Apparel and Fabricated Textiles (SIC Code 23)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

The effect of the projected reductions in the apparel and fabricated textiles sector's reporting would be to increase the role of on-site treatment in the sector's management of TRI chemicals in waste, from 27.7% of production-related waste in 1996 to 45.7% in 1998. At the same time, releases would decrease from 57.7% of production-related waste in 1996 to 34.7% in 1998. While this is still a high percentage for releases, the projected changes indicate improvement in the sector's waste management practices as measured by the waste management hierarchy, explained in Chapter 1. In that hierarchy of options, releases are the least environmentally desirable action. However, treatment is still a less preferred option, for environmental consequences, than recycling or energy recovery.

Source Reduction Activity

Approximately one-third (34.0%) of the forms submitted in the apparel and fabricated textiles sector indicated that one or more source reduction activities was being implemented for that chemical in 1996. Seven of the 10 industries in the sector reported such activity. Six forms reported process modifications, and six forms reported raw materials modifications, the categories most likely to represent innovative source reduction projects. Table 5-11 presents these data.

Year-to-Year Comparisons for Apparel and Fabricated Textiles

1995-1996 TRI Data for Apparel and Fabricated Textiles

The number of forms submitted in the apparel and fabricated textiles sector was about the same in 1995 and 1996, increasing from 46 in 1995 to 47 in 1996, as shown in Table 5-12.

Table 5-11. Number of Forms Reporting Source Reduction Activity, 1996: Apparel and Fabricated Textiles, SIC Code 23

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
2321	Men's & Boys' Shirts	3	3	100.0	0	3	0	0	0	0	0	0
2325	Men's & Boys' Trousers & Slacks	1	0	0.0	0	0	0	0	0	0	0	0
2329	Men's & Boys' Clothing, nec*	2	0	0.0	0	0	0	0	0	0	0	0
2337	Women's & Misses' Suits & Coats	2	2	100.0	2	0	2	0	2	0	0	0
2353	Hats, Caps, & Millinery	7	3	42.9	1	0	0	1	1	1	0	0
2389	Apparel & Accessories, nec*	5	1	20.0	0	0	0	1	0	0	0	0
2392	Household Furnishings, nec*	3	3	100.0	0	0	0	3	0	0	0	0
2393	Textile Bags	2	0	0.0	0	0	0	0	0	0	0	0
2396	Automotive & Apparel Trimmings	14	3	21.4	0	0	0	1	2	0	0	0
2399	Fabricated Textile Products, nec*	4	1	25.0	0	0	0	0	1	0	0	0
	Invalid SIC Code within SIC Code 23	4	0	0.0	0	0	0	0	0	0	0	0
	Total for SIC Code 23	47	16	34.0	3	3	2	6	6	1	0	0

*nec: not elsewhere classified.

On- and Off-site Releases

The sector's reported on- and off-site releases for 1995 and 1996 also appear in Table 5-12. Total releases increased slightly from 1.29 million pounds to 1.32 million pounds. On-site releases in the apparel and fabricated textiles sector decreased by 7,000 pounds from 1995 to 1996.

Off-site releases (transfers to disposal) reported in the apparel and fabricated textiles sector more than doubled from 1995 to 1996, from 28,000 pounds to 63,000 pounds.

Figure 5-11 illustrates the sector's change in releases for 1995-1996 in percentage terms.

Other On-site Waste Management

Amounts of other on-site waste management reported in the apparel and fabricated textiles sector increased from 640,000 pounds in 1995 to 834,000 pounds in 1996, as shown in Table 5-12. The change from 1995 to 1996 was an increase of 195,000 pounds or 30.4%, occurring in both on-site treatment and on-site recycling.

Transfers Off-site for Further Waste Management

Table 5-12 also presents the sector's 1995-1996 data for transfers off-site for further waste management. Such transfers decreased from 170,000 pounds to 142,000 pounds in this period, a 16.7% reduction. This represented a substantial drop in transfers to treatment (99.1%, or 60,000 pounds), partly offset by an increase in transfers to energy recovery (30.9%, or 33,000 pounds).

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

Table 5-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Apparel and Fabricated Textiles, SIC Code 23

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	23	25	8.7
Total Forms	46	47	2.2
Form Rs	45	45	0.0
Form As	1	2	100.0
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	1,258,927	1,252,519	-0.5
Fugitive Air	81,334	128,987	58.6
Point Source Air	1,177,593	1,123,532	-4.6
Surface Water Discharges	5	0	-100.0
Underground Injection	0	0	--
On-site Land Releases	250	5	-98.0
Total On-site Releases	1,259,024	1,252,524	-0.5
Off-site Releases			
Transfers Off-site to Disposal	27,842	63,177	126.9
Total On- and Off-site Releases	1,287,024	1,315,701	2.2
Other On-site Waste Management			
Recycled On-site	138,311	190,976	38.1
Energy Recovery On-site	0	0	--
Treated On-site	501,405	643,262	28.3
Total Other On-site Waste Management	639,716	834,238	30.4
Transfers Off-site for Further Waste Management			
Transfers to Recycling	3,021	1,440	-52.3
Transfers to Energy Recovery	106,707	139,653	30.9
Transfers to Treatment	60,300	535	-99.1
Transfers to POTWs	255	255	0.0
Other Off-site Transfers	0	0	--
Total Transfers Off-site for Further Waste Management	170,283	141,883	-16.7

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

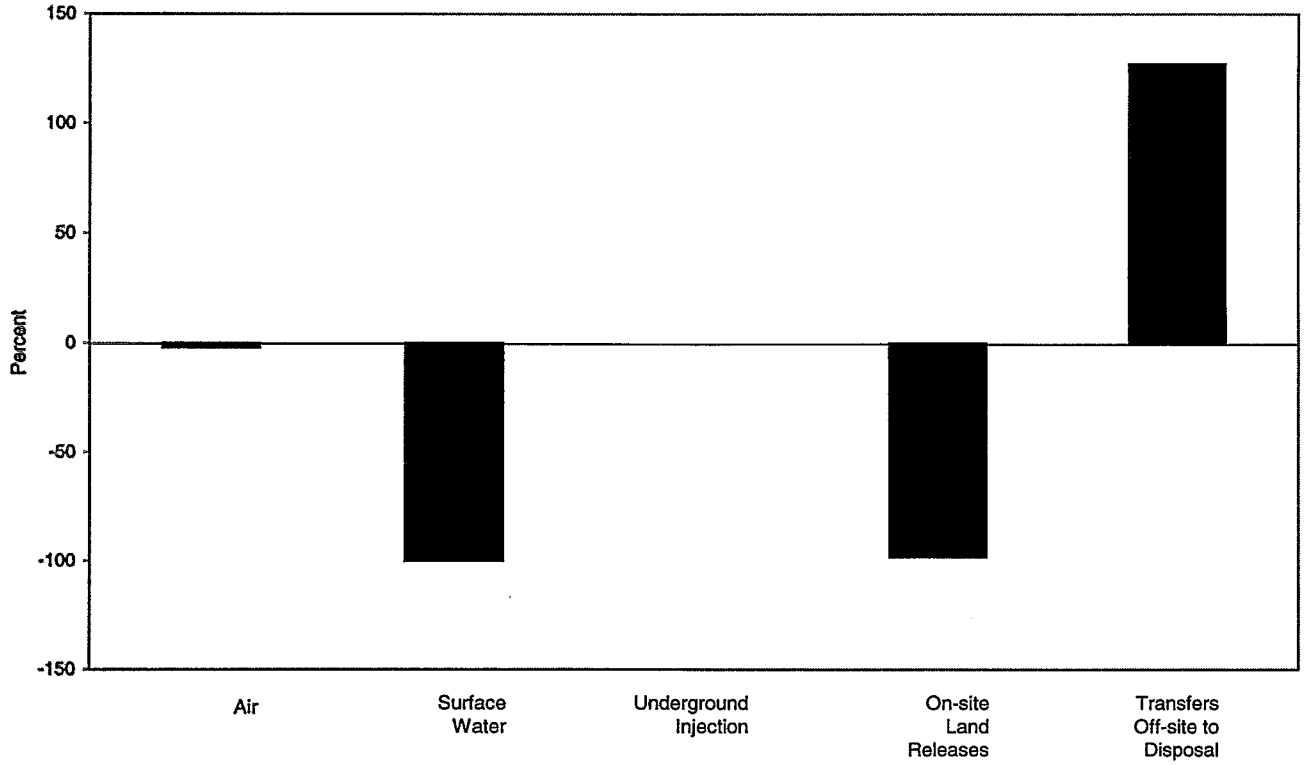


Figure 5-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

1988-1996 TRI Data for Apparel and Fabricated Textiles

Reporting by four-digit SIC codes in this sector reflects the level of economic change that has characterized the apparel trades in the last decade. In a number of industries, TRI forms have been filed in only one or two of the years shown in these tables (1988 and 1994-1996). These may represent plant closures, relocation of operations in other parts of the United States or abroad, changes in product lines, reinterpretation of SIC codes when facility ownership changes, or reporting errors in earlier years. In several categories of data reported to TRI, the largest changes result from amounts reported in 1988 and "no reports received" in later years or vice versa.

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

The number of forms for "core" chemicals decreased from 45 forms in 1988 to 37 forms in

1996 in the apparel and fabricated textiles sector, as shown in Table 5-13.

Total on- and off-site releases reported in this sector increased from 1.0 million pounds in 1988 to 1.2 million pounds in 1996, an increase of 16.5%. This change arose from increased reporting of point source air emissions, from 620,000 pounds in 1988 to 1.0 million pounds in 1996. Small decreases, of about 40,000 pounds each, were reported in on-site land releases and in off-site releases (transfers to disposal).

Figure 5-12 illustrates percentage change in on- and off-site releases from 1988 to 1996 for this sector.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. Table 5-13 presents these data for recent years. For this sector, other on-site waste management increased from 739,000 pound in 1994 to 781,000 pounds in 1996. This included a 97,000-pound increase in on-site treatment, partly offset by a 56,000-pound decrease in on-site recycling.

Off-site transfers to treatment and to POTWs decreased by nearly 100% from 1988 to 1996 in the apparel and fabricated textiles sector's reporting, as shown in Table 5-13.

1988-1996 Data for Four-Digit Industries in Apparel and Fabricated Textiles

Tables 5-14 through 5-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 23. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Table 5-14 provides release data for all four-digit SIC codes in the apparel and fabricated textiles sector for 1988-1996.

The largest decrease in on- and off-site releases in this sector resulted from reporting of 98,000 pounds of air emissions in the pleating and stitching industry (SIC code 2395) in 1988 and no forms filed in this industry in 1996. Forms were submitted in all comparison years on Table 5-14 in the miscellaneous apparel and accessories industry (SIC code 2389), which had the second largest decrease. This was a reduction of 97,000 pounds in air emissions and total releases from 1988 to 1996. All other net decreases for 1988-1996 in this sector represented forms filed in 1988 with none submitted in 1996.

The largest increase in total releases reported in this sector was in automotive and apparel trimmings (SIC code 2396), from 247,000 pounds in 1988 to 537,000 pounds in 1996. Miscellaneous household furnishings (SIC code 2392) ranked second for 1988-1996 increase in releases, reporting 250 pounds in 1988 and 176,000 pounds in 1996. The industry with the third-largest increase in reported releases was miscellaneous fabricated textiles (SIC code 2399). This industry reported 750 pounds in 1988 and 81,000 pounds in 1996. Increases in all three industries were attributable to air emissions.

Other On-site Waste Management

The women's and misses' suits and coats industry (SIC code 2337) reported the largest 1994-1996 decrease in other on-site waste management (on-site waste management data were not collected in 1988). This industry reported 109,000 pounds in 1994 and 42,000 pounds in 1996, entirely in on-site treatment. Schiffli machine embroideries (SIC code 2397) reported 39,000 pounds of on-site treatment in 1994; no reports were filed in this industry in 1996. The next-largest 1994-1996 reduction was reported in miscellaneous apparel and accessories (SIC code 2389), from 31,000 pounds to zero (forms submitted with zero amounts in on-site waste management categories).

Table 5-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Apparel and Fabricated Textiles, SIC Code 23

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	31	33	24	22	-29.0
Total Forms	45	56	41	37	-17.8
Form Rs	45	56	41	36	-20.0
Form As	NA	NA	0	1	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	881,030	1,311,246	1,231,889	1,132,350	28.5
Fugitive Air	260,793	271,594	73,546	97,960	-62.7
Point Source Air	620,237	1,039,652	1,158,343	1,035,190	66.9
Surface Water Discharges	250	3	5	0	-100.0
Underground Injection	0	0	0	0	--
On-site Land Releases	40,849	25	250	5	-100.0
Total On-site Releases	922,129	1,311,274	1,232,144	1,132,355	22.8
Off-site Releases					
Transfers Off-site to Disposal	103,568	69,673	27,842	62,927	-39.2
Total On- and Off-site Releases	1,025,697	1,380,947	1,259,986	1,195,282	16.5
Other On-site Waste Management					
Recycled On-site	NA	245,936	138,311	190,376	NA
Energy Recovery On-site	NA	0	0	600	NA
Treated On-site	NA	493,412	501,405	590,347	NA
Total Other On-site Waste Management	NA	739,348	639,716	780,723	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	88,230	3,021	1,440	NA
Transfers to Energy Recovery	NA	125,515	103,627	136,573	NA
Transfers to Treatment	45,425	121,699	60,050	535	-98.8
Transfers to POTWs	276,730	2,636	255	255	-99.9
Other Off-site Transfers	5,351	0	0	0	-100.0
Total Transfers Off-site for Further Waste Management	NA	338,080	166,953	138,803	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. NA: not required to be reported in that year.

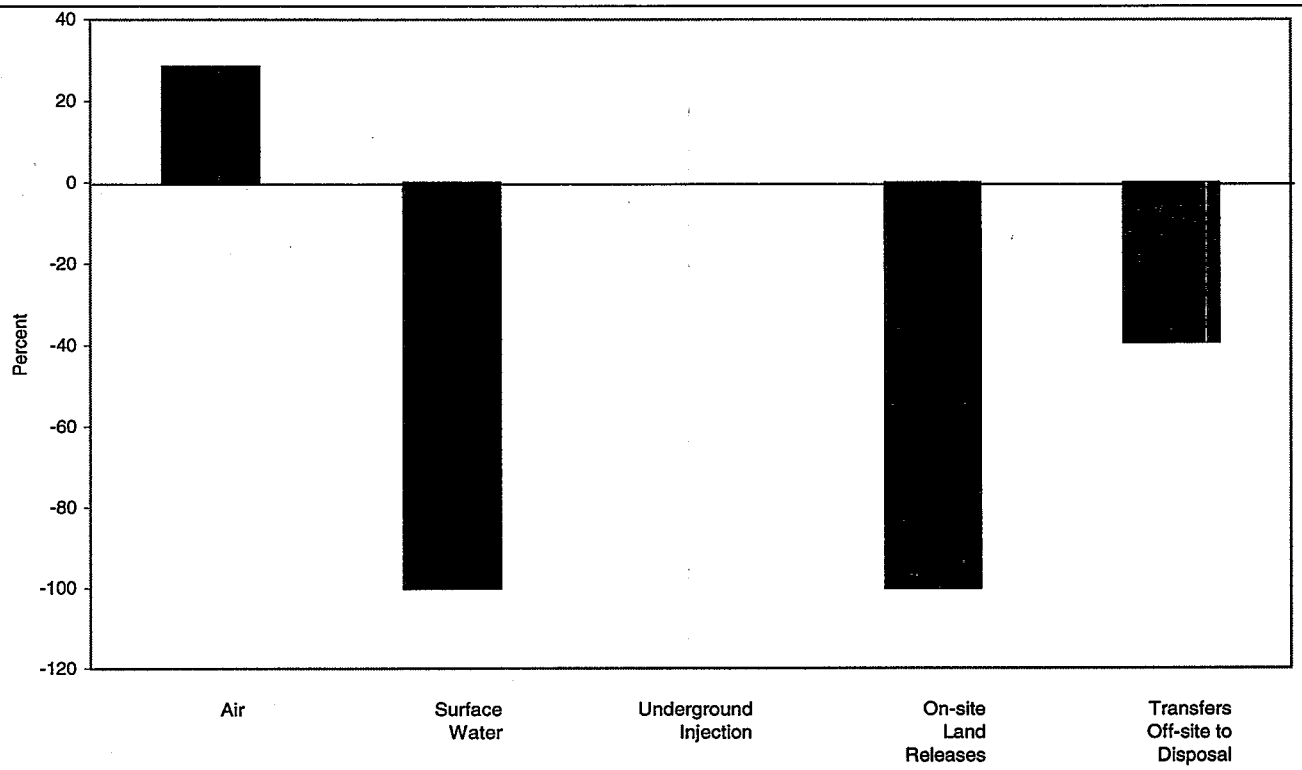


Figure 5-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

The two industries with the largest increases in other on-site waste management for 1994 to 1996 were the same as those with the largest increases in total releases for 1988 to 1996: automotive and apparel trimmings (SIC code 2396), with 493,000 pounds in 1994 and 679,000 pounds in 1996, and miscellaneous household furnishings (SIC code 2392), with 44,000 pounds in 1994 and 48,000 pounds in 1996. The reported increases occurred in on-site treatment for automotive and apparel trimmings industry and in on-site recycling for the household furnishings industry.

On-site waste management data for 1994-1996 appear in Table 5-15.

Transfers Off-site for Further Waste Management

The hats, caps, and millinery industry (SIC code 2353) had the largest decrease in transfers off-site for further waste management reported for 1994-1996 in the apparel and fabricated textiles sector (data for some types of off-site transfers were not collected in 1988). This industry reported 72,000 pounds in 1994 and 64,000 pounds in 1996; an increase in transfers to energy recovery was more than offset by reductions in transfers to recycling and treatment. The fur goods industry (SIC code 2371), ranking second for decreases, had 6,000 pounds of transfers off-site for further waste management in 1994, mostly in transfers to

Table 5-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Apparel and Fabricated Textiles, SIC Code 23

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pound
2321	Men's & Boys' Shirts	96	60	0	0	0	60	0	60
		95	20	0	0	0	20	0	20
		94	No reports received						
		88	No reports received						
2322	Men's & Boys' Underwear & Nightwear	96	No reports received						
		95	No reports received						
		94	10	1	0	20	31	0	31
		88	19,361	0	0	0	19,361	0	19,361
2326	Men's & Boys' Work Clothing	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	50	0	0	0	50	11,441	11,491
2329	Men's & Boys' Clothing, nec*	96	24,400	0	0	0	24,400	7,872	32,272
		95	37,407	0	0	0	37,407	7,742	45,149
		94	42,997	0	0	0	42,997	0	42,997
		88	0	0	0	0	0	9,943	9,943
2337	Women's & Misses' Suits & Coats	96	2,005	0	0	0	2,005	0	2,005
		95	4,055	0	0	0	4,055	0	4,055
		94	5,355	0	0	0	5,355	0	5,355
		88	No reports received						
2341	Women's & Children's Underwear	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	22,200	0	0	0	22,200	0	22,200
2353	Hats, Caps, & Millinery	96	145,138	0	0	0	145,138	0	145,138
		95	237,956	0	0	0	237,956	0	237,956
		94	346,903	0	0	0	346,903	0	346,903
		88	70,100	0	0	0	70,100	11,899	81,999
2371	Fur Goods	96	No reports received						
		95	No reports received						
		94	40,412	0	0	0	40,412	0	40,412
		88	No reports received						
2381	Fabric Dress & Work Gloves	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	8,900	0	0	0	8,900	0	8,900
2385	Waterproof Outerwear	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	2,000	0	0	0	2,000	0	2,000

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 23 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 5-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Apparel and Fabricated Textiles, SIC Code 23, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2386	Leather & Sheep-lined Clothing	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	43,120	0	0	0	43,120	0	43,120
2389	Apparel & Accessories, nec*	96	64,239	0	0	0	64,239	505	64,744
		95	77,687	0	0	0	77,687	250	77,937
		94	83,857	0	0	0	83,857	0	83,857
		88	161,302	0	0	250	161,552	85	161,637
2392	Household Furnishings, nec*	96	176,205	0	0	0	176,205	0	176,205
		95	174,580	0	0	0	174,580	0	174,580
		94	149,694	0	0	0	149,694	0	149,694
		88	250	0	0	0	250	0	250
2393	Textile Bags	96	10	0	0	0	10	250	260
		95	10	0	0	0	10	0	10
		94	10	0	0	0	10	0	10
		88	No reports received						
2394	Canvas & Related Products	96	No reports received						
		95	0	0	0	0	0	0	0
		94	10	0	0	0	10	0	10
		88	No reports received						
2395	Pleating & Stitching	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	98,062	0	0	0	98,062	0	98,062
2396	Automotive & Apparel Trimmings	96	494,381	0	0	5	494,386	42,600	536,986
		95	470,710	0	0	0	470,710	12,150	482,860
		94	430,493	0	0	5	430,498	61,973	492,471
		88	217,144	0	0	0	217,144	29,700	246,844
2397	Schiffli Machine Embroideries	96	No reports received						
		95	No reports received						
		94	255	0	0	0	255	0	255
		88	No reports received						
2399	Fabricated Textile Products, nec*	96	69,597	0	0	0	69,597	11,700	81,297
		95	74,387	5	0	250	74,642	7,700	82,342
		94	16,508	0	0	0	16,508	7,700	24,208
		88	750	0	0	0	750	0	750
	Multiple within SIC Code 23	96	No reports received						
		95	No reports received						
		94	33,595	0	0	0	33,595	0	33,595
		88	36,807	250	0	99	37,156	0	37,156
	Invalid SIC Code within SIC Code 23	96	156,315	0	0	0	156,315	0	156,315
		95	155,077	0	0	0	155,077	0	155,077
		94	161,147	2	0	0	161,149	0	161,149
		88	200,984	0	0	40,500	241,484	40,500	281,984
	Total for SIC Code 23	96	1,132,350	0	0	5	1,132,355	62,927	1,195,282
		95	1,231,889	5	0	250	1,232,144	27,842	1,259,986
		94	1,311,246	3	0	25	1,311,274	69,673	1,380,947
		88	881,030	250	0	40,849	922,129	103,568	1,025,697

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 23 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 5-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Apparel and Fabricated Textiles, SIC Code 23

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total On-site Waste Management Pounds
2321	Men's & Boys' Shirts	96	0	0	0	0
		95	0	0	0	0
		94	No reports received			
		88	No reports received			
2322	Men's & Boys' Underwear & Nightwear	96	No reports received			
		95	No reports received			
		94	0	0	1,609	1,609
		88	NA	NA	NA	NA
2326	Men's & Boys' Work Clothing	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2329	Men's & Boys' Clothing, nec*	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2337	Women's & Misses' Suits & Coats	96	0	0	42,000	42,000
		95	0	0	81,000	81,000
		94	0	0	109,000	109,000
		88	No reports received			
2341	Women's & Children's Underwear	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2353	Hats, Caps, & Millinery	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2371	Fur Goods	96	No reports received			
		95	No reports received			
		94	0	0	0	0
		88	NA	NA	NA	NA
2381	Fabric Dress & Work Gloves	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2385	Waterproof Outerwear	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 23 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 5-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Apparel and Fabricated Textiles, SIC Code 23, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total On-site Waste Management Pounds
2386	Leather & Sheep-lined Clothing	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2389	Apparel & Accessories, nec*	96	0	0	0	0
		95	0	0	0	0
		94	31,405	0	0	31,405
		88	NA	NA	NA	NA
2392	Household Furnishings, nec*	96	47,864	0	0	47,864
		95	42,230	0	0	42,230
		94	44,110	0	0	44,110
		88	NA	NA	NA	NA
2393	Textile Bags	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			
2394	Canvas & Related Products	96	No reports received			
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			
2395	Pleating & Stitching	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2396	Automotive & Apparel Trimmings	96	130,640	0	548,347	678,987
		95	76,670	0	419,000	495,670
		94	149,030	0	343,848	492,878
		88	NA	NA	NA	NA
2397	Schiffli Machine Embroideries	96	No reports received			
		95	No reports received			
		94	0	0	38,955	38,955
		88	No reports received			
2399	Fabricated Textile Products, nec*	96	0	0	0	0
		95	0	0	1,405	1,405
		94	0	0	0	0
		88	NA	NA	NA	NA
	Multiple within SIC Code 23	96	No reports received			
		95	No reports received			
		94	0	0	0	0
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 23	96	11,872	0	0	11,872
		95	19,411	0	0	19,411
		94	21,391	0	0	21,391
		88	NA	NA	NA	NA
	Total for SIC Code 23	96	190,376	0	590,347	780,723
		95	138,311	0	501,405	639,716
		94	245,936	0	493,412	739,348
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 23 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

treatment and no forms in 1996. The miscellaneous apparel and accessories industry (SIC code 2389) was the third-ranked industry, reporting 7,000 pounds in 1994 and 1,000 in 1996. This reduction was attributable to transfers to recycling.

The automotive and apparel trimmings industry (SIC code 2396) reported the largest increase in transfers off-site for further waste management for 1994-1996, from 36,000 pounds in 1994 and 56,000 pounds in 1996. The miscellaneous fabricated textile products industry (SIC code 2399) ranked second for increases in this category, increasing from 5,000 pounds to 16,000 pounds. The principal factor in both industries' increase was reporting of larger amounts of transfers to energy recovery. No other sectors reported increases from 1994 to 1996.

Table 5-16 presents data for the apparel and fabricated textiles sector's transfers off-site for further waste management.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Glenmore Plastic Industries in Brooklyn, New York (did not report in 1988, SIC code 2392 in 1996), was first in increases with an overall increase of 176,000 pounds. The chemical 1,1,1-trichloroethane was responsible for 71% of the increase. Printing operations for shower curtains and table cloths used 1,1,1-trichloroethane as a solvent for inks. The plant did not start using the chemical until after the 1988 reporting year. However, beginning in 1992, the facility began converting to water-based inks. Since the 1996 reporting year, Glenmore has switched entirely to water-based inks and has ceased using 1,1,1-trichloroethane altogether. (For more information on the Glenmore facility, see "Facilities with Large Increases and Decreases in Waste Management, 1991-1996.")

Tri-Con Industries, Ltd., in Columbia, Missouri (did not report in 1988, SIC code 2351 in 1996), was the second-ranked facility for increases with a total increase of 156,000 pounds. Methyl ethyl ketone accounted for 75% of the increase. The facility closed in 1996. No information was available.

Hat Brands, Inc., in Garland, Texas (did not report in 1988, SIC code 2353 in 1996), was third in increases with 103,000 pounds. 82,000 pounds of methyl isobutyl ketone (MIBK) stack emissions were reported in 1996. This made up 80% of the facility's overall increase. Now operating under the name, HATCO, the facility is the site of straw hat manufacture. The straw hats are coated with a lacquer that contains MIBK. The facility contact stated that no information was available for reporting years prior to 1995 and that it was unclear why the facility did not report in 1988.

Champion Products in Perry, New York (SIC code 2389), was first in decreases with 97,000 pounds. A 55,000 pound reduction in dichloromethane reporting accounted for 57% of the facility's overall decrease. Between 1988 and 1996, the facility's production focus shifted from cotton to nylon athletic wear. Less dichloromethane was required to clean the nylon products, according to the facility contact. The facility has also undergone a decrease in production between comparison years.

E.R. Moore Company in Chicago, Illinois (SIC code 2388 in 1988 and 2389 in 1996), ranked second with a 95,000 pound decrease, all in reported tetrachloroethylene releases. The reduction is attributable to two factors, according to the facility contact: a cleaning process substitution and more frequent monitoring. E.R. Moore manufactures and rents academic caps and gowns.

Table 5-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Apparel and Fabricated Textiles, SIC Code 23

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2321	Men's & Boys' Shirts	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	No reports received					
		88	No reports received					
2322	Men's & Boys' Underwear & Nightwear	96	No reports received					
		95	No reports received					
		94	0	0	0	750	0	750
		88	NA	NA	0	28,667	0	NA
2326	Men's & Boys' Work Clothing	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	30,164	0	NA
2329	Men's & Boys' Clothing, nec*	96	686	257	35	0	0	978
		95	217	0	225	0	0	442
		94	0	0	5,285	0	0	5,285
		88	NA	NA	0	0	0	NA
2337	Women's & Misses' Suits & Coats	96	0	0	0	250	0	250
		95	0	0	0	250	0	250
		94	0	0	0	250	0	250
		88	No reports received					
2341	Women's & Children's Underwear	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	22,000	0	NA
2353	Hats, Caps, & Millinery	96	754	63,304	0	0	0	64,058
		95	2,554	37,028	2,220	0	0	41,802
		94	7,787	50,034	14,600	0	0	72,421
		88	NA	NA	2,277	0	4,811	NA
2371	Fur Goods	96	No reports received					
		95	No reports received					
		94	0	913	4,868	0	0	5,781
		88	No reports received					
2381	Fabric Dress & Work Gloves	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	29,200	0	0	NA
2385	Waterproof Outerwear	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	9,100	500	0	NA
2386	Leather & Sheep-lined Clothing	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 23 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 5-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Apparel and Fabricated Textiles, SIC Code 23, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2389	Apparel & Accessories, nec*	96	0	755	500	0	0	1,255
		95	0	0	1,250	0	0	1,250
		94	6,001	0	625	0	0	6,626
		88	NA	NA	4,348	0	0	NA
2392	Household Furnishings, nec*	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	3,565	0	0	3,565
		88	NA	NA	0	10,975	0	NA
2393	Textile Bags	96	0	0	0	0	0	0
		95	0	0	750	0	0	750
		94	0	0	0	0	0	0
		88	No reports received					
2394	Canvas & Related Products	96	No reports received					
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	No reports received					
2395	Pleating & Stitching	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	33,858	0	NA
2396	Automotive & Apparel Trimmings	96	0	56,072	0	0	0	56,072
		95	0	56,292	0	0	0	56,292
		94	0	35,469	430	0	0	35,899
		88	NA	NA	250	0	0	NA
2397	Schiffli Machine Embroideries	96	No reports received					
		95	No reports received					
		94	0	0	0	0	0	0
		88	No reports received					
2399	Fabricated Textile Products, nec*	96	0	16,185	0	5	0	16,190
		95	0	10,307	5	5	0	10,317
		94	2,200	1,631	5	1,636	0	5,472
		88	NA	NA	0	0	0	NA
	Multiple within SIC Code 23	96	No reports received					
		95	No reports received					
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
	Invalid SIC Code within SIC Code 23	96	0	0	0	0	0	0
		95	250	0	55,600	0	0	55,850
		94	72,242	37,468	92,321	0	0	202,031
		88	NA	NA	250	150,566	540	NA
	Total for SIC Code 23	96	1,440	136,573	535	255	0	138,803
		95	3,021	103,627	60,050	255	0	166,953
		94	88,230	125,515	121,699	2,636	0	338,080
		88	NA	NA	45,425	276,730	5,351	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 23 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Sandusky, Ltd., in Sandusky, Ohio (SIC code 2396), was third with a 90,000 pound reduction. The manufacturer of automotive vinyls, such as door panels and dashboard material, also ranked first for increases in waste management (see "Facilities with Large Increases and Decreases in Waste Management, 1991-1996"). Methyl ethyl ketone (MEK), used as an ink solvent, accounted for 81% of the facility's decrease. Conversions to water-based inks within some processes at the plant resulted in a significant reduction of MEK releases between 1988 and 1991. MEK was not eliminated from all processes, however. A production increase between 1994 and 1996 resulted in the facility's ranking as a top *increaser* in total amount of waste managed between 1991 and 1996, with 82% of this increase attributable to MEK reporting.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the apparel and fabricated textiles sector:

> Grimes Aerospace Company, Columbus, Ohio, decrease of 98,000 pounds, plant closure.

1991-1996 Waste Management Data for Apparel and Fabricated Textiles

Table 5-17 summarizes on- and off-site waste management data for the apparel and fabricated textiles sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste reported in this sector decreased from 2.3 million pounds to 2.1 million pounds (8.3%) from 1991 to 1996.

Decreases from 1991 to 1996 were reported for on-site recycling (31.9%), off-site recycling (65.7%), off-site treatment (96.3%) and quantities released on- and off-site (12.2%). Increases were reported in on-site treatment (56.1%) and off-site energy recovery (93.8%).

Figure 5-13 illustrates the percentage change in waste management quantities in this sector from 1991 to 1996.

The changes in the apparel and fabricated textiles sector's management of TRI chemicals in waste from 1991 to 1996 show little improvement, as measured by the waste management hierarchy (explained in Chapter 1). As production-related waste decreased in this sector, both releases and recycling also decreased. These are, respectively, the least desirable management option for environmental consequences and the most environmentally desirable option for waste that cannot be eliminated at the source.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Sandusky, Ltd., in Sandusky, Ohio (SIC code 2396), was first in increases of production-related waste. The manufacturer of automotive vinyls, such as door panel and dashboard material, was ranked third for decreases in releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996"). Methyl ethyl ketone, used as an ink solvent, was responsible for 82% of the facility's overall 286,000-pound increase. A production increase is cited as the reason for the change.

Tri-Con Industries, Ltd., in Columbia, Missouri (SIC code 2351), was the second-ranked facility for increases with a total increase of 168,000 pounds. Methyl ethyl ketone, a significant contributor to the facility's ranking as a major increaser in releases (see "Facilities with Large Increases and Decreases

Table 5-17. TRI Waste Management Data, 1991, 1994-1996: Apparel and Fabricated Textiles, SIC Code 23

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	279,602	246,116	138,311	190,376
Energy Recovery On-site	0	0	0	600
Treated On-site	378,208	493,412	501,405	590,347
Total On-site Waste Management	657,810	739,528	639,716	780,723
Off-site Waste Management				
Recycled Off-site	4,196	82,225	24,089	1,440
Energy Recovery Off-site	70,359	125,485	103,599	136,350
Treated Off-site	220,250	128,429	66,539	8,102
Total Off-site Waste Management	294,805	336,139	194,227	145,892
Quantity Released On- and Off-site	1,388,265	1,374,738	1,247,993	1,219,144
Total Production-related Waste	2,340,880	2,450,405	2,081,936	2,145,759
Non-Production-related Waste	6,066	242	23	3

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-43.8	37.6	-31.9
Energy Recovery On-site	--	--	--
Treated On-site	1.6	17.7	56.1
Total On-site Waste Management	-13.5	22.0	18.7
Off-site Waste Management			
Recycled Off-site	-70.7	-94.0	-65.7
Energy Recovery Off-site	-17.4	31.6	93.8
Treated Off-site	-48.2	-87.8	-96.3
Total Off-site Waste Management	-42.2	-24.9	-50.5
Quantity Released On- and Off-site	-9.2	-2.3	-12.2
Total Production-related Waste	-15.0	3.1	-8.3
Non-Production-related Waste	-90.5	-87.0	-100.0

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

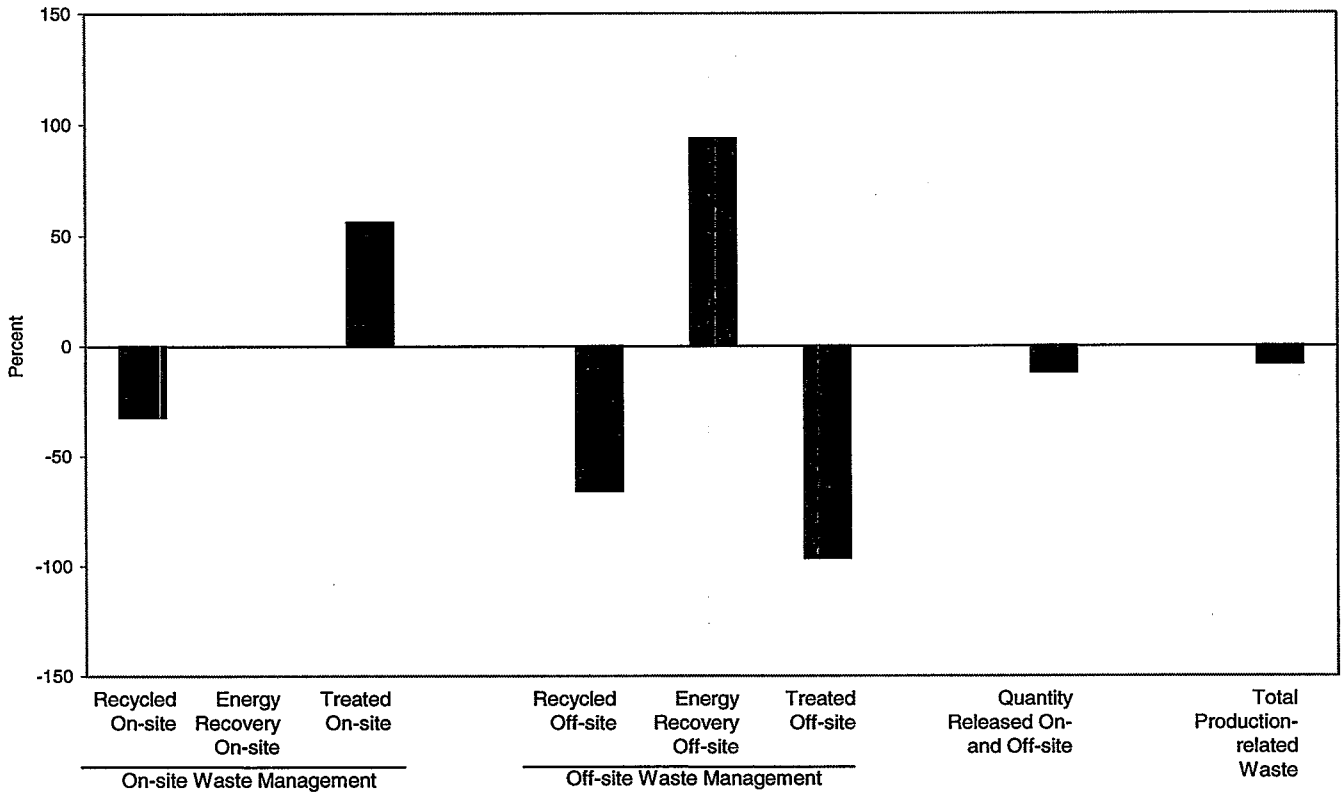


Figure 5-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Apparel and Fabricated Textiles (SIC Code 23)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

in Releases, 1988-1996"), accounted for 77% of the increase. Most of this increase in production-related waste is the result of the facility's increase in MEK releases (reported as quantities released on- and off-site). The facility closed in 1996. No information was available.

United Techs. Automotive Systems in West Olive, Michigan (SIC code 2396), was third with an overall 46,000 pound increase. Phenol was responsible for all of the facility's increase. The chemical is produced as a by-product of a process where recycled fabrics, such as blue jeans, T-shirts, and sweatshirts are shredded and combined with resin and then hot molded into pads that are used in automotive interiors. Phenol is produced in the hot-molding process. The increase in reporting is largely due to changes in emissions estimation methodology, according to the facility contact.

Burrell-Leder Beltech, Inc., in Skokie, Illinois (SIC code 2399 in 1991, did not report in 1996), was first in decreases with 187,000 pounds. All of this change was due to a switch from solvent-based construction material coatings to water-based coatings. The contact did not specify the type of construction material produced at this site. Methyl ethyl ketone accounted for all of the facility's decrease.

Glenmore Plastic Industries in Brooklyn, New York (SIC code 2392), was second in decreases with an overall 109,000 pound reduction. This plant is ranked as the top increaser in releases from 1988 to 1996 (see "Facilities with Large Increases and

Decreases in Releases, 1988-1996"). The chemical 1,1,1-trichloroethane was used as an ink solvent in 1991, when the facility reported releases (also reported as quantity released on- or off-site, a production-related waste category) of 178,000 pounds of this chemical. Beginning in 1992, 1,1,1-trichloroethane usage declined as the facility switched to water-based inks, accounting for the ranking as a major decreaser in production-related waste.

Champion Products, Inc., in Perry, New York (SIC code 2389), was third in decreases with a 99,000 pound decrease. The facility also ranked first in decreases of releases. Dichloromethane reported as quantity released was responsible for 53% of the facility's reduction. See "6.2.2 Facilities with Large Increases and Decreases in Releases, 1988-1996" for more information.

Facilities Contacted for Explanations (alphabetical by facility):

Burrell-Leder Beltech, Inc., Skokie, Illinois: Eduardo Arce, August 11, 1998 (explanation provided)

Champion Products, Inc., Perry, New York: Joe Galarneau, August 27, 1998 (explanation provided)

E. R. Moore Company, Chicago, Illinois: Tom Hoy, September 16, 1998 and Roger Wandersee, September 21, 1988 (explanation provided)

Glenmore Plastics Industries, Brooklyn, New York: Leslie Liebowitz, August 12, 1998 (explanation provided)

Grimes Aerospace Co., Columbus, Ohio: Ray White, August 12, 1998 (explanation provided)

Hat Brands, Inc., Garland, Texas: Tyra Anderson, August 7 and August 24, 1998 (explanation provided)

Sandusky, Ltd., Sandusky, Ohio: Dinesh Parekh, August 11 and August 12, 1998 (explanation provided)

Tri-Con Industries, Ltd., Columbia, Missouri: no contact information available.

United Techs. Automotive Systems, West Olive, Michigan: Chris Kull, September 16, 1998 (explanation provided)

Chapter 6

Toxics Release Inventory Data for Lumber and Wood Products (SIC Code 24)

A Look at the Lumber and Wood Products Industry (SIC Code 24)

The lumber and wood products sector (SIC code 24) cuts timber and pulpwood, saws rough lumber and timber, and re-saws veneer stock, dimension (components cut to nominal or precise sizes for use in manufacturing finished wood products), flooring, frames for furniture, and other products. Facilities in this sector also produce veneer and plywood. In addition, the sector mills shutters, moldings, staircases, and similar goods, manufactures wood kitchen cabinets, and produces window and door units. Other products include prefabricated houses and mobile homes. Facilities that treat wood products, including railroad crossties, are included in SIC code 24, as are those that manufacture reconstituted wood products such as fiberboard, particleboard, and wallboard. Furniture, however, is classified in SIC code 25. Box 6-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The lumber and wood products sector shipped products valued at $106.52 billion in 1996, up from $104.94 in 1995 (both in current dollars). This was about 3% of the value of all manufacturing shipments in the United States. The sector employed 739,000 in 1996, down slightly from 740,000 in 1995. Employment in lumber and wood products industries dropped substantially in 1991, but grew steadily through 1995 to its highest level in the last decade. Production in this sector has grown modestly in the 1990s, increasing 5.3% from 1989 to 1996, compared to 17.6% for all U.S. manufacturing (see Chapter 1, Table 1-10).

Industries in millwork, plywood, and structural members (SIC code 243) contributed the largest portion of the sector's shipments ($31.80 billion) and employment (257,000) in 1996. Sawmills and planing mills (SIC code 242) were second with $29.70 billion in shipments and employment of 172,000. The sector's largest customer is the construction and building sector.

Basic activities in the lumber and wood products sector are logging, sawing wood into sizes and shapes for further use, cutting and gluing veneer (layers) into plywood, reconstituting wood particles or other fragments into boards, and treating wood surfaces. Lumber and wood generally must be kept

Box 6-1. SIC Code 24, Lumber and Wood Products, Except Furniture: Codes and Classifications

SIC Code		Industry Description
241	**Logging**	
2411	Logging	Cutting timber and producing rough, round, hewn, or riven primary forest or wood raw materials, or producing wood chips in the field.
242	**Sawmills and Planing Mills**	
2421	Sawmills and Planing Mills, General	Sawing rough lumber and timber from logs and bolts. Resawing cants and flitches into lumber, including box lumber and softwood cut stock. (Includes planing mills combined with sawmills and planing mills primarily producing surfaced lumber, standard workings, or patterns of lumber).
2426	Hardwood Dimension and Flooring Mills	Manufacture of hardwood dimension lumber and workings therefrom; other hardwood dimension, semifabricated or ready for assembly; hardwood flooring; and wood frames for household furniture.
2429	Special Product Sawmills, nec*	Manufacture of excelsior, wood shingles, and cooperage stock. Sawing of miscellaneous special products.
243	**Millwork, Veneer, Plywood, and Structural Wood Members**	
2431	Millwork	Manufacture of fabricated wood millwork, including millwork covered with materials such as metal and plastics. (Includes planing mills primarily engaged in producing millwork.)
2434	Wood Kitchen Cabinets	Manufacture of wood kitchen cabinets and bathroom vanities, generally for permanent installation.
2435	Hardwood Veneer and Plywood	Production of commercial hardwood veneer, commercial plywood, or prefinished hardwood plywood. (Includes veneer and plywood backed or faced with non-wood material).
2436	Softwood Veneer and Plywood	Production of commercial softwood veneer and plywood.
2439	Structural Wood Members, nec*	Production of laminated or fabricated trusses, arches, and other structural members of lumber.
244	**Wood Containers**	
2441	Nailed and Lock Corner Wood Boxes and Shook	Manufacture of nailed and lock corner wood boxes (lumber or plywood) and shook for nailed and lock corner boxes.
2448	Wood Pallets and Skids	Manufacture of wood or wood-and-metal pallets and skids.
2449	Wood Containers, nec*	Manufacture of miscellaneous wood containers, such as cooperage, wirebound boxes and crates, and other veneer and plywood containers.
245	**Wood Buildings and Mobile Homes**	
2451	Mobile Homes	Manufacture of mobile homes and non-residential mobile buildings.
2452	Prefabricated Wood Buildings and Components	Manufacture of prefabricated wood buildings, sections, and panels.
249	**Miscellaneous Wood Products**	
2491	Wood Preserving	Treatment of wood, sawed or planed elsewhere, with creosote or other preservatives. Includes cutting, treating, and selling of poles, posts, and piling.
2493	Reconstituted Wood Products	Manufacture of reconstituted wood products, including hardboard, particleboard, insulation board, medium density fiberboard, waferboard, and oriented strandboard.
2499	Wood Products, nec*	Manufacture of miscellaneous wood products and products from rattan, reed, veneer, wicker, and similar materials.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

moist until use; most finished products of this sector, from plywood to kitchen cabinets, require drying the moisture in the wood as well as drying adhesives or coatings. Lumber and wood products are generally dried in boiler-fired ovens, which may result in air emissions reportable to TRI.

Nearly all phases of lumber and wood production involve some treatment to protect the wood. Sawmills, for example, may treat lumber to prevent stains from sap. Chemicals used most extensively in preserving wood are water-borne inorganic chemicals such as chromated copper arsenate and ammoniacal copper zinc arsenate. However, creosote and pentachlorophenol, oil-borne organics, represent 15% and 6%, respectively, of all preservatives used. Chemicals used in treatment processes account for a substantial portion of the sector's TRI reporting. Because treating wood is its primary business, the wood preserving industry (SIC code 2491) ranks high in this sector for amounts reported in most TRI categories.

Chemicals used in plywood and veneer production (SIC codes 2435 and 2436) include phenol-formaldehyde resins, generally used with softwoods, and urea-formaldehyde resins, used with hardwoods. These resins are mixed with extenders, fillers, catalysts, and caustic to form adhesives used to glue veneer into plywood. Reconstituted wood products (SIC code 2493) are similarly manufactured, using these resins and other additives to bind wood particles, fibers, or strands. The drying and pressing phases of this production result in air emissions of chemicals such as formaldehyde, methanol, toluene, and xylene. The application of coatings and finishes in the manufacture of wood kitchen cabinets (SIC code 2434) results in air emissions of volatile organic chemicals reportable to TRI.

1996 TRI Data for Lumber and Wood Products

Table 6-1 summarizes TRI reporting by the lumber and wood products sector for 1996. More than 1,900 forms were submitted in this sector in 1996. One-fourth of them (480 forms) were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.) Form As were a substantially larger percentage (24.9%) of the submissions in this sector than the average for all reporting sectors (10.1%).

The wood preserving industry (SIC code 2491) submitted the most forms in this sector: 884 forms or 45.9% of the total. The wood kitchen cabinets industry (SIC code 2434) submitted 285 forms,

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Lumber and Wood Products Industry,* Sector Notebook project, EPA/310-R-95-006, September 1995 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

Table 6-1. Summary of TRI Information by 4-digit SIC Code, 1996: Lumber and Wood Products, SIC Code 24

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
13	13	2421	Sawmills & Planing Mills, General	10	19	1	61,349	0	61,349
12	9	2426	Hardwood Dimension & Flooring Mills	10	13	0	193,060	0	193,060
5	5	2431	Millwork	27	84	4	2,305,119	11,193	2,316,312
2	2	2434	Wood Kitchen Cabinets	85	285	0	8,718,447	18,062	8,736,509
10	12	2435	Hardwood Veneer & Plywood	10	17	1	248,200	250	248,450
7	7	2436	Softwood Veneer & Plywood	19	40	4	1,190,616	270	1,190,886
9	10	2439	Structural Wood Members, nec*	8	14	2	285,940	0	285,940
15	15	2448	Wood Pallets & Skids	1	1	1	0	0	0
16	16	2449	Wood Containers, nec*	0	1	1	0	0	0
11	11	2451	Mobile Homes	103	159	109	228,689	0	228,689
14	14	2452	Prefabricated Wood Buildings	4	4	1	16,730	0	16,730
1	1	2491	Wood Preserving	311	884	318	1,229,577	7,612,134	8,841,711
3	3	2493	Reconstituted Wood Products	79	167	4	7,087,818	2,380	7,090,198
4	4	2499	Wood Products, nec*	40	114	0	4,309,887	379	4,310,266
6	6		Multiple within SIC Code 24	46	97	28	2,119,337	10,148	2,129,485
8	8		Invalid SIC Code within SIC Code 24	12	27	6	590,740	2,355	593,095
			Total for SIC Code 24	765	1,926	480	28,585,509	7,657,171	36,242,680

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category. There may be forms but no facilities in a single 4-digit SIC code because a facility reported different 4-digit SIC codes in the range of SIC codes 20 to 39 on its individual forms.
*nec: not elsewhere classified.

14.8% of the total. Third was reconstituted wood products (SIC code 2493), with 167 forms (8.7%). Form A submissions were unusually concentrated in this sector; 66.3% of these (318 forms) were submitted in the wood preserving industry (SIC code 2491) and 22.7% (109 forms) in the mobile homes industry (SIC code 2451).

As shown in Table 6-1, two industries dominated reporting in the lumber and wood products sector. The wood preserving industry (SIC code 2491) ranked first among industries in this sector for amounts reported as off-site releases, total on- and off-site releases, other on-site waste management, and total production-related waste. In all of these categories, the wood kitchen cabinets industry (SIC code 2434) ranked second. Wood kitchen cabinets also ranked first in the two remaining categories: on-site releases and transfers off-site for further waste management.

The wood preserving industry (SIC code 2491) reported 8.8 million pounds of total on- and off-site releases in 1996, one-fourth (24.4%) of the sector's total of 36.2 million pounds. The wood kitchen cabinets industry (SIC code 2434) reported 8.7 million pounds of total releases, also one-fourth (24.1%) of the sector's total. The reconstituted wood products industry (SIC code 2493) ranked third, with 7.1 million pounds (19.6%) of total releases.

The wood kitchen cabinets industry (SIC code 2434) reported the largest on-site releases in this sector, 8.7 million pounds, or 30.5% of the sector's total of 28.6 million pounds. Reconstituted wood products (SIC code 2493) was second with 7.1 million pounds (24.8%). Miscellaneous wood products (SIC code 2499) was third with 4.3 million pounds (15.1%).

Table 6-1. Summary of TRI Information by 4-digit SIC Code, 1996: Lumber and Wood Products, SIC Code 24, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2421	Sawmills & Planing Mills, General	0	2,150	64,645	0
2426	Hardwood Dimension & Flooring Mills	68,424	196,023	429,526	1,083
2431	Millwork	87,023	298,418	2,628,419	1
2434	Wood Kitchen Cabinets	2,457,857	1,527,819	13,103,937	955
2435	Hardwood Veneer & Plywood	2,175	2,559	253,065	0
2436	Softwood Veneer & Plywood	725	30,022	1,217,750	0
2439	Structural Wood Members, nec*	0	55,937	428,323	0
2448	Wood Pallets & Skids	0	0	0	0
2449	Wood Containers, nec*	0	0	0	0
2451	Mobile Homes	0	70,762	313,378	0
2452	Prefabricated Wood Buildings	0	0	15,335	0
2491	Wood Preserving	69,421,504	453,460	74,739,362	4,833,743
2493	Reconstituted Wood Products	2,367,555	57,383	9,540,641	0
2499	Wood Products, nec*	1,061,516	575,204	5,338,101	1,550
	Multiple within SIC Code 24	59,536	38,840	2,227,749	0
	Invalid SIC Code within SIC Code 24	39,103	41,875	672,054	0
	Total for SIC Code 24	75,565,418	3,350,452	110,972,285	4,837,332

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

The wood preserving industry (SIC code 2491) reported the largest off-site releases (transfers to disposal), 7.6 million pounds, or 99.4% of the sector's total of 7.7 million pounds. Other lumber and wood products industries reported less than 20,000 pounds each in this category. One facility in SIC code 2491 reported off-site releases in 1996 of 3.4 million pounds of creosote; 3.3 million pounds of this resulted from one-time clean-up activities at the facility.

The lumber and wood products sector reported 75.6 million pounds of other on-site waste management in 1996. The wood preserving industry (SIC code 2491) reported 69.4 million pounds of other on-site waste management, which was 91.9% of the sector's total. The wood kitchen cabinets industry (SIC code 2434) reported 2.5 million pounds in this category and the reconstituted wood products (SIC code 2493) reported 2.4 million pounds; these amounts represented a little over 3% each of the sector's total.

Wood kitchen cabinets (SIC code 2434) reported 1.5 million pounds of transfers off-site for further waste management, 45.6% of the sector's total of 3.4 million pounds. Ranking second in this category, the miscellaneous wood products industry (SIC code 2499) reported 575,000 pounds (17.2%). The wood preserving industry (SIC code 2491) ranked third with 453,000 pounds (13.5%).

Production-related waste reported in the lumber and wood products sector totaled 111.0 million pounds in 1996. The industries reporting the largest amounts of other on-site waste management also reported the largest amounts of total production-related waste. These were wood preserving (SIC code 2491), with 74.7 million pounds (67.3% of the sector's total), wood kitchen cabinets (SIC code 2434), with 13.1 million pounds (11.8%), and reconstituted wood products (SIC code 2493), with 9.5 million pounds (8.6%).

Multiple SIC Codes in SIC Code 24

Some facilities in the lumber and wood products sector engage in operations that are classified in different SIC codes within SIC code 24. A sawmill, for example, may also treat wood that was sawed elsewhere. These activities are described by SIC code 2421 (sawmills and planing mills) and SIC code 2491 (wood preserving). Another facility may produce both softwood veneer and plywood (SIC code 2436) and reconstituted wood products (SIC code 2493). Such facilities may report multiple SIC codes on their TRI forms to describe their operations. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Forms that reported more than one four-digit SIC code within SIC code 24 represented a relatively small portion of lumber and wood products reporting to TRI in 1996. Table 6-2 further examines TRI reporting on these "multiple-codes" forms. The most frequent combination, submitted on 42 forms, was sawmills and planing mills (SIC code 2421) and wood preserving (SIC code 2491). The second most frequent combination, reported on 11 forms, was sawmills and planing mills (SIC code 2421) and softwood veneer and plywood (SIC code 2436).

The multiple codes group in SIC code 24 reported 2.1 million pounds of total on- and off-site releases and 2.2 million pounds of total production-related waste in 1996, as shown in Table 6-2.

On- and Off-site Releases

The lumber and wood products sector reported 28.5 million pounds of air emissions in 1996, 78.6% of the sector's total on- and off-site releases. Off-site releases (transfers to disposal) totaled 7.7 million pounds, or 21.1%. Much smaller amounts were reported for surface water discharges and on-site land releases. The sector reported no underground injection. These data appear in Table 6-3 and Figure 6-1.

Table 6-2. Multiple SIC Codes, 1996: Lumber and Wood Products, SIC Code 24

SIC Codes	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2411 2421 2436	1	1	0	0	0	0	0	0	0
2421 2426 2436	1	0	11,700	0	11,700	0	0	11,700	0
2421 2436	11	1	276,285	270	276,555	38,000	0	315,005	0
2421 2436 2439	1	0	633	0	633	20	0	653	0
2421 2436 2491	4	0	8,879	350	9,229	845	0	10,074	0
2421 2436 2491 2493	4	3	102	0	102	0	0	102	0
2421 2436 2493	2	0	338,000	0	338,000	0	0	337,000	0
2421 2491	42	23	2,241	9,388	11,629	1,628	11,095	23,768	0
2421 2493	4	0	135,915	0	135,915	100	0	136,110	0
2431 2434	2	0	18,635	0	18,635	0	1,905	22,439	0
2431 2434 2499	4	0	88,524	0	88,524	0	9,839	98,363	0
2434 2499	1	0	21,259	0	21,259	0	929	22,188	0
2435 2436	2	0	439,175	0	439,175	0	0	439,175	0
2435 2436 2492	2	0	95,471	0	95,471	0	0	95,471	0
2436 2491	2	0	0	0	0	0	500	1,100	0
2436 2493	6	0	430,558	0	430,558	93	0	430,401	0
2491 2493	1	0	154,885	0	154,885	0	0	154,885	0
2491 2499	1	0	490	140	630	0	0	630	0
2492 2499	6	0	96,585	0	96,585	18,850	14,572	128,685	0
Total for SIC Code 24	97	28	2,119,337	10,148	2,129,485	59,536	38,840	2,227,749	0

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 6-3. TRI On-site and Off-site Releases, 1996: Lumber and Wood Products, SIC Code 24 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2491	Wood Preserving	1,192,710	26,629	0	0	6,039	4,199	1,229,577	7,612,134	8,841,711
2434	Wood Kitchen Cabinets	8,718,447	0	0	0	0	0	8,718,447	18.062	8,736,509
2493	Reconstituted Wood Products	7,035,762	49,000	0	0	0	3,056	7,087,818	2,380	7,090,198
2499	Wood Products, nec*	4,309,132	122	0	0	0	633	4,309,887	379	4,310,266
2431	Millwork	2,304,642	0	0	0	0	477	2,305,119	11,193	2,316,312
	Multiple within SIC Code 24	2,118,214	1,123	0	0	0	0	2,119,337	10,148	2,129,485
2436	Softwood Veneer & Plywood	1,190,616	0	0	0	0	0	1,190,616	270	1,190,886
	Invalid SIC Code within SIC Code 24	590,740	0	0	0	0	0	590,740	2.355	593,095
2439	Structural Wood Members, nec*	285,940	0	0	0	0	0	285,940	0	285,940
2435	Hardwood Veneer & Plywood	248,200	0	0	0	0	0	248,200	250	248,450
2451	Mobile Homes	228,689	0	0	0	0	0	228,689	0	228,689
2426	Hardwood Dimension & Flooring Mills	191,618	0	0	0	0	1,442	193,060	0	193,060
2421	Sawmills & Planing Mills, General	61,349	0	0	0	0	0	61,349	0	61,349
2452	Prefabricated Wood Buildings	16,730	0	0	0	0	0	16,730	0	16,730
2448	Wood Pallets & Skids	0	0	0	0	0	0	0	0	0
2449	Wood Containers, nec*	0	0	0	0	0	0	0	0	0
	Total for SIC Code 24	28,492,789	76,874	0	0	6,039	9,807	28,585,509	7,657,171	36,242,680

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

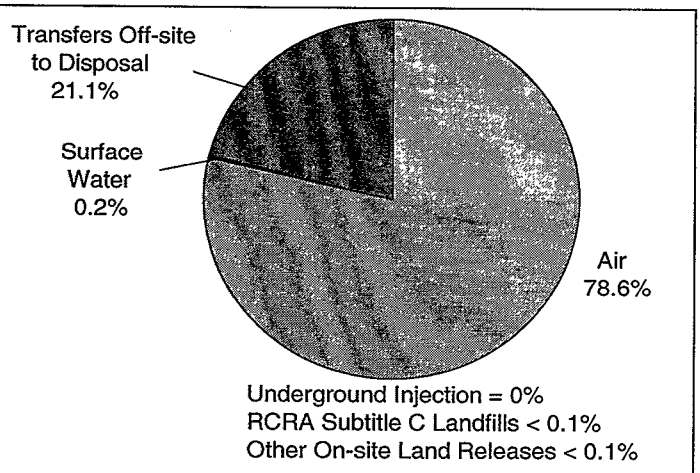


Figure 6-1. Distribution of TRI On-site and Off-site Releases, 1996: Lumber and Wood Products (SIC Code 24)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

The wood kitchen cabinets industry (SIC code 2434) reported 8.7 million pounds of air emissions, the largest in this sector. Reconstituted wood products (SIC code 2493) ranked second with 7.0 million pounds, and miscellaneous wood products (SIC code 2499) was third with 4.3 million pounds. Together, these industries accounted for 70.4% of the sector's reported air emissions.

The wood preserving industry (SIC code 2491) reported the largest off-site releases (transfers to disposal) in this sector in 1996. With 7.6 million pounds in off-site releases and 1.2 million pounds in on-site releases, this industry had the largest reported total releases in the sector, 8.8 million pounds. As noted, one facility's report of 3.4 million pounds of off-site releases in SIC code 2491 included 3.3 million pounds resulting from clean-up activity in 1996.

Figure 6-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

Two-thirds (66.9%) of the other on-site waste management reported in the lumber and wood products sector in 1996 was reported as on-site recycling, which totaled 50.5 million pounds. The wood preserving industry (SIC code 2491) reported 49.8 million pounds of this amount, or 98.5%. On-

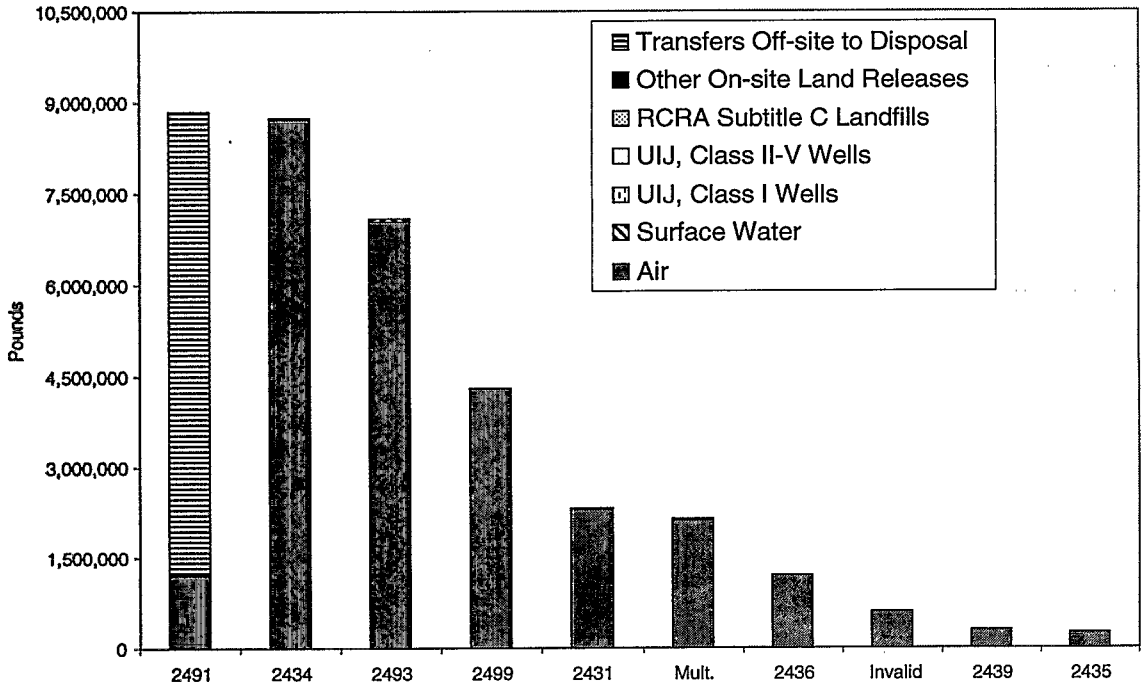


Figure 6-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Lumber and Wood Products (SIC Code 24)

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "24" that do not exist in the current Standard Industrial Classification code system.

site treatment totaled 23.5 million pounds, nearly one-third (31.1%) of the other on-site waste management reported in this sector. The wood preserving industry (SIC code 2491) reported 19.7 million pounds, or 83.7% of the total.

Two facilities in the wood preserving industry reported large amounts of on-site waste management of creosote in 1996. One facility reported on-site recycling of 28.5 million pounds of this chemical, which it uses to treat wood products for farm use. The other facility reported 7.9 million pounds of on-site recycling and 12.7 million pounds of on-site treatment of creosote, used primarily to treat wood for railroad crossties.

The lumber and wood products sector reported 1.5 million pounds in on-site energy recovery, which represented just 2.0% of the sector's total other on-site waste management.

Table 6-4 presents the lumber and wood products sector's data for other on-site waste management. Distribution by waste management types appears in Figure 6-3. Figure 6-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

The lumber and wood products sector reported 2.3 million pounds of transfers off-site for energy recovery in 1996, as shown in Table 6-5. This was the largest type of off-site transfer for further waste management reported in this sector and amounted to 68.6% of the sector's total for such transfers.

Table 6-4. TRI Other On-site Waste Management, 1996: Lumber and Wood Products, SIC Code 24 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2491	Wood Preserving	49,762,362	0	19,659,142	69,421,504
2434	Wood Kitchen Cabinets	601,684	272,244	1,583,929	2,457,857
2493	Reconstituted Wood Products	12,378	283,557	2,071,620	2,367,555
2499	Wood Products, nec*	91,349	959,685	10,482	1,061,516
2431	Millwork	14,010	0	73,013	87,023
2426	Hardwood Dimension & Flooring Mills	31,739	0	36,685	68,424
	Multiple within SIC Code 24	20,877	70	38,589	59,536
	Invalid SIC Code within SIC Code 24	8,351	22,830	7,922	39,103
2435	Hardwood Veneer & Plywood	2,175	0	0	2,175
2436	Softwood Veneer & Plywood	0	0	725	725
2421	Sawmills & Planing Mills, General	0	0	0	0
2439	Structural Wood Members, nec*	0	0	0	0
2448	Wood Pallets & Skids	0	0	0	0
2449	Wood Containers, nec*	0	0	0	0
2451	Mobile Homes	0	0	0	0
2452	Prefabricated Wood Buildings	0	0	0	0
	Total for SIC Code 24	50,544,925	1,538,386	23,482,107	75,565,418

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

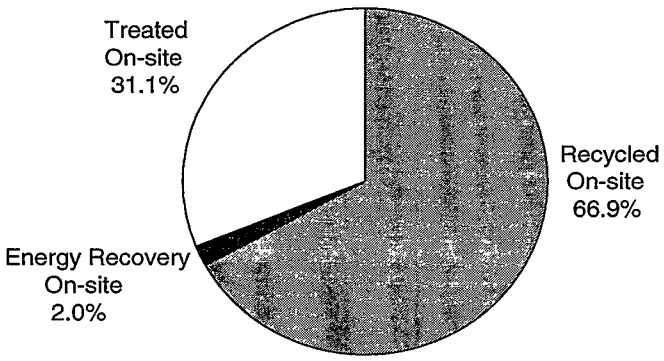


Figure 6-3. Distribution of TRI Other On-site Waste Management, 1996: Lumber and Wood Products (SIC Code 24)

Note: Data from Section 8 of Form R.

The wood kitchen cabinets industry (SIC code 2434) reported the largest transfers to energy recovery, 1.3 million pounds, and the miscellaneous wood products industry (SIC code 2499) reported the second-largest transfers to energy recovery, 488,000 pounds.

The sector reported 515,000 pounds transferred off-site to recycling, the second largest type of off-site transfers for further waste management in this sector. The wood kitchen cabinets industry (SIC code 2434) reported 118,000 pounds of this amount, and the hardwood dimension and flooring mills industry (SIC code 2426) reported 99,000 pounds. Reporting of transfers to treatment totaled 491,000 pounds, including 380,000 pounds reported in the wood preserving industry (SIC code 2491) and 80,000 pounds reported in the wood kitchen cabinets industry (SIC code 2434).

Figure 6-5 illustrates the distribution of types of off-site transfers for further waste management reported in the lumber and wood products sector. Figure 6-6 illustrates the distribution of such transfers for the top industries in this sector.

1996 TRI Data by State for Lumber and Wood Products

Table 6-6 presents 1996 TRI data by state for the lumber and wood products sector. In four states, more than 100 TRI forms were submitted in the

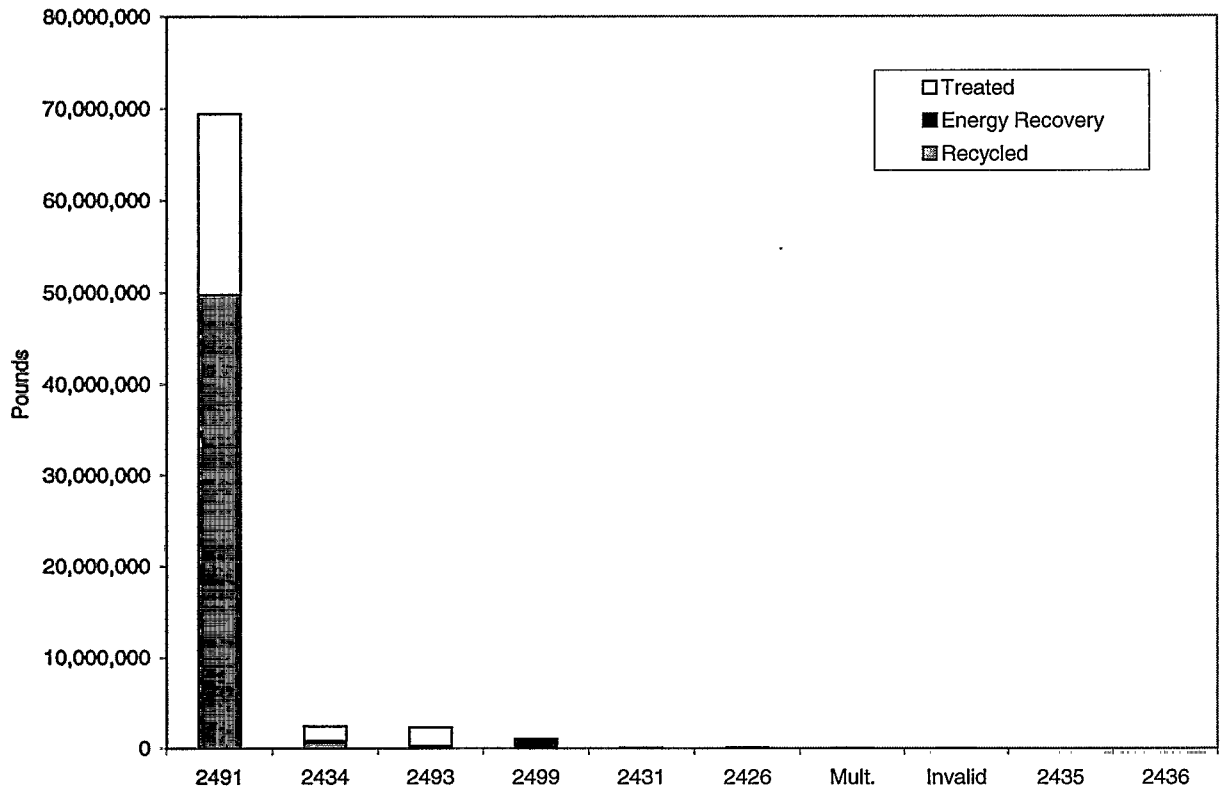


Figure 6-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Lumber and Wood Products (SIC Code 24)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC Code 24 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "24" that do not exist in the current Standard Industrial Classification code system.

lumber and wood products sector in 1996: Alabama (149 forms), Georgia (124 forms), North Carolina (118 forms), and Texas (117 forms). Together, these represented one-fourth (26.4%) of all forms submitted in the sector.

The largest total on- and off-site releases were reported in Kentucky, 3.5 million pounds, or 9.8% of the sector's total. Reporting of releases in Kentucky consisted largely of off-site releases (transfers to disposal), which totaled 3.4 million pounds in that state or 44.9% of the sector's total off-site releases. Kentucky is the state in which one facility reported 3.4 million pounds of off-site releases, including 3.3 million pounds from clean-up activity. The state with the second-largest reported total releases was Oregon with 2.82 million pounds (7.8%). On-site releases in Oregon totaled 2.6 million pounds. Mississippi ranked third among states for total releases with 2.79 million pounds, including 1.8 million pounds of on-site releases and 1.0 million pounds of off-site releases.

Most of the sector's other on-site waste management was reported in South Dakota (29.7 million pounds, or 39.3% of the sector's total) and Mississippi (20.7 million pounds, or 27.5%). Of the two facilities that reported large amounts of on-site waste management of creosote in 1996, described above, one is located in South Dakota and the other in Mississippi. Texas ranked third among states for other on-site waste management, with 7.7 million pounds, or 10.2%.

Table 6-5. TRI Transfers Off-site for Further Waste Management, 1996: Lumber and Wood Products, SIC Code 24 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
2434	Wood Kitchen Cabinets	118,412	1,328,484	79,923	0	1,000	1,527,819
2499	Wood Products, nec*	85,771	487,968	500	965	0	575,204
2491	Wood Preserving	3,082	43,581	379,741	16,020	11,036	453,460
2431	Millwork	64,068	226,073	7,495	782	0	298,418
2426	Hardwood Dimension & Flooring Mills	99,217	90,607	6,199	0	0	196,023
2451	Mobile Homes	70,308	0	454	0	0	70,762
2493	Reconstituted Wood Products	18,350	24,672	750	13,611	0	57,383
2439	Structural Wood Members, nec*	46,161	8,636	0	1,140	0	55,937
	Invalid SIC Code within SIC Code 24	0	34,324	7,551	0	0	41,875
	Multiple within SIC Code 24	9,839	20,441	8,544	16	0	38,840
2436	Softwood Veneer & Plywood	0	29,841	0	181	0	30,022
2435	Hardwood Veneer & Plywood	0	2,475	0	84	0	2,559
2421	Sawmills & Planing Mills, General	0	2,150	0	0	0	2,150
2448	Wood Pallets & Skids	0	0	0	0	0	0
2449	Wood Containers, nec*	0	0	0	0	0	0
2452	Prefabricated Wood Buildings	0	0	0	0	0	0
	Total for SIC Code 24	515,208	2,299,252	491,157	32,799	12,036	3,350,452

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

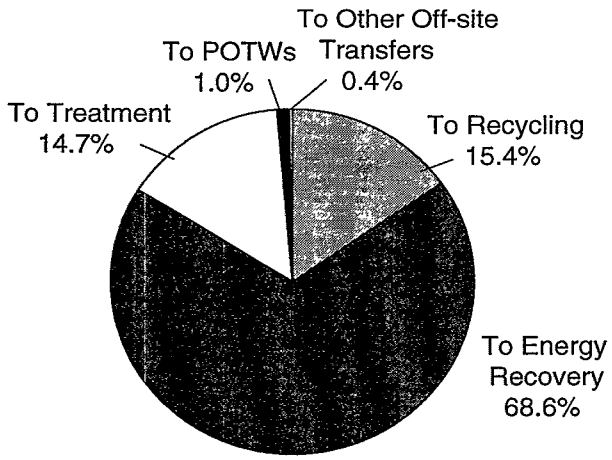


Figure 6-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Lumber and Wood Products (SIC Code 24)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

Ohio was the state with the largest reported transfers off-site for further waste management, with 833,000 pounds or 24.9% of the sector's total. The second- and third-largest amounts in this category were reported in Illinois (218,000 pounds, or 6.5%) and Wisconsin (179,000 pounds, or 5.3%).

The three states with the largest amounts reported in total production-related waste in this sector for 1996 were the same as the three with the largest amounts reported in other on-site waste management. In South Dakota, the total for production-related waste was 29.9 million pounds, and in Mississippi, the total was 23.4 million pounds. These were 27.0% and 21.1%, respectively, of the lumber and wood products sector's total production-related waste. Texas was third with 10.1 million pounds, or 9.1%.

Map 6-1 illustrates the geographic distribution of total on- and off-site releases in the lumber and wood products sector.

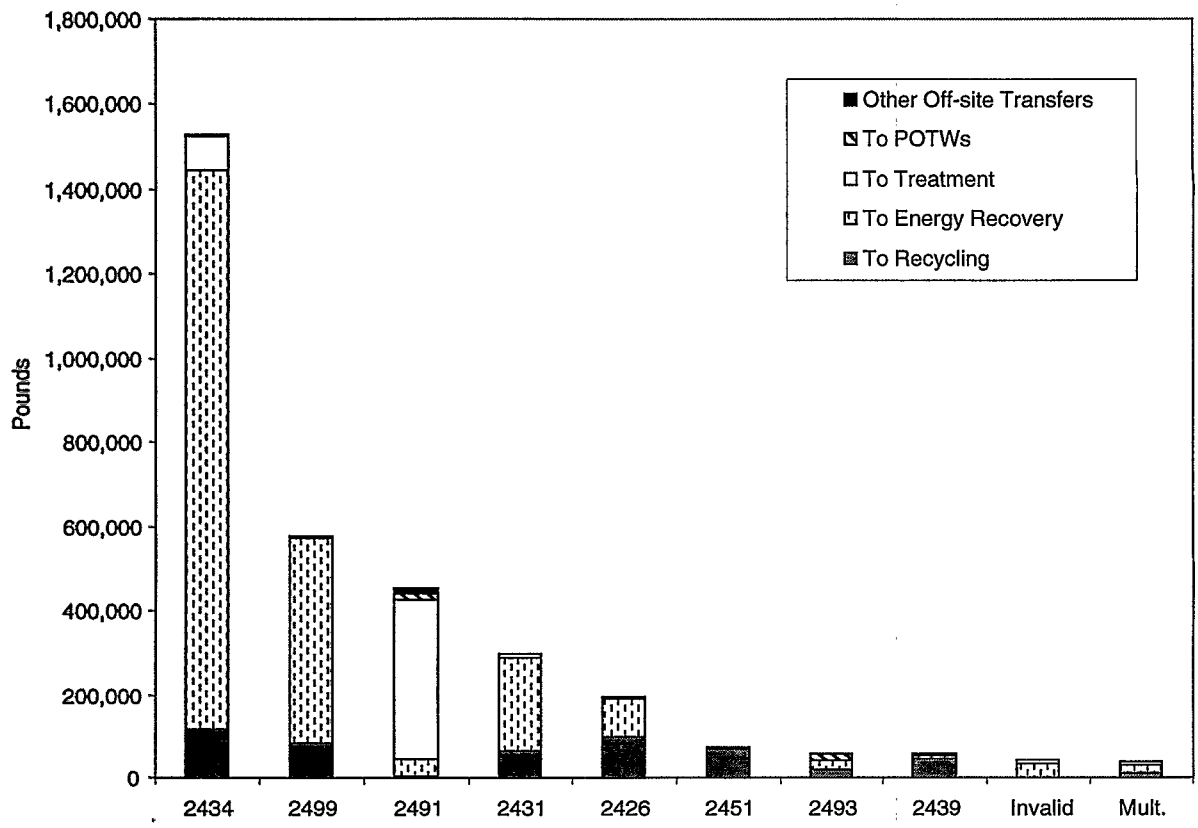


Figure 6-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Lumber and Wood Products (SIC Code 24)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC Code 24 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "24" that do not exist in the current Standard Industrial Classification code system.

1996 TRI Data by Chemical for Lumber and Wood Products

As shown in Table 6-7, the top 15 chemicals for total on- and off-site releases in the lumber and wood products sector accounted for 35.3 million pounds, or 97.4% of the sector's total releases in 1996. Air emissions reported for these 15 chemicals totaled 27.8 million pounds and off-site releases (transfers to disposal) totaled 7.4 million pounds, also approximately 97% of the sector's totals in those categories.

The chemical with the largest reported releases was creosote. Off-site releases for this chemical were 7.2 million pounds, and total releases were 7.9 million pounds. As noted earlier, one facility in the wood preserving industry, SIC code 2491, reported 3.4 million pounds of off-site releases of creosote, attributing 3.3 million pounds of this amount to clean-up activities.

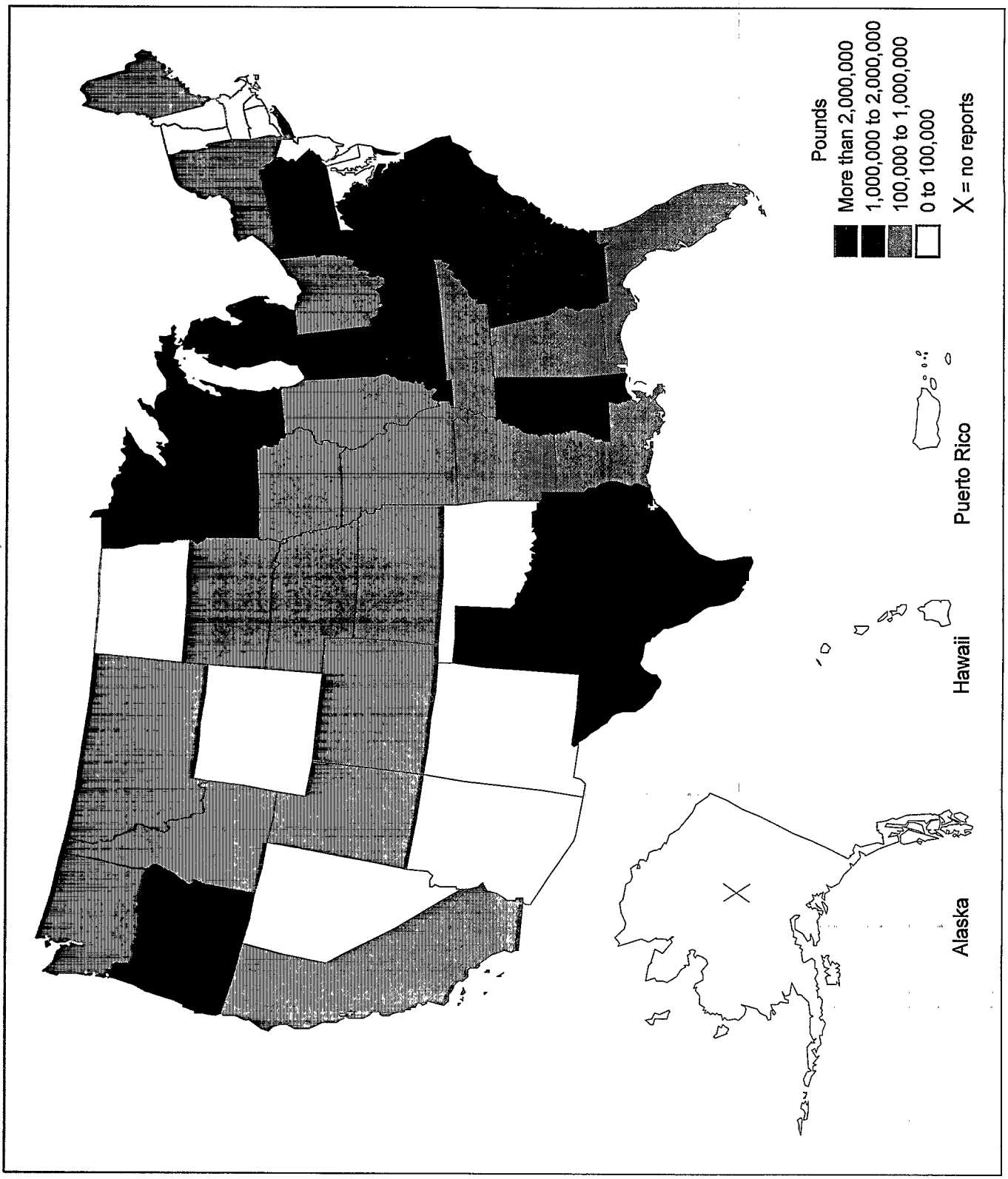
In addition to creosote, four chemicals were reported in amounts of more than 4 million pounds each for total releases. These were methanol with 5.8 million pounds, xylenes with 5.4 million pounds, toluene with 5.3 million pounds, and

Table 6-6. Summary of TRI Information by State, 1996: Lumber and Wood Products, SIC Code 24

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	60	149	30	896,423	85,682	982,105		57,253	1,191,968	5,360
Arizona	4	11	3	53,759	0	53,759	0	22,431	76,205	0
Arkansas	27	71	13	931,139	49,256	980,395	159,809	90,110	1,215,697	5
California	23	57	7	773,456	6,068	779,524	44,887	79,716	891,947	6,312
Colorado	4	13	6	133,095	192,150	325,245	140	32,260	166,555	190,775
Connecticut	1	1	0	1,000	0	1,000	46,400	3,025	46,400	0
Delaware	1	1	0	5	0	5	0	0	10	0
Florida	23	62	21	97,417	14,222	111,639	349	1,169	111,390	0
Georgia	50	124	63	986,429	132,490	1,118,919	86,295	2,228	1,318,086	1
Hawaii	2	6	4	10	0	10	1,111	0	1,263	0
Idaho	5	10	3	599,955	0	599,955	0	46,688	646,657	0
Illinois	10	35	7	251,475	306,898	558,373	5,618,897	217,777	6,399,627	0
Indiana	43	95	17	1,642,175	321,060	1,963,235	999,975	160,382	3,135,054	318,060
Iowa	5	32	0	744,248	10,100	754,348	150,826	162,966	1,419,447	0
Kansas	8	18	2	490,590	0	490,590	15,000	31,895	524,325	0
Kentucky	7	17	0	97,223	3,441,828	3,539,051	10,412	1,515	335,436	3,268,311
Louisiana	18	34	16	251,576	396,564	648,140	161,872	154,567	684,598	280,000
Maine	4	8	0	105,490	0	105,490	5,297	1,250	108,238	0
Maryland	5	17	8	20	218	238	1,145	287	1,650	0
Massachusetts	3	9	3	30	1,500	1,530	30	0	376	0
Michigan	17	47	19	1,035,420	8,742	1,044,162	36,233	30,846	1,119,472	0
Minnesota	20	50	11	1,607,659	2,134	1,609,793	585,555	80,601	2,275,491	0
Mississippi	36	85	18	1,752,804	1,039,508	2,792,312	20,747,347	163,222	23,388,967	10,237
Missouri	8	16	6	100,971	237,560	338,531	1,567,102	22,743	1,927,029	213,143
Montana	3	9	1	517,192	0	517,192	0	7,441	523,633	0
Nebraska	3	9	6	254,392	0	254,392	0	0	254,392	0
Nevada	1	3	0	10	2,555	2,565	2,477	600	7,838	0
New Hampshire	1	3	3	0	0	0	0	0	0	0
New Jersey	3	4	0	15,122	19,250	34,372	0	1,800	57,095	0
New Mexico	2	4	0	4,570	500	5,070	741	0	5,916	0
New York	11	26	2	176,334	4,413	180,747	734	2,269	182,634	0
North Carolina	44	118	43	2,016,224	5,924	2,022,148	1,330,519	120,867	3,170,816	0
North Dakota	1	3	0	60	500	560	488	0	543	0
Ohio	21	63	16	707,354	19,529	726,883	2,567,797	833,397	4,296,369	950
Oklahoma	2	5	2	11,700	750	12,450	0	1,090	13,370	0
Oregon	45	95	18	2,556,273	268,680	2,824,953	1,740,254	44,654	4,692,127	1,550
Pennsylvania	37	79	31	790,275	473,734	1,264,009	1,462,558	151,898	2,848,698	457,274
Puerto Rico	3	7	0	542	1,743	2,285	14	0	1,464	212
Rhode Island	1	3	0	15	2,852	2,867	0	0	2,852	0
South Carolina	24	72	11	1,096,846	102,635	1,199,481	15,533	18,951	1,155,946	79,785
South Dakota	5	11	0	253,369	20,750	274,119	29,660,070	13,850	29,913,229	0
Tennessee	19	41	11	473,132	4,050	477,182	4,439	142,532	625,355	0
Texas	47	117	23	2,134,545	359,710	2,494,255	7,695,124	91,432	10,106,743	0
Utah	6	22	0	289,561	773	290,334	650	3,185	294,094	5
Vermont	2	3	1	10,055	0	10,055	1,449	0	11,408	0
Virginia	36	94	21	1,187,081	11,065	1,198,146	444,302	152,764	1,733,136	0
Washington	21	54	14	825,611	3,619	829,230	49,377	51,403	665,736	1,628
West Virginia	9	28	3	1,353,889	101,405	1,455,294	115,325	170,400	1,783,893	3,724
Wisconsin	32	81	14	1,358,984	6,004	1,364,988	54,133	178,988	1,619,747	0
Wyoming	2	4	3	4	750	754	0	0	19,363	0
Total for SIC Code 24	765	1,926	480	28,585,509	7,657,171	36,242,680	75,565,418	3,350,452	110,972,285	4,837,332

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Map 6-1. Total On- and Off-site Releases, 1996: Lumber and Wood Products, SIC Code 24



Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

Table 6-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Lumber and Wood Products, SIC Code 24 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
8001-58-9	Creosote	713,349	9,109	0	0	460	250	723,168	7,226,364	7,949,532
67-56-1	Methanol	5,828,821	10	0	0	0	0	5,828,831	250	5,829,081
1330-20-7	Xylene (mixed isomers)	5,417,261	0	0	0	0	0	5,417,261	0	5,417,261
108-88-3	Toluene	5,312,624	0	0	0	0	1,442	5,314,066	18,035	5,332,101
50-00-0	Formaldehyde	4,050,500	433	0	0	0	251	4,051,184	500	4,051,684
78-93-3	Methyl ethyl ketone	2,153,925	0	0	0	0	0	2,153,925	25	2,153,950
7664-41-7	Ammonia	858,280	43,700	0	0	0	1,650	903,630	2,255	905,885
71-36-3	n-Butyl alcohol	865,015	0	0	0	0	0	865,015	1	865,016
100-41-4	Ethylbenzene	652,473	0	0	0	0	0	652,473	0	652,473
108-10-1	Methyl isobutyl ketone	607,866	0	0	0	0	0	607,866	1	607,867
75-07-0	Acetaldehyde	369,111	10	0	0	0	0	369,121	0	369,121
107-21-1	Ethylene glycol	365,519	0	0	0	0	632	366,151	0	366,151
--	Glycol ethers	324,913	0	0	0	0	0	324,913	265	325,178
108-95-2	Phenol	267,191	505	0	0	0	505	268,201	2,105	270,306
87-86-5	Pentachlorophenol	6,794	8,236	0	0	2,750	250	18,030	196,075	214,105
	Subtotal	27,793,642	62,003	0	0	3,210	4,980	27,863,835	7,445,876	35,309,711
	Total for SIC Code 24	28,492,789	76,874	0	0	6,039	9,807	28,585,509	7,657,171	36,242,680

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

formaldehyde with 4.1 million pounds. The reconstituted wood products industry (SIC code 2493) reported half or more of the releases of methanol (2.9 million pounds, or 50.1%) and formaldehyde (2.4 million pounds, or 59.0%). The wood kitchen cabinets industry (SIC code 2434) reported half or more of the releases of xylenes (2.7 million pounds, or 49.1%) and toluene (3.1 million, or 58.8%).

For 13 of the 15 chemicals in Table 6-7, air emissions were the predominant release type, accounting for 95% or more of total releases. For the 15th-ranked chemical, pentachlorophenol, off-site releases also represented the large majority of reported releases, 196,000 pounds out of 214,000 pounds. Both creosote and pentachlorophenol are used in preserving wood.

OSHA Carcinogens

On- and off-site releases of OSHA carcinogens reported in the lumber and wood products sector totaled 12.7 million pounds in 1996, as shown in Table 6-8. This was 35.2% of total releases reported in the sector. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.)

The largest source of these releases was the wood preserving industry (SIC code 2491), which reported total releases of 8.2 million pounds of OSHA carcinogens. This included 7.4 million pounds of off-site releases (transfers to disposal), which was 97.2% of all off-site releases reported in this sector. The chemical with the largest total releases in this sector, creosote, is an OSHA carcinogen (see Table 6-7). Most of the wood preserving industry's reporting of off-site releases was for creosote (7.2 million pounds), including the 3.4 million pounds reported by one facility that resulted largely from clean-up activity.

The reconstituted wood products industry (SIC code 2493) reported 2.7 million pounds of releases of OSHA carcinogens, largely as air emissions. This was the industry with the second-largest total releases of OSHA carcinogens in the lumber and wood products sector. This industry reported 2.4 million pounds of air emissions of formaldehyde, a

Table 6-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Lumber and Wood Products, SIC Code 24 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2491	Wood Preserving	718,666	17,270	0	0	3,211	500	739,647	7,445,293	8,184,940
2493	Reconstituted Wood Products	2,675,900	250	0	0	0	250	2,676,400	250	2,676,650
	Multiple within SIC Code 24	698,882	252	0	0	0	0	699,134	1,258	700,392
2499	Wood Products, nec*	661,969	107	0	0	0	1	662,077	114	662,191
	Invalid SIC Code within SIC Code 24	348,470	0	0	0	0	0	348,470	250	348,720
2436	Softwood Veneer & Plywood	57,193	0	0	0	0	0	57,193	0	57,193
2431	Millwork	27,640	0	0	0	0	0	27,640	130	27,770
2434	Wood Kitchen Cabinets	23,830	0	0	0	0	0	23,830	0	23,830
2451	Mobile Homes	18,055	0	0	0	0	0	18,055	0	18,055
2452	Prefabricated Wood Buildings	16,400	0	0	0	0	0	16,400	0	16,400
2426	Hardwood Dimension & Flooring Mills	14,100	0	0	0	0	0	14,100	0	14,100
2435	Hardwood Veneer & Plywood	9,921	0	0	0	0	0	9,921	0	9,921
2421	Sawmills & Planing Mills, General	4,087	0	0	0	0	0	4,087	0	4,087
	Subtotal	5,275,113	17,879	0	0	3,211	751	5,296,954	7,447,295	12,744,249
	Total for SIC Code 24	28,492,789	76,874	0	0	6,039	9,807	28,585,509	7,657,171	36,242,680

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
*nec: not elsewhere classified.

component of resins that bind wood particles, fibers, and strands to make up reconstituted wood products.

Ranking third, the multiple-codes group (forms reporting multiple SIC codes within SIC code 24) reported 700,000 pounds of releases of OSHA carcinogens, also principally as air emissions.

Altogether, four of the top 15 chemicals for total releases reported in this sector were OSHA carcinogens. Total releases of creosote and formaldehyde were 7.9 million pounds and 4.1 million pounds, respectively. The other two chemicals were acetaldehye and pentachlorophenol. Reported releases of acetaldehyde totaled 369,000 pounds, almost entirely as air emissions. Like creosote, pentachlorophenol was principally reported as off-site releases (transfers to disposal), 196,000 pounds out of 214,000 pounds total releases for this chemical.

Figure 6-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Lumber and Wood Products

The lumber and wood products sector reported 111.0 million pounds of total production-related waste in 1996. Nearly half of this amount, 50.5 million pounds or 45.5%, was reported as on-site recycling. Quantities released on- and off-site amounted to 31.5 million pounds, 28.4% of the total. The third-largest category of waste management in lumber and wood products reporting was on-site treatment, with 23.5 million pounds, or 21.2% of total production-related waste. Table 6-9 presents waste management data for the lumber and wood products sector. Figure 6-8 illustrates the distribution by type of waste management.

The wood preserving industry (SIC code 2491) reported the largest amount of on-site recycling in this sector—49.8 million pounds. This was 44.8% of all production-related waste in the sector. This

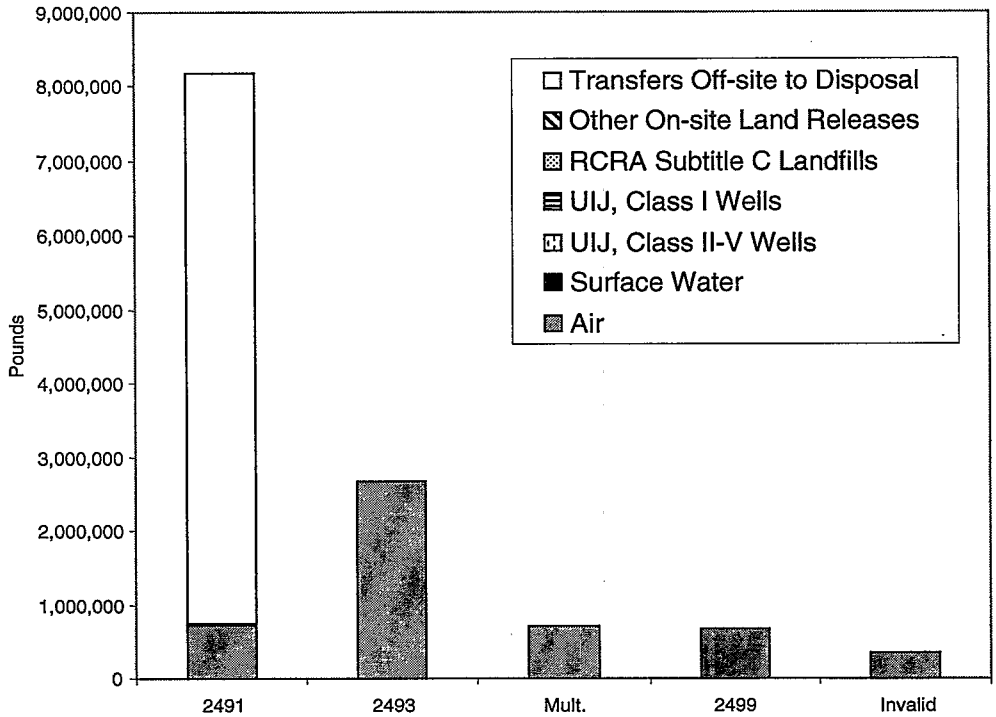


Figure 6-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Lumber and Wood Products (SIC Code 24)

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "24" that do not exist in the current Standard Industrial Classification code system.

Table 6-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Lumber and Wood Products, SIC Code 24 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2491	Wood Preserving	49,762,362	0	19,659,142	3,123	68,141	557,325	4,689,269	74,739,362	4,833,743
2434	Wood Kitchen Cabinets	601,684	272,244	1,583,929	104,608	1,257,488	220,532	9,063,452	13,103,937	955
2493	Reconstituted Wood Products	12,378	283,557	2,071,620	17,640	24,643	13,077	7,117,726	9,540,641	0
2499	Wood Products, nec*	91,349	959,685	10,482	85,921	521,207	280	3,669,177	5,338,101	1,550
2431	Millwork	14,010	0	73,013	163,517	376,714	6,619	1,994,546	2,628,419	1
	Multiple within SIC Code 24	20,877	70	38,589	9,839	25,701	8,170	2,124,503	2,227,749	0
2436	Softwood Veneer & Plywood	0	0	725	0	29,661	181	1,187,183	1,217,750	0
	Invalid SIC Code within SIC Code 24	8,351	22,830	7,922	0	17,715	16,719	598,517	672,054	0
2426	Hardwood Dimension & Flooring Mills	31,739	0	36,685	99,275	99,024	0	162,803	429,526	1,083
2439	Structural Wood Members, nec*	0	0	0	46,206	95,036	1,140	285,941	428,323	0
2451	Mobile Homes	0	0	0	70,308	0	0	243,070	313,378	0
2435	Hardwood Veneer & Plywood	2,175	0	0	0	2,475	273	248,142	253,065	0
2421	Sawmills & Planing Mills, General	0	0	0	0	2,100	0	62,545	64,645	0
2452	Prefabricated Wood Buildings	0	0	0	0	0	0	15,335	15,335	0
2448	Wood Pallets & Skids	0	0	0	0	0	0	0	0	0
2449	Wood Containers, nec*	0	0	0	0	0	0	0	0	0
	Total for SIC Code 24	50,544,925	1,538,386	23,482,107	600,437	2,519,905	824,316	31,462,209	110,972,285	4,837,332

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

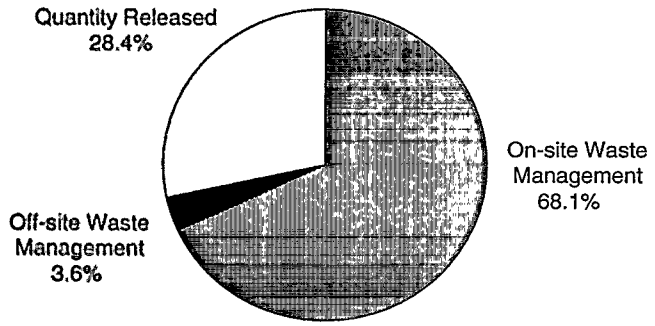


Figure 6-8. Distribution of TRI Production-related Waste, 1996: Lumber and Wood Products (SIC Code 24)

Note: Data from Section 8 of Form R.

industry also reported 19.7 million pounds of on-site treatment, the largest amount in that category. As noted earlier, two facilities in the wood preserving industry accounted for a large portion of the industry's reporting of on-site waste management.

Three industries accounted for 66.3% of the quantities reported as released by the lumber and wood products sector. The wood kitchen cabinets industry (SIC code 2434) reported the largest quantities released on- and off-site, 9.1 million pounds. Reconstituted wood products (SIC code 2493) reported 7.1 million pounds of releases. Wood preserving (SIC code 2491) reported 4.7 million pounds of releases.

Distribution of production-related waste for the top industries in the sector appears in Figure 6-9.

Projected Quantities of TRI Chemicals in Waste

The lumber and wood products sector projected a 5.2% reduction in total production-related waste by 1998, as shown in Table 6-10. Production-related waste reported in 1996 totaled 111.0 million pounds, and this was projected to decrease to 105.2 million pounds in 1998. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.)

The largest components of the overall projected reduction were quantities released on- and off-site (decrease from 31.5 million pounds in 1996 to 27.2 million pounds in 1998) and on-site recycling (decrease from 50.5 million pounds to 47.6 million pounds). These represented projected decreases of 13.4% in releases and 5.8% in on-site recycling. A large percentage decrease (29.5%) was projected in off-site treatment from 824,000 pounds in 1996 to 582,000 pounds in 1998.

These reductions were partly offset by a projected 6.9% increase in on-site treatment from 23.5 million pounds to 25.1 million pounds.

Figure 6-10 illustrates the projected percentage changes in waste management in this sector for 1996-1998.

These projected changes represent some improvement in the sector's management of TRI chemicals in waste, as measured by the waste management hierarchy, explained in Chapter 1. A smaller portion of the sector's TRI chemicals in waste would be released while a larger portion would be managed by treatment. In 1996, releases represented 28.4% of total production-related waste; the projected proportion was 25.9% in 1998. On-site treatment would increase from 21.2% of total production-related waste in 1996 to 23.8% in 1998. In the waste management hierarchy hierarchy, treatment is preferred over releases, which are the least desirable waste management option.

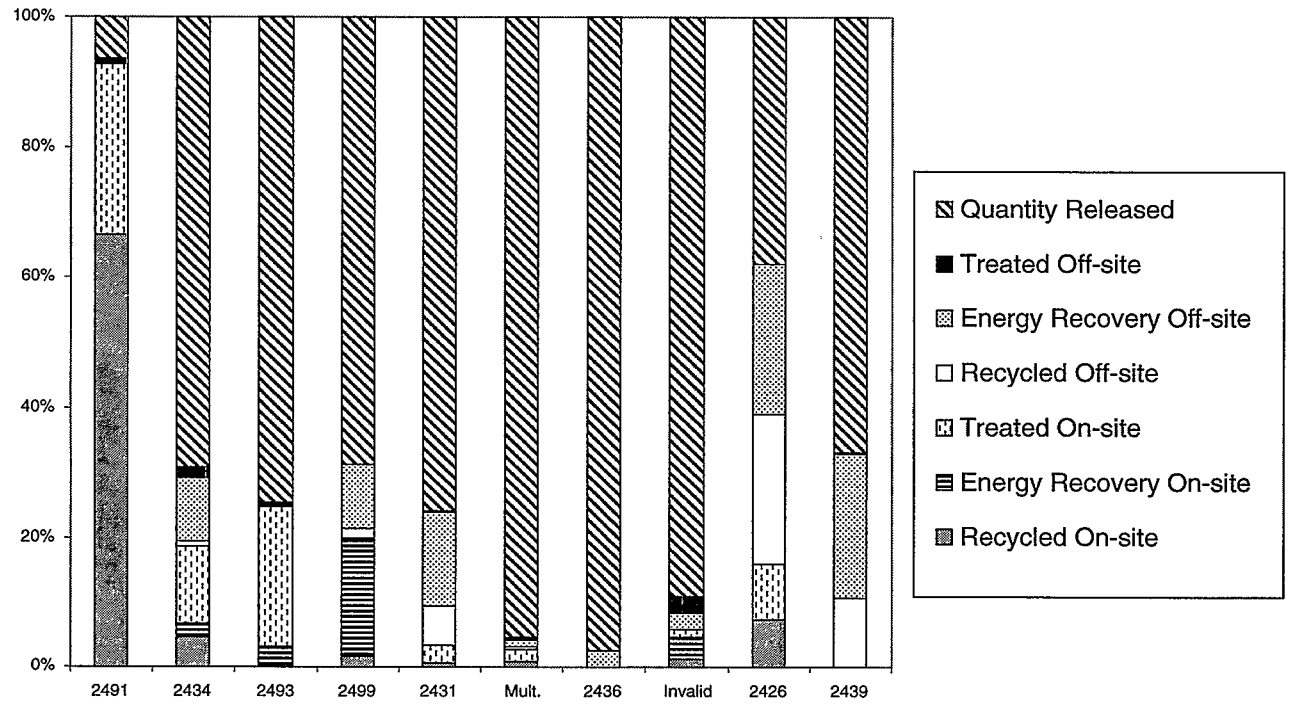


Figure 6-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Lumber and Wood Products (SIC Code 24)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC Code within SIC code 24 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "24" that do not exist in the current Standard Industrial Classification code system.

Source Reduction Activity

In the lumber and wood products sector, nearly one-fourth (22.7%, 438 forms) of the forms submitted indicated one or more source reduction activities underway during the year. Table 6-11 presents the sector's reporting of source reduction activity. The industries submitting the largest number of forms indicating source reduction activity were wood preserving (SIC code 2491) with 144 forms and wood kitchen cabinets (SIC code 2434) with 136 forms. These forms represented nearly half (47.7%) of the submissions in the wood kitchen cabinet industry, but less than one-fifth (16.3%) of the submissions in wood preserving.

The activities most frequently reported in this sector were improving operating practices (190 forms) and modifying processes (113 forms).

Year-to-Year Comparisons for Lumber and Wood Products

1995-1996 TRI Data for Lumber and Wood Products

From 1995 to 1996, the number of forms submitted in the lumber and wood products industry increased 2.4%, an increase of 45 forms, as shown in Table 6-12. A much larger increase (29.0%, or 108 forms) occurred in the number of Form As submitted. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the Form A certification statement in its second year of availability.

Table 6-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Lumber and Wood Products, SIC Code 24

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	50,544,925	45.5	54,738,293	48.7	47,598,202	45.2
Energy Recovery On-site	1,538,386	1.4	1,546,483	1.4	1,487,798	1.4
Treated On-site	23,482,107	21.2	24,643,369	21.9	25,098,464	23.8
Off-site Waste Management						
Recycled Off-site	600,437	0.5	684,348	0.6	728,040	0.7
Energy Recovery Off-site	2,519,905	2.3	2,466,028	2.2	2,518,823	2.4
Treated Off-site	824,316	0.7	595,438	0.5	581,532	0.6
Quantity Released On- and Off-site	31,462,209	28.4	27,690,254	24.6	27,234,587	25.9
Total Production-related Waste for SIC Code 24	110,972,285	100.0	112,364,213	100.0	105,247,446	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	8.3	13.0	-5.8
Energy Recovery On-site	0.5	3.8	-3.3
Treated On-site	4.9	1.8	6.9
Off-site Waste Management			
Recycled Off-site	14.0	6.4	21.3
Energy Recovery Off-site	-2.1	2.1	0.0
Treated Off-site	-27.8	-2.3	-29.5
Quantity Released On- and Off-site	-12.0	-1.6	-13.4
Total Production-related Waste for SIC Code 24	1.3	-6.3	-5.2

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

On- and Off-site Releases

In the lumber and wood products sector, total on- and off-site releases reported to TRI increased 4.0% from 34.8 million pounds in 1995 to 36.2 million pounds in 1996. The overall increase in total releases reflected an increase of 166.7% in off-site releases (transfers to disposal) from 2.9 million pounds to 7.7 million pounds. As mentioned earlier in this chapter, one facility reported 3.4 million pounds in transfers to disposal of creosote in 1996 (including 3.3 million pounds of remedial waste from clean-up activities). This facility reported 39,000 pounds of transfers to disposal in 1995, resulting in an increase of 3.4 million pounds from 1995 to 1996.

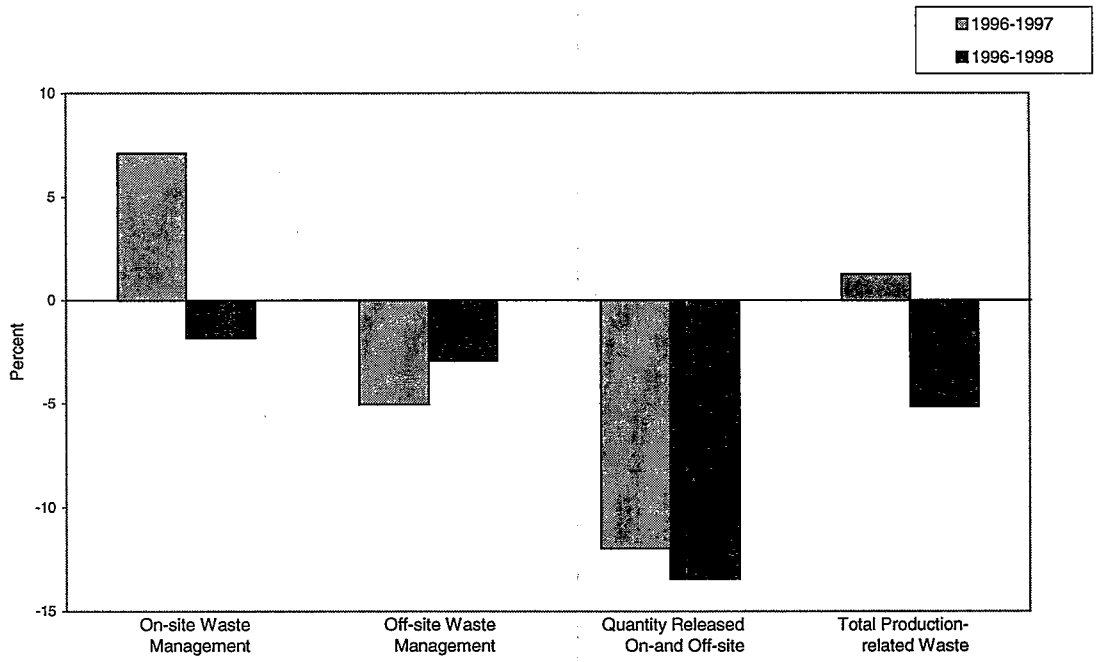


Figure 6-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Lumber and Wood Products (SIC Code 24)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

Table 6-11. Number of Forms Reporting Source Reduction Activity, 1996: Lumber and Wood Products, SIC Code 24

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifi-cations Number	Process Modifi-cations Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifi-cations Number
2421	Sawmills & Planing Mills, General	19	0	0.0	0	0	0	0	0	0	0	0
2426	Hardwood Dimension & Flooring Mills	13	4	30.8	2	2	2	2	1	0	0	1
2431	Millwork	84	40	47.6	7	4	3	9	4	0	15	4
2434	Wood Kitchen Cabinets	285	136	47.7	73	11	8	39	20	13	31	12
2435	Hardwood Veneer & Plywood	17	4	23.5	0	0	0	4	0	0	0	0
2436	Softwood Veneer & Plywood	40	3	7.5	2	0	0	0	1	0	0	0
2439	Structural Wood Members, nec*	14	0	0.0	0	0	0	0	0	0	0	0
2448	Wood Pallets & Skids	1	0	0.0	0	0	0	0	0	0	0	0
2449	Wood Containers, nec*	1	0	0.0	0	0	0	0	0	0	0	0
2451	Mobile Homes	159	12	7.5	11	0	0	0	0	0	1	0
2452	Prefabricated Wood Buildings	4	0	0.0	0	0	0	0	0	0	0	0
2491	Wood Preserving	884	144	16.3	59	8	79	8	58	0	3	3
2493	Reconstituted Wood Products	167	29	17.4	19	0	4	6	4	1	3	0
2499	Wood Products, nec*	114	49	43.0	9	1	3	27	15	1	28	5
	Multiple within SIC Code 24	97	9	9.3	7	0	0	3	5	0	5	0
	Invalid SIC Code within SIC Code 24	27	8	29.6	1	2	2	4	5	1	2	2
	Total for SIC Code 24	1,926	438	22.7	190	28	101	102	113	16	88	27

Note: Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Lumber and Wood Products, SIC Code 24

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	737	765	3.8
Total Forms	1,881	1,926	2.4
Form Rs	1,509	1,446	-4.2
Form As	372	480	29.0
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	31,884,645	28,492,789	-10.6
Fugitive Air	5,268,456	4,636,576	-12.0
Point Source Air	26,616,189	23,856,213	-10.4
Surface Water Discharges	68,632	76,874	12.0
Underground Injection	0	0	--
On-site Land Releases	10,970	15,846	44.4
Total On-site Releases	31,964,247	28,585,509	-10.6
Off-site Releases			
Transfers Off-site to Disposal	2,870,699	7,657,171	166.7
Total On- and Off-site Releases	34,834,946	36,242,680	4.0
Other On-site Waste Management			
Recycled On-site	76,288,451	50,544,925	-33.7
Energy Recovery On-site	1,468,254	1,538,386	4.8
Treated On-site	5,672,195	23,482,107	314.0
Total Other On-site Waste Management	83,428,900	75,565,418	-9.4
Transfers Off-site for Further Waste Management			
Transfers to Recycling	459,499	515,208	12.1
Transfers to Energy Recovery	2,649,553	2,299,252	-13.2
Transfers to Treatment	526,038	491,157	-6.6
Transfers to POTWs	29,720	32,799	10.4
Other Off-site Transfers	2,418	12,036	397.8
Total Transfers Off-site for Further Waste Management	3,667,228	3,350,452	-8.6

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

From 1995 to 1996, air emissions, which constituted the great majority of releases reported in this sector, decreased from 31.9 million pounds to 28.5 million pounds (a 10.6% reduction), with reductions in both fugitive and point-source emissions.

Table 6-12 shows the 1995-1996 reporting of releases in this sector, and Figure 6-11 illustrates the percentage change for each type of release.

Other On-site Waste Management

Table 6-12 also presents the lumber and wood products sector's other on-site waste management data for 1995-1996. A large absolute reduction in on-site recycling, from 76.3 million pounds in 1995 to 50.5 million pounds in 1996, was the major factor in an overall reduction in the sector's reporting of other on-site waste management. The decrease in on-site recycling amounted to 33.7%. At the same time, on-site treatment increased from 5.7 million pounds to 23.5 million pounds, or 314.0%.

Several facilities in the wood preserving industry (SIC code 2491) reported large amounts that influenced the 1995-1996 changes in other on-site waste management. Two facilities reported reductions of 12.7 million pounds and 7.3 million pounds, respectively, in on-site recycling of creosote from 1995 to 1996. At the same time, three facilities that reported zero amounts of on-site treatment of creosote in 1995 reported 12.6 million pounds, 3.4 million pounds, and 1.2 million pounds, respectively, for on-site treatment of creosote in 1996. In part, these changes resulted from facilities redefining specific activities from one type of waste management to another, as noted

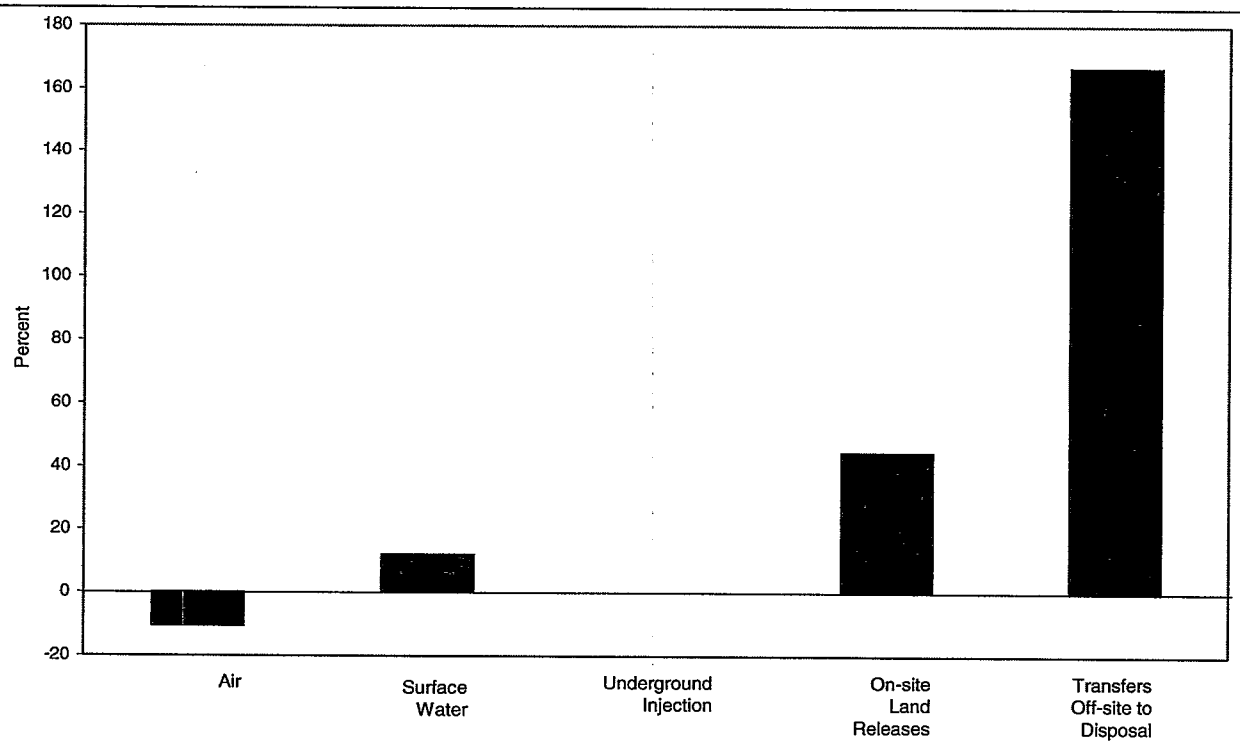


Figure 6-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Lumber and Wood Products (SIC Code 24)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

in "Facilities with Large Increases and Decreases in Waste Management, 1991-1996," later in this chapter.

Transfers Off-site for Further Waste Management

In the lumber and wood products sector, transfers off-site for further waste management reported to TRI decreased from 3.7 million pounds in 1995 to 3.4 million pounds in 1996, as shown in Table 6-12. The largest component of this 8.6% reduction was transfers to energy recovery, which decreased from 2.6 million pounds to 2.3 million pounds (13.2%). A smaller reduction was reported in transfers to treatment, from 526,000 pounds to 491,000 pounds (6.6%). Transfers to recycling increased from 459,000 pounds to 515,000 pounds, a 12.1% increase.

1988-1996 TRI Data for Lumber and Wood Products

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years.[1] These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

As shown in Table 6-13, the lumber and wood products sector reported total on- and off-site releases of 33.0 million pounds in 1988 and 27.1 million pounds in 1996, a reduction of 17.8%. All release types showed decreases, including a 13.9% reduction in air emissions from 31.0 million pounds to 26.7 million pounds. Both fugitive and point-source emissions decreased over the period 1988-1996. Off-site releases (transfers off-site to disposal) decreased by 78.1%, from 1.9 million pounds in 1988 to 423,000 pounds in 1996.

Figure 6-12 illustrates percentage changes in on- and off-site releases for 1988-1996 in the lumber and wood products sector.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, on-site waste management showed little overall change in the lumber and wood products sector, totaling 6.42 million pounds in 1994 and 6.46 million in 1996. This represented the net result of a 644,000 pounds decrease in on-site energy recovery and increases of 271,000 pounds in on-site recycling and 410,000 pounds in on-site treatment.

Reductions were reported in both of the types of transfers off-site for further waste management that were collected for the full 1988-1996 period. Transfers to treatment decreased from 2.4 million pounds to 220,000 pounds, a 91.0% reduction. Transfers to POTWs decreased from 80,000 pounds to 4,000 pounds, a 95.3% reduction.

In some categories, substantially higher amounts were reported in 1994 or 1995. In part, this reflects changes in reporting by facilities mentioned earlier in this chapter.

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[1] Creosote, the chemical with the largest releases reported in the lumber and wood products sector for 1996, was added to the TRI list in reporting year 1990. Analyses of 1988-1996 data therefore do not include this chemical.

Table 6-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Lumber and Wood Products, SIC Code 24

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	678	658	629	615	-9.3
Total Forms	1,816	1,760	1,673	1,654	-8.9
Form Rs	1,816	1,760	1,365	1,294	-28.7
Form As	NA	NA	308	360	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	30,972,926	32,561,527	30,102,727	26,662,607	-13.9
Fugitive Air	5,463,271	4,205,621	4,353,277	3,646,061	-33.3
Point Source Air	25,509,655	28,355,906	25,749,450	23,016,546	-9.8
Surface Water Discharges	27,125	23,732	11,049	18,165	-33.0
Underground Injection	0	0	0	0	--
On-site Land Releases	49,529	8,917	7,142	12,483	-74.8
Total On-site Releases	31,049,580	32,594,176	30,120,918	26,693,255	-14.0
Off-site Releases					
Transfers Off-site to Disposal	1,932,227	392,090	313,719	423,386	-78.1
Total On- and Off-site Releases	32,981,807	32,986,266	30,434,637	27,116,641	-17.8
Other On-site Waste Management					
Recycled On-site	NA	1,897,805	11,914,269	2,168,592	NA
Energy Recovery On-site	NA	2,160,052	1,439,098	1,516,386	NA
Treated On-site	NA	2,361,800	4,168,098	2,771,625	NA
Total Other On-site Waste Management	NA	6,419,657	17,521,465	6,456,603	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	627,071	457,249	515,208	NA
Transfers to Energy Recovery	NA	2,503,747	2,555,283	2,262,522	NA
Transfers to Treatment	2,438,178	228,431	288,032	220,330	-91.0
Transfers to POTWs	79,544	22,448	6,006	3,711	-95.3
Other Off-site Transfers	395,167	250	2,418	1,536	-99.6
Total Transfers Off-site for Further Waste Management	NA	3,381,947	3,308,988	3,003,307	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. **NA:** not required to be reported in that year.

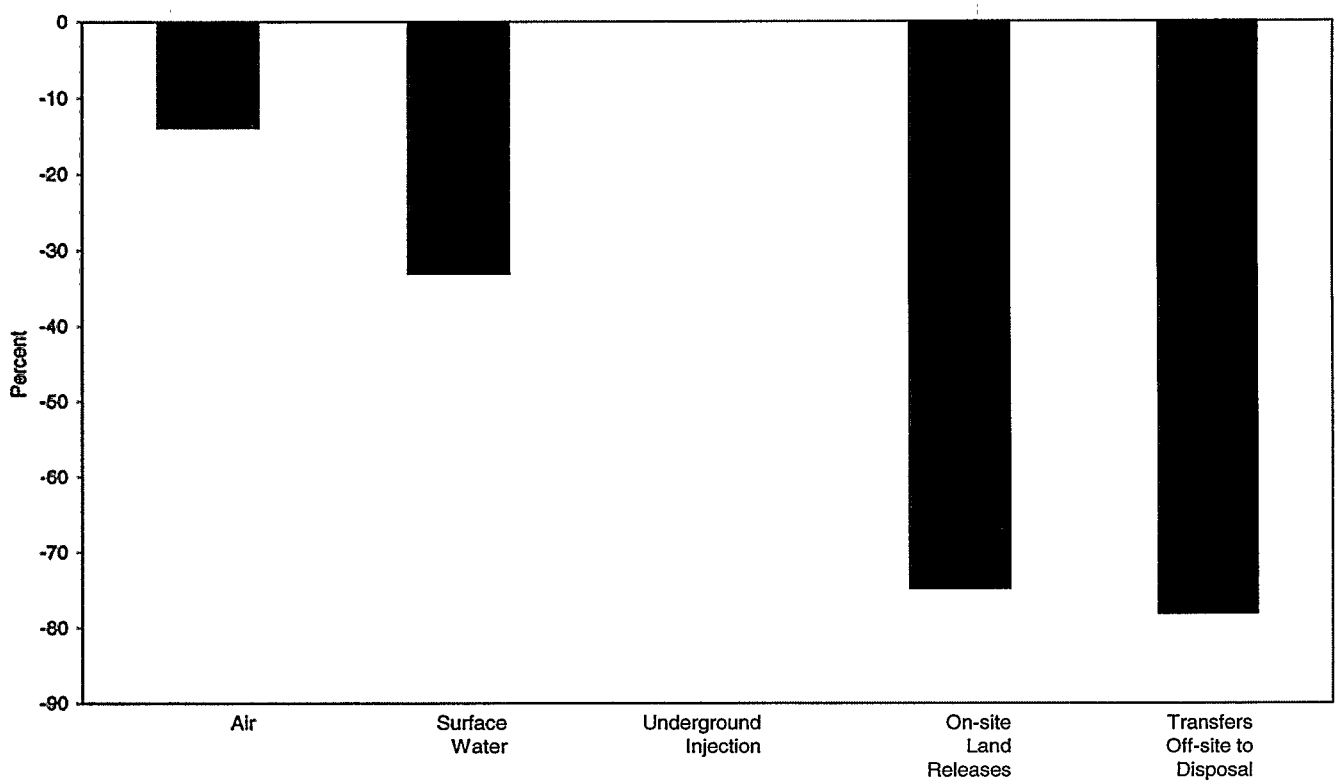

Figure 6-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Lumber and Wood Products (SIC Code 24)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

1988-1996 Data for Four-Digit Industries in Lumber and Wood Products

Tables 6-14 through 6-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 24. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Table 6-14 provides release data for all four-digit SIC codes in the lumber and wood products sector for 1988-1996.

The wood kitchen cabinets industry (SIC code 2434) reported the largest decrease in total on- and off-site releases from 1988 to 1996, from 11.8 million pounds to 8.7 million pounds. The millwork industry (SIC code 2431) had the second largest reduction, from 4.2 million pounds to 2.3 million pounds. Both industries reported somewhat larger releases in 1994 than in 1988, as shown in Table 6-14; their reductions were reported after 1994. Ranking third was the miscellaneous wood products industry (SIC code 2499), reporting 5.9 million pounds of releases in 1988 and 4.2 million pounds in 1996. Air emissions accounted for the largest portion of the reductions in all three of these industries.

Table 6-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Lumber and Wood Products, SIC Code 24

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2421	Sawmills & Planing Mills, General	96	61,339	0	0	0	61,339	0	61,339
		95	33,897	0	0	0	33,897	0	33,897
		94	9,418	0	0	0	9,418	0	9,418
		88	345,436	0	0	250	345,686	0	345,686
2426	Hardwood Dimension & Flooring Mills	96	191,618	0	0	1,442	193,060	0	193,060
		95	130,411	0	0	0	130,411	0	130,411
		94	284,722	0	0	0	284,722	0	284,722
		88	296,073	0	0	500	296,573	0	296,573
2429	Special Product Sawmills, nec*	96	No reports received						
		95	No reports received						
		94	57,766	0	0	0	57,766	0	57,766
		88	No reports received						
2431	Millwork	96	2,302,304	0	0	0	2,302,304	10,707	2,313,011
		95	3,110,360	0	0	1,400	3,111,760	2,739	3,114,499
		94	4,244,538	0	0	1,100	4,245,638	14,469	4,260,107
		88	4,199,101	0	0	0	4,199,101	27,350	4,226,451
2434	Wood Kitchen Cabinets	96	8,718,307	0	0	0	8,718,307	18,062	8,736,369
		95	9,290,161	0	0	0	9,290,161	905	9,291,066
		94	12,110,771	0	0	0	12,110,771	1,871	12,112,642
		88	11,572,398	0	0	0	11,572,398	273,449	11,845,847
2435	Hardwood Veneer & Plywood	96	248,200	0	0	0	248,200	250	248,450
		95	707,411	0	0	0	707,411	250	707,661
		94	793,655	0	0	0	793,655	250	793,905
		88	776,516	0	0	0	776,516	0	776,516
2436	Softwood Veneer & Plywood	96	1,165,964	0	0	0	1,165,964	0	1,165,964
		95	1,227,314	0	0	0	1,227,314	0	1,227,314
		94	1,153,531	38	0	0	1,153,569	0	1,153,569
		88	287,153	0	0	2,250	289,403	250	289,653
2439	Structural Wood Members, nec*	96	285,940	0	0	0	285,940	0	285,940
		95	296,284	0	0	0	296,284	0	296,284
		94	340,498	14	0	0	340,512	0	340,512
		88	199,350	0	0	0	199,350	0	199,350
2441	Nailed Wood Boxes & Shook	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	17	0	0	0	17	0	17
2449	Wood Containers, nec*	96	0	0	0	0	0	0	0
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	250	250
2451	Mobile Homes	96	81,032	0	0	0	81,032	0	81,032
		95	201,462	0	0	0	201,462	0	201,462
		94	274,000	0	0	5	274,005	0	274,005
		88	18,650	250	0	0	18,900	0	18,900

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Lumber and Wood Products, SIC Code 24, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2452	Prefabricated Wood Buildings	96	16,400	0	0	0	16,400	0	16,400
		95	46,098	0	0	0	46,098	4,456	50,554
		94	106,620	0	0	0	106,620	11,500	118,120
		88	41,950	0	0	0	41,950	0	41,950
2491	Wood Preserving	96	13,404	16,580	0	9,278	39,262	381,270	420,532
		95	12,864	9,466	0	265	22,595	263,643	286,238
		94	43,173	15,089	0	265	58,527	319,311	377,838
		88	495,690	8,035	0	23,298	527,023	1,522,698	2,049,721
2493	Reconstituted Wood Products	96	6,927,927	500	0	1,130	6,929,557	625	6,930,182
		95	7,399,983	260	0	1,794	7,402,037	1,638	7,403,675
		94	5,245,147	5,766	0	1,047	5,251,960	1,198	5,253,158
		88	3,123,754	4,220	0	2,500	3,130,474	998	3,131,472
2499	Wood Products, nec*	96	4,244,991	122	0	633	4,245,746	379	4,246,125
		95	4,508,431	96	0	3,433	4,511,960	11,783	4,523,743
		94	4,729,231	500	0	6,500	4,736,231	15,798	4,752,029
		88	5,854,210	819	0	0	5,855,029	87,070	5,942,099
	Multiple within SIC Code 24	96	1,814,441	963	0	0	1,815,404	9,738	1,825,142
		95	1,897,093	1,177	0	250	1,898,520	27,305	1,925,825
		94	1,965,763	2,325	0	0	1,968,088	19,805	1,987,893
		88	2,475,585	13,301	0	13,674	2,502,560	15,299	2,517,859
	Invalid SIC Code within SIC Code 24	96	590,740	0	0	0	590,740	2,355	593,095
		95	1,240,958	50	0	0	1,241,008	1,000	1,242,008
		94	1,202,694	0	0	0	1,202,694	7,888	1,210,582
		88	1,287,043	500	0	7,057	1,294,600	4,863	1,299,463
	Total for SIC Code 24	96	26,662,607	18,165	0	12,483	26,693,255	423,386	27,116,641
		95	30,102,727	11,049	0	7,142	30,120,918	313,719	30,434,637
		94	32,561,527	23,732	0	8,917	32,594,176	392,090	32,986,266
		88	30,972,926	27,125	0	49,529	31,049,580	1,932,227	32,981,807

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
*nec: not elsewhere classified.

The reconstituted wood products industry (SIC code 2493) reported the largest increase in total releases from 1988 to 1996 in the lumber and wood products sector. This industry reported 3.1 million pounds of releases in 1988 and 6.9 million pounds in 1996, although the 1996 level represented a decrease from 1995. Increases reported in air emissions accounted for the overall increase. The softwood veneer and plywood industry (SIC code 2436) had the second largest-increase in the sector, from 290,000 pounds in 1988 to 1.2 million pounds in 1996. Almost all of this industry's reporting was for air emissions. This industry also had a small decrease from 1995 to 1996, despite the overall increase for the full 1988-1996 comparison period. The miscellaneous structural wood members industry (SIC code 2439) ranked third for increases, reporting 199,000 pounds in 1988 and 286,000 pounds in 1996, entirely in air emissions.

Other On-site Waste Management

In the lumber and wood products sector, the miscellaneous wood products industry (SIC code 2499) had the largest 1994-1996 decrease in other

on-site waste management (on-site waste management data were not collected in 1988). This industry reported 1.7 million pounds in 1994 and 1.1 million pounds in 1996, and the reduction was attributable to decreases in on-site energy recovery. Reconstituted wood products (SIC code 2493) reported 1.9 million pounds of other on-site waste management in 1994 and 1.3 million pounds in 1996, the second-largest reduction in the sector. Reductions in both on-site recycling and on-site energy recovery contributed to this overall decrease. Ranking third for decreases was the millwork industry (SIC code 2431), which reported 331,000 pounds in 1994 and 87,000 pounds in 1996. The reported reductions occurred in both on-site recycling and on-site treatment.

The wood kitchen cabinets industry (SIC code 2434) ranked first for increases in other on-site waste management, with 1.4 million pounds in 1994 and 2.5 million pounds in 1996. Increases were reported in all three types of waste management. The industry with the second-largest increase was wood preserving (SIC code 2491). This industry reported 894,000 pounds in 1994 and 1.4 million pounds in 1996, although the 1995 level was higher (2.1 million pounds). These changes were reported primarily in on-site recycling. Some wood preserving facilities with large increases in on-site recycling attributed their increases to revisions in their interpretation of how to report on-site recycling[2] (see "Facilities with Large Increases and Decreases in Waste Management, 1991-1996," later in this chapter). The hardwood veneer and plywood industry (SIC code 2435) was the only other lumber and wood products industry to record an increase from 1994 to 1996 in on-site waste management. This industry reported a little over 2,000 pounds, entirely in on-site recycling, in both 1994 and 1996, with an increase of 87 pounds.

On-site waste management data for 1994-1996 appear in Table 6-15.

Transfers Off-site for Further Waste Management

The millwork industry (SIC code 2431) reported 870,000 pounds of transfers off-site for further waste management in 1994 and 297,000 pounds in 1996, after an increase to 927,000 pounds in 1995. The 1994-1996 reduction was the largest in the lumber and wood products sector (data for some types of off-site transfers were not collected in 1988). The second-largest reduction was reported in the hardwood veneer and plywood industry (SIC code 2435), from 176,000 pounds in 1994 to 3,000 pounds in 1996. Reductions in both industries were reported in all transfer types. The multiple-codes group (forms reporting more than one SIC code in SIC code 24) had the third-largest decrease, from 41,000 pounds in 1994 to 35,000 in 1996. Transfers to energy recovery decreased, offset by small increases in transfers to recycling and treatment.

Hardwood dimension and flooring mills (SIC code 2426) reported the largest increase in transfers off-site for further waste management in the lumber and wood products sector for 1994-1996. This industry reported 73,000 pounds in 1994 and 196,000 pounds in 1996, with increases in transfers to recycling, energy recovery, and treatment. The wood kitchen cabinets industry (SIC code 2434) ranked second for increases, reporting 1.4 million pounds in 1994, 1.2 million pounds in 1995, and 1.5 million pounds in 1996. An increase in reported transfers to energy recovery was only partly offset by a decrease in reported transfers to recycling in the wood kitchen cabinets industry. The third-largest increase was reported by the mobile homes industry (SIC code 2451), from zero pounds in 1994 (forms received for 1994 reported no amounts of transfers off-site for further waste management) to 71,000 pounds in 1996.

[2] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

Table 6-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Lumber and Wood Products, SIC Code 24

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2421	Sawmills & Planing Mills, General	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2426	Hardwood Dimension & Flooring Mills	96	31,739	0	36,685	68,424
		95	96,309	0	0	96,309
		94	75,430	0	0	75,430
		88	NA	NA	NA	NA
2429	Special Product Sawmills, nec*	96	No reports received			
		95	No reports received			
		94	0	0	0	0
		88	No reports received			
2431	Millwork	96	14,010	0	73,013	87,023
		95	41,685	0	110,231	151,916
		94	151,461	0	179,944	331,405
		88	NA	NA	NA	NA
2434	Wood Kitchen Cabinets	96	601,684	272,244	1,583,929	2,457,857
		95	244,843	181,440	2,194,028	2,620,311
		94	256,414	0	1,163,597	1,420,011
		88	NA	NA	NA	NA
2435	Hardwood Veneer & Plywood	96	2,175	0	0	2,175
		95	7,165	0	0	7,165
		94	2,088	0	0	2,088
		88	NA	NA	NA	NA
2436	Softwood Veneer & Plywood	96	0	0	725	725
		95	0	0	1,184	1,184
		94	0	0	1,200	1,200
		88	NA	NA	NA	NA
2439	Structural Wood Members, nec*	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2441	Nailed Wood Boxes & Shook	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2449	Wood Containers, nec*	96	0	0	0	0
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2451	Mobile Homes	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 6-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Lumber and Wood Products, SIC Code 24, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2452	Prefabricated Wood Buildings	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2491	Wood Preserving	96	1,386,479	0	26,664	1,413,143
		95	2,089,180	0	9,562	2,098,742
		94	849,890	0	44,593	894,483
		88	NA	NA	NA	NA
2493	Reconstituted Wood Products	96	12,378	261,557	993,616	1,267,551
		95	278,742	8,769	932,174	1,219,685
		94	420,419	544,926	936,132	1,901,477
		88	NA	NA	NA	NA
2499	Wood Products, nec*	96	90,899	959,685	10,482	1,061,066
		95	88,482	1,209,200	39,199	1,336,881
		94	78,424	1,605,111	16,290	1,699,825
		88	NA	NA	NA	NA
	Multiple within SIC Code 24	96	20,877	70	38,589	59,536
		95	52,627	68	38,680	91,375
		94	62,110	15	18,684	80,809
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 24	96	8,351	22,830	7,922	39,103
		95	9,015,236	39,621	843,040	9,897,897
		94	1,569	10,000	1,360	12,929
		88	NA	NA	NA	NA
	Total for SIC Code 24	96	2,168,592	1,516,386	2,771,625	6,456,603
		95	11,914,269	1,439,098	4,168,098	17,521,465
		94	1,897,805	2,160,052	2,361,800	6,419,657
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-16 presents the lumber and wood sector's reporting of transfers off-site for further waste management for 1988 and 1994-1996.

Facilities with Large Increases and Decreases in Releases, 1988-1996

American Woodmark Corporation in Moorefield, West Virginia (SIC code 2434), ranked first in increases with an overall 542,000 pound change. Approximately one-third of the change is accounted for by point-source air emissions of toluene. This manufacturer of kitchen cabinets uses toluene as a solvent in finish coatings and in cleaning materials. The facility contact stated that the increase is due to several factors: a slight increase in production, a process change whereby two coats of a finish sealer are applied instead of one, and a reformulation of some finish materials. The contact also stated that toluene air emissions were reduced from 461,000 pounds in 1996 to 266,000 pounds in 1997 to comply with the Hazardous Air Pollutant component of the facility's Title V air permit.

Fiber Products Operations in Diboll, Texas (SIC code 2493), was second in increases with a 534,000 pound total. Methanol reporting is responsible for 90% of the increase. The manufacturer of

Table 6-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Lumber and Wood Products, SIC Code 24

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2421	Sawmills & Planing Mills, General	96	0	2,150	0	0	0	2,150
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2426	Hardwood Dimension & Flooring Mills	96	99,217	90,607	6,199	0	0	196,023
		95	7,681	78,908	0	0	0	86,589
		94	0	72,769	0	0	0	72,769
		88	NA	NA	1,419	0	0	NA
2429	Special Product Sawmills, nec*	96	No reports received					
		95	No reports received					
		94	0	1,040	0	0	0	1,040
		88	No reports received					
2431	Millwork	96	64,068	225,523	6,207	782	0	296,580
		95	202,681	707,059	16,526	604	0	926,870
		94	257,356	594,394	16,960	1,309	0	870,019
		88	NA	NA	398,050	10	0	NA
2434	Wood Kitchen Cabinets	96	118,412	1,328,479	79,923	0	1,000	1,527,814
		95	50,231	1,054,396	131,400	0	2,418	1,238,445
		94	277,538	1,071,259	71,704	0	250	1,420,751
		88	NA	NA	1,191,363	0	46,536	NA
2435	Hardwood Veneer & Plywood	96	0	2,475	0	84	0	2,559
		95	0	94,677	12,550	205	0	107,432
		94	4,960	152,107	18,800	198	0	176,065
		88	NA	NA	24,521	17,600	0	NA
2436	Softwood Veneer & Plywood	96	0	29,841	0	181	0	30,022
		95	0	36,383	0	296	0	36,679
		94	0	30,556	0	300	0	30,856
		88	NA	NA	0	1,500	0	NA
2439	Structural Wood Members, nec*	96	46,161	8,636	0	1,140	0	55,937
		95	250	14,850	0	1,112	0	16,212
		94	1,000	23,850	0	1,323	0	26,173
		88	NA	NA	2,160	0	0	NA
2441	Nailed Wood Boxes & Shook	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA
2449	Wood Containers, nec*	96	0	0	0	0	0	0
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 6-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Lumber and Wood Products, SIC Code 24, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2451	Mobile Homes	96	70,308	0	454	0	0	70,762
		95	6,263	0	250	0	0	6,513
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
2452	Prefabricated Wood Buildings	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	172,500	NA
2491	Wood Preserving	96	3,082	11,596	110,202	630	536	126,046
		95	360	18,102	98,210	1,764	0	118,436
		94	250	24,982	89,178	2,090	0	116,500
		88	NA	NA	171,305	25,145	23,230	NA
2493	Reconstituted Wood Products	96	18,350	24,672	750	525	0	44,297
		95	16,229	21,005	1,989	525	0	39,748
		94	4,661	24,927	2,642	16,298	0	48,528
		88	NA	NA	55,500	6,286	0	NA
2499	Wood Products, nec*	96	85,771	487,968	500	369	0	574,608
		95	168,316	463,488	23,074	250	0	655,128
		94	64,654	427,950	22,659	165	0	515,428
		88	NA	NA	491,234	253	151,401	NA
	Multiple within SIC Code 24	96	9,839	16,251	8,544	0	0	34,634
		95	4,483	21,456	3,698	0	0	29,637
		94	7,830	26,718	6,488	250	0	41,286
		88	NA	NA	58,461	5,400	750	NA
	Invalid SIC Code within SIC 24	96	0	34,324	7,551	0	0	41,875
		95	755	44,959	335	1,250	0	47,299
		94	8,822	53,195	0	515	0	62,532
		88	NA	NA	44,165	23,350	750	NA
	Total for SIC Code 24	96	515,208	2,262,522	220,330	3,711	1,536	3,003,307
		95	457,249	2,555,283	288,032	6,006	2,418	3,308,988
		94	627,071	2,503,747	228,431	22,448	250	3,381,947
		88	NA	NA	2,438,178	79,544	395,167	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 24 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

reconstituted wood products uses a low-level thermal digesting process to break down wood chips into fibers. This process produces methanol as a by-product. The fibers are then combined with resin and pressed into a board material. According to the facility contact, improved estimation methodology was the reason for the increase.

Weyerhaeuser in Elkin, North Carolina (did not report in 1988, SIC code 2493 in 1996), ranked third in increases with 513,000 pounds. Point source air emissions of methanol accounted for 55% of the increase. The facility's primary product is oriented strand board, which is produced by impregnating wood chips with resin and then

forming the resinated material into boards under high temperature and pressure. Methanol is produced as a by-product during this pressing cycle. The plant did not come into full operation until 1989 and, according to the facility contacts, did not meet the reporting threshold in 1988. Therefore, the facility did not report in 1988. Facility contacts also stated that, until 1996, industry emission factors for methanol were not thoroughly developed for the oriented strand board manufacturing processes used at this plant.

Andersen Corporation in Bayport, Minnesota (SIC code 2431), ranked first in decreases with an overall 1.3 million-pound decrease. Xylene (mixed isomers) accounted for over half (667,000 pounds) of the reduction. The manufacturer of clad-wood windows and patio doors reduced xylene usage in a number of ways. The chemical was used as a paint thinner and was replaced with n-butyl acetate. It was eliminated as a cleaning solvent and replaced by unlisted chemicals such as denatured alcohol. Xylene was also eliminated as a diluent in a solvent-based wood preservative (heptane was substituted). Additionally, Andersen asked its suppliers to reduce or eliminate TRI chemicals from their products. These included paints and a solvent-based wood preservative. Xylene usage was further reduced by switching from solvent-based adhesives (used to laminate vinyl to wood core) to urethane adhesives. Andersen noted that because the facility purchases high volumes of materials, its suppliers have sometimes discontinued products with higher contents of regulated chemicals and replaced them with reformulated products.

Dallas Woodcraft, Inc., in Dallas, Texas (SIC code 2499), was second in decreases with a 790,000 pound reduction. The plant produces framed copies of artwork. Wooden picture frames are manufactured on-site. Xylene (mixed isomers), which accounted for 84% of the decrease, was used in staining and coating processes. No xylene data were reported in 1996 because the facility switched to water-based processes.

Pella Corporation in Pella, Iowa (SIC code 2431), was third in decreases with an overall 669,000 pound decrease. Air emissions of toluene, a paint constituent, were reduced by over 353,000 pounds (53% of the total decrease) after the facility started using lower VOC (high-solids) paints on newly manufactured windows and doors.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the lumber and wood products sector:

> Woodgrain Millwork, Inc., Fruitland, Idaho, increase of 600,000 pounds, reporting error.

1991-1996 Waste Management Data for Lumber and Wood Products

Table 6-17 summarizes on- and off-site waste management data for the lumber and wood products sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). From 1991 to 1996, production-related waste reported in this sector increased from 68.5 million pounds to 108.0 million pounds. This increase, of 39.5 million pounds or 57.7%, reflected increases in recent years in on-site recycling and on-site treatment by facilities mentioned in the discussion of "1996 TRI Data in Lumber and Wood Products," early in this chapter.

Overall, on-site recycling reported in this sector increased from 19.1 million pounds in 1991 to 49.9 million pounds in 1996, although the amounts reported fluctuated through this period. On-site treatment increased from 1.5 million pounds in 1991 to 22.4 million pounds in 1996, and the bulk

Table 6-17. TRI Waste Management Data, 1991, 1994-1996: Lumber and Wood Products, SIC Code 24

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	19,124,567	15,517,790	75,897,536	49,864,475
Energy Recovery On-site	9,962,519	2,160,052	1,439,098	1,516,386
Treated On-site	1,532,897	2,520,293	4,329,754	22,404,103
Total On-site Waste Management	30,619,983	20,198,135	81,666,388	73,784,964
Off-site Waste Management				
Recycled Off-site	1,064,302	718,808	446,470	600,437
Energy Recovery Off-site	3,394,448	2,832,307	2,850,179	2,519,261
Treated Off-site	1,039,182	403,194	621,617	794,475
Total Off-site Waste Management	5,497,932	3,954,309	3,918,266	3,914,173
Quantity Released On- and Off-site	32,364,953	38,293,538	32,129,087	30,301,565
Total Production-related Waste	68,482,868	62,445,982	117,713,741	108,000,702
Non-Production-related Waste	633,947	1,563,282	517,690	4,835,588

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	389.1	-34.3	160.7
Energy Recovery On-site	-33.4	5.4	-84.8
Treated On-site	71.8	417.4	1,361.6
Total On-site Waste Management	304.3	-9.7	141.0
Off-site Waste Management			
Recycled Off-site	-37.9	34.5	-43.6
Energy Recovery Off-site	0.6	-11.6	-25.8
Treated Off-site	54.2	27.8	-23.5
Total Off-site Waste Management	-0.9	-0.1	-28.8
Quantity Released On- and Off-site	-16.1	-5.7	-6.4
Total Production-related Waste	88.5	-8.3	57.7
Non-Production-related Waste	-66.9	834.1	662.8

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

of this increase occurred in the last year. These changes also amounted to very large percentage increases, 160.7% for on-site recycling and more than 1,300% for on-site treatment.

All other waste management options decreased from 1991 to 1996 in the lumber and wood products sector's reporting. The largest reduction was reported in on-site energy recovery, from 10.0 million pounds to 1.5 million pounds. Smaller reductions in reported quantities for each of the off-site waste management types contributed to a reduction in total off-site waste management from 5.5 million pounds to 3.9 million pounds.

The lumber and wood products sector reported 32.4 million pounds in quantities released on- and off-site in 1991 and 30.3 million pounds in 1996. This was a reduction of 2.1 million pounds, or 28.8%.

Figure 6-13 displays percentage change for on-site waste management, off-site waste management, quantities released on- and off-site, and total production-related waste for the lumber and wood products sector for 1991-1996.

As a result of these changes, on-site waste management accounted for a much larger proportion of the sector's production-related waste in 1996 than in 1991 and quantities released for a much smaller proportion. On-site waste management was 44.7% of production-related waste in 1991 and 68.3% in 1996, while releases decreased from 47.3% to 28.1%. Some changes reflect facilities' decisions about how to report quantities of TRI chemicals in use of waste that they manage. However, the increase in use of waste management options such as recycling accompanied by the decrease in releases suggests improvement in the sector's performance, as measured by the waste management hierarchy (explained in Chapter 1). In that hierarchy, recycling is the most preferred option and releases the lease preferred option.

However, at the same time, production-related waste showed large increases overall. TRI facilities report absolute amounts of waste managed and of environmental releases, not adjusted for changes in production levels. In the lumber and wood products sector, however, production-related waste has increased much more rapidly than the sector's level of production.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Wheeler Lumber Operations in Whitewood, South Dakota (SIC code 2491), ranked first for increases with a 29.3 million-pound increase. Ninety-six percent of the change was attributable to on-site recycling of creosote. The facility manufactures timber bridges and farm products such as posts and barn poles. Creosote is used as a wood preservative. The facility contact at Wheeler gave two reasons for the increase in on-site recycling: The facility has undergone a production increase, and some of the increase is likely due to a change in the interpretation of how to report on-site recycling.[3]

Kerr-McGee Chemical Corporation in Columbus, Mississippi (SIC code 2491), was second in increases with 18.2 million pounds. The facility manufactures railroad products, primarily crossties, that are preserved with creosote. All of this increase was due to creosote reporting, and nearly all of that was reported as on-site recycling and on-site treatment. The facility contact stated that increases in both of these categories were due to changes in interpretation of its activities. Most of the increase was a change in interpretation of how to estimate

[3] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

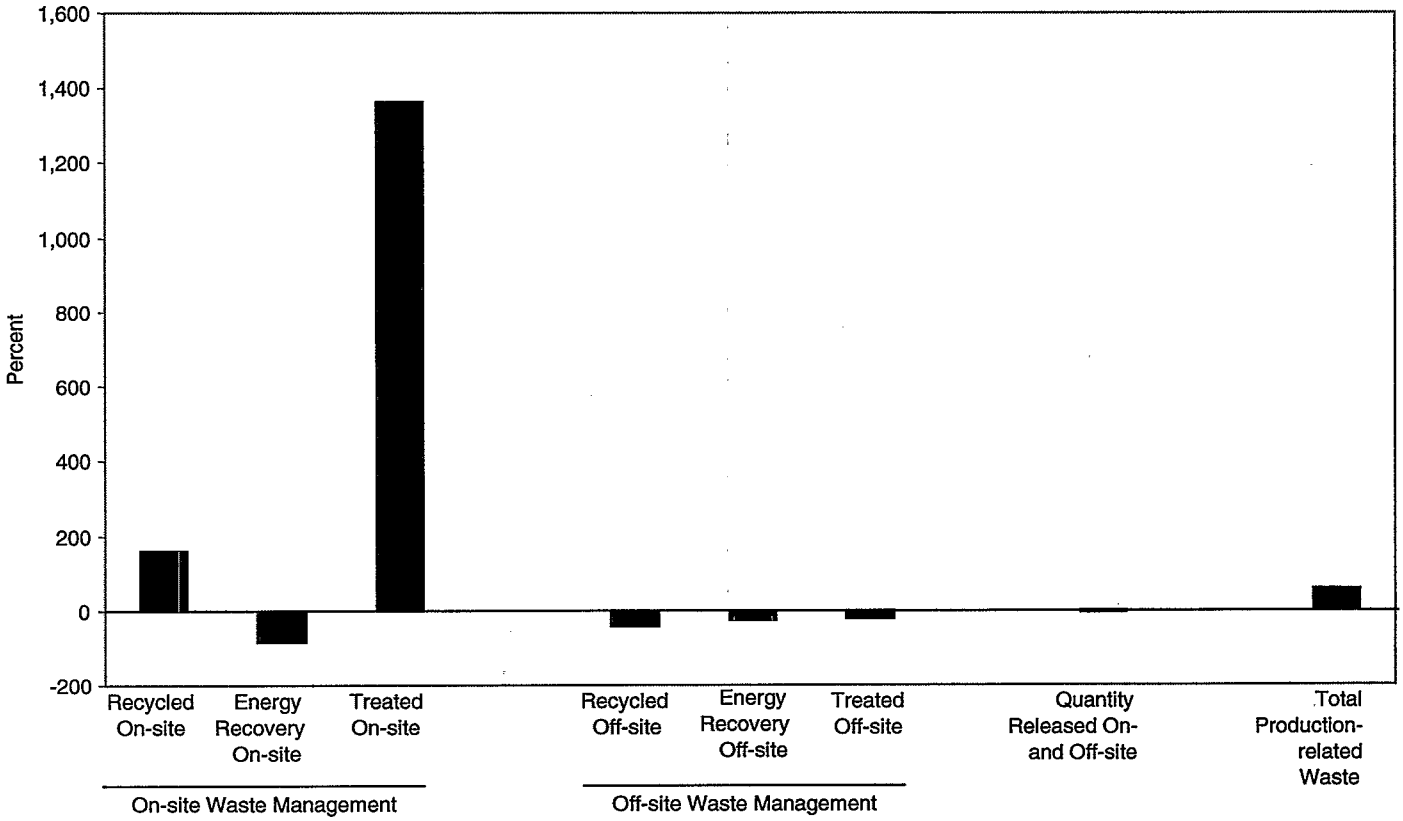

Figure 6-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Lumber and Wood Products (SIC Code 24)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

on-site recycling quantities.[4] More recently (1996), the facility also redefined some of its recycling to be treatment.

Another Kerr-McGee Chemical Corporation facility, in Texarkana, Texas (SIC code 2491), was ranked third in increases with 4.7 million pounds. The railroad crosstie manufacturing plant also uses creosote as a wood preservative. This chemical accounted for all of the facility's increase. An increase in the reported amount of creosote recycled on-site was responsible for 97% of the overall change. The reason cited for the increase was a change in the interpretation of how to estimate on-site recycling quantities.[5]

Andersen Corporation in Bayport, Minnesota (SIC code 2431), was first in decreases with an overall 1.0 million-pound decrease. The facility also ranked as the top decreaser in releases, in part due

[4] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

[5] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

to significant reductions in the use of xylene (mixed isomers). Xylene accounted for almost half of Andersen's decrease. (See "Facilities with Large Increases and Decreases in Releases, 1988-1996" for more information.)

Kenson Wood Preserving, LLC, in Picayune, Mississippi (SIC code 2491), was second in decreases with 786,000 pounds. The primary products of Kenson are power poles and pilings. Creosote accounted for 100% of the facility's decrease and 76% of the creosote reduction was reported as recycled on-site. Steam flashing, a process by which preservative is forced into wood and water is forced out, produces wastewater containing excess creosote. The excess preservative was separated from the water, recycled, and reused. Installation of dry kilns replaced steam flashing and effectively reduced the need to recover and recycle excess creosote.

Colfax Creosoting Company in Pineville, Louisiana (SIC code 2491), ranked third in decreases with an overall 556,000 pound decrease. A 394,000 pound drop in the amount of creosote reported as recycled on-site accounted for 71% of the decrease. A manufacturer of preserved wood products, primarily utility poles and railroad crossties, Colfax Creosoting attributes the change in on-site recycling data to revisions in how the figure was calculated.[6]

Other Apparent Increases and Decreases in Production-Related Waste, 1991-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There are three such facilities in the lumber and wood products sector:

Medite of New Mexico, Las Vegas, New Mexico, decrease of 8.7 million pounds, plant closure.

Sanderson Plumbing Products, Inc., Columbus, Mississippi, decrease of 592,000 pounds, reporting error.

Schrock Cabinet Company, Grants Pass, Oregon, decrease of 773,000 pounds, reporting error.

Facilities Contacted for Explanations (alphabetical by facility):

American Woodmark Corporation, Moorefield, West Virginia: Rod Gunter, August 19, September 16, October 9, and October 15, 1998 (explanation provided)

Andersen Corporation, Bayport, Minnesota: Dale Olson, August 19, 1998 (explanation provided)

Colfax Creosoting Company, Pineville, Louisiana: Carl Johnson and Rick Deerman, October 19, 1998 (explanation provided)

Dallas Woodcraft, Inc., Dallas, Texas: Richard Hudson, August 17, 1998 (explanation provided)

Fiber Products Operations, Diboll, Texas: Don Cox, August 19, 1998 (explanation provided)

Kenson Wood Preserving, LLC, Picayune, Mississippi: Mark Simmons, October 13, 1998, Dr. John Ball, October 3, 1998, and Randy McGough, October 15, 1998 (explanation provided)

Kerr-McGee Chemical Corporation, Columbus, Mississippi and Texarkana, Texas: Nick Bock, August 17, 1998 (explanation provided)

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[6] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

Medite of New Mexico, Las Vegas, New Mexico: Barbara Lemley, August 17, 1998 (explanation provided)

Pella Corporation, Pella, Iowa: Jim Nieboer, September 8, 1998 (explanation provided)

Sanderson Plumbing Products, Inc., Columbus, Mississippi (no explanation provided).

Schrock Cabinet Company, Grants Pass, Oregon: Jim Weitkamp, September 8, 1998 (explanation provided)

Weyerhaeuser, Elkin, North Carolina: Billie Caudill and Jim Odendahl, September 16, 1998 (explanation provided)

Wheeler Lumber Operations, Whitewood, South Dakota: Tammie Hill, August 17, 1998 (explanation provided)

Woodgrain Millwork, Inc., Fruitland, Idaho: James A. Jaderholm, August 25, 1998 (explanation provided)

Chapter 7

Toxics Release Inventory Data for Furniture (SIC Code 25)

A Look at the Furniture and Fixtures Industry (SIC Code 25)

The furniture and fixtures industry (SIC code 25) manufactures furniture for homes, offices, public buildings, and restaurants. It produces fixtures such as partitions, shelving, and display cases for offices and stores. Many products of this sector are made of wood, but household furniture made of metal and office and store fixtures made of non-wood materials are included. This sector also produces mattresses and bedsprings. Automobile and aircraft seats are included, classified as furniture for public buildings and related uses. Box 7-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The furniture sector shipped products valued at $55.70 billion in 1996, up from $53.47 billion in 1995 (both in current dollars). This was about 1.5% of the value of shipments of all U.S. manufacturing. Employment in this sector was 515,000 in 1996, having increased steadily since 1991. From 1989 to 1996, furniture production rose 6.3%, a modest expansion compared to a 17.6% increase for all U.S. manufacturing sectors over that period (see Chapter 1, Table 1-10). Household furniture manufacture (SIC code 251) constituted approximately half the sector's 1996 economic activity, with $25.43 billion in shipments and 273,000 in employment.

Processes in production of wood furniture and fixtures include drying, sawing and planing, assembly, and coating or finishing. Some furniture is finished before assembly. Assembly of upholstered wood furniture typically involves solvent-based adhesives, while non-upholstered wood furniture is joined using "hot melt" adhesive or polyvinyl acetate. Veneer (a thin layer of wood) may be applied, requiring adhesives along with heat and/or pressure. Ammonia and acetone may be applied to remove natural wood rosin. Wood surfaces are then bleached (often with hydrogen peroxide), coated, and finished for indoor or outdoor use. Coatings and finishes may be applied, dried, and sanded several times. Outdoor furniture is usually treated with a fungicide and water-repellent.

Adhesives commonly used in assembling furniture contain solvents such as methyl ethyl ketone, methyl isobutyl ketone, toluene, and xylene. Coating and finishing applications typically involve solvents in stains, paints, finishes, and inks (used to simulate wood grain); toluene and xylene are common.

Box 7-1. SIC Code 25, Furniture and Fixtures: Codes and Classifications

SIC Code		Industry Description
251	**Household Furniture**	
2511	Wood Household Furniture, Except Upholstered	Manufacture of wood household furniture commonly used in dwellings. Manufacture of camp furniture.
2512	Wood Household Furniture, Upholstered	Manufacture of upholstered furniture on wood frames.
2514	Metal Household Furniture	Manufacture of metal household furniture of a type commonly used in dwellings.
2515	Mattresses, Foundations, and Convertible Beds	Manufacture of mattresses (innerspring, box spring, and non-innerspring) containing felt, foam rubber, urethane, hair, or any other filling material. Manufacture of assembled wire springs (fabric, coil, or box) for use on beds, couches, and cots. Manufacture of dual-purpose sleep furniture, such as convertible sofas and chair beds.
2517	Wood Television, Radio, Phonograph, and Sewing Machine Cabinets	Manufacture of wood cabinets for radios, television sets, phonographs, and sewing machines.
2519	Household Furniture, nec*	Manufacture of reed, rattan, and other wicker furniture, plastics and fiberglass household furniture and cabinets, and other miscellaneous household furniture.
252	**Office Furniture**	
2521	Wood Office Furniture	Manufacture of office furniture, chiefly of wood.
2522	Office Furniture, Except Wood	Manufacture of office furniture, except furniture chiefly of wood.
253	**Public Building and Related Furniture**	
2531	Public Building and Related Furniture	Manufacture of furniture for schools, theaters, assembly halls, churches, and libraries. Includes manufacture of seats for public conveyances, automobiles, and aircraft.
254	**Partitions, Shelving, Lockers, and Office and Store Fixtures**	
2541	Wood Office and Store Fixtures, Partitions, Shelving, and Lockers	Manufacture of shelving, lockers, and office and store fixtures, plastics laminated fixture tops, and related fabricated products, chiefly of wood. (Includes prefabricated partitions designed to be attached to the floor.)
2542	Office and Store Fixtures, Partitions, Shelving, and Lockers, Except Wood	Manufacture of office and store fixtures, shelving, storage racks, lockers, and related products, chiefly of materials other than wood. (Includes prefabricated partitions designed to be attached to the floor.)
259	**Miscellaneous Furniture and Fixtures**	
2591	Drapery Hardware and Window Blinds and Shades	Manufacture of curtain and drapery rods, poles, and fixtures. Manufacture of venetian blinds and other window blinds and shades, except of canvas.
2599	Furniture and Fixtures, nec*	Manufacture of miscellaneous furniture and fixtures, including hospital beds and furniture specially designed for use in restaurants, bars, cafeterias, bowling centers, and ships.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Wood Furniture and Fixtures Industry,* Sector Notebook project, EPA/310-R-95-003, September 1995 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

As previously mentioned, furniture and fixtures classified in SIC code 25 also include those constructed of non-wood materials. Production of furniture and fixtures from metals, plastics, and other materials is similar to processes associated with other industrial sectors. The manufacture of metal furniture, for example, involves preparation and finishing similar to processes applied in production of some fabricated metal products (SIC code 34).

1996 TRI Data for Furniture

Table 7-1 summarizes TRI reporting by the furniture sector for 1996. A total of 1,250 forms were submitted by this sector in 1996. Of this total, only 26 Form As (or 2.1%) were submitted by this sector, well below the 10.1% TRI average. Form A certification statements certify that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The wood household furniture industry (SIC code 2511) submitted 630 forms, half (50.4%) of the forms submitted by this sector. There were 168 forms that reported more than one SIC code within SIC code 25 to define the facility's operations. This "multiple-codes" group of forms (explained below) represented 13.4% of all forms submitted by the furniture sector for 1996. The wood office furniture industry (SIC code 2521) submitted the third-largest number of forms in the sector, 95 forms or 7.6% of the total.

Some facilities in the furniture sector manufacture distinct, but related, products that are classified in different SIC codes within SIC code 25. A facility may manufacture office furniture from both wood and non-wood materials. These activities are classified in SIC code 2521 (wood office furniture) and SIC code 2522 (office furniture, except wood). Another facility may manufacture both wood household furniture and wood office furniture. These products are classified in SIC codes 2511 and 2521, respectively. These facilities may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Two industrial groups dominated TRI reporting in the furniture sector in 1996. The wood household furniture industry (SIC code 2511) ranked first for releases (on-site, off-site, and total on- and off-site) and for total production-related waste. The multiple-codes group reported the largest amounts for other on-site waste management and transfers off-site for further waste management.

The furniture sector reported 35.9 million pounds of total on- and off-site releases, consisting almost entirely (99.6%) of on-site releases. Ranking first in the sector, the wood household furniture industry (SIC code 2511) reported 22.2 million pounds of total releases, including 22.1 million pounds on-site and 91,000 pounds off-site. This industry's reported releases amounted to 61.7% of the sector's total. The multiple-codes group ranked second for the release categories, with 5.3 million pounds of total releases (5.27 million pounds on-site and 19,000 pounds off-site). Multiple-codes forms accounted for 14.7% of the sector's total releases. The wood office furniture industry (SIC code 2521) reported the third-largest on-site releases and total releases, with 2.1 million pounds (approximately 6%).

The multiple-codes group reported 2.7 million pounds of other on-site waste management, 65.7% of the sector's 4.1 million-pound total in this category. This was the only category in which the wood household furniture industry did not rank first or second in the sector. Non-wood partitions and fixtures (SIC code 2542) reported the second-

Table 7-1. Summary of TRI Information by 4-digit SIC Code, 1996: Furniture, SIC Code 25

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
1	1	2511	Wood Household Furniture	183	630	0	22,059,136	91,199	22,150,335
6	8	2512	Upholstered Household Furniture	23	38	0	783,320	0	783,320
13	12	2514	Metal Household Furniture	12	17	0	269,490	0	269,490
11	15	2515	Mattresses & Bedsprings	2	3	1	337,599	0	337,599
14	13	2517	Wood TV & Radio Cabinets	3	8	0	193,575	0	193,575
9	10	2519	Household Furniture, nec*	11	21	0	507,354	0	507,354
3	3	2521	Wood Office Furniture	36	95	2	2,129,854	1,928	2,131,782
4	4	2522	Office Furniture, Except Wood	32	65	7	1,225,136	0	1,225,136
7	5	2531	Public Building & Related Furniture	23	53	4	683,843	5,985	689,828
10	11	2541	Wood Partitions & Fixtures	21	31	0	424,332	2,116	426,448
5	6	2542	Partitions & Fixtures, Except Wood	25	48	0	893,719	529	894,248
12	7	2591	Drapery Hardware & Blinds & Shades	8	24	0	333,297	0	333,297
8	9	2599	Furniture & Fixtures, nec*	25	47	2	630,226	4,688	634,914
2	2		Multiple within SIC Code 25	48	168	10	5,269,424	19,413	5,288,837
15	14		Invalid SIC Code within SIC Code 25	1	2	0	10,500	0	10,500
			Total for SIC Code 25	453	1,250	26	35,750,805	125,858	35,876,663

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category. One facility incorrectly reported 0 pounds of total production-related waste under SIC code 2515. The correct amount is 370,695 pounds. The total production-related waste rank of SIC code 2515 changes from 15 to 12.
*nec: not elsewhere classified.

largest other on-site waste management, with 455,000 pounds (11.2% of the total). Ranking third was drapery hardware and blinds and shades (SIC code 2591), with 381,000 pounds or 9.4%.

The multiple-codes group also ranked first for transfers off-site for further waste management in the furniture sector. Multiple-codes forms reported 7.1 million pounds, 54.5% of the sector's 13.1 million pounds in this category. Wood household furniture (SIC code 2511) ranked second, with 1.7 million pounds (13.4%), and public building and related furniture (SIC code 2531) was third, with 1.3 million pounds (10.0%).

Production-related waste reported in SIC code 25 totaled 57.8 million pounds in 1996. The wood household furniture industry (SIC code 2511) reported 25.4 million pounds, 44.0% of this total. Multiple-codes forms reported 19.3 million pounds, or 33.3%. Ranking third for total production-related waste, the wood office furniture industry (SIC code 2521) reported 2.8 million pounds (4.8%).

Multiple SIC Codes in SIC Code 25

Table 7-2 further examines reporting of multiple SIC codes within SIC code 25. The most frequent combination, submitted on 34 forms, was for non-upholstered and upholstered household furniture made of wood (wood household furniture in SIC code 2511 and upholstered household furniture in SIC code 2512). Thirty-three forms reported the combination of wood partitions and fixtures (SIC code 2541) and non-wood partitions and fixtures (SIC code 2542).

Among multiple-codes groups in SIC code 25, the combination of wood office furniture (SIC code 2521), non-wood office furniture (SIC code 2522), and non-wood partitions and fixtures (SIC code

Table 7-1. Summary of TRI Information by 4-digit SIC Code, 1996: Furniture, SIC Code 25, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2511	Wood Household Furniture	176,677	1,747,568	25,423,289	20
2512	Upholstered Household Furniture	2,005	76,527	788,082	0
2514	Metal Household Furniture	20,970	57,694	335,415	0
2515	Mattresses & Bedsprings	0	6,295	0	72
2517	Wood TV & Radio Cabinets	0	7,922	201,401	0
2519	Household Furniture, nec*	7,325	21,152	554,735	1
2521	Wood Office Furniture	14,284	587,487	2,762,682	0
2522	Office Furniture, Except Wood	286,683	777,365	2,252,266	0
2531	Public Building & Related Furniture	31,012	1,303,070	2,036,351	40
2541	Wood Partitions & Fixtures	6,404	69,517	519,279	0
2542	Partitions & Fixtures, Except Wood	454,834	807,107	1,832,715	0
2591	Drapery Hardware & Blinds & Shades	381,128	389,067	1,103,870	0
2599	Furniture & Fixtures, nec*	11,792	92,848	725,609	0
	Multiple within SIC Code 25	2,667,300	7,112,961	19,277,636	15
	Invalid SIC Code within SIC Code 25	0	1,000	10,610	0
	Total for SIC Code 25	4,060,414	13,057,580	57,823,940	148

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category. One facility incorrectly reported 0 pounds of total production-related waste under SIC code 2515. The correct amount is 370,695 pounds. The total production-related waste rank of SIC code 2515 changes from 15 to 12.
***nec:** not elsewhere classified.

2542) reported the largest amounts of total on- and off-site releases (1.6 million pounds) and total production-related waste (12.9 million pounds), as shown in Table 7-2. Fifteen forms reported this combination.

The combination of non-upholstered and upholstered wood household furniture (SIC codes 2511 and 2512, respectively) ranked second for both total on- and off-site releases (1.3 million pounds) and total production-related waste (1.5 million pounds). Ranking third, the combination of wood and non-wood partitions and fixtures (SIC codes 2541 and 2542, respectively), reported 1.0 million pounds of total releases and 1.4 million pounds of total production-related waste.

On- and Off-site Releases

Almost all of the sector's 35.9 million-pound total for on- and off-site releases in 1996 consisted of air emissions, which totaled 35.7 million pounds. The wood household furniture industry (SIC code 2511) reported 22.1 million pounds of air emissions, 61.7% of the sector's total air emissions.

The multiple-codes group (forms with more than one SIC code in SIC code 25) reported the second-largest amount of air emissions, 5.2 million pounds (14.7%). As noted above, these two industrial groups also reported the largest off-site releases (transfers to disposal), the wood household furniture industry with 92,000 pounds and the multiple-codes forms with 19,000 pounds.

Table 7-3 and Figure 7-1 present the sector's data for on- and off-site releases in 1996. Figure 7-2 shows the distribution of on- and off-site releases for the

Table 7-2. Multiple SIC Codes, 1996: Furniture, SIC Code 25

SIC Codes			Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2511	2512		34	0	1,300,661	0	1,300,661	7,600	157,887	1,469,614	15
2511	2512	2514	1	0	0	0	0	0	7,453	7,453	0
2511	2514		1	0	13,000	0	13,000	0	500	13,200	0
2511	2515		4	0	53,820	0	53,820	0	0	52,820	0
2511	2517	2531	1	0	11,250	0	11,250	0	950	11,700	0
2511	2521		14	0	279,469	0	279,469	0	24,494	303,415	0
2511	2521	2531	2	0	30,172	0	30,172	0	3,222	33,394	0
2511	2522	2599	1	1	0	0	0	0	0	0	0
2511	2541		1	0	21,416	0	21,416	0	1,930	23,346	0
2511	2599		1	0	5,202	0	5,202	0	0	5,201	0
2512	2521		1	0	26,000	0	26,000	0	960	26,960	0
2519	2521		1	0	250	0	250	1,180	2,580	2,591	0
2521	2517		1	0	11,786	0	11,786	0	0	11,786	0
2521	2522		18	0	352,445	18,400	370,845	273,300	564,822	1,190,232	0
2521	2522	2542	15	0	1,613,744	1	1,613,745	2,178,171	4,600,361	12,911,664	0
2521	2522	2599	8	4	47,200	0	47,200	0	93,100	139,550	0
2521	2531		8	0	175,166	0	175,166	4,346	9,910	189,422	0
2521	2541		1	0	37,260	0	37,260	0	0	37,260	0
2522	2531		2	0	55,477	0	55,477	0	11,869	66,979	0
2522	2542		5	0	187,487	1,000	188,487	120,000	320,829	621,187	0
2522	2599		9	0	507	12	519	60,203	636,989	696,472	0
2531	2542		2	0	19,390	0	19,390	0	10,465	28,634	0
2531	2599		4	0	5,403	0	5,403	0	13,165	18,568	0
2541	2542		33	5	1,022,319	0	1,022,319	22,500	651,475	1,416,188	0
Total for SIC Code 25			168	10	5,269,424	19,413	5,288,837	2,667,300	7,112,961	19,277,636	15

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 7-3. TRI On-site and Off-site Releases, 1996: Furniture, SIC Code 25 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2511	Wood Household Furniture	22,058,018	25	0	0	0	1,093	22,059,136	91,199	22,150,335
	Multiple within SIC Code 25	5,244,133	3	0	0	0	25,288	5,269,424	19,413	5,288,837
2521	Wood Office Furniture	2,129,854	0	0	0	0	0	2,129,854	1,928	2,131,782
2522	Office Furniture, Except Wood	1,225,131	5	0	0	0	0	1,225,131	0	1,225,136
2542	Partitions & Fixtures, Except Wood	893,459	10	0	0	0	250	893,719	529	894,248
2512	Upholstered Household Furniture	783,320	0	0	0	0	0	783,320	0	783,320
2531	Public Building & Related Furniture	683,833	0	0	0	0	10	683,843	5,985	689,828
2599	Furniture & Fixtures, nec*	630,226	0	0	0	0	0	630,226	4,688	634,914
2519	Household Furniture, nec*	507,354	0	0	0	0	0	507,354	0	507,354
2541	Wood Partitions & Fixtures	424,332	0	0	0	0	0	424,332	2,116	426,448
2515	Mattresses & Bedsprings	337,599	0	0	0	0	0	337,599	0	337,599
2591	Drapery Hardware & Blinds & Shades	333,297	0	0	0	0	0	333,297	0	333,297
2514	Metal Household Furniture	269,490	0	0	0	0	0	269,490	0	269,490
2517	Wood TV & Radio Cabinets	193,575	0	0	0	0	0	193,575	0	193,575
	Invalid SIC Code within SIC Code 25	10,500	0	0	0	0	0	10,500	0	10,500
	Total for SIC Code 25	35,724,121	43	0	0	0	26,641	35,750,805	125,858	35,876,663

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
*nec: not elsewhere classified.

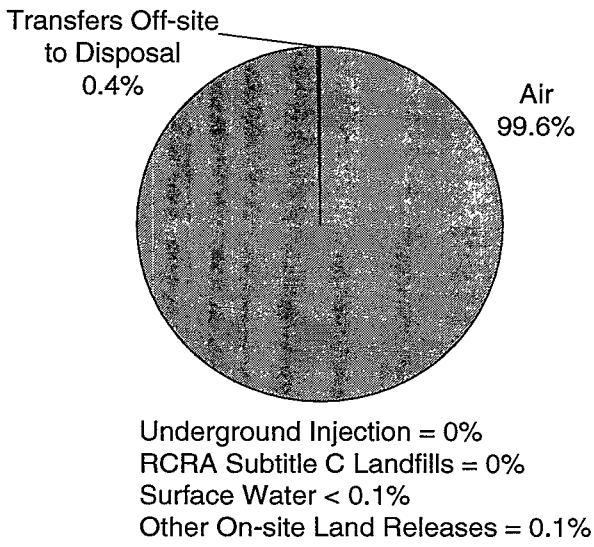


Figure 7-1. Distribution of TRI On-site and Off-site Releases, 1996: Furniture (SIC Code 25)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

The furniture sector reported 2.8 million pounds of on-site recycling in 1996, which was 70.0% of the sector's other on-site waste management. On-site treatment totaled 1.2 million pounds, or 29.1% of the total. Little on-site energy recovery was reported. Table 7-4 presents the sector's other on-site waste management data for 1996, and Figure 7-3 illustrates the distribution by waste management method.

The multiple-codes group reported 2.2 million pounds of on-site recycling and 427,000 pounds of on-site treatment, the largest amounts in this sector in both categories. On-site recycling reported on multiple-codes forms amounted to more than half (55.2%) of all other on-site waste management

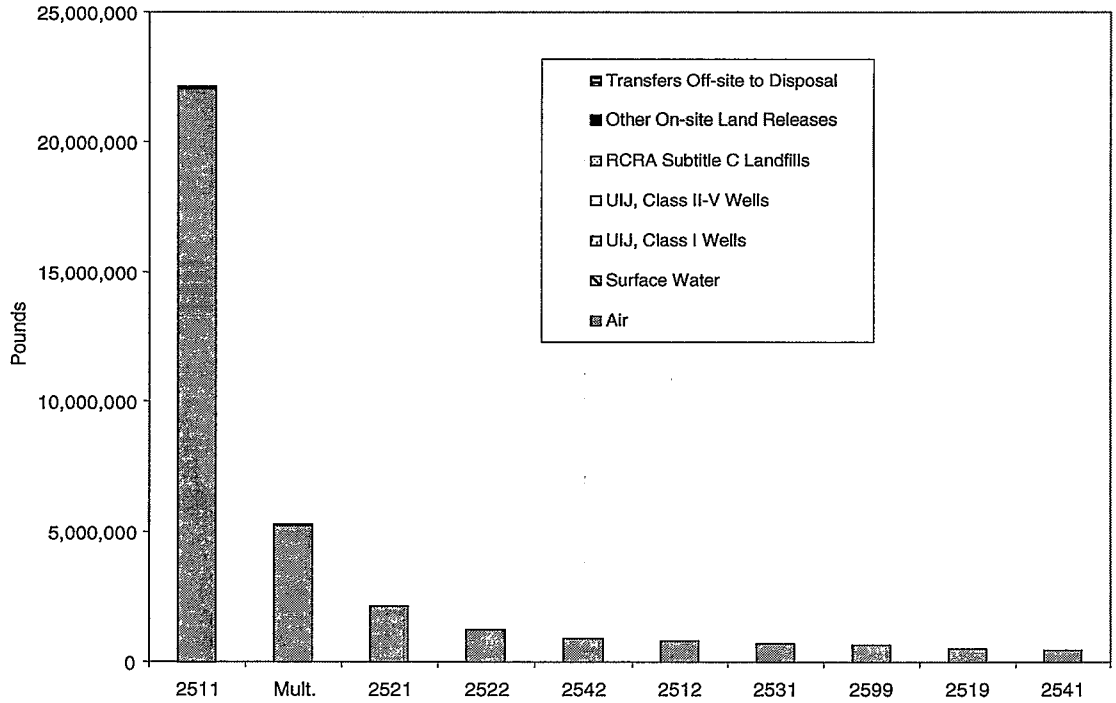


Figure 7-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Furniture (SIC Code 25)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC Code 25 are assigned to the "multiple" category.

Table 7-4. TRI Other On-site Waste Management, 1996: Furniture, SIC Code 25 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
	Multiple within SIC Code 25	2,240,579	0	426,721	2,667,300
2542	Partitions & Fixtures, Except Wood	121,200	0	333,634	454,834
2591	Drapery Hardware & Blinds & Shades	32,168	0	348,960	381,128
2522	Office Furniture, Except Wood	273,527	0	13,156	286,683
2511	Wood Household Furniture	161,450	12,080	3,147	176,677
2531	Public Building & Related Furniture	0	0	0	0
2514	Metal Household Furniture	0	0	31,012	31,012
2521	Wood Office Furniture	0	0	20,970	20,970
2599	Furniture & Fixtures, nec*	689	13,595	0	14,284
2519	Household Furniture, nec*	0	11,792	0	11,792
2541	Wood Partitions & Fixtures	3,895	0	3,430	7,325
2512	Upholstered Household Furniture	6,404	0	0	6,404
2515	Mattresses & Bedsprings	2,005	0	0	2,005
2517	Wood TV & Radio Cabinets	0	0	0	0
	Invalid SIC Code within SIC Code 25	0	0	0	0
	Total for SIC Code 25	2,841,917	37,467	1,181,030	4,060,414

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
*nec: not elsewhere classified.

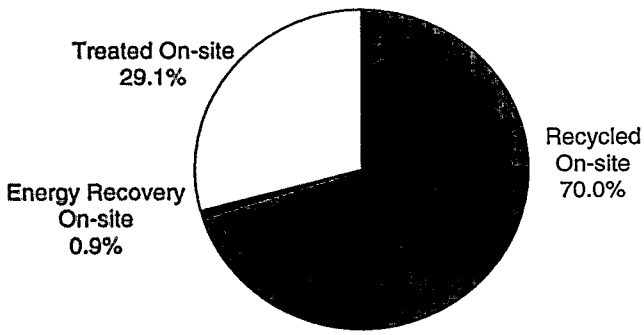


Figure 7-3. Distribution of TRI Other On-site Waste Management, 1996: Furniture (SIC Code 25)

Note: Data from Section 8 of Form R.

reported by the furniture sector. This included on-site recycling of 1.4 million pounds of xylenes reported by one facility, reporting SIC codes 2522, 2542, and 2521.

The non-wood office furniture industry (SIC code 2522) reported the second-largest amount of on-site recycling with 274,000 pounds. Drapery hardware and blinds and shades (SIC code 2591) reported the second-largest amount of on-site treatment with 349,000 pounds.

Figure 7-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

Recycling and energy recovery each accounted for more than 40% of the furniture sector's total transfers off-site for further waste management in 1996. The sector reported 6.5 million pounds transferred to recycling (49.4% of transfers for further waste management) and 5.6 million pounds of transfers to energy recovery (43.0%), as shown in Table 7-5.

Multiple-codes forms in SIC code 25 reported the largest transfers to recycling (3.2 million pounds) and transfers to energy recovery (3.6 million pounds). One facility reported transferring 1.9 million pounds of xylenes off-site to recycling. The facility that reported substantial on-site recycling of xylenes, noted above, also reported transferring 1.6 million pounds of this chemical to energy recovery.

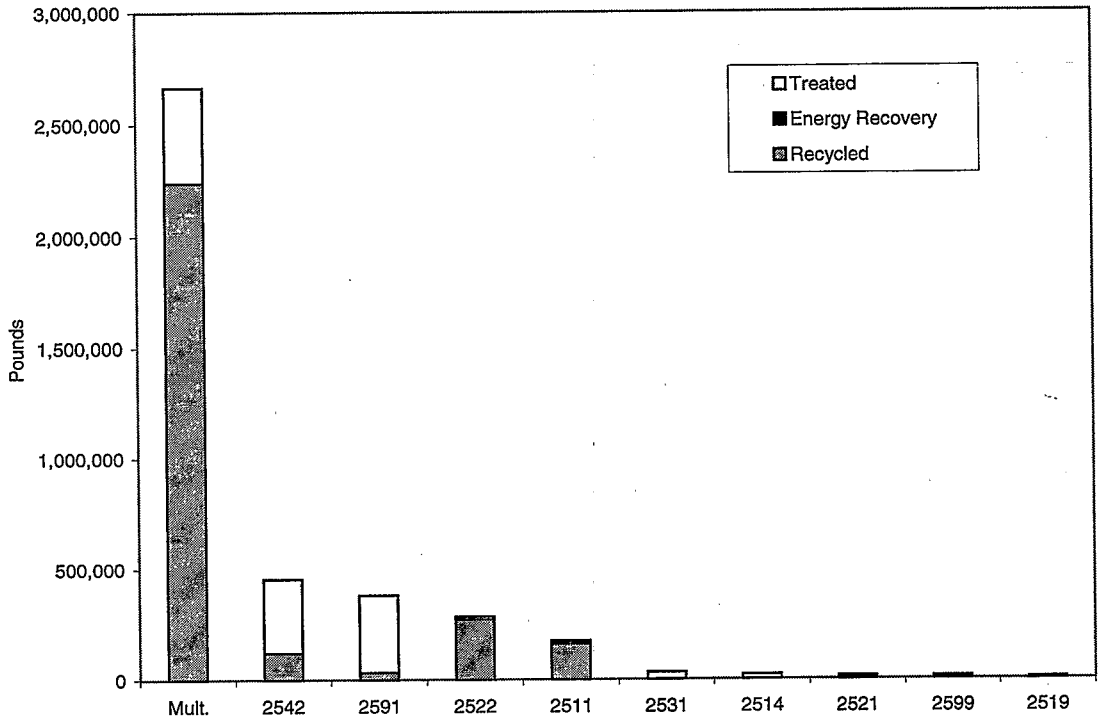


Figure 7-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Furniture (SIC Code 25)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.

Table 7-5. TRI Transfers Off-site for Further Waste Management, 1996: Furniture, SIC Code 25 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
	Multiple within SIC Code 25	3,217,820	3,624,081	181,472	89,588	0	7,112,961
2511	Wood Household Furniture	410,287	1,209,346	99,267	28,668	0	1,747,568
2531	Public Building & Related Furniture	1,132,903	50,207	118,706	1,254	0	1,303,070
2542	Partitions & Fixtures, Except Wood	346,366	100,791	107,438	252,512	0	807,107
2522	Office Furniture, Except Wood	650,378	102,019	24,455	513	0	777,365
2521	Wood Office Furniture	405,048	151,436	30,953	50	0	587,487
2591	Drapery Hardware & Blinds & Shades	267,603	104,876	16,516	72	0	389,067
2599	Furniture & Fixtures, nec*	4,265	88,483	100	0	0	92,848
2512	Upholstered Household Furniture	2,031	62,684	987	10,825	0	76,527
2541	Wood Partitions & Fixtures	2,730	48,721	18,066	0	0	69,517
2514	Metal Household Furniture	195	56,297	1,202	0	0	57,694
2519	Household Furniture, nec*	8,652	12,500	0	0	0	21,152
2517	Wood TV & Radio Cabinets	5,602	1,300	1,000	20	0	7,922
2515	Mattresses & Bedsprings	0	0	0	0	6,295	6,295
	Invalid SIC Code within SIC Code 25	0	0	1,000	0	0	1,000
	Total for SIC Code 25	6,453,880	5,612,741	601,162	383,502	6,295	13,057,580

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

The public building and related furniture industry (SIC code 2531) ranked second for transfers to recycling with 1.1 million pounds. One facility reported 315,000 pounds of cobalt and 250,000 pounds of chromium; these were the largest transfers to recycling reported in SIC code 2531.

The wood household furniture industry (SIC code 2511) ranked second for transfers to energy recovery with 1.2 million pounds, including 487,000 pounds of toluene and 250,000 pounds of methanol.

Less than 8% of the sector's transfers for further waste management were reported as transfers to treatment (602,000 pounds) and POTWs (384,000 pounds). The multiple-codes group also reported the largest transfers to treatment (181,000 pounds). The non-wood partitions and fixtures industry (SIC code 2542) reported the largest transfers to POTWs (253,000 pounds).

Figure 7-5 illustrates the distribution of off-site transfers for further waste management by type. Figure 7-6 illustrates the distribution of such transfers for the top industries in this sector.

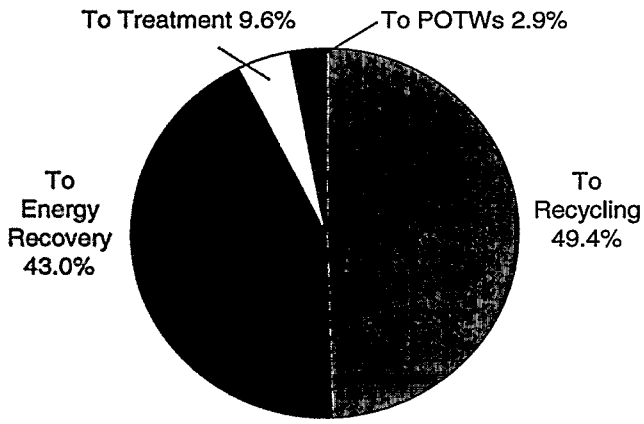


Figure 7-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Furniture (SIC Code 25)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

1996 TRI Data by State for Furniture

Table 7-6 presents 1996 summary TRI data for the furniture sector by state.

The furniture sector submitted more than 100 forms in each of three states: North Carolina with 279 forms, Virginia with 143, and Indiana with 110. These were also the states with the largest on-site releases and total releases. The furniture sector reported on-site releases and total releases of 8.6 million pounds (24.0% of the sector's total releases) in North Carolina, 5.9 million pounds (16.4%) in Virginia, and 3.0 million pounds (8.3%) in Indiana.

Georgia was the state with the largest reported off-site releases (transfers to disposal) with 79,000 pounds (62.7% of the total). Michigan was second with 26,000 pounds (20.5%), and South Carolina was third with 12,000 pounds (9.7%).

Michigan ranked first in the remaining categories. Two multiple-code facilities that reported sizable amounts of on-site recycling, transfers to recycling, and transfer to energy recovery are located in Michigan.

Other on-site waste management reported in Michigan totaled 2.6 million pounds (63.6% of the sector's total). Pennsylvania reported the second-largest total for other on-site waste management, with 438,000 pounds (10.8%). Illinois ranked third in this category with 320,000 pounds (7.9%).

For transfers off-site for further waste management, 5.6 million pounds was reported in Michigan. This was 42.8% of the furniture sector's reported transfers off-site for further waste management. Mississippi ranked second with 1.2 million pounds (9.2%). Wisconsin ranked third with 1.1 million pounds (8.3%).

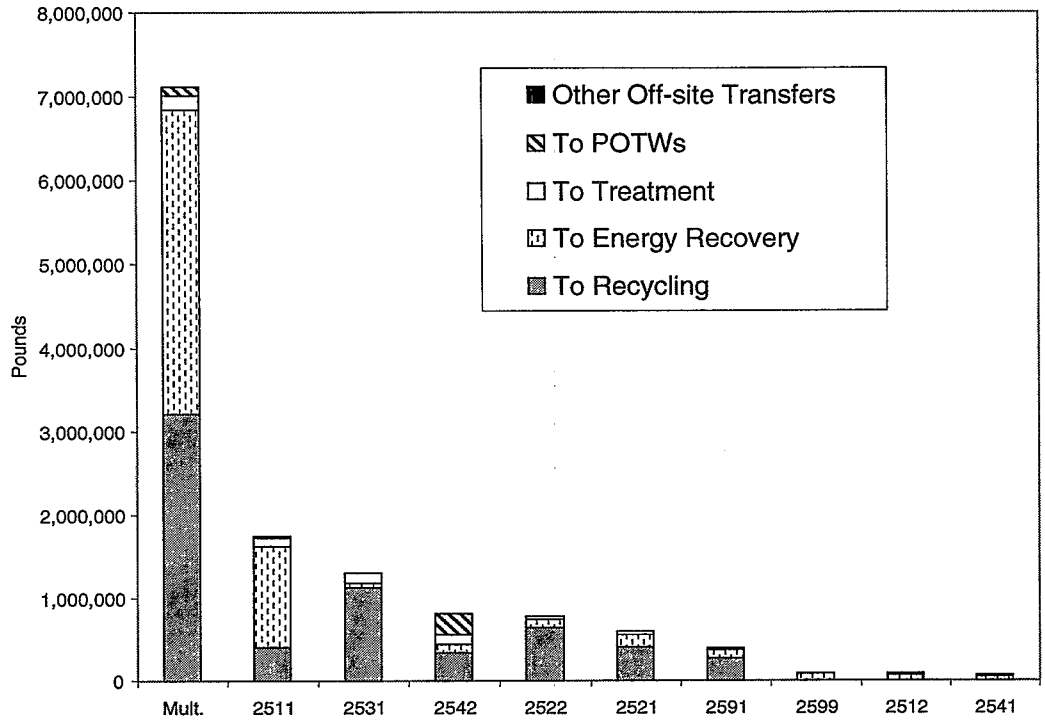


Figure 7-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Furniture (SIC Code 25)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC Code 25 are assigned to the "multiple" category.

Michigan ranked first for production-related waste reporting 15.2 million pounds (26.3% of the sector's total), followed by North Carolina with 8.7 million pounds (15.0%) and Virginia with 6.3 million pounds (10.9%).

Map 7-1 illustrates the geographic distribution of total on- and off-site releases in the furniture sector.

1996 TRI Data by Chemical for Furniture

Table 7-7 presents the 15 chemicals with the largest on- and off-site releases reported by the furniture sector. Releases of these chemicals totaled 35.7 million pounds in 1996, 99.5% of the sector's total releases. The sector reported 35.6 million pounds of air emissions of these 15 chemicals, 99.6% of total air emissions, and 107,000 pounds of off-site releases (transfers to disposal), 84.8% of total off-site releases.

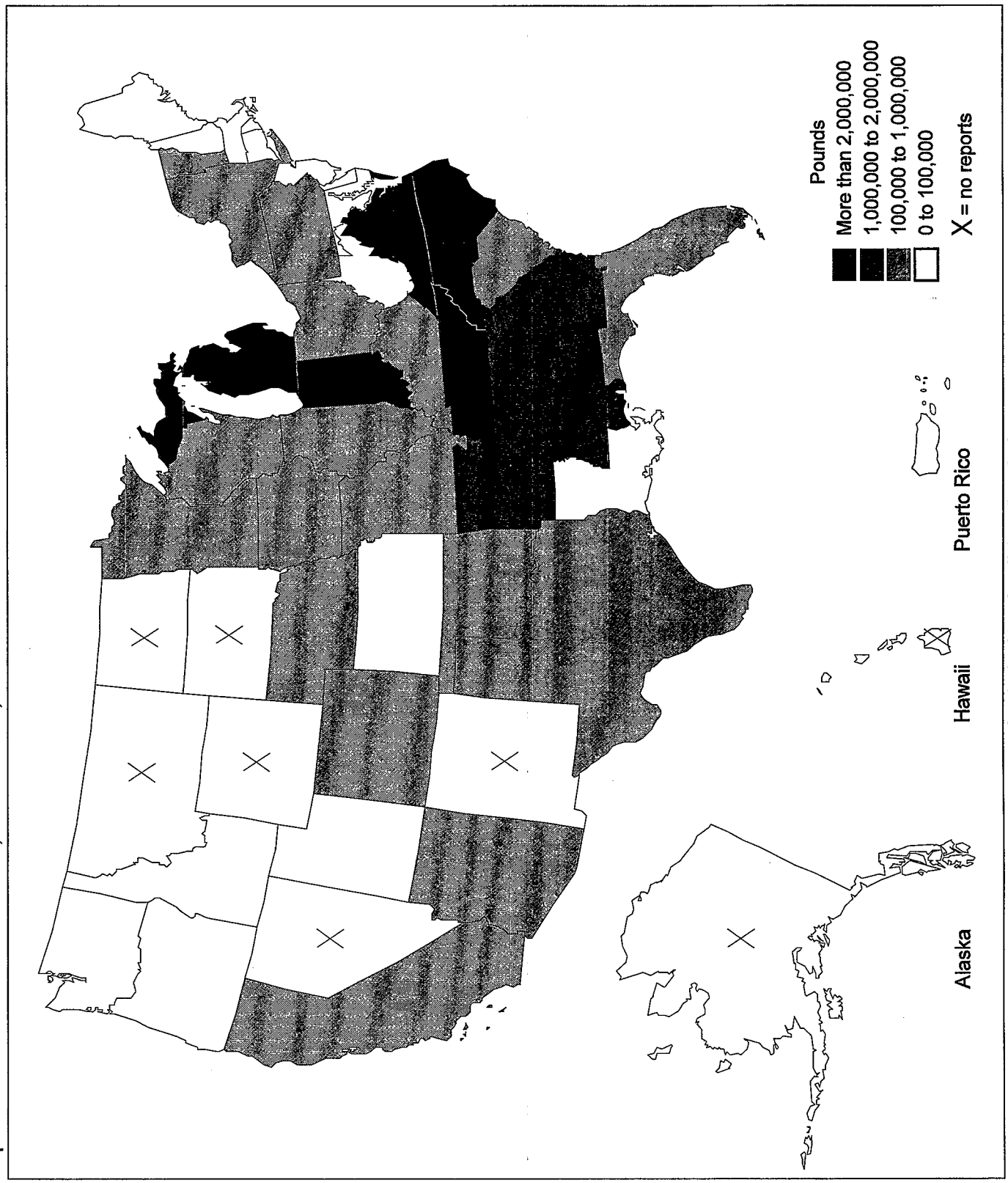
Toluene was reported in the largest amount, 10.5 million pounds, followed by xylenes with 7.5 million pounds and methanol with 7.0 million pounds. These three chemicals made up 69.6% of the sector's total on- and off-site releases in 1996. As mentioned early in this chapter, solvents such as these are used in many furniture coating applications. The wood household furniture industry (SIC code 2511) reported the largest air emissions of all three chemicals: 7.3 million pounds of toluene, 5.5 million pounds of methanol, and 3.9 million pounds of xylenes.

Table 7-6. Summary of TRI Information by State, 1996: Furniture, SIC Code 25

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	17	40	0	1,607,627	0	1,607,627	22,000	543,017	2,202,665	0
Arizona	3	6	0	105,788	0	105,788	0	11,378	117,166	0
Arkansas	17	58	0	1,334,996	2,400	1,337,396	50,390	407,374	1,792,367	0
California	20	38	4	607,683	250	607,933	0	267,791	827,227	0
Colorado	5	19	0	171,223	0	171,223	0	1,512	173,337	0
Connecticut	1	1	0	1,600	0	1,600	0	9,400	11,000	0
Delaware	1	2	0	33,000	0	33,000	0	20,005	53,000	0
Florida	7	16	0	658,383	1,500	659,883	0	57,973	715,190	0
Georgia	13	32	1	1,106,580	78,948	1,185,528	27,582	29,604	3,257,964	0
Idaho	1	9	5	47,200	0	47,200	0	93,100	139,550	0
Illinois	8	17	0	122,562	1,846	124,408	319,972	631,459	833,528	0
Indiana	39	110	13	2,963,110	0	2,963,110	17,235	205,791	3,243,743	0
Iowa	6	13	0	507,291	0	507,291	0	43,619	444,000	0
Kansas	1	3	0	62,741	0	62,741	0	0	62,741	0
Kentucky	10	22	0	360,242	441	360,683	0	205,499	556,712	40
Louisiana	1	2	0	12,739	0	12,739	0	47,777	47,778	0
Maine	1	2	0	22,662	0	22,662	0	0	24,662	0
Maryland	1	1	0	7,650	0	7,650	0	2,943	10,593	0
Massachusetts	5	7	0	96,038	0	96,038	0	2,506	98,694	0
Michigan	22	65	3	2,512,533	25,757	2,538,290	2,582,218	5,593,358	15,236,444	0
Minnesota	6	11	0	122,264	0	122,264	90,495	52,837	271,046	0
Mississippi	16	52	0	1,790,943	0	1,790,943	17,070	1,205,618	2,688,291	72
Missouri	11	20	0	440,374	5	440,379	969	17,110	457,387	20
Nebraska	2	10	0	415,581	0	415,581	5,600	43,067	181,303	0
New Hampshire	1	2	0	4,055	0	4,055	0	1,000	28,111	0
New Jersey	2	3	0	39,030	0	39,030	0	1,540	40,340	0
New York	11	22	0	348,525	250	348,775	1,181	41,401	324,549	0
North Carolina	90	279	0	8,609,476	250	8,609,726	56,806	690,842	8,696,256	15
Ohio	4	6	0	206,570	0	206,570	300	158,579	355,420	0
Oklahoma	2	6	0	102,917	0	102,817	0	40,863	154,137	0
Oregon	4	7	0	96,022	0	96,022	0	255	96,487	0
Pennsylvania	19	40	0	808,622	0	808,622	438,205	169,234	1,356,041	0
Puerto Rico	1	2	0	500	0	500	7,325	0	12,062	0
Rhode Island	1	1	0	9,600	0	9,600	0	750	10,140	0
South Carolina	4	20	0	651,422	12,251	663,673	24,976	53,306	741,088	0
Tennessee	23	67	0	2,114,100	0	2,114,100	32,774	696,295	2,863,615	0
Texas	10	26	0	569,684	0	569,684	4,346	215,742	779,756	0
Utah	5	10	0	85,151	0	85,151	194,753	23,021	302,920	0
Vermont	2	5	0	126,788	0	126,788	8,434	5,328	140,550	0
Virginia	38	143	0	5,868,592	0	5,868,592	81,580	370,707	6,293,178	0
Washington	3	4	0	41,092	1,948	43,040	0	5,005	45,707	0
West Virginia	1	2	0	32,343	0	32,242	0	5,634	37,876	0
Wisconsin	18	49	0	925,707	12	925,719	76,203	1,085,340	2,099,319	0
Total for SIC Code 25	453	1,250	26	35,750,805	125,858	35,876,663	4,060,414	13,057,580	57,823,940	148

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Map 7-1. Total On- and Off-site Releases, 1996: Furniture, SIC Code 25



Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

Table 7-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Furniture, SIC Code 25 (In Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
108-88-3	Toluene	10,498,072	5	0	0	0	404	10,498,481	21,344	10,519,825
1330-20-7	Xylene (mixed isomers)	7,441,280	8	0	0	0	605	7,441,893	16,252	7,458,145
67-56-1	Methanol	6,978,735	5	0	0	0	430	6,979,170	13,934	6,993,104
78-93-3	Methyl ethyl ketone	3,335,687	5	0	0	0	0	3,335,692	14,558	3,350,250
71-36-3	n-Butyl alcohol	1,984,495	5	0	0	0	0	1,984,500	1,844	1,986,344
108-10-1	Methyl isobutyl ketone	1,129,309	0	0	0	0	154	1,129,463	13,158	1,142,621
--	Glycol ethers	1,037,251	0	0	0	0	0	1,037,251	250	1,037,501
75-09-2	Dichloromethane	890,645	0	0	0	0	0	890,645	12,251	902,896
100-41-4	Ethylbenzene	823,752	0	0	0	0	250	824,002	13,158	837,160
95-63-6	1,2,4-Trimethylbenzene	735,992	0	0	0	0	0	735,992	0	735,992
110-54-3	n-Hexane	222,957	0	0	0	0	0	222,957	0	222,957
71-55-6	1,1,1-Trichloroethane	197,967	0	0	0	0	0	197,967	0	197,967
67-63-0	Isopropyl alcohol (manufacturing)	147,866	0	0	0	0	0	147,866	0	147,866
100-42-5	Styrene	76,860	0	0	0	0	0	76,860	0	76,860
50-00-0	Formaldehyde	73,852	0	0	0	0	0	73,852	0	73,852
	Subtotal	35,574,720	28	0	0	0	1,843	35,576,591	106,749	35,683,340
	Total for SIC Code 25	35,724,121	43	0	0	0	26,641	35,750,805	125,858	35,876,663

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.

OSHA Carcinogens

The furniture sector's releases of chemicals designated as OSHA carcinogens totaled 1.1 million pounds in 1996, as shown in Table 7-8. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) This amounted to 3.2% of the sector's total releases. Air emissions of 1.1 million pounds represented 98.0% of total releases of the OSHA carcinogens.

Dichloromethane was the OSHA carcinogen with the largest releases reported in this sector, with 903,000 pounds. More than 50,000 pounds each was also reported for styrene (77,000 pounds), formaldehyde (74,000 pounds), and trichloroethylene (69,000 pounds). Three of these chemicals (dichloromethane, styrene, and formaldehyde) were among the top 15 chemicals for total releases reported by the furniture sector in 1996 (see Table 7-7).

The mattresses and bedsprings industry (SIC code 2515) reported the largest releases of OSHA carcinogens in the furniture sector, with 338,000 pounds. One facility in SIC code 2515 reported 337,000 pounds of dichloromethane, although this solvent and thinner was also reported in smaller amounts in numerous furniture industries. Ranking second for releases of these chemicals, the non-wood partitions and fixtures industry (SIC code 2542) reported 155,000 pounds. Multiple-codes forms reported 152,000 pounds of releases and ranked third.

Figure 7-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Furniture

In 1996, the furniture sector reported production-related waste totaling 57.8 million pounds. The majority of this reporting consisted of quantities released on- and off-site, 42.2 million pounds, or 73.0% of the sector's production-related waste. The next largest categories were off-site energy

Table 7-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Furniture, SIC Code 25 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2515	Mattresses & Bedsprings	337,599	0	0	0	0	0	337,599	0	337,599
2542	Partitions & Fixtures, Except Wood	154,930	10	0	0	0	0	154,940	8	154,557
	Multiple within SIC Code 25	143,262	0	0	0	0	8,288	151,550	7	151,557
2522	Office Furniture, Except Wood	137,799	0	0	0	0	0	137,799	0	137,799
2531	Public Building & Related Furniture	81,912	0	0	0	0	5	81,917	1,900	83,817
2511	Wood Household Furniture	62,210	0	0	0	0	0	62,210	12,251	74,461
2512	Upholstered Household Furniture	63,900	0	0	0	0	0	63,900	0	63,900
2521	Wood Office Furniture	45,434	0	0	0	0	0	45,434	0	45,434
2541	Wood Partitions & Fixtures	44,810	0	0	0	0	0	44,810	0	44,810
2519	Household Furniture, nec*	29,762	0	0	0	0	0	29,762	0	29,762
2599	Furniture & Fixtures, nec*	9,089	0	0	0	0	0	9,089	0	9,089
	Invalid SIC Code within SIC Code 25	6,050	0	0	0	0	0	6,050	0	6,050
	Subtotal	1,116,757	10	0	0	0	8,293	1,125,060	14,166	1,139,226
	Total for SIC Code 25	35,724,121	43	0	0	0	26,641	35,750,805	125,858	35,876,663

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

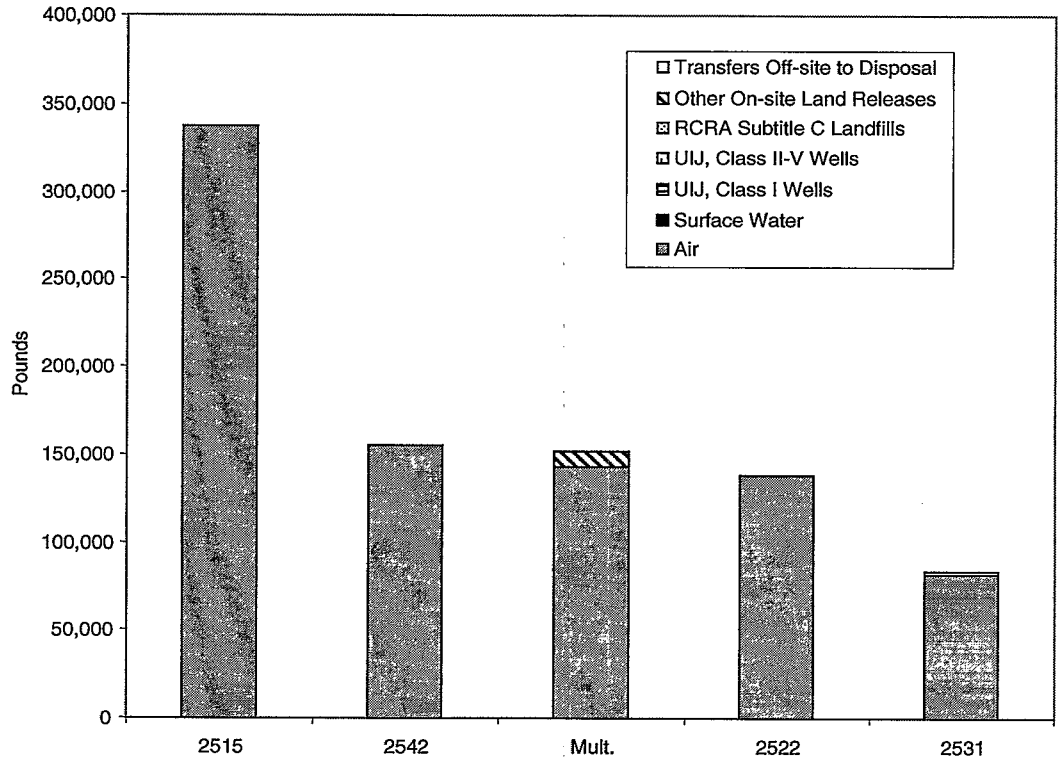


Figure 7-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Furniture (SIC Code 25)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.

Table 7-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Furniture, SIC Code 25 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2511	Wood Household Furniture	161,450	12,080	3,147	445,301	1,216,048	233,647	23,351,616	25,423,289	20
	Multiple within SIC Code 25	2,240,579	0	426,721	1,900,005	3,622,093	265,949	10,822,289	19,177,636	15
2521	Wood Office Furniture	689	13,595	0	404,805	155,583	56,669	2,131,341	2,762,682	0
2522	Office Furniture, Except Wood	273,527	0	13,156	597,595	102,019	24,208	1,241,761	2,252,266	0
2531	Public Building & Related Furniture	0	0	31,012	1,130,233	53,376	118,481	703,249	2,036,351	40
2542	Partitions & Fixtures, Except Wood	121,200	0	333,634	342,514	153,364	57,467	824,536	1,832,715	0
2591	Drapery Hardware & Blinds & Shades	32,168	0	348,960	267,603	104,954	16,563	333,622	1,103,870	0
2512	Upholstered Household Furniture	2,005	0	0	2,830	49,848	11,916	721,483	788,082	0
2599	Furniture & Fixtures, nec*	0	11,792	0	4,265	81,086	150	628,316	725,609	0
2519	Household Furniture, nec*	3,895	0	3,430	11,193	12,500	4,055	519,622	554,735	1
2541	Wood Partitions & Fixtures	6,404	0	0	3,332	50,717	13,572	445,254	519,279	0
2514	Metal Household Furniture	0	0	20,970	195	43,559	1,202	269,489	335,415	0
2517	Wood TV & Radio Cabinets	0	0	0	5,618	2,100	1,108	192,575	201,401	0
	Invalid SIC Code within SIC Code 25	0	0	0	0	0	610	10,000	10,610	0
2515	Mattresses & Bedsprings	0	0	0	0	0	0	0	0	72
	Total for SIC Code 25	2,841,917	37,467	1,181,030	5,115,489	5,647,247	805,597	42,195,193	57,823,940	148

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category. One facility incorrectly reported 0 pounds of total production-related waste under SIC code 2515. The correct amount is 370,695 pounds. The total production-related waste rank of SIC code 2515 changes from 15 to 12.
*nec: not elsewhere classified.

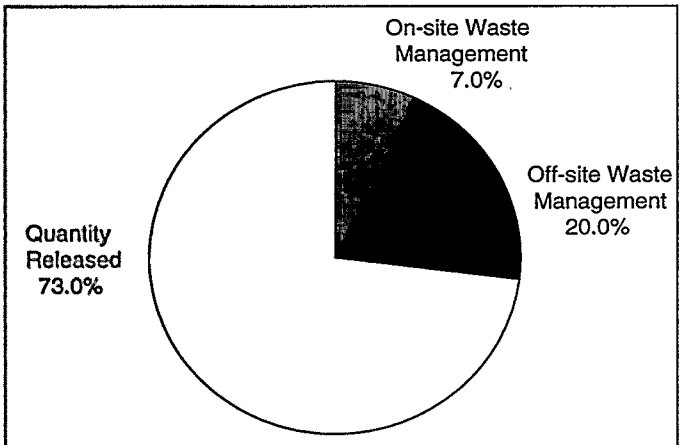


Figure 7-8. Distribution of TRI Production-related Waste, 1996: Furniture (SIC Code 25)

Note: Data from Section 8 of Form R.

recovery, 5.6 million pounds (9.8%) and off-site recycling, 5.1 million pounds (8.8%). Other waste management types accounted for less than 5% each of total production-related waste. These data appear in Table 7-9, and Figure 7-8 illustrates the percentage distribution.

Two industrial groups accounted for the largest reported quantities released by this sector: wood household furniture (SIC code 2511), with 23.4 million pounds, and multiple-codes forms with 10.8 million pounds. These two amounts together accounted for 81.0% of the sector's reported release quantities and 59.1% of the sector's total production-related waste. Zero amounts reported by the mattresses and bedsprings industry (SIC code 2515), shown in Table 7-9, represent a reporting error. As seen in Tables 7-1 and 7-8, this industry reported 338,000 pounds of releases in Section 5 of Form R for 1996, which should also have been reported as quantities released on- and off-site in Section 8 of Form R.

The multiple-codes group reported the largest amounts in all other types of waste management except on-site energy recovery. (The furniture sector as a whole reported only small amounts of toxic chemicals burned for energy recovery on-site.). Multiple-codes forms reported 2.2 million pounds of on-site recycling, 427,000 pounds of on-site treatment, 1.9 million pounds of off-site recycling, 3.6 million pounds of off-site energy recovery, and 266,000 pounds of off-site treatment. These amounts ranged from 33.0% (off-site treatment) to 78.8% (on-site recycling) of the sector's total in each of the various categories.

The non-wood office furniture industry (SIC code 2522) ranked second for on-site recycling, with 274,000 pounds (9.6% of the sector's total for on-site recycling). Drapery hardware and blinds and shades (SIC code 2591) reported the second-largest amount for on-site treatment, 349,000 pounds (29.5%). The public building and related furniture industry (SIC code 2531) ranked second for off-site recycling, with 1.1 million pounds (22.1%). The wood household furniture industry (SIC code 2511) was second for off-site energy recovery, with 1.2 million pounds (21.5%), and for off-site treatment, with 234,000 pounds (29.0%).

Distribution of production-related waste for the top industries in the sector appears in Figure 7-9.

Projected Quantities of TRI Chemicals in Waste

Table 7-10 and Figure 7-10 summarize the furniture sector's projections for on- and off-site waste management through 1998. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) Total production-related waste was expected to decline 4.2% from 1996 to 1998, from 57.8 million pounds to 55.4 million pounds. The largest component of this sector's reported production-related waste—quantities released on- and off-site—was projected to decrease 4.6%, from 42.2 million pounds to 40.3 million pounds. These projected reductions would amount to a 2.4 million-pound decrease in total production-

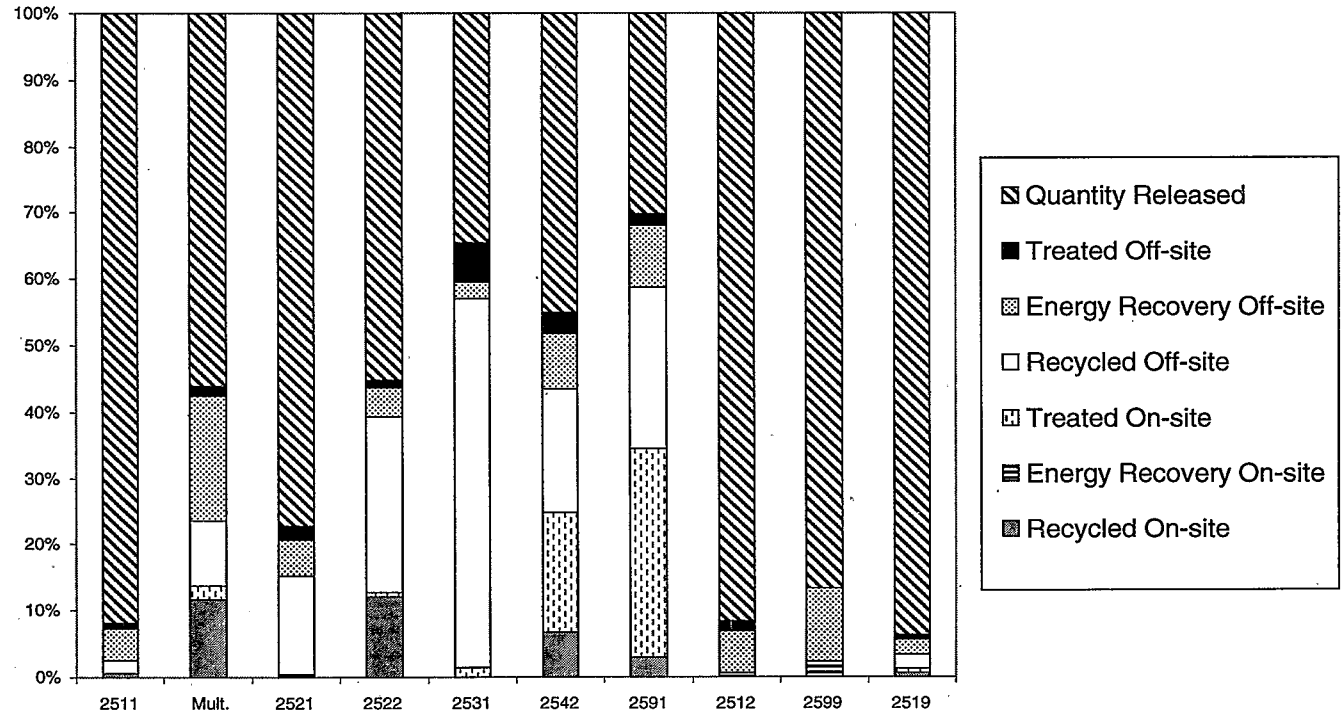


Figure 7-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Furniture (SIC Code 25)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.

Table 7-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Furniture, SIC Code 25

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	2,841,917	4.9	2,662,976	4.8	2,672,601	4.8
Energy Recovery On-site	37,467	0.1	144,010	0.3	143,101	0.3
Treated On-site	1,181,030	2.0	1,183,940	2.1	1,207,393	2.2
Off-site Waste Management						
Recycled Off-site	5,115,489	8.8	4,523,551	8.2	4,848,379	8.7
Energy Recovery Off-site	5,647,247	9.8	5,176,598	9.4	5,417,144	9.8
Treated Off-site	805,597	1.4	876,297	1.6	875,121	1.6
Quantity Released On- and Off-site	42,195,193	73.0	40,718,754	73.7	40,251,945	72.6
Total Production-related Waste for SIC Code 25	57,823,940	100.0	55,286,126	100.0	55,415,684	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-6.3	0.4	-6.0
Energy Recovery On-site	284.4	-0.6	281.9
Treated On-site	0.2	2.0	2.2
Off-site Waste Management			
Recycled Off-site	-11.6	7.2	-5.2
Energy Recovery Off-site	-8.3	4.6	-4.1
Treated Off-site	8.8	-0.1	8.6
Quantity Released On- and Off-site	-3.5	-1.1	-4.6
Total Production-related Waste for SIC Code 25	-4.4	0.2	-4.2

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

related waste, including a 1.9 million-pound decrease in quantities released.

The sector also projected reductions of 6.0% in on-site recycling, 5.2% in off-site recycling, and 4.1% in off-site energy recovery. The absolute decrease in each of these cases would be less than 300,000 pounds.

Relatively small absolute increases were projected in on-site energy recovery (106,000 pounds), on-site treatment (26,000 pounds), and off-site treatment (70,000 pounds).

These projections indicate no change in the way the furniture sector planned to manage its TRI chemicals in waste. Despite the large absolute decrease projected for releases, that category would continue to account for approximately 73% of the

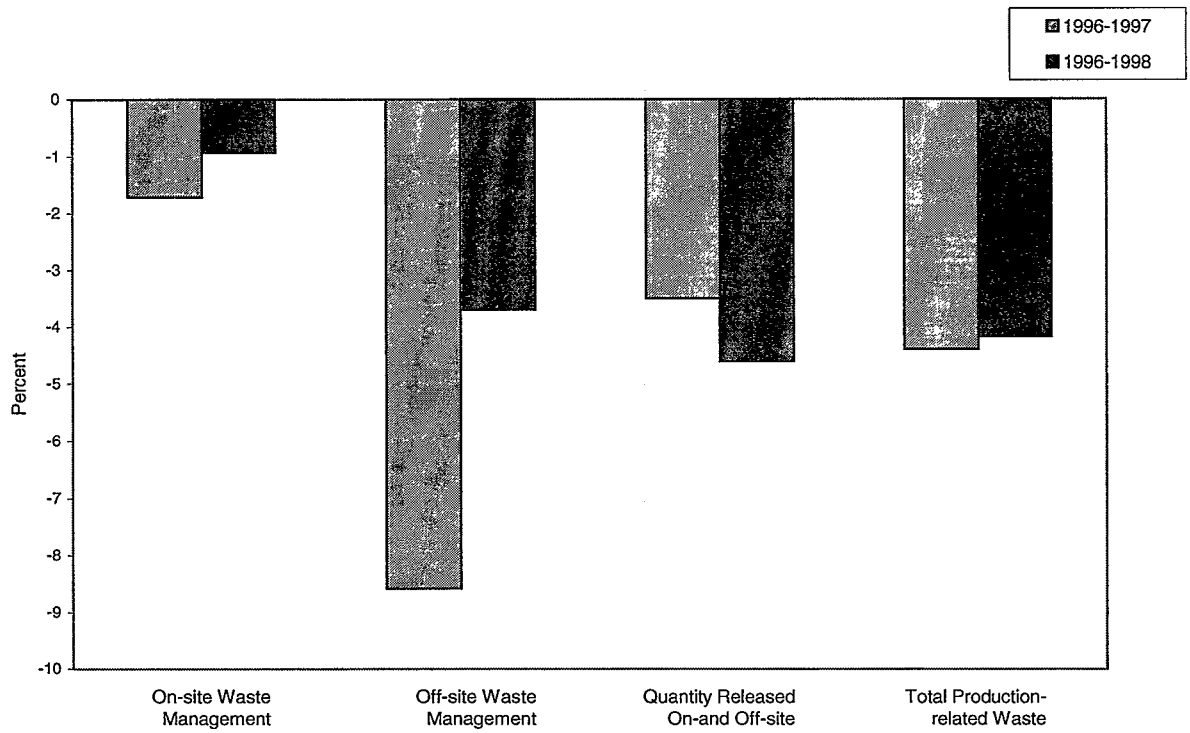


Figure 7-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Furniture (SIC Code 25)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

sector's production-related waste. As explained in Chapter 1, releases are the least desirable option for managing TRI chemicals in waste, according to the waste management hierarchy.

Source Reduction Activity

A relatively high percentage of the TRI forms submitted by the furniture sector—37.8%—indicated that one or more source reduction activities were undertaken during 1996. For TRI as a whole, 19.6% of all forms reported source reduction activity. As shown in Table 7-11, the furniture sector submitted 472 forms that reported source reduction activity. The wood household furniture industry (SIC code 2511) submitted the largest number, 279 forms or 44.3% of all TRI reports filed by that industry. Among the multiple-codes forms, 79 (or 47.0%) indicated source reduction activity. The level of source reduction activity represented by these high percentages, in the industry groups that reported the largest amounts of releases and waste management in this sector, suggests that efforts are underway to reduce those amounts.

Surface preparation and finishing was the category of source reduction activity most often reported (on 235 forms), reflecting the importance of these activities in furniture manufacture. Raw material modifications was second (177 forms), and good operating practices was third (112 forms).

Year-to-Year Comparisons for Furniture

1995-1996 TRI Data for Furniture

From 1995 to 1996, the number of forms submitted to TRI by the furniture sector decreased 16.0%, from 1,488 forms to 1,250, as shown in Table 7-12.

Table 7-11. Number of Forms Reporting Source Reduction Activity, 1996: Furniture, SIC Code 25

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
2511	Wood Household Furniture	630	279	44.3	58	36	25	105	21	5	139	7
2512	Upholstered Household Furniture	38	3	7.9	0	0	0	2	1	0	0	0
2514	Metal Household Furniture	17	1	5.9	1	0	0	0	1	0	0	0
2515	Mattresses & Bedsprings	3	0	0.0	0	0	0	0	0	0	0	0
2517	Wood TV & Radio Cabinets	8	2	25.0	0	0	0	2	0	0	0	0
2519	Household Furniture, nec*	21	2	9.5	1	0	0	2	0	0	0	0
2521	Wood Office Furniture	95	33	34.7	8	1	0	13	1	2	20	0
2522	Office Furniture, Except Wood	65	18	27.7	6	3	1	5	5	2	8	2
2531	Public Building & Related Furniture	53	3	5.7	1	0	0	0	1	0	0	1
2541	Wood Partitions & Fixtures	31	15	48.4	7	0	0	4	0	0	8	2
2542	Partitions & Fixtures, Except Wood	48	15	31.3	5	3	2	4	2	0	8	2
2591	Drapery Hardware & Blinds & Shades	24	6	25.0	2	0	0	2	1	0	1	0
2599	Furniture & Fixtures, nec*	47	16	34.0	4	1	2	3	2	1	9	0
	Multiple within SIC Code 25	168	79	47.0	19	0	2	35	9	5	42	6
	Invalid SIC Code within SIC Code 25	2	0	0.0	0	0	0	0	0	0	0	0
	Total for SIC Code 25	1,250	472	37.8	112	44	32	177	44	15	235	20

Note: Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Although very few Form As were submitted in this sector in either year, these also decreased by a substantial margin (35.0%), from 40 to 26. (The Form A certification statement is explained in Chapter 1.)

On- and Off-site Releases

Releases on- and off-site reported by the furniture sector decreased 14.1%, from 41.8 million pounds in 1995 to 35.9 million pounds in 1996. The largest component of the reduction was air emissions, which decreased from 41.7 million pounds to 35.7 million pounds (14.3%). Both fugitive and point-source emissions decreased. Other types of releases constituted less than 1% of the furniture sector's total on- and off-site releases, and were not significant elements of the 1995-1996 change.

Table 7-12 presents the furniture sector's on- and off-site releases for 1995 and 1996. Figure 7-11 illustrates the percentage change in releases by type.

Other On-site Waste Management

All types of other on-site waste management reported by the furniture sector decreased from 1995 to 1996, as shown in Table 7-12. The sector reported a 16.2% reduction, from 4.8 million pounds to 4.1 million pounds in total other on-site waste management. Contributing to this overall decrease was a reduction in on-site recycling from 3.4 million pounds to 2.8 million pounds and a reduction in on-site treatment from 1.4 million pounds to 1.2 million pounds. Energy recovery, the on-site waste management option with the smallest amounts reported by this sector, decreased from 94,000 pounds to 37,000 pounds.

Transfers Off-site for Further Waste Management

Table 7-12 also shows the furniture sector's 1995 and 1996 reporting of transfers off-site for further waste management. The total of such transfers decreased 8.3% from 14.2 million pounds to 13.1 million

Table 7-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Furniture, SIC Code 25

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	524	453	-13.5
Total Forms	1,488	1,250	-16.0
Form Rs	1,448	1,224	-15.5
Form As	40	26	-35.0
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	41,662,290	35,724,121	-14.3
Fugitive Air	5,867,608	4,813,779	-18.0
Point Source Air	35,794,682	30,910,342	-13.6
Surface Water Discharges	872	43	-95.1
Underground Injection	0	0	--
On-site Land Releases	9,608	26,641	177.3
Total On-site Releases	41,672,770	35,750,805	-14.2
Off-site Releases			
Transfers Off-site to Disposal	107,119	125,858	17.5
Total On- and Off-site Releases	41,779,889	35,876,663	-14.1
Other On-site Waste Management			
Recycled On-site	3,394,403	2,841,917	-16.3
Energy Recovery On-site	94,077	37,467	-60.2
Treated On-site	1,356,904	1,181,030	-13.0
Total Other On-site Waste Management	4,845,384	4,060,414	-16.2
Transfers Off-site for Further Waste Management			
Transfers to Recycling	6,340,055	6,453,880	1.8
Transfers to Energy Recovery	6,982,200	5,612,741	-19.6
Transfers to Treatment	798,575	601,162	-24.7
Transfers to POTWs	122,438	383,502	213.2
Other Off-site Transfers	250	6,295	2,418.0
Total Transfers Off-site for Further Waste Management	14,243,518	13,057,580	-8.3

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

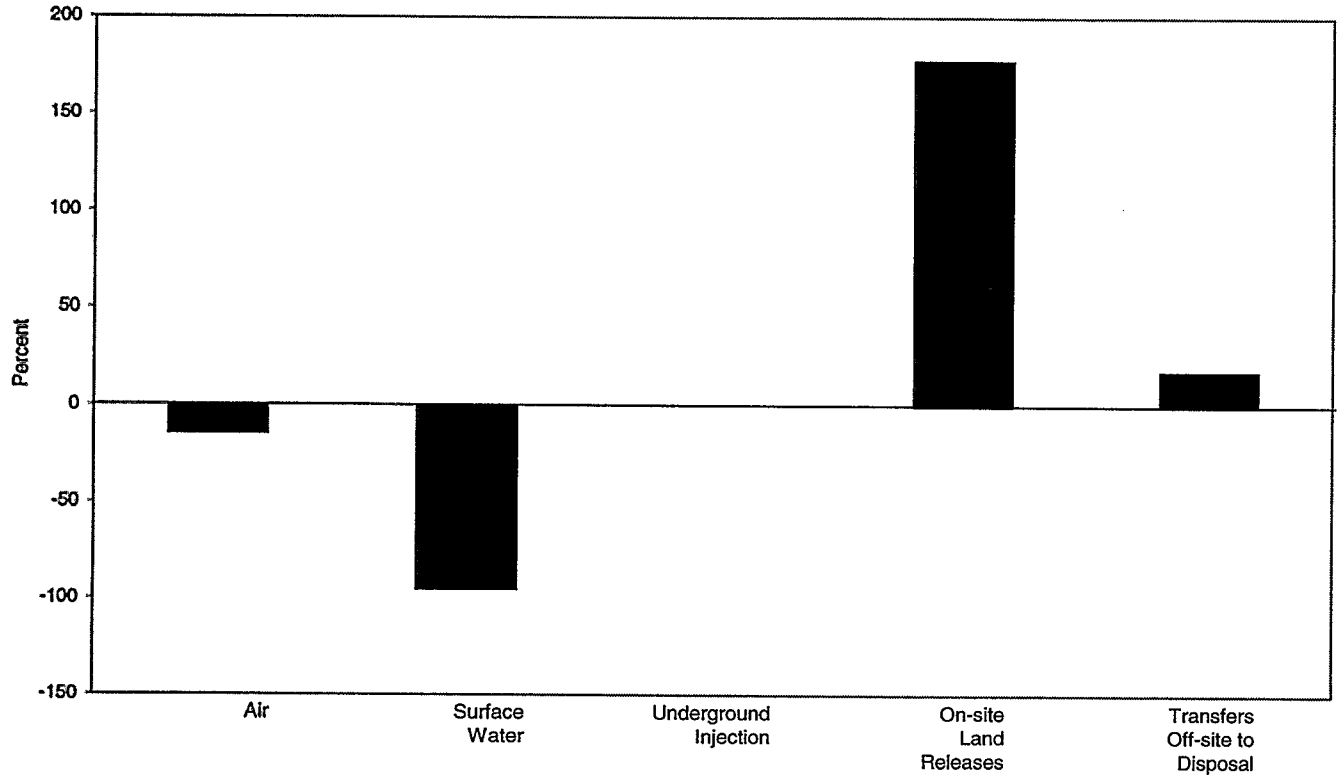


Figure 7-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Furniture (SIC Code 25)

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

pounds. This reduction was principally attributable to a reduction in transfers to energy recovery from 7.0 million pounds in 1995 to 5.6 million pounds in 1996, a 19.6% decrease. Transfers to treatment also decreased, from 799,000 pounds to 601,000 pounds, while transfers to recycling increased from 6.3 million pounds to 6.5 million pounds and transfers to POTWs increased from 122,000 pounds to 384,000 pounds.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Furniture

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste

management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

The number of forms submitted by the furniture sector decreased by 25.8% from 1988 to 1996 (from 1,630 forms to 1,209 forms), as shown in Table 7-13.

For the 1988-1996 "core" chemicals, the furniture sector reported 62.4 million pounds of total on- and off-site releases in 1988 and 35.7 million pounds in 1996. This was a reduction of 42.8% or 26.7 million pounds. The reduction in air emissions over this period was 25.8 million pounds (from 61.3 million pounds in 1988 to 35.5 million pounds in 1996), including reductions in both fugitive and point-source releases to air. The sector also recorded an 848,000 pound reduction in off-site releases (transfers to disposal), from 974,000 pounds to 126,000 pounds.

Figure 7-12 displays the percentage change in on- and off-site releases by type of release for the furniture sector.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, other on-site waste management reported by the furniture sector increased from 2.8 million pounds in 1994 to 3.7 million pounds in 1996, as shown in Table 7-13. This reflected a larger increase in on-site recycling (from 1.7 million pounds to 2.8 million pounds), partly offset by smaller decreases in energy recovery (from 173,000 pounds to 37,000 pounds) and treatment (from 997,000 pounds to 840,000 pounds).

For the types of transfers reported to TRI for the full 1988-1996 comparison period, the furniture sector reported an 83.8% reduction in transfers to treatment (from 3.7 million pounds to 599,000 pounds) and a 57.9% reduction in transfers to POTWs (from 250,000 pounds to 105,000 pounds). These data also appear in Table 7-13.

1988-1996 Data for Four-Digit Industries in Furniture

Tables 7-14 through 7-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 25. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Table 7-14 provides release data for all four-digit SIC codes in the furniture sector, for 1988-1996. The wood household furniture industry (SIC code 2511) reported the largest decrease in total on- and off-site releases, from 38.1 million pounds in 1988 to 22.1 million pounds in 1996. The non-wood office furniture industry (SIC code 2522) ranked second for decreases in releases, reporting 3.2 million pounds in 1988 and 1.2 million pounds in 1996. The third-largest decrease was reported by the public building and related furniture industry (SIC code 2531), from 2.5 million pounds to 690,000 pounds. All three reductions occurred largely in reporting of air emissions.

The mattresses and bedsprings industry (SIC code 2515) reported the largest increase in releases for the 1988-to-1996 period, from 30,000 pounds to 337,000 pounds, entirely in air emissions. The only other industry reporting an increase was the miscellaneous household furniture (SIC code 2519), from 431,000 pounds to 507,000 pounds. Releases reported in both industries were considerably higher in 1994, but decreased in 1995 and 1996. The overall increase was primarily attributable to air emissions.

Table 7-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Furniture, SIC Code 25

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	500	562	522	446	-10.8
Total Forms	1,630	1,604	1,446	1,209	-25.8
Form Rs	1,630	1,604	1,413	1,191	-26.9
Form As	NA	NA	33	18	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	61,313,783	51,786,463	41,412,706	35,499,005	-42.1
Fugitive Air	8,556,134	6,469,770	5,786,731	4,717,964	-44.9
Point Source Air	52,757,649	45,316,693	35,625,975	30,781,041	-41.7
Surface Water Discharges	3,051	266	872	43	-98.6
Underground Injection	0	0	0	0	--
On-site Land Releases	72,249	63,717	9,603	26,636	-63.1
Total On-site Releases	61,389,083	51,850,446	41,423,181	35,525,684	-42.1
Off-site Releases					
Transfers Off-site to Disposal	974,037	284,499	107,119	125,857	-87.1
Total On- and Off-site Releases	62,363,120	52,134,945	41,530,300	35,651,541	-42.8
Other On-site Waste Management					
Recycled On-site	NA	1,650,599	3,354,403	2,806,917	NA
Energy Recovery On-site	NA	172,607	94,077	37,467	NA
Treated On-site	NA	996,921	985,333	840,182	NA
Total Other On-site Waste Management	NA	2,820,127	4,433,813	3,684,566	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	4,201,644	6,340,055	6,453,880	NA
Transfers to Energy Recovery	NA	6,388,993	6,943,916	5,544,138	NA
Transfers to Treatment	3,706,391	1,741,230	789,922	598,945	-83.8
Transfers to POTWs	250,472	134,380	122,428	105,448	-57.9
Other Off-site Transfers	1,143,394	5,772	250	6,295	-99.4
Total Transfers Off-site for Further Waste Management	NA	12,472,019	14,196,571	12,708,706	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. NA: not required to be reported in that year.

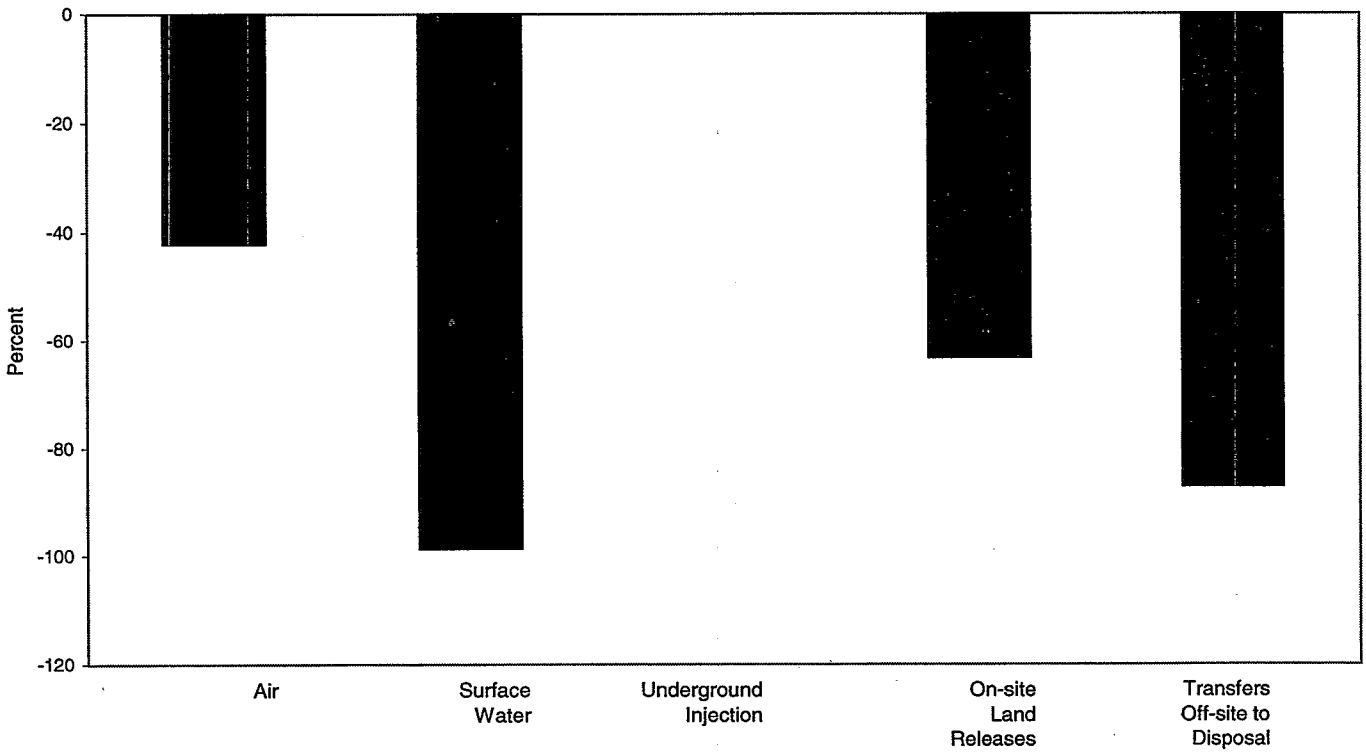


Figure 7-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Furniture (SIC Code 25)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

Other On-site Waste Management

The drapery hardware and blinds and shades industry (SIC code 2591) reported the largest decrease in other on-site waste management in the furniture sector for 1994 to 1996 (on-site waste management data were not collected in 1988). This was a reduction from 586,000 pounds to 381,000 pounds, although this industry's total other on-site waste management was higher (652,000 pounds) in 1995. The industry reported reductions in all waste management methods except for a small increase in on-site recycling.

The miscellaneous furniture and fixtures industry (SIC code 2599) ranked second for decreases, reporting 77,000 pounds in 1994 and 12,000 pounds in 1996. The public building and related furniture industry (SIC code 2531) reported the third-largest decrease, from 81,000 pounds to 31,000 pounds. In both industries, the reductions reflected decreased reporting in on-site recycling and treatment.

The largest increase from 1994 to1996 was reported by the multiple-codes group, from 1.4 million pounds to 2.6 million pounds. This increase was reported principally in on-site recycling. The non-wood partitions and fixtures industry (SIC code 2542) ranked second, increasing from 116,000 pounds to 194,000 pounds. The increase was attributable to treatment and recycling. Non-wood office furniture (SIC code 2522) ranked third, reporting 263,000 pounds in 1996 and 287,000 pounds in 1996. This increase reflected an increase in on-site recycling, partly offset by a decrease in on-site treatment.

Table 7-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Furniture, SIC Code 25

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2511	Wood Household Furniture	96	22,057,768	25	0	1,093	22,058,886	91,199	22,150,085
		95	26,173,314	780	0	1,632	26,175,726	84,074	26,259,800
		94	32,176,694	30	0	61,631	32,238,355	173,505	32,411,860
		88	37,550,473	1,000	0	43,574	37,595,047	512,180	38,107,227
2512	Upholstered Household Furniture	96	783,320	0	0	0	783,320	0	783,320
		95	776,874	0	0	500	777,374	0	777,374
		94	867,981	0	0	0	867,981	250	868,231
		88	2,540,446	0	0	0	2,540,446	3,750	2,544,196
2514	Metal Household Furniture	96	269,490	0	0	0	269,490	0	269,490
		95	283,949	0	0	0	283,949	0	283,949
		94	709,128	0	0	68	709,196	14,436	723,632
		88	795,886	0	0	0	795,886	4,150	800,036
2515	Mattresses & Bedsprings	96	337,486	0	0	0	337,486	0	337,486
		95	400,917	0	0	0	400,917	0	400,917
		94	435,233	0	0	0	435,233	250	435,483
		88	29,600	0	0	0	29,600	0	29,600
2517	Wood TV & Radio Cabinets	96	193,575	0	0	0	193,575	0	193,575
		95	414,400	0	0	0	414,400	0	414,400
		94	674,260	0	0	0	674,260	0	674,260
		88	1,371,204	0	0	0	1,371,204	20,737	1,391,941
2519	Household Furniture, nec*	96	507,354	0	0	0	507,354	0	507,354
		95	644,588	0	0	0	644,588	0	644,588
		94	880,890	0	0	0	880,890	0	880,890
		88	421,953	0	0	0	421,953	8,739	430,692
2521	Wood Office Furniture	96	2,118,974	0	0	0	2,118,974	1,928	2,120,902
		95	2,036,813	0	0	0	2,036,813	2,748	2,039,561
		94	2,738,599	0	0	1,250	2,739,849	0	2,739,849
		88	2,526,256	0	0	27,425	2,553,681	69,376	2,623,057
2522	Office Furniture, Except Wood	96	1,213,831	5	0	0	1,213,836	0	1,213,836
		95	1,530,217	0	0	0	1,530,217	0	1,530,217
		94	1,657,778	0	0	0	1,657,778	1,111	1,658,889
		88	3,063,823	0	0	0	3,063,823	180,736	3,244,559
2531	Public Building & Related Furniture	96	683,716	0	0	5	683,721	5,985	689,706
		95	667,777	0	0	0	667,777	2,523	670,300
		94	806,372	0	0	0	806,372	1,955	808,327
		88	2,466,218	250	0	0	2,466,468	8,665	2,475,133
2541	Wood Partitions & Fixtures	96	411,227	0	0	0	411,227	2,116	413,343
		95	698,839	0	0	0	698,839	173	699,012
		94	828,548	0	0	0	828,548	7,944	836,492
		88	759,942	0	0	0	759,942	5,100	765,042
2542	Partitions & Fixtures, Except Wood	96	865,200	10	0	250	865,460	529	865,989
		95	767,300	90	0	22	767,412	608	768,020
		94	1,042,946	210	0	15	1,043,171	26,551	1,069,722
		88	1,875,302	190	0	0	1,875,492	311	1,875,803

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 7-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Furniture, SIC Code 25, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2591	Drapery Hardware & Blinds & Shades	96	333,297	0	0	0	333,297	0	333,297
		95	388,166	0	0	0	388,166	0	388,166
		94	555,236	0	0	0	555,236	0	555,236
		88	346,207	0	0	0	346,207	1,248	347,455
2599	Furniture & Fixtures, nec*	96	573,550	0	0	0	573,550	4,688	578,238
		95	913,939	0	0	0	913,939	15,851	929,790
		94	848,809	0	0	0	848,809	34,224	883,033
		88	1,299,911	0	0	0	1,299,911	70,835	1,370,746
	Multiple within SIC Code 25	96	5,139,717	3	0	25,288	5,165,008	19,412	5,184,420
		95	5,471,343	2	0	7,449	5,478,794	1,142	5,479,936
		94	7,103,554	26	0	753	7,104,333	24,273	7,128,606
		88	5,482,818	1,600	0	1,250	5,485,668	21,810	5,507,478
	Invalid SIC Code within SIC Code 25	96	10,500	0	0	0	10,500	0	10,500
		95	244,270	0	0	0	244,270	0	244,270
		94	460,435	0	0	0	460,435	0	460,435
		88	783,744	11	0	0	783,755	66,400	850,155
	Total for SIC Code 25	96	35,499,005	43	0	26,636	35,525,684	125,857	35,651,541
		95	41,412,706	872	0	9,603	41,423,181	107,119	41,530,300
		94	51,786,463	266	0	63,717	51,850,446	284,499	52,134,945
		88	61,313,783	3,051	0	72,249	61,389,083	974,037	62,363,120

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

On-site waste management data for 1994-1996 appear in Table 7-15.

Transfers Off-site for Further Waste Management

The wood household furniture industry (SIC code 2511) reported the largest decrease in the furniture sector from 1994 to 1996 in transfers off-site for further waste management (data for some types of off-site transfers were not collected in 1988). This was a reduction from 2.4 million pounds to 1.7 million pounds, reflecting decreases in all types of transfers except for a small increase in transfers to POTWs.

The miscellaneous furniture and fixtures industry (SIC code 2599) ranked second for decreases, with 166,000 pounds in 1994 and 93,000 pounds in 1996. Ranking third, the wood partitions and fixtures industry (SIC code 2541) reported a reduction from 138,000 pounds to 70,000 pounds. Transfers to energy recovery accounted for the majority of the reductions for both of these industries.

As with other on-site waste management, the multiple-codes group reported the largest increase in transfers off-site for further waste management. Multiple-codes forms reported 5.9 million pounds in 1994 and 7.0 million pounds in 1996. A large increase in transfers to recycling was the significant factor in this overall change, although transfers to treatment showed a substantial decrease.

The public building and related furniture industry (SIC code 2531) reported 1.2 million pounds of transfers off-site for further waste management in 1994 and 1.3 million pounds in 1996, although the

Table 7-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Furniture, SIC Code 25

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2511	Wood Household Furniture	96	161,450	12,080	2,737	176,267
		95	184,609	269	0	184,878
		94	152,204	68,400	320	220,924
		88	NA	NA	NA	NA
2512	Upholstered Household Furniture	96	2,005	0	0	2,005
		95	9,002	0	0	9,002
		94	8,645	0	0	8,645
		88	NA	NA	NA	NA
2514	Metal Household Furniture	96	0	0	0	0
		95	4,562	0	0	4,562
		94	24,506	0	0	24,506
		88	NA	NA	NA	NA
2515	Mattresses & Bedsprings	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2517	Wood TV & Radio Cabinets	96	0	0	0	0
		95	8,600	0	0	8,600
		94	20,500	0	0	20,500
		88	NA	NA	NA	NA
2519	Household Furniture, nec*	96	3,895	0	3,430	7,325
		95	0	0	0	0
		94	5,062	325	0	5,387
		88	NA	NA	NA	NA
2521	Wood Office Furniture	96	689	13,595	0	14,284
		95	24,615	8	0	24,623
		94	26,090	23	0	26,113
		88	NA	NA	NA	NA
2522	Office Furniture, Except Wood	96	273,527	0	13,156	286,683
		95	134,210	0	30,204	164,414
		94	238,336	0	24,665	263,001
		88	NA	NA	NA	NA
2531	Public Building & Related Furniture	96	0	0	31,000	31,000
		95	62,792	0	22,000	84,792
		94	37,254	0	44,000	81,254
		88	NA	NA	NA	NA
2541	Wood Partitions & Fixtures	96	6,404	0	0	6,404
		95	11,087	0	0	11,087
		94	13,395	0	110	13,505
		88	NA	NA	NA	NA
2542	Partitions & Fixtures, Except Wood	96	121,200	0	73,002	194,202
		95	128,877	0	14,708	143,585
		94	99,878	0	15,955	115,833
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code 25 are assigned to the "multiple" category.
*nec: not elsewhere classified

Table 7-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Furniture, SIC Code 25, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2591	Drapery Hardware & Blinds & Shades	96	32,168	0	348,960	381,128
		95	21,398	93,800	536,661	651,859
		94	14,193	103,800	467,628	585,621
		88	NA	NA	NA	NA
2599	Furniture & Fixtures, nec*	96	0	11,792	0	11,792
		95	20,947	0	0	20,947
		94	51,197	0	25,574	76,771
		88	NA	NA	NA	NA
	Multiple within SIC Code 25	96	2,205,579	0	367,897	2,573,476
		95	2,743,704	0	381,760	3,125,464
		94	958,805	0	418,669	1,377,474
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 25	96	0	0	0	0
		95	0	0	0	0
		94	534	59	0	593
		88	NA	NA	NA	NA
	Total for SIC Code 25	96	2,806,917	37,467	840,182	3,684,566
		95	3,354,403	94,077	985,333	4,433,813
		94	1,650,599	172,607	996,921	2,820,127
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code 25 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

1995 amount was higher (1.4 million pounds). This was the second-largest increase reported in the furniture sector. The drapery hardware and blinds and shades industry (SIC code 2591) ranked third for increases, with 354,000 pounds in 1994 and 389,000 pounds in 1996, although the total was lower (249,000 pounds) in the intervening year. Transfers to recycling were the principal factor in the increase for both industries.

Transfers off-site for further waste management reported by the furniture sector for 1988-1996 appear in Table 7-16.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Broyhill Furniture Industries, Inc., in Lenoir, North Carolina (SIC code 2511 in 1988 and codes 2493 and 2511 in 1996), ranked first with a reported 787,000 pound increase between 1988 and 1996. The Broyhill Miller Hill complex is made up of several wood household furniture manufacturing plants. Three of the plants reported as individual facilities from 1987 to 1990. Beginning in 1991, reporting by the three plants was combined, and the three were identified as a single facility. The decision to combine the TRI reporting followed consolidation of the plants' various air permits under Title V of the Clean Air Act, according to the Broyhill contact. See also "Facilities with Large Increases and Decreases in Waste Management, 1991-1996."

Peters-Revington Furniture in Delphi, Indiana (SIC code 2511), ranked second in increases with an overall 765,000 pounds. Toluene was the largest chemical contributor to the change, accounting for 44% of the increase. The chemical is part of coating formulations for the facility's products, occasional furniture. According to the facility contact, the increase in releases was due to expansion

Table 7-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Furniture, SIC Code 25

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2511	Wood Household Furniture	96	410,287	1,187,146	99,267	28,668	0	1,725,368
		95	1,426,541	1,392,523	96,054	9,605	250	2,924,973
		94	780,076	1,486,323	126,932	9,058	0	2,402,389
		88	NA	NA	617,728	80,962	209,325	NA
2512	Upholstered Household Furniture	96	2,031	62,684	987	10,825	0	76,527
		95	2,766	33,026	20,574	8,800	0	65,166
		94	5,488	46,171	8,250	8,000	5,772	73,681
		88	NA	NA	17,716	4,537	10,533	NA
2514	Metal Household Furniture	96	195	56,297	1,102	0	0	57,594
		95	1,250	34,184	240	0	0	35,674
		94	0	32,418	59,605	0	0	92,023
		88	NA	NA	42,830	1,250	0	NA
2515	Mattresses & Bedsprings	96	0	0	0	0	6,295	6,295
		95	0	0	0	0	0	0
		94	0	0	55	0	0	55
		88	NA	NA	0	0	0	NA
2517	Wood TV & Radio Cabinets	96	5,602	1,300	1,000	20	0	7,922
		95	8,747	12,753	2,250	0	0	23,750
		94	7,280	24,073	2,350	0	0	33,703
		88	NA	NA	32,165	2,000	2,000	NA
2519	Household Furniture, nec*	96	8,652	12,500	0	0	0	21,152
		95	4,986	16,464	0	0	0	21,450
		94	9,801	20,754	3	0	0	30,558
		88	NA	NA	17,350	250	0	NA
2521	Wood Office Furniture	96	405,048	151,436	30,953	50	0	587,487
		95	25,232	232,712	293,254	250	0	551,448
		94	66,320	258,575	260,770	1,000	0	586,665
		88	NA	NA	242,930	2,803	12,431	NA
2522	Office Furniture, Except Wood	96	650,378	102,019	24,455	513	0	777,365
		95	358,425	231,753	5,228	6,965	0	602,371
		94	339,470	364,749	107,091	23,525	0	834,835
		88	NA	NA	789,913	72,937	259,800	NA
2531	Public Building & Related Furniture	96	1,132,903	50,207	116,589	1,254	0	1,300,953
		95	1,195,060	84,024	105,808	1,394	0	1,386,286
		94	1,058,758	69,185	111,277	1,307	0	1,240,527
		88	NA	NA	304,215	11,820	107,234	NA
2541	Wood Partitions & Fixtures	96	2,730	48,721	18,066	0	0	69,517
		95	10,082	103,530	1,000	0	0	114,612
		94	10,967	118,048	8,652	0	0	137,667
		88	NA	NA	108,885	0	4,000	NA
2542	Partitions & Fixtures, Except Wood	96	346,366	100,791	107,438	2,570	0	557,165
		95	183,689	64,430	60,542	395	0	309,056
		94	319,888	148,317	68,457	283	0	536,945
		88	NA	NA	304,434	2,000	84,517	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 7-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Furniture, SIC Code 25, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2591	Drapery Hardware & Blinds & Shades	96	267,603	104,876	16,516	72	0	389,067
		95	89,594	151,211	7,576	738	0	249,119
		94	105,805	236,237	4,150	7,789	0	353,981
		88	NA	NA	12,390	0	0	NA
2599	Furniture & Fixtures, nec*	96	4,265	88,383	100	0	0	92,748
		95	17,925	101,154	2,991	250	0	122,320
		94	4,890	158,526	2,400	250	0	166,066
		88	NA	NA	33,124	510	125,710	NA
	Multiple within SIC Code 25	96	3,217,820	3,577,778	181,472	61,476	0	7,038,546
		95	3,012,196	4,453,882	193,805	93,781	0	7,753,664
		94	1,452,827	3,380,549	979,785	82,918	0	5,896,079
		88	NA	NA	761,390	70,403	322,174	NA
	Invalid SIC Code within SIC Code 25	96	0	0	1,000	0	0	1,000
		95	3,562	32,270	600	250	0	36,682
		94	40,074	45,068	1,453	250	0	86,845
		88	NA	NA	421,321	1,000	5,670	NA
	Total for SIC Code 25	96	6,453,880	5,544,138	598,945	105,448	6,295	12,708,706
		95	6,340,055	6,943,916	789,922	122,428	250	14,196,571
		94	4,201,644	6,388,993	1,741,230	134,380	5,772	12,472,019
		88	NA	NA	3,706,391	250,472	1,143,394	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 25 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

and increased sales volume. See also "Facilities with Large Increases and Decreases in Waste Management, 1991-1996."

Superior Products Sales, Inc., in Plantersville, Mississippi (did not report in 1988 and SIC code 2515 in 1996), was third with 337,000 pounds. Dichloromethane was responsible for 100% of the increase. The chemical is used as a blowing (or expansion) agent in the production of urethane foam for furniture and bedding. No data were reported for dichloromethane in 1988 which was not used as a blowing agent until 1991.

Child Craft Industry, Inc., in Salem, Indiana (SIC codes 2511, 2517, 2519, and 2521 in 1988 and code 2511 in 1996), ranked first in decreases with a 656,000 pound reduction. This manufacturer of wooden children's furniture, such as cribs and dressers, reduced the amount of methyl ethyl ketone emitted to air by 241,000 pounds (37% of the total decrease). The decrease was attributable, in part, to the installation of automatic painting equipment which improved paint transfer efficiency and reduced overspray.

Singer Furniture Company in Lenoir, North Carolina (SIC code 2511), was second in decreases with 604,000 pounds. N-butyl alcohol, a component of finishing material used on household wood furniture, accounted for 27% of the decrease. The facility experienced a gradual decrease in production for several years prior to its closure in March 1997. See also "Facilities with Large Increases and Decreases in Waste Management, 1991-1996."

The third-ranked facility for decreases, Kincaid Furniture in Hudson, North Carolina (SIC code 2511), is a manufacturer of solid wood furniture.

Reductions in the use of toluene were partly attributable to reformulation of finishing materials such as paints and stains. Toluene accounted for 35% of the facility's overall decrease.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the furniture sector:

Johnston-Tombigbee Furniture, Columbus, Mississippi, increase of 341,000 pounds, reporting error.

1991-1996 Waste Management Data for Furniture

Table 7-17 summarizes on- and off-site waste management data for the furniture sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). The furniture sector's total production-related waste decreased 8.1%, from 62.2 million pounds in 1994 to 57.1 million pounds in 1996 (a 5.0 million-pound reduction). The largest decrease was reported in quantities released on- and off-site, from 47.9 million pounds to 41.9 million pounds, a 5.9 million-pound reduction (12.4%). The sector also reported smaller reductions in on-site recycling, on-site energy recovery, off-site energy recovery, and off-site treatment. The net decrease in each of these cases was less than 400,000 pounds.

Off-site recycling increased from 3.6 million pounds to 5.1 million pounds, or 42.8%. This was an increase of 1.5 million pounds. On-site treatment showed a smaller increase (376,000 pounds).

In several types of waste management, the sector reported larger amounts in 1994 or 1995.

Figure 7-13 illustrates the percentage change in on-site waste management, off-site waste management, quantities released on- and off-site, and total production related waste.

These changes suggest little real improvement in the sector's management of TRI chemicals in waste, as measured by the waste management hierarchy (explained in Chapter 1). Over the 1991-1996 period, quantities released decreased more than total production-related waste decreased, which indicates that the sector relied less on releases and more on other waste management options. However, releases still amounted to 73.4% of total production-related waste reported in 1996. This is a very high percentage for the least desirable waste management option, as set forth in the waste management hierarchy.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Peters-Revington Furniture in Delphi, Indiana (SIC code 2511), ranked first in increases in waste management with an overall 558,000 pounds. Toluene reported under quantity released made up 36% of the increase. The chemical is part of coating formulations for the facility's products, occasional furniture. A production increase was primarily responsible for the change. See "Facilities with Large Increases and Decreases in Releases, 1988-1996" for more information.

Another Broyhill Furniture Industries, Inc., facility in Lenoir, North Carolina (SIC code 2511 in 1991 and codes 2435, 2436 and 2511 in 1996) was the second largest increaser in waste managed. The Virginia Street plant, site of household furniture manufacture, had a reported 508,000 pound increase. Toluene, a constituent of paints and other finishing materials, accounted for 32% of the change. The facility contact stated that the toluene increase may be due to a higher toluene content of finishing materials. The contact also stated that the facility does not control the make-up of its finishing

Table 7-17. TRI Waste Management Data, 1991, 1994-1996: Furniture, SIC Code 25

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	3,030,729	1,650,599	3,354,403	2,806,917
Energy Recovery On-site	394,527	172,607	94,077	37,467
Treated On-site	464,549	996,931	985,333	840,182
Total On-site Waste Management	3,889,805	2,820,137	4,433,813	3,684,566
Off-site Waste Management				
Recycled Off-site	3,583,027	4,204,474	5,463,991	5,115,489
Energy Recovery Off-site	5,884,807	6,985,222	7,059,720	5,600,991
Treated Off-site	927,481	1,821,776	807,883	776,234
Total Off-site Waste Management	10,395,315	13,011,472	13,331,594	11,492,714
Quantity Released On- and Off-site	47,873,853	53,269,294	46,891,595	41,933,646
Total Production-related Waste	62,158,973	69,100,903	64,657,002	57,110,926
Non-Production-related Waste	68,366	40,437	1,366	148

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	103.2	-16.3	-7.4
Energy Recovery On-site	-45.5	-60.2	-90.5
Treated On-site	-1.2	-14.7	80.9
Total On-site Waste Management	57.2	-16.9	-5.3
Off-site Waste Management			
Recycled Off-site	30.0	-6.4	42.8
Energy Recovery Off-site	1.1	-20.7	-4.8
Treated Off-site	-55.7	-3.9	-16.3
Total Off-site Waste Management	2.5	-13.8	10.6
Quantity Released On- and Off-site	-12.0	-10.6	-12.4
Total Production-related Waste	-6.4	-11.7	-8.1
Non-Production-related Waste	-96.6	-89.2	-99.8

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

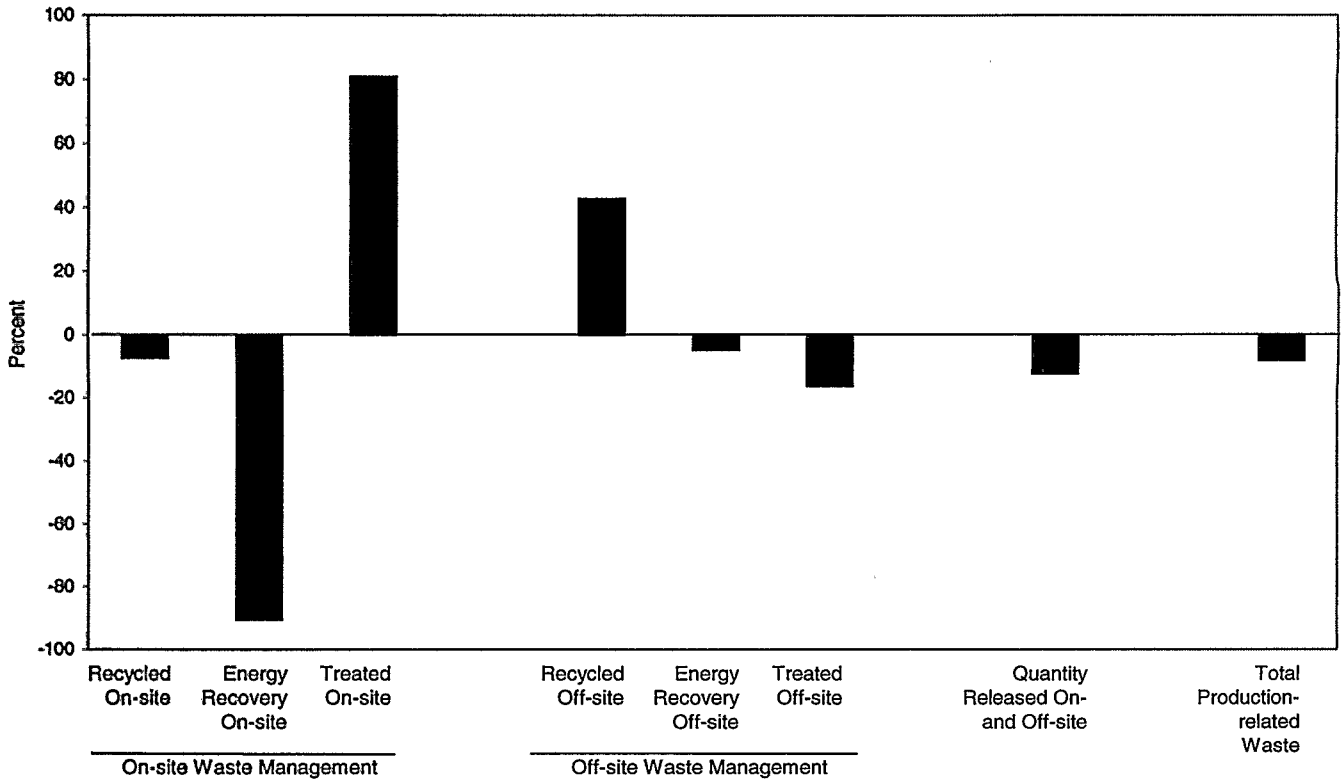


Figure 7-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Furniture (SIC Code 25)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

materials because they are purchased from suppliers.

Meridian, Inc., in Spring Lake, Michigan (SIC codes 2522 and 2542), was the top decreaser with an overall 1.2 million-pound reduction. Reporting of toluene accounted for 91% of the overall change between 1991 and 1996. No information was provided by the facility before this publication's deadline.

Singer Furniture Company in Lenoir, North Carolina (SIC code 2511), ranked second in decreases with 811,000 pounds. The Singer plant also ranked second in decreases of releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996"). Toluene, a solvent for finishing material used on household wood furniture, accounted for 29% of the decrease. The facility experienced a gradual decrease in production for several years prior to its closure in March 1997.

Steelcase, Inc., in Athens, Alabama (SIC code 2522), was third in decreases with a 617,000 pound reduction. Toluene was used at the facility to adjust the viscosity of paints and as a cleaning solvent in painting processes. Toluene reporting dropped from 370,000 pounds in 1991 to zero pounds in 1996 (60% of the overall reduction) due to several factors: A light aromatic solvent with a low toluene-content replaced a 40% toluene paint-thinner, the facility switched paint vendors in order to acquire materials with lower contents of regulated chemicals, and a dry-powder paint system was implemented. The latter involves the application of paint as a powder, which liquefies and adheres to surfaces in a heating cycle.

The metal office furniture manufacturer now uses toluene in amounts below the TRI reporting threshold.

Other Apparent Increases and Decreases in Production-Related Waste, 1991-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There are four such facilities in the furniture sector:

Bassett Furniture Industries, Dublin, Georgia, increase of 902,000 pounds, reporting error.

Broyhill Furniture Industries, Inc., Lenoir, North Carolina (Miller Hill Complex), increase of 1.1 million pounds, reporting error.

Steelcase, Inc., Grand Rapids, Michigan, increase of 5.0 million pounds, reporting error.

Steelcase, Inc., Kentwood, Michigan, increase of 3.5 million pounds, reporting error.

Facilities Contacted for Explanations (alphabetical by facility):

Bassett Furniture Industries, Dublin, Georgia: Walt Hammond, October 19 and 21, 1998 (explanation provided)

Broyhill Furniture Industry, Inc. (Virginia Street plant), Lenoir, North Carolina: David Stout, October 21, 1998 (explanation provided)

Broyhill Furniture Industry, Inc. (Miller Hill Complex), Lenoir, North Carolina: David Stout, September 25, 1998 (explanation provided)

Child Craft Industry, Inc., Salem, Indiana: Jenna Robinson, August 18 and August 21, 1998 (explanation provided)

Johnston-Tombigbee Furniture, Columbus, Mississippi: Bill Wells, August 18, 1998 (explanation provided)

Kincaid Furniture Company, Hudson, North Carolina: Delbert Cline, August 18, 1998 (explanation provided)

Meridian, Inc., Spring Lake, Michigan: Rudy Bartels, September 24 and October 23, 1998 (no explanation provided)

Peters-Revington Furniture, Delphi, Indiana: Linus Thornton, October 13, 1998 (explanation provided)

Singer Furniture Company, Lenoir, North Carolina: Dana Crump, September 24, 1998 (explanation provided)

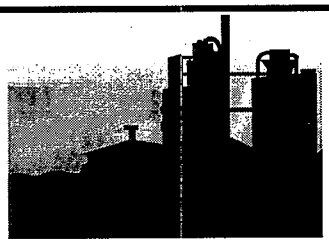
Steelcase, Inc., Athens, Alabama: Dan Tomerlin, August 18, 1998 (explanation provided)

Steelcase, Inc., Grand Rapids, Michigan (no explanation provided)

Steelcase, Inc., Kentwood, Michigan (no explanation provided)

Superior Products Sales, Inc., Plantersville, Mississippi: Ronnie Johnson, September 24, 1998 (explanation provided)

Chapter 8



Toxics Release Inventory Data for Printing and Publishing (SIC Code 27)

A Look at the Printing and Publishing Industry (SIC Code 27)

Printing, publishing, and allied industries (SIC code 27) publish newspapers, magazines, books, and pamphlets. (Publishers in this sector may or may not print their publications.) The sector also includes commercial printing. In addition, other products of the sector are business forms, greeting cards, looseleaf binders and blankbooks, and a wide variety of other materials ranging from atlases to sheet music to telephone directories. Bookbinding and services for the printing trade, such as typesetting, also appear in SIC code 27. Box 8-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The printing and publishing sector's value of shipments was $195.44 billion in 1996, up from $188.13 in 1995 (both in current dollars). The sector employed more than 1.5 million in both years. Printing and publishing activities are labor-intensive, although automation is increasing. Employment in printing and publishing has been relatively stable. Production levels, however, decreased 4.8% from 1989 to 1996, compared to an increase of 17.6% for all U.S. manufacturing (see Chapter 1, Table 1-10). The United States is both the world's largest market for printed products and the world's largest exporter of printed products. Electronic media such as CD-ROMs and the Internet increasingly compete with printing and publishing for certain types of products, such as encyclopedias, catalogs, and advertising.

In 1996, commercial printing (SIC code 275) accounted for one-third (34.7%) of the sector's value of shipments, with $67.84 billion in 1996, and more than one-third (40.0%) of the sector's employment, with 604,000. Newspaper publishing (SIC code 271) contributed $39.17 billion (20.0%) in value of shipments and 403,000 (26.6%) in employment. While industries in commercial printing have reported the largest amounts of TRI releases and waste management in this sector, no TRI forms have been submitted in the newspaper publishing industry in recent years.

Printing processes typically begin with photographing prepared pages (or other layouts) to produce film transparencies. Most printing

Box 8-1. SIC Code 27, Printing, Publishing, and Allied Industries: Codes and Classifications

SIC Code		Industry Description
271	**Newspapers: Publishing, or Publishing and Printing**	
2711	Newspapers: Publishing, or Publishing and Printing	Publishing, or publishing and printing, of newspapers.
272	**Periodicals: Publishing, or Publishing and Printing**	
2721	Periodicals: Publishing, or Publishing and Printing	Publishing, or publishing and printing, of periodicals.
273	**Books**	
2731	Books: Publishing, or Publishing and Printing	Publishing, or publishing and printing, of books and pamphlets.
2732	Book Printing	Printing, or printing and binding, of books and pamphlets (establishments not engaged in publishing).
274	**Miscellaneous Publishing**	
2741	Miscellaneous Publishing	Engaging in miscellaneous publishing activities, whether or not engaged in printing (includes atlases, business services newsletters, calendars, catalogs, maps, multimedia educational kits, sheet music, paper patterns, racing forms, shopping news, technical manuals and papers, telephone directories, yearbooks).
275	**Commercial Printing**	
2752	Commercial Printing, Lithographic	Printing by the lithographic process (includes offset printing, photo-offset printing, and photolithographing).
2754	Commercial Printing, Gravure	Gravure printing.
2759	Commercial Printing, nec*	Miscellaneous commercial or job printing (includes miscellaneous general printing shops and shops specializing in printing newspapers and periodicals for others).
276	**Manifold Business Forms**	
2761	Manifold Business Forms	Designing and printing, by any process, of special forms for use in operation of a business, in single and multiple sets.
277	**Greeting Cards**	
2771	Greeting Cards	Publishing, printing by any process, or both, of greeting cards.
278	**Blankbooks, Looseleaf Binders, and Bookbinding and Related Work**	
2782	Blankbooks, Looseleaf Binders and Devices	Manufacture of blankbooks, looseleaf devices, and library binders. Ruling of paper.
2789	Bookbinding and Related Work	Edition, trade, job, and library bookbinding. Bronzing, gilding, and edging of books or paper; mounting of maps and samples; and other services related to bookbinding.
279	**Service Industries for the Printing Trade**	
2791	Typesetting	Typesetting for the trade, including advertisement typesetting.
2796	Platemaking and Related Services	Making plates for printing purposes, and related services. Includes making positives or negatives from which offset lithographic plates are made.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Research and Development, *Guides to Pollution Prevention: The Commercial Printing Industry*, EPA/625-7-90-008, September 1995 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

Print Publishing Guide, Adobe Systems Incorporated, 1993-1995, industry processes and technologies.

processes require production of a positive image from the transparencies, but some make use of negatives (on paper or film). In either case, the image is next transferred to a plate or cylinder. Lithography, the predominant printing process, uses printing plates to transfer ink to a rubber blanket, which in turn transfers ink to the paper or other substrate. Lithographic plates are typically thin aluminum sheets. Gravure processes print directly from etched copper cylinders, rather than plates and blankets. Printing processes thus share characteristics, including chemical usage, with both photographic and metal fabrication processes.

Printing processes involve metal compounds, light-sensitive salts, acids, and other chemicals. Photoprocessing chemicals used in printing may include benzene derivatives used as developers. Wastewaters from photoprocessing often contain metals—not only silver, but others such as mercury compounds, used to intensify image contrast during photographic development. Plate coatings include dyes, photopolymers, binders, resins, pigments, and acids. Platemaking and cleaning involve extensive use of solvents, including toluene. Inks also typically contain solvents such as xylenes, generating air emissions during printing and drying operations. Gravure printing, in particular, uses inks that dry by solvent evaporation. The predominant solvent in TRI reporting by the publishing and printing sector is toluene, which was the chemical reported by this sector in the largest amounts in almost all TRI categories.

Technological developments and environmental concerns have both influenced changes in the sector's environmental performance. Digital (electronic) processes for text and graphics can eliminate the need for photographic film. Water-based printing processes are becoming more common, and vegetable-based inks have been formulated to replace inks with high solvent or metal content. Solvents and waste ink are recycled; in some cases, solvents used in platecleaning can be re-used as ink thinners.

1996 TRI Data for Printing and Publishing

Table 8-1 summarizes TRI reporting by the printing and publishing sector for 1996. A total of 483 forms were submitted in publishing and printing industries. This total included eight Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The commercial gravure printing industry (SIC code 2754) submitted 172 forms, or 35.6% of the total number of forms submitted in this sector. The commercial lithographic printing industry (SIC code 2752) submitted 95 forms, 19.7% of the total. There were 71 forms (14.7%) that reported more than one SIC code within SIC code 27. Some facilities in this sector conduct business in distinct, but related, SIC codes. A commercial printer, for example, may perform both lithographic and gravure printing, classified in SIC codes 2752 and 2754, respectively. Such facilities may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Two industrial groups submitted most of the sector's forms and reported the bulk of the sector's releases and waste management. These were the commercial gravure printing industry (SIC code 2754) and the multiple-codes forms that reported more than one SIC code within SIC code 27 to describe their operations.

Commercial gravure printing (SIC code 2754) reported the largest amounts of releases and waste management in the printing and publishing sector for 1996, summarized in Table 8-1. The

Table 8-1. Summary of TRI Information by 4-digit SIC Code, 1996: Printing and Publishing, SIC Code 27

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
10	13	2721	Periodicals	1	1	0	15,429	0	15,429
14	14	2731	Book Publishing	3	3	3	0	0	0
6	7	2732	Book Printing	6	11	0	149,725	0	149,725
8	11	2741	Miscellaneous Publishing	1	1	0	18,669	0	18,669
3	3	2752	Commercial Printing, Lithographic	57	95	0	951,368	4,520	955,888
1	1	2754	Commercial Printing, Gravure	63	172	2	17,309,198	49,002	17,358,200
4	4	2759	Commercial Printing, nec*	36	51	0	821,554	13,870	835,424
12	9	2771	Greeting Cards	3	4	0	18	2,235	2,253
11	8	2782	Blankbooks & Looseleaf Binders	1	1	0	6,414	0	6,414
9	10	2789	Bookbinding & Related Work	1	2	0	18,270	0	18,270
13	12	2791	Typesetting	0	1	0	0	69	69
7	5	2796	Platemaking Services	39	53	2	110,657	14,596	125,253
2	2		Multiple within SIC Code 27	23	71	1	8,637,462	4,778	8,642,240
5	6		Invalid SIC Code within SIC Code 27	7	17	0	338,185	0	338,185
			Total for SIC Code 27	241	483	8	28,376,949	89,070	28,466,019

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category. There may be forms but no facilities in a single 4-digit SIC code because a facility reported different 4-digit SIC codes in SIC code 27 on its individual forms.
*nec: not elsewhere classified.

commercial gravure printing industry reported 17.4 million pounds of total on- and off-site releases, 61.0% of the sector's 28.5 million pounds of total releases. The commercial gravure printing industry reported 17.3 million pounds of on-site releases (also 61.0% of the sector's total of 28.4 million pounds) and 49,000 pounds of off-site releases (55.0% of the sector's total of 89,000 pounds.

The commercial gravure printing industry also reported 115.7 million pounds (50.2% of the sector's total) of other on-site waste management, 3.6 million pounds (44.9%) of transfers off-site for further waste management, and 136.1 million pounds (51.1%) of total production-related waste. The sector's totals in these categories were 230.4 million pounds, 7.9 million pounds, and 266.2 million pounds, respectively.

The multiple-codes group ranked second in the publishing and printing sector in all categories, except off-site releases. The multiple-codes forms reported 8.6 million pounds of total releases, nearly all of it as on-site releases. This amount represented 30.4% of the sector's on-site releases and total releases. Multiple-codes forms also reported 111.6 million pounds (48.4%) of other on-site waste management, 2.7 million pounds (33.8%) of transfers off-site for further waste management, and 122.9 million pounds (46.2%) of total production-related waste.

Platemaking services (SIC code 2796) reported the second-largest amount of off-site releases (transfers to disposal), with 15,000 pounds (16.4% of the sector's total). Miscellaneous commercial printing (SIC code 2759) reported the third-largest off-site releases, with 14,000 pounds (15.6%).

No other industry reported as much as 10% of the amount reported in any summary category presented in Table 8-1.

Multiple SIC Codes in SIC Code 27

Table 8-2 further examines reporting of multiple SIC codes within SIC code 27. Of the 71 forms that

Table 8-1. Summary of TRI Information by 4-digit SIC Code, 1996: Printing and Publishing, SIC Code 27, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-Related Waste Pounds
2721	Periodicals	0	0	0	0
2731	Book Publishing	0	0	0	0
2732	Book Printing	53,663	50,759	253,739	0
2741	Miscellaneous Publishing	0	0	18,669	0
2752	Commercial Printing, Lithographic	760,363	740,716	2,471,543	27
2754	Commercial Printing, Gravure	115,721,158	3,560,715	136,064,979	3,784
2759	Commercial Printing, nec*	993,590	267,472	2,116,847	1
2771	Greeting Cards	36,891	2,715	41,859	0
2782	Blankbooks & Looseleaf Binders	20,000	17,218	43,700	0
2789	Bookbinding & Related Work	1,320	4,919	24,590	0
2791	Typesetting	0	0	69	0
2796	Platemaking Services	1,072,023	579,666	1,734,863	0
	Multiple within SIC Code 27	111,616,665	2,680,356	122,920,147	2,175
	Invalid SIC Code within SIC Code 27	150,945	32,961	516,147	1,120
	Total for SIC Code 27	230,426,618	7,937,497	266,207,152	7,107

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category. There may be forms but no facilities in a single 4-digit SIC code because a facility reported different 4-digit SIC codes in SIC code 27 on its individual forms.
***nec:** not elsewhere classified.

Table 8-2. Multiple SIC Codes, 1996: Printing and Publishing, SIC Code 27

SIC Codes			Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2721	2752		2	0	30,963	250	31,213	21,637	1,505	55,053	0
2752	2754		59	1	8,388,067	4,528	8,392,595	111,434,028	2,626,319	122,432,858	2,175
2752	2754	2759	1	0	8,000	0	8,000	0	0	8,000	0
2752	2759		1	0	38,250	0	38,250	0	0	38,250	0
2752	2789		3	0	64,142	0	64,142	0	12,032	75,886	0
2752	2795		2	0	87,800	0	87,800	87,800	0	175,600	0
2754	2759		2	0	3,700	0	3,700	72,500	40,250	116,400	0
2759	2796		1	0	16,540	0	16,540	700	250	18,100	0
Total for SIC Code 27			71	1	8,637,462	4,778	8,642,240	111,616,665	2,680,356	122,920,147	2,175

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

reported multiple codes, 59 reported the combination of the two primary categories of commercial printing, lithographic (SIC code 2752) and gravure (SIC code 2754). This combination reported 95% or more of the releases and waste management amounts submitted on multiple-codes forms in SIC code 27, as shown in Table 8-2.

On- and Off-site Releases

Air emissions represented 99.6% (28.4 million pounds) of the printing and publishing sector's reported releases in 1996, as shown in Table 8-3 and Figure 8-1. Commercial gravure printing (SIC code 2754) reported 17.3 million pounds of air emissions (61.0% of all reported releases to air in the sector), and multiple-codes forms reported 8.6

Table 8-3. TRI On-site and Off-site Releases, 1996: Printing and Publishing, SIC Code 27 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2754	Commercial Printing, Gravure	17,307,788	1,410	0	0	0	0	17,309,198	49,002	17,358,200
	Multiple within SIC Code 27	8,637,212	250	0	0	0	0	8,637,462	4,778	8,642,240
2752	Commercial Printing, Lithographic	951,368	0	0	0	0	0	951,368	4,520	955,888
2759	Commercial Printing, nec*	821,304	0	0	0	0	250	821,554	13,870	835,424
	Invalid SIC Code within SIC Code 27	338,175	10	0	0	0	0	338,185	0	338,185
2732	Book Printing	149,725	0	0	0	0	0	149,725	0	149,725
2796	Platemaking Services	97,257	0	0	0	0	13,400	110,657	14,596	125,253
2741	Miscellaneous Publishing	18,669	0	0	0	0	0	18,669	0	18,669
2789	Bookbinding & Related Work	18,270	0	0	0	0	0	18,270	0	18,270
2721	Periodicals	15,429	0	0	0	0	0	15,429	0	15,429
2782	Blankbooks & Looseleaf Binders	6,414	0	0	0	0	0	6,414	0	6,414
2771	Greeting Cards	18	0	0	0	0	0	18	2,235	2,253
2791	Typesetting	0	0	0	0	0	0	0	69	69
2731	Book Publishing	0	0	0	0	0	0	0	0	0
	Total for SIC Code 27	28,361,629	1,670	0	0	0	13,650	28,376,949	89,070	28,466,019

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
*nec: not elsewhere classified.

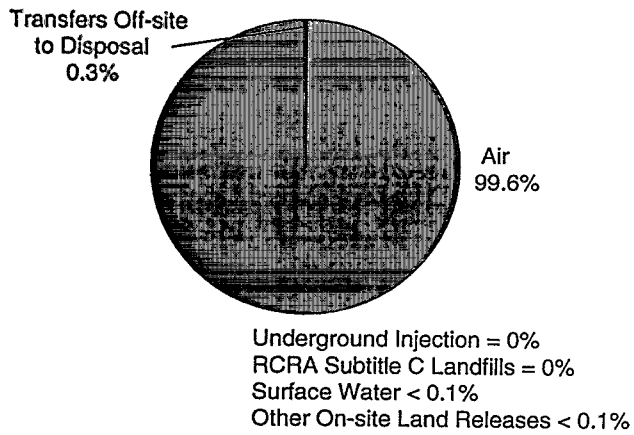


Figure 8-1. Distribution of TRI On-site and Off-site Releases, 1996: Printing and Publishing (SIC Code 27)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

million pounds (30.5%). Commercial lithographic printers (SIC code 2752) reported the third-largest air emissions (951,000 pounds, or 3.4%).

As noted, the printing and publishing sector reported larger amounts for toluene than for any other chemical in nearly all TRI categories. The two industrial groups with the largest releases—commercial gravure printing (SIC code 2754) and multiple-codes forms—reported toluene air emissions of 15.0 million pounds and 7.7 million pounds, respectively.

The printing and publishing sector reported off-site releases (transfers to disposal) of 89,000 pounds. As noted earlier, the commercial gravure printing industry (SIC code 2754) reported 49,000 pounds (55.0% of this total).

Figure 8-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

The printing and publishing sector reported 168.5 million pounds of on-site recycling, nearly three-quarters (73.1%) of the sector's reported other on-site waste management in 1996. This included 105.8 million pounds of toluene. The second-largest waste management option in this sector's reporting was on-site treatment (61.7 million pounds, or 26.8% of total other on-site waste management). The sector reported on-site treatment of 55.9 million pounds of toluene. The sector reported relatively little on-site energy recovery (204,000 pounds). Table 8-4 and Figure 8-3 present other on-site waste management data reported by the printing and publishing sector for 1996.

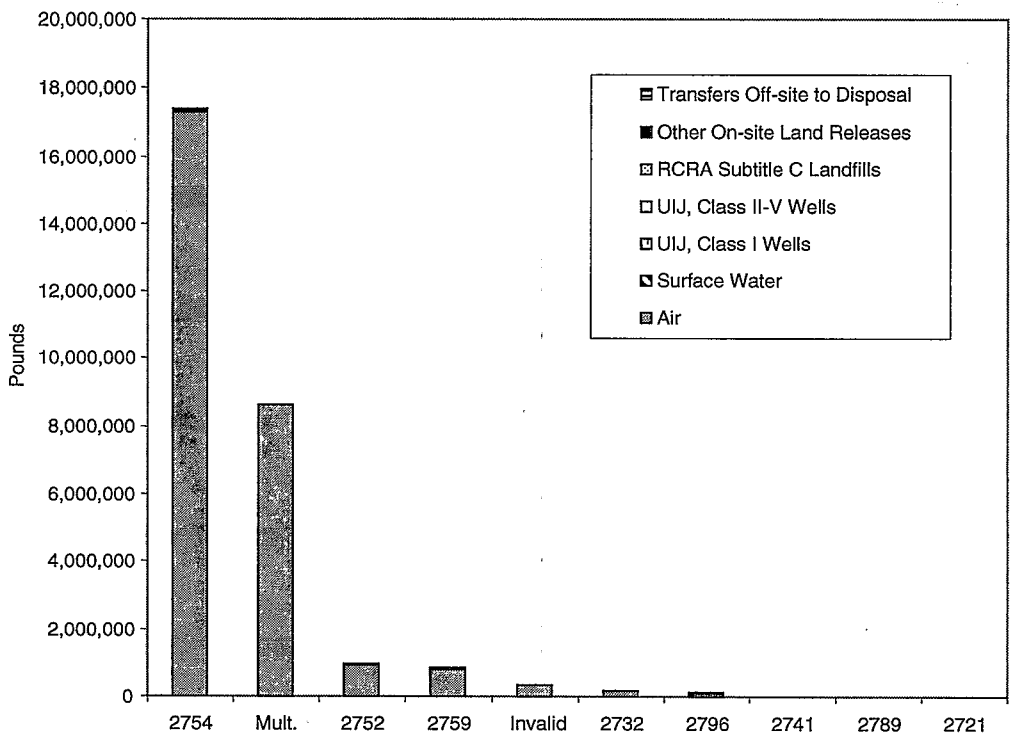


Figure 8-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Printing and Publishing (SIC Code 27)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "27" that do not exist in the current Standard Industrial Classification code system

Table 8-4. TRI Other On-site Waste Management, 1996: Printing and Publishing, SIC Code 27 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2754	Commercial Printing, Gravure	110,160,354	29,900	5,530,904	115,721,158
	Multiple within SIC Code 27	57,629,847	72,500	53,914,318	111,616,665
2796	Platemaking Services	330,446	0	741,577	1,072,023
2759	Commercial Printing, nec*	349,485	54,286	589,819	993,590
2752	Commercial Printing, Lithographic	78	46,850	713,435	760,363
	Invalid SIC Code within SIC Code 27	10,000	0	140,945	150,945
2732	Book Printing	0	0	53,663	53,663
2771	Greeting Cards	0	0	36,891	36,891
2782	Blankbooks & Looseleaf Binders	20,000	0	0	20,000
2789	Bookbinding & Related Work	1,200	0	120	1,320
2721	Periodicals	0	0	0	0
2731	Book Publishing	0	0	0	0
2741	Miscellaneous Publishing	0	0	0	0
2791	Typesetting	0	0	0	0
	Total for SIC Code 27	168,501,410	203,536	61,721,672	230,426,618

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

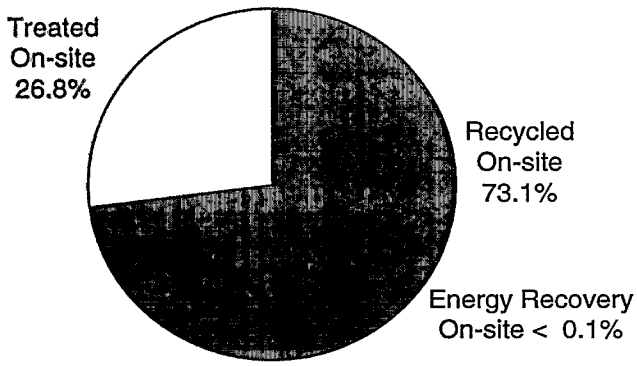


Figure 8-3. Distribution of TRI Other On-site Waste Management, 1996: Printing and Publishing (SIC Code 27)

Note: Data from Section 8 of Form R.

The commercial gravure printing industry (SIC code 2754) reported 110.2 million pounds of on-site recycling, 65.4% of all on-site recycling reported in this sector in 1996. The multiple-codes group reported 57.6 million pounds (34.2%) of on-site recycling. Three commercial gravure printing facilities and two multiple-codes facilities reported on-site recycling of more than 14 million pounds each of toluene. (Both multiple-codes facilities reported SIC codes 2752 and 2754.)

Multiple-codes forms also reported most of the sector's on-site treatment: 53.9 million pounds, or 87.4% of the sector's total. One commercial printer that reported in both the lithographic and gravure industries (SIC codes 2752 and 2754, respectively) reported on-site treatment of 53.2 million pounds of toluene. Commercial gravure printing (SIC code 2754) reported 5.5 million pounds in on-site treatment, or 9.0% of the sector's total.

Figure 8-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

As shown in Table 8-5, the printing and publishing sector reported nearly equal amounts of transfers off-site to recycling (3.64 million pounds) and to energy recovery (3.67 million pounds) in 1996. These transfer types accounted for about 46% each of the sector's total transfers off-site for further waste management. Figure 8-5 illustrates the percentage distribution of transfer types reported in this sector in 1996.

Forms reporting multiple SIC codes in SIC code 27 reported 2.3 million pounds of transfers to recycling, the largest amount of off-site transfers to recycling in the sector. This amount was 64.5% of the sector's total for transfers to recycling. Almost all of this was recycling of toluene (2.2 million pounds). One facility that reported commercial lithographic and gravure printing (SIC codes 2752 and 2754) reported transferring 2.0 million pounds of toluene off-site to recycling.

The commercial gravure printing industry (SIC code 2754) reported 2.6 million pounds of transfers to energy recovery, the sector's largest amount in that category. This was 71.5% of the sector's total for transfers to energy recovery. The chemical with the largest such transfers was glycol ethers with 549,000 pounds, including 532,000 pounds reported by one commercial gravure printer (SIC code 2754).

Figure 8-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

1996 TRI Data by State for Printing and Publishing

Table 8-6 presents 1996 summary TRI data by state for the printing and publishing sector. Facilities in the printing and publishing sector are found throughout the United States. Five percent or more of the 1996 TRI forms filed in this sector were submitted in each of 10 states. There were 24 to 35 forms submitted in California, Illinois, Indiana, Missouri, New Jersey, Ohio, Pennsylvania, Tennessee, Virginia, and Wisconsin.

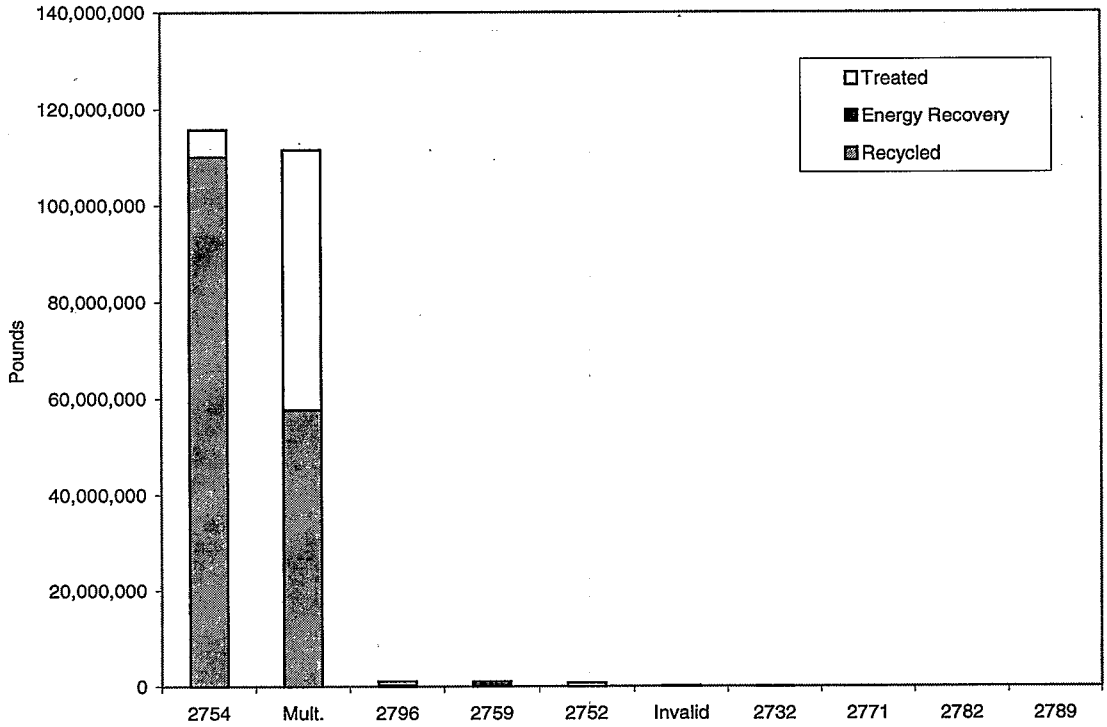


Figure 8-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Printing and Publishing (SIC Code 27)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC Code 27 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "27" that do not exist in the current Standard Industrial Classification code system.

Table 8-5. TRI Transfers Off-site for Further Waste Management, 1996: Printing and Publishing, SIC Code 27 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
2754	Commercial Printing, Gravure	766,697	2,624,196	122,985	46,837	0	3,560,715
	Multiple within SIC Code 27	2,349,432	278,596	43,862	8,466	0	2,680,356
2752	Commercial Printing, Lithographic	62,607	572,407	79,513	26,189	0	740,716
2796	Platemaking Services	345,263	73,139	51,573	109,691	0	579,666
2759	Commercial Printing, nec*	86,329	106,492	70,114	4,537	0	267,472
2732	Book Printing	14,312	0	10,130	26,317	0	50,759
	Invalid SIC Code within SIC Code 27	597	15,539	0	16,825	0	32,961
2782	Blankbooks & Looseleaf Binders	17,218	0	0	0	0	17,218
2789	Bookbinding & Related Work	0	0	2,373	2,546	0	4,919
2771	Greeting Cards	0	0	1,712	1,003	0	2,715
2721	Periodicals	0	0	0	0	0	0
2731	Book Publishing	0	0	0	0	0	0
2741	Miscellaneous Publishing	0	0	0	0	0	0
2791	Typesetting	0	0	0	0	0	0
	Total for SIC Code 27	3,642,455	3,670,369	382,262	242,411	0	7,937,497

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

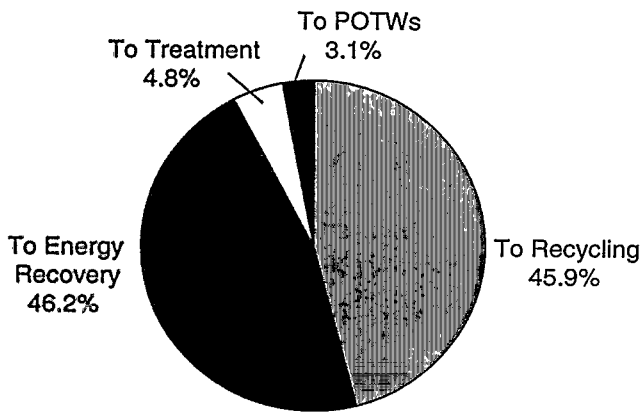


Figure 8-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Printing and Publishing (SIC Code 27)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

Tennessee was the state with the sector's largest reporting of on-site releases, total on- and off-site releases, and transfers off-site for further waste management. In Tennessee, the sector reported 5.9 million pounds of on-site releases, 20.9% of the sector's total of 28.4 million pounds of on-site releases. Tennessee's total for on- and off-site releases was also 5.9 million pounds, or 20.9% of the sector's total of 28.5 million pounds. Virginia ranked second in both categories with 3.8 million pounds, approximately 13% of the sector's reported amounts for on-site releases and for total on- and off-site releases. Illinois ranked third in both categories with 2.8 million pounds, 10.0% of the sector's totals.

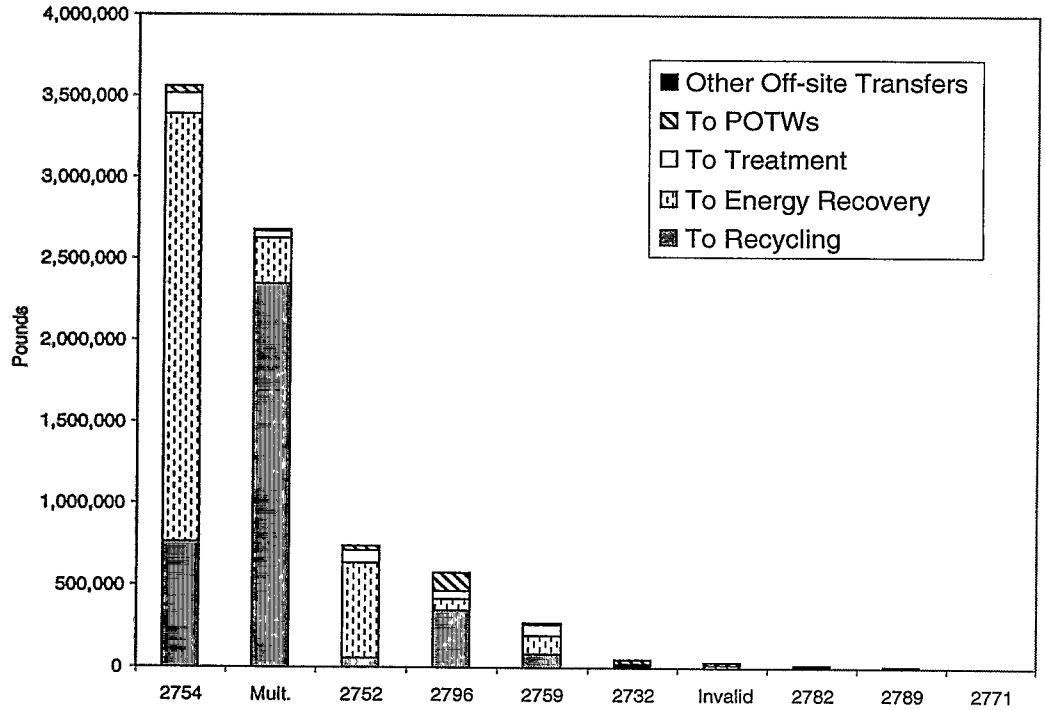


Figure 8-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Printing and Publishing (SIC Code 27)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "27" that do not exist in the current Standard Industrial Classification code system.

Table 8-6. Summary of TRI Information by State, 1996: Printing and Publishing, SIC Code 27

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	3	3	0	85,668	0	85,668	0	4,404	90,072	0
Arizona	2	5	0	115,695	18	115,713	0	2,621	118,302	0
Arkansas	1	2	0	0	2,235	2,235	10,395	2,715	15,345	0
California	12	25	0	974,455	0	974,455	8,263,146	126,927	9,360,763	1,964
Colorado	1	1	0	12,834	0	12,834	0	2,970	15,804	0
Connecticut	3	6	0	68,315	0	68,315	42,539	108,635	237,655	0
Florida	4	7	0	67,248	0	67,248	341,623	2,214	414,737	0
Georgia	8	14	0	838,894	0	838,894	26,151,838	267,381	26,605,627	300
Illinois	15	33	1	2,828,771	4,544	2,833,315	14,259,008	139,131	18,415,339	0
Indiana	10	30	3	1,735,360	0	1,735,360	1,567,684	1,102,580	4,403,255	3,400
Iowa	2	6	0	580,388	0	580,388	29,264	30,044	601,914	0
Kansas	1	2	0	40,705	0	40,705	0	7,798	56,500	0
Kentucky	7	14	0	1,139,066	4,950	1,144,016	20,067,578	314,570	21,565,721	0
Louisiana	1	1	0	878	0	878	19,455	504	20,837	0
Maine	1	3	0	11,820	0	11,820	0	660	17,461	0
Maryland	2	5	0	573,418	0	573,418	2,231,427	13,040	2,817,731	0
Massachusetts	4	6	0	32,949	820	33,769	396,144	373,650	955,709	0
Michigan	7	11	0	67,633	5	67,638	167,186	70,109	312,525	0
Minnesota	7	16	0	247,033	2,200	249,233	50,392	44,360	343,435	0
Mississippi	1	2	0	1,384,320	0	1,384,320	18,732,661	218,943	19,136,180	0
Missouri	10	26	0	892,778	20,848	913,626	100,413	637,315	1,645,585	1,120
Nebraska	1	2	0	12,002	0	12,002	0	5,795	18,285	0
Nevada	1	5	0	298,976	0	298,976	12,326	17,264	327,698	0
New Hampshire	2	2	0	11,696	0	11,696	30,340	2,535	47,107	0
New Jersey	12	24	1	186,137	500	186,637	851,403	162,088	1,128,437	0
New York	11	15	0	451,662	12,290	463,952	4,621,528	95,381	5,182,395	0
North Carolina	12	19	0	966,487	5,320	971,807	200,590	336,518	1,521,704	1
Ohio	21	31	1	570,395	1,601	571,996	600,208	207,915	1,485,125	0
Oklahoma	1	1	0	6,390	0	6,390	0	10,330	16,720	0
Oregon	2	2	0	15,552	0	15,552	5,600	9,629	33,364	0
Pennsylvania	11	25	0	1,971,020	1,750	1,972,770	13,377,764	373,535	15,723,767	295
Rhode Island	1	3	0	708,150	795	708,945	5,657,980	29,514	6,396,249	0
South Carolina	5	12	0	434,216	20,000	454,216	137,800	107,909	677,794	0
Tennessee	15	35	0	5,935,685	9,141	5,944,826	37,850,396	2,352,935	46,141,563	0
Texas	9	17	1	234,735	53	234,788	2,617,728	61,090	2,918,564	0
Utah	1	1	0	250	0	250	0	57,208	57,297	0
Virginia	14	33	0	3,788,531	2,000	3,790,531	17,868,039	338,814	22,011,551	27
Washington	1	2	0	0	0	0	144,586	13,549	173,225	0
West Virginia	1	1	0	35,288	0	35,288	0	0	35,288	0
Wisconsin	18	35	1	1,051,549	0	1,051,549	54,019,577	284,917	55,160,522	0
Total for SIC Code 27	241	483	8	28,376,949	89,070	28,466,019	230,426,618	7,937,497	266,207,152	7,107

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Missouri ranked first for off-site releases with 21,000 pounds of the printing and publishing sector's total of 89,000 pounds. South Carolina was second with 20,000 pounds, and New York was third with 12,000 pounds. These amounts represented 23.4%, 22.5%, and 13.8%, respectively of the sector's total off-site releases.

Wisconsin ranked first for other on-site waste management, with 54.0 million pounds, and first for total production-related waste, with 55.2 million pounds. These amounts represented 23.4% and 20.7%, respectively, of the sector's totals in those categories. Tennessee ranked second for other on-site waste management (37.9 million pounds, or 16.4%) and second for total production-related waste (46.1 million pounds, or 17.3%). Georgia

ranked third in both categories, with 26.2 million pounds (11.3%) of other on-site waste management and 26.6 million pounds (10.0%) of total production-related waste.

Tennessee had the sector's largest reported transfers off-site for further waste management, 2.4 million pounds, or 29.6% of the sector's total transfers off-site for further waste management. Ranking second, Indiana reported 1.1 million pounds (13.9%). Missouri ranked third with 637,000 pounds (8.0%).

Map 8-1 illustrates the geographic distribution of total on- and off-site releases in the printing and publishing sector.

1996 TRI Data by Chemical for Printing and Publishing

The top 15 chemicals for total on- and off-site releases in the printing and publishing sector accounted for more than 99% of the sector's air emissions, on-site releases, and total releases. The sector reported 28.2 million pounds of releases, almost entirely as air emissions, as shown in Table 8-7. Off-site releases (transfers to disposal) of these chemicals totaled 29,000 pounds, 32.3% of the sector's off-site releases.

Toluene was reported in the largest amounts for both air emissions (23.1 million pounds) and transfers to disposal (18,000 pounds). Toluene ranked first among all chemicals for total on- and off-site releases reported in the publishing and printing sector, with a total of 23.1 million pounds. As noted, commercial gravure printing (SIC code 2754) reported 15.0 million pounds of air emissions of toluene, and multiple-codes forms reported 7.7 million pounds of air emissions of toluene. This solvent is a constituent of inks used in gravure printing and is used in cleaning printing plates, cylinders, and other equipment.

As shown in Table 8-7, releases of other chemicals reported in the printing and publishing sector were considerably smaller than those for toluene. Xylenes ranked second with 1.3 million pounds of total releases, and glycol ethers ranked third with 1.2 million pounds. For xylenes, the multiple-codes group reported 652,000 pounds of total releases, and commercial gravure printing (SIC code 2754) reported 527,000 pounds. Three industries reported releasing more than 275,000 pounds each of glycol ethers: commercial gravure printing (SIC code 2754, 376,000 pounds), commercial lithographic printing (SIC code 2752, 332,000 pounds), and miscellaneous commercial printing (SIC code 2759, 277,000 pounds).

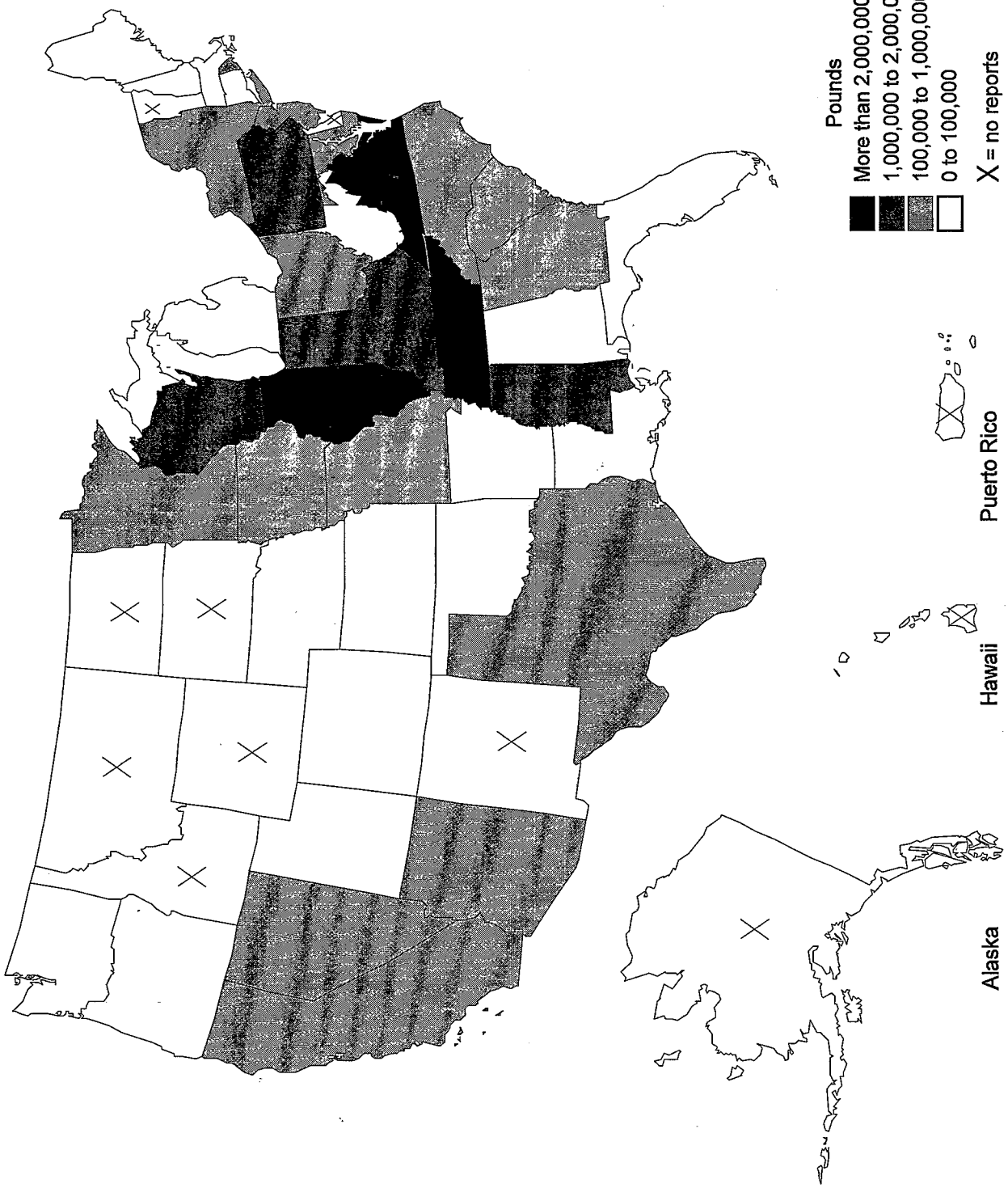
OSHA Carcinogens

The printing and publishing sector reported 273,000 pounds of on- and off-site releases of chemicals designated as OSHA carcinogens, as shown in Table 8-8. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) This represented 1.0% of the sector's total releases for all chemicals.

Two of the 15 chemicals with the largest total releases in this sector were also OSHA carcinogens: dichloromethane and tetrachloroethylene. The sector reported releases of 177,000 pounds of dichloromethane and 48,000 pounds of tetrachloroethylene, as shown in Table 8-7. Releases of more than 10,000 pounds each were also reported for two other OSHA carcinogens: trichloroethylene (33,000 pounds) and di-(2-ethylhexyl) phthalate (12,000 pounds).

The commercial gravure printing industry (SIC code 2754) reported the largest total releases (153,000 pounds) of OSHA carcinogens in the printing and publishing sector. One commercial gravure printer reported all of the sector's releases

Map 8-1. Total On- and Off-site Releases, 1996: Printing and Publishing, SIC Code 27



Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

(141,000 pounds) of dichloromethane. The gravure printing industry also reported the sector's only off-site releases (transfers to disposal) of the OSHA carcinogens, 12,000 pounds of di-(2-ethylhexyl) phthalate.

Platemaking services (SIC code 2796) ranked second for total releases of these chemicals, with 75,000 pounds, including 13,000 pounds of on-site land releases of trichloroethylene. Commercial lithographic printing (SIC code 2752) reported the third-largest total releases, with 35,000 pounds.

Figure 8-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

Table 8-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Printing and Publishing, SIC Code 27 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
108-88-3	Toluene	23,119,979	290	0	0	0	0	23,120,269	17,521	23,137,790
1330-20-7	Xylene (mixed isomers)	1,332,661	396	0	0	0	0	1,333,057	20	1,333,077
–	Glycol ethers	1,185,026	260	0	0	0	0	1,185,286	1,830	1,187,116
78-93-3	Methyl ethyl ketone	885,640	0	0	0	0	0	885,640	500	886,140
67-56-1	Methanol	437,219	0	0	0	0	0	437,219	1,500	438,719
108-10-1	Methyl isobutyl ketone	330,385	0	0	0	0	0	330,385	250	330,635
67-63-0	Isopropyl alcohol (manufacturing)	305,058	0	0	0	0	0	305,058	0	305,058
75-09-2	Dichloromethane	176,524	0	0	0	0	0	176,524	0	176,524
110-54-3	n-Hexane	73,748	0	0	0	0	0	73,748	4,960	78,708
95-63-6	1,2,4-Trimethylbenzene	74,844	0	0	0	0	0	74,844	2,200	77,044
107-21-1	Ethylene glycol	72,544	0	0	0	0	0	72,544	0	72,544
7664-41-7	Ammonia	63,887	0	0	0	0	0	63,887	0	63,887
127-18-4	Tetrachloroethylene	48,402	0	0	0	0	0	48,402	0	48,402
872-50-4	N-Methyl-2-pyrrolidone	39,223	0	0	0	0	0	39,223	0	39,223
71-55-6	1,1,1-Trichloroethane	35,219	0	0	0	0	0	35,219	0	35,219
	Subtotal	28,180,359	946	0	0	0	0	28,181,305	28,781	28,210,086
	Total for SIC Code 27	28,361,629	1,670	0	0	0	13,650	28,376,949	89,070	28,466,019

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.

Table 8-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Printing and Publishing, SIC Code 27 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2754	Commercial Printing, Gravure	140,762	0	0	0	0	0	140,762	12,248	153,010
2796	Platemaking Services	61,302	0	0	0	0	13,400	74,702	0	74,702
2752	Commercial Printing, Lithographic	35,362	0	0	0	0	0	35,362	0	35,362
2782	Blankbooks & Looseleaf Binders	6,414	0	0	0	0	0	6,414	0	6,414
	Invalid SIC Code within SIC Code 27	1,900	0	0	0	0	0	1,900	0	1,900
2759	Commercial Printing, nec*	500	0	0	0	0	250	750	0	750
2732	Book Printing	650	0	0	0	0	0	650	0	650
	Subtotal	246,890	0	0	0	0	13,650	260,540	12,248	272,788
	Total for SIC Code 27	28,361,629	1,670	0	0	0	13,650	28,376,949	89,070	28,466,019

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.
*nec: not elsewhere classified.

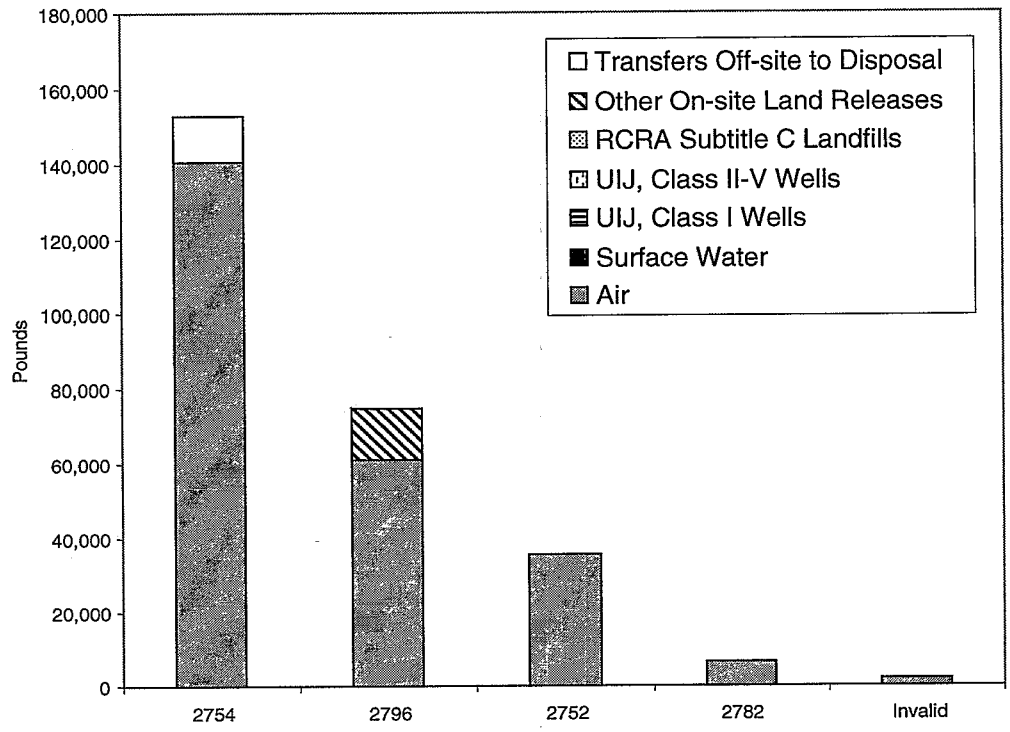


Figure 8-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Printing and Publishing (SIC Code 27)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Invalid SIC codes are codes beginning "27" that do not exist in the current Standard Industrial Classification code system.

1996 TRI Chemicals in Waste for Printing and Publishing

The printing and publishing sector reported total production-related waste of 266.2 million pounds in 1996, as shown in Table 8-9. On-site recycling amounted to nearly two-thirds (63.3%) of this total, with 168.5 million pounds. On-site treatment was the second-largest waste management option, with 61.7 million pounds (23.2%). Quantities released on- and off-site totaled 26.4 million pounds (9.9% of total production-related waste). Each of the other types of waste management accounted for 2% or less of the sector's production-related waste. Figure 8-8 illustrates the distribution of waste management methods in the sector's 1996 reporting of production-related waste.

The commercial gravure printing industry (SIC code 2754) reported approximately two-thirds of the sector's on-site recycling (110.2 million pounds or 65.4%) and quantities released (16.5 million pounds, or 62.4%). Forms reporting multiple SIC codes in SIC code 27 reported most of the sector's on-site treatment (53.9 million pounds, or 87.4%). The multiple-codes forms also reported the second-largest amounts for both on-site recycling (57.6 million pounds, or 34.2%) and quantities released (7.4 million pounds, or 28.2%). Together, the commercial gravure printing industry and the multiple-codes group accounted for 97.3% of the sector's total production-related waste.

Table 8-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Printing and Publishing, SIC Code 27 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2754	Commercial Printing, Gravure	110,160,354	29,900	5,530,904	960,017	2,734,592	174,225	16,474,987	136,064,979	3,784
	Multiple within SIC Code 27	57,629,847	72,500	53,914,318	3,481,966	301,329	76,498	7,443,689	122,920,147	2,175
2752	Commercial Printing, Lithographic	78	46,850	713,435	62,607	577,814	107,028	963,731	2,471,543	27
2759	Commercial Printing, nec*	349,485	54,286	589,819	87,714	128,957	76,220	830,366	2,116,847	1
2796	Platemaking Services	330,446	0	741,577	320,132	65,723	138,954	138,031	1,734,863	0
	Invalid SIC Code within SIC Code 27	10,000	0	140,945	511	15,539	4,065	345,087	516,147	1,120
2732	Book Printing	0	0	53,663	14,312	0	36,339	149,425	253,739	0
2782	Blankbooks & Looseleaf Binders	20,000	0	0	17,200	0	0	6,500	43,700	0
2771	Greeting Cards	0	0	36,891	0	0	2,715	2,253	41,859	0
2789	Bookbinding & Related Work	1,200	0	120	0	0	5,000	18,270	24,590	0
2741	Miscellaneous Publishing	0	0	0	0	0	0	18,669	18,669	0
2791	Typesetting	0	0	0	0	0	0	69	69	0
2721	Periodicals	0	0	0	0	0	0	0	0	0
2731	Book Publishing	0	0	0	0	0	0	0	0	0
	Total for SIC Code 27	168,501,410	203,536	61,721,672	4,944,459	3,823,954	621,044	26,391,077	266,207,152	7,107

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
*nec: not elsewhere classified.

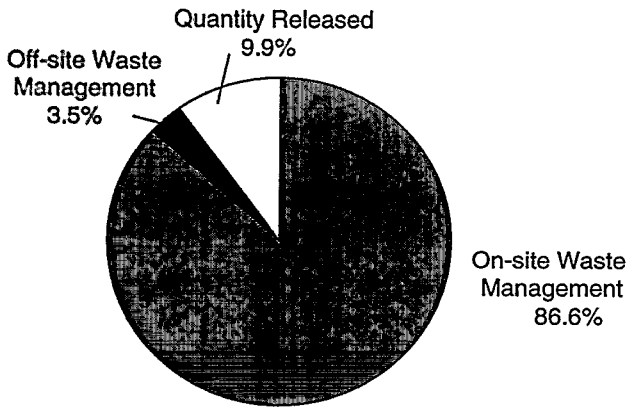


Figure 8-8. Distribution of TRI Production-related Waste, 1996: Printing and Publishing (SIC Code 27)

Note: Data from Section 8 of Form R.

Distribution of production-related waste for the top industries in the sector appears in Figure 8-9.

Projected Quantities of TRI Chemicals in Waste

Table 8-10 summarizes the printing and publishing sector's projections for on- and off-site waste management through 1998. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) From 1996 to 1998, the printing and publishing sector projected a 2.7% increase of 7.2 million pounds in total production-related waste, from 266.2 million pounds to 273.4 million pounds. The largest contributing factor in this overall projected increase was on-site recycling, projected to increase from 168.5 million pounds to 182.8 million pound (an 8.5% increase). This projected increase was partly offset by a projected reduction in on-site treatment from 61.7 million pounds to 56.3 million pounds (an 8.8% decrease).

Reductions were also projected for off-site recycling (from 4.9 million pounds in 1996 to 4.6 million pounds in 1998) and off-site energy recovery (from 3.8 million pounds to 3.0 million pounds). Quantities released on- and off-site were expected to decrease from 26.4 million pounds to 25.7 million pounds.

The sector projected increases in on-site energy recovery (from 204,000 pounds to 225,000 pounds) and off-site treatment (from 621,000 pounds to 705,000 pounds).

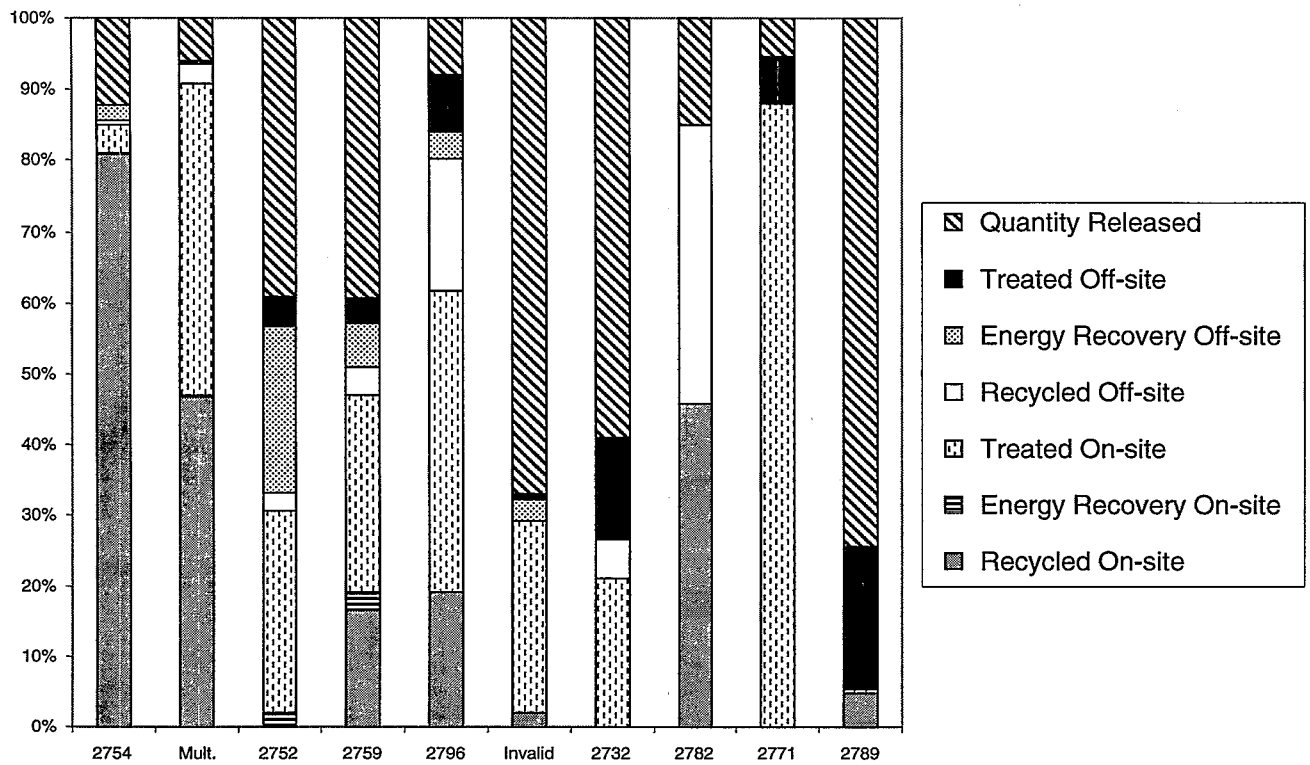


Figure 8-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Printing and Publishing (SIC Code 27)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC Code within SIC code 27 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "27" that do not exist in the current Standard Industrial Classified code system.

Figure 8-10 illustrates the projected changes in on-site waste management, off-site waste management, quantities released, and total production-related waste.

These changes suggest only modest improvement in the sector's management of TRI chemicals in waste, as measured by the waste management hierarchy, explained in Chapter 1. Although on-site treatment was projected to decrease by nearly 5 million pounds, on-site recycling was projected to increase nearly three times that amount. Despite this apparent shift from treatment to recycling, the printing and publishing sector's projected increase represents an additional volume of production-related waste.

Source Reduction Activity

As shown in Table 8-11, one-third (34.4%) of the forms submitted in printing and publishing indicated one or more source reduction activities underway in 1996. The three commercial printing industries submitted the majority of these (73.5% of all forms indicating source reduction activity). The largest number of forms (73 forms) was submitted by the commercial gravure printing industry (SIC code 2754). The miscellaneous commercial printing (SIC code 2759) submitted 26 forms indicating source reduction activity and the commercial lithographic printing (SIC code 2752) submitted 23 such forms. Forms indicating source reduction activity represented 42.4% of all forms submitted

by commercial gravure printing and 51.0% of those submitted by miscellaneous commercial printing, but 24.2% of those submitted by commercial lithographic printing.

Seventy forms indicated improvements in operating practices, the source reduction activity most often reported. Raw material modifications (67 forms) and process modifications (53 forms) were the next most frequently reported activities.

Table 8-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Printing and Publishing, SIC Code 27

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	168,501,410	63.3	177,704,130	65.3	182,794,584	66.9
Energy Recovery On-site	203,536	0.1	224,445	0.1	224,975	0.1
Treated On-site	61,721,672	23.2	58,811,928	21.6	56,263,486	20.6
Off-site Waste Management						
Recycled Off-site	4,944,459	1.9	4,618,227	1.7	4,612,485	1.7
Energy Recovery Off-site	3,823,954	1.4	3,421,044	1.3	3,043,113	1.1
Treated Off-site	621,044	0.2	564,707	0.2	705,371	0.3
Quantity Released On- and Off-site	26,391,077	9.9	26,642,306	9.8	25,741,991	9.4
Total Production-related Waste for SIC Code 27	266,207,152	100.0	271,986,787	100.0	273,386,005	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	5.5	2.9	8.5
Energy Recovery On-site	10.3	0.2	10.5
Treated On-site	-4.7	-4.3	-8.8
Off-site Waste Management			
Recycled Off-site	-6.6	-0.1	-6.7
Energy Recovery Off-site	-10.5	-11.0	-20.4
Treated Off-site	-9.1	24.9	13.6
Quantity Released On- and Off-site	1.0	-3.4	-2.5
Total Production-related Waste for SIC Code 27	2.2	0.5	2.7

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

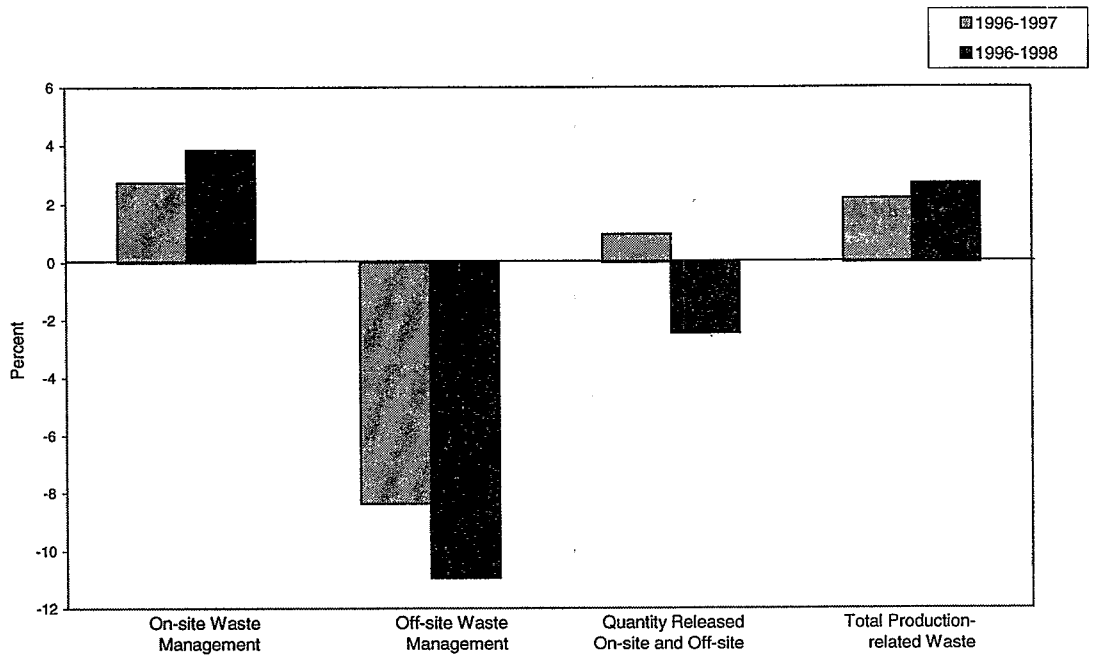


Figure 8-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Printing and Publishing (SIC Code 27)

Note: Current year and projected year amount are all taken from Section 8 of Form R for 1996.

Table 8-11. Number of Forms Reporting Source Reduction Activity, 1996: Printing and Publishing, SIC Code 27

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifi-cations Number	Process Modifi-cations Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifi-cations Number
2721	Periodicals	1	0	0.0	0	0	0	0	0	0	0	0
2731	Book Publishing	3	0	0.0	0	0	0	0	0	0	0	0
2732	Book Printing	11	3	27.3	0	0	0	1	2	0	0	0
2741	Miscellaneous Publishing	1	0	0.0	0	0	0	0	0	0	0	0
2752	Commercial Printing, Lithographic	95	23	24.2	8	0	1	7	6	3	0	3
2754	Commercial Printing, Gravure	172	73	42.4	34	3	11	36	25	6	3	4
2759	Commercial Printing, nec*	51	26	51.0	9	1	1	12	7	2	1	1
2771	Greeting Cards	4	1	25.0	0	0	0	0	1	0	0	0
2782	Blankbooks & Looseleaf Binders	1	0	0.0	0	0	0	0	0	0	0	0
2789	Bookbinding & Related Work	2	1	50.0	0	0	0	0	1	0	0	0
2791	Typesetting	1	1	100.0	1	0	0	0	1	0	0	0
2796	Platemaking Services	53	10	18.9	4	1	0	2	3	0	1	1
	Multiple within SIC Code 27	71	24	33.8	14	3	2	6	6	1	0	2
	Invalid SIC Code within SIC Code 27	17	4	23.5	0	0	0	3	1	0	2	0
	Total for SIC Code 27	483	166	34.4	70	8	15	67	53	12	7	11

Note: Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Year-to-Year Comparisons for Printing and Publishing

1995-1996 TRI Data for Printing and Publishing

The number of TRI forms submitted in the printing and publishing sector decreased from 538 in 1995 to 483 in 1996, as shown in Table 8-12. Form As decreased from 12 to eight. (The Form A certification statement is explained in Chapter 1.)

On- and Off-site Releases

From 1995 to 1996, total on- and off-site releases reported in the printing and publishing sector decreased from 31.2 million pounds to 28.5 million pounds, an 8.6% reduction. This resulted primarily from a 4.2 million-pound reduction in fugitive air emissions (from 18.0 million pounds in 1995 to 13.8 million pounds in 1996), partly offset by a 1.5 million-pound increase in point-source air emissions (from 13.1 million pounds to 14.6 million pounds). Table 8-12 presents the sector's reporting of releases in 1995 and 1996.

For other types of releases—surface water discharges, on-site land releases, and off-site releases (transfers to disposal)—the change from 1995 to 1996 was less than 50,000 pounds for each release type.

Figure 8-11 illustrates the 1995-1996 percentage change in releases for the printing and publishing sector.

Other On-site Waste Management

The printing and publishing sector reported reductions in all three methods of on-site waste management from 1995 to 1996. Total other on-site waste management decreased from 255.1 million pounds to 230.4 million pounds, a 9.7% reduction. The largest component of this change was on-site recycling, which decreased from 187.7 million pounds to 168.5 million pounds (a 10.2% reduction). On-site treatment decreased from 67.2 million pounds to 61.7 million pounds (8.1%). Energy recovery, the on-site waste management type reported in the smallest amounts in this sector, decreased from 278,000 pounds to 204,000 pounds (26.7%).

Table 8-12 presents 1995-1996 on-site waste management data for the printing and publishing sector.

Transfers Off-site for Further Waste Management

As shown in Table 8-12, the printing and publishing sector also reported reductions in all types of transfers off-site for further waste management from 1995 to 1996. Transfers off-site for further waste management totaled 10.1 million pounds in 1995 and 7.9 million pounds in 1996, a 21.1% reduction. The transfer type with the largest reduction, in both pounds and percent, was recycling. Transfers to recycling decreased from 5.6 million pounds to 3.6 million pounds, a 34.7% decrease. Other transfer types decreased by less than 125,000 pounds each.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

Table 8-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Printing and Publishing, SIC Code 27

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	275	241	-12.4
Total Forms	538	483	-10.2
Form Rs	526	475	-9.7
Form As	12	8	-33.3
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	31,083,334	28,361,629	-8.8
Fugitive Air	17,975,664	13,782,537	-23.3
Point Source Air	13,107,670	14,579,092	11.2
Surface Water Discharges	14,372	1,670	-88.4
Underground Injection	0	0	--
On-site Land Releases	4,600	13,650	196.7
Total On-site Releases	31,102,306	28,376,949	-8.8
Off-site Releases			
Transfers Off-site to Disposal	54,025	89,070	64.9
Total On- and Off-site Releases	31,156,331	28,466,019	-8.6
Other On-site Waste Management			
Recycled On-site	187,685,423	168,501,410	-10.2
Energy Recovery On-site	277,629	203,536	-26.7
Treated On-site	67,163,824	61,721,672	-8.1
Total Other On-site Waste Management	255,126,876	230,426,618	-9.7
Transfers Off-site for Further Waste Management			
Transfers to Recycling	5,578,564	3,642,455	-34.7
Transfers to Energy Recovery	3,791,308	3,670,369	-3.2
Transfers to Treatment	426,755	382,262	-10.4
Transfers to POTWs	261,638	242,411	-7.3
Other Off-site Transfers	3,866	0	-100.0
Total Transfers Off-site for Further Waste Management	10,062,131	7,937,497	-21.1

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

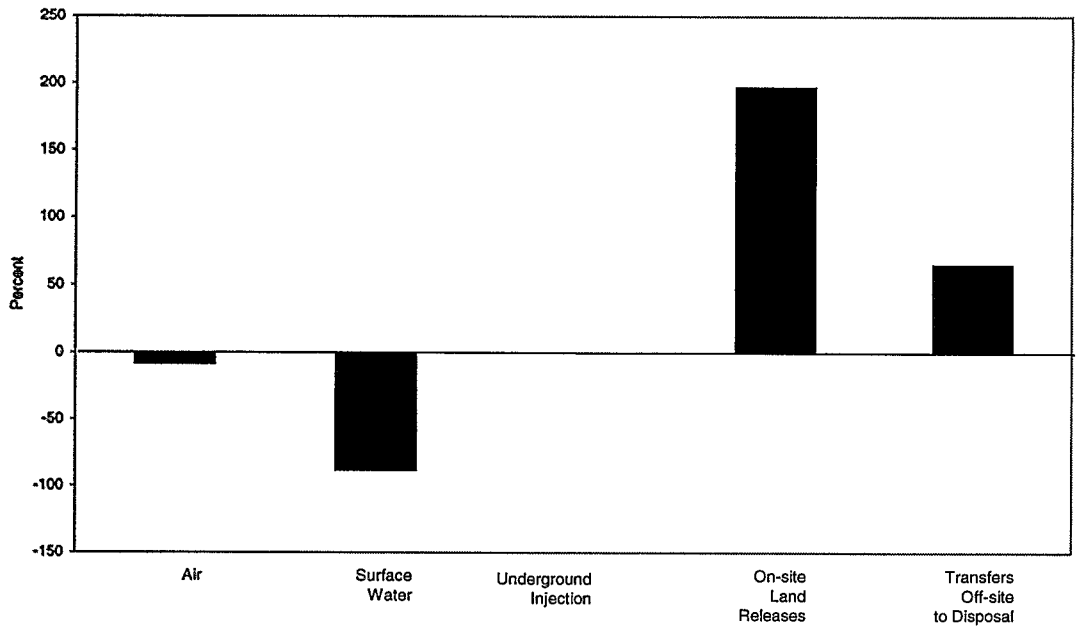


Figure 8-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Printing and Publishing (SIC Code 27)

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

1988-1996 TRI Data for Printing and Publishing

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable with the same reporting definition in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

The printing and publishing sector reported 61.2 million pounds of total on- and off-site releases in 1988 and 28.3 million pounds of total releases in 1996, as shown in Table 8-13. This reduction of 53.8%, or 32.9 million pounds, was attributable almost entirely to air emissions. In addition, the sector reported a 53.5% reduction in air emissions, from 60.6 million pounds in 1988 to 28.2 million pounds in 1996. Decreases were reported in both fugitive and point-source emissions.

Other on-site releases decreased by large percentages (66.6% to 100.0%) from 1988 to 1996, but these represented small absolute amounts, as shown in Table 8-13.

Off-site releases (transfers to disposal) decreased 82.9%, from 493,000 pounds to 84,000 pounds, over the 1988-1996 period.

Figure 8-12 illustrates the percentage changes in releases by release type for the printing and publishing sector.

Table 8-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Printing and Publishing, SIC Code 27

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	356	283	263	232	-34.8
Total Forms	688	542	501	452	-34.3
Form Rs	688	542	493	447	-35.0
Form As	NA	NA	8	5	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	60,581,384	34,323,896	30,822,855	28,170,356	-53.5
Fugitive Air	33,224,249	19,917,668	17,856,994	13,693,054	-58.8
Point Source Air	27,357,135	14,406,228	12,965,861	14,477,302	-47.1
Surface Water Discharges	32,091	843	14,372	1,670	-94.8
Underground Injection	40,000	0	0	0	-100.0
On-site Land Releases	40,816	1,370	4,600	13,650	-66.6
Total On-site Releases	60,694,291	34,326,109	30,841,827	28,185,676	-53.6
Off-site Releases					
Transfers Off-site to Disposal	493,227	60,570	54,025	84,110	-82.9
Total On- and Off-site Releases	61,187,518	34,386,679	30,895,852	28,269,786	-53.8
Other On-site Waste Management					
Recycled On-site	NA	187,310,903	187,529,232	168,357,066	NA
Energy Recovery On-site	NA	263,890	269,429	199,336	NA
Treated On-site	NA	9,024,252	64,762,421	61,173,022	NA
Total Other On-site Waste Management	NA	196,599,045	252,561,082	229,729,424	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	6,228,807	5,561,178	3,638,700	NA
Transfers to Energy Recovery	NA	3,310,699	3,711,781	3,594,420	NA
Transfers to Treatment	4,505,946	531,812	426,612	376,604	-91.6
Transfers to POTWs	1,751,776	233,217	209,444	159,617	-90.9
Other Off-site Transfers	396,671	22,740	3,866	0	-100.0
Total Transfers Off-site for Further Waste Management	NA	10,327,275	9,912,881	7,769,341	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. Forms for one facility for 1994 were not entered into the system due to an EPA error. The correct amounts for 1994 for these forms are 147,900 pounds of recycling on-site, 48,480,000 pounds of treatment on-site and 48,927,900 pounds of total other on-site waste management. **NA:** not required to be reported in that year.

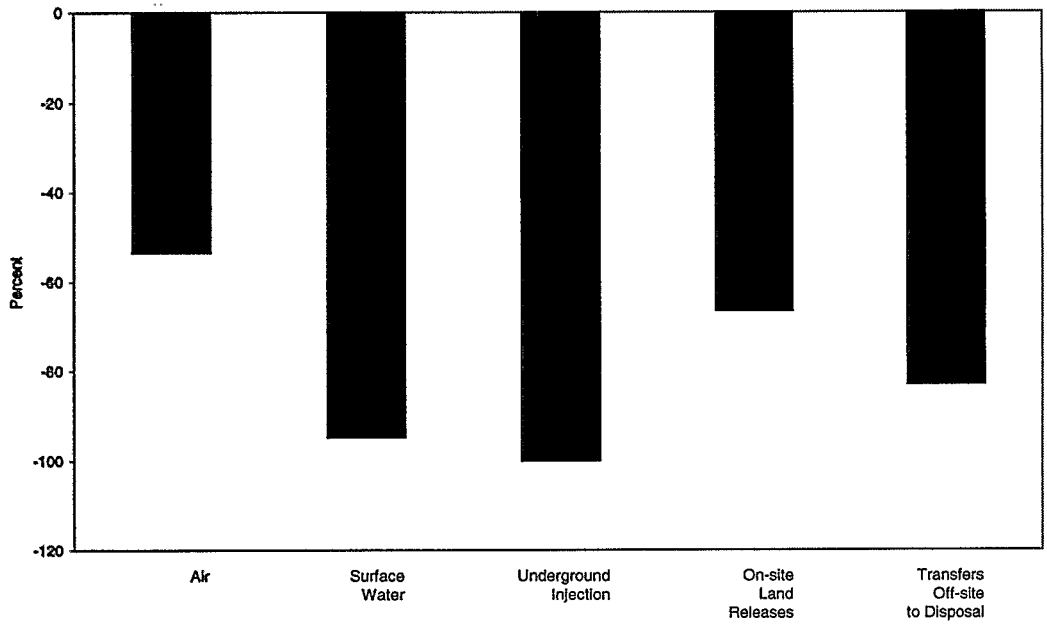


Figure 8-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Printing and Publishing (SIC Code 27)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, other on-site waste management increased from 196.6 million pounds to 229.7 million pounds, as shown in Table 8-13. This 33.1 million-pound increase reflected an apparent increase in on-site treatment from 9.0 million pounds to 61.2 million pounds (an increase of 52.1 million pounds). However, for one facility—a commercial lithographic and gravure printer filing multiple SIC codes 2752 and 2754—some forms for 1994 were not entered into the system due to an EPA error. This facility filed a 1994 report for 48.5 million pounds of on-site treatment of toluene. If this amount were included, the sector's increase in on-site treatment would be 3.6 million pounds and total other on-site waste management would show a decrease of 15.4 million pounds.

The printing and publishing sector reported on-site recycling of 187.3 million pounds in 1994 and 168.4 million pounds in 1996, a decrease of 19.0 million pounds. Energy recovery decreased from 264,000 pounds to 199,000 pounds.

For the two transfer types reported for the full 1988-1996 comparison period, the printing and publishing sector reported decreases of more than 90%. The sector reported a decrease in transfers to treatment from 4.5 million pounds in 1988 to 377,000 pounds in 1996. The sector reported a decrease in transfers to POTWs from 1.8 million pounds in 1988 to 160,000 pounds in 1996. These data also appear in Table 8-13.

1988-1996 Data for Four-Digit Industries in Printing and Publishing

Tables 8-14 through 8-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 27. The tables present, respectively, on- and off-site releases, other on-site

waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Table 8-14 provides release data for all four-digit SIC codes in the printing and publishing sector, from 1988 to 1996. The commercial gravure printing industry (SIC code 2754) reported the largest 1988-1996 decrease in total on- and off-site releases, from 31.6 million pounds to 17.2 million pounds. The multiple-codes group ranked second for decreases, reporting 17.3 million pounds in 1988 and 8.6 million pounds in 1996. Commercial lithographic printing (SIC code 2752) ranked third, with 2.8 million pounds in 1988 and 956,000 pounds in 1996. In all three industries, reductions occurred principally in reporting of air emissions, with smaller decreases in off-site releases (transfers to disposal).

Platemaking services (SIC code 2796) reported the largest increase in total releases, from 83,000 pounds in 1988 to 125,000 pounds in 1996. Increases in this industry were reported in air emissions, on-site land releases, and off-site releases (transfers to disposal). However, this industry's reported releases have decreased in recent years. Two other printing and publishing industries reported increases from 1988 to 1996. No TRI forms were submitted in bookbinding and related work (SIC code 2789) in 1988, while 18,000 pounds of releases were reported in this industry in 1996. The periodicals publishing industry (SIC code 2721) reported 3,000 pounds in 1988 and 15,000 pounds in 1996. Both industries reported only air emissions in the years compared in Table 8-14.

Other On-site Waste Management

The commercial gravure printing industry (SIC code 2754) reported the largest decrease in on-site waste management in the printing and publishing sector from 1994 to 1996 (on-site waste management data were not collected in 1988). This industry reported 126.9 million pounds of other on-site waste management in 1994 and 115.3 million pounds in 1996. Reductions were reported in all three types of waste management, although on-site recycling and total on-site waste management were larger (128.3 million pounds and 133.5 million pounds) in 1995.

Platemaking services (SIC code 2796) ranked second for decreases in other on-site waste management, reporting 1.7 million pounds in 1994 and 896,000 pounds in 1996. This industry also reported a larger sum in 1995 (1.8 million pounds). Decreases were reported in on-site recycling and treatment. Ranking third for decreases, the manifold business forms industry (SIC code 2761) reported 23,000 pounds of on-site recycling in 1994, but submitted no TRI forms in 1995 or 1996.

The multiple-codes group reported the largest increase in on-site waste management for the printing and publishing sector for 1994 to 1996, but these numbers reflect the reporting problem described in "1988-1996 TRI Data for Printing and Publishing," above. When data are adjusted for that reporting problem, commercial lithographic printing (SIC code 2752) ranked first for increases. This industry reported 479,000 pounds in 1994 and 760,000 pounds in 1996, with most of the increase occurring in on-site treatment. The second-largest increase was reported in miscellaneous commercial printing industries (SIC code 2759), with 797,000 pounds in 1994 and 982,000 pounds in 1996. Increases in all three waste management types contributed to this overall increase, although on-site recycling decreased from 1995 to 1996. The book printing industry (SIC code 2732) ranked third with an increase from 25,000 pounds in 1994 to 54,000 pounds in 1996. Nearly all of this increase was reported in on-site treatment.

On-site waste management data for 1994-1996 appear in Table 8-15.

Table 8-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Printing and Publishing, SIC Code 27

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2711	Newspapers	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	44,185	0	0	0	44,185	11,300	55,485
2721	Periodicals	96	15,429	0	0	0	15,429	0	15,429
		95	32,319	0	0	0	32,319	0	32,319
		94	30,314	0	0	0	30,314	0	30,314
		88	3,118	0	0	0	3,118	0	3,118
2731	Book Publishing	96	No reports received						
		95	10,080	0	0	0	10,080	0	10,080
		94	No reports received						
		88	42,003	0	0	0	42,003	0	42,003
2732	Book Printing	96	138,357	0	0	0	138,357	0	138,357
		95	176,606	0	0	0	176,606	0	176,606
		94	162,363	0	0	1,100	163,463	0	163,463
		88	343,645	0	0	0	343,645	90	343,735
2741	Miscellaneous Publishing	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	108,457	0	0	0	108,457	0	108,457
2752	Commercial Printing, Lithographic	96	951,368	0	0	0	951,368	4,520	955,888
		95	1,100,222	13,401	0	4,240	1,117,863	9,250	1,127,113
		94	1,448,145	0	0	0	1,448,145	6,755	1,454,900
		88	2,637,427	0	40,000	40,000	2,717,427	81,033	2,798,460
2754	Commercial Printing, Gravure	96	17,186,028	1,410	0	0	17,187,438	49,002	17,236,440
		95	19,107,315	711	0	0	19,108,026	15,442	19,123,468
		94	21,591,192	338	0	20	21,591,550	18,525	21,610,075
		88	31,377,396	30,100	0	0	31,407,496	174,689	31,582,185
2759	Commercial Printing, nec*	96	781,838	0	0	250	782,088	8,910	790,998
		95	894,686	0	0	250	894,936	14,867	909,803
		94	1,354,579	0	0	250	1,354,829	23,443	1,378,272
		88	808,574	0	0	0	808,574	0	808,574
2761	Manifold Business Forms	96	No reports received						
		95	No reports received						
		94	17,900	0	0	0	17,900	0	17,900
		88	508,612	0	0	313	508,925	11,133	520,058

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 8-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Printing and Publishing, SIC Code 27, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
2771	Greeting Cards	96	18	0	0	0	18	2,235	2,253
		95	17	0	0	0	17	0	17
		94	23,916	0	0	0	23,916	0	23,916
		88	226,904	0	0	0	226,904	1,500	228,404
2782	Blankbooks & Looseleaf Binders	96	6,414	0	0	0	6,414	0	6,414
		95	20,400	0	0	0	20,400	0	20,400
		94	20,200	0	0	0	20,200	0	20,200
		88	219,237	0	0	0	219,237	1,400	220,637
2789	Bookbinding & Related Work	96	18,270	0	0	0	18,270	0	18,270
		95	13,000	0	0	0	13,000	0	13,000
		94	13,000	0	0	0	13,000	0	13,000
		88	No reports received						
2791	Typesetting	96	0	0	0	0	0	69	69
		95	No reports received						
		94	No reports received						
		88	0	0	0	0	0	3,800	3,800
2796	Platemaking Services	96	97,247	0	0	13,400	110,647	14,596	125,243
		95	249,766	0	0	110	249,876	1,550	251,426
		94	253,447	0	0	0	253,447	6,418	259,865
		88	82,599	0	0	0	82,599	0	82,599
	Multiple within SIC Code 27	96	8,637,212	250	0	0	8,637,462	4,778	8,642,240
		95	8,830,095	250	0	0	8,830,345	5,334	8,835,679
		94	8,927,889	250	0	0	8,928,139	5,069	8,933,208
		88	17,203,655	1,840	0	503	17,205,998	142,875	17,348,873
	Invalid SIC Code within SIC Code 27	96	338,175	10	0	0	338,185	0	338,185
		95	388,349	10	0	0	388,359	7,582	395,941
		94	480,951	255	0	0	481,206	360	481,566
		88	6,975,572	151	0	0	6,975,723	65,407	7,041,130
	Total for SIC Code 27	96	28,170,356	1,670	0	13,650	28,185,676	84,110	28,269,786
		95	30,822,855	14,372	0	4,600	30,841,827	54,025	30,895,582
		94	34,323,896	843	0	1,370	34,326,109	60,570	34,386,679
		88	60,581,384	32,091	40,000	40,816	60,694,291	493,227	61,187,518

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 8-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Printing and Publishing, SIC Code 27

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2711	Newspapers	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2721	Periodicals	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
2731	Book Publishing	96	No reports received			
		95	0	0	0	0
		94	No reports received			
		88	NA	NA	NA	NA
2732	Book Printing	96	0	0	53,663	53,663
		95	3,680	0	35,527	39,207
		94	1,257	0	23,575	24,832
		88	NA	NA	NA	NA
2741	Miscellaneous Publishing	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2752	Commercial Printing, Lithographic	96	78	46,850	713,435	760,363
		95	300	40,700	565,661	606,661
		94	1,800	30,450	447,246	479,496
		88	NA	NA	NA	NA
2754	Commercial Printing, Gravure	96	110,141,802	25,700	5,177,653	115,345,155
		95	128,303,874	43,129	5,190,961	133,537,964
		94	120,448,670	233,440	6,264,474	126,946,584
		88	NA	NA	NA	NA
2759	Commercial Printing, nec*	96	346,937	54,286	580,805	982,028
		95	412,488	0	573,603	986,091
		94	251,752	0	545,720	797,472
		88	NA	NA	NA	NA
2761	Manifold Business Forms	96	No reports received			
		95	No reports received			
		94	23,000	0	0	23,000
		88	NA	NA	NA	NA
2771	Greeting Cards	96	0	0	36,891	36,891
		95	0	0	24,640	24,640
		94	0	0	23,163	23,163
		88	NA	NA	NA	NA
2782	Blankbooks & Looseleaf Binders	96	20,000	0	0	20,000
		95	19,500	0	0	19,500
		94	21,000	0	0	21,000
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one-4-digit SIC code within SIC code 27 are assigned to the "multiple" category. Forms for one facility for 1994 reporting under multiple codes within SIC code 27 were not entered into the system due to an EPA error. The correct amounts for 1994 are 147,900 pounds of recycling on-site, 48,480,000 pounds of treatment on-site and 48,927,900 pounds of total other on-site waste management.
*nec: not elsewhere classified.

Table 8-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Printing and Publishing, SIC Code 27, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2789	Bookbinding & Related Work	96	1,200	0	120	1,320
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			
2791	Typesetting	96	0	0	0	0
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
2796	Platemaking Services	96	217,202	0	678,312	895,514
		95	405,948	0	1,429,984	1,835,932
		94	465,301	0	1,242,689	1,707,990
		88	NA	NA	NA	NA
	Multiple within SIC Code 27	96	57,629,847	72,500	53,914,318	111,616,665
		95	58,365,411	185,600	56,820,327	115,371,338
		94	66,080,312	0	384,086	66,464,398
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC 27	96	0	0	17,825	17,825
		95	18,031	0	121,718	139,749
		94	17,811	0	93,299	111,110
		88	NA	NA	NA	NA
	Total for SIC Code 27	96	168,357,066	199,336	61,173,022	229,729,424
		95	187,529,232	269,429	64,762,421	252,561,082
		94	187,310,903	263,890	9,024,252	196,599,045
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category. Forms for one facility for 1994 reporting under multiple codes within SIC code 27 were not entered into the system due to an EPA error. The correct amounts for 1994 are 147,900 pounds of recycling on-site, 48,480,000 pounds of treatment on-site and 48,927,900 pounds of total other on-site waste management.
***nec:** not elsewhere classified.

Transfers Off-site for Further Waste Management

The multiple-codes group reported the largest decrease in transfers off-site for further waste management in printing and publishing for 1994-1996 (data for some types of off-site transfers were not collected in 1988). Multiple-codes forms reported 4.7 million pounds of transfers off-site for further waste management in 1994 and 2.7 million pounds in 1996. Transfers to recycling were the largest factor in this reduction.

The platemaking services industry (SIC code 2796), ranking second for decreases, reported 895,000 pounds of transfers off-site for further waste management in 1994 and 502,000 pounds in 1996. All types of transfers showed decreases, with the largest reduction appearing in transfers to recycling. The third-largest decrease was recorded in the commercial gravure printing industry (SIC code 2754), which reported 3.61 million pounds in 1994, 3.65 million pounds in 1995, and 3.48 million pounds in 1996.

The commercial lithographic printing industry (SIC code 2752) reported the largest increase for the 1994-to-1996 period, from 526,000 pounds to 741,000 pounds. Increases were reported in all transfer types except transfers to treatment. Ranking second for increases, the book printing industry (SIC code 2732) reported 37,000 pounds in 1994 and 51,000 pounds in 1996. Increases were reported in transfers to recycling and to treatment.

Bookbinding and related work (SIC code 2789) ranked third for transfers off-site for further waste management, as this industry reported no amounts in 1994 and 5,000 pounds in 1996. The 1996 amount included transfers to treatment and to POTWs.

Table 8-16 presents the sector's transfers off-site for further waste management for 1988-1996.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Quebecor Printing, Inc., in Dickson, Tennessee (SIC code 2754), ranked first in increases with an overall 1.7 million-pound increase. Toluene reporting constituted 100% of the increase. A gravure printer, this facility produces newspaper supplements. Toluene is a common ink solvent in gravure printing. The chemical is used to thin inks to a usable viscosity and is later allowed to evaporate off the printed material, resulting in air emissions. The increase in toluene air emissions is due to increased production, according to the facility contact. Quebecor Printing in Dickson also ranked as the third largest decreaser in waste managed (see Facilities with Large Increases and Decreases in Waste Management, 1991-1996, below).

World Color Press, Inc., in Dyersburg, Tennessee (SIC code 2752 and 2753 in 1988 and 2752 and 2754 in 1996), was second in increases with 1.3 million pounds. The facility installed its first gravure printing press in 1988 and did not come into full production until 1989. Since 1989, two additional presses have been installed. Consequently, toluene reporting was low in 1988 compared to subsequent years. Toluene, used as an ink solvent, accounted for all of the facility's increase. The facility reported a 1.2 million-pound increase in toluene fugitive emissions between 1988 and 1996.

Quebecor Printing in Richmond, Virginia (SIC code 2754), ranked third with an overall 861,000 pound increase. Like the other two top facilities for increases, air emissions of toluene are primarily responsible for the ranking of this gravure printing facility. The change in reporting was due to a production increase. Two presses were installed at the facility between 1988 and 1996. The facility prints newspaper supplements.

R.R. Donnelley & Sons, Company in Warsaw, Indiana (SIC code 2754), was first in decreases with 2.4 million pounds. Toluene reporting accounted for 95% of this facility's reduction. A gravure printer, R.R. Donnelly in Warsaw reduced toluene air emissions by implementing "permanent total enclosure" systems whereby solvent fumes are more efficiently captured. The captured solvents are then sent to recovery systems where they are recycled for reuse. This facility prints catalogs.

R.R. Donnelly & Sons Company in Mattoon, Illinois (SIC codes 2752 and 2754), ranked second in decreases with 2.0 million pounds. Again, toluene was the major contributor to this magazine printer's release reduction, accounting for 97% of the overall decrease. This facility cited improved solvent capture systems and improved process efficiency through equipment enhancements as the major reasons for decreased toluene releases.

R.R. Donnelly & Sons Company in Gallatin, Tennessee (SIC code 2754), was third for decreases of releases with 1.5 million pounds. Reductions in toluene emissions at this facility accounted for 97% of the overall decrease. Another gravure printer of catalogs, the facility also identified equipment enhancements as the major contributor to the reduction. In gravure printing, ink is transferred to paper by cylinders that are either made of copper or wrapped in copper plates. The copper is etched, creating wells that carry ink. Changes in how the copper was etched resulted in a reduction of ink usage, according to the facility contact. Consequently, toluene usage decreased.

Table 8-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Printing and Publishing, SIC Code 27

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2711	Newspapers	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	2,300	250	0	NA
2721	Periodicals	96	0	0	0	0	0	0
		95	0	1,826	0	0	0	1,826
		94	0	0	4,135	0	0	4,135
		88	NA	NA	10	0	0	NA
2731	Book Publishing	96	No reports received					
		95	0	0	0	0	0	0
		94	No reports received					
		88	NA	NA	0	26,324	0	NA
2732	Book Printing	96	14,312	0	10,130	26,317	0	50,759
		95	1,553	1,493	13,764	30,208	0	47,018
		94	0	3,583	3,897	29,482	0	36,962
		88	NA	NA	3,712	6,993	454	NA
2741	Miscellaneous Publishing	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	27,365	492	0	NA
2752	Commercial Printing, Lithographic	96	62,607	572,407	79,513	26,189	0	740,716
		95	44,530	589,417	54,865	58,142	3,866	750,820
		94	59,290	352,021	90,149	24,434	0	525,894
		88	NA	NA	393,011	25,591	0	NA
2754	Commercial Printing, Gravure	96	763,582	2,548,497	117,327	46,837	0	3,476,243
		95	877,908	2,537,502	172,153	61,753	0	3,649,316
		94	982,822	2,364,181	201,748	59,813	0	3,608,564
		88	NA	NA	2,347,107	104,310	187,748	NA
2759	Commercial Printing, nec*	96	85,689	106,242	70,114	4,537	0	266,582
		95	104,414	113,589	19,214	4,735	0	241,952
		94	113,162	193,225	23,636	4,098	0	334,121
		88	NA	NA	94,439	2,000	0	NA
2761	Manifold Business Forms	96	No reports received					
		95	No reports received					
		94	0	0	250	0	0	250
		88	NA	NA	14,753	5,953	0	NA
2771	Greeting Cards	96	0	0	1,712	1,003	0	2,715
		95	3,265	12,952	5	250	0	16,472
		94	2,400	16,534	0	350	0	19,284
		88	NA	NA	104,415	4,180	0	NA
2782	Blankbooks & Looseleaf Binders	96	17,218	0	0	0	0	17,218
		95	8,116	0	0	0	0	8,116
		94	16,009	0	0	0	0	16,009
		88	NA	NA	35,989	2	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the category.
***nec:** not elsewhere classified.

Table 8-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Printing and Publishing, SIC Code 27, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2789	Bookbinding & Related Work	96	0	0	2,373	2,546	0	4,919
		95	0	3,000	0	0	0	3,000
		94	0	0	0	0	0	0
		88	No reports received					
2791	Typesetting	96	0	0	0	0	0	0
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA
2796	Platemaking Services	96	345,263	73,139	51,573	31,712	0	501,687
		95	577,294	84,330	94,732	36,973	0	793,329
		94	602,357	143,599	88,939	59,883	0	894,778
		88	NA	NA	4,905	27,300	0	NA
	Multiple within SIC Code 27	96	2,349,432	278,596	43,862	8,466	0	2,680,356
		95	3,923,496	348,302	47,340	5,873	0	4,325,011
		94	4,354,814	220,232	77,274	43,289	22,740	4,718,349
		88	NA	NA	878,588	73,850	167,300	NA
	Invalid SIC Code within SIC Code 27	96	597	15,539	0	12,010	0	28,146
		95	20,602	19,370	24,539	11,510	0	76,021
		94	97,953	17,324	41,784	11,868	0	168,929
		88	NA	NA	599,352	1,474,531	41,169	NA
	Total for SIC Code 27	96	3,638,700	3,594,420	376,604	159,617	0	7,769,341
		95	5,561,178	3,711,781	426,612	209,444	3,866	9,912,881
		94	6,228,807	3,310,699	531,812	233,217	22,740	10,327,275
		88	NA	NA	4,505,946	1,751,776	396,671	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 27 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There are three such facilities in the printing and publishing sector:

Maxwell Communications Corporation, Broadview, Illinois, decrease of 4.2 million pounds, plant closure.

R.R. Donnelly & Sons Company, Chicago, Illinois, decrease of 2.0 million pounds, plant closure.

Standard Gravure Corporation, Louisville, Kentucky, decrease of 2.8 million pounds, plant closure.

1991-1996 Waste Management Data for Printing and Publishing

Table 8-17 summarizes on- and off-site waste management data for the printing and publishing sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Over this period, total production-related

Table 8-17. TRI Waste Management Data, 1991, 1994-1996: Printing and Publishing, SIC Code 27

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	173,316,833	187,310,903	187,529,232	168,357,066
Energy Recovery On-site	154,500	263,890	269,429	199,336
Treated On-site	28,405,276	9,024,252	64,762,421	61,173,022
Total On-site Waste Management	201,876,609	196,599,045	252,561,082	229,729,424
Off-site Waste Management				
Recycled Off-site	6,182,455	6,314,480	5,779,672	4,940,704
Energy Recovery Off-site	5,105,091	3,407,370	3,644,857	3,743,765
Treated Off-site	1,731,103	622,201	621,547	530,222
Total Off-site Waste Management	13,018,649	10,344,051	10,046,076	9,214,691
Quantity Released On- and Off-site	45,009,400	31,319,447	28,619,969	26,193,723
Total Production-related Waste	259,904,658	238,262,543	291,227,127	265,137,838
Non- Production-related Waste	36,975	25,448	14,064	7,107

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	0.1	-10.2	-2.9
Energy Recovery On-site	2.1	-26.0	29.0
Treated On-site	617.6	-5.5	115.4
Total On-site Waste Management	28.5	-9.0	13.8
Off-site Waste Management			
Recycled Off-site	-8.5	-14.5	-20.1
Energy Recovery Off-site	7.0	2.7	-26.7
Treated Off-site	-0.1	-14.7	-69.4
Total Off-site Waste Management	-2.9	-8.3	-29.2
Quantity Released On- and Off-site	-8.6	-8.5	-41.8
Total Production-related Waste	22.2	-9.0	2.0
Non-Production-related Waste	-44.7	-49.5	-80.8

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated. Forms for one facility for 1994 were not entered into the system due to an EPA error. The correct amounts for 1994 for these forms are 147,900 pounds of recycling on-site, 48,480,000 pounds of treatment on-site, 48,927,900 pounds of total on-site waste management, and 49,308,170 pounds of total production-related waste. The percentage change from 1994 to 1995 in treatment on-site changes from 617.6% to 5.8%, in total on-site waste management changes from 28.5% to 2.9%, and in total production-related waste changes from 22.2% to 1.3%.

waste reported in the printing and publishing sector increased from 259.9 million pounds to 265.1 million pounds, a 2.0% increase.

The largest increase was reported in on-site treatment, from 28.4 million pounds in 1991 to 61.2 million pounds in 1996. As discussed in "1988-1996 TRI Data for Printing and Publishing," above, some forms for reporting year 1994 for one facility were not entered into the system due to an EPA error. This reporting problem accounts for the apparent increase in on-site treatment from 1994 to 1995 in Table 8-17, but has no effect on the overall 1991-1996 analysis.

The sector reported a relatively small increase in on-site energy recovery, from 155,000 in 1991 pounds to 199,000 pounds in 1996. This was the only other type of waste management with an increase for 1991-1996.

The largest reduction was reported in quantities released on- and off-site, from 45.0 million pounds to 26.2 million pounds. On-site recycling also decreased, from 173.3 million pounds to 168.4 million pounds. All three types of off-site waste management decreased: recycling from 6.2 million pounds to 4.9 million pounds; energy recovery from 5.1 million pounds to 3.7 million pounds; and treatment from 1.7 million pounds to 530,000 pounds.

Figure 8-13 illustrates the percentage changes in waste management methods reported by the printing and publishing sector for 1991-1996.

TRI facilities report absolute amounts of waste managed and environmental releases, not amounts adjusted for changes in production levels. The printing and publishing sector's reporting of total production-related waste increased, while production decreased. However, changes in amounts reported for the various waste management options indicate that the sector has made some progress in improving its management of TRI chemicals in waste, as measured by the waste management hierarchy (explained in Chapter 1). Most production-related waste reported in this sector was recycled. Although the proportion of total production-related waste that was recycled declined somewhat from 1991 to 1996, the proportion of this waste that was released decreased more substantially. The difference was taken up by treatment (this is not affected by the 1994 reporting problem identified above). In terms of the hierarchy, recycling is the preferred option for managing TRI chemicals in waste that cannot be prevented. Although treatment is less desirable than recycling, it is still preferable to releasing such chemicals to the environment.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Quad/Graphics, Inc., in Lomira, Wisconsin (SIC code 2572 and 2754), ranked first in increases of waste managed with a total of 31.3 million pounds. The facility is a solvent-based publications printer and prints materials ranging from coupons to magazines and catalogs. Reported on-site treatment of toluene increased 31.2 million pounds between 1991 and 1996. Production doubled at the plant after the installation of new presses between 1993 and 1996.

Brown Printing Company in Franklin, Kentucky (SIC code 2754), was second in increases with 7.8 million pounds. Reported on-site recycling of toluene accounted for nearly all of the facility's increase. This facility, now owned by Quebecor Printing, manufactures magazines, catalogs, and newspaper inserts. The increase in toluene reporting was the result of the addition of two presses.

World Color in Evans, Georgia (SIC code 2754), was third in increases with 4.3 million pounds. Toluene reported in on-site recycling increased 4.2 million pounds between 1991 and 1996 (95% of the overall increase). A gravure printer of catalogs, World Color installed a press that was, at the time

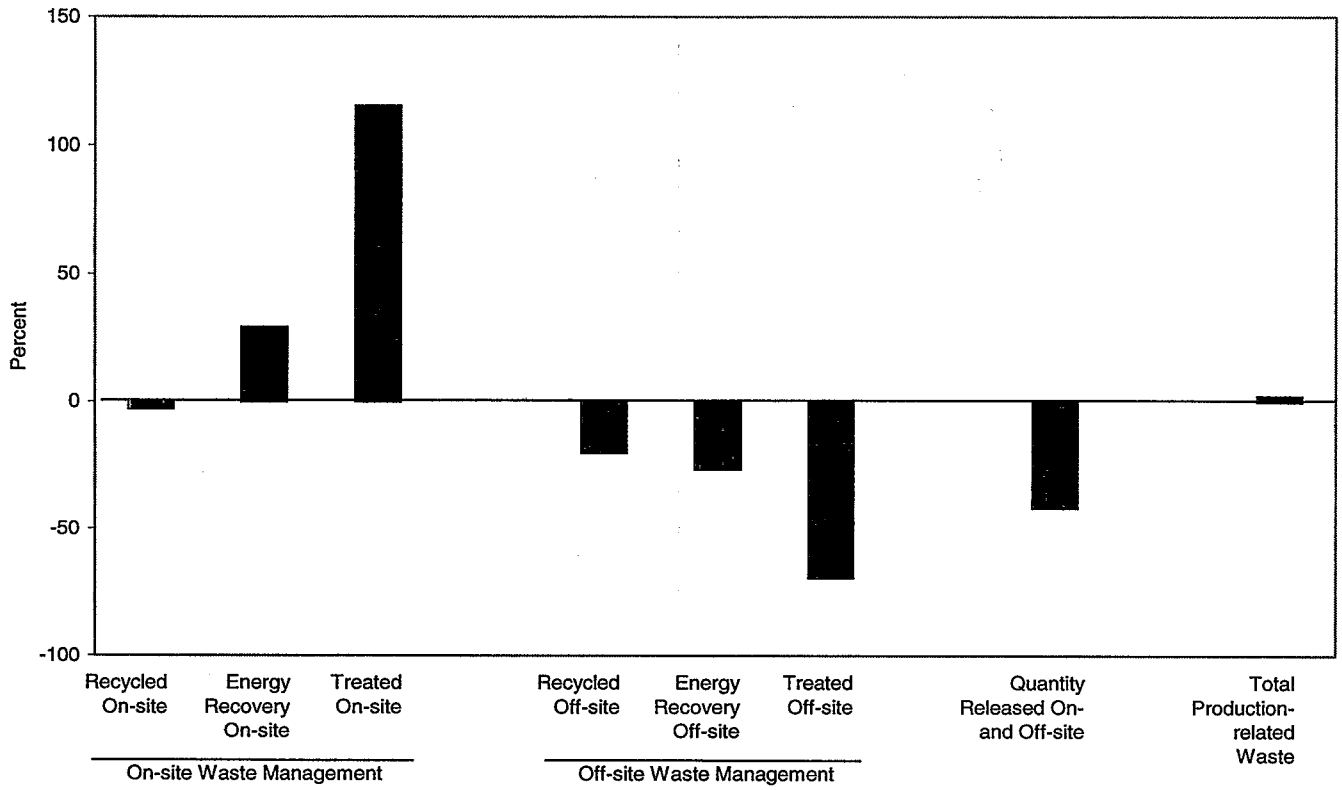


Figure 8-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Printing and Publishing (SIC Code 27)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

of installation, the largest gravure printing press in the world. Consequently, the amount of recovered ink solvent increased by one-third.

Quebecor Printing Memphis, Inc., in Glen Burnie, Maryland (SIC code 2754), ranked first in decreases with an overall 10.1 million-pound decrease. Toluene reporting accounted for 95% of the overall decrease. On-site recycling of toluene decreased by 8.3 million pounds between 1991 and 1996. A printer of newspaper inserts, the facility cited three reasons for the decrease: first, one press was removed from operation, reducing production capacity by approximately 20%; second, overall production concurrently decreased; and third, toluene content of ink solvent was reduced.

Quebecor Printing Memphis, Inc., in Memphis, Tennessee (SIC code 2754), was second in decreases with an overall 5.9 million pound decrease. Toluene was responsible for 87% of the overall decrease. The facility contact stated that the primary reason for reductions in toluene reporting was a reduction in toluene content of the facility's ink solvent.

Quebecor Printing, Inc., in Dickson, Tennessee (SIC code 2754), was third in decreases with an overall 5.2 million-pound decrease. Toluene accounted for 97% of the decrease. Although the facility contacts stated that this facility had undergone a production increase and improvements in their solvent recovery systems, the amount of toluene reported in on-site recycling decreased by 5.0 million pounds between 1991 and 1996. Two

reasons were cited for the reported decrease: Solvent formulation changed from 90% to 55% toluene, and modifications were made to estimation methodology. This facility also ranked as the top increaser in releases (see Facilities with Large Increases and Decreases in Releases, 1988-1996).

Facilities Contacted for Explanations (alphabetical by facility):

Brown Printing Company, Franklin, Kentucky: Roswell Dennison, September 28, 1998 (explanation provided)

Maxwell Communication Corporation, Broadview, Illinois: Plant closure. No contact person available.

Quad/Graphics, Inc., Lomira, Wisconsin: Jason Bowker, August 26, 1998 and Tom Estock, August 27 and 28, 1998 (explanation provided)

Quebecor Printing Memphis, Inc., Glen Burnie, Maryland: James Hunt, August 26, 1998 (explanation provided)

Quebecor Printing Memphis, Inc., Memphis, Tennessee: Tom Brown, August 26, 1998 (explanation provided)

Quebecor Printing, Inc., Dickson, Tennessee: Donna Brown, October 13, 1998 and Steve Prosser, October 15, 1998 (explanation provided)

Quebecor Printing, Richmond, Virginia: Edward A. Hall, August 27, 1998 (explanation provided)

R.R. Donnelly & Sons Company, Chicago, Illinois: Dale Kalina, September 28, 1998 (explanation provided)

R.R. Donnelly & Sons Company, Gallatin, Tennessee: R.O. Thigpen, October 13, 1998 (explanation provided)

R.R. Donnelly & Sons Company, Mattoon, Illinois: Vicki Howell and Dale Kalina, September 28, 1998 (explanation provided)

R.R. Donnelly & Sons Company, Warsaw, Indiana: Debora Woodward, September 28, 1998 (explanation provided)

Standard Gravure Corporation, Louisville, Kentucky: Plant closure. No contact person available.

World Color Press, Inc., Dyersburg, Tennessee: Rick Yarbrough, August 26, 1998 (explanation provided)

World Color, Evans, Georgia: Rick Stuart, October 13, 1998 (explanation provided)

Chapter 9

Toxics Release Inventory Data for Rubber and Plastics Products (SIC Code 30)

A Look at the Rubber and Miscellaneous Plastics Products Industry (SIC Code 30)

The rubber and plastics products industry (SIC code 30) manufactures miscellaneous products from natural, synthetic, or reclaimed rubber or from plastics resins. Box 9-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

Manufacturing activity in this sector is closely related to work performed in other industrial sectors. Plastics materials (resins) and synthetic rubbers, which are important raw materials for this sector, are classified as chemical products in SIC code 28. Many products made of rubber and plastics, from boats to buttons, are classified elsewhere, based on the type of object or end use rather than the material from which they are made. This sector, SIC code 30, covers some types of rubber and plastics products with end uses—for example, tires, plastic bottles, and numerous other products made from both kinds of materials. It also makes semi-finished plastics (in the group designated by SIC code 308)—shaped plastics (rods or tubes, for example) or plastics plate or sheet—that are used in manufacturing other products. Plants that produce both the resins and the plastics sheet or shapes are categorized in this sector (in SIC code 308). Most miscellaneous rubber products (SIC code 306) are used by other sectors such as automobile manufacturing and service industries like hospitals.

Manufacturers in the rubber and plastics products sector produced shipments valued at $150.47 billion in 1996, up from $145.74 billion in 1995 (both in current dollars). Employment in this sector has steadily increased over the last decade and was just over 1.0 million in both years. The rubber and plastics products sector has seen rapid growth in the 1990s. Only electrical equipment (SIC code 36), which includes computer components such as circuit boards, and industrial machinery (SIC code 35) expanded more rapidly. Rubber and plastics products manufacturing increased by one third from 1989 to 1996, nearly twice the U.S. average for all manufacturing (see Chapter 1, Table 1-10).

Box 9-1. SIC Code 30, Rubber and Miscellaneous Plastics Products: Codes and Classifications

SIC Code		Industry Description
301	**Tires and Inner Tubes**	
3011	Tires and Inner Tubes	Manufacture of pneumatic casings, inner tubes, and solid and cushion tires; tiring (in continuous lengths); camelback for retreading, and tire repair and retreading materials.
302	**Rubber and Plastics Footwear**	
3021	Rubber and Plastics Footwear	Manufacture of fabric upper footwear with rubber or plastics soles, and rubber and plastics protective footwear.
305	**Gaskets, Packing, and Sealing Devices and Rubber and Plastics Hose and Belting**	
3052	Rubber and Plastics Hose and Belting	Manufacture of rubber and plastics hose and belting, including garden hose.
3053	Gaskets, Packing, and Sealing Devices	Manufacture of gaskets, gasketing materials, compression packings, mold packings, oil seals, and mechanical seals. Includes devices made of leather, rubber, metal, asbestos, and plastics.
306	**Fabricated Rubber Products, nec***	
3061	Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods	Manufacture of molded, extruded, and lathe-cut mechanical rubber goods (generally parts for machinery and equipment).
3069	Fabricated Rubber Products, nec*	Manufacture of industrial rubber goods, rubberized fabrics, vulcanized rubber clothing, and miscellaneous rubber specialties and sundries. (Establishments primarily engage in reclaiming rubber and rubber products.)
308	**Miscellaneous Plastics Products**	
3081	Unsupported Plastics Film and Sheet	Manufacture of unsupported plastics film and sheet, including cellulosic plastics, polyester, polyethylene, polypropylene, polyvinyl, vinyl, and vinyl copolymer film and sheet, and photographic, micrographic, and X-ray plastics sheet and film.
3082	Unsupported Plastics Profile Shapes	Manufacture of unsupported plastics profiles, rods, tubes, and other shapes.
3083	Laminated Plastics Plate, Sheet, and Profile Shapes	Manufacture of laminated plastics plate, sheet, profiles, rods, and tubes.
3084	Plastics Pipe	Manufacture of plastics pipe.
3085	Plastics Bottles	Manufacture of plastics bottles.
3086	Plastics Foam Products	Manufacture of plastics foam products, including cups, cushions, portable ice chests or coolers, insulation and cushioning, packaging, plates, and shipping pads.
3087	Custom Compounding of Purchased Plastics Resins	Custom compounding of purchased plastics resins.
3088	Plastics Plumbing Fixtures	Manufacture of plastics plumbing fixtures.
3089	Plastics Products, nec*	Manufacture of miscellaneous plastics products.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Rubber and Plastics Industry,* Sector Notebook project, EPA/310-R-95-016, September 1995 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

In 1996, miscellaneous plastics production (SIC code 308, at the three-digit SIC code level) represented three-quarters of the sector's shipments, $112.62 billion, and three-quarters of the sector's employment, 763,000 employees. Among the industries producing rubber products, two—tires and inner tubes (SIC code 301) and miscellaneous fabricated rubber products (SIC 306)—each contributed more than $14 billion in shipments. Employment in the miscellaneous fabricated rubber products industry (122,000) was about double that of the tire producers (65,000).

Plastics Products

Steps in making products out of plastics materials vary. Generally, resins in the form of pellets, granules, powders, sheets, fluids, or "preforms" are molded into shapes or parts. Additives are common and are used to influence characteristics such as plasticity and brittleness, color, electrical conductivity (to reduce electrostatic charges), stability against the effects of heat or oxidation, and others. Some plants use plastics pellets already containing such additives, while others add them on-site. Molding processes include injection, extrusion, blow molding, thermoforming, rotational molding, compression molding, casting, and calendaring (squeezing or pressing). Foam plastics undergo similar processes, but chemical blowing agents, air, pressurized gases, or liquids that boil at low temperatures are added to create the cellular foam structures.

Generally, in the manufacture of plastics products, solvent cleaning and finishing processes contribute the bulk of the emissions of toxic substances to air. Additives, including metals such as cadmium and lead, may also be released during mixing or, under conditions of high heat or pressure, in the molding process. Plastics mixing processes are also a source of styrene releases.

Rubber Products

Common processes in the manufacture of rubber products begin with mixing, which covers both mixing of polymers (raw and/or synthetic rubber), carbon black (filler), oils, and miscellaneous chemical aids or agents, and forming the rubber into preliminary sheets. Some plants purchase already mixed uncured rubber. Further steps in the process include milling the sheets in preparation for further processing; extruding and calendaring (squeezing through a press) into various shapes or thin sheets; building the rubber with reinforcing materials (wire, polyester, etc.) with or without adhesives; vulcanizing (or curing); and finishing by grinding, printing, washing, buffing, and other techniques.

In the manufacture of rubber, air emissions of toxic chemicals occur primarily during preparation of mixing components and the building phase when reinforcing materials are added. Metals are common ingredients of the mixture, notably zinc compounds used as a processing aid, accelerator, activator, and/or age resistor.

1996 TRI Data for Rubber and Plastics Products

Table 9-1 summarizes TRI reporting by the rubber and plastics products sector for 1996. A total of 3,747 forms were submitted in this sector. Of these, 9.2% were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

Table 9-1. Summary of TRI Information by 4-digit SIC Code, 1996: Rubber and Plastics Products, SIC Code 30

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
7	8	3011	Tires & Inner Tubes	66	205	5	2,407,553	2,577,771	4,985,324
14	14	3021	Rubber & Plastics Footwear	8	31	0	862,298	32,454	894,752
9	1	3052	Rubber & Plastics Hose & Belting	57	129	0	2,421,054	1,103,615	3,524,669
10	10	3053	Gaskets, Packing & Sealing Devices	36	79	11	1,755,563	112,935	1,868,498
13	12	3061	Mechanical Rubber Goods	41	102	7	859,124	140,274	999,398
3	5	3069	Fabricated Rubber Products, nec*	233	476	27	7,526,188	1,804,432	9,330,620
8	3	3081	Unsupported Plastics Film & Sheet	59	160	20	4,401,792	62,365	4,464,157
15	15	3082	Unsupported Plastics Profile Shapes	28	41	8	224,329	21,317	245,646
5	7	3083	Laminated Plastics Plate & Sheet	43	110	2	7,049,707	6,707	7,056,414
16	16	3084	Plastics Pipe	10	15	3	168,265	0	168,265
17	17	3085	Plastics Bottles	6	6	2	295	0	295
2	4	3086	Plastics Foam Products	248	521	46	30,821,332	462,972	31,284,304
12	13	3087	Custom Compound Purchased Resins	141	361	89	609,229	480,614	1,089,843
4	9	3088	Plastics Plumbing Fixtures	137	164	3	7,939,095	29,880	7,968,975
1	2	3089	Plastics Products, nec*	547	952	75	31,987,488	2,564,966	34,552,454
6	6		Multiple within SIC Code 30	114	321	40	5,576,293	1,183,557	6,759,850
11	11		Invalid SIC Code within SIC Code 30	50	74	5	1,182,000	33,827	1,215,827
			Total for SIC Code 30	1,824	3,747	343	105,791,605	10,617,686	116,409,291

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
*nec: not elsewhere classified.

One quarter of all forms in this sector (952 forms) were submitted in the miscellaneous plastics products industry (SIC code 3089). Another 521 came from the plastics foam products industry (SIC code 3086), and 476 from miscellaneous fabricated rubber products (SIC code 3069). Together, these three industries represented more than half of all forms in the sector.

These were also the top industries for on- and off-site releases in this sector, which totaled 116.4 million pounds, as shown in Table 9-1. Miscellaneous plastics products ranked first, with 34.6 million pounds of total releases, followed by plastics foam products with 31.3 million pounds. In both cases, the great majority of the releases were reported on-site. No other industry in this sector totaled more than 10 million pounds in on- and off-site releases. Miscellaneous fabricated rubber products, which ranked third, had 9.3 million pounds. The same two industries that had the largest total releases also had the largest amounts of on-site releases, but plastics plumbing fixtures (SIC code 3088) was third (with 7.9 million pounds) in this category.

Tires and inner tubes (SIC code 3011) accounted for the largest off-site releases (transfers to disposal) with 2.58 million pounds, closely followed by miscellaneous plastics products (SIC code 3089) with 2.56 million pounds. Miscellaneous fabricated rubber products (SIC code 3069) was third with 1.8 million pounds.

For the most part, industries with large quantities of production-related waste were different from those with the largest releases. Production-related waste in this sector totaled 369.8 million pounds in 1996. The rubber and plastics hose and belting industry (SIC code 3052) reported the largest amount, 97.8 million pounds. Miscellaneous plastics products (SIC code 3089) was second with 72.9 million

Table 9-1. Summary of TRI Information by 4-digit SIC Code, 1996: Rubber and Plastics Products, SIC Code 30, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3011	Tires & Inner Tubes	2,991,544	1,675,820	9,668,342	0
3021	Rubber & Plastics Footwear	9,482	45,217	977,685	0
3052	Rubber & Plastics Hose & Belting	92,708,038	1,515,450	97,791,468	614
3053	Gaskets, Packing & Sealing Devices	2,857,008	717,424	5,242,928	7,012
3061	Mechanical Rubber Goods	228,399	892,040	2,076,226	1,532
3069	Fabricated Rubber Products, nec*	14,411,993	2,358,314	26,686,362	6,755
3081	Unsupported Plastics Film & Sheet	36,236,347	2,566,711	50,511,044	3,070
3082	Unsupported Plastics Profile Shapes	211,671	296,950	696,319	110
3083	Laminated Plastics Plate & Sheet	11,469,430	2,309,314	20,751,598	1,300
3084	Plastics Pipe	162,488	28,344	339,504	0
3085	Plastics Bottles	3,004	0	3,094	0
3086	Plastics Foam Products	16,805,912	1,417,909	49,201,648	85,257
3087	Custom Compound Purchased Resins	500,218	363,209	1,881,639	16,650
3088	Plastics Plumbing Fixtures	9	32,880	7,367,415	2,511
3089	Plastics Products, nec*	30,597,303	6,161,857	72,902,282	531
	Multiple within SIC Code 30	10,838,269	3,937,953	21,446,604	5,900
	Invalid SIC Code within SIC Code 30	666,011	333,324	2,246,104	0
	Total for SIC Code 30	220,697,126	24,652,716	369,790,262	131,242

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

pounds, and unsupported plastics film and sheet (SIC code 3081) was third with 50.5 million pounds. Although miscellaneous plastics also ranked high for releases (ranking first), the first and third industries for total production-related waste were ninth and eighth, respectively, for releases.

The same three industries reported the largest other on-site waste management quantities: rubber and plastics hose and belting with 92.7 million pounds, unsupported plastics film and sheet second with 36.2 million pounds, and miscellaneous plastics products third with 30.6 million pounds. Altogether, other on-site waste management totaled 220.7 million pounds in SIC code 30.

One facility in the rubber and plastics hose and belting industry (SIC code 3052) accounted for a great majority of the sector's on-site recycling, reporting 89.2 million pounds for lead compounds in 1996. This large amount similarly influenced the sector's data for on-site waste management and total production-related waste. This facility has made a substantial reduction in its on-site recycling of this chemical since 1995, described in "Facilities with Large Increases and Decreases in Waste Management, 1991-1996" later in this chapter.

Miscellaneous plastics products (SIC code 3089) reported 6.2 million pounds of transfers off-site for further waste management, out of 24.7 million pounds for the sector. This was the only category in which facilities that reported more than one SIC code in SIC code 30 to describe their manufacturing activities ranked high. TRI forms in this "multiple-code" category, explained below, were second for transfers off-site for further waste management with 3.9 million pounds. Unsupported plastics film and sheet (SIC code 3081) was third with 2.6 million pounds.

Multiple SIC Codes in SIC Code 30

Some facilities in the rubber and plastics products sector manufacture products in similar but distinct categories, as designated in the Standard Industrial Classification (SIC) scheme. For example, a facility may manufacture both rubber and plastics hose and belting (SIC code 3052) and miscellaneous fabricated rubber products (SIC code 3069). Another facility may produce plastics foam products (SIC code 3086) and miscellaneous plastics products (SIC code 3089). Such facilities may report multiple SIC codes on their TRI forms to describe their operations. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

In the rubber and plastics products sector, 321 forms were submitted in 1996 with more than one SIC code within SIC code 30, a little less than 10% of the total forms submitted. Table 9-2 examines TRI reporting from these forms. The most frequent combination was custom compounding of purchased resins (SIC code 3087) and miscellaneous plastics products (SIC code 3089), reported on 30 forms. Two combinations appeared on 27 forms each. One such combination was unsupported plastics film and sheet (SIC code 3081) and laminated plastics plate and sheet (SIC code 3083), and the other combined miscellaneous fabricated rubber products (SIC code 3069) and miscellaneous plastics products (SIC code 3089). The combination of miscellaneous fabricated rubber products (SIC code 3069) and custom compounding of purchased resins (SIC code 3087) was reported on 26 forms.

The multiple-forms codes reported total on- and off-site releases of 6.8 million pounds, other on-site waste management of 10.8 million pounds, transfers off-site for further waste management of 3.9 million pounds, and total production-related waste of 21.4 million pounds. Forms reporting gaskets, packing, and sealing devices (SIC code 3053) and mechanical rubber goods (SIC code 3061) reported the largest total on- and off-site releases among multiple-codes groups in SIC code 30, with 1.6 million pounds. Forms reporting both unsupported plastics film and sheet (SIC code 3081) and laminated plastics plate and sheet (SIC code 3083) reported the largest total production-related waste, with 5.9 million pounds. These data are shown in Table 9-2.

On- and Off-site Releases

As shown in Table 9-3, air emissions reported by the rubber and plastics products sector totaled 105.3 million pounds, 90.5% of the sector's releases. More than half the air emissions came from two industries: miscellaneous plastics products (SIC code 3089) with 31.8 million pounds and plastics foam products (SIC code 3086) with 30.8 million pounds. As noted in the discussion of chemicals later in this chapter, the miscellaneous plastics products industry reported air emissions primarily of carbon disulfide and styrene, while the plastics foam industry reported large amounts of air emissions of dichloromethane.

Other types of on-site releases in this sector were much smaller, ranging from 398,000 pounds for land releases (other than RCRA subtitle C landfills) to 750 pounds for underground injection. Off-site releases (transfers to disposal) were 10.6 million. As noted above, tire manufacture (SIC code 3011) and miscellaneous plastics products (SIC code 3089) each reported 2.6 million pounds of such transfers. The bulk of the transfers to disposal by the tire and inner tube industry consisted of zinc compounds (2.3 million pounds). For the miscellaneous plastics products industry, the chemical with the largest transfers to disposal was styrene (2.1 million pounds).

Table 9-2. Multiple SIC Codes, 1996: Rubber and Plastics Products, SIC Code 30

SIC Codes	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3011 3061 3069	1	0	10	5,000	5,010	8,800	3,150	16,720	0
3011 3069	9	0	285	50,255	50,540	47,993	39,370	130,191	0
3020 3061 3069	1	0	0	0	0	0	0	0	0
3052 3053	4	0	55,107	0	55,107	0	8,127	62,722	0
3052 3053 3061 3069	2	0	146	19,600	19,746	0	5	26,200	0
3052 3061	11	0	166,021	13,939	179,960	55,020	154,767	392,722	0
3052 3069	16	0	30,853	87,166	118,019	5,913	12,398	124,660	0
3052 3069 3061 3089	5	0	1,000	37,270	38,270	18,150	69,460	109,280	0
3052 3081 3087	5	3	491	78,860	79,351	7,403	35	86,778	0
3052 3081 3089	7	7	0	0	0	0	0	0	0
3052 3082	1	0	0	0	0	0	750	2,308	0
3052 3087	7	3	1,010	43,069	44,079	13,741	505	57,290	0
3053 3061	14	0	1,471,720	111,223	1,582,943	2,535,030	84,037	4,206,821	0
3053 3061 3069	9	0	253,170	10,800	263,970	0	123,612	387,512	0
3053 3069	12	0	131,182	43,551	174,733	72,481	58,799	310,730	0
3053 3069 3082 3086 3089	6	0	23,724	0	23,724	0	95,246	118,970	0
3053 3089	1	0	40	4,000	4,040	0	0	4,100	0
3061 3069	7	0	66,409	37,440	103,849	6,700	10,556	121,198	0
3061 3069 3089	4	2	500	936	1,436	0	500	1,144	0
3061 3083	1	0	4,931	0	4,931	150,024	250	155,333	0
3061 3086	1	1	0	0	0	0	0	0	0
3061 3089	1	0	0	1,259	1,259	0	0	1,259	0
3069 3079	2	0	28,769	0	28,769	1,080	1,250	31,099	0
3069 3081	2	0	0	2,081	2,081	12,000	0	14,081	0
3069 3087	26	6	26,355	266,030	292,385	0	40,202	329,250	0
3069 3089	27	0	502,960	140,309	643,269	838,854	221,643	1,690,857	0
3079 3088	2	0	10,934	0	10,934	0	0	10,934	0
3081 3082 3083	8	5	0	14,824	14,824	0	0	14,824	0
3081 3082 3083 3084 3086 3087	3	1	0	0	0	0	0	0	0
3081 3083	27	0	1,259,578	18,575	1,278,153	4,062,670	590,777	5,911,819	0
3081 3083 3086	4	2	3,930	2,050	5,980	0	0	6,290	0
3081 3083 3089	1	1	0	0	0	0	0	0	0
3081 3084	1	0	21,945	0	21,945	0	0	22,194	0
3081 3087	5	5	0	0	0	0	0	0	0
3081 3088	5	0	187,951	3,858	191,809	0	88,522	280,331	0
3081 3089	9	0	70,290	5,394	75,684	2,660,800	2,210,162	4,946,656	0
3082 3087	2	0	12,374	11,000	23,374	0	5,815	17,691	0
3082 3087 3089	2	0	28,828	0	28,828	0	0	28,828	0
3082 3089	8	2	106,026	0	106,026	31,400	6,738	130,850	300
3083 3087	3	0	48,267	0	48,267	0	750	48,803	0
3083 3089	4	0	123,300	5,200	128,500	0	20,500	147,200	0
3084 3089	1	0	3,896	0	3,896	0	0	3,896	0
3086 3089	17	2	680,916	0	680,916	100	7,064	691,055	0
3087 3088	1	0	11,345	0	11,345	0	0	11,345	0
3087 3089	30	0	227,914	169,868	397,782	306,410	82,963	777,226	5,600
3088 3087 3089	2	0	8,200	0	8,200	0	0	8,200	0
3088 3089	3	0	5,916	0	5,916	0	0	3,537	0
30 3079	1	0	0	0	0	3,700	0	3,700	0
Total for SIC Code 30	321	40	5,576,293	1,183,557	6,759,850	10,838,269	3,937,953	21,446,604	5,900

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Figure 9-1 illustrates the dominant role of air emissions among all releases reported in this sector. Figure 9-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

Recycling was the largest category of other on-site waste management for the rubber and plastics sector in 1996. As shown in Table 9-4 and Figure 9-3,

Table 9-3. TRI On-site and Off-site Releases, 1996: Rubber and Plastics Products, SIC Code 30 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3089	Plastics Products, nec*	31,788,725	4,479	0	0	24,819	169,465	31,987,488	2,564,966	34,552,454
3086	Plastics Foam Products	30,803,210	5	0	0	0	18,117	30,821,332	462,972	31,284,304
3069	Fabricated Rubber Products, nec*	7,469,029	4,222	750	0	21,336	30,851	7,526,188	1,804,432	9,330,620
3088	Plastics Plumbing Fixtures	7,939,090	0	0	0	0	5	7,939,095	29,880	7,968,975
3083	Laminated Plastics Plate & Sheet	7,045,193	100	0	0	0	4,414	7,049,707	6,707	7,056,414
	Multiple within SIC Code 30	5,549,123	1,815	0	0	2,763	22,592	5,576,293	1,183,557	6,759,850
3011	Tires & Inner Tubes	2,377,898	10,439	0	0	0	19,216	2,407,553	2,577,771	4,985,324
3081	Unsupported Plastics Film & Sheet	4,399,070	216	0	0	0	2,506	4,401,792	62,365	4,464,157
3052	Rubber & Plastics Hose & Belting	2,380,117	6,020	0	0	0	34,917	2,421,054	1,103,615	3,524,669
3053	Gaskets, Packing & Sealing Devices	1,751,700	18	0	0	0	3,845	1,755,563	112,935	1,868,498
	Invalid SIC Code within SIC Code 30	1,181,998	2	0	0	0	0	1,182,000	33,827	1,215,827
3087	Custom Compound Purchased Resins	574,133	299	0	0	0	34,797	609,229	480,614	1,089,843
3061	Mechanical Rubber Goods	801,424	200	0	0	0	57,500	859,124	140,274	999,398
3021	Rubber & Plastics Footwear	862,298	0	0	0	0	0	862,298	32,454	894,752
3082	Unsupported Plastics Profile Shapes	224,187	0	0	0	0	142	224,329	21,317	245,646
3084	Plastics Pipe	168,265	0	0	0	0	0	168,265	0	168,265
3085	Plastics Bottles	295	0	0	0	0	0	295	0	295
	Total for SIC Code 30	105,315,755	27,815	750	0	48,918	398,367	105,791,605	10,617,686	116,409,291

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
*nec: not elsewhere classified.

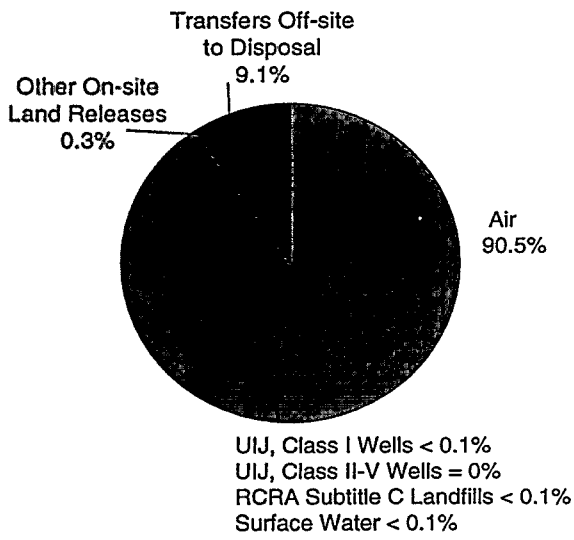


Figure 9-1. Distribution of TRI On-site and Off-site Releases, 1996: Rubber and Plastics Products (SIC Code 30)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. UIJ = underground injection.

on-site recycling totaled 162.1 million pounds, nearly three quarters of the on-site waste management reported. More than half (55.7%) of this amount, 90.3 million pounds, was reported in the rubber and plastics hose and belting industry (SIC code 3052), primarily by one facility as noted above.

Other methods of on-site waste management had considerably smaller amounts. Treatment totaled 39.0 million pounds, led by miscellaneous plastics products (SIC code 3089) with 13.7 million pounds and unsupported plastics film and sheet (SIC code 3081) with 12.9 million pounds. Energy recovery on-site totaled 19.6 million pounds, and half of this amount (10.6 million pounds) was reported by the laminated plastics plate and sheet industry (SIC code 3083).

Figure 9-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

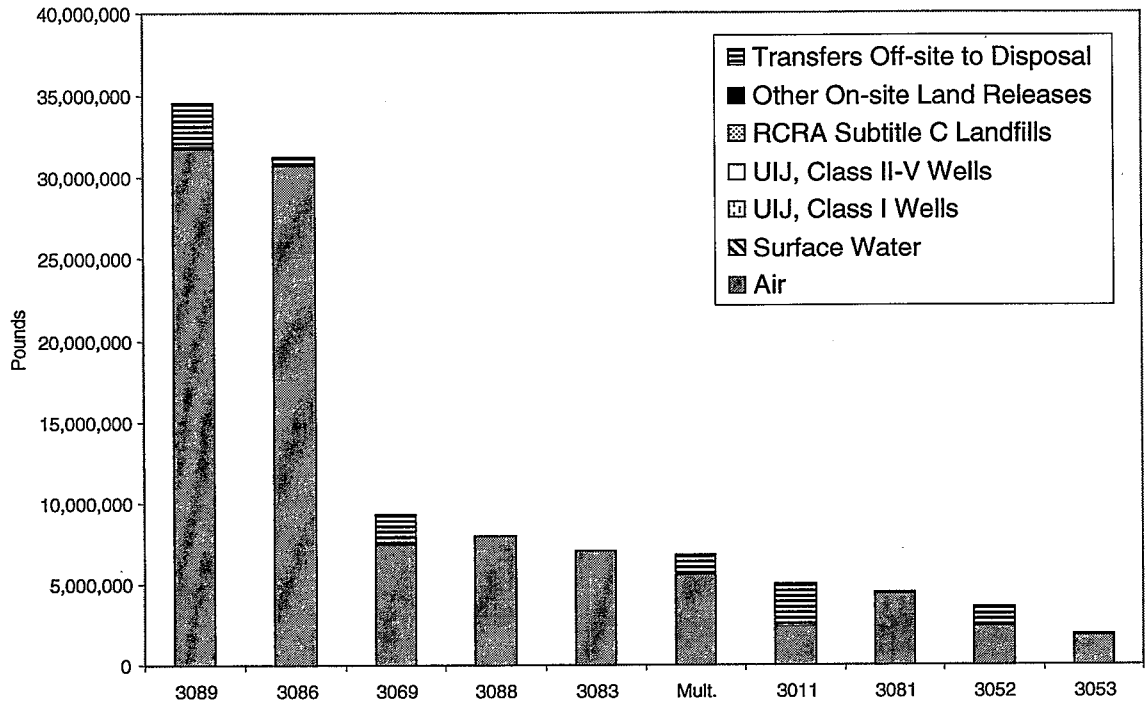


Figure 9-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Rubber and Plastics Products (SIC Code 30)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.

Table 9-4. TRI Other On-site Waste Management, 1996: Rubber and Plastics Products, SIC Code 30 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3052	Rubber & Plastics Hose & Belting	90,279,770	787,943	1,640,325	92,708,038
3081	Unsupported Plastics Film & Sheet	20,224,009	3,153,847	12,858,491	36,236,347
3089	Plastics Products, nec*	14,554,683	2,335,531	13,707,089	30,597,303
3086	Plastics Foam Products	16,044,545	0	761,367	16,805,912
3069	Fabricated Rubber Products, nec*	9,896,971	1,713,342	2,801,680	14,411,993
3083	Laminated Plastics Plate & Sheet	283,746	10,561,479	624,205	11,469,430
	Multiple within SIC Code 30	5,331,123	150,024	5,357,122	10,838,269
3011	Tires & Inner Tubes	2,113,611	720,000	157,933	2,991,544
3053	Gaskets, Packing & Sealing Devices	2,439,515	0	417,493	2,857,008
	Invalid SIC Code within SIC Code 30	60,458	175,977	429,576	666,011
3087	Custom Compound Purchased Resins	479,925	0	20,293	500,218
3061	Mechanical Rubber Goods	209,772	0	18,627	228,399
3082	Unsupported Plastics Profile Shapes	135,030	0	76,641	211,671
3084	Plastics Pipe	0	0	162,488	162,488
3021	Rubber & Plastics Footwear	9,482	0	0	9,482
3085	Plastics Bottles	0	0	3,004	3,004
3088	Plastics Plumbing Fixtures	0	0	9	9
	Total for SIC Code 30	162,062,640	19,598,143	39,036,343	220,697,126

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Transfers Off-site for Further Waste Management

Transfers off-site for further waste management of 24.7 million pounds represented a much smaller portion of all reporting in this industry than releases or other on-site waste management. As shown in Table 9-5 and Figure 9-5, transfers off-site to recycling were 11.8 million pounds, or 47.9% of the total. Miscellaneous plastics products (SIC code 3089) accounted for 3.3 million pounds of the transfers to recycling, and the group of TRI forms with multiple SIC codes reported another 2.7 million pounds. Miscellaneous plastics products also reported 2.0 million pounds transferred off-site for energy recovery, out of the 6.8 million pounds transferred off-site for energy recovery for the entire sector.

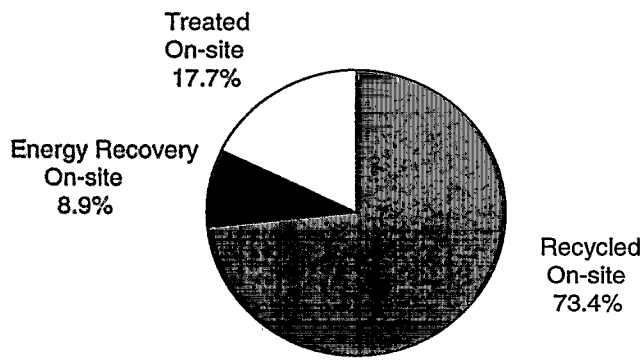


Figure 9-3. Distribution of TRI Other On-site Waste Management, 1996: Rubber and Plastics Products (SIC Code 30)

Note: Data from Section 8 of Form R.

Figure 9-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

1996 TRI Data by State for Rubber and Plastics Products

As shown in Table 9-6, 446 forms in this sector came from Ohio, more than any other state. Indiana

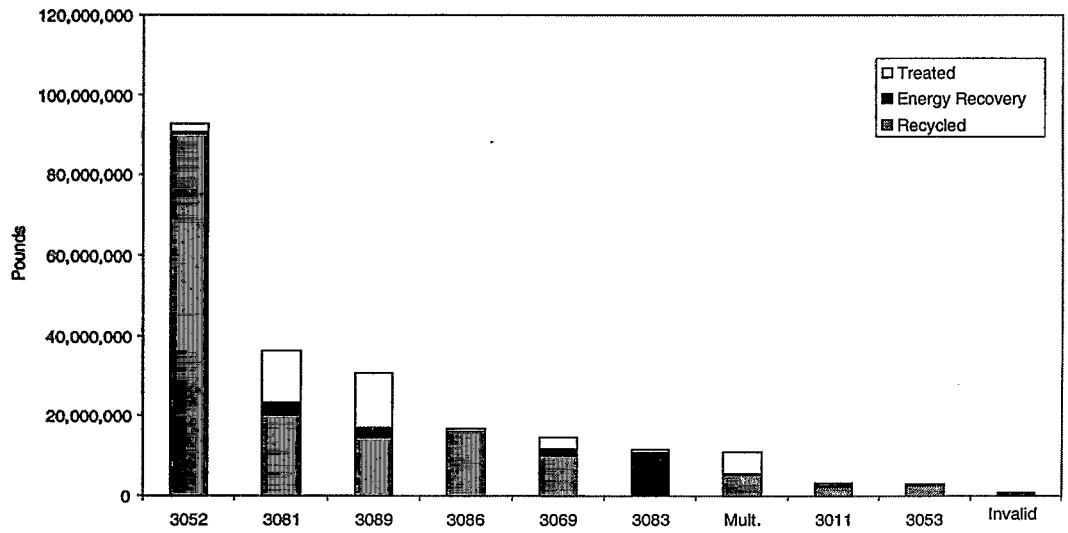


Figure 9-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Rubber and Plastics Products (SIC Code 30)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "30" that do not exist in the current Standard Industrial Classification code system.

Table 9-5. TRI Transfers Off-site for Further Waste Management, 1996: Rubber and Plastics Products, SIC Code 30 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3089	Plastics Products, nec*	3,252,620	2,008,938	511,302	388,747	250	6,161,857
	Multiple within SIC Code 30	2,692,165	795,630	409,304	40,854	0	3,937,953
3081	Unsupported Plastics Film & Sheet	667,460	1,177,872	668,145	52,906	328	2,566,711
3069	Fabricated Rubber Products, nec*	673,825	816,899	325,838	537,211	4,541	2,358,314
3083	Laminated Plastics Plate & Sheet	410,798	719,163	242,441	936,912	0	2,309,314
3011	Tires & Inner Tubes	1,355,478	94,155	188,299	37,888	0	1,675,820
3052	Rubber & Plastics Hose & Belting	1,248,573	227,971	26,685	12,221	0	1,515,450
3086	Plastics Foam Products	667,830	216,941	527,181	5,957	0	1,417,909
3061	Mechanical Rubber Goods	112,872	41,495	21,510	696,707	19,456	892,040
3053	Gaskets, Packing & Sealing Devices	154,946	396,149	164,785	1,544	0	717,424
3087	Custom Compound Purchased Resins	140,106	96,007	48,525	78,571	0	363,209
	Invalid SIC Code within SIC Code 30	184,039	121,394	3,141	24,750	0	333,324
3082	Unsupported Plastics Profile Shapes	196,056	3,957	21,106	75,831	0	296,950
3021	Rubber & Plastics Footwear	25,107	20,110	0	0	0	45,217
3088	Plastics Plumbing Fixtures	16,806	4,265	11,045	764	0	32,880
3084	Plastics Pipe	18,602	9,742	0	0	0	28,344
3085	Plastics Bottles	0	0	0	0	0	0
	Total for SIC Code 30	11,817,283	6,750,688	3,169,307	2,890,863	24,575	24,652,716

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

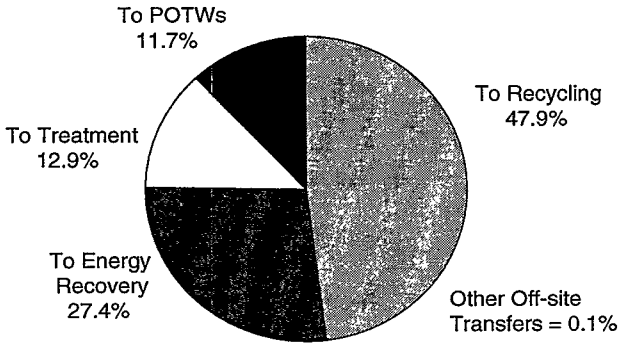


Figure 9-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Rubber and Plastics Products (SIC Code 30)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

was second with 304, and two states had more than 200 forms each: Texas with 208 and Illinois with 203.

States with the largest on- and off-site releases were Indiana with 12.7 million pounds and Tennessee with 12.5 million pounds. Illinois was third with 10.6 million pounds. The three accounted for a little over 30% of total on-and off-site releases in the rubber and plastics products sector.

By far the largest other on-site waste management was reported in Kansas: 102.4 million pounds or 46.4% of the total on-site waste management in this sector. Kansas is the location of the facility with the largest on-site recycling reported in this sector, which accounted for 89.2 million pounds of the on-site waste management reported in this sector. The state with the second-largest reported amount of on-site waste management was Kentucky with 14.5 million pounds, followed by three states with more than 10 million pounds each: Florida, 10.7

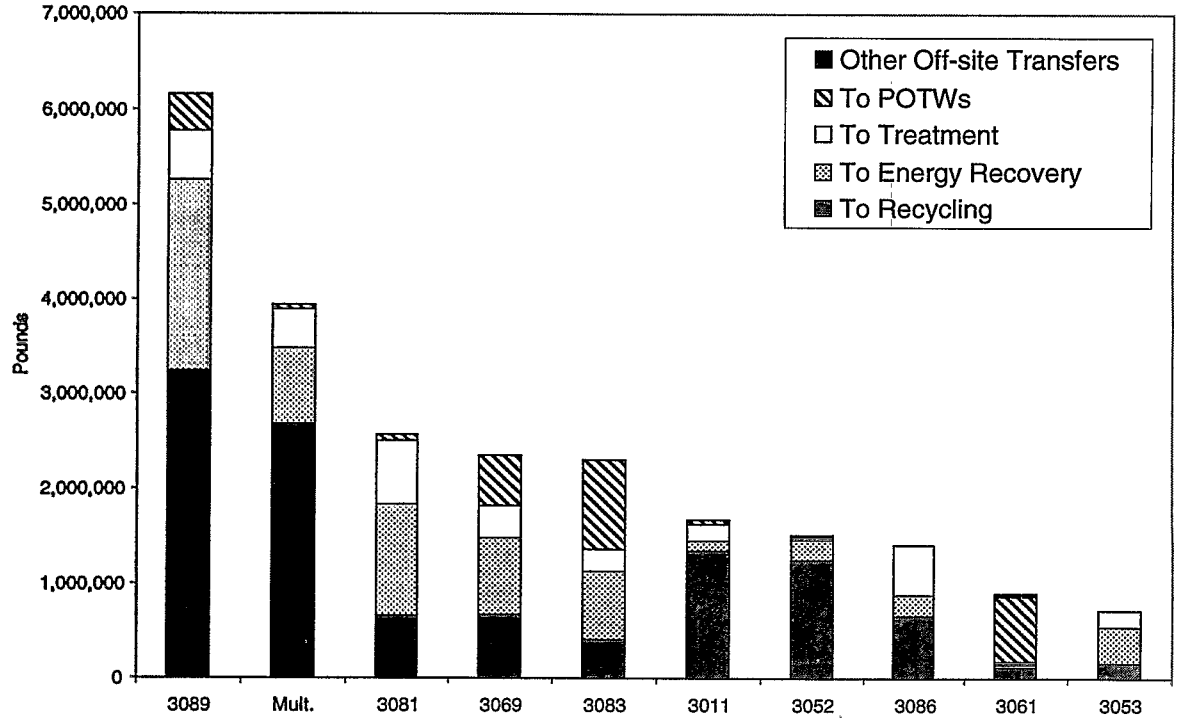


Figure 9-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Rubber and Plastics Products (SIC Code 30)

Note: **Off-site Transfers for Further Waste Management** from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.

million pounds; Missouri, 10.4 million pounds; and Texas, 10.3 million pounds.

Amounts transferred off-site for further waste management were largest in Ohio, with 3.2 million pounds and Arkansas with 2.9 million pounds. No other state had more than 2 million pounds of such transfers.

Total production-related waste was 103.9 million pounds in Kansas, reflecting the large quantity of on-site recycling by one facility. Indiana had 22.3 million pounds and Kentucky 17.3 million pounds. Another 10 states had total production- related waste of amounts ranging from 11 million to 16 million pounds, indicating the geographic diversity of the sector.

Map 9-1 illustrates the geographic distribution of total on- and off-site releases in the rubber and plastics products sector.

1996 TRI Data by Chemical for Rubber and Plastics Products

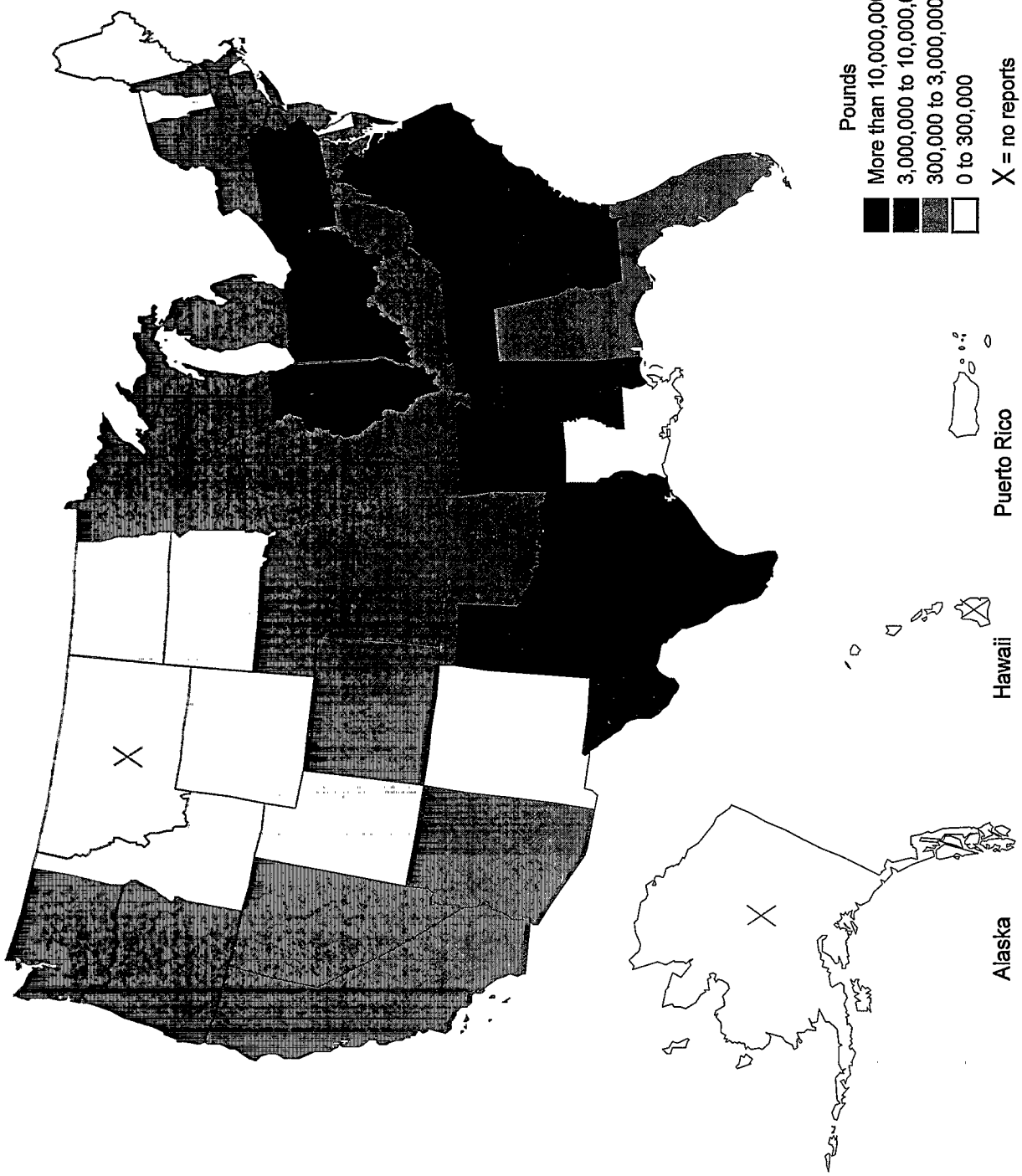
Air emissions were the primary release type for 13 of the top 15 chemicals for total on- and off-site releases in this sector. This is consistent with the role of air emissions in the rubber and plastics products sector as a whole, as discussed above. As shown in Table 9-7, more dichloromethane was released to air in the rubber and plastics products sector than any other chemical, with 24.9 million pounds. This made dichloromethane the chemical

Table 9-6. Summary of TRI Information by State, 1996: Rubber and Plastics Products, SIC Code 30

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	29	65	1	1,584,388	194,253	1,778,641	2,275,700	897,701	5,126,033	2
Arizona	24	41	4	592,503	1,074	593,577	25	61,771	648,598	0
Arkansas	30	84	5	2,935,010	180,113	3,115,123	3,287,929	2,863,481	9,407,118	5,410
California	89	169	17	2,108,979	477,928	2,586,907	3,650,601	767,088	6,944,532	3,588
Colorado	14	21	0	295,485	20,161	315,646	572,601	23,791	903,844	0
Connecticut	18	33	2	781,538	5,264	786,802	1,155,027	301,128	2,196,993	65
Delaware	8	13	0	168,320	2,182	170,502	2,933,124	232,650	3,326,924	9,500
Florida	49	70	3	2,354,680	31,591	2,386,271	10,740,996	553,020	13,906,208	1,320
Georgia	65	120	15	3,737,219	197,319	3,934,538	2,501,820	823,080	7,774,789	7
Idaho	1	1	0	22,600	0	22,600	0	0	22,600	0
Illinois	96	203	18	10,089,432	472,037	10,561,469	2,279,038	1,295,121	14,289,985	7,012
Indiana	125	304	23	11,770,102	911,071	12,681,173	7,868,807	1,638,205	22,332,224	50,010
Iowa	30	45	6	1,484,629	94,017	1,578,646	178,355	162,212	1,811,733	0
Kansas	21	49	8	879,683	222,806	1,102,489	102,444,162	358,989	103,862,703	0
Kentucky	35	65	3	2,411,397	75,120	2,486,517	14,485,372	279,963	17,308,652	1,426
Louisiana	8	16	3	173,127	10	173,137	5	0	180,922	0
Maine	7	13	3	77,252	17,300	94,552	0	12,871	90,738	1
Maryland	13	25	7	464,015	19,960	483,975	102,138	102,499	662,116	0
Massachusetts	40	91	15	1,104,455	101,603	1,206,058	5,477,510	769,530	7,453,598	0
Michigan	74	135	14	1,953,631	189,299	2,142,930	811,887	506,779	3,394,509	16,650
Minnesota	38	58	4	881,706	47,716	929,422	75,065	1,041,626	2,062,647	0
Mississippi	32	57	2	3,688,184	155,272	3,843,456	180,022	412,435	4,440,256	0
Missouri	50	103	5	1,890,441	286,297	2,176,738	10,380,263	848,870	13,450,456	1,532
Nebraska	12	35	0	1,387,095	245,188	1,632,283	208,594	167,880	1,993,605	614
Nevada	6	15	1	645,720	22,908	668,628	400	0	669,520	0
New Hampshire	11	25	0	477,805	33,164	510,969	444,288	111,973	1,177,755	300
New Jersey	46	101	13	431,371	78,447	509,818	1,927,350	479,690	2,886,375	2
New Mexico	3	4	1	13,934	0	13,934	45,635	806	59,560	0
New York	39	72	3	1,973,208	324,091	2,297,299	2,718,819	470,422	5,405,390	0
North Carolina	98	198	16	6,386,579	714,846	7,101,425	5,874,343	1,049,344	13,937,883	43
North Dakota	3	3	0	33,967	0	33,967	9,966	1,350	43,506	0
Ohio	186	446	50	5,759,325	1,320,136	7,079,461	3,271,697	3,214,022	13,883,644	5,650
Oklahoma	18	39	1	620,959	356,998	977,957	478,397	457,880	1,929,495	0
Oregon	18	23	0	1,410,762	1,290	1,412,052	10,302	9,294	1,426,722	2,511
Pennsylvania	90	174	12	5,738,713	288,302	6,027,015	3,387,181	714,657	9,793,927	340
Puerto Rico	7	10	2	155,614	0	155,614	206,244	14,093	343,494	500
Rhode Island	13	31	6	212,036	21,938	233,974	3,712,581	372,758	11,436,260	2,978
South Carolina	46	121	6	7,082,113	395,856	7,477,969	7,846,320	926,631	16,321,169	6,200
South Dakota	4	7	0	108,842	43,751	152,593	35,309	12,912	200,068	0
Tennessee	72	161	12	10,316,011	2,233,879	12,549,890	765,227	612,432	14,248,298	300
Texas	113	208	29	4,148,625	313,474	4,462,099	10,273,761	812,954	15,188,008	112
Utah	7	17	0	272,896	5,410	278,306	31,314	5,507	282,485	0
Vermont	2	4	2	2,647	689	3,336	0	0	3,335	0
Virginia	39	92	4	4,369,281	206,494	4,575,775	6,984,687	427,291	11,954,289	15,168
Washington	17	32	6	825,049	6,272	831,321	89,346	6,439	918,311	1
West Virginia	12	23	4	681,859	38,064	719,923	19,598	65,198	790,987	0
Wisconsin	65	124	16	1,288,418	264,096	1,552,514	955,320	766,373	3,297,998	0
Wyoming	1	1	1	0	0	0	0	0	0	0
Total for SIC Code 30	1,824	3,747	343	105,791,605	10,617,686	116,409,291	220,697,126	24,652,716	369,790,262	131,242

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Map 9-1. Total On- and Off-site Releases, 1996: Rubber and Plastics Products, SIC Code 30



Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

Table 9-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Rubber and Plastics Products, SIC Code 30 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
75-09-2	Dichloromethane	24,936,111	10	0	0	0	1,162	24,937,283	5,274	24,942,557
100-42-5	Styrene	19,980,164	18	0	0	23,500	144,214	20,147,896	2,318,865	22,466,761
75-15-0	Carbon disulfide	12,588,600	404	0	0	0	0	12,589,004	0	12,589,004
108-88-3	Toluene	10,647,737	689	0	0	3,212	0	10,651,638	33,262	10,684,900
78-93-3	Methyl ethyl ketone	7,839,262	0	0	0	0	0	7,839,262	34,619	7,873,881
--	Zinc compounds	184,658	12,363	0	0	9,474	69,408	275,903	4,810,788	5,086,691
67-56-1	Methanol	4,764,537	0	0	0	0	77	4,764,614	697	4,765,311
110-54-3	n-Hexane	4,258,280	5	0	0	0	0	4,258,285	2,750	4,261,035
1330-20-7	Xylene (mixed isomers)	3,151,126	10	0	0	0	0	3,151,136	200	3,151,336
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)	2,167,161	0	0	0	0	5,353	2,172,514	123,439	2,295,953
75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	1,888,731	0	0	0	0	0	1,888,731	0	1,888,731
108-95-2	Phenol	1,491,565	1,461	0	0	0	4,576	1,497,602	96,094	1,593,696
108-10-1	Methyl isobutyl ketone	1,584,572	0	0	0	0	0	1,584,572	250	1,584,822
117-81-7	Di-(2-ethylhexyl) phthalate	296,350	26	0	0	250	57,512	354,138	1,154,421	1,508,559
--	Glycol ethers	1,215,913	4,306	0	0	0	15,269	1,235,488	81,921	1,317,409
	Subtotal	96,994,767	19,292	0	0	36,436	297,571	97,348,066	8,662,580	106,010,646
	Total for SIC Code 30	105,315,755	27,815	750	0	48,918	398,367	105,791,605	10,617,686	116,409,291

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

with the largest on-site releases and the largest total on- and off-site releases. The largest industrial source of dichloromethane releases in this sector was the plastics foam products industry (SIC code 3086), with 23.3 million pounds. Dichloromethane serves as a blowing agent in production of plastics foam.

Styrene ranked second in air emissions, on-site releases, off-site releases, and total releases; it also had the largest on-site land releases. Carbon disulfide ranked third for total releases, almost exclusively as air emissions These chemicals were reported in large amounts by producers of miscellaneous plastics products (SIC code 3089). This industry reported 10.2 million pounds of air emissions of styrene and 2.1 million pounds in off-site releases (transfers to disposal). Styrene is a component of many plastics production processes, including fiberglass. All reported releases of carbon disulfide in this sector originated in the miscellaneous plastics products industry, although the chemical has uses in rubber production as well.

Off-site releases (transfers to disposal) were led by zinc compounds, with 4.8 million pounds. This was also the chemical with the largest surface water discharges (12,000 pounds). The manufacture of rubber products often relies on zinc compounds for several purposes, such as processing aid and vulcanizing accelerator. Among the top 15 chemicals, only zinc compounds and di-(2-ethylhexyl) phthalate had off-site releases larger than on-site releases.

OSHA Carcinogens

In the rubber and plastics sector, on- and off-site releases of chemicals designated as OSHA carcinogens totaled 51.0 million pounds in 1996, as shown in Table 9-8. This represented 43.8% of all releases in this sector. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) Consistent with the pattern of releases in

Table 9-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Rubber and Plastics Products, SIC Code 30 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3086	Plastics Foam Products	23,461,382	5	0	0	0	1,681	23,463,068	25,488	23,488,556
3089	Plastics Products, nec*	11,355,557	261	0	0	23,750	166,174	11,545,742	2,090,712	13,636,454
3088	Plastics Plumbing Fixtures	7,874,057	0	0	0	0	5	7,874,062	29,880	7,903,942
	Multiple within SIC Code 30	730,112	24	0	0	2,763	11,250	744,149	497,397	1,241,546
3069	Fabricated Rubber Products, nec*	460,912	1	0	0	0	750	461,663	581,194	1,042,857
3083	Laminated Plastics Plate & Sheet	928,263	0	0	0	0	204	928,467	1,590	930,057
3052	Rubber & Plastics Hose & Belting	309,933	0	0	0	0	25,292	335,225	300,584	635,809
	Invalid SIC Code within SIC Code 30	502,730	2	0	0	0	0	502,732	11,877	514,609
3081	Unsupported Plastics Film & Sheet	441,917	8	0	0	0	5	441,930	3,019	444,949
3087	Custom Compound Purchased Resins	376,020	12	0	0	0	8	376,040	66,132	442,172
3011	Tires & Inner Tubes	49,347	80	0	0	0	0	49,427	184,722	234,149
3084	Plastics Pipe	168,038	0	0	0	0	0	168,038	0	168,038
3053	Gaskets, Packing & Sealing Devices	137,937	0	0	0	0	0	137,937	0	137,937
3082	Unsupported Plastics Profile Shapes	81,195	0	0	0	0	0	81,195	15,719	96,914
3061	Mechanical Rubber Goods	45,729	0	0	0	0	0	45,729	255	45,984
3021	Rubber & Plastics Footwear	3,265	0	0	0	0	0	3,265	5,292	8,557
	Subtotal	46,926,394	393	0	0	26,513	205,369	47,158,669	3,813,861	50,972,530
	Total for SIC Code 30	105,315,755	27,815	750	0	48,918	398,367	105,791,605	10,617,686	116,409,291

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
*nec: not elsewhere classified

this sector, 92.1% (46.9 million pounds) of these releases were air emissions.

Plastics foam products (SIC code 3086) reported the largest total releases of the OSHA carcinogens, 23.5 million pounds. The miscellaneous plastics products industry group (SIC code 3089) had 13.6 million pounds, and plastics plumbing fixtures (SIC code 3088) reported 7.9 million pounds.

The top two chemicals for total releases in this sector, dichloromethane and styrene, are both OSHA carcinogens. Total releases for these chemicals were 24.9 million pounds and 22.5 million pounds, respectively (see Table 9-7). Releases of other OHSA carcinogens were reported in smaller amounts: One other TRI chemical among the top 15 chemicals released in this sector was an OSHA carcinogen. This was di-(2-ethylhexyl) phthalate (1.5 million pounds). The OSHA carcinogen with the next-largest releases was trichloroethylene (918,000 pounds).

Figure 9-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Rubber and Plastics Products

Table 9-9 and Figure 9-8 present 1996 waste management data for the industries in rubber and plastics products manufacturing. Production-related waste totaled 369.8 million pounds in 1996. The industry within the sector with the largest on-site waste management was rubber and plastics hose and belting (SIC code 3052). Of the 97.8 million pounds of production-related waste reported in this industry, 90.3 million pounds was on-site recycling and 89.2 million pounds of this was reported by one facility, as noted throughout this chapter.

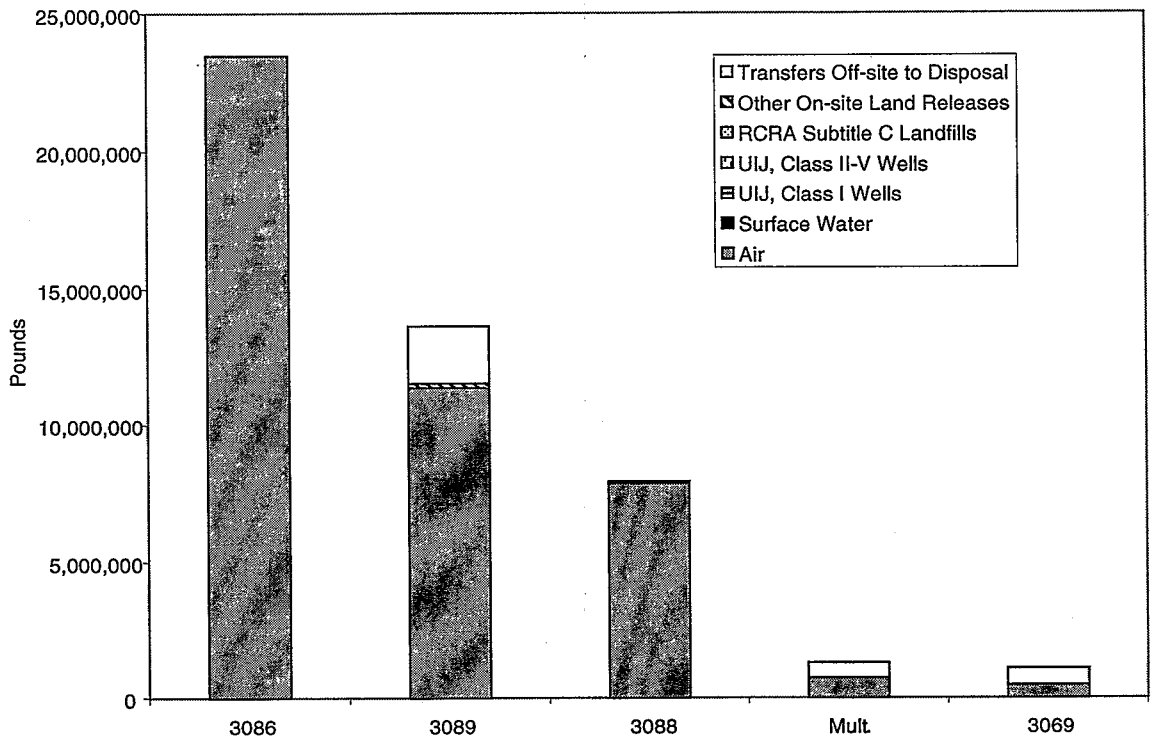


Figure 9-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Rubber and Plastics Products (SIC Code 30)

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.

Table 9-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Rubber and Plastics Products, SIC Code 30 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3052	Rubber & Plastics Hose & Belting	90,279,770	787,943	1,640,325	1,229,184	224,936	34,841	3,594,469	97,791,468	614
3089	Plastics Products, nec*	14,554,683	2,335,531	13,707,089	4,295,212	2,753,857	873,325	34,382,585	72,902,282	531
3081	Unsupported Plastics Film & Sheet	20,224,009	3,153,847	12,858,491	7,756,166	1,309,195	780,433	4,428,903	50,511,044	3,070
3086	Plastics Foam Products	16,044,545	0	761,367	625,037	188,526	492,523	31,089,650	49,201,648	85,257
3069	Fabricated Rubber Products, nec*	9,896,971	1,713,342	2,801,680	648,956	1,003,320	906,867	9,715,226	26,686,362	6,755
	Multiple within SIC Code 30	5,331,123	150,024	5,357,122	2,660,942	808,657	399,799	6,738,937	21,446,604	5,900
3083	Laminated Plastics Plate & Sheet	283,746	10,561,479	624,205	409,539	644,381	1,184,040	7,044,208	20,751,598	1,300
3011	Tires & Inner Tubes	2,113,611	720,000	157,933	1,432,541	94,785	74,106	5,075,366	9,668,342	0
3088	Plastics Plumbing Fixtures	0	0	9	30,246	4,040	10,857	7,322,263	7,367,415	2,511
3053	Gaskets, Packing & Sealing Devices	2,439,515	0	417,493	153,477	395,304	54,232	1,782,907	5,242,928	7,012
	Invalid SIC Code within SIC Code 30	60,458	175,977	429,576	169,553	121,212	40,941	1,248,387	2,246,104	0
3061	Mechanical Rubber Goods	209,772	0	18,627	122,392	37,163	722,847	965,425	2,076,226	1,532
3087	Custom Compound Purchased Resins	479,925	0	20,293	99,481	95,437	138,908	1,047,595	1,881,639	16,650
3021	Rubber & Plastics Footwear	9,482	0	0	25,057	47,208	0	895,938	977,685	0
3082	Unsupported Plastics Profile Shapes	135,030	0	76,641	196,056	3,957	95,669	188,966	696,319	110
3084	Plastics Pipe	0	0	162,488	12,502	0	0	164,514	339,504	0
3085	Plastics Bottles	0	0	3,004	0	0	0	90	3,094	0
	Total for SIC Code 30	162,062,640	19,598,143	39,036,343	19,866,341	7,731,978	5,809,388	115,685,429	369,790,262	131,242

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

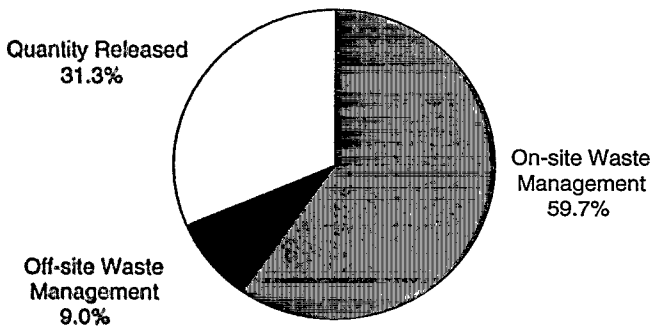


Figure 9-8. Distribution of TRI Production-related Waste, 1996: Rubber and Plastics Products (SIC Code 30)

Note: Data from Section 8 of Form R.

Other reporting of production-related waste was somewhat more diverse. Miscellaneous plastics products (SIC code 3089), which was second overall, had the largest quantities treated on-site (13.7 million pounds), sent off-site for energy recovery (2.8 million pounds), and released on- and off-site (34.4 million pounds). Producers of laminated plastics plate and sheet (SIC code 3083) reported the largest quantities of on-site energy recovery (10.6 million pounds) and the largest quantities treated off-site (1.2 million pounds). Unsupported plastics film and sheet (SIC code 3081) was first for off-site recycling (7.8 million pounds).

Distribution of production-related waste for the top industries in the sector appears in Figure 9-9.

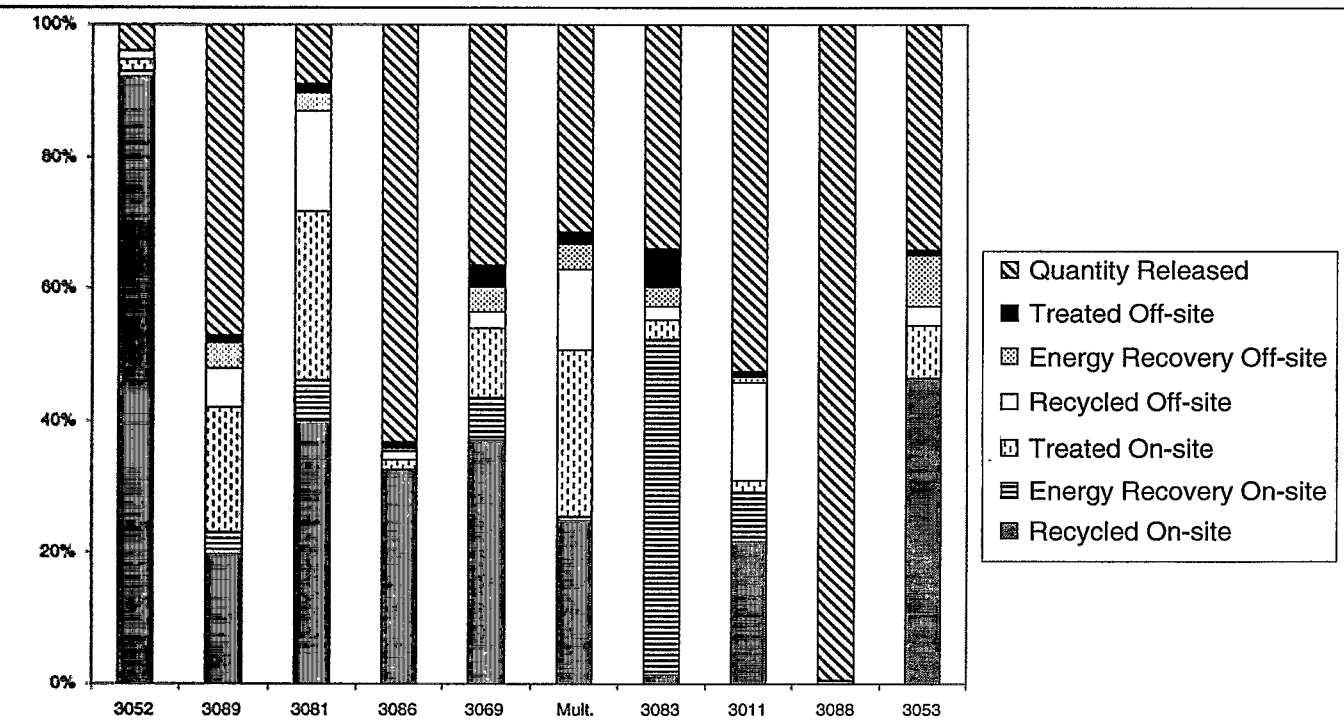


Figure 9-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Rubber and Plastics Products (SIC Code 30)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC Code within SIC code 30 are assigned to the "multiple" category.

Projected Quantities of TRI Chemicals in Waste

Reported amounts on TRI forms filed for 1996 in the rubber and plastics products sector projected that total production-related waste would decrease by 90.0 million pounds, or nearly one fourth (24.3%), by reporting year 1998. As shown in Table 9-10, the largest percentage reduction, 53.6%, was expected in on-site recycling; this would be a decrease of 86.8 million pounds. This reflects further reductions anticipated by the facility reporting the largest amount of on-site recycling. Table 9-10 shows current year and projected waste management data, and percentage changes are illustrated in Figure 9-10. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.)

The quantity released on- and off-site was also projected to decline, by 16.9 million pounds or 14.6%. Such releases constituted nearly one-third (31.3%) of total production-related waste in this sector in 1996. Despite the projected decrease, quantities released would form a larger proportion (35.3%) of production-related waste in 1998, because of the much larger drop in on-site recycling. This sector reports releasing a greater proportion of production-related waste than do many others.

Increases were projected in most other types of waste management in this sector, although the quantities involved are smaller. In particular, on-site energy recovery and treatment were projected to increase (by 10.0% and 27.4%, respectively).

These projected changes suggest that the sector does not expect to improve its management of TRI chemicals in waste, as measured against the waste management hierarchy. In that hierarchy, as explained in Chapter 1, recycling is the preferred management option for waste that is not prevented or cannot be prevented in the first place. The least desirable option is releasing the chemical to the environment. In these terms, projections in the rubber and plastics products sector indicate that less desirable performance is expected.

Source Reduction Activity

Of the 3,747 forms submitted in the rubber and plastics products sector, 800 reported source reduction activity during 1996. Table 9-11 shows the number of forms and categories of source reduction activity by four-digit SIC code. Rubber and plastics footwear manufacturers (SIC code 3021) had the highest percentage (64.5%) of forms indicating source reduction activity. In several industries, 25% to 35% of the forms reported such activities. Miscellaneous fabricated rubber products (SIC code 3069) and miscellaneous plastics products (SIC code 3089), which accounted for a substantial proportion of the sector's releases, had about 21% of forms with source reduction activity.

Good operating practices was the category most often reported (289 forms). Two others were also cited on more than 200 forms each: raw material modifications (241 forms) and process modifications (207 forms). Such modifications often represent more innovative pollution prevention projects.

Year-to-Year Comparisons for Rubber and Plastics Products

1995-1996 TRI Data for Rubber and Plastics Products

Although the number of forms submitted in the rubber and plastics products sector dropped 4.4% from 1995 to 1996, the number of Form A certification statements increased 15.9%, as shown in Table 9-12. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the Form A certification statement in its second year of availability.

Table 9-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Rubber and Plastics Products, SIC Code 30

Waste Management Activity	Current Year 1996 Total Pounds	Current Year 1996 Percent of Total	Projected 1997 Total Pounds	Projected 1997 Percent of Total	Projected 1998 Total Pounds	Projected 1998 Percent of Total
On-site Waste Management						
Recycled On-site	162,062,640	43.8	120,820,121	38.1	75,247,536	26.9
Energy Recovery On-site	19,598,143	5.3	21,003,772	6.6	21,560,812	7.7
Treated On-site	39,036,343	10.6	34,802,671	11.0	49,746,655	17.8
Off-site Waste Management						
Recycled Off-site	19,866,341	5.4	20,526,534	6.5	20,934,761	7.5
Energy Recovery Off-site	7,731,978	2.1	8,003,170	2.5	7,526,913	2.7
Treated Off-site	5,809,388	1.6	5,723,015	1.8	5,959,877	.21
Quantity Released On- and Off-site	115,685,429	31.3	106,222,829	33.5	98,793,085	35.3
Total Production-related Waste for SIC Code 30	369,790,262	100.0	317,102,112	100.0	279,769,639	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-25.4	-37.7	-53.6
Energy Recovery On-site	7.2	2.7	10.0
Treated On-site	-10.8	42.9	27.4
Off-site Waste Management			
Recycled Off-site	3.3	2.0	5.4
Energy Recovery Off-site	3.5	-6.0	-2.7
Treated Off-site	-1.5	4.1	2.6
Quantity Released On- and Off-site	-8.2	-7.0	-14.6
Total Production-related Waste for SIC Code 30	-14.2	-11.8	-24.3

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

On- and Off-site Releases

Releases on- and off-site decreased by 8.5% from 1995 to 1996, a decrease of 10.8 million pounds (see Table 9-12). This was largely the result of a corresponding decrease in air emissions (8.3%, or 9.5 million pounds), as would be expected with air emissions playing such a dominant role in the sector's releases. The reduction in releases to air came about equally from fugitive (4.8 million pounds) and point (4.7 million pounds) sources.

Off-site releases (transfers to disposal) decreased 10.6%, or 1.3 million pounds. Other release types showed large percentage changes, as illustrated in Figure 9-11, but these represent smaller absolute amounts. On-site land releases increased 46.7%, or 142,000 pounds.

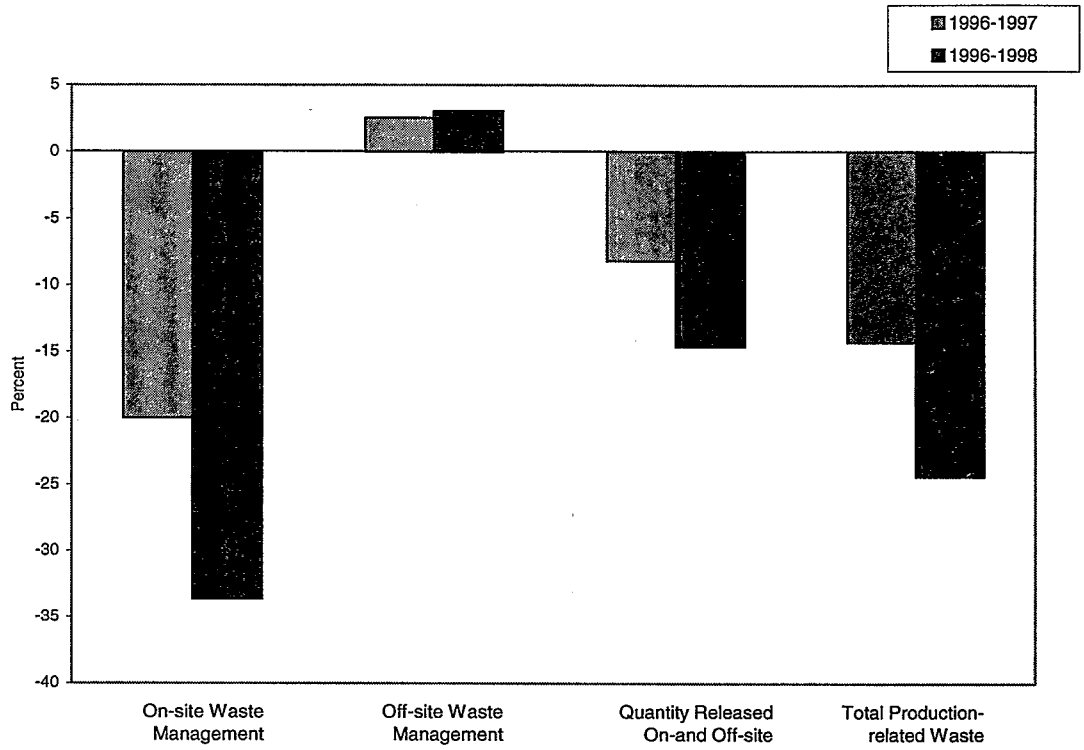


Figure 9-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Rubber and Plastics Products (SIC Code 30)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

Table 9-11. Number of Forms Reporting Source Reduction Activity, 1996: Rubber and Plastics Products, SIC Code 30

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3011	Tires & Inner Tubes	205	29	14.1	8	4	5	7	7	0	2	1
3021	Rubber & Plastics Footwear	31	20	64.5	16	1	0	4	0	0	0	0
3052	Rubber & Plastics Hose & Belting	129	26	20.2	11	4	2	5	7	1	2	7
3053	Gaskets, Packing & Sealing Devices	79	20	25.3	7	2	1	6	4	1	1	0
3061	Mechanical Rubber Goods	102	26	25.5	12	7	1	2	5	4	6	0
3069	Fabricated Rubber Products, nec*	476	99	20.8	34	15	6	18	29	5	13	13
3081	Unsupported Plastics Film & Sheet	160	50	31.3	13	4	14	10	7	4	1	11
3082	Unsupported Plastics Profile Shapes	41	14	34.1	4	1	1	5	4	0	4	2
3083	Laminated Plastics Plate & Sheet	110	29	26.4	6	3	3	6	16	9	2	3
3084	Plastics Pipe	15	0	0.0	0	0	0	0	0	0	0	0
3085	Plastics Bottles	6	0	0.0	0	0	0	0	0	0	0	0
3086	Plastics Foam Products	521	101	19.4	17	5	8	58	22	6	7	8
3087	Custom Compound Purchased Resins	361	53	14.7	24	4	5	24	7	1	0	8
3088	Plastics Plumbing Fixtures	164	26	15.9	6	0	0	10	10	2	8	2
3089	Plastics Products, nec*	952	205	21.5	87	16	23	55	63	16	24	10
	Multiple within SIC Code 30	321	78	24.3	35	2	19	26	22	2	8	7
	Invalid SIC Code within SIC Code 30	74	24	32.4	9	2	0	5	4	6	9	2
	Total for SIC Code 30	3,747	800	21.4	289	70	88	241	207	57	87	74

Note: Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 9-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Rubber and Plastics Products, SIC Code 30

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	1,881	1,824	-3.0
Total Forms	3,921	3,747	-4.4
Form Rs	3,625	3,404	-6.1
Form As	296	343	15.9
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	114,827,334	105,315,755	-8.3
Fugitive Air	32,349,396	27,540,757	-14.9
Point Source Air	82,477,938	77,774,998	-5.7
Surface Water Discharges	152,593	27,815	-81.8
Underground Injection	5	750	14,900.0
On-site Land Releases	304,898	447,285	46.7
Total On-site Releases	115,284,830	105,791,605	-8.2
Off-site Releases			
Transfers Off-site to Disposal	11,883,163	10,617,686	-10.6
Total On- and Off-site Releases	127,167,993	116,409,291	-8.5
Other On-site Waste Management			
Recycled On-site	311,405,281	162,062,640	-48.0
Energy Recovery On-site	21,703,785	19,598,143	-9.7
Treated On-site	47,308,429	39,036,343	-17.5
Total Other On-site Waste Management	380,417,495	220,697,126	-42.0
Transfers Off-site for Further Waste Management			
Transfers to Recycling	19,534,871	11,817,283	-39.5
Transfers to Energy Recovery	7,541,660	6,750,688	-10.5
Transfers to Treatment	3,042,927	3,169,307	4.2
Transfers to POTWs	2,684,018	2,890,863	7.7
Other Off-site Transfers	13,156	24,575	86.8
Total Transfers Off-site for Further Waste Management	32,816,632	24,652,716	-24.9

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

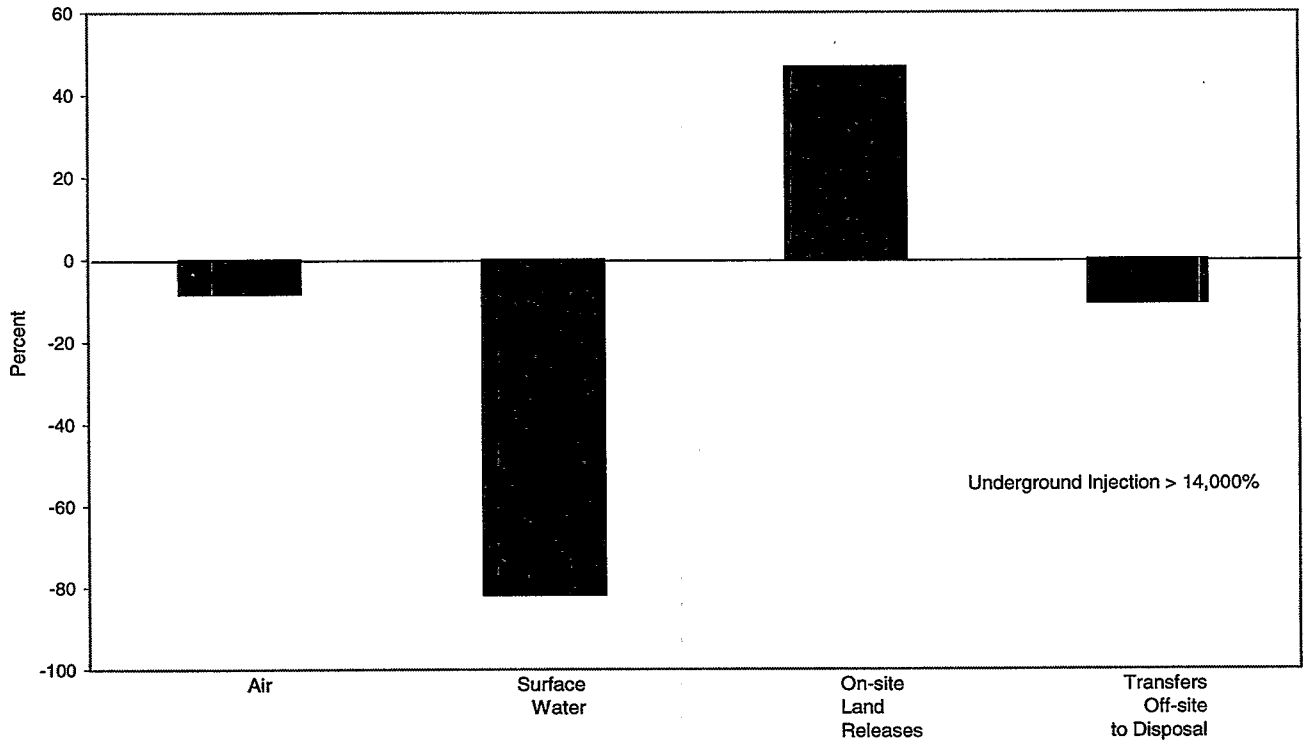


Figure 9-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Rubber and Plastics Products (SIC Code 30)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

Other On-site Waste Management

Table 9-12 also shows the changes from 1995 to 1996 in other on-site waste management for the rubber and plastics products sector. The largest change occurred in on-site recycling, which decreased by nearly half (48.0%, or 149.3 million pounds). This change was attributable to one facility that recorded a large reduction in on-site recycling of lead compounds, as discussed in "Facilities with Large Increases and Decreases in Waste Management, 1991-1996" later in this chapter.

On-site energy recovery and treatment also declined and, overall, other on-site waste management decreased 42.0% (159.7 million pounds) in the rubber and plastics products sector for 1995-1996.

Transfers Off-site for Further Waste Management

As with releases and other on-site waste management, transfers off-site for further waste management decreased from 1995 to 1996 in this sector. As shown in Table 9-12, the net decrease was 24.9%, or 8.2 million pounds. Transfers to recycling decreased by 39.5%, or 7.7 million pounds. A smaller reduction occurred in transfers to energy recovery, while the other off-site transfer types showed small increases.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different

understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Rubber and Plastics Products

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

From 1988 to 1996, reporting of on- and off-site releases of the "core" chemicals fell by one third (33.4%) in this sector. This was a decrease of 53.0 million pounds. In both percentage and pounds, the largest reduction occurred in air emissions, 35.1% or 51.4 million pounds. All release types decreased over the period except for on-site land releases. These data appear in Table 9-13. Figure 9-12 presents the percentage changes by release type.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, all of these categories showed decreases except on-site treatment. The largest reduction, in both pounds and percentage, occurred in on-site recycling, which decreased from 302.3 million pounds to 160.1 million pounds, or 47.1%; again this relates largely to a single facility.

For categories reported across the full 1988-1996 comparison period, transfers off-site to treatment decreased 69.9%, or 6.4 million pounds, while transfers to POTWs decreased 58.8%, or 777,000 pounds.

The number of forms filed in this sector increased 1.3% from 1988 to 1996, in contrast to the trend across all sectors. This is because submissions in rubber and plastics manufacturing showed a larger increase in the early years of TRI than was the case for all sectors taken together.

As noted early in this chapter, this sector has experienced pronounced growth through the 1990s. Decreases in releases, other on-site waste management, and transfers off-site for further waste management since 1988 were accomplished even as facilities expanded their production capacity and new facilities came on line.

1988-1996 Data for Four-Digit Industries in Rubber and Plastics Products

Tables 9-14 through 9-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 30. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The industry in the rubber and plastics products sector with the largest decrease in on-and off-site releases from 1988 to 1996 was miscellaneous fabricated rubber products (SIC code 3069). This industry's releases decreased 18.3 million pounds (67.5%). Forms that reported multiple SIC codes (explained earlier in this chapter) had total releases that decreased 6.4 million pounds (50.4%) during the comparison period. The industry with the third largest decrease was tires and inner tubes (SIC code 3011), with a 2.2-million-pound decrease (42.4%). These were all primarily reductions in air emissions.

Table 9-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Rubber and Plastics Products, SIC Code 30

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	1,469	1,801	1,743	1,672	13.8
Total Forms	3,096	3,393	3,292	3,136	1.3
Form Rs	3,096	3,393	3,069	2,871	-7.3
Form As	NA	NA	223	265	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	146,353,851	113,133,962	103,465,289	94,964,378	-35.1
Fugitive Air	40,654,046	31,044,869	26,883,985	23,286,889	-42.7
Point Source Air	105,699,805	82,089,093	76,581,304	71,677,489	-32.2
Surface Water Discharges	30,931	42,778	20,830	22,374	-27.7
Underground Injection	754	0	0	750	-0.5
On-site Land Releases	157,087	100,670	221,298	390,070	148.3
Total On-site Releases	146,542,623	113,277,410	103,707,417	95,377,572	-34.9
Off-site Releases					
Transfers Off-site to Disposal	11,771,176	12,184,698	11,057,941	9,980,619	-15.2
Total On- and Off-site Releases	158,313,799	125,462,108	114,765,358	105,358,191	-33.4
Other On-site Waste Management					
Recycled On-site	NA	302,332,267	309,823,629	160,059,514	NA
Energy Recovery On-site	NA	20,534,873	20,417,428	16,035,103	NA
Treated On-site	NA	26,464,963	24,941,008	28,022,460	NA
Total Other On-site Waste Management	NA	349,332,103	355,182,065	204,117,077	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	20,925,490	19,021,069	11,407,263	NA
Transfers to Energy Recovery	NA	8,122,891	7,262,452	6,417,186	NA
Transfers to Treatment	9,188,124	3,172,773	2,737,189	2,763,945	-69.9
Transfers to POTWs	1,320,533	1,014,507	708,699	543,666	-58.8
Other Off-site Transfers	393,879	1,628	11,510	24,575	-93.8
Total Transfers Off-site for Further Waste Management	NA	33,237,289	29,740,919	21,156,635	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. **NA:** not required to be reported in that year.

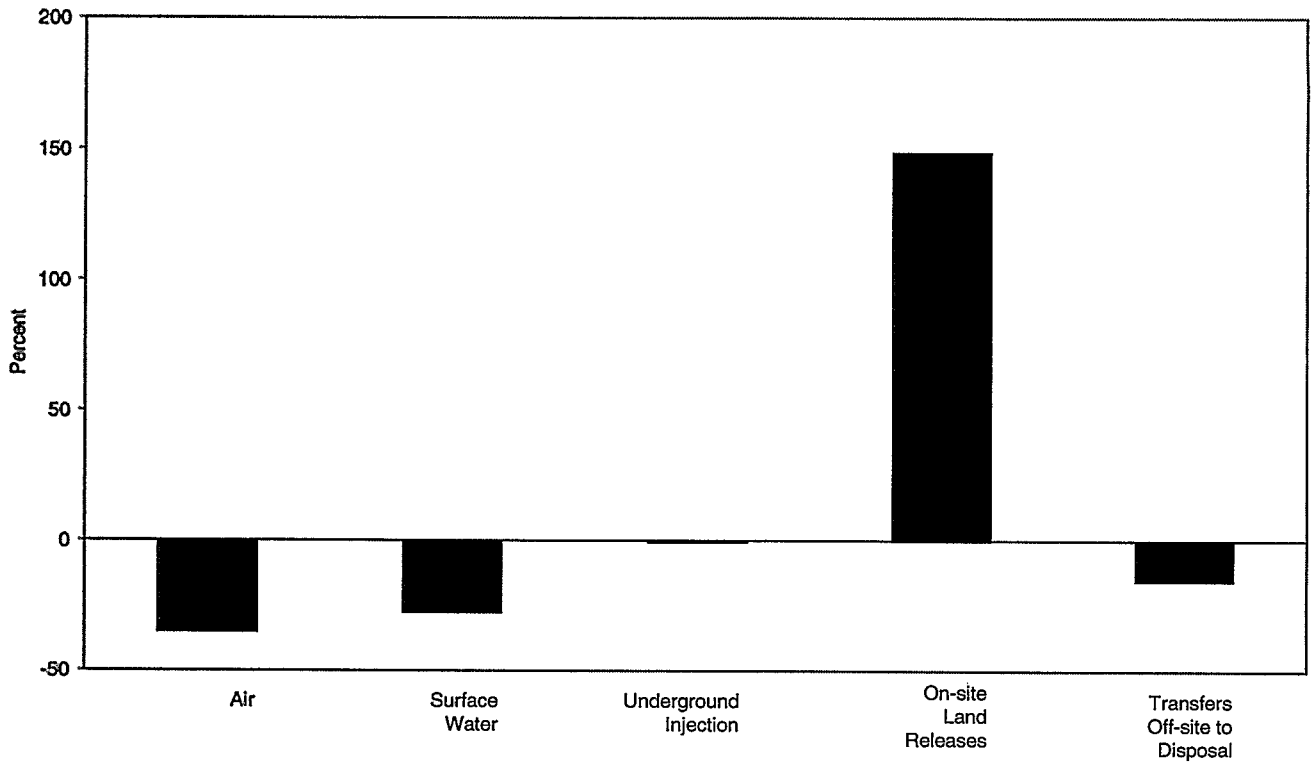


Figure 9-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Rubber and Plastics Products (SIC Code 30)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

Three industries had increases in total releases of more than 5 million pounds: plastics foam products (SIC code 3086) with a 13.9-million-pound increase (109.0%), plastics plumbing fixtures (SIC code 3088) with 6.9 million pounds (649.7%), and miscellaneous plastics products (SIC code 3089) with 5.2 million pounds (18.3%). For producers of foam products and plumbing fixtures, the net increase arose largely from air emissions. For miscellaneous plastics products, much of the increase occurred in air emissions and, to a lesser extent, in off-site releases (transfers to disposal). However, air emissions in the miscellaneous plastics products industry have been decreasing over the last few years.

Table 9-14 provides release data for all four-digit SIC codes in the rubber and plastics products sector, for 1988-1996.

Other On-site Waste Management

Rubber and plastics hose and belting (SIC code 3052) had the largest decrease in other on-site waste management since 1994 (on-site waste management data were not collected in 1988). This was a decrease of 130.7 million pounds, or 58.5%, which occurred principally in on-site recycling by one facility. Miscellaneous plastics products (SIC code 3089) was second with a decrease of 11.4 million pounds, or 36.7%, and miscellaneous

Table 9-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Rubber and Plastics Products, SIC Code 30

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3011	Tires & Inner Tubes	96	584,906	10,424	0	19,216	614,546	2,413,943	3,028,489
		95	1,123,874	5,590	0	5,980	1,135,444	2,541,382	3,676,826
		94	826,009	21,672	0	23,835	871,516	2,503,522	3,375,038
		88	2,359,703	4,293	0	11,600	2,375,596	2,880,185	5,255,781
3021	Rubber & Plastics Footwear	96	117,085	0	0	0	117,085	32,454	149,539
		95	455,407	0	0	0	455,407	36,712	492,119
		94	788,702	0	0	0	788,702	97,991	886,693
		88	519,633	0	0	0	519,633	119,439	639,072
3052	Rubber & Plastics Hose & Belting	96	2,305,262	2,570	0	34,917	2,342,749	1,084,819	3,427,568
		95	3,755,431	3,270	0	16,993	3,775,694	1,454,455	5,230,149
		94	4,453,582	3,335	0	15,749	4,472,666	1,065,625	5,538,291
		88	3,639,811	181	0	0	3,639,992	551,309	4,191,301
3053	Gaskets, Packing & Sealing Devices	96	1,751,200	18	0	3,845	1,755,063	112,935	1,867,998
		95	2,704,014	11	0	59,270	2,763,295	146,389	2,909,684
		94	2,450,376	250	0	6,634	2,457,260	1,478,375	3,935,635
		88	2,059,523	0	0	2,980	2,062,503	182,741	2,245,244
3061	Mechanical Rubber Goods	96	622,656	200	0	17,000	639,856	139,519	779,375
		95	1,214,946	363	0	24,524	1,239,833	122,675	1,362,508
		94	946,943	343	0	2,402	949,688	129,626	1,079,314
		88	1,074,138	500	0	90	1,074,728	151,235	1,225,963
3069	Fabricated Rubber Products, nec*	96	7,068,784	4,182	750	52,187	7,125,903	1,702,753	8,828,656
		95	7,438,648	2,131	0	12,141	7,452,920	1,926,605	9,379,525
		94	9,827,764	8,525	0	14,230	9,850,519	1,718,523	11,569,042
		88	24,999,605	1,831	0	24,061	25,025,497	2,111,784	27,137,281
3081	Unsupported Plastics Film & Sheet	96	3,112,811	216	0	2,506	3,115,533	60,165	3,175,698
		95	4,089,280	339	0	5	4,089,624	55,061	4,144,685
		94	3,990,569	932	0	5	3,991,506	90,649	4,082,155
		88	5,022,185	1,229	0	16	5,023,430	12,586	5,036,016
3082	Unsupported Plastics Profile Shapes	96	156,782	0	0	142	156,924	21,317	178,241
		95	167,244	0	0	0	167,244	30,541	197,785
		94	429,897	0	0	0	429,897	39,819	469,716
		88	249,046	250	0	0	249,296	41,756	291,052
3083	Laminated Plastics Plate & Sheet	96	6,902,178	100	0	4,414	6,906,692	6,707	6,913,399
		95	6,538,683	878	0	0	6,539,561	12,496	6,552,057
		94	5,862,201	47	0	0	5,862,248	101,639	5,963,887
		88	3,476,023	6,022	0	0	3,482,045	41,673	3,523,718
3084	Plastics Pipe	96	168,265	0	0	0	168,265	0	168,265
		95	163,264	0	0	500	163,764	0	163,764
		94	142,769	0	0	186	142,955	10	142,965
		88	428,021	0	0	0	428,021	0	428,021

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 9-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Rubber and Plastics Products, SIC Code 30, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3085	Plastics Bottles	96	43	0	0	0	43	0	43
		95	40,538	0	0	0	40,538	0	40,538
		94	61,698	0	0	0	61,698	1	61,699
		88	No reports received						
3086	Plastics Foam Products	96	26,441,137	5	0	1,402	26,442,544	299,546	26,742,090
		95	29,167,192	34	0	12,300	29,179,526	189,001	29,368,527
		94	31,502,444	316	0	16,570	31,519,330	140,452	31,659,782
		88	12,629,819	250	0	20,530	12,650,599	141,903	12,792,502
3087	Custom Compound Purchased Resins	96	546,267	299	0	34,797	581,363	443,171	1,024,534
		95	657,336	334	0	0	657,670	594,140	1,251,810
		94	693,834	566	0	1,000	695,400	562,133	1,257,533
		88	631,258	291	4	0	631,553	484,355	1,115,908
3088	Plastics Plumbing Fixtures	96	7,937,848	0	0	5	7,937,853	29,880	7,967,733
		95	6,063,461	0	0	0	6,063,461	3,985	6,067,446
		94	6,047,988	0	0	0	6,047,988	1,960	6,049,948
		88	1,009,024	0	0	0	1,009,024	53,819	1,062,843
3089	Plastics Products, nec*	96	31,101,057	2,558	0	194,284	31,297,899	2,427,833	33,725,732
		95	31,460,169	1,066	0	59,645	31,520,880	2,393,548	33,914,428
		94	35,683,564	1,711	0	2,510	35,687,785	2,822,201	38,509,986
		88	27,377,729	3,682	0	16,250	27,397,661	1,105,345	28,503,006
	Multiple within SIC Code 30	96	5,131,332	1,800	0	25,355	5,158,487	1,171,750	6,330,237
		95	6,630,193	5,797	0	29,323	6,665,313	1,170,942	7,836,255
		94	7,111,753	4,131	0	17,019	7,132,903	879,070	8,011,973
		88	12,362,467	5,654	0	411	12,368,532	387,910	12,756,442
	Invalid SIC Code within SIC Code 30	96	1,016,765	2	0	0	1,016,767	33,827	1,050,594
		95	1,795,609	1,017	0	617	1,797,243	380,009	2,177,252
		94	2,313,869	950	0	530	2,315,349	553,102	2,868,451
		88	48,515,866	6,748	750	81,149	48,604,513	3,505,136	52,109,649
	Total for SIC Code 30	96	94,964,378	22,374	750	390,070	95,377,572	9,980,619	105,358,191
		95	103,465,289	20,830	0	221,298	103,707,417	11,057,941	114,765,358
		94	113,133,962	42,778	0	100,670	113,277,410	12,184,698	125,462,108
		88	146,353,851	30,931	754	157,087	146,542,623	11,771,176	158,313,799

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
*nec: not elsewhere classified.

fabricated rubber products (SIC code 3069) was third with a 9.4 million-pound reduction, or 39.9%.

The largest increase over the 1994-1996 period was reported in the unsupported plastics film and sheet industry (SIC code 3081): 9.9 million pounds, or 40.4%. Recycling and treatment each accounted for roughly half of this increase. Makers of gaskets, packing, and sealing devices (SIC code 3053) reported an increase of 1.8 million pounds, or 184.2%. The large majority of this increase occurred in recycling. No other industry in this sector had an increase of more than 200,000 pounds for 1994-1996.

On-site waste management data for 1994-1996 appear in Table 9-15.

Table 9-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Rubber and Plastics Products, SIC Code 30

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3011	Tires & Inner Tubes	96	1,707,402	144,000	109,376	1,960,778
		95	1,646,885	4,100	336,130	1,987,115
		94	1,621,487	0	141,804	1,763,291
		88	NA	NA	NA	NA
3021	Rubber & Plastics Footwear	96	9,482	0	0	9,482
		95	7,312	0	0	7,312
		94	45,982	0	0	45,982
		88	NA	NA	NA	NA
3052	Rubber & Plastics Hose & Belting	96	90,279,390	787,943	1,539,301	92,606,634
		95	245,208,725	1,015,326	1,354,889	247,578,940
		94	220,969,274	961,735	1,333,147	223,264,156
		88	NA	NA	NA	NA
3053	Gaskets, Packing & Sealing Devices	96	2,439,515	0	270,973	2,710,488
		95	860,529	0	253,582	1,114,111
		94	780,720	0	172,995	953,715
		88	NA	NA	NA	NA
3061	Mechanical Rubber Goods	96	39,272	0	18,627	57,899
		95	53,577	0	91,850	145,427
		94	30,763	0	19,216	49,979
		88	NA	NA	NA	NA
3069	Fabricated Rubber Products, nec*	96	9,888,481	1,702,203	2,628,716	14,219,400
		95	8,856,566	2,518,948	4,500,930	15,876,444
		94	14,238,234	2,082,377	7,330,923	23,651,534
		88	NA	NA	NA	NA
3081	Unsupported Plastics Film & Sheet	96	20,224,009	1,230,647	12,849,891	34,304,547
		95	14,347,977	1,803,702	9,443,727	25,595,406
		94	15,176,365	954,973	8,298,044	24,429,382
		88	NA	NA	NA	NA
3082	Unsupported Plastics Profile Shapes	96	105,992	0	76,641	182,633
		95	96,000	0	0	96,000
		94	102,000	0	43,360	145,360
		88	NA	NA	NA	NA
3083	Laminated Plastics Plate & Sheet	96	274,242	9,508,778	401,500	10,184,520
		95	74,411	10,859,976	566,604	11,500,991
		94	2,286,769	10,766,061	583,409	13,636,239
		88	NA	NA	NA	NA
3084	Plastics Pipe	96	0	0	162,488	162,488
		95	0	0	93,689	93,689
		94	0	0	166,934	166,934
		88	NA	NA	NA	NA
3085	Plastics Bottles	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	No reports received			

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 9-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Rubber and Plastics Products, SIC Code 30, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3086	Plastics Foam Products	96	16,037,717	0	692,093	16,729,810
		95	15,042,171	3,792	168,471	15,214,434
		94	16,428,257	0	626,574	17,054,831
		88	NA	NA	NA	NA
3087	Custom Compound Purchased Resins	96	479,925	0	18,336	498,261
		95	288,966	0	34,525	323,491
		94	537,291	0	63,631	600,922
		88	NA	NA	NA	NA
3088	Plastics Plumbing Fixtures	96	0	0	9	9
		95	0	0	0	0
		94	0	0	2,880	2,880
		88	NA	NA	NA	NA
3089	Plastics Products, nec*	96	13,220,502	2,335,531	4,083,014	19,639,047
		95	17,106,755	1,976,312	4,197,626	23,280,693
		94	23,593,710	2,686,778	4,763,502	31,043,990
		88	NA	NA	NA	NA
	Multiple within SIC Code 30	96	5,293,327	150,024	4,961,919	10,405,270
		95	5,978,664	2,123,044	3,387,282	11,488,990
		94	6,093,975	2,996,441	2,383,742	11,474,158
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 30	96	60,258	175,977	209,576	445,811
		95	255,091	112,228	511,703	879,022
		94	427,440	86,508	534,802	1,048,750
		88	NA	NA	NA	NA
	Total for SIC Code 30	96	160,059,514	16,035,103	28,022,460	204,117,077
		95	309,823,629	20,417,428	24,941,008	355,182,065
		94	302,332,267	20,534,873	26,464,963	349,332,103
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
*nec: not elsewhere classified

Transfers Off-site for Further Waste Management

Producers of unsupported plastics film and sheet (SIC code 3081) recorded the largest reduction in transfers off-site for further waste management since 1994 (data for some types of off-site transfers were not collected in 1988). This was a net decrease of 5.4 million pounds, or 68.3%, attributable to off-site recycling. (However, this industry also had the largest increase in other on-site waste management.)

Miscellaneous plastics products (SIC code 3089) reported a decrease of 3.7 million pounds (39.3%); decreases in all off-site transfer types contributed to this figure. The industry with the third largest decrease, rubber and plastics hose and belting (SIC code 3052), had a reduction of 1.3 million pounds (45.9%), due almost entirely to a decrease in off-site recycling.

The largest increase was reported in the laminated plastics plate and sheet sector (SIC code 3083): 584,000 pounds, or 79.9%. Transfers to recycling and to energy recovery accounted for this figure. No other industry had an increase of more than 300,000 pounds from 1994-1996.

Table 9-16 provides data for transfers off-site for further waste management for the four-digit SIC codes in SIC code 30.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Devro-Teepak, Inc., in Danville, Illinois (SIC code 3079 in 1988 and 3089 in 1996), ranked first in increase of releases with an overall increase of 1.8 million pounds. Carbon disulfide accounted for 100% of the increase because it was the only chemical this facility reported to TRI in 1988 and 1996. This facility manufactures cellophane tubing used for shaping food products such as hot dogs and sausages. Early in the tube-making process, carbon disulfide is reacted with wood pulp and the mixture is dissolved in dilute caustic. Later in the process, the carbon disulfide is stripped off of the tubing and much of it leaves the plant through point-source air emissions. A fire closed the plant in 1987. Consequently, carbon disulfide emissions were low in 1988 because production was low. The facility returned to full capacity before the 1996 reporting year.

The second-ranked facility was Texas Recreation Corporation in Wichita Falls, Texas (did not report in 1988, SIC code 3086 in 1996). Approximately half of this facility's 1.5 million-pound increase in releases was due to fugitive air emissions of methyl ethyl ketone (MEK). Texas Recreation manufactures foam leisure products. A coating process for this product line involves the use of MEK as a solvent. The Wichita Falls facility came into operation in 1988, and the product line in which MEK is used was not initiated until after the 1988 reporting year.

Third was Sequentia, Inc., in Grand Junction, Tennessee (SIC code 3089), with a 1.5 million-pound increase. The facility manufactures fiberglass-reinforced plastic panels. Scrap material is sent off-site to a landfill. The scrap material contains styrene, which is used in the production of polyester resin. Styrene reporting accounts for 99% of the facility's increase. TRI reporting guidance materials such as the EPA document *Estimating Chemical Releases From Rubber Production and Compounding* (EPA 560/4-88-004q) were brought to the attention of Sequentia staff at a 1991 waste management seminar hosted by the University of Tennessee. The facility attributes the increase in reported releases to a better understanding of reporting requirements and improved estimation methods as a result of attending the seminar.

International Paper in Hampton, South Carolina (SIC 3079 in 1988 and 3083 in 1996), had the largest reduction in releases with a 3.0 million-pound decrease. A 2.6 million-pound reduction in methanol point-source air emissions accounted for 87% of the decrease. The facility's largest production line is decorative laminate. The facility has been engineering methanol out of the formulation of a resin used in laminate production. The reason for the reformulation, according to International Paper, is to reduce methanol emissions.

3M of Nevada, Missouri (SIC code 3081), was second in decreases with an overall release reduction of 2.5 million pounds. 3M uses xylene (mixed isomers) as a solvent in the manufacture of plastic adhesive film. Fugitive and point-source air emissions of xylene were reduced by a combined 1.3 million pounds after the facility installed two thermal oxidizers. Reduced xylene emissions account for over 50% of this facility's overall decrease in releases between the comparison years.

Goodyear Tire & Rubber Company in Lincoln, Nebraska (SIC code 3041 in 1988 and 3052 in 1996), was third in decreases with an overall reduction of 2.3 million pounds. Reduction in toluene point-source air emissions was the primary reason for the change. A material substitution was made for toluene, a processing aid in the manufacture of belts and hoses for industrial applications and automobiles.

Table 9-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Rubber and Plastics Products, SIC Code 30

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3011	Tires & Inner Tubes	96	1,216,761	63,839	167,252	37,205	0	1,485,057
		95	1,240,574	11,986	244,277	18,532	500	1,515,869
		94	1,158,886	11,137	201,264	19,317	250	1,390,854
		88	NA	NA	194,739	13,310	600	NA
3021	Rubber & Plastics Footwear	96	25,107	19,860	0	0	0	44,967
		95	16,117	64,390	3,613	0	0	84,120
		94	17,816	136,205	3,011	0	0	157,032
		88	NA	NA	23,894	0	0	NA
3052	Rubber & Plastics Hose & Belting	96	1,248,573	227,970	23,831	11,944	0	1,512,318
		95	1,676,681	210,051	58,947	18,841	0	1,964,520
		94	2,536,317	203,813	34,369	19,484	0	2,793,983
		88	NA	NA	60,252	41,185	42,008	NA
3053	Gaskets, Packing & Sealing Devices	96	154,946	396,149	159,835	1,544	0	712,474
		95	178,222	457,857	89,432	1,195	0	726,706
		94	711,683	483,293	49,659	143,483	0	1,388,118
		88	NA	NA	153,965	6,470	0	NA
3061	Mechanical Rubber Goods	96	82,172	41,495	19,510	8,297	19,456	170,930
		95	104,958	68,874	26,146	6,000	250	206,228
		94	108,310	58,257	25,458	3,247	0	195,272
		88	NA	NA	50,751	253	0	NA
3069	Fabricated Rubber Products, nec*	96	654,661	798,807	304,889	35,657	4,541	1,798,555
		95	517,884	957,216	266,977	70,497	0	1,812,574
		94	526,360	1,139,487	245,663	152,583	0	2,064,093
		88	NA	NA	1,420,284	240,942	19,723	NA
3081	Unsupported Plastics Film & Sheet	96	667,460	1,128,972	668,005	52,741	328	2,517,506
		95	6,381,041	738,275	668,583	45,914	0	7,833,813
		94	6,476,366	709,421	634,162	117,399	0	7,937,348
		88	NA	NA	430,027	10,221	0	NA
3082	Unsupported Plastics Profile Shapes	96	196,056	3,957	21,106	250	0	221,369
		95	0	3,584	10,900	53	0	14,537
		94	0	71,404	10,010	15	0	81,429
		88	NA	NA	9,772	250	0	NA
3083	Laminated Plastics Plate & Sheet	96	398,201	674,186	242,441	0	0	1,314,828
		95	308,420	338,683	142,408	22,802	10,010	822,323
		94	38,449	437,588	253,008	1,660	0	730,705
		88	NA	NA	158,752	21,712	348	NA
3084	Plastics Pipe	96	18,602	9,742	0	0	0	28,344
		95	23,310	9,411	11,480	0	0	44,201
		94	42,051	8,018	2,796	0	0	52,865
		88	NA	NA	0	0	0	NA
3085	Plastics Bottles	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	1,797	0	0	0	1,797
		88	No reports received					

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.

* nec: not elsewhere classified.

Table 9-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Rubber and Plastics Products, SIC Code 30, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3086	Plastics Foam Products	96	653,239	151,161	305,714	5,957	0	1,116,071
		95	559,708	168,181	155,574	279	0	883,742
		94	617,478	81,175	131,902	316	0	830,871
		88	NA	NA	218,503	5	3,500	NA
3087	Custom Compound Purchased Resins	96	87,106	82,399	40,454	78,571	0	288,530
		95	82,565	55,015	74,828	60,790	0	273,198
		94	801,329	75,849	43,722	54,528	0	975,428
		88	NA	NA	74,194	53,128	38,039	NA
3088	Plastics Plumbing Fixtures	96	16,806	4,265	8,534	764	0	30,369
		95	35,362	8,804	2,696	5	750	47,617
		94	22,933	11,103	14,699	5	0	48,740
		88	NA	NA	29,726	0	0	NA
3089	Plastics Products, nec*	96	3,130,826	1,971,271	392,120	281,292	250	5,775,759
		95	5,084,815	2,780,599	304,777	445,765	0	8,615,956
		94	5,156,475	3,185,434	692,522	475,160	1,378	9,510,969
		88	NA	NA	802,439	379,224	82,477	NA
	Multiple within SIC Code 30	96	2,672,708	722,469	409,140	28,694	0	3,833,011
		95	2,526,569	1,075,967	646,667	13,255	0	4,262,458
		94	2,513,984	930,746	793,249	19,351	0	4,257,330
		88	NA	NA	1,469,877	64,440	64,113	NA
	Invalid SIC Code within SIC Code 30	96	184,039	120,644	1,114	750	0	306,547
		95	284,843	313,559	29,884	4,771	0	633,057
		94	197,053	578,164	37,279	7,959	0	820,455
		88	NA	NA	4,090,949	489,393	143,071	NA
	Total for SIC Code 30	96	11,407,263	6,417,186	2,763,945	543,666	24,575	21,156,635
		95	19,021,069	7,262,452	2,737,189	708,699	11,510	29,740,919
		94	20,925,490	8,122,891	3,172,773	1,014,507	1,628	33,237,289
		88	NA	NA	9,188,124	1,320,533	393,879	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 30 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Goodyear attributes its toluene reduction to participation in EPA's 33/50 Program.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the rubber and plastics products sector:

Pioneer Plastics Corporation, Wisconsin Rapids, Wisconsin, decrease of 2.6 million pounds, plant closure.

1991-1996 Waste Management Data for Rubber and Plastics Products

Table 9-17 summarizes on- and off-site waste management data for the rubber and plastics products sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste decreased 26.0% from 1991-1996, with an even larger percentage decrease (32.0%) from 1995-1996. As noted, one facility accounted for much of this change. Since 1991, total production-related waste decreased 118.8 million pounds. This represents the net reduction for the period, despite an increase in the early years. Without the one facility that has substantially reduced its on-site recycling, the sector's waste management data would still show a decrease (31.1 million pounds) from 1991 to 1996. This net reduction has been accomplished despite increases in production throughout those years.

From 1991 to 1996, two areas showed increases. On-site treatment rose from 16.8 million pounds in 1991 to 28.0 million pounds in 1996, a 66.5% increase. Off-site recycling was 14.0 million pounds in 1991 and 19.5 million pounds in 1996, a 39.6% increase. Total off-site waste management increased 3.8 million pounds, from 26.3 million pounds to 30.1 million pounds (a 14.6% increase) for 1991-1996, driven by the 5.5 million-pound increase in off-site recycling.

The quantity released on- and off-site decreased 39.5 million pounds (27.4%), from 144.2 million pounds in 1991 to 104.7 million pounds in 1996.

Figure 9-13 illustrates the percentage changes in on-site and off-site waste management types.

These data present a somewhat mixed picture in relation to the waste management hierarchy (explained in Chapter 1). As noted, one facility reported large quantities of on-site recycling as well as a large reduction in those quantities from 1991 to 1996. For the rest of the sector, on-site recycling quantities (excluding data from that one facility) fluctuated from year to year. Off-site recycling increased over the 1991-1996 period. Taken together, the quantities for on-site recycling and off-site recycling show that the sector's use of recycling to manage production-related waste varied from year to year. Under the waste management hierarchy, recycling is the preferred option for TRI chemicals in waste that cannot be prevented. At the same time, although the quantities released showed decreases, on-site treatment rose. In terms of the hierarchy, treatment is the least preferable option except for release or disposal of the waste quantities. Thus, there is no evident trend in this sector toward the environmentally preferable waste management options.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Component Technologies, Inc., in Palmetto, Florida (did not report in 1991, SIC code 3081 in 1996), had the biggest increase in production-related waste. All of this facility's increase was accounted for by on-site recycling of methyl ethyl ketone (MEK). For this chemical, 9.6 million pounds were reported as recycled on-site in 1996, and there were no data reported in 1991. The facility did not begin operation until 1992. The facility uses methyl ethyl ketone as a solvent in audio cassette tape coating operations. One of the coatings produced is a polyester-based film used to line the inside of the tape housing. The other coating is applied to leader tape. MEK recovered from the coating operations is recycled and reused.

Toray Plastics America, Inc., in North Kingstown, Rhode Island (SIC code 3081), ranked second with an overall increase of 5.3 million pounds. The facility had a 5.0 million-pound increase in the amount of ethylene glycol reported as recycled off-site. Ethylene glycol is the by-product of a process for making a polyester resin. The resin is used in the manufacture of film for the video industry. This facility went into production in 1990 and did not

Table 9-17. TRI Waste Management Data, 1991, 1994-1996: Rubber and Plastics Products, SIC Code 30

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	251,766,231	302,339,767	309,831,983	160,065,614
Energy Recovery On-site	18,651,762	20,534,873	20,417,428	16,035,103
Treated On-site	16,831,797	26,464,963	24,941,008	28,022,520
Total On-site Waste Management	287,249,790	349,339,603	355,190,419	204,123,237
Off-site Waste Management				
Recycled Off-site	13,952,872	20,881,773	18,621,438	19,472,557
Energy Recovery Off-site	8,511,402	8,186,142	7,314,903	7,314,920
Treated Off-site	3,786,766	4,143,715	3,734,712	3,303,301
Total Off-site Waste Management	26,251,040	33,211,630	29,671,053	30,090,778
Quantity Released On- and Off-site	144,161,844	129,408,647	113,504,064	104,655,240
Total Production-related Waste	457,662,674	511,959,880	498,365,536	338,869,255
Non-Production-related Waste	337,557	441,514	328,849	90,906

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	2.5	-48.3	-36.4
Energy Recovery On-site	-0.6	-21.5	-14.0
Treated On-site	-5.8	12.4	66.5
Total On-site Waste Management	1.7	-42.5	-28.9
Off-site Waste Management			
Recycled Off-site	-10.8	4.6	39.6
Energy Recovery Off-site	-10.6	0.0	-14.1
Treated Off-site	-9.9	-11.6	-12.8
Total Off-site Waste Management	-10.7	1.4	14.6
Quantity Released On- and Off-site	-12.3	-7.8	-27.4
Total Production-related Waste	-2.7	-32.0	-26.0
Non-Production-related Waste	-25.5	-72.4	-73.1

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

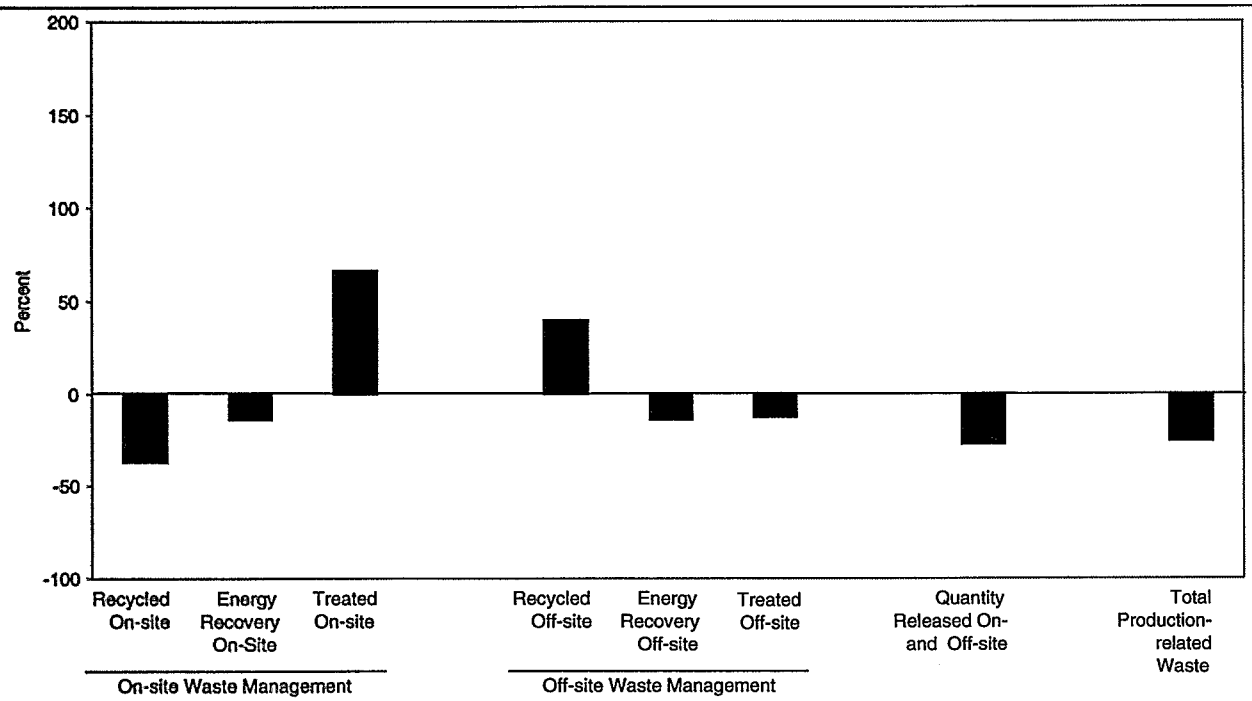


Figure 9-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Rubber and Plastics Products (SIC Code 30)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

reach production capacity until 1991. Between 1991 and 1995, the facility doubled in size. Increased efficiency in ethylene glycol recovery and production capacity are cited by Toray Plastics as the reasons for the change in reporting.

Ranked third is Wilsonart International in Temple, Texas (SIC code 3083), with an increase of 4.8 million pounds. Over 90% of the increase is accounted for by methanol reported as on-site energy recovery. Wilsonart produces laminated plastic countertop and flooring. Methanol is used as a solvent in the laminate production process. It is recovered from paper impregnated with phenolic resin before the material goes through a heated pressing cycle. The recovered methanol is then used as a fuel in boilers that generate steam for the pressing cycle. The facility attributes the increase to two factors: a significant production increase and a change in estimation methods. Methanol data were formerly calculated by engineering estimates. Now they are based on empirical data.

First in decreases was Gates Rubber Company in Iola, Kansas (SIC code 3052), with an overall reduction of 87.7 million pounds. This plant, which manufactures hydraulic hose, used lead molds to form the hose. After the forming process, the lead mold was stripped off of the hose, recycled on-site, and reused in the same process. Replacing the lead molds with plastic molds resulted in an 87.7 million-pound reduction in reported on-site recycling for 1991-1996. This facility's on-site recycling of lead compounds actually increased from 1991 to 1995, reaching a peak of 243.7 million pounds. However, a reduction of 154.5 million pounds occurred in the last year. The changeover began in 1995 and was completed in 1997. The facility estimates that there will be no on-site recycling of lead compounds by 1998.

Flexel, Inc., in Tecumseh, Kansas (SIC code 3089), ranked second in decreases with an overall reduction of 13.2 million pounds. Over 60% of the reduction was due to a decrease in the amount of carbon disulfide reported as recycled on-site. The facility changed ownership since the 1996 reporting year and is now called UCB. Carbon disulfide is used as a reactant in the manufacture of cellophane packaging film. Regenerated carbon disulfide is partially recoverable and this is recycled and reused in the process. A 7.2 million-pound decrease in on-recycling of carbon disulfide was the result of a change in the interpretation of how to report carbon disulfide in this category, according to the facility contact.[1]

Wilsonart International in Fletcher, North Carolina (SIC code 3083), ranked third in decreases with a total change of 3.9 million pounds. The plant produces the same product lines as the Wilsonart facility in Temple, Texas (ranked third for increases in production-related waste). The two plants have very similar operations, according to the contact. The Fletcher facility reported a 3.8 million-pound reduction in on-site energy recovery of methanol, accounting for 99% of the overall decrease. The change is due to improved estimation methods. Like the Temple facility, TRI reporting at the Fletcher plant is now based on empirical data rather than engineering estimates.

Other Apparent Increases and Decreases in Production-Related Waste, 1991-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There are two such facilities in the rubber and plastics products sector:

Huntsman Packaging Corporation, Merced, California, decrease of 5.3 million pounds, reporting error.

Spaulding Composites Company, Inc., Tonawanda, New York, decrease of 5.5 million pounds, plant closure.

Facilities Contacted for Explanations (alphabetical by facility):

3M, Nevada, Missouri: Roy E. Fletchall, July 22, 1998 (explanation provided)

Component Technologies, Inc., Palmetto, Florida: Susan Shively, July 22, 1998 (explanation provided)

Devro-Teepak, Inc., Danville, Illinois: John R. Ramsey, July 22, 1998 (explanation provided)

Flexel, Inc., Tecumseh, Kansas: Richard J. Kieffer, July 31, 1998 (explanation provided)

Gates Rubber Company, Iola, Kansas: Don Jones, July 22, 1998 (explanation provided)

Goodyear Tire & Rubber Company, Lincoln, Nebraska: Michael L. Hedberg, August 5, 1998 (explanation provided)

Huntsman Packaging Corporation, Merced, California: Bill Fitzwater, July 30, 1998 (explanation provided)

International Paper, Hampton, South Carolina: David L. Clampitt, August 3, 1998 (explanation provided)

Pioneer Plastics Corp., Wisconsin Rapids, Wisconsin, Paul Fazio (Auburn, Maine), July 22, 1998 (explanation provided)

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[1] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

Sequentia, Inc., Grand Junction, Tennessee: John Smith, July 22 and 28, 1998 (explanation provided)

Spaulding Composites Company, Inc., Tonawanda, New York: Ronald Juhre, July 22, 1998 (explanation provided)

Texas Recreation Corp., Wichita Falls, Texas: Don Badgwell, July 29, 1998 (explanation provided)

Toray Plastics America, Inc., North Kingstown, Rhode Island: Bronwyn Boyle, July 22, 1998 (explanation provided)

Wilsonart International, Temple, Texas, and Fletcher, North Carolina: Paul Maxwell, July 28 and August 11, 1998 (explanation provided)

Chapter 10

Toxics Release Inventory Data for Leather and Leather Products (SIC Code 31)

A Look at the Leather and Leather Products Industry (SIC Code 31)

The leather and leather products industry (SIC code 31) engages in tanning, currying, and finishing hides and skins. This sector manufactures finished leather and artificial leather products. Some products of this sector, such as handbags, billfolds, and card cases, may be made of leather or non-leather materials. Box 10-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The leather and leather products sector is the United States' smallest manufacturing sector, with shipments valued at $9.31 billion in 1996, up from $9.16 billion in 1995 (both in current dollars). This was one-quarter of one percent (0.25%) of the U.S. total value of manufacturing shipments. Although the sector's value of shipments increased from 1995 to 1996, employment decreased from 86,000 in 1995 to 77,000 in 1996. The leather and leather products sector experienced the sharpest economic decline of all U.S. manufacturing sectors in the 1990s. Production in this sector dropped 28.5% from 1989 to 1996, while production levels for all U.S. manufacturing increased 17.6% (see Chapter 1, Table 1-10).

Manufacturing of shoes (footwear, SIC code 314) generated the largest part of the sector's value of shipments ($3.61 billion) and employment (37,000) in 1996. Men's footwear (SIC code 3143) contributed the bulk of this activity, with shipments of $2.43 billion and employment of 19,000. The leather tanning and finishing industry (SIC code 311) shipped products valued at $3.13 billion and employed 15,000 in 1996. Production volume in the U.S. leather tanning and finishing industry is tied primarily to meat consumption. In contrast, the manufacture of leather products, such as shoes, is labor-intensive and strongly influenced by international trade.

Leather production begins at the time of slaughter, when hides are cured with dry salt or brine and (usually) held in cold storage. "Beamhouse" operations rehydrate the hides, remove curing salt, and apply lime (with alkaline additives) to remove

Box 10-1. SIC Code 31, Leather and Leather Products: Codes and Classifications

SIC Code		Industry Description
311	**Leather Tanning and Finishing**	
3111	Leather Tanning and Finishing	Tanning, currying, and finishing hides and skins into leather. Purchasing hides and skins for processing into leather on a contract basis by others.
313	**Boot and Shoe Cut Stock and Findings**	
3131	Boot and Shoe Cut Stock and Findings	Manufacture of leather soles, inner soles, and other boot and shoe cut stock and findings. (Includes manufacture of finished heels, whether leather or wood).
314	**Footwear, Except Rubber**	
3142	House Slippers	Manufacture of house slippers of leather or other materials.
3143	Men's Footwear, Except Athletic	Production of men's footwear designed primarily for dress, street, and work.
3144	Women's Footwear, Except Athletic	Production of women's footwear designed primarily for dress, street, and work.
3149	Footwear, Except Rubber, nec*	Production of miscellaneous shoes, such as misses', youths', boys', children's, and infants' footwear and athletic footwear.
315	**Leather Gloves and Mittens**	
3151	Leather Gloves and Mittens	Manufacture of dress, semidress, and work gloves exclusively of leather or leather with lining of other material.
316	**Luggage**	
3161	Luggage	Manufacture of luggage out of leather or other materials.
317	**Handbags and Other Personal Leather Goods**	
3171	Women's Handbags and Purses	Manufacture of women's handbags and purses of leather or other materials, except precious metal.
3172	Personal Leather Goods, Except Women's Handbags and Purses	Manufacture of small articles normally carried on the person or in a handbag, such as billfolds, key cases, and coin purses of leather or other materials, except precious metal.
319	**Leather Goods, nec***	
3199	Leather Goods, nec*	Manufacture of miscellaneous leather goods, such as saddlery, harnesses, whips, embossed leather goods, leather desk sets, razor strops, and leather belting.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

McGraw-Hill Encyclopedia of Science and Technology, 8th ed., 1997: industry processes and technologies.

hair and/or epidermal tissue. Hides and skins may require degreasing; for most leathers, this process is aqueous, but for sheepskin, hydrocarbon solvents are used.

One important tanning process is chromium tannage. The tanning material consists of one-third basic chromic sulfate, accounting for the prevalence of chromium compounds in this sector's TRI reporting. Masking chemicals (often sodium formate) are used to moderate the leather's uptake of trivalent chromium. Tanneries also use enzymes to condition the grain, deliming salts, and pickling acid (a sodium chloride brine with sulfuric acid). Chromium tannage produces "chrome-in-the-blue stock" or "blue stock," named for the color of the resulting product. Manufacturers of leather products may purchase wet "blue stock" and finish the leather themselves.

An alternative to chromium tannage is vegetable tannage, involving polyphenolic extracts from bark and wood. Vegetable tannage is used for about 10% of leather production, especially leathers intended for shoe soles, insoles, belting, straps, and specialty products.

Tanneries next split the hides into grain and "blue drop"; the latter is usually used for suede. A three-part process follows: retannage, coloring, and fat liquoring. Hides and skins may undergo a second trivalent chromium tannage, natural vegetable tannage, or one of a variety of organic synthetic tannage processes. Coloring agents may be acidic, basic, direct, or reactive. In fat liquoring, tanneries lubricate the hides with oil emulsions, most often using marine or vegetable oils. A single tannery may have available hundreds of formulas for retannage, coloring, and fat liquoring, intended to produce a wide range of characteristics in leathers of various types and qualities.

The last stages of leather tanning are drying and finishing. Dried leather may be milled or flexed for suppleness and buffed with abrasives. Finishing coats consist of film-forming binder polymers, colorant (dye or pigment), carrier, and additives for adhesion. Many finishes are water-based, but lacquer top-coatings are also used. Repeated applications are common. Those who purchase tanned and finished leather may also apply further finishing steps in the course of manufacturing leather products.

1996 TRI Data for Leather and Leather Products

Table 10-1 summarizes TRI reporting by the leather and leather products sector for 1996. The sector submitted 223 forms in 1996. Of these, 14 were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The leather tanning and finishing industry (SIC code 3111) submitted the largest number of forms in this sector in 1996: 166 forms, or 74.4% of the sector's total. Men's footwear (SIC code 3143) submitted 16 forms, and miscellaneous footwear (SIC code 3149) submitted 15. These were 7.2% and 6.7%, respectively, of the total number of forms in leather and leather products.

The leather tanning and finishing industry (SIC code 3111) reported the large majority of the sector's releases and waste management, as shown in Table 10-1. This industry reported 2.0 million pounds of on-site releases, which was 73.7% of the sector's total of 2.7 million pounds, and almost all (99.2%) of the sector's 1.5 million pounds of off-site releases (transfers to disposal). The leather tanning and finishing industry's total on- and off-site releases of 3.5 million pounds amounted to 82.9% of the sector's total of 4.2 million pounds.

Table 10-1. Summary of TRI Information by 4-digit SIC Code, 1996: Leather and Leather Products, SIC Code 31

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
1	1	3111	Leather Tanning & Finishing	54	166	9	2,002,032	1,514,336	3,516,368
7	7	3131	Footwear Cut Stock	1	1	0	250	0	250
2	2	3143	Men's Footwear, Except Athletic	12	16	1	238,641	24	238,665
5	6	3144	Women's Footwear, Except Athletic	3	3	0	29,683	0	29,683
3	3	3149	Footwear, Except Rubber, nec*	10	15	4	221,391	9,058	230,449
4	4		Multiple within SIC Code 31	5	11	0	221,614	0	221,614
6	5		Invalid SIC Code within SIC Code 31	4	11	0	1,453	3,407	4,860
			Total for SIC Code 31	89	223	14	2,715,064	1,526,825	4,241,889

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Three industries reported approximately 5% each of the sector's total on- and off-site releases. These were men's footwear (SIC code 3143) with 239,000 pounds, miscellaneous footwear (SIC code 3149) with 230,000 pounds, and the group of forms that reported multiple SIC codes in SIC code 31 with 222,000 pounds. In all three cases, the majority of the releases were reported as on-site releases. The miscellaneous footwear industry (SIC code 3149) ranked second (after leather tanning and finishing) for off-site releases (transfers to disposal), with 9,000 pounds. This represented 0.6% of the sector's total off-site releases.

The leather tanning and finishing industry (SIC code 3111) also reported 99.0% of the sector's 4.2 million pounds of other on-site waste management and 97.8% of the sector's 1.8 million pounds of transfers off-site for further waste management. Men's footwear (SIC code 3143) ranked second for both other on-site waste management, with 5,900 pounds (0.1% of the sector's total), and transfers off-site for further waste management, with 21,000 pounds (1.2% of the sector's total).

For total production-related waste, the leather tanning and finishing industry reported 9.4 million pounds, or 92.2% of the sector's 10.2 million-pound total. The same three leather and leather products industries that reported comparable amounts of total releases also reported approximately 2% each of the sector's total production-related waste: men's footwear (SIC code 3143) with 256,000 pounds, miscellaneous footwear (SIC code 3149) with 238,000 pounds, and the multiple-codes group with 229,000 pounds.

Multiple SIC Codes in SIC Code 31

Several facilities in the leather and leather products sector engage in activities that are classified in distinct, but separate, SIC codes. For example, a facility may produce both men's footwear (SIC code 3143) and pieces used in shoe construction (footwear cut stock, SIC code 3131). These facilities may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Table 10-2 further examines multiple-codes reporting in the leather and leather products sector. Eleven forms reported more than one four-digit SIC code within SIC code 31, as shown in Table 10-2. Most of these (8 forms) combined men's footwear (SIC code 3143) and women's footwear (SIC code

Table 10-1. Summary of TRI Information by 4-digit SIC Code, 1996: Leather and Leather Products, SIC Code 31, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3111	Leather Tanning & Finishing	4,184,589	1,782,858	9,374,393	6,122
3131	Footwear Cut Stock	0	750	348	0
3143	Men's Footwear, Except Athletic	5,900	21,133	255,952	0
3144	Women's Footwear, Except Athletic	0	3,393	31,715	0
3149	Footwear, Except Rubber, nec*	642	6,573	237,721	0
	Multiple within SIC Code 31	0	8,538	229,292	0
	Invalid SIC Code within SIC Code 31	33,885	637	39,459	0
	Total for SIC Code 31	4,225,016	1,823,882	10,168,880	6,122

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 10-2. Multiple SIC Codes, 1996: Leather and Leather Products, SIC Code 31

SIC Codes		Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3131	3143	3	0	102,439	0	102,439	0	7,700	109,916	0
3143	3144	8	0	119,175	0	119,175	0	830	119,376	0
Total for SIC Code 31		11	0	221,614	0	221,614	0	8,538	229,292	0

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

3144). This combination reported 119,000 pounds of total on- and off-site releases and 119,000 pounds of total production-related waste in 1996.

On- and Off-site Releases

The leather and leather products sector reported air emissions totaling 2.7 million pounds in 1996, nearly two-thirds (62.6%) of the sector's total on- and off-site releases. Off-site releases (transfers to disposal) totaled 1.5 million pounds, 36.0% of the sector's total releases. The sector reported much smaller amounts of surface water discharges (54,000 pounds) and on-site land releases (7,000 pounds). The leather and leather products sector reported no underground injection. Table 10-3 presents the sector's reporting of on- and off-site releases by four-digit SIC code for 1996. Figure 10-1 illustrates the distribution of releases by type.

The leather tanning and finishing industry (SIC code 3111) reported the largest amounts of air emissions (1.9 million pounds) and off-site releases (1.5 million pounds). The industry's reported air emissions included 1.2 million pounds of glycol ethers, and the off-site releases included 1.2 million pounds of chromium compounds. The leather tanning and finishing industry also reported all of the sector's surface water discharges and other on-site land releases.

As noted above, three industry groups reported roughly equal amounts of the sector's total on- and off-site releases: men's footwear (SIC code 3143),

Table 10-3. TRI On-site and Off-site Releases, 1996: Leather and Leather Products, SIC Code 31 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3111	Leather Tanning & Finishing	1,941,895	53,526	0	0	0	6,611	2,002,032	1,514,336	3,516,368
3143	Men's Footwear, Except Athletic	238,641	0	0	0	0	0	238,641	24	238,665
3149	Footwear, Except Rubber, nec *	221,391	0	0	0	0	0	221,391	9,058	230,449
	Multiple within SIC Code 31	221,614	0	0	0	0	0	221,614	0	221,614
3144	Women's Footwear, Except Athletic	29,683	0	0	0	0	0	29,683	0	29,683
	Invalid SIC Code within SIC Code 31	1,453	0	0	0	0	0	1,453	3,407	4,860
3131	Footwear Cut Stock	250	0	0	0	0	0	250	0	250
	Total for SIC Code 31	2,654,927	53,526	0	0	0	6,611	2,715,064	1,526,825	4,241,889

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
*nec: not elsewhere classified.

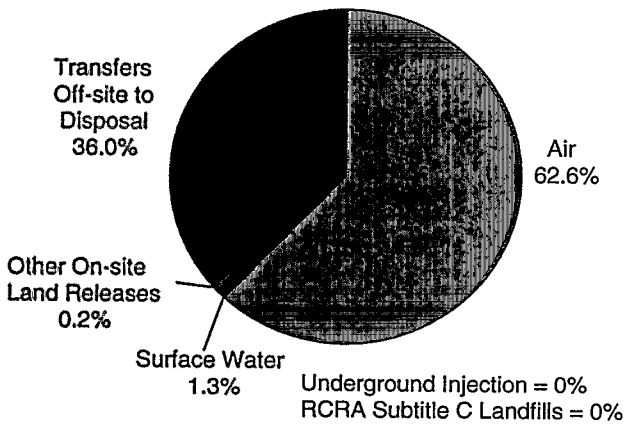


Figure 10-1. Distribution of TRI On-site and Off-site Releases, 1996: Leather and Leather Products (SIC Code 31)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

miscellaneous footwear (SIC code 3149), and the multiple-codes forms. All releases reported by these three groups were air emissions, except for 9,000 pounds of off-site releases reported by the miscellaneous footwear industry and 24 pounds of off-site releases reported by the men's footwear industry.

Figure 10-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) in the leather and leather products sector.

Other On-site Waste Management

The leather and leather products sector reported 3.6 million pounds of on-site treatment in 1996, which was 85.7% of the sector's total other on-site waste management. The sector also reported 604,000 pounds of on-site recycling, 14.3% of the total. No energy recovery was reported by the leather and leather products industries. Table 10-4 presents the sector's 1996 reporting of other on-site waste management. Figure 10-3 illustrates the distribution of these data by waste management method.

As in other categories, the leather tanning and finishing industry (SIC code 3111) reported the bulk of the sector's other on-site waste management. This industry reported 3.6 million pounds of on-site treatment, including 2.0 million pounds of formic acid treated on-site. The leather and tanning industry also reported 598,000 pounds of on-site recycling.

Few other industries in this sector reported other on-site waste management, as shown in Table 10-4. Figure 10-4 illustrates the distribution of on-site waste management reporting for the industries in the leather and leather products sector.

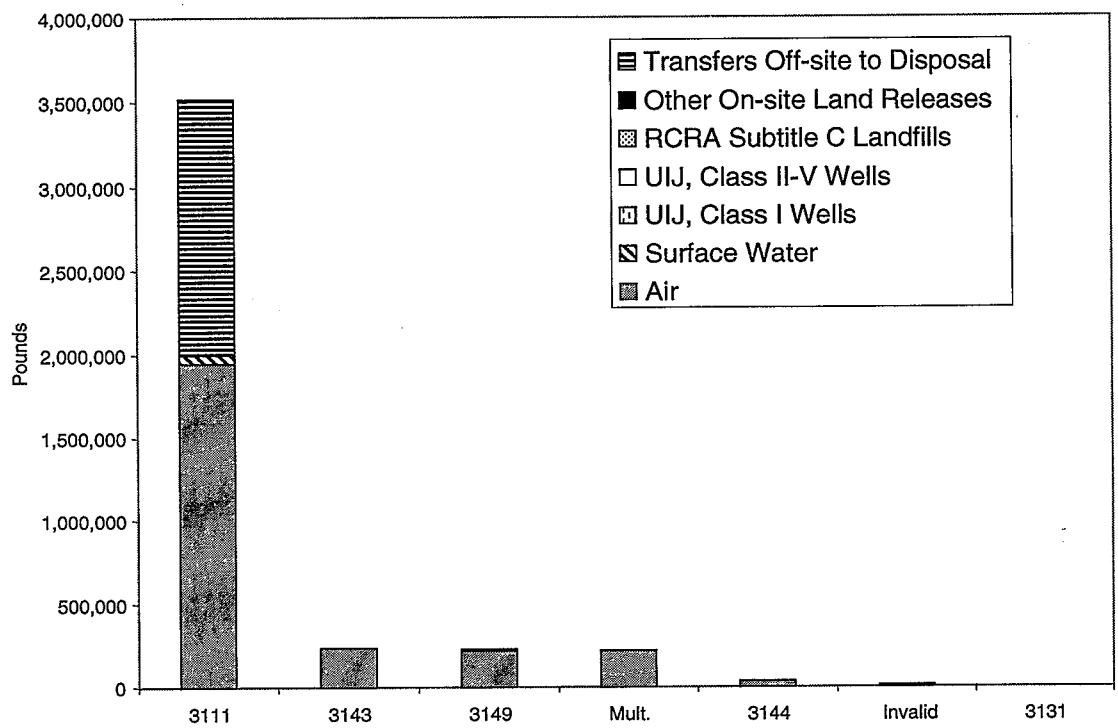


Figure 10-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Leather and Leather Products (SIC Code 31)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "31" that do not exist in the current Standard Industrial Classification code system.

Table 10-4. TRI Other On-site Waste Management, 1996: Leather and Leather Products, SIC Code 31 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3111	Leather Tanning & Finishing	597,780	0	3,586,809	4,184,589
	Invalid SIC Code within SIC Code 31	0	0	33,885	33,885
3143	Men's Footwear, Except Athletic	5,900	0	0	5,900
3149	Footwear, Except Rubber, nec*	642	0	0	642
3131	Footwear Cut Stock	0	0	0	0
3144	Women's Footwear, Except Athletic	0	0	0	0
	Multiple within SIC Code 31	0	0	0	0
	Total for SIC Code 31	604,322	0	3,620,694	4,225,016

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
***nec:** not elsewhere classified

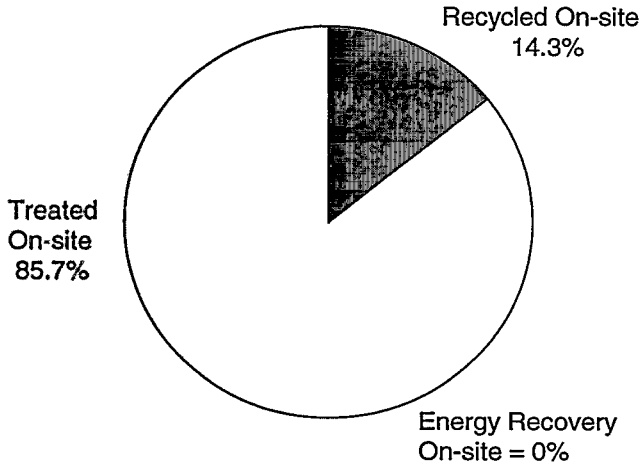


Figure 10-3. Distribution of TRI Other On-site Waste Management, 1996: Leather and Leather Products (SIC Code 31)

Note: Data from Section 8 of Form R.

Transfers Off-site for Further Waste Management

As shown in Table 10-5, the leather and leather products sector reported 1.3 million pounds of transfers to POTWs in 1996. This amounted to 70.7% of the sector's total transfers off-site for further waste management. The sector also reported 338,000 pounds of transfers to recycling and 167,000 pounds of transfers to energy recovery. These amounts represented 18.5% and 9.2%, respectively, of the sector's total. Figure 10-5 illustrates the percentage distribution of transfers off-site for further waste management reported by the leather and leather products sector.

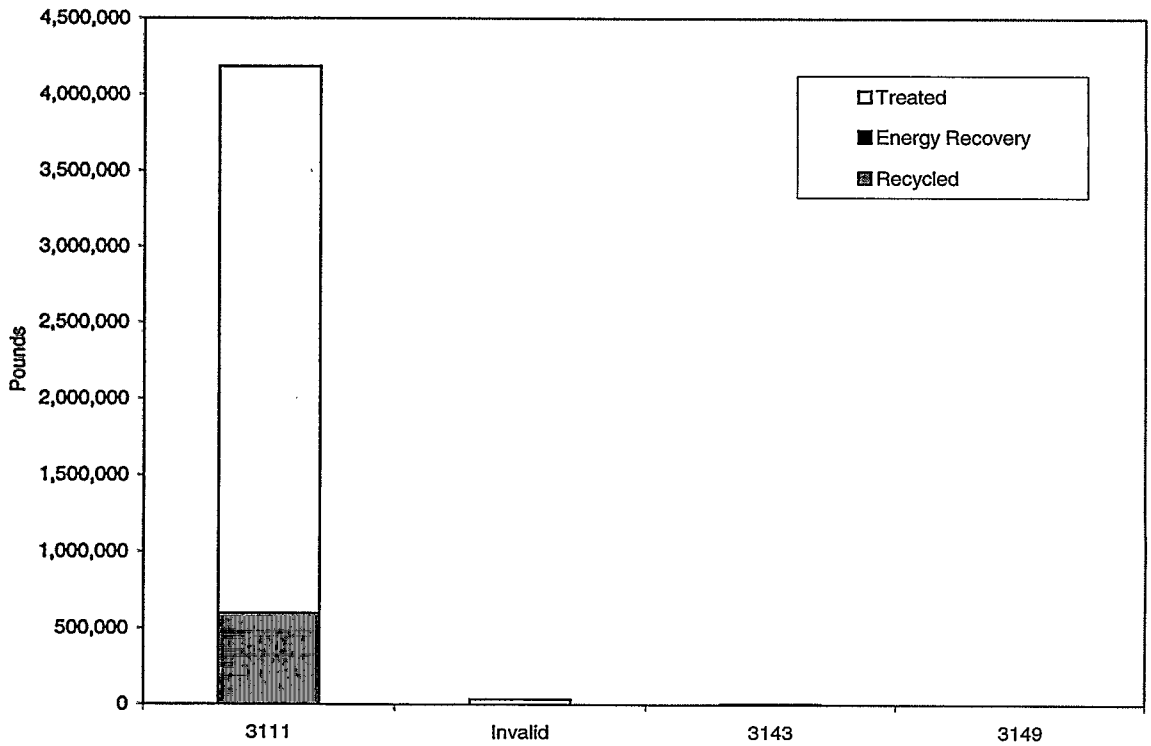


Figure 10-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Leather and Leather Products (SIC Code 31)

Note: Other On-site Waste Management from Section 8 of Form R. Invalid SIC codes are codes beginning "31" that do not exist in the current Standard Industrial Classification code system.

Table 10-5. TRI Transfers Off-site for Further Waste Management, 1996: Leather and Leather Products, SIC Code 31 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3111	Leather Tanning & Finishing	335,880	136,787	21,010	1,289,181	0	1,782,858
3143	Men's Footwear, Except Athletic	980	12,222	7,931	0	0	21,133
	Multiple within SIC Code 31	440	8,098	0	0	0	8,538
3149	Footwear, Except Rubber, nec*	0	6,573	0	0	0	6,573
3144	Women's Footwear, Except Athletic	0	3,393	0	0	0	3,393
3131	Footwear Cut Stock	0	0	0	750	0	750
	Invalid SIC Code within SIC Code 31	255	0	83	299	0	637
	Total for SIC Code 31	337,555	167,073	29,024	1,290,230	0	1,823,882

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category. ***nec:** not elsewhere classified.

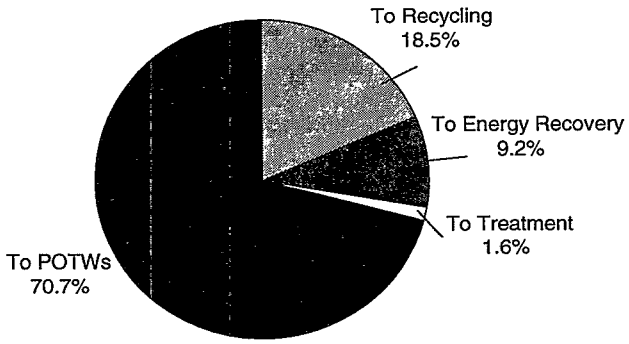


Figure 10-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Leather and Leather Products (SIC Code 31)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

The leather tanning and finishing industry (SIC code 3111) again reported the largest amounts in each transfer type, including 1.3 million pounds of transfers to POTWs and 336,000 pounds of transfers to recycling. The chemical reported in the largest amount was ammonia (796,000 pounds to POTWs). No other leather industry reported more than 1,000 pounds in either of these categories.

The leather tanning and finishing industry (SIC code 3111) also reported the largest amounts transferred to energy recovery (137,000 pounds) and treatment (21,000 pounds). In these categories, the men's footwear industry (SIC code 3143) reported the second-largest amounts (12,000 pounds and 8,000 pounds, respectively).

Figure 10-6 illustrates the distribution of off-site transfers for further waste management for the industries in this sector.

1996 TRI Data by State for Leather and Leather Products

As shown in Table 10-6, leather and leather products industries reported to TRI in about half the U.S. states (25 states plus Puerto Rico). The largest number of forms were submitted in Wisconsin (33 forms or 14.8% of the sector's total). Michigan ranked second, with 25 forms (11.2%). In both New York and Pennsylvania, 19 forms were submitted (8.5% each).

Wisconsin and Michigan were also the states with the largest reported releases (on-site, off-site, and total on- and off-site). In Wisconsin, releases totaled 964,000 pounds (22.7% of the sector's total). Wisconsin's reported releases consisted of 549,000 pounds of on-site releases (20.2% of the

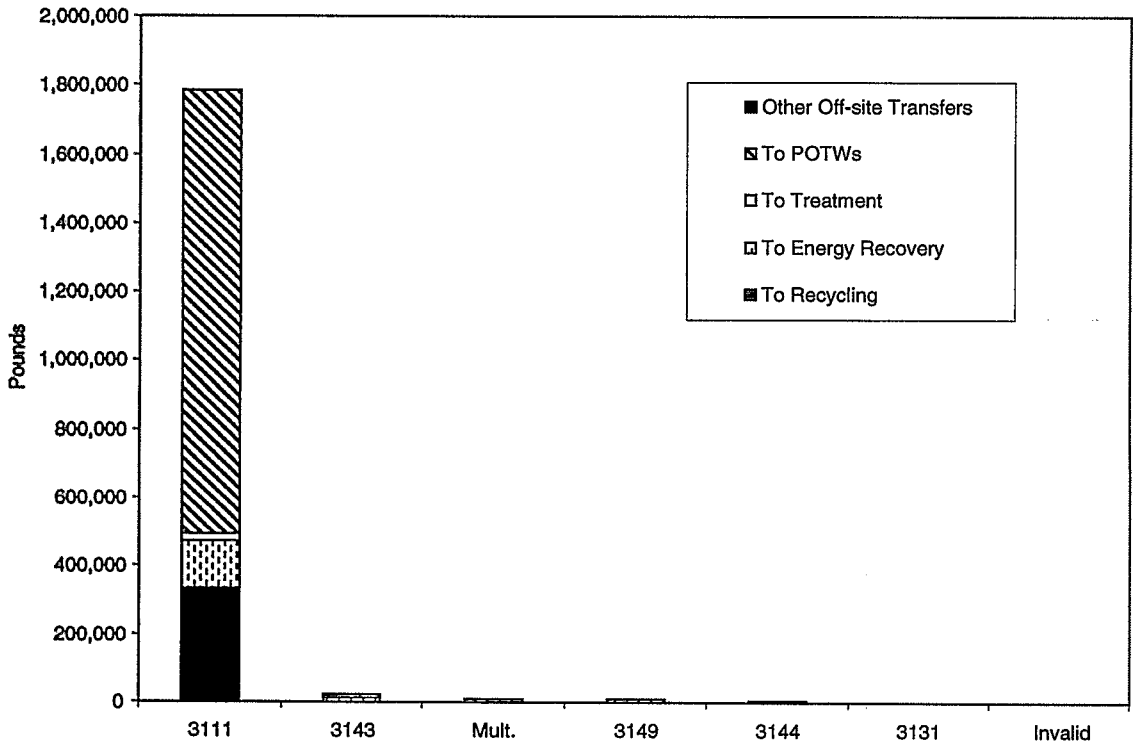


Figure 10-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Leather and Leather Products (SIC Code 31)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "31" that do not exist in the current Standard Industrial Classification code system.

total) and 415,000 pounds of off-site releases (27.2%). Michigan's reported releases totaled 663,000 pounds (15.6%), including 317,000 pounds (11.7%) on-site and 346,000 pounds off-site (22.6%).

Maine ranked third for total on- and off-site releases, with 372,000 pounds (8.8%). Maine was also third for on-site releases (285,000 pounds, or 10.5%). Missouri ranked third for off-site releases (124,000 pounds, or 8.1%).

The leather and leather products sector's largest other on-site waste management was reported in Michigan, with 921,000 pounds, or 21.8% of the sector's total other on-site waste management. Maine ranked second in this category, with 658,000 pounds, or 15.6%, and Pennsylvania ranked third, with 498,000 pounds, or 11.8%.

States with the sector's largest reported transfers off-site for further waste management were Wisconsin with 325,000 pounds (17.8% of the total), Missouri with 192,000 pounds and Pennsylvania with 191,000 pounds (10.5% each).

In both Wisconsin and Michigan, the leather and leather products sector reported 1.7 million pounds of total production-related waste, or 16.4% each of the sector's total. Maine was the state with the next-largest reported total production-related waste, 1.1 million pounds, or 11.2%.

Table 10-6. Summary of TRI Information by State, 1996: Leather and Leather Products, SIC Code 31

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Arkansas	2	2	0	21,036	0	21,036	0	385	21,421	0
California	1	3	0	90,580	13,182	103,762	140,000	11,300	254,800	0
Florida	1	1	0	19,130	4	19,134	0	65	19,000	0
Georgia	1	1	0	720	24	744	5,900	0	6,640	0
Illinois	4	9	0	148,790	73,084	221,874	0	38,809	260,423	0
Indiana	1	1	0	8,647	0	8,647	0	3,008	10,294	0
Iowa	1	4	0	9,805	91,000	100,805	2,200	66,700	169,740	0
Kentucky	1	1	0	10,806	0	10,806	0	250	10,863	0
Maine	7	16	3	284,721	86,837	371,558	657,976	107,538	1,137,837	0
Maryland	1	9	0	172,831	37,500	210,331	396,500	112,000	647,625	0
Massachusetts	6	17	0	30,992	74,632	105,624	323,346	68,229	385,489	0
Michigan	6	25	0	317,441	345,708	663,149	920,891	147,538	1,669,482	6,122
Minnesota	4	12	2	186,824	39,751	226,575	54,000	176,825	518,296	0
Missouri	3	6	0	16,205	123,983	140,188	444,000	192,330	777,205	0
Nebraska	1	5	0	29,697	51,530	81,227	0	62,693	143,930	0
New Hampshire	1	2	0	23,129	4,065	27,194	0	4,825	32,019	0
New Jersey	2	4	0	35,955	105,446	141,401	396,693	46,936	585,030	0
New York	9	19	0	69,942	15,099	85,041	38,813	18,965	144,217	0
North Carolina	2	6	0	227,630	0	227,630	4,780	25	232,434	0
Oregon	2	5	0	29,935	22,144	52,079	0	61,339	113,263	0
Pennsylvania	7	19	1	229,473	15,326	244,799	498,421	191,437	926,599	0
Puerto Rico	4	6	0	50,786	0	50,786	2	11,597	62,242	0
Tennessee	4	7	0	30,077	12,807	42,884	28,642	18,797	61,244	0
Texas	4	6	0	120,787	0	120,787	30,000	157,267	308,243	0
Utah	1	4	4	0	0	0	0	0	0	0
Wisconsin	13	33	4	549,125	414,703	963,828	282,852	325,024	1,670,544	0
Total for SIC Code 31	89	223	14	2,715,064	1,526,825	4,241,889	4,225,016	1,823,882	10,168,880	6,122

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

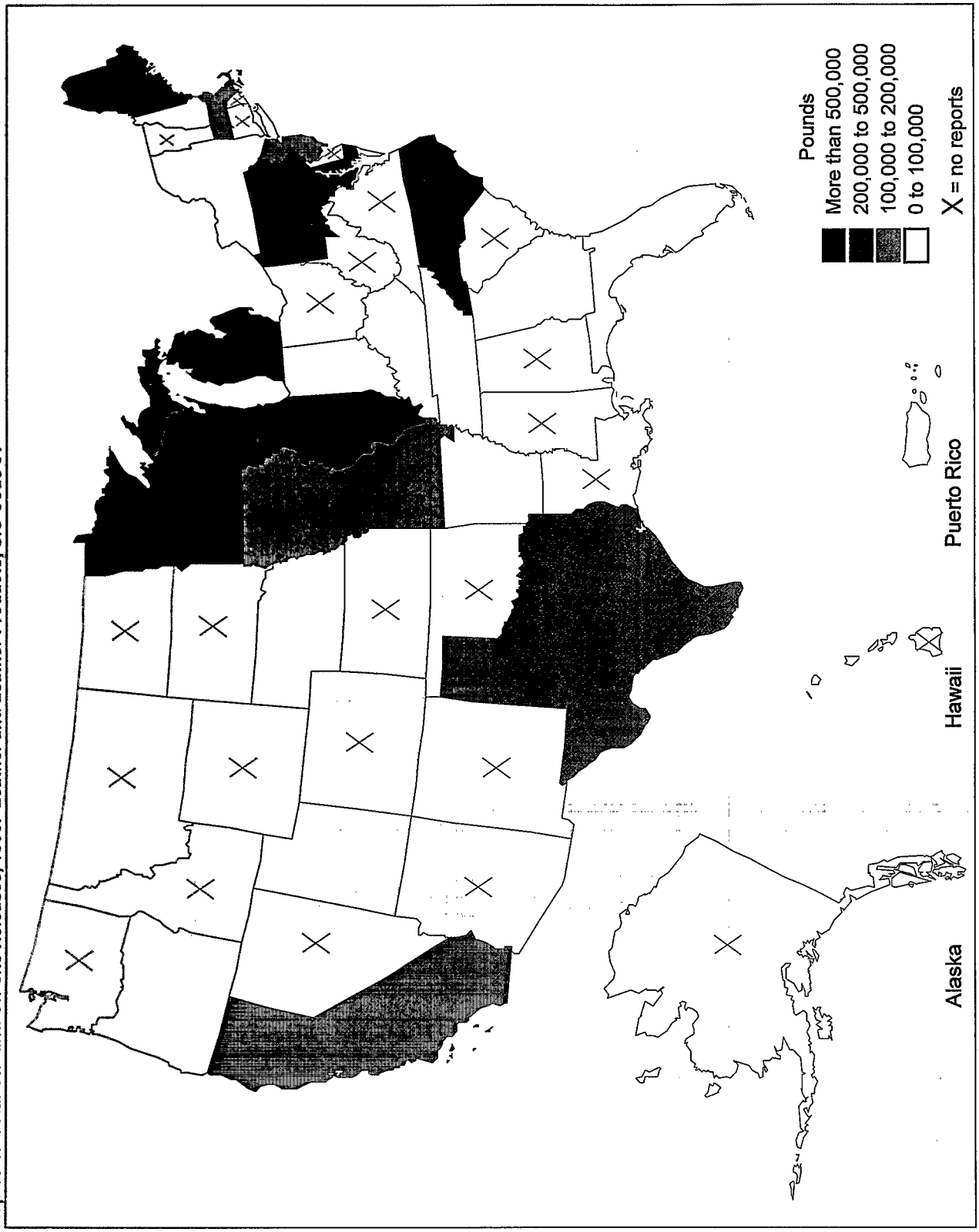
Map 10-1 illustrates the geographic distribution of total on- and off-site releases in the leather and leather products sector.

1996 TRI Data by Chemical for Leather and Leather Products

The top 15 chemicals for total on- and off-site releases in the leather and leather products sector in 1996 appear in Table 10-7. Releases of these chemicals totaled 4.2 million pounds, or 98.9% of all releases reported in this sector. The sector reported 2.6 million pounds of air emissions of these chemicals and 1.5 million pounds of off-site releases (transfers to disposal). Both amounts represented approximately 99% of the sector's totals in those categories.

Glycol ethers was the chemical reported in the largest amount, with 1.22 million pounds, mostly reported as air emissions. All of the air emissions of this chemical were reported by the leather tanning and finishing industry (SIC code 3111), which uses glycol ethers in coating processes. Chromium compounds ranked second for total releases, with 1.18 million pounds, almost entirely as off-site releases (transfers to disposal). The leather tanning and finishing industry reported the bulk (99.5%) of the off-site releases of chromium compounds, used in tanning hides and skins.

Map 10-1. Total On- and Off-site Releases, 1996: Leather and Leather Products, SIC Code 31



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

Table 10-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Leather and Leather Products, SIC Code 31 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
--	Glycol ethers	1,181,573	5	0	0	0	5	1,181,583	34,555	1,216,138
--	Chromium compounds	1,628	1,268	0	0	0	2,447	5,343	1,170,842	1,176,185
108-88-3	Toluene	516,408	0	0	0	0	0	516,408	0	516,408
78-93-3	Methyl ethyl ketone	358,911	0	0	0	0	0	358,911	0	358,911
--	Manganese compounds	530	526	0	0	0	5	1,061	178,200	179,261
872-50-4	N-Methyl-2-pyrrolidone	154,838	0	0	0	0	250	155,088	5,480	160,568
7664-41-7	Ammonia	132,456	3,466	0	0	0	379	136,301	15,356	151,657
7440-47-3	Chromium	10	250	0	0	0	3,525	3,785	111,207	114,992
71-36-3	n-Butyl alcohol	73,516	0	0	0	0	0	73,516	0	73,516
108-10-1	Methyl isobutyl ketone	68,257	0	0	0	0	0	68,257	0	68,257
1330-20-7	Xylene (mixed isomers)	54,006	0	0	0	0	0	54,006	0	54,006
--	Nitrate compounds	0	48,000	0	0	0	0	48,000	100	48,100
64-18-6	Formic acid	37,252	0	0	0	0	0	37,252	260	37,512
75-09-2	Dichloromethane	21,507	0	0	0	0	0	21,507	0	21,507
127-18-4	Tetrachloroethylene	19,130	0	0	0	0	0	19,130	4	19,134
	Subtotal	2,620,022	53,515	0	0	0	6,611	2,680,148	1,516,004	4,196,152
	Total for SIC Code 31	2,654,927	53,526	0	0	0	6,611	2,715,064	1,526,825	4,241,889

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

Table 10-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Leather and Leather Products, SIC Code 31 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3111	Leather Tanning & Finishing	25,767	0	0	0	0	0	25,767	9	25,776
3143	Men's Footwear, Except Athletic	21,507	0	0	0	0	0	21,507	0	21,507
	Invalid SIC Code within SIC Code 31	125	0	0	0	0	0	125	541	666
3131	Footwear Cut Stock	250	0	0	0	0	0	250	0	250
	Subtotal	47,649	0	0	0	0	0	47,649	550	48,199
	Total for SIC Code 31	2,654,927	53,526	0	0	0	6,611	2,715,064	1,526,825	4,241,889

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

As noted earlier, the leather tanning and finishing industry also reported all of the sector's surface water discharges and on-site land releases, including amounts for the top 15 chemicals, as shown in Table 10-7.

OSHA Carcinogens

As shown in Table 10-8, the leather and leather products sector reported releasing 48,000 pounds of chemicals designated as OSHA carcinogens in 1996. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) Almost all of these releases were reported as air emissions. The leather tanning and finishing industry (SIC code 3111) reported 26,000 pounds, and men's footwear (SIC code 3143) reported 22,000 pounds of total air emissions.

Dichloromethane and tetrachloroethylene ranked 14th and 15th for total on- and off-site releases in this sector and are OSHA carcinogens. Leather and leather products facilities reported releasing 22,000 pounds of dichloromethane and 19,000 pounds of

tetrachloroethylene (see Table 10-7). The sector also reported releases of two other OSHA carcinogens: formaldehyde (7,000 pounds) and nickel compounds (less than 1,000 pounds).

The men's footwear industry (SIC code 3143) reported all of the releases of dichloromethane. The leather tanning and finishing industry (SIC code 3111) reported most of the releases of the other three OSHA carcinogens. For each of the four chemicals, one or two facilities reported all of the releases.

Figure 10-7 shows the on- and off-site releases of the four-digit SIC codes in this sector that reported OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Leather and Leather Products

The leather and leather products sector reported 10.2 million pounds of total production-related waste in 1996. Most of the total was reported as released on- and off-site (4.6 million pounds) or as treated on-site (3.6 million pounds), as shown in Table 10-9. Together, these methods of waste management accounted for 80.4% of the sector's total production-related waste. The sector also reported 951,000 pounds of off-site treatment and

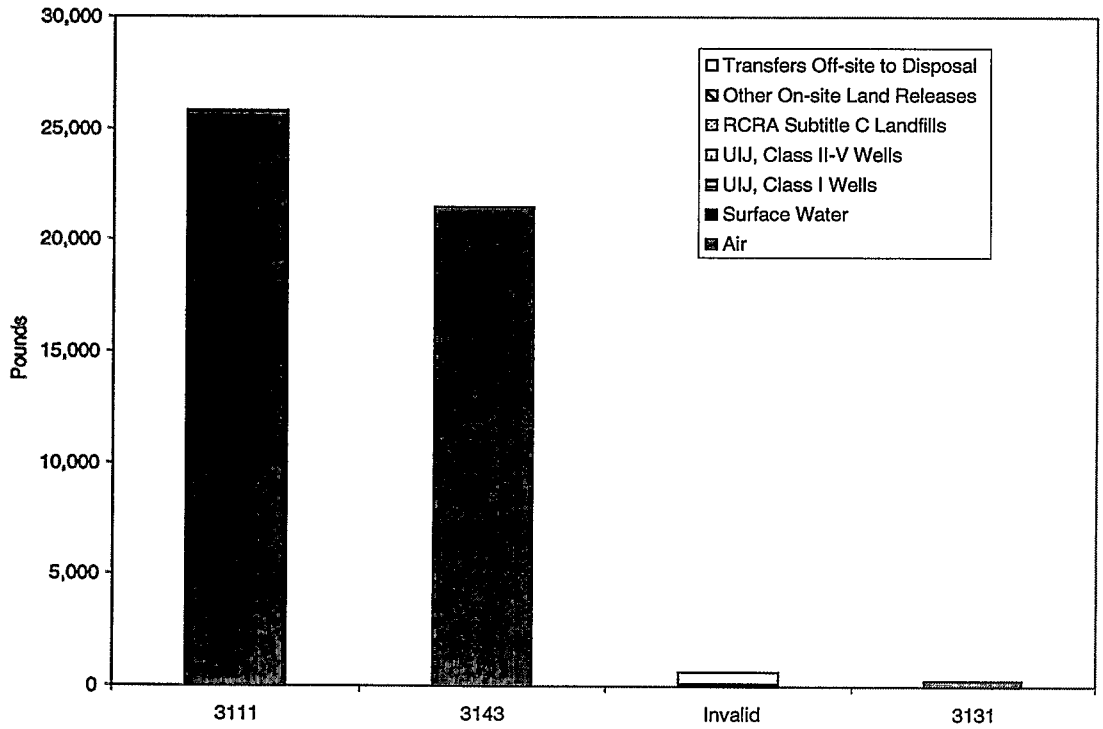


Figure 10-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Leather and Leather Products (SIC Code 31)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. UIJ = underground injection. Invalid SIC codes are codes beginning "31" that do not exist in the current Standard Industrial Classification code system.

Table 10-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Leather and Leather Products, SIC Code 31 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3111	Leather Tanning & Finishing	597,780	0	3,586,809	270,818	136,705	939,320	3,842,961	9,374,393	6,122
3143	Men's Footwear, Except Athletic	5,900	0	0	980	12,160	8,113	228,799	255,952	0
3149	Footwear, Except Rubber, nec*	642	0	0	0	6,759	0	230,320	237,721	0
	Multiple within SIC Code 31	0	0	0	440	8,098	0	220,754	229,292	0
	Invalid SIC Code within SIC Code 31	0	0	33,885	255	0	458	4,861	39,459	0
3144	Women's Footwear, Except Athletic	0	0	0	0	385	3,088	28,242	31,715	0
3131	Footwear Cut Stock	0	0	0	0	0	340	8	348	0
	Total for SIC Code 31	604,322	0	3,620,694	272,493	164,107	951,319	4,555,945	10,168,880	6,122

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

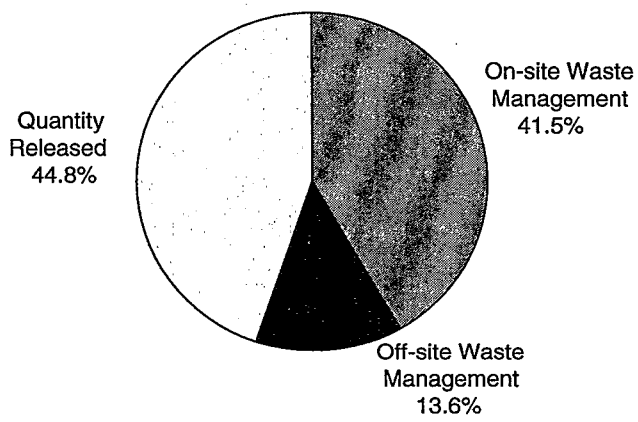


Figure 10-8. Distribution of TRI Production-related Waste, 1996: Leather and Leather Products (SIC Code 31)

Note: Data from Section 8 of Form R.

604,000 pounds of on-site recycling. These amounts represented 9.4% and 5.9%, respectively, of the sector's total production-related waste. Figure 10-8 illustrates the distribution of the sector's reporting of production-related waste.

The leather tanning and finishing industry (SIC code 3111) reported more that 80% of all types of waste management reported in this sector, including 98% or more of the on-site and off-site recycling and treatment. This industry reported 3.8 million pounds released on- and off-site and 3.6 million pounds of on-site treatment.

As noted earlier, three industries reported similar amounts of total production-related waste. Almost all of their production-related waste was reported as quantities released. These industries were men's footwear (SIC code 3143) with 256,000 pounds of total production-related waste, miscellaneous footwear (SIC code 3149) with 238,000 pounds, and the multiple SIC codes group with 229,000 pounds.

Distribution of production-related waste for the industries in the leather and leather products sector appears in Figure 10-9.

Projected Quantities of TRI Chemicals in Waste

The leather and leather products sector projected a 7.8% reduction in reported production-related waste by 1998, as shown in Table 10-10. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) The sector projected a decrease from 10.2 million pounds of total production-related waste in 1996 to 9.4 million pounds in 1998.

The sector projected reductions in all types of production-related waste, except for a 5.8% increase in off-site recycling, from 272,000 pounds in 1996 to 288,000 pounds in 1998. (No on-site energy recovery was reported in 1996 or projected for 1998).

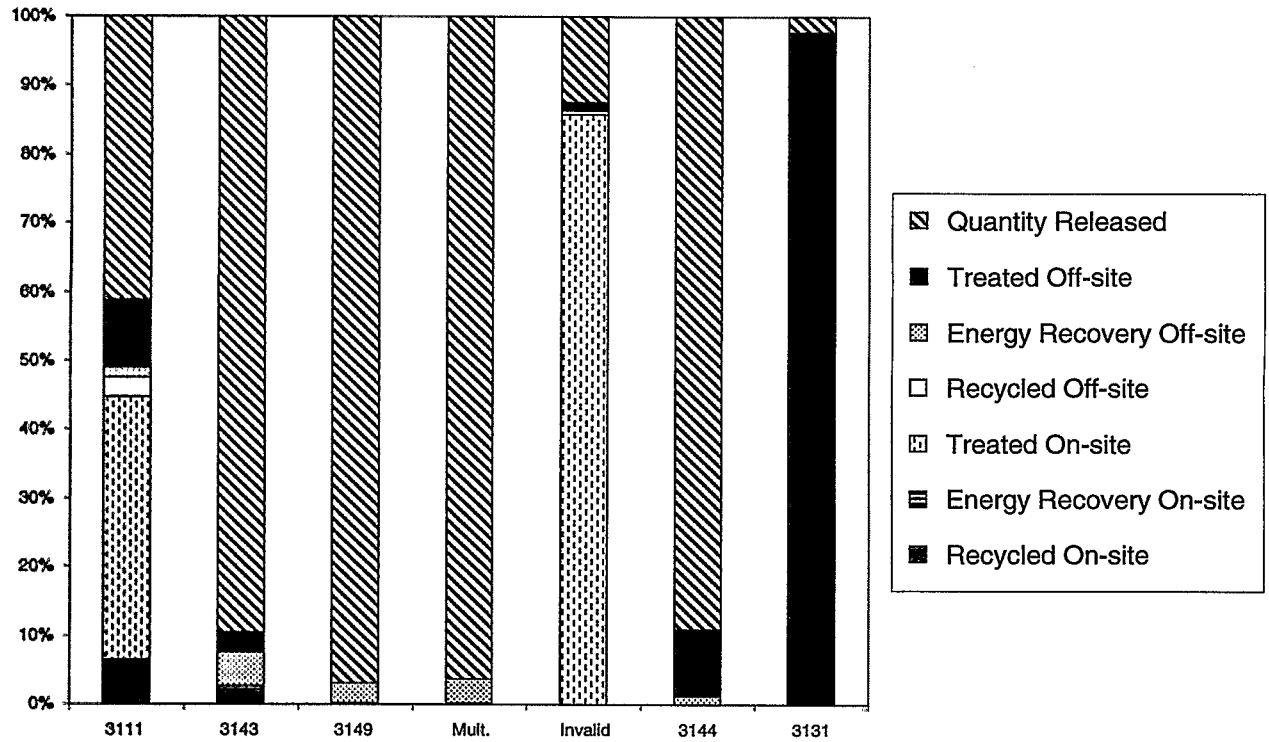


Figure 10-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Leather and Leather Products (SIC Code 31)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category. Invalid SIC codes are codes beginning "31" that do not exist in the current Standard Industrial Classification code system.

The largest component of the overall reduction was a projected 13.5% decrease in on-site treatment from 3.6 million pounds in 1996 to 3.1 million pounds in 1998. Off-site energy recovery was expected to decrease from 164,000 pounds to 45,000 pounds, which would represent a 72.5% reduction. Off-site treatment was projected to decrease from 951,000 pounds to 874,000 pounds, or 8.1%. The sector projected a 2.0% reduction in quantities released from 4.6 million pounds to 4.5 million pounds.

Figure 10-10 illustrates the projected percentage change in on-site waste management, off-site waste management, quantities released, and total production-related waste for the leather and leather products sector.

These changes represent small shifts in the ways that the leather and leather products sector expects to manage its TRI chemicals in waste. For example, recycling would increase slightly as a percentage of total production-related waste, both on-site and off-site. However, 44.8% of the sector's total production-related waste was reported as released on- and off-site in 1996, and this percentage would increase somewhat to 47.6%. Thus, releases represent a large and potentially increasing proportion of the sector's waste management, as indicated in these projections. In terms of the waste management hierarchy, as explained in Chapter 1, releases are the least environmentally desirable option for management of TRI chemicals in waste.

Table 10-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Leather and Leather Products, SIC Code 31

Waste Management Activity	Current Year 1996 Total Pounds	Current Year 1996 Percent of Total	Projected 1997 Total Pounds	Projected 1997 Percent of Total	Projected 1998 Total Pounds	Projected 1998 Percent of Total
On-site Waste Management						
Recycled On-site	604,322	5.9	634,631	6.6	575,031	6.1
Energy Recovery On-site	0	0.0	0	0.0	0	0.0
Treated On-site	3,620,694	35.6	3,240,079	33.7	3,133,300	33.4
Off-site Waste Management						
Recycled Off-site	272,493	2.7	285,890	3.0	288,363	3.1
Energy Recovery Off-site	164,107	1.6	59,516	0.6	45,106	0.5
Treated Off-site	951,319	9.4	860,670	8.9	874,011	9.3
Quantity Released On- and Off-site	4,555,945	44.8	4,539,310	47.2	4,464,143	47.6
Total Production-related Waste for SIC Code 31	10,168,880	100.0	9,620,096	100.0	9,379,954	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	5.0	-9.4	-4.8
Energy Recovery On-site	--	--	--
Treated On-site	-10.5	-3.3	-13.5
Off-site Waste Management			
Recycled Off-site	4.9	-0.9	5.8
Energy Recovery Off-site	-63.7	-24.2	-72.5
Treated Off-site	-9.5	1.6	-8.1
Quantity Released On- and Off-site	-0.4	-1.7	-2.0
Total Production-related Waste for SIC Code 31	-5.4	-2.5	-7.8

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

Source Reduction Activity

In 1996, 55 forms in the leather and leather products sector indicated one or more source reduction activities underway during the year, as shown in Table 10-11. This was one-fourth (24.7%) of all forms submitted by this sector. The leather tanning and finishing industry (SIC code 3111) submitted 38 of these forms (22.9% of the forms submitted by that industry).

Raw material modifications was one of the source reduction activities most often indicated (23 forms). This type of activity often represents more innovative projects to reduce or eliminate toxic chemicals in waste. Surface preparation and finishing was also

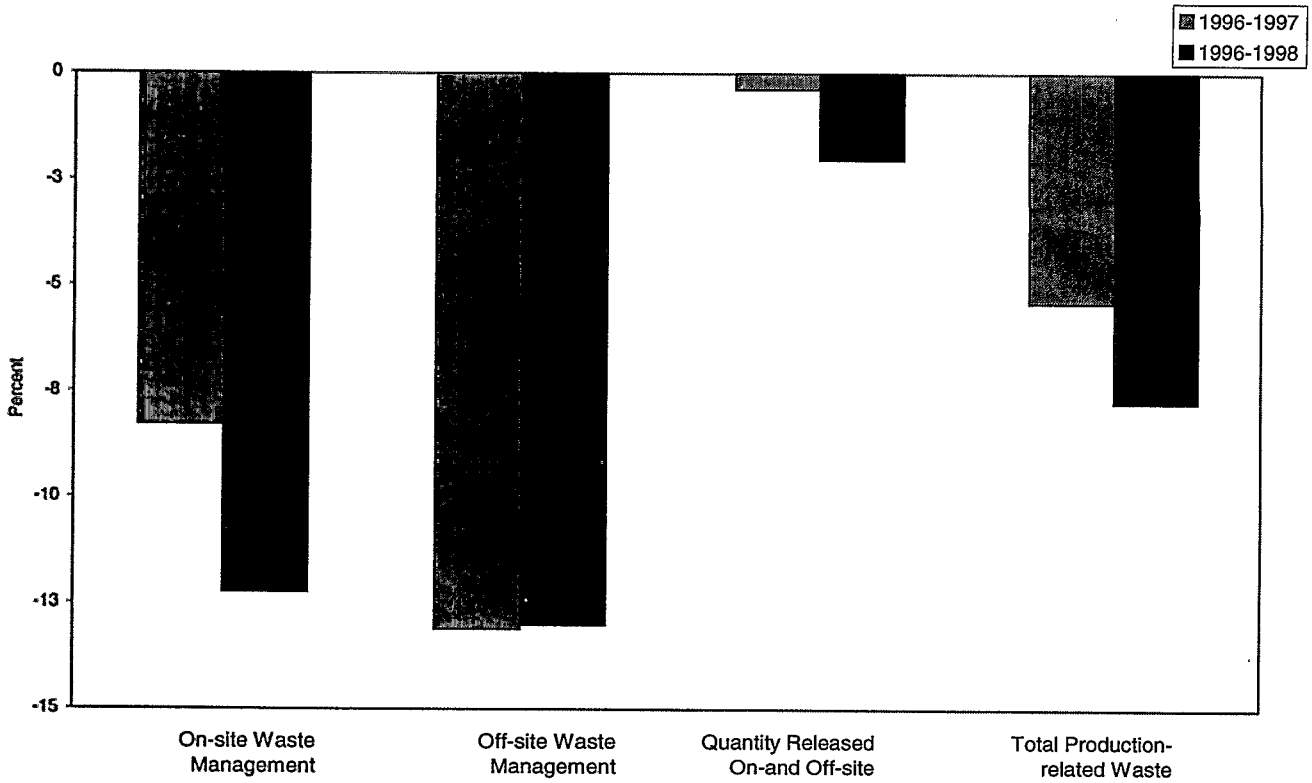


Figure 10-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Leather and Leather Products (SIC Code 31)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

Table 10-11. Number of Forms Reporting Source Reduction Activity, 1996: Leather and Leather Products, SIC Code 31

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3111	Leather Tanning & Finishing	166	38	22.9	8	1	4	11	4	3	21	1
3131	Footwear Cut Stock	1	0	0.0	0	0	0	0	0	0	0	0
3143	Men's Footwear, Except Athletic	16	10	62.5	1	2	0	8	0	0	0	4
3144	Women's Footwear, Except Athletic	3	2	66.7	1	0	0	1	0	0	2	0
3149	Footwear, Except Rubber, nec*	15	5	33.3	2	0	0	3	0	2	0	0
	Multiple within SIC Code 31	11	0	0.0	0	0	0	0	0	0	0	0
	Invalid SIC Code within SIC Code 31	11	0	0.0	0	0	0	0	0	0	0	0
	Total for SIC Code 31	223	55	24.7	12	3	4	23	4	5	23	5

Note: Forms with more than one 4-digit SIC code within code 31 are assigned to the "multiple" category.
*nec: not elsewhere classified.

frequently indicated (also 23 forms), reflecting the importance of this type of activity in the leather tanning and finishing industry.

Year-to-Year Comparisons for Leather and Leather Products

1995-1996 TRI Data for Leather and Leather Products

The number of forms submitted by the leather and leather products sector decreased from 251 in 1995 to 223 in 1996, as shown in Table 10-12.

On- and Off-site Releases

Total on- and off-site releases reported by the leather and leather products sector decreased 5.2% from 1995 to 1996, as shown in Table 10-12. The sector reported 4.5 million pounds of total releases in 1995 and 4.2 million pounds in 1996. Reported air emissions decreased from 2.9 million in 1995 to 2.7 million in 1996 (a reduction of 8.7%). Reductions were reported in both fugitive and point-source air emissions. Surface water discharges decreased from 113,000 pounds to 54,000 pounds (a 52.8% reduction). On-site land releases also decreased, from 15,000 pounds to 7,000 pounds (55.5%).

The leather and leather products sector reported an increase in off-site releases (transfers to disposal), the only release type with an increase in this sector for 1995-1996. Transfers to disposal rose from 1.4 million pounds to 1.5 million pounds. This was an increase of 6.0%.

Figure 10-11 illustrates the percentage change in releases reported by the leather and leather products sector.

Other On-site Waste Management

The leather and leather products sector reported 4.5 million pounds of other on-site waste management in 1995 and 4.2 million pounds in 1996, a 6.2% reduction, as shown in Table 10-12. All three methods of waste management showed decreases. On-site recycling decreased 2.9%, from 622,000 pounds to 604,000 pounds, and on-site treatment decreased 5.4% from 3.8 million pounds to 3.6 million pounds. The sector reported 56,000 pounds of on-site energy recovery in 1995, and none in 1996.

Transfers Off-site for Further Waste Management

The leather and leather products sector reported decreases in off-site transfers to recycling and energy recovery from 1995 to 1996, while transfers to treatment and POTWs increased. The net change in the sector's reported transfers off-site for further waste management was a reduction of 8.2%, from 2.0 million pounds to 1.8 million pounds. Table 10-12 presents the sector's reporting of transfers off-site for further waste management for 1995 and 1996.

In this sector, transfers to recycling decreased 23.4%, from 441,000 pounds to 338,000 pounds. Transfers to energy recovery decreased 37.8%, from 269,000 pounds to 167,000 pounds. The sector reported relatively small amounts of transfers to treatment, but these transfers increased 150.4%, from 12,000 pounds to 29,000 pounds. The largest type of off-site transfer for further waste management in this sector—transfers to POTWs—increased from 1.27 million pounds to 1.29 million pounds, an increase of 1.9%.

Table 10-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Leather and Leather Products, SIC Code 31

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	97	89	-8.2
Total Forms	251	223	-11.2
Form Rs	231	209	-9.5
Form As	20	14	-30.0
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	2,907,485	2,654,927	-8.7
Fugitive Air	882,616	747,962	-15.3
Point Source Air	2,024,869	1,906,965	-5.8
Surface Water Discharges	113,360	53,526	-52.8
Underground Injection	0	0	--
On-site Land Releases	14,843	6,611	-55.5
Total On-site Releases	3,035,688	2,715,064	-10.6
Off-site Releases			
Transfers Off-site to Disposal	1,440,001	1,526,825	6.0
Total On- and Off-site Releases	4,475,689	4,241,889	-5.2
Other On-site Waste Management			
Recycled On-site	622,116	604,322	-2.9
Energy Recovery On-site	55,500	0	-100.0
Treated On-site	3,828,717	3,620,694	-5.4
Total Other On-site Waste Management	4,506,333	4,225,016	-6.2
Transfers Off-site for Further Waste Management			
Transfers to Recycling	440,743	337,555	-23.4
Transfers to Energy Recovery	268,536	167,073	-37.8
Transfers to Treatment	11,591	29,024	150.4
Transfers to POTWs	1,266,405	1,290,230	1.9
Other Off-site Transfers	0	0	--
Total Transfers Off-site for Further Waste Management	1,987,275	1,823,882	-8.2

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

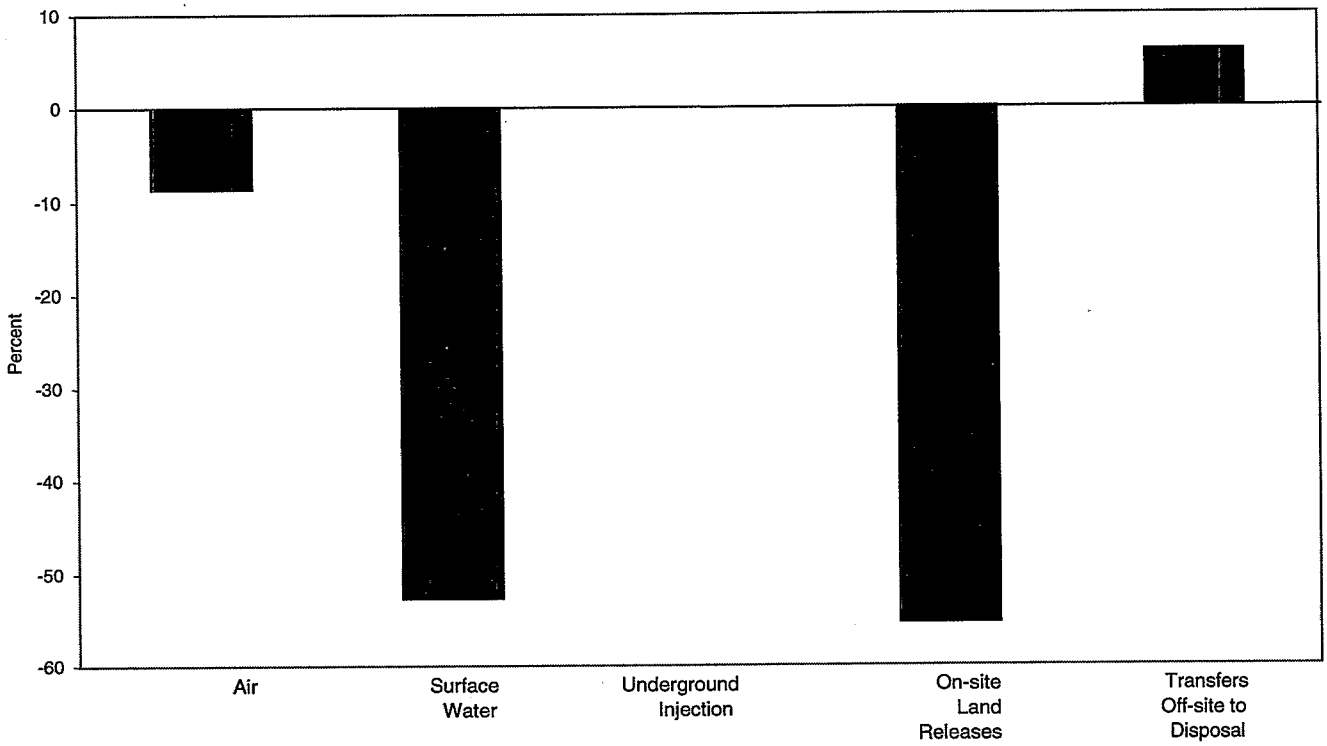


Figure 10-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Leather and Leather Products (SIC Code 31)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

1988-1996 TRI Data for Leather and Leather Products

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

From 1988 to 1996, the number of forms submitted to TRI by the leather and leather products sector decreased by about half (47.9%), from 282 forms to 147 forms. During this period, the sector also reduced reported on- and off-site releases from 13.0 million pounds to 3.8 million pounds, a 70.7% reduction. These data appear in Table 10-13.

All types of on-site releases reported by this sector decreased from 1988 to 1996, as shown in Table 10-13. Air emissions exhibited the largest reduction, from 11.7 million pounds to 2.3 million pounds, or 80.2%. The largest portion of the overall reduction occurred in reporting of point-source emissions (from 9.4 million pounds to 1.7 million pounds), although fugitive air emissions also decreased (from 2.2 million pounds to 568,000 pounds). On-site land releases decreased from

Table 10-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Leather and Leather Products, SIC Code 31

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	137	98	82	81	-40.9
Total Forms	282	177	167	147	-47.9
Form Rs	282	177	156	144	-48.9
Form As	NA	NA	11	3	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	11,692,677	3,660,926	2,599,137	2,309,389	-80.2
Fugitive Air	2,247,960	983,445	693,456	568,439	-74.7
Point Source Air	9,444,717	2,677,481	1,905,681	1,740,950	-81.6
Surface Water Discharges	3,302	1,967	1,600	2,060	-37.6
Underground Injection	0	0	0	0	--
On-site Land Releases	231,937	16,059	14,723	5,982	-97.4
Total On-site Releases	11,927,916	3,678,952	2,615,460	2,317,431	-80.6
Off-site Releases					
Transfers Off-site to Disposal	1,095,701	1,425,439	1,410,961	1,496,071	36.5
Total On- and Off-site Releases	13,023,617	5,104,391	4,026,421	3,813,502	-70.7
Other On-site Waste Management					
Recycled On-site	NA	658,304	620,791	604,322	NA
Energy Recovery On-site	NA	0	55,500	0	NA
Treated On-site	NA	1,702,691	1,609,388	906,297	NA
Total Other On-site Waste Management	NA	2,360,995	2,285,679	1,510,619	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	499,037	434,713	328,155	NA
Transfers to Energy Recovery	NA	270,203	259,792	157,543	NA
Transfers to Treatment	1,151,152	22,020	6,690	13,403	-98.8
Transfers to POTWs	814,909	629,324	524,995	485,130	-40.5
Other Off-site Transfers	4,715	0	0	0	-100.0
Total Transfers Off-site for Further Waste Management	NA	1,420,584	1,226,190	984,231	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. **NA:** not required to be reported in that year.

232,000 pounds to 6,000 pounds, or 97.4%. A reduction was also reported in surface water discharges, of 37.6%, but very small amounts were reported in this category (3,000 pounds in 1988 and 2,000 in 1996).

The leather and leather products sector reported an increase in off-site releases (transfers to disposal) from 1.1 million pounds in 1988 to 1.5 million pounds in 1996. This amounted to an increase of more than one-third (36.5%).

Figure 10-12 displays the percentage change in release types reported in the leather and leather products sector from 1988 to 1996.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, total other on-site waste management reported by this sector decreased from 2.4 million pounds to 1.5 million pounds. This reflected a reduction in reporting of on-site treatment from 1.7 million pounds to 906,000 pounds. Amounts reported for on-site recycling also decreased, from 658,000 pounds to 604,000 pounds. For the 1994-to-1996 period shown in Table 10-13, the sector reported energy recovery only in 1995 (56,000 pounds).

The sector's reported transfers to treatment decreased 98.8% from 1988 to 1996, from 1.2

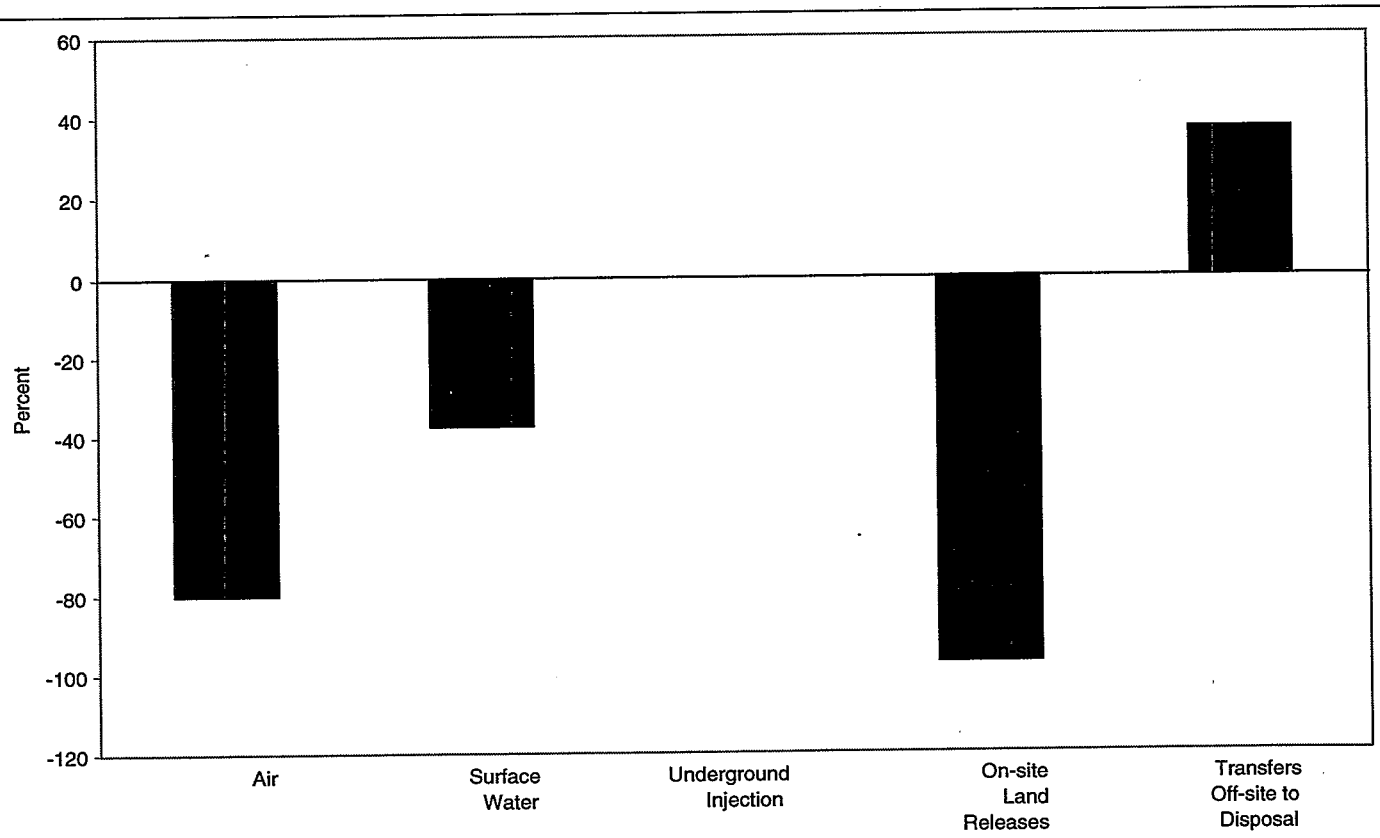


Figure 10-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Leather and Leather Products (SIC Code 31)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

million pounds to 13,000 pounds. Transfers to POTWs also decreased, by 40.5%, from 815,000 pounds to 485,000 pounds.

1988-1996 Data for Four-Digit Industries in Leather and Leather Products

Tables 10-14 through 10-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 31. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Table 10-14 provides release data for all four-digit SIC codes in the leather and leather products sector, for 1988-1996. The leather tanning and finishing industry (SIC code 3111) reported the largest decrease in on- and off-site releases. This industry reported total releases of 7.2 million pounds in 1988 and 3.1 million pounds in 1996. Air emissions were the largest factor in this reduction, along with a smaller reduction in on-site releases to land. The industry's reporting of off-site releases (transfers to disposal) increased over this period.

The women's footwear industry (SIC code 3144) ranked second for decreases, reporting 472,000 pounds in 1988 and 30,000 pounds in 1996. Men's footwear (SIC code 3143) ranked third, with 591,000 pounds in 1988 and 239,000 pounds in 1996. Virtually all of the releases and reductions reported in both industries were in air emissions.

One industry group reported an increase from 1988 to 1996. This was the multiple-codes group, which reported 158,000 pounds of on- and off-site releases in 1988 and 221,000 pounds in 1996. Total releases reported on forms with multiple SIC codes varied from year to year, as is evident in Table 10-14. Almost all of the releases reported in the multiple-codes group were air emissions.

Other On-site Waste Management

The leather tanning and finishing industry (SIC code 3111) reported the sector's largest decrease in other on-site waste management from 1994 to 1996 (on-site waste management data were not collected in 1988). This industry reported 2.3 million pounds in 1994 and 1.5 million pounds in 1996. This reflected a large reduction in on-site treatment, along with a smaller decrease in on-site recycling.

The miscellaneous footwear industry (SIC code 3149) ranked second for decreases in other on-site waste management. This industry reported less than 3,000 pounds in 1994 and 1995 and 600 pounds in 1996, all in on-site recycling.

Men's footwear (SIC code 3143) reported a net increase for this period, from zero pounds in 1994 to 6,000 pounds in 1996 although the total was larger (8,000 pounds) in 1995. This industry also reported only on-site recycling.

Other leather and leather products industries did not report in the comparison years or reported only zero amounts of other on-site waste management.

On-site waste management data for 1994-1996 appear in Table 10-15.

Transfers Off-site for Further Waste Management

As with on- and off-site releases and other on-site waste management, the leather tanning and finishing industry (SIC code 3111) reported the largest reduction in transfers off-site for further waste management from 1994 to 1996 (data for some types of off-site transfers were not collected in 1988). The leather tanning and finishing industry reported 1.1 million pounds of such transfers in 1994 and 951,000 pounds in 1996. This industry reported decreases in all types of transfers except transfers to recycling.

Table 10-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Leather and Leather Products, SIC Code 31

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3111	Leather Tanning & Finishing	96	1,614,599	2,060	0	5,982	1,622,641	1,492,640	3,115,281
		95	1,658,662	1,600	0	14,723	1,674,985	1,409,309	3,084,294
		94	2,304,637	1,967	0	16,059	2,322,663	1,417,601	3,740,264
		88	6,208,035	2,052	0	186,937	6,397,024	825,531	7,222,555
3131	Footwear Cut Stock	96	250	0	0	0	250	0	250
		95	14,293	0	0	0	14,293	0	14,293
		94	10,180	0	0	0	10,180	1,216	11,396
		88	154,070	0	0	0	154,070	800	154,870
3142	House Slippers	96	No reports received						
		95	750	0	0	0	750	0	750
		94	13,000	0	0	0	13,000	0	13,000
		88	250	0	0	0	250	0	250
3143	Men's Footwear, Except Athletic	96	238,641	0	0	0	238,641	24	238,665
		95	288,454	0	0	0	288,454	26	288,480
		94	503,324	0	0	0	503,324	0	503,324
		88	590,406	250	0	0	590,656	0	590,656
3144	Women's Footwear, Except Athletic	96	29,683	0	0	0	29,683	0	29,683
		95	120,824	0	0	0	120,824	0	120,824
		94	111,950	0	0	0	111,950	250	112,200
		88	472,247	250	0	0	472,497	0	472,497
3149	Footwear, Except Rubber, nec*	96	203,649	0	0	0	203,649	0	203,649
		95	320,437	0	0	0	320,437	0	320,437
		94	358,583	0	0	0	358,583	0	358,583
		88	378,829	750	0	0	379,579	19,628	399,207
3161	Luggage	96	No reports received						
		95	10,863	0	0	0	10,863	0	10,863
		94	19,100	0	0	0	19,100	0	19,100
		88	136,412	0	0	0	136,412	750	137,162
3199	Leather Goods, nec*	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	2,631	0	0	0	2,631	0	2,631
	Multiple within SIC Code 31	96	221,114	0	0	0	221,114	0	221,114
		95	184,331	0	0	0	184,331	0	184,331
		94	299,751	0	0	0	299,751	0	299,751
		88	156,137	0	0	0	156,137	2,000	158,137
	Invalid SIC Code within SIC Code 31	96	1,453	0	0	0	1,453	3,407	4,860
		95	523	0	0	0	523	1,626	2,149
		94	40,401	0	0	0	40,401	6,372	46,773
		88	3,593,660	0	0	45,000	3,638,660	246,992	3,885,652
	Total for SIC Code 31	96	2,309,389	2,060	0	5,982	2,317,431	1,496,071	3,813,502
		95	2,599,137	1,600	0	14,723	2,615,460	1,410,961	4,026,421
		94	3,660,926	1,967	0	16,059	3,678,952	1,425,439	5,104,391
		88	11,692,677	3,302	0	231,937	11,927,916	1,095,701	13,023,617

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
***nec:** not elsewhere classified

Table 10-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Leather and Leather Products, SIC Code 31

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3111	Leather Tanning & Finishing	96	597,780	0	872,412	1,470,192
		95	609,663	55,500	1,506,339	2,171,502
		94	655,639	0	1,608,016	2,263,655
		88	NA	NA	NA	NA
3131	Footwear Cut Stock	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3142	House Slippers	96	No reports received			
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3143	Men's Footwear, Except Athletic	96	5,900	0	0	5,900
		95	8,200	0	0	8,200
		94	0	0	0	0
		88	NA	NA	NA	NA
3144	Women's Footwear, Except Athletic	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3149	Footwear, Except Rubber, nec*	96	642	0	0	642
		95	2,928	0	0	2,928
		94	2,665	0	0	2,665
		88	NA	NA	NA	NA
3161	Luggage	96	No reports received			
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3199	Leather Goods, nec*	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
	Multiple within SIC Code 31	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 31	96	0	0	33,885	33,885
		95	0	0	103,049	103,049
		94	0	0	94,675	94,675
		88	NA	NA	NA	NA
	Total for SIC Code 31	96	604,322	0	906,297	1,510,619
		95	620,791	55,500	1,609,388	2,285,679
		94	658,304	0	1,702,691	2,360,995
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
*nec: not elsewhere classified.

The multiple-codes group ranked second for decreases in transfers off-site for further waste management, reporting 19,000 pounds in 1994 and 800 pounds in 1996. Women's footwear (SIC code 3144) ranked third, with 14,000 pounds in 1994 and 3,000 pounds in 1996. Both reported reductions occurred principally in transfers to energy recovery.

Among leather and leather products industries, only the men's footwear industry (SIC code 3143) reported an increase in transfers off-site for further waste management for 1994 to 1996. This industry reported 11,000 pounds in 1994, 5,000 pounds in 1995, and 21,000 pounds in 1996. Increases were reported in transfers to energy recovery and to treatment.

Table 10-16 provides multi-year data by four-digit SIC codes for these transfer types.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Pfister & Vogel Leather in Milwaukee, Wisconsin (SIC code 3111), ranked first in increases of releases with 200,000 pounds. The chemical glycol ethers was responsible for all of the facility's increase. The tannery switched some of its coating processes from solvent-based materials to water-based materials. Glycol ethers is a component of the water-based coatings. The facility's reporting of solvents decreased over the 1988-1996 period, including decreases of 128,000 pounds in xylene releases and 51,000 pounds in 2-methoxyethanol releases.

Blackhawk Leather, Ltd., in Milwaukee, Wisconsin (SIC code 3111), was second in increases with an overall 141,000 pounds. An automotive leather manufacturer, the Blackhawk facility reported 83,000 pounds more chromium compounds (59% of the increase) transferred off-site for disposal. Chromium is integral to leather tanning and acts as a preservative. Waste sludge from the tanning process and leather scraps containing chromium are sent to off-site landfills. The facility attributed the increase to increased production.

Eagle Tanning Company in Waterloo, Iowa (did not report in 1988, SIC code 3111 in 1996), was the third-ranked facility for increases with 91,000 pounds. The tannery reported 91,000 pounds of chromium compounds in 1996, all in the category of transfers off-site to disposal. The facility came into operation in 1988 and did not use chromium compounds until the 1989 reporting year.

The top decreaser for releases was Eagle Ottawa Leather Company in Grand Haven, Michigan (SIC code 3111). This manufacturer of automobile upholstery leather had an overall decrease of 2.7 million pounds, 33% of which was accounted for by the elimination of methyl ethyl ketone from its coating process. Toluene, acetone, and methyl isobutyl ketone were also eliminated when Eagle Ottawa switched from solvent-based coatings to water-based coatings. Eagle Ottawa, a participant in EPA's 33/50 Program, received an Environmental Quality Award from the Michigan Chamber of Commerce for its environmental record.

Irving Tanning Company in Hartland, Maine (SIC code 3111), ranked second in decreases with 1.3 million pounds. This facility substituted an unlisted solvent for 2-methoxyethanol, used in leather coating operations. 2-Methoxyethanol, reported as fugitive and point-source air emissions in 1988, accounted for 62% of the facility's overall decrease. No data were reported for the chemical in 1996. Irving Tanning tans leather to customer specifications. Their customers produce finished leather goods.

Seton Company in Newark, New Jersey (SIC code 3111), was third in decreases with 671,000 pounds. Elimination of methyl ethyl ketone accounted for 49% of Seton's reduction. In 1992, this plant transferred its leather finishing operations to another Seton facility in Pennsylvania. Methyl ethyl ketone and other solvents used in coating

Table 10-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Leather and Leather Products, SIC Code 31

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3111	Leather Tanning & Finishing	96	326,480	134,957	5,389	484,081	0	950,907
		95	191,268	219,526	144	523,742	0	934,680
		94	271,117	229,625	8,267	627,824	0	1,136,833
		88	NA	NA	1,052,614	778,566	4,715	NA
3131	Footwear Cut Stock	96	0	0	0	750	0	750
		95	0	0	1,292	750	0	2,042
		94	0	0	0	750	0	750
		88	NA	NA	0	750	0	NA
3142	House Slippers	96	No reports received					
		95	0	0	500	0	0	500
		94	0	0	250	0	0	250
		88	NA	NA	0	0	0	NA
3143	Men's Footwear, Except Athletic	96	980	12,222	7,931	0	0	21,133
		95	736	3,031	1,267	0	0	5,034
		94	2,090	4,079	5,021	0	0	11,190
		88	NA	NA	250	0	0	NA
3144	Women's Footwear, Except Athletic	96	0	3,393	0	0	0	3,393
		95	0	20,826	0	0	0	20,826
		94	0	13,690	750	0	0	14,440
		88	NA	NA	8,250	0	0	NA
3149	Footwear, Except Rubber, nec*	96	0	6,573	0	0	0	6,573
		95	7,487	4,738	500	0	0	12,725
		94	6,080	5,669	2,350	0	0	14,099
		88	NA	NA	14,757	0	0	NA
3161	Luggage	96	No reports received					
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
3199	Leather Goods, nec*	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	1,023	0	NA
	Multiple within SIC Code 31	96	440	398	0	0	0	838
		95	1,470	11,671	2,895	0	0	16,036
		94	0	17,140	1,572	0	0	18,712
		88	NA	NA	0	750	0	NA
	Invalid SIC Code within SIC Code 31	96	255	0	83	299	0	637
		95	233,752	0	92	503	0	234,347
		94	219,750	0	3,810	750	0	224,310
		88	NA	NA	75,281	33,820	0	NA
	Total for SIC Code 31	96	328,155	157,543	13,403	485,130	0	984,231
		95	434,713	259,792	6,690	524,995	0	1,226,190
		94	499,037	270,203	22,020	629,324	0	1,420,584
		88	NA	NA	1,151,152	814,909	4,715	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 31 are assigned to the "multiple" category.
*nec: not elsewhere classified.

processes were, therefore, no longer used at the Newark facility or they were used in small enough quantities to be below the reporting threshold. The Seton Company contact added that the Pennsylvania facility has recently switched from solvent-based coating processes to water-based processes.

1991-1996 Waste Management Data for Leather and Leather Products

Table 10-17 summarizes on- and off-site waste management data for the leather and leather products sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). From 1991 to 1996, total production-related waste reported by the leather and leather products sector decreased by two-thirds (65.1%) from 18.0 million pounds to 6.3 million pounds.

Reductions were reported in all waste management types except on-site treatment (which increased 32.5%, from 684,000 pounds to 906,000 pounds). The sector's largest reduction (in pounds) was reported in quantities released on- and off-site, from 9.1 million pounds in 1991 to 3.9 million pounds in 1996. The second-largest reduction was reported in on-site recycling, from 5.5 million pounds to 604,000 pounds. These changes amounted to reductions of 56.8% and 89.0%, respectively.

Total off-site waste management decreased 68.9%, from 2.7 million pounds in 1991 to 835,000 pounds in 1996, reflecting reductions in all three waste management methods. Off-site recycling decreased from 937,000 pounds to 263,000 pounds, off-site energy recovery decreased from 1.1 million pounds to 155,000 pounds, and off-site treatment decreased from 615,000 pounds to 417,000 pounds.

Figure 10-13 illustrates the 1991-1996 percentage change in the sector's total production-related waste, by type of waste management.

TRI facilities report absolute amounts of waste managed and of environmental releases, not adjusted for changes in production levels. As noted early in this chapter, production in the leather and leather products sector declined sharply through the 1990s. However, reporting of total production-related waste decreased even more rapidly.

At the same time, the 1991-1996 record indicates that the sector is managing its waste in less desirable ways over time. In terms of the waste management hierarchy (explained in Chapter 1), recycling is the preferred option for TRI chemicals in waste that cannot be prevented. Treatment is preferred only above releases, the least environmentally desirable waste management option. From 1991 to 1996, the leather and leather products sector reported substantial decreases in recycling, a net increase in treatment, and less rapid decreases in releases. The result of these changes is that the sector reported recycling a much smaller portion of its production-related waste, while increasing the portion of production-related waste that it released.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Law Tanning in Milwaukee, Wisconsin (did not report in 1988, SIC code 3111 in 1996), was first in increases of waste managed with 130,000 pounds. Chromium compounds accounted for 100% of the increase. The facility purchases blue drop splits (tanned leather that is split off of a hide to get a desired thickness) and manufactures "suede split." Leather trimmed from the suede split product is sent off-site for recycling. In 1993, the facility changed its location, thereby changing its TRI facility identification number. Because no data were reported under the identification number for the new location prior to 1993, the facility appeared to have a 130,000 pound increase in chromium compounds reported as recycled off-site and quantity released. The original location reported 87,000 pounds for these same reporting categories

Table 10-17. TRI Waste Management Data, 1991, 1994-1996: Leather and Leather Products, SIC Code 31

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	5,503,083	658,304	620,791	604,322
Energy Recovery On-site	0	0	55,500	0
Treated On-site	684,252	1,702,691	1,609,388	906,297
Total On-site Waste Management	6,187,335	2,360,995	2,285,679	1,510,619
Off-site Waste Management				
Recycled Off-site	936,712	555,371	445,300	263,093
Energy Recovery Off-site	1,136,350	272,980	264,511	154,577
Treated Off-site	614,893	613,767	504,033	416,961
Total Off-site Waste Management	2,687,955	1,442,118	1,213,844	834,631
Quantity Released On- and Off-site	9,135,066	4,947,855	4,042,532	3,941,804
Total Production-related Waste	18,010,356	8,750,968	7,542,055	6,287,054
Non-Production-related Waste	14,980	5	1	0

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-5.7	-2.7	-89.0
Energy Recovery On-site	--	-100.0	--
Treated On-site	-5.5	-43.7	32.5
Total On-site Waste Management	-3.2	-33.9	-75.6
Off-site Waste Management			
Recycled Off-site	-19.8	-40.9	-71.9
Energy Recovery Off-site	-3.1	-41.6	-86.4
Treated Off-site	-17.9	-17.3	-32.2
Total Off-site Waste Management	-15.8	-31.2	-68.9
Quantity Released On- and Off-site	-18.3	-2.5	-56.8
Total Production-related Waste	-13.8	-16.6	-65.1
Non-Production-related Waste	-80.0	-100.0	-100.0

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

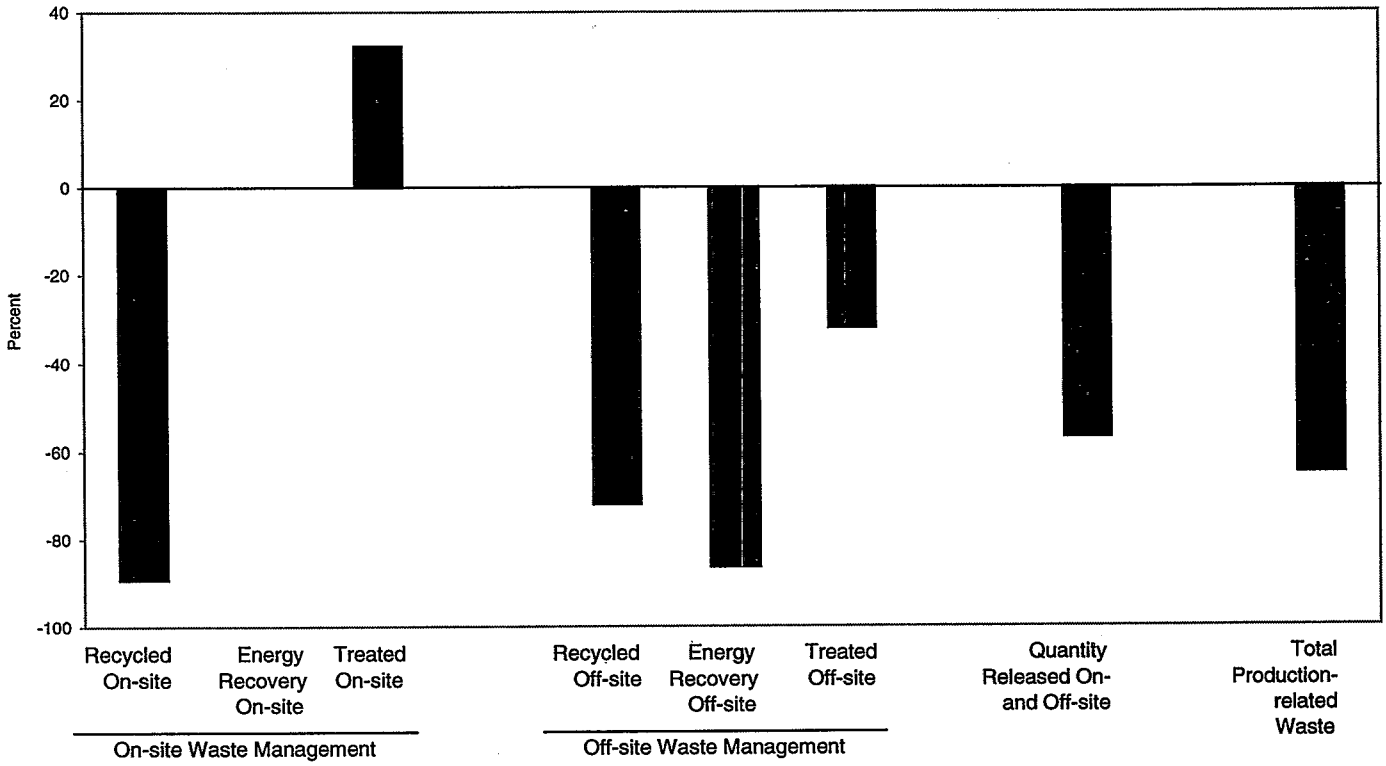


Figure 10-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Leather and Leather Products (SIC Code 31)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

in 1991. The increase in reported chromium compounds between the two facilities was due to a production increase.

Prime Tanning Corporation in Saint Joseph, Missouri (SIC code 3111), second in increases, had an overall increase of 125,000 pounds. Phosphoric acid had the biggest influence on the change, accounting for 44% of the increase between 1991 and 1996. The facility, which manufactures leather for shoes, boots, and upholstery, uses phosphoric acid in a wastewater pretreatment system. Phosphoric acid is neutralized upon introduction to the activated sludge system and supplies phosphate as a nutrient to biological organisms that aid in waste biodegradation. Between 1991 and 1996, the activated sludge system was found to be performing poorly due to a phosphate deficiency. As a result, the facility increased the amount of phosphoric acid introduced into the system.

Twin City Tanning in South Saint Paul, Missouri (SIC code 3111), was third in increases with 119,000 pounds. This custom tannery uses manganese sulfate in a wastewater pretreatment system to oxidize sulfides that are used to de-hair cattle hides. Reported manganese compounds were responsible for 88% of the facility's increase. The pretreatment system was installed in 1991 and was, therefore, not in operation for the entire reporting year.

Pfister & Vogel Leather in Milwaukee, Wisconsin (SIC code 3111), ranked first in decreases of waste managed with an overall 4.7 million-pound reduction. Chromium compounds accounted for all of the decrease. Trivalent chromium ion, the

primary chemical component of the tanning process, migrates from an aqueous solution, or "chrome liquor," into rawhide and bonds to the material, creating leather. The used chrome liquor, along with water used to wash the tanned hides, is pumped to a recycling system where chromium is isolated and prepared for reuse. The reported decrease in on-site recycling of chromium compounds was due a change in estimation methodology. According to the facility contact, in 1991 the amount of chromium reported as recycled on-site was estimated on the basis of the total weight of chromium compounds recycled (e.g., the amount of the chromium and the other elements making up the compound). After 1991, this figure was calculated using only the weight of chromium.

Garden State Tanning in Fleetwood, Pennsylvania (SIC code 3111), was second in decreases of waste managed with a reduction of 1.4 million pounds. A manufacturer of automotive leather, this facility used toluene and other solvents in a finish-coating process. Late in 1991, an incinerator that burned emissions from the facility's finish drying ovens broke down. Instead of replacing the incinerator, Garden State opted to initiate a source reduction program, with guidance from the Pennsylvania Department of Environmental Resources, that involved phasing out high-VOC, solvent-based coatings and substituting water-based coatings. Consequently, toluene, methyl ethyl ketone, and methyl isobutyl ketone were eliminated. Toluene reporting accounted for 44% of the facility's overall decrease between 1991 and 1996. This plant was a participant of the EPA's 33/50 Program. All three of the eliminated solvents were 33/50 chemicals.

Garden State Tanning in Williamsport, Maryland (SIC code 3111), ranked third in decreases with an overall 981,000 pounds. Like its counterpart in Freeport, Pennsylvania, this manufacturer of automotive leather eliminated emissions of high VOC solvents by switching from solvent-based finish-coating operations to water-based operations. Toluene accounted for 43% of the reduction in waste managed at the Williamsport plant between 1991 and 1996.

Facilities Contacted for Explanations (alphabetical by facility):

Blackhawk Leather, Ltd., Milwaukee, Wisconsin: Paul Holzman, September 1, 1998 (explanation provided)

Eagle Ottawa Leather Company, Grand Haven, Michigan: Scott Braspenninx, September 1, 1998 (explanation provided)

Eagle Tanning Company, Waterloo, Iowa: John Vankamen, September 1, 1998 (explanation provided)

Garden State Tanning, Inc., Fleetwood, Pennsylvania and Williamsport, Maryland: Chris Ehret, September 1 and September 30, 1998 (explanation provided)

Irving Tanning Company, Hartland, Maine: Richard Holden, September 1, 1998 (explanation provided)

Law Tanning Company, Milwaukee, Wisconsin: Thomas Squire, September 1 and September 30, 1998 (explanation provided)

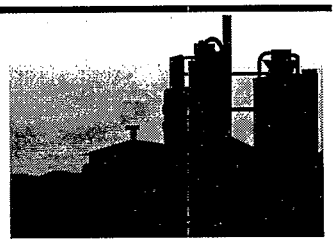
Pfister & Vogel Leather, Milwaukee, Wisconsin: Michael J. Travis, August 31 and September 1, 1998 (explanation provided)

Prime Tanning Corporation, Saint Joseph, Missouri: Rick A. Ream, September 1, 1998 (explanation provided)

Seton Company, Newark, New Jersey: Juan Flores and Carl Zipfel, September 1, 1998 (explanation provided)

Twin City Tanning Company, L.L.P., South Saint Paul, Missouri: John N. Smith, September 1, 1998 (explanation provided)

Chapter 11



Toxics Release Inventory Data for Stone, Clay, Glass, and Concrete (SIC Code 32)

A Look at the Stone, Clay, Glass, and Concrete Industry (SIC Code 32)

The stone, clay, glass, and concrete products sector (SIC code 32) manufactures flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, and abrasive and asbestos products. Products made from materials taken principally from the earth in the form of stone, clay, or sand are classified in this SIC code. Box 11-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The stone, clay, glass, and concrete sector shipped products valued at $82.44 billion in 1996, up from $75.93 billion in 1995 (both in current dollars). Employment also rose, from 501,000 in 1995 to 520,000 in 1996. Production levels in this sector dropped from 1989 to 1991, but increased modestly through 1996. From 1989 to 1996, stone, clay, glass, and concrete production rose 3.4%, compared to an increase of 17.6% for U.S. manufacturing as a whole (see Chapter 1, Table 1-10).

Concrete, gypsum, and plaster products (SIC code 327) contributed about 40% of the sector's shipments ($32.69 billion) and employment (205,000) in 1996. Other industry groups (at the three-digit SIC code level) with a substantial portion of the sector's economic activity were miscellaneous nonmetallic mineral products (SIC code 329), with $13.24 billion in shipments, and pressed or blown glass and glassware (SIC code 322), with $10.06 billion in shipments.

Industries that accounted for most of the stone, clay, glass, and concrete sector's reporting of TRI releases and waste management represented smaller levels of economic activity within the sector. These industries include hydraulic cement (SIC code 3241), with $5.82 billion in 1996 shipments; miscellaneous pressed and blown glass (SIC code 3229) with $5.72 billion; and mineral wool (SIC code 3296, primarily fiberglass) with $4.15 billion.

Box 11-1. SIC Code 32, Stone, Clay, Glass, and Concrete: Codes and Classifications

SIC Code		Industry Description
321	**Flat Glass**	
3211	Flat Glass	Manufacture of flat glass. Manufacture of laminated glass, from flat glass produced in the same establishment.
322	**Glass and Glassware, Pressed or Blown**	
3221	Glass Containers	Manufacture of glass containers for commercial packing and bottling and for home canning, from glass produced in the same establishment.
3229	Pressed and Blown Glass and Glassware, nec*	Manufacture of miscellaneous glass and glassware pressed, blown, or shaped from glass produced in the same establishment. Includes manufacture of textile glass fibers.
323	**Glass Products, Made of Purchased Glass**	
3231	Glass Products, Made of Purchased Glass	Manufacture of glass products from purchased glass.
324	**Cement, Hydraulic**	
3241	Cement, Hydraulic	Manufacture of hydraulic cement, including Portland, natural, masonry, and pozzolana cements.
325	**Structural Clay Products**	
3251	Brick and Structural Clay Tile	Manufacture of brick and structural clay tile.
3253	Ceramic Wall and Floor Tile	Manufacture of ceramic wall and floor tile.
3255	Clay Refractories	Manufacture of clay firebrick and other heat-resisting clay products.
3259	Structural Clay Products, nec*	Manufacture of clay sewer pipe and other miscellaneous structural clay products.
326	**Pottery and Related Products**	
3261	Vitreous China Plumbing Fixtures and China and Earthenware Fittings and Bathroom Accessories	Manufacture of vitreous china plumbing fixtures and earthenware fittings and bathroom accessories.
3262	Vitreous China Table and Kitchen Articles	Manufacture of vitreous china table and kitchen articles for use in households and in hotels, restaurants, and other commercial institutions, for preparing, serving, or storing food or drink.
3263	Fine Earthenware (Whiteware) Table and Kitchen Articles	Manufacture of fine (semivitreous) earthenware table and kitchen articles for preparing, serving, or storing food or drink.
3264	Porcelain Electrical Supplies	Manufacture of porcelain electronic and other electrical insulators, molded porcelain parts for electrical devices, spark plug and steatitic porcelain, and electronic and electrical supplies from clay and other ceramic materials.
3269	Pottery Products, nec*	Firing and decorating of white china and earthenware for the trade. Manufacture of art and ornamental pottery, industrial and laboratory pottery, stoneware and coarse earthenware table and kitchen articles, unglazed red earthenware florists' articles, and other miscellaneous pottery products.
327	**Concrete, Gypsum, and Plaster Products**	
3271	Concrete Block and Brick	Manufacture of concrete building block and brick from a combination of cement and aggregate.
3272	Concrete Products, Except Block and Brick	Manufacture of concrete products, except block and brick, from a combination of cement and aggregate.
3273	Ready-mixed Concrete	Manufacture of Portland cement concrete delivered to a purchaser in a plastic and unhardened state. Includes production and sale of central-mixed, shrink-mixed, and truck-mixed concrete.
3274	Lime	Manufacture of quicklime, hydrated lime, and "dead-burned" dolomite from limestone, dolomite shells, or other substances.
3275	Gypsum Products	Manufacture of plaster, plasterboard, and other products composed wholly or chiefly of gypsum, except articles of plaster of Paris and papier-mâché.
328	**Cut Stone and Stone Products**	
3281	Cut Stone and Stone Products	Cutting, shaping, and finishing granite, marble, limestone, slate, and other stone for building and miscellaneous uses.
329	**Abrasive, Asbestos, and Miscellaneous Nonmetallic Mineral Products**	
3291	Abrasive Products	Manufacture of abrasive grinding wheels of natural or synthetic materials, abrasive-coated products, and other abrasive products.
3292	Asbestos Products	Manufacture of asbestos textiles, asbestos building materials (except asbestos paper), insulating materials for covering boilers and pipes, and other products composed wholly or chiefly of asbestos.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 11-1. SIC Code 32, Stone, Clay, Glass, and Concrete: Codes and Classifications, Continued

SIC Code		Industry Description
3295	Minerals and Earths, Ground or Otherwise Treated	Crushing, grinding, pulverizing, or otherwise preparing clay, ceramic, and refractory minerals, barite, and miscellaneous nonmetallic minerals, except fuels (excludes establishments operating a mine or quarry). Crushing of slag and preparing roofing granules.
3296	Mineral Wool	Manufacture of mineral wool and mineral wool insulation products made of rock, slag, glass, and similar materials, or combinations thereof.
3297	Nonclay Refractories	Manufacture of refractories and crucibles made of materials other than clay.
3299	Nonmetallic Mineral Products, nec*	Factory production of goods made of plaster of Paris and papier-mâché. Manufacture of sand lime products and other miscellaneous nonmetallic mineral products.

***nec:** not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

The manufacture of hydraulic cement (SIC code 3241), such as Portland cement, generally requires two types of raw materials: Limestone or chalk is used to supply calcium, and clay or shale supplies silica. These materials are mixed with sand and sent through a rotary kiln to produce clinker (hard nodules). Clinker is then ground to a powder that will harden when reacted with water. Cements for special purposes undergo similar manufacture. White cement, for example, is made using raw materials with little iron content. Pozzolana cement is made by incorporating natural materials such as diatomaceous earths or shales. Masonry cement also incorporates pozzolans, in addition to hydrated lime, air-entraining agents, and other constituents. Because of the high temperatures involved, cement kilns often receive hazardous and other wastes for waste management purposes. This practice accounts for the industry's reporting of large amounts of energy recovery of TRI chemicals such as toluene. These chemicals are combusted in waste used as fuel.

Glass is manufactured by melting sand, limestone (for calcium and magnesium), and other substances at high temperatures. More than 90% of all glass is produced by combining soda, lime, and silica to obtain a material that can be melted and worked at a reasonable temperature and yet yield a durable product. Powdered anthracite coal may be used as a reducing agent. Iron, chromium, cerium, cobalt, or nickel may be added as a colorant. Boric oxide is used to make glass that better withstands heat; products include ovenware, laboratory equipment, and piping. Lead lowers the melting point of glass, enabling it to be worked through a broad temperature range. Lead oxide increases the refractive index of glass, often used in the production of optical glass.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Stone, Clay, Glass, and Concrete Products Industry,* Sector Notebook project, EPA/310-R-97-017, September 1995. <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

Kirk-Othmer Concise Encyclopedia of Chemical Technology, 1985: industry processes and technologies.

Table 11-1. Summary of TRI Information by 4-digit SIC Code, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
15	15	3211	Flat Glass	12	31	1	249,328	1,203	250,531
16	18	3221	Glass Containers	26	32	3	108,675	82,591	191,266
2	2	3229	Pressed & Blown Glass, nec*	49	129	3	3,575,029	3,733,236	7,308,265
8	12	3231	Products of Purchased Glass	49	79	3	976,954	43,085	1,020,039
3	1	3241	Cement, Hydraulic	70	444	68	6,350,765	19,092	6,369,857
4	6	3251	Brick & Structural Clay Tile	109	262	80	4,657,903	46,122	4,704,025
7	11	3253	Ceramic Wall & Floor Tile	25	51	1	523,403	533,538	1,056,941
6	19	3255	Clay Refractories	20	37	5	1,066,944	15,080	1,082,024
27	27	3259	Structural Clay Products, nec*	1	1	0	5	0	5
20	13	3261	Vitreous Plumbing Fixtures	6	15	2	8,242	63,752	71,994
21	21	3262	Vitreous China Table & Kitchenware	6	7	1	4,387	41,709	46,096
22	24	3263	Semivitreous Table & Kitchenware	1	2	0	3,849	34,100	37,949
19	14	3264	Porcelain Electrical Supplies	14	29	0	62,510	30,969	93,479
24	22	3269	Pottery Products, nec*	7	8	1	1,831	8,637	10,468
25	25	3271	Concrete Block & Brick	2	3	2	8,067	0	8,067
14	16	3272	Concrete Products, nec*	16	26	0	235,028	24,028	259,056
28	28	3273	Ready-mixed Concrete	1	1	0	0	0	0
18	23	3274	Lime	3	4	0	101,842	0	101,842
23	26	3275	Gypsum Products	5	5	0	11,352	34	11,386
17	20	3281	Cut Stone & Stone Products	15	17	1	156,037	0	156,037
11	9	3291	Abrasive Products	29	61	3	546,512	172,673	719,185
5	5	3292	Asbestos Products	3	19	0	1,672,856	649,197	2,322,053
9	3	3295	Minerals, Ground or Treated	45	150	3	882,639	41,580	924,219
1	4	3296	Mineral Wool	46	149	2	10,195,490	305,900	10,501,390
13	10	3297	Nonclay Refractories	31	57	11	121,526	163,680	285,206
12	7	3299	Nonmetallic Mineral Products, nec*	14	28	2	389,444	3,888	393,332
10	8		Multiple within SIC Code 32	30	64	6	686,190	127,709	813,899
26	17		Invalid SIC Code within SIC Code 32	5	5	1	1,815	0	1,815
			Total for SIC Code 32	640	1,716	199	32,598,623	6,141,803	38,740,426

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Air emissions result from both raw materials and additives during the melting process in glass production, along with releases of nitrogen oxides and sulfur oxides from fuel combustion. Chemicals applied during finishing processes include hydrofluoric and sulfuric acids, potassium nitrate, chromic and sulfuric acid mixtures, and others. Solvents are used as cleaning agents, once the glass products are formed, cooled, and treated.

Mineral wool (SIC code 3296) is an inorganic fibrous material processed by steam blasting and cooling molten silicate or a similar substance. The chief use of this material is insulation. The fibers may be processed into flexible blanket forms, pressed (with organic binders) into flexible or rigid felts, or vacuum-formed into intricate rigid shapes. Textile fiberglass (or electrical glass), made in this industry, is used in the production of fireproof cloth.

1996 TRI Data for Stone, Clay, Glass, and Concrete

Table 11-1 summarizes TRI reporting by the stone, clay, glass, and concrete sector for 1996.

Table 11-1. Summary of TRI Information by 4-digit SIC Code, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3211	Flat Glass	191,646	51,717	490,240	0
3221	Glass Containers	138,480	3,100	329,317	960
3229	Pressed & Blown Glass, nec*	139,047,439	3,116,438	150,624,246	73,462
3231	Products of Purchased Glass	922,940	650,039	2,349,901	1,844
3241	Cement, Hydraulic	416,778,569	1,598,325	425,302,604	92
3251	Brick & Structural Clay Tile	1,122,940	0	5,537,006	252
3253	Ceramic Wall & Floor Tile	1,254,296	112,271	2,381,922	1
3255	Clay Refractories	205,887	758	290,646	0
3259	Structural Clay Products, nec*	0	0	4	0
3261	Vitreous Plumbing Fixtures	144,003	473,753	661,769	0
3262	Vitreous China Table & Kitchenware	0	124,784	170,559	3,890
3263	Semivitreous Table & Kitchenware	0	0	38,300	0
3264	Porcelain Electrical Supplies	382,793	96,817	579,207	0
3269	Pottery Products, nec*	90,725	2,961	102,811	711
3271	Concrete Block & Brick	0	5,235	13,301	0
3272	Concrete Products, nec*	154,247	115,896	471,813	0
3273	Ready-mixed Concrete	0	0	0	0
3274	Lime	0	0	101,837	0
3275	Gypsum Products	45	0	745	0
3281	Cut Stone & Stone Products	764	14,148	206,347	1
3291	Abrasive Products	1,362,304	605,310	3,282,128	5
3292	Asbestos Products	5,230,879	131,423	7,674,906	0
3295	Minerals, Ground or Treated	35,823,239	1,650,319	38,523,666	0
3296	Mineral Wool	5,932,647	1,255,885	18,083,349	4,346
3297	Nonclay Refractories	2,180,402	70,955	2,531,114	524
3299	Nonmetallic Mineral Products, nec*	4,511,507	111,076	5,010,773	0
	Multiple within SIC Code 32	2,309,633	369,568	3,563,551	5,129
	Invalid SIC Code within SIC Code 32	191	537	446,922	0
	Total for SIC Code 32	617,785,576	10,561,315	668,768,984	91,217

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

The sector submitted 1,716 forms in 1996. Of these, 199 were Form A certification statements certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The hydraulic cement industry (SIC code 3241) submitted 444 forms, one-fourth (25.9%) of the stone, clay, glass, and concrete sector's forms in 1996. The brick and structural clay tile industry (SIC code 3251) submitted 262 forms (15.3%). Ground or treated minerals (SIC code 3295) submitted 150 forms, and mineral wool (SIC code 3296) submitted 149 forms (8.7% each).

The mineral wool industry (SIC code 3296) reported the largest on-site releases and total on- and off-site releases in the stone, clay, glass, and concrete sector in 1996. This industry reported on-site releases of 10.2 million pounds, 31.3% of the sector's total of 32.6 million pounds, and total on- and off-site releases of 10.5 million pounds, 27.1% of the sector's total of 38.7 million pounds.

However, the mineral wool industry did not rank among the top three industries in the sector for any other summary category shown in Table 11-1.

The hydraulic cement industry (SIC code 3241) ranked second for on-site releases with 6.4 million pounds, 19.5% of the sector's on-site releases. The miscellaneous pressed and blown glass industry (SIC code 3229) ranked second for total on- and off-site releases with 7.3 million pounds, 18.9% of the sector's total on- and off-site releases.

Miscellaneous pressed and blown glass (SIC code 3229) also reported the largest off-site releases in this sector, with 3.7 million pounds. This amount was 60.8% of the sector's total of 6.1 million pounds of off-site releases. Ranking second, the asbestos products industry (SIC code 3292) reported 649,000 pounds, or 10.6% of the total.

The hydraulic cement industry (SIC code 3241) reported the largest amounts of other on-site waste management and total production-related waste in the stone, clay, glass, and concrete sector, as shown in Table 11-1. This industry reported 416.8 million pounds of other on-site waste management, two-thirds (67.5%) of the sector's total of 617.8 million pounds. Hydraulic cement also accounted for 425.3 million pounds of total production-related waste, nearly two-thirds (63.6%) of the sector's total of 668.8 million pounds. The miscellaneous pressed and blown glass industry (SIC code 3229) ranked second in both categories, with 139.0 million pounds of other on-site waste management and 150.6 million pounds of total production-related waste. These amounts were 22.5% of each of these categories for the sector as a whole.

Miscellaneous pressed and blown glass (SIC code 3229) ranked first for reporting of transfers off-site for further waste management, with 3.1 million pounds, which was 29.5% of the sector's total of 10.6 million pounds. Ground or treated minerals (SIC code 3295) ranked second in this category with 1.7 million pounds (15.6%).

Multiple SIC Codes in SIC Code 32

Some facilities in the stone, clay, glass, and concrete sector manufacture products that are classified in related, but distinct SIC codes. A facility may manufacture both flat glass (SIC code 3211) and products made of purchased glass (SIC code 3231). Another facility may produce both ground or treated minerals (SIC code 3295) and miscellaneous nonmetallic mineral products (SIC code 3299). Such facilities will report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Table 11-2 examines TRI reporting on forms that reported more than one SIC code within SIC code 32. There were 64 such forms. The most frequent combination, appearing on 24 of the forms, was clay refractories (SIC code 3255) and non-clay refractories (SIC code 3297). These facilities manufacture refractories (bricks and other shapes) and crucibles for use in high-heat furnaces. Ten forms combined ground or treated minerals (SIC code 3295) and miscellaneous nonmetallic mineral products (SIC code 3299).

The 64 multiple-codes forms in SIC code 32 reported 814,000 pounds of total on- and off-site releases, 2.3 million pounds of other on-site waste management, 370,000 pounds of transfers off-site for further waste management, and 3.6 million pounds of total production-related waste, as shown in Table 11-2. The combination of flat glass (SIC code 3211) and products made of purchased glass (SIC code 3231) reported the largest total on- and off-site releases, 474,000 pounds. A combination of three products—miscellaneous pressed and blown glass (SIC code 3229), non-clay refractories

Table 11-2. Multiple SIC Codes, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32

SIC Codes				Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3211	3231			6	2	473,795	0	473,795	0	0	473,540	0
3221	3295			1	0	282	0	282	0	0	282	0
3229	3231			1	0	4	0	4	14,664	0	94,774	0
3229	3297	3299		3	0	2,830	0	2,830	2,010,000	33,055	2,045,498	0
3251	3271			1	0	46,000	0	46,000	0	0	46,000	0
3255	3261	3264	3291	3	0	33	3,911	3,944	0	0	3,911	0
3255	3295			2	0	740	0	740	1,470	0	3,240	0
3255	3297			24	2	16,230	97,092	113,322	226,312	14,121	348,705	5,129
3261	3298			1	0	48	4,503	4,551	9,537	3,345	17,232	0
3271	3273			1	0	3,996	0	3,996	0	0	8,360	0
3274	3297			2	0	1,475	0	1,475	24,200	820	25,140	0
3291	3297	3299		1	0	0	200	200	0	200	400	0
3291	3299			4	0	42,600	1,087	43,687	23,450	1,400	67,950	0
3295	3297			3	0	9,131	0	9,131	0	0	9,131	0
3295	3299			10	2	88,947	20,916	109,863	0	316,627	419,309	0
3297	3299			1	0	79	0	79	0	0	79	0
Total for SIC Code 32				64	6	686,190	127,709	813,899	2,309,633	369,568	3,563,551	5,129

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

(SIC code 3297), and miscellaneous nonmetallic mineral products (SIC code 3299)—reported the largest total production-related waste, 2.0 million pounds.

On- and Off-site Releases

The stone, clay, glass, and concrete sector reported 30.0 million pounds of air emissions in 1996, which was 77.5% of all on- and off-site releases reported by this sector. The sector also reported 2.4 million pounds of other on-site land releases and 6.1 million pounds of off-site releases (transfers to disposal). These amounts were 6.2% and 15.9%, respectively, of total releases. Other types of releases accounted for less than 0.5% each of the sector's total. Table 11-3 presents on- and off-site releases reported by the stone, clay, glass, and concrete sector in 1996. Figure 11-1 illustrates the distribution of these releases by type.

The mineral wool industry (SIC code 3296) reported the largest air emissions in the stone, clay, glass, and concrete sector. This industry reported 9.9 million pounds (33.0% of the sector's total air emissions), including 5.0 million pounds of ammonia and 2.0 million pounds of formaldehyde. The hydraulic cement industry (SIC code 3241) reported the second-largest air emissions, with 5.7 million pounds (18.9%), including 4.5 million pounds of hydrochloric acid. The industry with the third-largest reported air emissions was brick and structural clay tile manufacturing (SIC code 3251), with 4.6 million pounds (15.4%), including 3.7 million pounds of hydrogen fluoride.

The clay refractories industry (SIC code 3255) ranked first for other on-site land releases in this sector, reporting 1.0 million pounds, or 41.5% of the sector's total, almost all of which was phosphoric acid. Hydraulic cement production (SIC code 3241) accounted for the second-largest other on-site land releases with 671,000 pounds (27.8%). Mineral wool (SIC code 3296) ranked third, with 269,000 pounds (11.1%).

Miscellaneous pressed and blown glass production (SIC code 3229) reported the sector's largest off-site releases (transfers to disposal), with 3.7 million pounds or 60.8% of the total. This industry reported transferring 2.7 million pounds of lead compounds off-site to disposal, and one facility in this industry

Table 11-3. TRI On-site and Off-site Releases, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3296	Mineral Wool	9,915,677	10,010	0	0	778	269,025	10,195,490	305,900	10,501,390
3229	Pressed & Blown Glass, nec*	3,430,429	4,868	0	0	48,114	91,618	3,575,029	3,733,236	7,308,265
3241	Cement, Hydraulic	5,662,118	56	0	0	17,584	671,007	6,350,765	19,092	6,369,857
3251	Brick & Structural Clay Tile	4,631,615	270	0	0	7,362	18,656	4,657,903	46,122	4,704,025
3292	Asbestos Products	1,662,051	24	0	0	0	10,781	1,672,856	649,197	2,322,053
3255	Clay Refractories	63,013	261	0	0	0	1,003,670	1,066,944	15,080	1,082,024
3253	Ceramic Wall & Floor Tile	354,237	1,275	0	0	0	167,891	523,403	533,538	1,056,941
3231	Products of Purchased Glass	969,607	0	0	0	0	7,347	976,954	43,085	1,020,039
3295	Minerals, Ground or Treated	795,774	25,699	0	0	0	61,166	882,639	41,580	924,219
	Multiple within SIC Code 32	666,659	550	0	0	0	18,981	686,190	127,709	813,899
3291	Abrasive Products	546,262	0	0	0	0	250	546,512	172,673	719,185
3299	Nonmetallic Mineral Products, nec*	376,908	0	0	0	9,400	3,136	389,444	3,888	393,332
3297	Nonclay Refractories	69,691	1,012	0	0	21,383	29,440	121,526	163,680	285,206
3272	Concrete Products, nec*	210,241	0	0	0	0	24,787	235,028	24,028	259,056
3211	Flat Glass	249,298	25	0	0	0	5	249,328	1,203	250,531
3221	Glass Containers	108,521	154	0	0	0	0	108,675	82,591	191,266
3281	Cut Stone & Stone Products	156,037	0	0	0	0	0	156,037	0	156,037
3274	Lime	63,305	0	0	0	0	38,537	101,842	0	101,842
3264	Porcelain Electrical Supplies	60,459	1,042	500	500	0	9	62,510	30,969	93,479
3261	Vitreous Plumbing Fixtures	7,926	11	0	0	0	305	8,242	63,752	71,994
3262	Vitreous China Table & Kitchenware	4,367	15	0	0	0	5	4,387	41,709	46,096
3263	Semivitreous Table & Kitchenware	2,803	166	0	0	880	0	3,849	34,100	37,949
3275	Gypsum Products	11,352	0	0	0	0	0	11,352	34	11,386
3269	Pottery Products, nec*	1,350	5	0	0	476	0	1,831	8,637	10,468
3271	Concrete Block & Brick	8,067	0	0	0	0	0	8,067	0	8,067
	Invalid SIC Code within SIC Code 32	1,815	0	0	0	0	0	1,815	0	1,815
3259	Structural Clay Products, nec*	5	0	0	0	0	0	5	0	5
3273	Ready-mixed Concrete	0	0	0	0	0	0	0	0	0
	Total for SIC Code 32	30,029,587	45,443	500	500	105,977	2,416,616	32,598,623	6,141,803	38,740,426

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
*nec: not elsewhere classified.

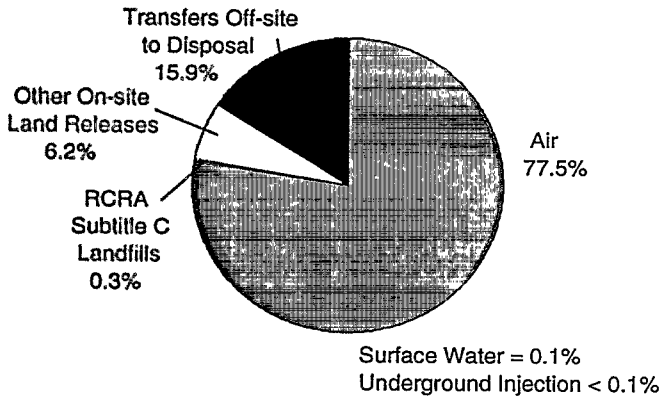


Figure 11-1. Distribution of TRI On-site and Off-site Releases, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

reported 969,000 pounds of that amount. The asbestos products industry (SIC code 3292) ranked second for off-site releases with 649,000 pounds, 10.6% of the total, and the ceramic wall and floor tile industry (SIC code 3253) ranked third with 534,000 pounds, 8.7% of the total.

Figure 11-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

Nearly three-quarters (72.1%) of the stone, clay, glass, and concrete sector's other on-site waste management in 1996 was reported as on-site energy

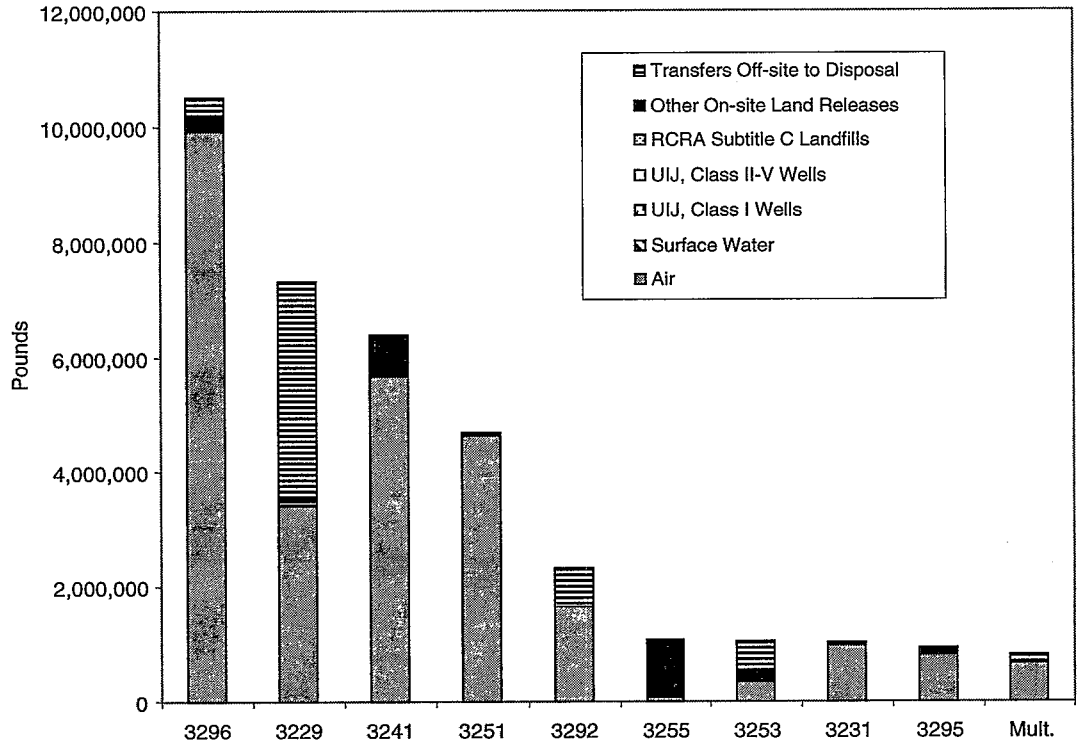


Figure 11-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.

recovery. As indicated in Table 11-4, the sector reported 445.3 million pounds of on-site energy recovery. Most of the remainder (24.3%) was reported as on-site recycling, which totaled 149.8 million pounds. The sector reported 22.7 million pounds of on-site treatment, 3.7% of total on-site waste management. Figure 11-3 illustrates the percentage distribution of the three waste management types.

The hydraulic cement industry (SIC code 3241) reported 405.7 million pounds of on-site energy recovery, 91.1% of the sector's total in this waste management method. The industry reported on-site energy recovery of 121.2 million pounds of toluene and 116.6 million pounds of xylenes. One facility in SIC code 3241 reported 15.0 million pounds of toluene and 19.0 million pounds of xylenes burned on-site for energy recovery. Another facility in this industry reported 14.2 million pounds of toluene, and a third facility reported 20.3 million pounds of xylenes, both in energy recovery. The ground or treated minerals industry (SIC code 3295) ranked second among stone, clay, glass, and concrete industries with 35.2 million pounds (7.9%) in energy recovery. Few other industries in this sector reported on-site energy recovery.

The miscellaneous pressed and blown glass industry (SIC code 3229) reported 136.0 million pounds of on-site recycling, 90.8% of the sector's total reporting in this category. Miscellaneous pressed and blown glass reported on-site recycling of 96.5 million pounds of lead compounds and 34.9 million pounds of barium compounds. Three facilities in the miscellaneous pressed and blown

Table 11-4. TRI Other On-site Waste Management, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3241	Cement, Hydraulic	56,079	405,667,303	11,055,187	416,778,569
3229	Pressed & Blown Glass, nec*	136,031,875	0	3,015,564	139,047,439
3295	Minerals, Ground or Treated	4,082	35,210,152	609,005	35,823,239
3296	Mineral Wool	3,239,352	0	2,693,295	5,932,647
3292	Asbestos Products	4,818,516	0	412,363	5,230,879
3299	Nonmetallic Mineral Products, nec*	4,126	4,212,915	294,466	4,511,507
	Multiple within SIC Code 32	272,313	2,400	2,034,920	2,309,633
3297	Nonclay Refractories	2,043,098	460	136,844	2,180,402
3291	Abrasive Products	496,029	150,400	715,875	1,362,304
3253	Ceramic Wall & Floor Tile	1,254,296	0	0	1,254,296
3251	Brick & Structural Clay Tile	834,599	0	288,341	1,122,940
3231	Products of Purchased Glass	229,255	0	693,685	922,940
3264	Porcelain Electrical Supplies	49,412	0	333,381	382,793
3255	Clay Refractories	196,087	0	9,800	205,887
3211	Flat Glass	191,646	0	0	191,646
3272	Concrete Products, nec*	0	0	154,247	154,247
3261	Vitreous Plumbing Fixtures	12,253	0	131,750	144,003
3221	Glass Containers	0	14,600	123,880	138,480
3269	Pottery Products, nec*	90,725	0	0	90,725
3281	Cut Stone & Stone Products	0	750	14	764
	Invalid SIC Code within SIC Code 32	0	0	191	191
3275	Gypsum Products	15	0	30	45
3259	Structural Clay Products, nec*	0	0	0	0
3262	Vitreous China Table & Kitchenware	0	0	0	0
3263	Semivitreous Table & Kitchenware	0	0	0	0
3271	Concrete Block & Brick	0	0	0	0
3273	Ready-mixed Concrete	0	0	0	0
3274	Lime	0	0	0	0
	Total for SIC Code 32	149,823,758	445,258,980	22,702,838	617,785,576

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
*nec: not elsewhere classified.

glass industry reported on-site recycling of 49.0 million pounds, 20.0 million pounds, and 17.6 million pounds of lead compounds, respectively. One facility in this industry accounted for 25.6 million pounds of on-site recycling of barium compounds. The asbestos products industry (SIC code 3292) reported 4.8 million pounds of on-site recycling and ranked second in that category with 3.2% of the sector's total. The mineral wool industry (SIC code 3296) ranked third with 3.2 million pounds (2.2%).

Hydraulic cement (SIC code 3241) reported approximately half (48.7%) of the on-site treatment, 11.1 million pounds. Miscellaneous pressed and blown glass (SIC code 3229) ranked second with 3.0 million pounds (13.3%). Mineral wool (SIC code 3296) reported the third-largest amount, 2.7 million pounds (11.9%).

Figure 11-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

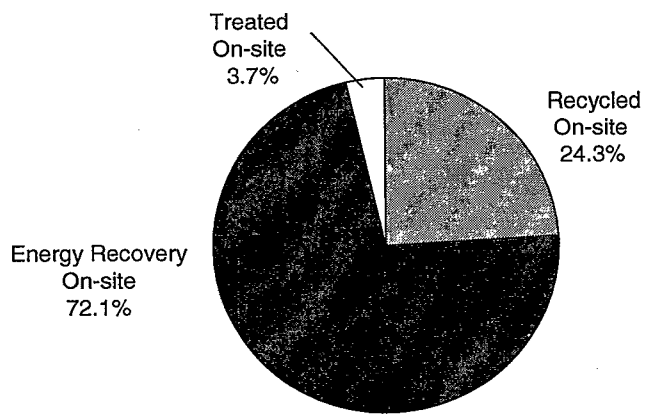


Figure 11-3. Distribution of TRI Other On-site Waste Management, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Data from Section 8 of Form R.

Transfers Off-site for Further Waste Management

As shown in Table 11-5, the stone, clay, glass, and concrete sector reported transfers off-site for further waste management of 3.7 million pounds to recycling, 2.9 million pounds to energy recovery, 3.0 million pounds to treatment, and 1.0 million pounds to POTWs in 1996. Figure 11-5 illustrates the distribution of transfers off-site for further waste management by transfer type.

The pressed and blown glass industry (SIC code 3229) reported 1.6 million pounds of transfers to recycling, or 43.5% of the sector's total. Most of this was recycling of lead compounds (1.1 million pounds). The mineral wool industry (SIC code

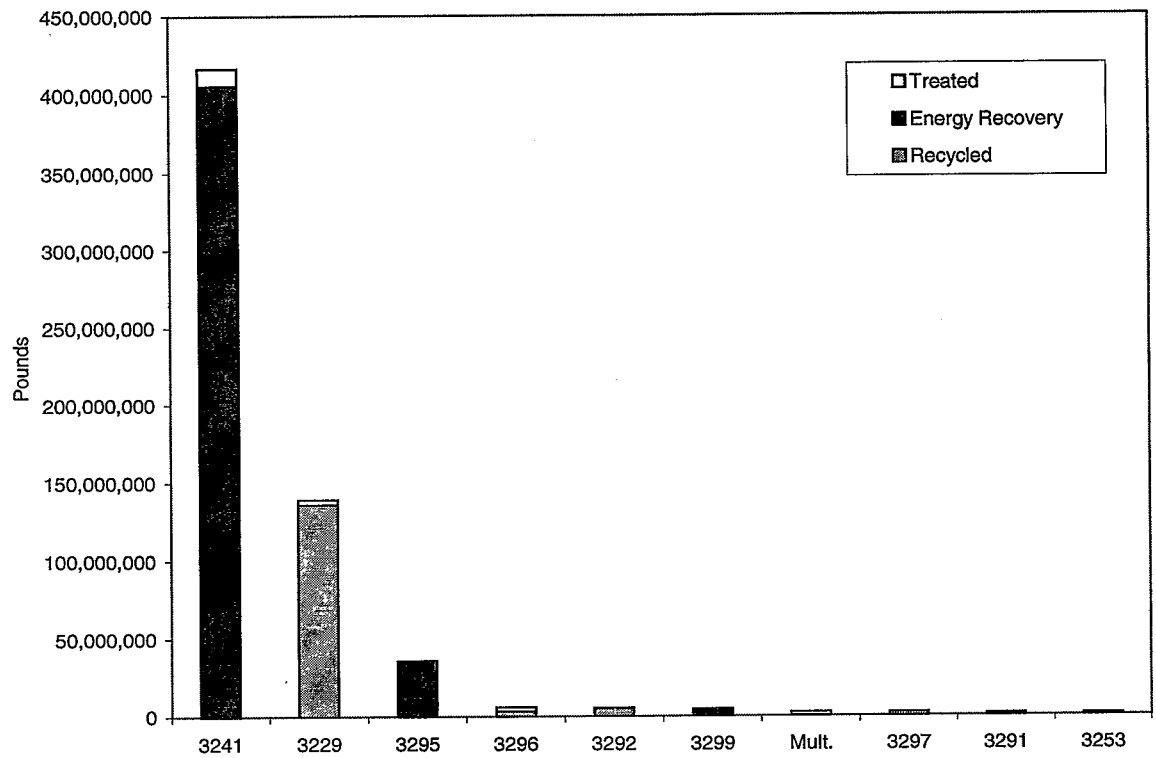


Figure 11-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.

Table 11-5. TRI Transfers Off-site for Further Waste Management, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32 (In Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3229	Pressed & Blown Glass, nec*	1,597,461	2,255	1,191,575	309,400	15,747	3,116,438
3295	Minerals, Ground or Treated	9,000	1,512,339	128,720	260	0	1,650,319
3241	Cement, Hydraulic	151,805	1,016,097	429,673	0	750	1,598,325
3296	Mineral Wool	667,526	683	405,163	182,513	0	1,255,885
3231	Products of Purchased Glass	188,096	149,201	74,341	238,401	0	650,039
3291	Abrasive Products	38,526	114,003	363,128	89,653	0	605,310
3261	Vitreous Plumbing Fixtures	473,353	0	8	392	0	473,753
	Multiple within SIC Code 32	17,690	0	167,693	184,185	0	369,568
3292	Asbestos Products	83,800	47,539	8	76	0	131,423
3262	Vitreous China Table & Kitchenware	49,575	65	74,874	270	0	124,784
3272	Concrete Products, nec*	104,195	4,450	0	7,251	0	115,896
3253	Ceramic Wall & Floor Tile	109,429	0	0	2,842	0	112,271
3299	Nonmetallic Mineral Products, nec*	0	0	111,076	0	0	111,076
3264	Porcelain Electrical Supplies	81,658	10,944	1,017	3,198	0	96,817
3297	Nonclay Refractories	56,461	6,981	6,200	1,313	0	70,955
3211	Flat Glass	27,142	0	24,543	32	0	51,717
3281	Cut Stone & Stone Products	13,736	412	0	0	0	14,148
3271	Concrete Block & Brick	0	0	5,235	0	0	5,235
3221	Glass Containers	2,160	250	690	0	0	3,100
3269	Pottery Products, nec*	0	0	2,900	61	0	2,961
3255	Clay Refractories	0	0	750	8	0	758
	Invalid SIC Code within SIC Code 32	537	0	0	0	0	537
3251	Brick & Structural Clay Tile	0	0	0	0	0	0
3259	Structural Clay Products, nec*	0	0	0	0	0	0
3263	Semivitreous Table & Kitchenware	0	0	0	0	0	0
3273	Ready-mixed Concrete	0	0	0	0	0	0
3274	Lime	0	0	0	0	0	0
3275	Gypsum Products	0	0	0	0	0	0
	Total for SIC Code 32	3,672,150	2,865,219	2,987,594	1,019,855	16,497	10,561,315

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
*nec: not elsewhere classified.

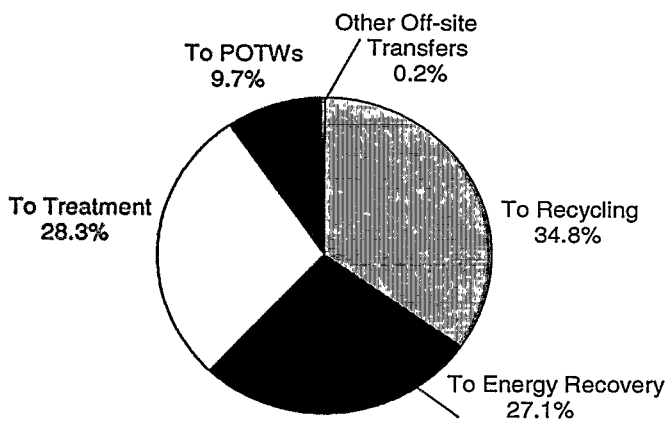


Figure 11-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

3296) reported 668,000 pounds of transfers to recycling (18.2%), and the vitreous plumbing fixture industry (SIC code 3261) reported 473,000 pounds (12.9%). These industries reported the largest transfers to recycling in the stone, clay, glass, and concrete sector.

Ranking first for reported transfers to energy recovery, the ground or treated minerals industry (SIC code 3295) reported 1.5 million pounds, or 52.8% of the sector's total for such transfers, including 428,000 pounds of toluene. The hydraulic cement industry (SIC code 3241) ranked second with 1.0 million pounds (35.5%), including 361,000 pounds of methyl ethyl ketone. No other industry reported more than 6% of the sector's transfers to energy recovery.

Miscellaneous pressed and blown glass (SIC code 3229) reported transferring 1.2 million pounds of TRI chemicals in waste off-site to treatment, which was 39.9% of the sector's total in that category. This industry reported transferring 435,000 pounds of chromium compounds to treatment. The hydraulic cement industry (SIC code 3241) reported the second-largest amount, 430,000 pounds (14.4%), and mineral wool (SIC code 3296) reported the third-largest amount, 405,000 pounds (13.6%).

For transfers to POTWs, miscellaneous pressed and blown glass (SIC code 3229) also reported the largest amount, 309,000 pounds or 30.3% of the sector's total. Products of purchased glass (SIC code 3231) ranked second with 238,000 pounds (23.4%), and mineral wool (SIC code 3296) ranked third with 183,000 pounds (17.9%).

Figure 11-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

1996 TRI Data by State for Stone, Clay, Glass, and Concrete

As shown in Table 11-6, the stone, clay, glass, and concrete sector submitted more than 100 forms in each of four states: Ohio (169 forms), Pennsylvania (159 forms), Texas (143 forms), and Missouri (126

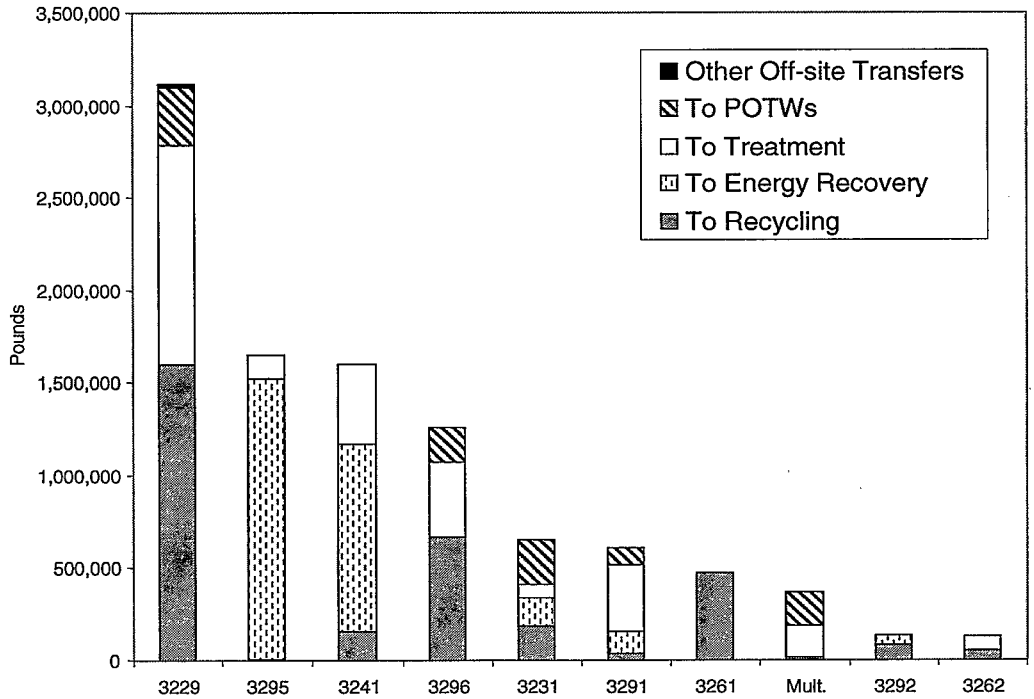


Figure 11-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.

Table 11-6. Summary of TRI Information by State, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	24	55	4	1,877,975	185,248	2,063,223	138,699	51,829	2,594,499	0
Arizona	6	8	1	129,985	640	130,625	14	250	130,972	0
Arkansas	14	36	0	511,122	15,042	526,164	10,501,573	9,561	11,105,097	0
California	41	80	9	1,725,702	123,750	1,849,452	6,706,369	129,247	9,062,351	0
Colorado	12	27	12	401,778	40	401,818	336,925	4,289	741,568	0
Connecticut	5	5	0	36,828	217	37,045	0	250	36,595	0
Florida	11	13	1	85,842	2,000	87,842	11,871	599	151,672	0
Georgia	21	45	4	2,544,226	88,147	2,632,373	1,674,910	246,762	4,458,322	0
Idaho	1	1	0	255	1,800	2,055	0	0	1,900	0
Illinois	27	48	5	366,824	81,062	447,886	473,749	270,200	950,277	0
Indiana	29	71	8	805,860	30,021	835,881	47,803,194	140,135	48,855,182	1
Iowa	9	21	1	380,634	0	380,634	22,416	856	408,008	0
Kansas	11	57	0	1,579,178	37,199	1,616,377	62,282,888	776,518	64,662,096	294
Kentucky	23	57	8	432,958	98,642	531,600	13,809,145	873,199	16,604,861	0
Louisiana	1	2	0	3,786	0	3,786	0	4,069	4,069	0
Maine	2	2	0	9,756	0	9,756	4,400	1,280	15,436	0
Maryland	5	5	0	66,914	0	66,914	99,880	12,400	178,360	0
Massachusetts	6	15	0	144,810	2,037	146,847	26,534	10,801	182,014	710
Michigan	14	49	3	2,850,695	182,499	3,033,194	30,995,191	386,526	34,641,251	531
Minnesota	7	11	3	390,553	11,000	401,553	81,720	52,499	535,033	0
Mississippi	8	44	12	302,655	50,867	353,522	5,898,348	9,989	6,229,611	0
Missouri	18	126	2	693,093	8,200	701,293	85,144,646	215,225	85,968,812	78
Nebraska	3	18	1	113,378	0	113,378	225,370	24,117	362,862	0
New Hampshire	1	4	0	1,015	0	1,015	20,557	491,474	425,627	0
New Jersey	10	18	2	170,318	47,267	217,585	120,718	113,195	444,225	3,500
New Mexico	1	1	0	0	0	0	0	5,700	24,700	0
New York	27	58	2	1,757,475	486,691	2,244,166	7,613,319	940,722	10,835,642	136
North Carolina	31	81	3	1,694,915	17,184	1,712,099	5,146,904	595,682	7,213,756	390
Ohio	70	169	32	3,936,286	1,906,480	5,842,766	125,643,374	1,821,163	133,187,967	81,444
Oklahoma	12	22	1	317,899	1,968	319,867	241,700	28,581	590,189	0
Oregon	6	9	0	129,055	1,135	130,190	192	7,345	137,473	0
Pennsylvania	56	159	19	2,333,245	1,404,387	3,737,632	78,763,996	598,157	82,507,285	1,329
Puerto Rico	1	2	0	3,065	77	3,142	0	690	4,102	960
Rhode Island	1	4	0	62,992	9,700	72,692	1,871,545	220,333	2,164,245	0
South Carolina	13	70	10	1,243,556	30,900	1,274,456	64,605,970	616,155	66,604,742	0
Tennessee	16	44	9	1,781,631	783,760	2,565,391	5,261,634	237,836	7,952,166	2
Texas	47	143	36	2,390,796	167,696	2,558,492	32,886,950	338,706	36,107,403	0
Utah	7	15	3	101,849	750	102,599	79,377	13,000	170,224	0
Vermont	1	2	0	6,009	0	6,009	294,466	30,076	330,550	0
Virginia	16	55	3	726,494	4,349	730,843	25,089,031	1,071,301	26,741,584	0
Washington	7	13	4	142,634	54,836	197,470	78,600	2	275,866	0
West Virginia	9	17	1	201,378	250,586	451,964	3,136,174	73,415	3,702,047	1,842
Wisconsin	9	33	0	134,643	55,626	190,269	693,227	137,181	1,459,782	0
Wyoming	1	1	0	8,561	0	8,561	0	0	8,561	0
Total for SIC Code 32	640	1,716	199	32,598,623	6,141,803	38,740,426	617,785,576	10,561,315	668,768,984	91,217

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

forms). These ranged from 7% to 10% of the total of 1,716 forms submitted by this sector.

Ohio was the state with the largest amounts in all summary categories shown in Table 11-6. In Ohio, the sector reported 3.9 million pounds of on-site releases and 1.9 million pounds of off-site releases (transfers to disposal), for a total of 5.8 million pounds on- and off-site releases. Other on-site waste management reported in Ohio totaled 125.6 million pounds, along with transfers off-site for further waste management of 1.8 million pounds. Production-related waste reported in Ohio totaled 133.2 million pounds for the stone, clay, glass, and concrete sector. These amounts ranged from 12.1% to 31.0% of the sector's totals in the summary categories. Of the six facilities with large amounts of on-site energy recovery or on-site recycling, mentioned earlier in this chapter, three were located in Ohio (see "Other On-site Waste Management," above).

Michigan ranked second behind Ohio for total on-site releases reported by this sector, with 2.9 million pounds (8.7% of the sector's total). Georgia was third with 2.5 million pounds (7.8%). For off-site releases, Pennsylvania ranked second behind Ohio, with 1.4 million pounds (22.9%), and Tennessee ranked third with 784,000 pounds (12.8%). The states with the largest amounts of total on- and off-site releases after Ohio were Pennsylvania, with 3.7 million pounds (9.6% of the sector's total), and Michigan, with 3.0 million pounds (7.8%).

For other on-site waste management, Missouri ranked second, with 85.1 million pounds (13.8% of the sector's total), and Pennsylvania ranked third, with 78.8 million pounds (12.7%).

Virginia was the state with the second-largest reporting (after Ohio) of transfers off-site for further waste management by the stone, clay, glass, and concrete sector. This amount was 1.1 million pounds (10.1% of the total). New York ranked third, with 941,000 pounds (8.9%).

The stone, clay, glass, and concrete sector reported 86.0 million pounds of production-related waste in Missouri and 82.5 million pounds in Pennsylvania, placing these states second and third after Ohio. These amounts were 12.9% and 12.3%, respectively, of the sector's reported total production-related waste in 1996.

Map 11-1 illustrates the geographic distribution of total on- and off-site releases in the stone, clay, glass, and concrete sector.

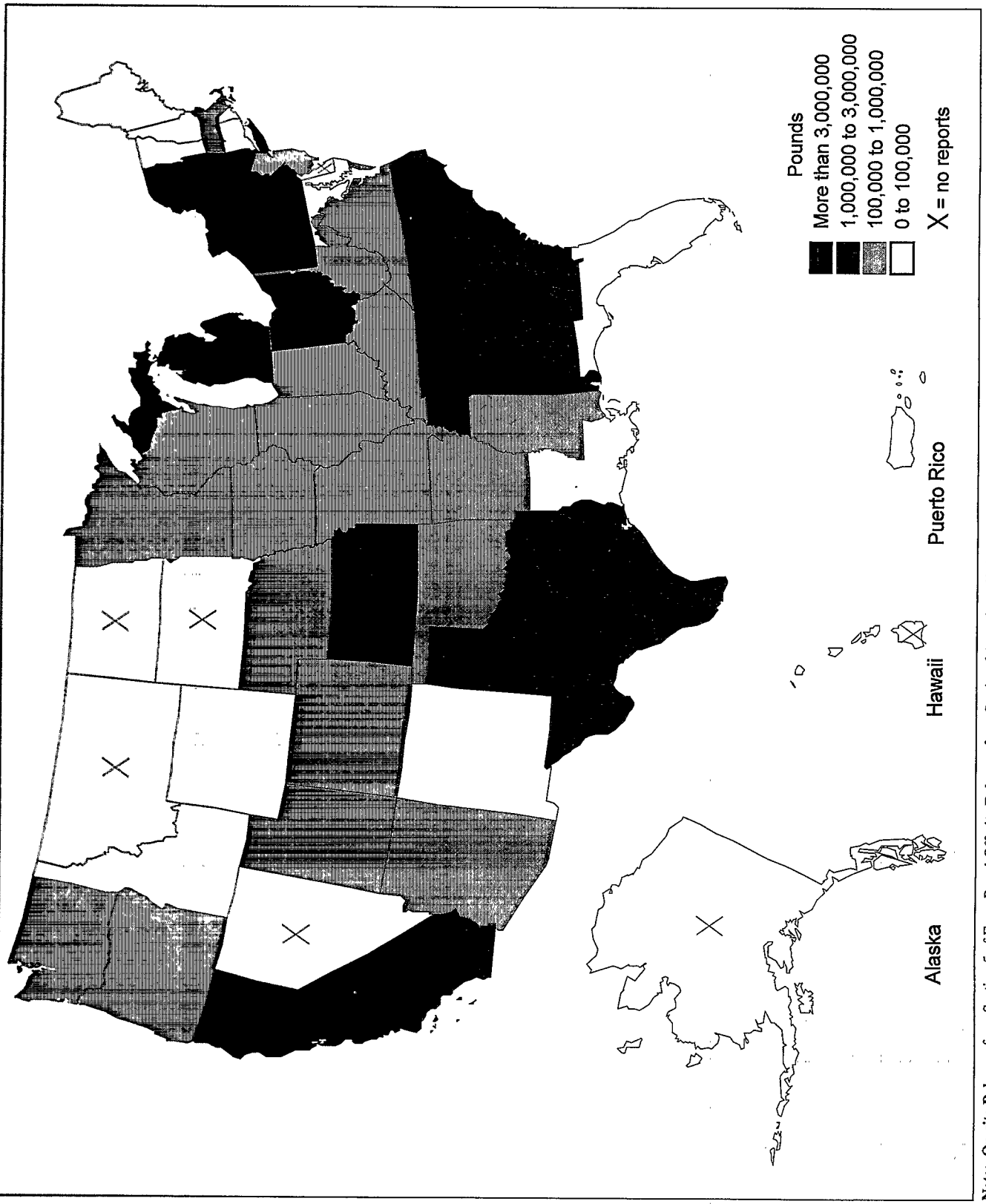
1996 TRI Data by Chemical for Stone, Clay, Glass, and Concrete

As shown in Table 11-7, on- and off-site releases of the 15 chemicals reported in the largest amounts by the stone, clay, glass, and concrete sector totaled 33.2 million pounds in 1996. This was 85.7% of the sector's total on- and off-site releases. Reporting of these chemicals included 26.1 million pounds of air emissions and 5.4 million pounds of off-site releases, approximately 87% of the sector's totals in these two categories.

The top 15 chemicals also accounted for 69.6% (1.7 million pounds) of other on-site land releases, 54.9% (58,000 pounds) of releases to RCRA subtitle C landfills, and 33.1% (15,000 pounds) of surface water discharges reported by the stone, clay, glass, and concrete sector.

Air emissions accounted for 90% or more of the sector's releases of nine of the 15 chemicals—including 98% or more of the releases of the top three chemicals: ammonia (7.3 million pounds of air emissions), hydrochloric acid (7.2 million pounds), and hydrogen fluoride (4.7 million pounds). As noted earlier, the mineral wool industry (SIC code 3296) reported 5.0 million pounds of the sector's air emissions of ammonia, and the hydraulic cement industry (SIC code 3241) reported air emissions of 4.5 million pounds

Map 11-1. Total On- and Off-site Releases, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32



Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

Table 11-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
7664-41-7	Ammonia	7,303,020	3,537	0	0	0	53,733	7,360,290	60,958	7,421,248
7647-01-0	Hydrochloric acid	7,170,375	0	0	0	0	22,097	7,192,472	3,966	7,196,438
7664-39-3	Hydrogen fluoride	4,703,303	154	0	0	0	0	4,703,457	0	4,703,457
--	Lead compounds	65,654	1,151	0	0	3,707	164,455	234,967	2,773,863	3,008,830
50-00-0	Formaldehyde	2,091,170	715	0	0	0	81,945	2,173,830	42,021	2,215,851
108-95-2	Phenol	1,534,018	511	0	0	778	18,240	1,553,547	72,478	1,626,025
7664-38-2	Phosphoric acid	19,973	5,040	0	0	0	1,015,956	1,040,969	57,328	1,098,297
67-56-1	Methanol	1,041,993	8	0	0	0	28,500	1,070,501	1,250	1,071,751
463-58-1	Carbonyl sulfide	922,103	0	0	0	0	0	922,103	0	922,103
--	Barium compounds	25,781	1,065	0	0	32,016	102,187	161,049	717,382	878,431
--	Zinc compounds	38,151	2,019	0	0	660	7,523	48,353	730,749	779,102
--	Chromium compounds	34,184	836	0	0	21,000	176,173	232,193	402,601	634,794
100-42-5	Styrene	611,123	0	0	0	0	0	611,123	383	611,506
108-88-3	Toluene	519,055	0	0	0	0	3,136	522,191	3,886	526,077
1332-21-4	Asbestos (friable)	455	0	0	0	0	8,159	8,614	512,348	520,962
	Subtotal	26,080,358	15,036	0	0	58,161	1,682,104	27,835,659	5,379,213	33,214,872
	Total for SIC Code 32	30,029,587	45,443	500	500	105,977	2,416,616	32,598,623	6,141,803	38,740,426

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

hydrochloric acid (including 2.7 million pounds reported by one facility). The miscellaneous pressed and blown glass industry (SIC code 3229) also reported air emissions of 1.4 million pounds of hydrochloric acid (including 1.2 million pounds reported by one facility). The brick and structural clay tile industry (SIC code 3251) reported 3.7 million pounds of hydrogen fluoride.

For four chemicals, off-site releases (transfers to disposal) amounted to 80% or more of total releases. Three of these were metal compounds: lead compounds (ranked fourth overall) with 2.8 million pounds of off-site releases; barium compounds (ranked 10th) with 717,000 pounds of off-site releases; and zinc compounds (ranked 11th) with 731,000 pounds of off-site releases. As noted earlier, the miscellaneous pressed and blown glass industry (SIC code 3229) reported 2.7 million pounds of off-site releases of lead compounds, including reporting by one facility of 969,000 pounds. The stone, clay, glass, and concrete sector also reported relatively large amounts of off-site releases of asbestos, the 15th-ranked chemical (512,000 pounds). These four chemicals accounted for 77.1% of the sector's total off-site releases.

The great majority (92.5%, or 1.0 million pounds) of phosphoric acid releases were reported as other on-site land releases by the clay refractories industry (SIC code 3255). For chromium compounds, the stone, clay, glass, and concrete sector reported 176,000 pounds of other on-site land releases and 403,000 pounds of off-site releases (transfers to disposal).

OSHA Carcinogens

The stone, clay, glass, and concrete sector reported 4.1 million pounds of on- and off-site releases of chemicals designated as OSHA carcinogens in 1996, as shown in Table 11-8. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) These chemicals represented approximately 11% of the sector's reported amounts for air emissions (3.3 million pounds), off-site releases (transfers to disposal, 629,000 pounds), and total on- and off-site releases (4.1

Table 11-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3296	Mineral Wool	2,053,420	715	0	0	0	81,982	2,136,117	33,604	2,169,721
3292	Asbestos Products	61,534	0	0	0	0	8,159	69,693	519,301	588,994
3229	Pressed & Blown Glass, nec*	346,352	130	0	0	1,878	0	348,360	54,631	402,991
3231	Products of Purchased Glass	162,713	0	0	0	0	0	162,713	1,776	164,489
3281	Cut Stone & Stone Products	156,037	0	0	0	0	0	156,037	0	156,037
3291	Abrasive Products	144,451	0	0	0	0	0	144,451	850	145,301
3241	Cement, Hydraulic	96,086	0	0	0	0	35,691	131,777	505	132,282
3272	Concrete Products, nec*	122,428	0	0	0	0	1,190	123,618	383	124,001
3211	Flat Glass	89,145	7	0	0	0	0	89,152	93	89,245
3295	Minerals, Ground or Treated	2,946	5	0	0	0	45,138	48,089	1,105	49,194
3264	Porcelain Electrical Supplies	32,955	260	0	0	0	0	33,215	1,805	35,020
3299	Nonmetallic Mineral Products, nec*	8,665	0	0	0	0	0	8,665	0	8,665
3269	Pottery Products, nec*	451	5	0	0	0	0	456	8,127	8,583
3251	Brick & Structural Clay Tile	0	0	0	0	6,000	0	6,000	0	6,000
3221	Glass Containers	1,300	0	0	0	0	0	1,300	1,958	3,258
	Multiple within SIC Code 32	0	0	0	0	0	270	270	2,645	2,915
	Invalid SIC Code within SIC Code 32	1,807	0	0	0	0	0	1,807	0	1,807
3297	Nonclay Refractories	255	250	0	0	0	0	505	1,000	1,505
3262	Vitreous China Table & Kitchenware	1,453	5	0	0	0	5	1,463	0	1,463
3253	Ceramic Wall & Floor Tile	5	0	0	0	0	0	5	1,245	1,250
3261	Vitreous Plumbing Fixtures	6	0	0	0	0	0	6	6	12
3259	Structural Clay Products, nec*	5	0	0	0	0	0	5	0	5
3275	Gypsum Products	2	0	0	0	0	0	2	0	2
	Subtotal	3,282,016	1,377	0	0	7,878	172,435	3,463,706	629,034	4,092,740
	Total for SIC Code 32	30,029,587	45,443	500	500	105,977	2,416,616	32,598,623	6,141,803	38,740,426

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
*nec: not elsewhere classified.

million pounds). They also amounted to 7.1% of the sector's reported other on-site land releases.

Three of the top 15 chemicals for total on- and off-site releases reported by this sector were OSHA carcinogens: formaldehyde, styrene, and asbestos (see Table 11-7). Reported formaldehyde releases of 2.2 million pounds included 2.1 million pounds of air emissions. As noted, the mineral wool industry (SIC code 3296) reported 2.0 million pounds of the formaldehyde air emissions. Almost all of the 611,000 pounds of styrene releases were also air emissions. As noted above, most of the 521,000 pounds of asbestos releases were reported as off-site releases (transfers to disposal). The stone, clay, glass, and concrete sector also reported releases of 231,000 pounds of dichloromethane and 94,000 pounds of tetrachloroethylene. These five chemicals constituted approximately 90% of the sector's reported releases of OSHA carcinogens in 1996.

The mineral wool industry (SIC code 3296) reported the largest releases of OSHA carcinogens, 2.2 million pounds, mostly as air emissions. Asbestos products (SIC code 3292) ranked second for releases of these chemicals, with 589,000 pounds, primarily as off-site releases (transfers to disposal). Miscellaneous pressed and blown glass (SIC code 3229) reported the third-largest total releases, 403,000 pounds, primarily as air emissions.

Figure 11-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

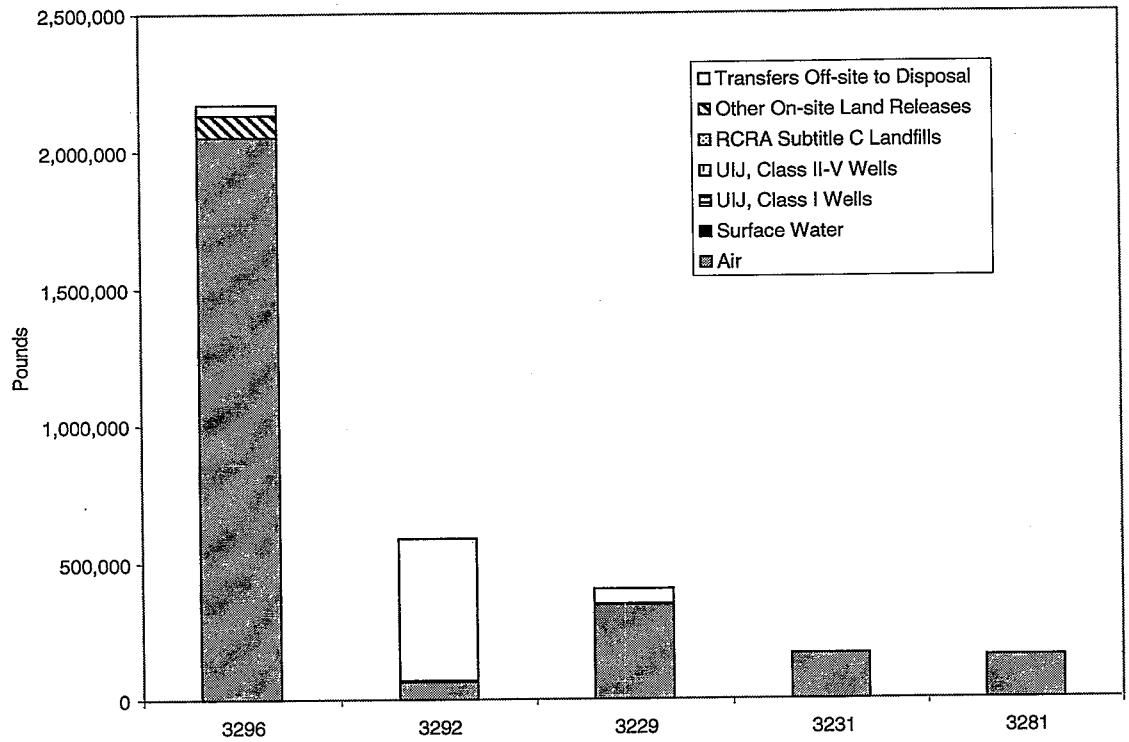


Figure 11-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection.

1996 TRI Chemicals in Waste for Stone, Clay, Glass, and Concrete

The stone, clay, glass, and concrete sector reported total production-related waste of 668.8 million pounds in 1996, as shown in Table 11-9. On-site energy recovery accounted for two-thirds (66.6%) of this total, or 445.3 million pounds. On-site recycling was the second-largest waste management method reported, accounting for nearly one-fourth (22.4%) of total production-related waste, or 149.8 million pounds. The sector also reported 40.1 million pounds released on- and off-site, which was 6.0% of the total. Other waste management options represented less than 4% each of the sector's total production-related waste. Figure 11-8 illustrates the distribution of waste management quantities reported in the stone, clay, glass, and concrete sector, by type of waste management.

The hydraulic cement industry (SIC code 3241) reported 405.7 million pounds of on-site energy recovery in 1996, which was 91.1% of the sector's total in this waste management type. This industry also reported the sector's largest amounts of on-site treatment (11.1 million pounds, 48.7% of the sector's total on-site treatment). The miscellaneous pressed and blown glass industry (SIC code 3229) reported 136.0 million pounds of on-site recycling, 90.8% of the sector's total in this category. This industry also reported the sector's largest amounts of off-site recycling (1.6 million pounds, or 44.9% of the total) and off-site treatment (2.5 million pounds, or 56.2%).

Table 11-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3241	Cement, Hydraulic	56,079	405,667,303	11,055,187	172,580	1,013,218	547,839	6,790,398	425,302,604	92
3229	Pressed & Blown Glass, nec*	136,031,875	0	3,015,564	1,615,866	2,257	2,464,069	7,494,615	150,624,246	73,462
3295	Minerals, Ground or Treated	4,082	35,210,152	609,005	9,220	1,547,349	122,588	1,021,270	38,523,666	0
3296	Mineral Wool	3,239,352	0	2,693,295	568,521	673	286,277	11,295,231	18,083,349	4,346
3292	Asbestos Products	4,818,516	0	412,363	83,800	47,539	65	2,312,623	7,674,906	0
3251	Brick & Structural Clay Tile	834,599	0	288,341	0	0	0	4,414,066	5,537,006	252
3299	Nonmetallic Mineral Products, nec*	4,126	4,212,915	294,466	0	0	111,075	388,191	5,010,773	0
	Multiple within SIC Code 32	272,313	2,400	2,034,920	12,559	0	191,832	1,049,527	3,563,551	5,129
3291	Abrasive Products	496,029	150,400	715,875	31,730	103,089	459,279	1,325,726	3,282,128	5
3297	Nonclay Refractories	2,043,098	460	136,844	55,709	6,981	6,901	281,121	2,531,114	524
3253	Ceramic Wall & Floor Tile	1,254,296	0	0	109,168	0	117	1,018,341	2,381,922	1
3231	Products of Purchased Glass	229,255	0	693,685	187,816	159,412	76,630	1,003,103	2,349,901	1,844
3261	Vitreous Plumbing Fixtures	12,253	0	131,750	473,353	0	93	44,320	661,769	0
3264	Porcelain Electrical Supplies	49,412	0	333,381	81,058	10,944	7,089	97,323	579,207	0
3211	Flat Glass	191,646	0	0	27,307	0	23,914	247,373	490,240	0
3272	Concrete Products, nec*	0	0	154,247	104,195	4,582	7,404	201,385	471,813	0
	Invalid SIC Code within SIC Code 32	0	0	191	537	0	0	446,194	446,922	0
3221	Glass Containers	0	14,600	123,880	2,160	95	0	188,582	329,317	960
3255	Clay Refractories	196,087	0	9,800	0	0	568	84,191	290,646	0
3281	Cut Stone & Stone Products	0	750	14	13,886	0	0	191,697	206,347	1
3262	Vitreous China Table & Kitchenware	0	0	0	49,413	65	75,538	45,543	170,559	3,890
3269	Pottery Products, nec*	90,725	0	0	0	0	77	12,009	102,811	711
3274	Lime	0	0	0	0	0	0	101,837	101,837	0
3263	Semivitreous Table & Kitchenware	0	0	0	0	0	0	38,300	38,300	0
3271	Concrete Block & Brick	0	0	0	0	0	5,235	8,066	13,301	0
3275	Gypsum Products	15	0	30	0	0	0	700	745	0
3259	Structural Clay Products, nec*	0	0	0	0	0	0	4	4	0
3273	Ready-mixed Concrete	0	0	0	0	0	0	0	0	0
	Total for SIC Code 32	149,823,758	445,258,980	22,702,838	3,598,878	2,896,204	4,386,590	40,101,736	668,768,984	91,217

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
*nec: not elsewhere classified.

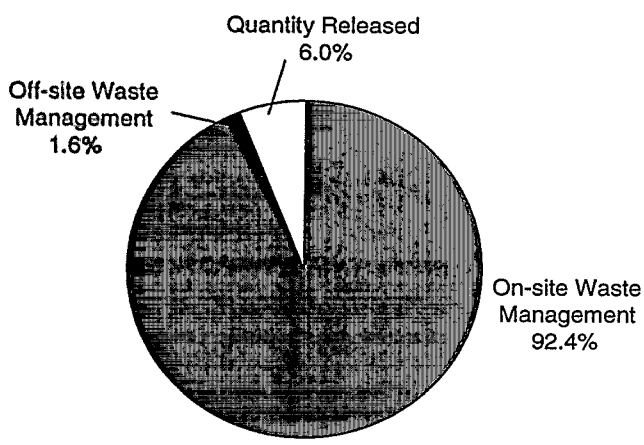


Figure 11-8. Distribution of TRI Production-related Waste, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Data from Section 8 of Form R.

In the remaining waste management categories, the ground or treated minerals industry (SIC code 3295) reported the largest amounts of off-site energy recovery (1.5 million pounds, or 53.4% of the sector's total), and the mineral wool industry (SIC code 3296) reported the largest quantities released (11.3 million pounds, or 28.2%).

Distribution of production-related waste for the top industries in the sector appears in Figure 11-9.

Projected Quantities of TRI Chemicals in Waste

Table 11-10 presents the stone, clay, glass, and concrete sector's projections of waste management quantities through 1998. (As explained in Chapter 1, facilities not only report current data but project

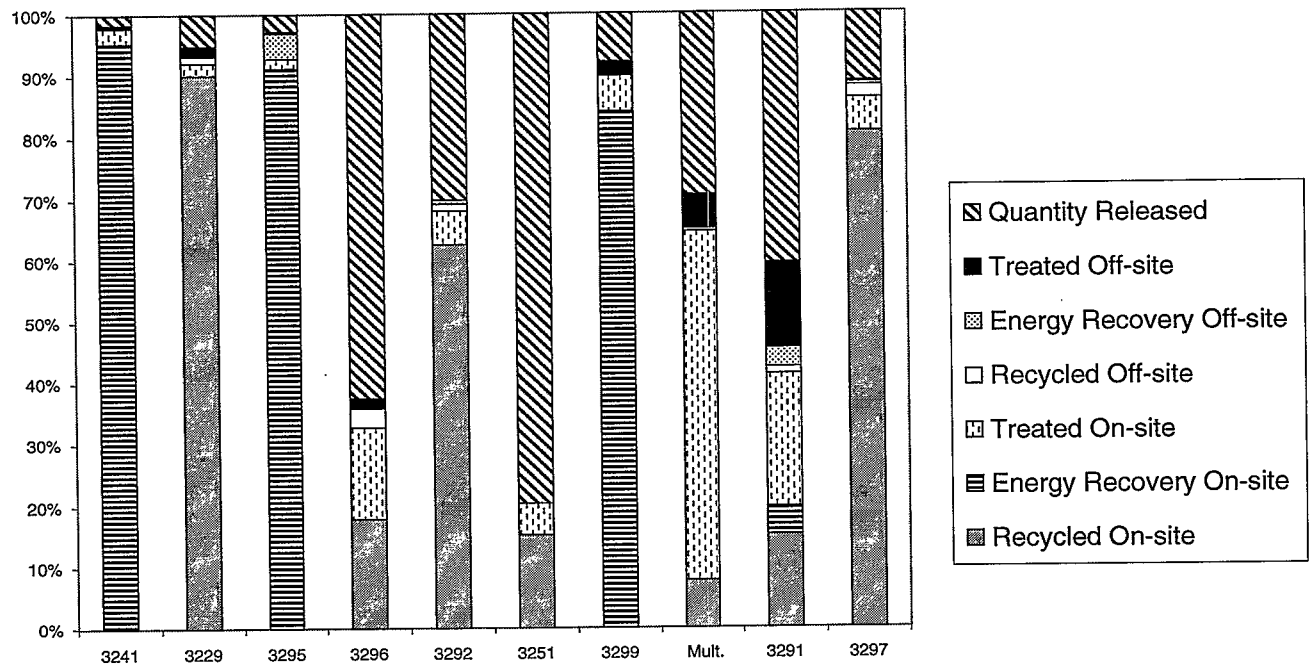


Figure 11-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.

waste management quantities for the next two years in their TRI submissions.) The sector projected an 1.0% decrease in total production-related waste, from 668.8 million pounds in 1996 to 661.9 million pounds in 1998.

The stone, clay, glass, and concrete sector projected decreases from 1996 to 1998 of more than 2 million pounds each in on-site energy recovery (from 445.3 million pounds to 442.9 million pounds), on-site treatment (from 22.7 million pounds to 19.7 million pounds), and quantities released (from 40.1 million pounds to 36.6 million pounds). These projections would represent decreases of 0.5%, 13.1%, and 8.7% respectively.

Smaller absolute decreases were projected in off-site recycling (from 3.6 million pounds to 3.3 million pounds, or 8.4%) and off-site treatment (from 4.4 million pounds to 3.8 million pounds, or 12.8%).

The sector projected a 2.6 million-pound increase in on-site recycling (from 149.8 million pounds to 152.4 million pounds), along with a 248,000 pound increase in off-site energy recovery (from 2.9 million pounds to 3.1 million pounds). These projections would amount to increases of 1.7% and 8.6%, respectively.

Figure 11-10 illustrates the stone, clay, glass, and concrete sector's projected percentage changes in waste management for 1996 to 1998.

These projections indicate little or no improvement in the way the stone, clay, glass, and concrete sector manages its TRI chemicals in waste, as measured by the waste management hierarchy, explained in Chapter 1. From 1996 to 1998, recycling (on-site) would increase from 22.4% to 23.0% of total production-related waste, while releases would decrease from 6.0% to 5.5%. In the waste management hierarchy, recycling is the most

Table 11-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Stone, Clay, Glass, and Concrete, SIC Code 32

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	149,823,758	22.4	157,992,612	24.1	152,411,595	23.0
Energy Recovery On-site	445,258,980	66.6	429,680,492	65.5	442,877,793	66.9
Treated On-site	22,702,838	3.4	19,822,449	3.0	19,719,276	3.0
Off-site Waste Management						
Recycled Off-site	3,598,878	0.5	3,396,734	0.5	3,295,492	0.5
Energy Recovery Off-site	2,896,204	0.4	2,477,041	0.4	3,144,424	0.5
Treated Off-site	4,386,590	0.7	4,625,240	0.7	3,826,377	0.6
Quantity Released On- and Off-site	40,101,736	6.0	37,763,336	5.8	36,607,323	5.5
Total Production-related Waste for SIC Code 32	668,768,984	100.0	655,757,904	100.0	661,882,280	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	5.5	-3.5	1.7
Energy Recovery On-site	-3.5	3.1	-0.5
Treated On-site	-12.7	-0.5	-13.1
Off-site Waste Management			
Recycled Off-site	-5.6	-3.0	-8.4
Energy Recovery Off-site	-14.5	26.9	8.6
Treated Off-site	5.4	-17.3	-12.8
Quantity Released On- and Off-site	-5.8	-3.1	-8.7
Total Production-related Waste for SIC Code 32	-1.9	0.9	-1.0

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

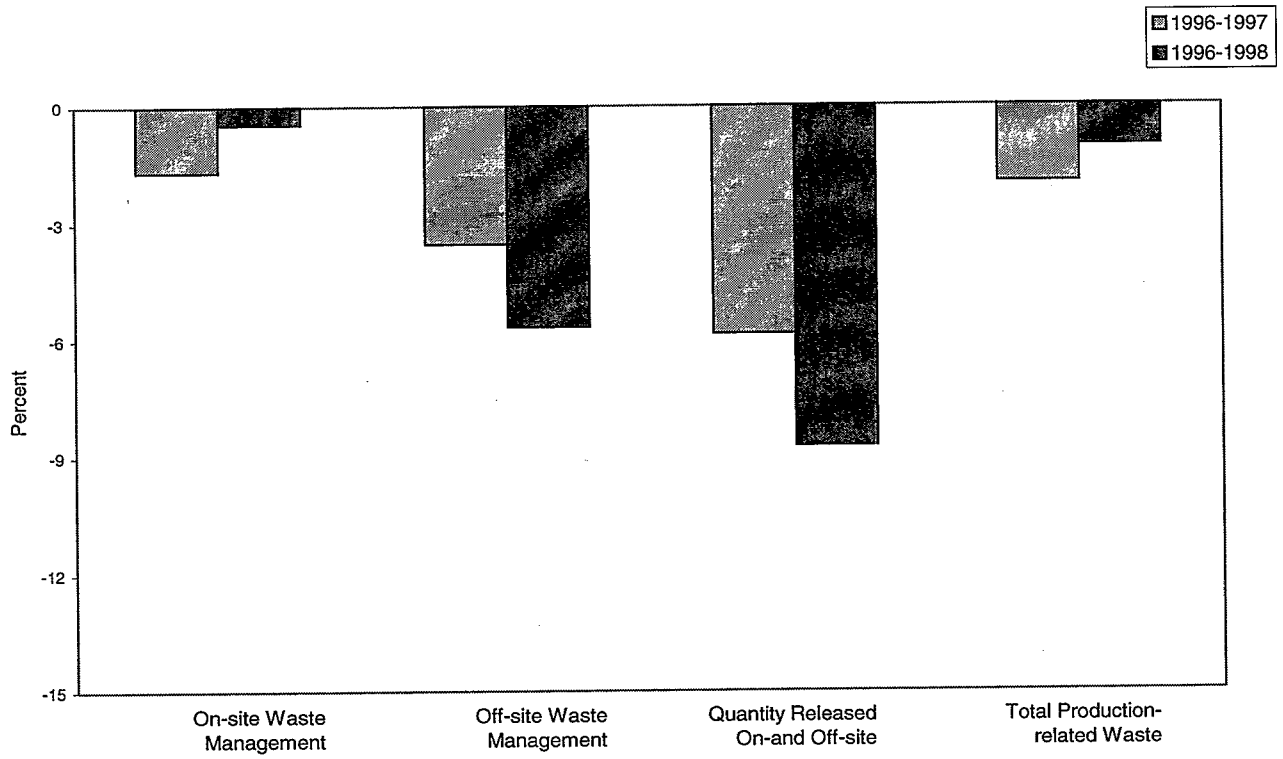


Figure 11-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

desirable option for TRI chemicals in waste that cannot be prevented, and release is the least desirable option. The projected changes, however, are too small to suggest any notable improvement in the sector's environmental performance.

Source Reduction Activity

In the stone, clay, glass, and concrete sector, 15.9% of the forms submitted indicated one or more source reduction activities underway during the year. Table 11-11 presents the sector's reporting of source reduction activity. The hydraulic cement industry (SIC code 3241) submitted the largest number of forms indicating source reduction activity with 46 forms, just 10.4% of that industry's 1996 forms. Miscellaneous pressed and blown glass (SIC code 3229) ranked second with 35 forms (27.1%), and ground or treated minerals (SIC code 3295) ranked third with 31 forms (20.7%).

The source reduction activities most frequently reported in this sector were improving operating practices (125 forms), modifying processes (77 forms), and modifying raw materials (72 forms).

Year-to-Year Comparisons for Stone, Clay, Glass, and Concrete

1995-1996 TRI Data for Stone, Clay, Glass, and Concrete

As shown in Table 11-12, the number of forms submitted by the stone, clay, glass, and concrete sector increased 5.0% from 1,635 forms in 1995 to 1,716 forms in 1996. At the same time, the number of Form As decreased 7.0%, from 214 forms to 199 forms. (The Form A certification statement is

Table 11-11. Number of Forms Reporting Source Reduction Activity, 1996: Stone, Clay, Glass, and Concrete, SIC Code 32

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3211	Flat Glass	31	4	12.9	1	0	0	2	0	0	0	1
3221	Glass Containers	32	1	3.1	0	0	0	0	1	0	0	0
3229	Pressed & Blown Glass, nec*	129	35	27.1	11	1	11	11	7	0	0	4
3231	Products of Purchased Glass	79	20	25.3	15	10	0	3	3	1	1	0
3241	Cement, Hydraulic	444	46	10.4	34	0	12	2	11	0	0	0
3251	Brick & Structural Clay Tile	262	14	5.3	1	0	8	0	5	0	0	1
3253	Ceramic Wall & Floor Tile	51	16	31.4	1	0	0	6	12	0	2	5
3255	Clay Refractories	37	5	13.5	1	1	0	1	2	0	0	2
3259	Structural Clay Products, nec*	1	0	0.0	0	0	0	0	0	0	0	0
3261	Vitreous Plumbing Fixtures	15	3	20.0	2	0	0	1	0	0	0	0
3262	Vitreous China Table & Kitchenware	7	2	28.6	0	0	0	2	0	0	0	0
3263	Semivitreous Table & Kitchenware	2	0	0.0	0	0	0	0	0	0	0	0
3264	Porcelain Electrical Supplies	29	15	51.7	13	1	0	1	10	0	0	0
3269	Pottery Products, nec*	8	3	37.5	1	0	0	2	1	0	0	0
3271	Concrete Block & Brick	3	1	33.3	0	0	1	0	0	0	1	0
3272	Concrete Products, nec*	26	1	3.8	1	1	1	1	0	0	0	0
3273	Ready-mixed Concrete	1	0	0.0	0	0	0	0	0	0	0	0
3274	Lime	4	2	50.0	0	0	1	0	1	0	0	0
3275	Gypsum Products	5	0	0.0	0	0	0	0	0	0	0	0
3281	Cut Stone & Stone Products	17	2	11.8	1	0	0	1	0	0	0	0
3291	Abrasive Products	61	15	24.6	4	0	0	5	3	2	1	2
3292	Asbestos Products	19	6	31.6	0	0	0	6	0	0	0	6
3295	Minerals, Ground or Treated	150	31	20.7	23	0	21	0	9	0	0	1
3296	Mineral Wool	149	27	18.1	6	0	0	21	5	0	0	1
3297	Nonclay Refractories	57	4	7.0	3	0	1	0	1	0	0	1
3299	Nonmetallic Mineral Products, nec*	28	5	17.9	2	0	1	1	3	0	0	0
	Multiple within SIC Code 32	64	15	23.4	5	0	1	6	3	1	3	4
	Invalid SIC Code within SIC Code 32	5	0	0.0	0	0	0	0	0	0	0	0
	Total for SIC Code 32	1,716	273	15.9	125	14	58	72	77	4	8	28

Note: Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category.
*nec: not elsewhere classified.

explained in Chapter 1.) This is in contrast to the average for all reporting sectors, which showed a 4.2% decrease in total forms submitted and an 11.8% increase in Form As from 1995 to 1996.

On- and Off-site Releases

From 1995 to 1996, on- and off-site releases reported by the stone, clay, glass, and concrete sector increased from 32.3 million pounds to 38.7 million pounds, an increase of 19.9% or 6.4 million pounds. Table 11-12 presents the sector's reporting of on- and off-site releases for 1995 and 1996, and Figure 11-11 illustrates the percentage change in releases by type.

Most of the sector's increase in on- and off-site releases occurred in reporting of point-source air emissions, which increased 21.8%, from 23.1 million pounds in 1995 to 28.2 million pounds in 1996. Reporting of on-site land releases more than doubled, a 112.1% increase from 1.2 million pounds to 2.5 million pounds. Smaller absolute increases were reported in fugitive air emissions (from 1.8 million pounds to 1.9 million pounds) and off-site releases (transfers to disposal, 6.0 million pounds to 6.1 million pounds).

The sector reported decreases, also relatively small in absolute terms, in surface water discharges (from

Table 11-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Stone, Clay, Glass, and Concrete, SIC Code 32

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	637	640	0.5
Total Forms	1,635	1,716	5.0
Form Rs	1,421	1,517	6.8
Form As	214	199	-7.0
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	24,867,358	30,029,587	20.8
Fugitive Air	1,757,425	1,870,677	6.4
Point Source Air	23,109,933	28,158,910	21.8
Surface Water Discharges	117,731	45,443	-61.4
Underground Injection	102,063	1,000	-99.0
On-site Land Releases	1,189,423	2,522,593	112.1
Total On-site Releases	26,276,575	32,598,623	24.1
Off-site Releases			
Transfers Off-site to Disposal	6,046,978	6,141,803	1.6
Total On- and Off-site Releases	32,323,553	38,740,426	19.9
Other On-site Waste Management			
Recycled On-site	132,773,128	149,823,758	12.8
Energy Recovery On-site	590,508,945	445,258,980	-24.6
Treated On-site	90,793,802	22,702,838	-75.0
Total Other On-site Waste Management	814,075,875	617,785,576	-24.1
Transfers Off-site for Further Waste Management			
Transfers to Recycling	3,143,522	3,672,150	16.8
Transfers to Energy Recovery	3,277,887	2,865,219	-12.6
Transfers to Treatment	2,282,551	2,987,594	30.9
Transfers to POTWs	969,779	1,019,855	5.2
Other Off-site Transfers	250	16,497	6,498.8
Total Transfers Off-site for Further Waste Management	9,673,989	10,561,315	9.2

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

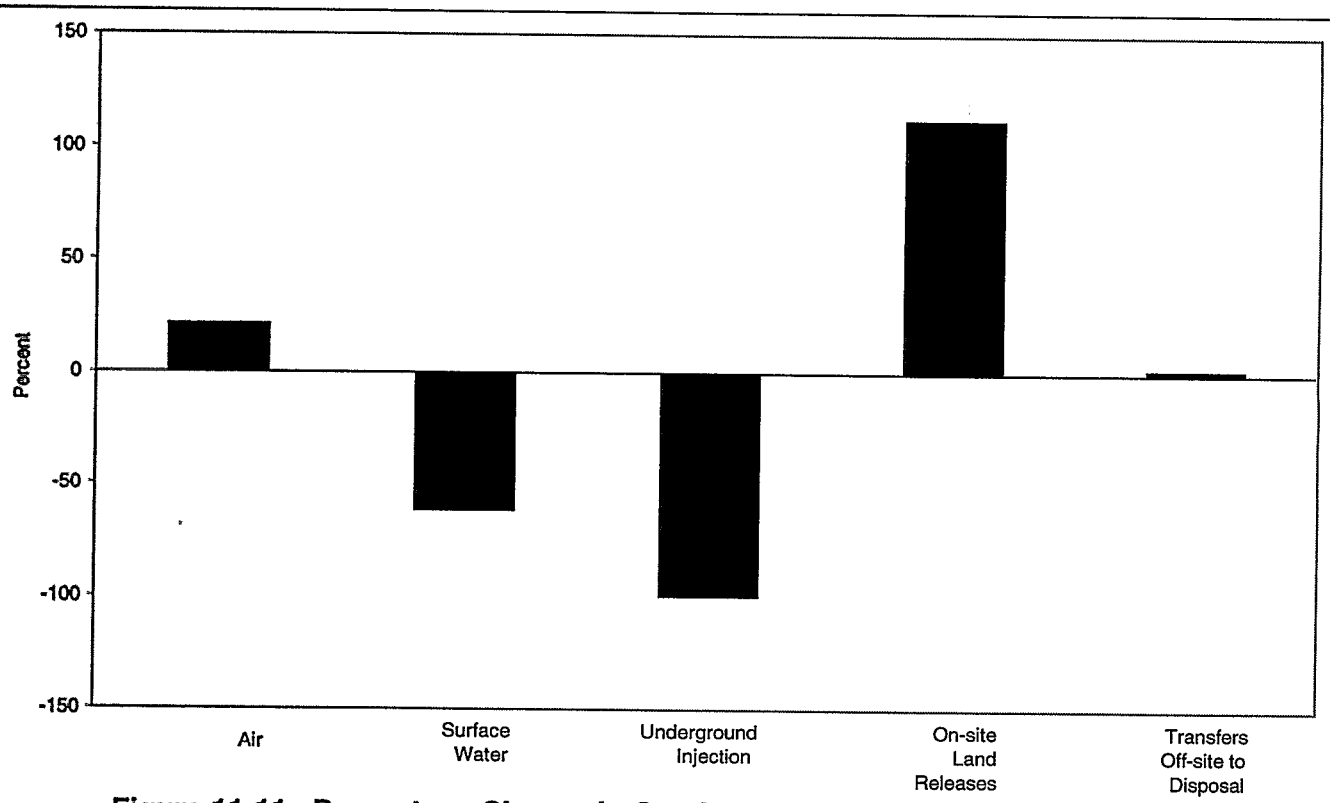


Figure 11-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

118,000 pounds in 1995 to 45,000 pounds in 1996) and underground injection (from 102,000 pounds to 1,000 pounds).

Other On-site Waste Management

The stone, clay, glass, and concrete sector reported a 24.1% decrease from 814.1 million pounds of other on-site waste management in 1995 to 617.8 million pounds in 1996, a reduction of 196.3 million pounds. The sector's reporting of other on-site waste management in 1995 and 1996 appears in Table 11-12.

The largest factor in this reduction was energy recovery. The sector reported 590.5 million pounds of on-site energy recovery in 1995 and 445.3 million pounds in 1996, a reduction of 24.6% or 145.2 million pounds. On-site treatment also decreased from 90.8 million pounds to 22.7 million pounds, a reduction of 75.0% or 68.1 million pounds. In 1995, one facility reported large quantities of on-site energy recovery (80.7 million pounds) and on-site treatment (72.7 million pounds) of a mixture identified as nonchlorinated solvents in waste fuel. In 1996, this facility did not report a mixture, but instead reported smaller quantities of constituents of the mixture.

On-site recycling reported by the stone, clay, glass, and concrete sector increased from 132.8 million pounds to 149.8 million pounds, a 12.8% increase or 17.1 million pounds.

Transfers Off-site for Further Waste Management

The stone, clay, glass, and concrete sector reported an increase in transfers off-site for further waste management from 9.7 million pounds in 1995 to 10.6 million pounds in 1996, as shown in Table 11-12. This 9.2% overall increase reflected increases of 16.8% in transfers to recycling (from 3.1 million pounds in 1995 to 3.7 million pounds in 1996), 30.9% in transfers to treatment (from 2.3 million pounds to 3.0 million pounds), and 5.2% in transfers to POTWs (from 970,000 pounds to 1.0 million pounds).

The sector reported a decrease of 12.6% in transfers to energy recovery, from 3.3 million pounds in 1995 to 2.9 million pounds in 1996.

1988-1996 TRI Data for Stone, Clay, Glass, and Concrete

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

From 1988 to 1996, the number of forms submitted by the stone, clay, glass, and concrete sector increased 18.1% from 1,264 forms to 1,493 forms, as shown in Table 11-13. At the same time, on- and off-site releases decreased 42.6%, from 40.5 million pounds to 23.3 million pounds. All release types showed decreases, except for a nominal increase (from zero to 1,000 pounds) in underground injection. Much of the overall reduction was attributable to a 10.3 million-pound reduction in off-site releases (transfers to disposal), from 16.3 million pounds in 1988 to 6.0 million pounds in 1996. This was a reduction of 63.4%.

Fugitive air emissions decreased 79.3% from 6.5 million pounds to 1.3 million pounds, the largest reduction (5.2 million pounds) among on-site releases reported by the stone, clay, glass, and concrete sector. Point-source air emissions, reported in larger amounts by this sector, decreased 7.5%, from 14.6 million pounds to 13.5 million pounds, a 1.1 million-pound reduction. Smaller absolute reductions were reported in surface water discharges (from 105,000 pounds to 17,000 pounds) and on-site land releases (from 3.0 million pounds to 2.4 million pounds).

Figure 11-12 illustrates percentage changes in the stone, clay, glass, and concrete's reporting of on- and off-site releases from 1988 to 1996.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, the sector reported a 366.3 million-pound reduction in other on-site waste management, from 974.8 million pounds to 608.5 million pounds. Other on-site waste management data for the stone, clay, glass, and concrete sector also appear in Table 11-13.

The sector reported a 428.6 million-pound reduction in on-site energy recovery, from 867.0 million pounds in 1994 to 438.4 million pounds in 1996. This reduction accounted for the overall decrease in the sector's reporting of other on-site waste management, partly offset by increases in both on-site recycling (from 93.6 million pounds to 149.5 million pounds) and on-site treatment (from 14.2 million pounds to 20.6 million pounds). One facility reported 122.1 million pounds of on-site energy recovery of a mixture (identified as nonchlorinated waste fuels) in 1994. In subsequent

Table 11-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	574	587	588	592	3.1
Total Forms	1,264	1,397	1,450	1,493	18.1
Form Rs	1,264	1,397	1,252	1,303	3.1
Form As	NA	NA	198	190	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	21,102,722	10,146,616	11,920,334	14,856,718	-29.6
Fugitive Air	6,502,432	1,945,771	1,309,376	1,345,104	-79.3
Point Source Air	14,600,290	8,200,845	10,610,958	13,511,614	-7.5
Surface Water Discharges	104,998	45,248	48,156	17,464	-83.4
Underground Injection	0	0	0	1,000	--
On-site Land Releases	3,045,632	1,293,518	1,109,412	2,434,188	-20.1
Total On-site Releases	24,253,352	11,485,382	13,077,902	17,309,370	-28.6
Off-site Releases					
Transfers Off-site to Disposal	16,286,012	5,873,800	5,975,488	5,954,346	-63.4
Total On- and Off-site Releases	40,539,364	17,359,182	19,053,390	23,263,716	-42.6
Other On-site Waste Management					
Recycled On-site	NA	93,573,702	132,633,760	149,492,726	NA
Energy Recovery On-site	NA	867,033,669	584,539,538	438,405,678	NA
Treated On-site	NA	14,206,118	88,243,066	20,626,203	NA
Total Other On-site Waste Management	NA	974,813,489	805,416,364	608,524,607	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	2,930,009	3,137,572	3,667,576	NA
Transfers to Energy Recovery	NA	5,270,908	3,263,984	2,790,959	NA
Transfers to Treatment	2,563,554	2,267,816	2,228,568	2,847,670	11.1
Transfers to POTWs	628,314	460,048	659,921	661,002	5.2
Other Off-site Transfers	34,223	25,027	250	16,497	-51.8
Total Transfers Off-site for Further Waste Management	NA	10,953,808	9,290,295	9,983,704	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. NA: not required to be reported in that year.

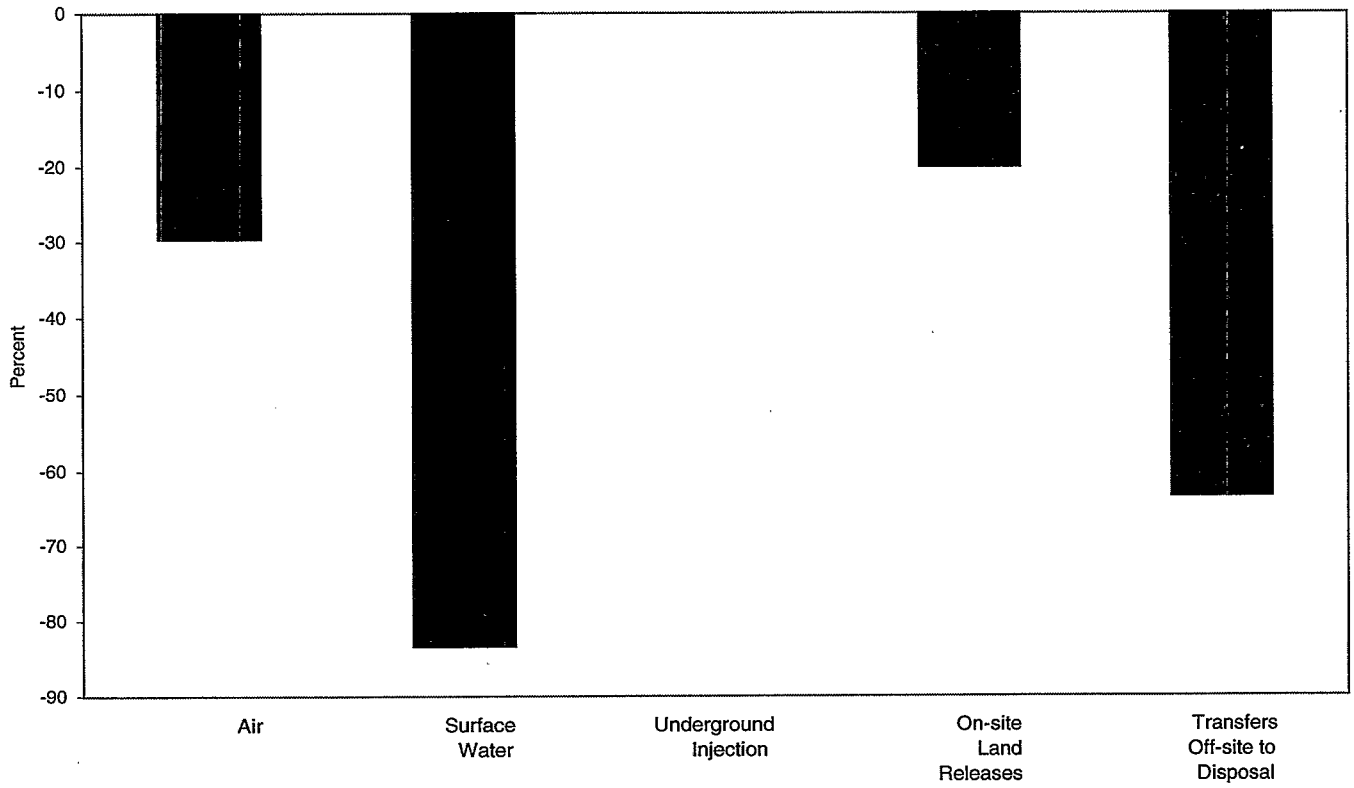


Figure 11-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

years, this facility did not report a mixture, but instead reported smaller quantities of constituents of the mixture.

For transfers off-site for further waste management reported in all years from 1988 to 1996, the stone, clay, glass, and concrete sector reported an 11.1% increase in transfers to treatment (from 2.6 million pounds to 2.8 million pounds) and a 5.2% increase in transfers to POTWs (from 628,000 pounds to 661,000 pounds).

1988-1996 Data for Four-Digit Industries in Stone, Clay, Glass, and Concrete

Tables 11-14 through 11-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 32. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The hydraulic cement industry (SIC code 3241) reported the largest decrease in on- and off-site releases reported in the stone, clay, glass, and concrete sector, from 6.7 million pounds in 1988 to 1.2 million pounds in 1996. This reduction was largely attributable to a decrease in off-site releases (transfers to disposal). Ranking second, the asbestos products industry (SIC code 3292) reported 4.6 million pounds in 1988 and 1.2 million

pounds in 1996, although total on- and off-site releases reported by this industry increased from 1994 to 1996. The 1988-1996 reduction reflected decreases in on-site land releases and off-site releases (transfers to disposal). The ceramic wall and floor tile industry (SIC code 3253) ranked third with a decrease from 3.5 million pounds in 1988 to 1.0 million pounds in 1996. This reduction occurred principally in reporting of air emissions.

The brick and structural clay tile industry (SIC code 3251) ranked first among stone, clay, glass, and concrete industries for increases in releases. This industry reported 801,000 pounds in 1988 and 3.8 million pounds in 1996. The mineral wool industry (SIC code 3296) ranked second with an increase from 3.5 million pounds to 5.2 million pounds. In both industries, increased air emissions were the largest factor. The clay refractories industry (SIC code 3255) reported the third-largest increase, from 297,000 pounds to 1.1 million pounds, although the 1995 level was lower. This increase was largely attributable to reporting of on-site land releases.

Table 11-14 provides release data for all four-digit SIC codes in the stone, clay, glass, and concrete sector, for 1988-1996.

Other On-site Waste Management

The hydraulic cement industry (SIC code 3241) reported the largest decrease in on-site waste management in the stone, clay, glass, and concrete sector for 1994-1996 (on-site waste management data were not collected in 1988). This industry reported 811.9 million pounds of other on-site waste management in 1994 and 410.9 million pounds in 1996. The ground or treated minerals industry (SIC code 3295) reported the second-largest reduction, from 56.3 million pounds to 34.2 million pounds. In both industries, the reduction occurred principally in on-site energy recovery. Ranking third, the non-clay refractories industry (SIC code 3297) reported a decrease from 4.6 million pounds to 2.1 million pounds, largely in on-site recycling.

Miscellaneous pressed and blown glass (SIC code 3229) ranked first for increases in other on-site waste management reported by the stone, clay, glass, and concrete sector. This industry reported 86.7 million pounds in 1994 and 138.7 million pounds in 1996. The asbestos products industry (SIC code 3292) ranked second with reported on-site waste management of 823,000 pounds in 1994 and 5.2 million pounds in 1996. In both industries, the increases reflected increased reporting of on-site recycling. The mineral wool industry (SIC code 3296) reported the third-largest increase, from 2.9 million pounds to 5.4 million pounds. This increase consisted of increases in on-site recycling and on-site treatment.

On-site waste management data for 1994-1996 appear in Table 11-15.

Transfers Off-site for Further Waste Management

The hydraulic cement industry (SIC code 3241) reported the sector's largest reduction in transfers off-site for further waste management from 1994 to 1996 (data for some types of off-site transfers were not collected in 1988). As noted, this industry also reported the largest reductions in on- and off-site releases and in other on-site waste management. The hydraulic cement industry reported 4.3 million pounds of transfers off-site for further waste management in 1994 and 1.6 million pounds in 1996. The largest reduction was reported in transfers to energy recovery. The glass containers industry (SIC code 3221) reported the second-largest decrease, from 526,000 pounds to 3,000 pounds. Ranking third, the miscellaneous concrete products industry (SIC code 3272) reported a decrease from 366,000 pounds and 116,000 pounds. For the glass containers industry and the miscellaneous concrete products industry, the overall reduction was principally attributable to transfers to recycling, along with smaller reductions in other types of transfers.

Table 11-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3211	Flat Glass	96	107,375	25	0	5	107,405	1,203	108,608
		95	188,371	32,042	0	250	220,663	4,834	225,497
		94	191,232	33,032	0	255	224,519	12,837	237,356
		88	460,167	750	0	8,700	469,617	764	470,381
3221	Glass Containers	96	4,284	154	0	0	4,438	82,591	87,029
		95	5,448	255	0	0	5,703	207,094	212,797
		94	64,765	113	0	0	64,878	200,236	265,114
		88	710,328	138	0	0	710,466	124,218	834,684
3229	Pressed & Blown Glass, nec*	96	1,829,348	3,978	0	127,432	1,960,758	3,717,786	5,678,544
		95	1,956,401	3,604	0	1,407	1,961,412	3,609,770	5,571,182
		94	2,573,316	4,534	0	780	2,578,630	3,930,789	6,509,419
		88	2,216,406	33,367	0	88,540	2,338,313	2,859,864	5,198,177
3231	Products of Purchased Glass	96	956,771	0	0	7,347	964,118	38,869	1,002,987
		95	1,031,807	5	0	255	1,032,067	33,594	1,065,661
		94	1,084,396	5	0	31,968	1,116,369	54,739	1,171,108
		88	1,865,722	0	0	750	1,866,472	89,380	1,955,852
3241	Cement, Hydraulic	96	525,474	56	0	688,591	1,214,121	19,092	1,233,213
		95	344,675	48	0	693,609	1,038,332	10,411	1,048,743
		94	375,725	479	0	603,554	979,758	32,537	1,012,295
		88	269,230	11,209	0	129,114	409,553	6,306,350	6,715,903
3251	Brick & Structural Clay Tile	96	3,750,190	270	0	26,018	3,776,478	46,122	3,822,600
		95	2,523,591	270	0	35,074	2,558,935	56,595	2,615,530
		94	738,449	25	0	41,120	779,594	49,963	829,557
		88	434,873	0	0	286,703	721,576	79,358	800,934
3253	Ceramic Wall & Floor Tile	96	354,237	1,275	0	167,891	523,403	479,706	1,003,109
		95	269,972	1,624	0	135,486	407,082	554,194	961,276
		94	330,120	840	0	132,174	463,134	592,188	1,055,322
		88	2,809,339	25,670	0	197,783	3,032,792	433,772	3,466,564
3255	Clay Refractories	96	63,013	261	0	1,003,670	1,066,944	15,080	1,082,024
		95	13,861	500	0	9,960	24,321	30,882	55,203
		94	8,981	525	0	12,931	22,437	20,665	43,102
		88	27,383	0	0	224,673	252,056	44,726	296,782
3259	Structural Clay Products, nec*	96	No reports received						
		95	No reports received						
		94	250	0	0	0	250	0	250
		88	18,362	33	0	0	18,395	1,220	19,615
3261	Vitreous Plumbing Fixtures	96	7,926	11	0	305	8,242	63,752	71,994
		95	10,189	10	0	0	10,199	99,521	109,720
		94	7,512	266	0	502	8,280	111,137	119,417
		88	13,997	3,261	0	37,505	54,763	130,957	185,720
3262	Vitreous China Table & Kitchenware	96	4,367	15	0	5	4,387	41,709	46,096
		95	3,936	15	0	5	3,956	51,792	55,748
		94	4,305	8	0	7	4,320	13,614	17,934
		88	10,200	750	0	2,542	13,492	90,650	104,142

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3271 for 1988. The facility should have reported in SIC code 3721. The incorrectly reported amounts were as follows: 1,851,500 pounds of total air emissions, 20,000 pounds of surface water discharges and 1,871,500 pounds of total releases. Examination of TRI data has brought to light other possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
***nec:** not elsewhere classified.

Table 11-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3263	Semivitreous Table & Kitchenware	96	2,803	166	0	880	3,849	34,100	37,949
		95	2,801	87	0	660	3,548	19,000	22,548
		94	12,202	149	0	1,170	13,521	27,200	40,721
		88	255	250	0	0	505	0	505
3264	Porcelain Electrical Supplies	96	49,669	1,042	1,000	9	51,720	30,969	82,689
		95	80,860	1,052	0	34	81,946	68,251	150,197
		94	79,688	1,285	0	251	81,224	37,113	118,337
		88	299,061	54	0	24	299,139	75,646	374,785
3269	Pottery Products, nec*	96	1,350	5	0	476	1,831	8,637	10,468
		95	1,330	0	0	0	1,330	11,992	13,322
		94	2,950	5	0	0	2,955	16,819	19,774
		88	7,898	0	0	8	7,906	118,304	126,210
3271	Concrete Block & Brick	96	8,067	0	0	0	8,067	0	8,067
		95	13,938	0	0	0	13,938	0	13,938
		94	17,688	0	0	0	17,688	0	17,688
		88	2,125,658	20,000	0	0	2,145,658	966	2,146,624
3272	Concrete Products, nec*	96	208,991	0	0	2,690	211,681	1,883	213,564
		95	245,136	0	0	1,170	246,306	410	246,716
		94	148,871	0	0	96,000	244,871	453	245,324
		88	86,820	0	0	0	86,820	4,000	90,820
3274	Lime	96	5	0	0	38,537	38,542	0	38,542
		95	5	0	0	55,606	55,611	0	55,611
		94	5	0	0	23,482	23,487	0	23,487
		88	1	0	0	12,040	12,041	0	12,041
3275	Gypsum Products	96	252	0	0	0	252	34	286
		95	500	0	0	0	500	28	528
		94	500	0	0	1,837	2,337	52	2,389
		88	10,600	427	0	10,833	21,860	13,967	35,827
3281	Cut Stone & Stone Products	96	156,037	0	0	0	156,037	0	156,037
		95	144,228	0	0	0	144,228	0	144,228
		94	159,722	0	0	0	159,722	0	159,722
		88	63,095	0	0	0	63,095	6,100	69,195
3291	Abrasive Products	96	546,262	0	0	250	546,512	172,423	718,935
		95	498,461	0	0	0	498,461	258,710	757,171
		94	484,809	0	0	0	484,809	305,989	790,798
		88	1,840,014	10	0	5,030	1,845,054	74,728	1,919,782
3292	Asbestos Products	96	556,494	24	0	10,781	567,299	649,197	1,216,496
		95	123,712	5	0	0	123,717	87,677	211,394
		94	2,677	250	0	0	2,927	93,869	96,796
		88	513,178	500	0	1,210,800	1,724,478	2,920,759	4,645,237
3295	Minerals, Ground or Treated	96	442,229	1,512	0	61,166	504,907	41,580	546,487
		95	446,025	1,505	0	6,937	454,467	20,492	474,959
		94	128,745	319	0	116,467	245,531	27,510	273,041
		88	282,176	1,500	0	28,870	312,546	197,400	509,946

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3271 for 1988. The facility should have reported in SIC code 3721. The incorrectly reported amounts were as follows: 1,851,500 pounds of total air emissions, 20,000 pounds of surface water discharges and 1,871,500 pounds of total releases. Examination of TRI data has brought to light other possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
*nec: not elsewhere classified.

Table 11-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3296	Mineral Wool	96	4,692,356	7,358	0	216,070	4,915,784	248,108	5,163,892
		95	3,281,024	5,492	0	81,096	3,367,612	191,538	3,559,150
		94	2,745,204	1,289	0	120,457	2,866,950	148,889	3,015,839
		88	2,899,092	356	0	273,041	3,172,489	324,067	3,496,556
3297	Nonclay Refractories	96	60,930	1,012	0	50,818	112,760	154,485	267,245
		95	53,366	513	0	44,277	98,156	573,063	671,219
		94	50,218	517	0	44,846	95,581	115,363	210,944
		88	124,772	2,825	0	376,402	503,999	631,228	1,135,227
3299	Nonmetallic Mineral Products, nec*	96	376,761	0	0	12,536	389,297	3,888	393,185
		95	518,180	0	0	13,372	531,552	2,736	534,288
		94	634,839	250	0	6,434	641,523	250	641,773
		88	162,993	0	0	0	162,993	436,240	599,233
	Multiple within SIC Code 32	96	149,720	300	0	18,711	168,731	103,132	271,863
		95	134,060	1,129	0	30,214	165,403	79,804	245,207
		94	172,082	1,357	0	49,878	223,317	78,783	302,100
		88	73,810	1,774	0	42,606	118,190	172,165	290,355
	Invalid SIC Code within SIC Code 32	96	1,807	0	0	0	1,807	0	1,807
		95	28,457	0	0	0	28,457	3,100	31,557
		94	127,365	0	0	9,405	136,770	2,805	139,575
		88	3,777,292	2,124	0	109,668	3,889,084	1,149,183	5,038,267
	Total for SIC Code 32	96	14,856,718	17,464	1,000	2,434,188	17,309,370	5,954,346	23,263,716
		95	11,920,334	48,156	0	1,109,412	13,077,902	5,975,488	19,053,390
		94	10,146,616	45,248	0	1,293,518	11,485,382	5,873,800	17,359,182
		88	21,102,722	104,998	0	3,045,632	24,253,352	16,286,012	40,539,364

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3271 for 1988. The facility should have reported in SIC code 3721. The incorrectly reported amounts were as follows: 1,851,500 pounds of total air emissions, 20,000 pounds of surface water discharges and 1,871,500 pounds of total releases. Examination of TRI data has brought to light other possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
***nec:** not elsewhere classified.

The miscellaneous pressed and blown glass industry (SIC code 3229) reported the sector's largest increase from 1994 to 1996 in transfers off-site for further waste management, an increase from 1.8 million pounds to 2.8 million pounds, in all types of transfers except those to energy recovery. The mineral wool industry (SIC code 3296) ranked second for increases, reporting 447,000 pounds in 1994 and 1.2 million pounds in 1996. This industry reported increases in transfers to recycling and to treatment. Ranking third, the vitreous plumbing industry (SIC code 3261) reported less than 1,000 pounds in 1994 and 474,000 pounds in 1996. The increase occurred in reporting of on-site recycling.

In the earlier volume of the *1996 TRI Public Data Release*, EPA included brief descriptions of the facilities with large increases and decreases in releases and production-related waste in each sector. In this volume of the data release, EPA has again attempted to look at these facilities for each sector. Closer examination of the TRI data at this level has brought to light a number of reporting discrepancies or possible reporting errors which cannot be immediately resolved. In some cases, these discrepancies could significantly impact the data for the whole sector. As a consequence of these unresolved data quality issues, the descriptions of the facilities with increases and decreases in releases from 1988 to 1996 and with increases and decreases in production-related waste from 1991 to 1996 have been removed from this chapter. EPA plans to address these data quality issues through improved outreach and guidance to this sector.

Table 11-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3211	Flat Glass	96	191,646	0	0	191,646
		95	598,386	0	0	598,386
		94	893,919	0	0	893,919
		88	NA	NA	NA	NA
3221	Glass Containers	96	0	14,600	123,880	138,480
		95	4,973	15,600	182,290	202,863
		94	8,500	41,400	377,650	427,550
		88	NA	NA	NA	NA
3229	Pressed & Blown Glass, nec*	96	136,022,229	0	2,669,730	138,691,959
		95	121,564,977	0	4,825,715	126,390,692
		94	82,260,009	0	4,482,546	86,742,555
		88	NA	NA	NA	NA
3231	Products of Purchased Glass	96	229,255	0	554,943	784,198
		95	36,229	0	704,695	740,924
		94	22,070	0	709,430	731,500
		88	NA	NA	NA	NA
3241	Cement, Hydraulic	96	56,079	399,921,392	10,905,169	410,882,640
		95	19,434	533,314,517	76,674,740	610,008,691
		94	184,631	808,316,306	3,414,589	811,915,526
		88	NA	NA	NA	NA
3251	Brick & Structural Clay Tile	96	824,599	0	223,803	1,048,402
		95	776,063	0	1,520	777,583
		94	752,025	0	430	752,455
		88	NA	NA	NA	NA
3253	Ceramic Wall & Floor Tile	96	1,254,296	0	0	1,254,296
		95	215,455	0	0	215,455
		94	199,131	0	855	199,986
		88	NA	NA	NA	NA
3255	Clay Refractories	96	196,087	0	9,800	205,887
		95	173,800	0	13,740	187,540
		94	138,900	0	13,006	151,906
		88	NA	NA	NA	NA
3259	Structural Clay Products, nec*	96	No reports received			
		95	No reports received			
		94	0	0	0	0
		88	NA	NA	NA	NA
3261	Vitreous Plumbing Fixtures	96	12,253	0	131,750	144,003
		95	96,106	0	219,463	315,569
		94	116,720	0	219,219	335,939
		88	NA	NA	NA	NA
3262	Vitreous China Table & Kitchenware	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. Examination of TRI data has brought to light possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
*nec: not elsewhere classified.

Table 11-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3263	Semivitreous Table & Kitchenware	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3264	Porcelain Electrical Supplies	96	49,412	0	121,841	171,253
		95	335,102	0	181,500	516,602
		94	524,242	0	204,200	728,442
		88	NA	NA	NA	NA
3269	Pottery Products, nec*	96	90,725	0	0	90,725
		95	90,733	0	0	90,733
		94	91,211	0	0	91,211
		88	NA	NA	NA	NA
3271	Concrete Block & Brick	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3272	Concrete Products, nec*	96	0	0	14,010	14,010
		95	0	0	12,000	12,000
		94	0	0	6,000	6,000
		88	NA	NA	NA	NA
3274	Lime	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3275	Gypsum Products	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3281	Cut Stone & Stone Products	96	0	750	14	764
		95	0	0	180	180
		94	0	0	660	660
		88	NA	NA	NA	NA
3291	Abrasive Products	96	496,029	150,400	715,875	1,362,304
		95	427,233	212,300	713,270	1,352,803
		94	314,732	234,000	800,260	1,348,992
		88	NA	NA	NA	NA
3292	Asbestos Products	96	4,753,860	0	412,363	5,166,223
		95	269,700	0	1,326,286	1,595,986
		94	345,300	0	478,000	823,300
		88	NA	NA	NA	NA
3295	Minerals, Ground or Treated	96	4,082	34,102,761	64,302	34,171,145
		95	1,163	49,856,696	21,121	49,878,980
		94	1,448	56,188,922	93,126	56,283,496
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. Examination of TRI data has brought to light possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
***nec:** not elsewhere classified.

Table 11-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3296	Mineral Wool	96	3,207,330	0	2,225,941	5,433,271
		95	1,725,693	0	1,713,935	3,439,628
		94	1,315,624	0	1,570,166	2,885,790
		88	NA	NA	NA	NA
3297	Nonclay Refractories	96	2,012,098	460	134,605	2,147,163
		95	4,596,538	0	98,202	4,694,740
		94	4,582,471	0	34,255	4,616,726
		88	NA	NA	NA	NA
3299	Nonmetallic Mineral Products, nec*	96	4,126	4,212,915	294,466	4,511,507
		95	6,284	1,136,825	1,182,264	2,325,373
		94	1,000	2,250,241	1,487,426	3,738,667
		88	NA	NA	NA	NA
	Multiple within SIC Code 32	96	88,620	2,400	2,023,520	2,114,540
		95	247,628	3,600	371,985	623,213
		94	77,769	2,800	314,298	394,867
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 32	96	0	0	191	191
		95	1,448,263	0	160	1,448,423
		94	1,744,000	0	2	1,744,002
		88	NA	NA	NA	NA
	Total for SIC Code 32	96	149,492,726	438,405,678	20,626,203	608,524,607
		95	132,633,760	584,539,538	88,243,066	805,416,364
		94	93,573,702	867,033,669	14,206,118	974,813,489
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. Examination of TRI data has brought to light possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
*nec: not elsewhere classified.

Table 11-16 presents the stone, clay, glass, and concrete sector's reporting of transfers off-site for further waste management from 1988 to 1996.

1991-1996 Waste Management Data for Stone, Clay, Glass, and Concrete

Table 11-17 summarizes on- and off-site waste management data for the stone, clay, glass, and concrete sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). The sector reported a decrease in total production-related waste from 945.5 million pounds in 1991 to 642.7 million pounds in 1996, a reduction of nearly one-third (32.0%). The largest reduction was reported in on-site energy recovery, from 781.4 million pounds to 438.4 million pounds (a 343.0 million-pound reduction, or 43.9%).

The sector also reported decreases in on-site treatment (from 64.3 million pounds to 20.6 million pounds, or 67.9%) and in off-site energy recovery (from 6.8 million pounds to 2.8 million pounds, or 58.7%).

Stone, clay, glass, and concrete industries reported their largest increase (in pounds and percent) in on-site recycling, from 64.3 million pounds to 149.7 million pounds (a 132.7% increase). The sector also reported increases in off-site recycling (from 3.4

Table 11-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3211	Flat Glass	96	27,142	0	24,543	32	0	51,717
		95	35,020	0	27,970	1,224	0	64,214
		94	30,674	0	27,533	1,276	0	59,483
		88	NA	NA	11,179	250	14,355	NA
3221	Glass Containers	96	2,160	250	690	0	0	3,100
		95	327,753	250	54,240	0	0	382,243
		94	494,854	2,480	29,134	0	0	526,468
		88	NA	NA	24,934	69,250	250	NA
3229	Pressed & Blown Glass, nec*	96	1,597,461	2,255	1,057,431	169,892	15,747	2,842,786
		95	1,562,374	1,255	461,859	35,618	0	2,061,106
		94	1,055,333	3,804	715,154	56,076	0	1,830,367
		88	NA	NA	402,318	315,544	823	NA
3231	Products of Purchased Glass	96	188,096	149,201	73,341	238,151	0	648,789
		95	304,249	152,296	75,993	328,678	0	861,216
		94	147,049	301,955	69,419	286,515	0	804,938
		88	NA	NA	135,553	2,809	13,950	NA
3241	Cement, Hydraulic	96	150,805	995,749	427,284	0	750	1,574,588
		95	193,744	1,207,333	415,389	0	0	1,816,466
		94	206,383	3,631,048	428,679	0	0	4,266,110
		88	NA	NA	615,200	0	0	NA
3251	Brick & Structural Clay Tile	96	0	0	0	0	0	0
		95	0	0	10	0	250	260
		94	0	0	5	0	5	10
		88	NA	NA	0	109	0	NA
3253	Ceramic Wall & Floor Tile	96	109,429	0	0	2,842	0	112,271
		95	115,858	0	0	29,589	0	145,447
		94	159,183	0	0	2,046	0	161,229
		88	NA	NA	20,400	3,484	0	NA
3255	Clay Refractories	96	0	0	750	8	0	758
		95	0	0	1,500	0	0	1,500
		94	0	0	0	0	0	0
		88	NA	NA	0	400	0	NA
3259	Structural Clay Products, nec*	96	No reports received					
		95	No reports received					
		94	0	0	0	0	0	0
		88	NA	NA	0	0	0	NA
3261	Vitreous Plumbing Fixtures	96	473,353	0	8	392	0	473,753
		95	0	0	58	625	0	683
		94	0	0	7	724	0	731
		88	NA	NA	0	256	2,737	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3271 for 1988. The facility should have reported in SIC code 3721. The incorrectly reported amount was 295,385 pounds of transfers to treatment. Examination of TRI data has brought to light other possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
***nec:** not elsewhere classified.

Table 11-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3262	Vitreous China Table & Kitchenware	96	49,575	65	74,874	270	0	124,784
		95	40,017	446	69,451	513	0	110,427
		94	62,076	267	49,142	515	21,930	133,930
		88	NA	NA	128,180	750	0	NA
3263	Semivitreous Table & Kitchenware	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	13,000	0	0	NA
3264	Porcelain Electrical Supplies	96	81,658	10,944	767	3,198	0	96,567
		95	33,600	15,169	795	4,098	0	53,662
		94	74,853	11,010	7,030	3,151	0	96,044
		88	NA	NA	58,875	9,843	0	NA
3269	Pottery Products, nec*	96	0	0	2,900	61	0	2,961
		95	3,359	0	1,000	52	0	4,411
		94	6,100	0	2,200	29	0	8,329
		88	NA	NA	7,700	758	0	NA
3271	Concrete Block & Brick	96	0	0	5,235	0	0	5,235
		95	0	723	0	0	0	723
		94	0	418	0	0	0	418
		88	NA	NA	295,385	9	0	NA
3272	Concrete Products, nec*	96	104,195	4,450	0	7,251	0	115,896
		95	122,976	4,205	250	6,842	0	134,273
		94	334,883	23,946	290	6,395	0	365,514
		88	NA	NA	250	0	0	NA
3274	Lime	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	250	0	NA
3275	Gypsum Products	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	0	0	0	0	0
		88	NA	NA	0	17,518	0	NA
3281	Cut Stone & Stone Products	96	13,736	412	0	0	0	14,148
		95	10,583	35,325	0	0	0	45,908
		94	12,789	1,274	0	0	0	14,063
		88	NA	NA	0	0	0	NA
3291	Abrasive Products	96	38,521	113,503	362,878	1,580	0	516,482
		95	13,615	163,422	249,541	4,694	0	431,272
		94	20,311	141,449	146,124	3,982	0	311,866
		88	NA	NA	199,108	45,697	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3271 for 1988. The facility should have reported in SIC code 3721. The incorrectly reported amount was 295,385 pounds of transfers to treatment. Examination of TRI data has brought to light other possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
*nec: not elsewhere classified.

Table 11-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Stone, Clay, Glass, Concrete, SIC Code 32, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3292	Asbestos Products	96	83,800	47,539	8	76	0	131,423
		95	0	0	0	317	0	317
		94	0	0	0	112	0	112
		88	NA	NA	157,145	48,182	0	NA
3295	Minerals, Ground or Treated	96	9,000	1,458,970	126,852	260	0	1,595,082
		95	1,750	1,673,687	540,297	6,150	0	2,221,884
		94	15,000	1,131,391	436,333	1,005	0	1,583,729
		88	NA	NA	500	1,000	0	NA
3296	Mineral Wool	96	667,526	640	405,140	84,741	0	1,158,047
		95	321,164	783	28,334	41,060	0	391,341
		94	278,334	4,115	74,077	90,137	0	446,663
		88	NA	NA	93,612	93,364	500	NA
3297	Nonclay Refractories	96	56,461	6,981	6,200	1,063	0	70,705
		95	49,194	9,090	1,000	814	0	60,098
		94	15,540	6,981	2,625	615	0	25,761
		88	NA	NA	2,545	6,452	0	NA
3299	Nonmetallic Mineral Products, nec*	96	0	0	111,076	0	0	111,076
		95	0	0	134,588	0	0	134,588
		94	0	10,770	168,521	5	3,092	182,388
		88	NA	NA	32,209	775	1,605	NA
	Multiple within SIC Code 32	96	14,121	0	167,693	151,185	0	332,999
		95	250	0	166,293	199,647	0	366,190
		94	750	0	111,538	7,464	0	119,752
		88	NA	NA	4,435	10,136	0	NA
	Invalid SIC Code within SIC Code 32	96	537	0	0	0	0	537
		95	2,066	0	0	0	0	2,066
		94	15,897	0	5	1	0	15,903
		88	NA	NA	361,026	1,478	3	NA
	Total for SIC Code 32	96	3,667,576	2,790,959	2,847,670	661,002	16,497	9,983,704
		95	3,137,572	3,263,984	2,228,568	659,921	250	9,290,295
		94	2,930,009	5,270,908	2,267,816	460,048	25,027	10,953,808
		88	NA	NA	2,563,554	628,314	34,223	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 32 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3271 for 1988. The facility should have reported in SIC code 3721. The incorrectly reported amount was 295,385 pounds of transfers to treatment. Examination of TRI data has brought to light other possible reporting errors that could significantly impact the data for SIC code 32. At the time of publication, these data quality issues remained unresolved.
***nec:** not elsewhere classified.

Table 11-17. TRI Waste Management Data, 1991, 1994-1996: Stone, Clay, Glass, and Concrete, SIC Code 32

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	64,319,675	93,586,902	132,654,260	149,667,726
Energy Recovery On-site	781,439,504	868,133,042	585,566,707	438,433,769
Treated On-site	64,333,845	14,206,118	88,243,066	20,626,203
Total On-site Waste Management	910,093,024	975,926,062	806,464,033	608,727,698
Off-site Waste Management				
Recycled Off-site	3,430,448	3,027,459	3,378,016	3,596,635
Energy Recovery Off-site	6,839,905	5,269,827	3,251,888	2,821,861
Treated Off-site	1,908,476	2,418,500	2,327,223	3,883,899
Total Off-site Waste Management	12,178,829	10,715,786	8,957,127	10,302,395
Quantity Released On- and Off-site	23,222,325	16,908,487	19,722,496	23,703,644
Total Production-related Waste	945,494,178	1,003,550,335	835,143,656	642,733,737
Non-Production-related Waste	56,841	51,316	454,039	89,174

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	41.7	12.8	132.7
Energy Recovery On-site	-32.5	-25.1	-43.9
Treated On-site	521.2	-76.6	-67.9
Total On-site Waste Management	-17.4	-24.5	-33.1
Off-site Waste Management			
Recycled Off-site	11.6	6.5	4.8
Energy Recovery Off-site	-38.3	-13.2	-58.7
Treated Off-site	-3.8	66.9	103.5
Total Off-site Waste Management	-16.4	15.0	-15.4
Quantity Released On- and Off-site	16.6	20.2	2.1
Total Production-related Waste	-16.8	-23.0	-32.0
Non-Production-related Waste	784.8	-80.4	56.9

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

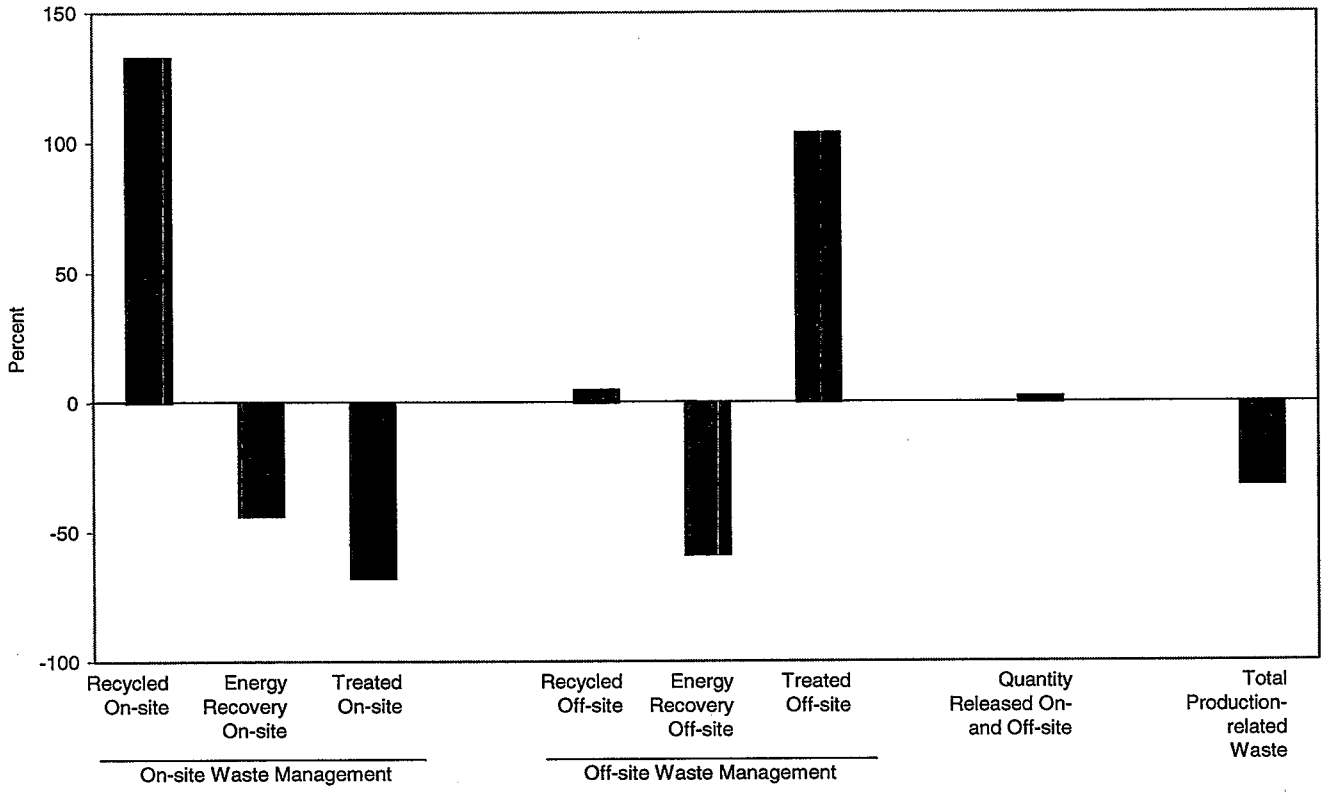


Figure 11-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Stone, Clay, Glass, and Concrete (SIC Code 32)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

million pounds to 3.6 million pounds, or 4.8%), off-site treatment (from 1.9 million pounds to 3.9 million pounds, or 103.5%), and quantities released (from 23.2 million pounds to 23.7 million pounds, or 2.1%).

Figure 11-13 illustrates the sector's percentage changes in production-related waste, by waste management method, for 1991 to 1996.

Chapter 12

Toxics Release Inventory Data for Fabricated Metals (SIC Code 34)

A Look at the Fabricated Metal Products Industry (SIC Code 34)

The fabricated metal products industry (SIC code 34) manufactures ferrous and nonferrous metal products ranging from metal cans to hardware to nonelectric heating equipment and plumbing fixtures. Structural products classified in this sector include iron, steel, and other metal fabricated for use in bridges and buildings, along with metal sections for ships and boats. Fabricated plate work includes power boilers, marine boilers, industrial processing and storage vessels, heat exchangers, and similar products. The sector also produces screw machine products (unassembled parts made to specification on a job basis) and standard bolts, nuts, screws, and other fasteners. The metal forgings and stampings group forges iron, steel, and nonferrous metals for aircraft, automobiles, railroads, and other uses. The sector also performs electroplating and finishing of metals and metal products, along with metal cutting, engraving, enameling, and galvanizing. In addition, small arms, ammunition, and miscellaneous ordnance are classified in SIC code 34, as are valves, springs, metal foil, pipe, and other miscellaneous fabricated metal products.

Box 12-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The fabricated metal products sector shipped products valued at $214.01 billion in 1996, up from $204.4 billion in 1995 (both in current dollars). The sector employed nearly 1.5 million in both years. Employment in fabricated metal products has increased through the 1990s. From 1989 to 1996, production in this sector rose 13.2%, somewhat slower growth than the 17.6% average for all U.S. manufacturing (see Chapter 1, Table 1-10).

Three industry groups in SIC code 34 accounted for the bulk of the value of shipments and employment in 1996. Fabricated structural metal products (SIC code 344 at the three-digit level) shipped products valued at $59.39 billion and employed 432,000. Metal forgings and stampings (SIC code 346) recorded $41.28 billion in shipments and 259,000 in employment.

Box 12-1. SIC Code 34, Fabricated Metal Products, Except Machinery and Transportation Equipment: Codes and Classifications

SIC Code		Industry Description
343	**Heating Equipment, Except Electric and Warm Air; and Plumbing Fixtures**	
3431	Enameled Iron and Metal Sanitary Ware	Manufacture of enameled iron, cast iron, or pressed metal sanitary ware.
3432	Plumbing Fixture Fittings and Trim	Manufacture of metal plumbing fixture fittings and trim. Assembly of plastics components into plumbing fixture fittings.
3433	Heating Equipment, Except Electric and Warm Air Furnaces	Manufacture of heating equipment, except electric and warm air furnaces.
344	**Fabricated Structural Metal Products**	
3441	Fabricated Structural Metal	Fabrication of iron and steel or other metal for structural purposes, such as bridges, buildings, and sections for ships, boats, and barges.
3442	Metal Doors, Sash, Frames, Molding, and Trim	Manufacture of ferrous and nonferrous metal doors, sash, window and door frames and screens, molding, and trim.
3443	Fabricated Plate Work (Boiler Shops)	Manufacture of power and marine boilers, pressure and nonpressure tanks, processing and storage vessels, heat exchangers, weldments and similar products, by cutting, forming, and joining metal plates, shapes, bars, sheet, pipe mill products, and tubing to custom or standard design, for factory or field assembly.
3444	Sheet Metal Work	Manufacture of sheet metal work for buildings. Manufacture of stovepipes, light tanks, and other products of sheet metal.
3446	Architectural Metal Work	Manufacture of architectural and ornamental metal work, such as stairs and staircases, open steel flooring (grating), fire escapes, grilles, railings, and fences and gates, except those made from wire.
3448	Prefabricated Metal Buildings and Components	Manufacture of portable and other prefabricated metal buildings and parts and prefabricated exterior metal panels.
3449	Miscellaneous Structural Metal Work	Manufacture of miscellaneous structural metal work, such as metal plaster bases, fabricated bar joists, and concrete reinforcing bars. Custom roll forming of metal.
345	**Screw Machine Products, and Bolts, Nuts, Screws, Rivets, and Washers**	
3451	Screw Machine Products	Manufacture of automatic or hand-screw machine products from rod, bar, or tube stock of metal, fiber, plastics, or other material. (Includes a wide variety of unassembled parts, usually produced on a job or order basis.)
3452	Bolts, Nuts, Screws, Rivets, and Washers	Manufacture of metal bolts, nuts, screws, rivets, washers, formed and threaded wire goods, and special industrial fasteners.
346	**Metal Forgings and Stampings**	
3462	Iron and Steel Forgings	Manufacture of metal forgings or metal stampings, generally on a job or order basis.
3463	Nonferrous Forgings	Manufacture of nonferrous forgings, with or without the use of dies.
3465	Automotive Stampings	Manufacture of automotive stampings, such as body parts, hubs, and trim.
3466	Crowns and Closures	Manufacture of metal crowns and closures, such as bottle caps.
3469	Metal Stampings, nec*	Manufacture of miscellaneous metal stampings and spun products, including porcelain enameled products. Includes household appliance housing and parts, cooking and kitchen utensils, and other non-automotive job stampings.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 12-1. SIC Code 34, Fabricated Metal Products, Except Machinery and Transportation Equipment: Codes and Classifications, Continued

SIC Code		Industry Description
347	**Coating, Engraving, and Allied Services**	
3471	Electroplating, Plating, Polishing, Anodizing, and Coloring	Electroplating, plating, anodizing, coloring, and finishing of metals and formed products for the trade or, on purchased metals or formed products, for the establishment's own use.
3479	Coating, Engraving, and Allied Services, nec*	Enameling, lacquering, and varnishing metal products. Hot dip galvanizing of mill sheets, plates and bars, castings, and formed products of iron and steel; hot dip coating such items with aluminum, lead, or zinc; retinning of cans and utensils. Engraving, chasing, and etching of jewelry, silverware, notarial and other seals, and other metal products for purposes other than printing. Providing other miscellaneous metal services. (All activities are performed for the trade or, on purchased metals or products, for the establishment's own use.)
348	**Ordnance and Accessories, Except Vehicles and Guided Missiles**	
3482	Small Arms Ammunition	Manufacture of ammunition for small arms (bore of 30 millimeters or less).
3483	Ammunition, Except For Small Arms	Manufacture of miscellaneous ammunition. Loading and assembling ammunition more than 30 millimeters, including component parts. Manufacture of bombs, mines, torpedoes, grenades, depth charges, chemical warfare projectiles, and their component parts.
3484	Small Arms	Manufacture of small firearms and their parts. Manufacture of certain larger weapons carried and employed by an individual (such as grenade launchers and heavy field machine guns).
3489	Ordnance and Accessories, nec*	Manufacture of miscellaneous ordnance and accessories, such as naval, aircraft, antiaircraft, tank, coast, and field artillery.
349	**Miscellaneous Fabricated Metal Products**	
3491	Industrial Valves	Manufacture of industrial valves.
3492	Fluid Power Valves and Hose Fittings	Manufacture of hydraulic and pneumatic valves, hose and tube fittings, and hose assemblies for fluid power systems.
3493	Steel Springs, Except Wire	Manufacture of leaf springs, hot wound springs, and coiled flat springs.
3494	Valves and Pipe Fittings, nec*	Manufacture of miscellaneous metal valves and pipe fittings, such as plumbing and heating valves, and pipe fittings, flanges, and unions, except from purchased pipes.
3495	Wire Springs	Manufacture of wire springs from purchased wires.
3496	Miscellaneous Fabricated Wire Products	Manufacture of miscellaneous fabricated wire products from purchased wire, such as non-insulated wire rope and cable, fencing, screening, netting, paper machine wire cloth, hangers, paper clips, kitchenware, and wire carts.
3497	Metal Foil and Leaf	Manufacture of gold, silver, tin, and other metal foil (including converted metal foil) and leaf. Converting of metal foil (including aluminum) into wrappers, cookware, dinnerware, and containers (except bags and liners). (Excludes manufacture of plain aluminum foil.)
3498	Fabricated Pipe and Pipe Fittings	Fabrication of pipe and pipe fittings from purchased metal pipe, by processes such as cutting, threading, and bending.
3499	Fabricated Metal Products, nec*	Manufacture of miscellaneous fabricated metal products, such as steel safes and vaults and similar fire or burglary resistive products, collapsible tubes of thin flexible metal, metal boxes, metal ladders, and metal household articles, such as ice cream freezers and ironing boards.

***nec:** not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Miscellaneous fabricated metal products (SIC code 349) had $40.83 billion in value of shipments and employed 300,000.

Fabricated metal production includes a number of stages that can result in releases or waste management of TRI chemicals. Prominent operations in metal fabrication include forming (bending and shaping), machining (cutting and shearing), cleaning and stripping, and surface treatment and plating. Aqueous solutions, emulsions, and cutting oils (such as ethylene glycol) may be used to cool or lubricate metal pieces during cutting operations. Releases of glycol ethers to air may result from cutting operations as well as from coating processes. Air emissions of solvents such as xylene and toluene also may result from forming and cutting operations. Organic solvents, alkalines, and acids are used in cleaning and degreasing metal surfaces; these uses also may result in air emissions, particularly of solvents.

Finishing operations often include plating, which uses solutions bearing metal ions for deposition on the surface of the fabricated workpiece. Chrome (hexavalent or trivalent), copper, gold, silver, cadmium, zinc, or nickel may be used in plating tanks. Polishing, hot dip coating, and etching are other finishing techniques. In plating and hot dip coating, metal pieces are plated or coated with another metal. The principal example of hot dip coating is galvanizing with zinc. Fabricated metal products may also be painted, using dry powder or solvent-based or water-borne formulations. Plating and finishing operations may result in solvent releases and in waste management of metals and other TRI chemicals.

1996 TRI Data for Fabricated Metals

Table 12-1 summarizes TRI reporting by the fabricated metals sector for 1996. The sector submitted 7,416 forms in 1996. Of these, 521 were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

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U.S. Environmental Protection Agency, Office of Research and Development, *Guides to Pollution Prevention: The Fabricated Metal Products Industry*, EPA/625/7-90/006, July 1990 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

The plating and polishing industry (SIC code 3471) submitted 1,241 forms, or 16.7% of the sector's total in 1996. The metal coating industry (SIC code 3479) submitted 883 forms (11.9%). A total of 688 forms (9.3%) reported more than one SIC code within SIC code 34; these "multiple-codes" forms are explained below. Two other industries in the fabricated metals sector submitted more than 600 forms each: miscellaneous fabricated metal products (SIC code 3499), 623 forms, and metal cans (SIC code 3411), 601 forms. These represented 8.4% and 8.1%, respectively, of all forms submitted by the sector in 1996.

The metal cans industry (SIC code 3411) reported the fabricated metals sector's largest total on- and off-site releases (24.8 million pounds) in 1996. This amount was 27.5% of the sector's total of 90.3 million pounds. The metal cans industry's reported releases consisted almost entirely of on-site releases: 24.7 million pounds or 35.2% of the sector's total of 70.3 million pounds. The miscellaneous metal stampings industry (SIC code 3469) ranked first for reporting of off-site releases, with 8.3 million pounds, or 41.4% of the sector's total of 19.9 million pounds. The metal coating industry (SIC code 3479) ranked second in all three summary release categories shown in Table 12-1: on-site releases (8.5 million pounds, or 12.0% of the sector's total), off-site releases (3.1 million pounds, or 15.5%), and total releases (11.6 million pounds, or 12.8%).

The plating and polishing industry (SIC code 3471) ranked first in the sector for other on-site waste management, reporting 55.6 million pounds, or 19.7% of the sector's total of 282.7 million pounds. The cutlery industry (SIC code 3421) reported the second-largest amount, 46.5 million pounds (16.4%).

Some facilities in the fabricated metals sector manufacture related, but distinct, product lines that are classified in different SIC codes. A facility may forge iron and steel (SIC code 3462) and nonferrous metals (SIC code 3463). Another facility may manufacture miscellaneous hardware (SIC code 3429) and also perform plating and polishing (SIC code 3471) for the fabricated metals trade. Such facilities may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.) In 1996, these multiple-codes forms reported the sector's largest amounts of transfers off-site for further waste management and total production-related waste.

The multiple-codes group reported 50.0 million pounds of transfers off-site for further waste management, 14.9% of the sector's 336.5 million pounds in this category. These forms also reported 100.1 million pounds of total production-related waste, 14.0% of the sector's total of 716.2 million pounds. For transfers off-site for further waste management, the plumbing fixture fittings and trim industry (SIC code 3432) ranked second with 41.5 million pounds (12.3%). For total production-related waste, the plating and polishing industry (SIC code 3471) ranked second with 90.4 million pounds (12.6%).

Multiple SIC Codes in SIC Code 34

Table 12-2 further examines reporting on forms that reported more than one four-digit SIC code within SIC code 34 in 1996. The largest number of forms (96 forms) combined plating and polishing (SIC code 3471) and metal coating (SIC code 3479). The combination of fabricated structural metal (SIC code 3441) and fabricated plate work (SIC code 3443) submitted the second-largest number of multiple-codes forms (31 forms).

Among the multiple-codes forms, the combination of plating and polishing (SIC code 3471) and metal coating (SIC code 3479) reported the largest total on- and off-site releases, with 945,000 pounds. The

Table 12-1. Summary of TRI Information by 4-digit SIC Code, 1996: Fabricated Metals, SIC Code 34

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
1	4	3411	Metal Cans	150	601	4	24,734,812	59,341	24,794,153
8	22	3412	Metal Barrels, Drums, & Pails	46	149	0	2,274,771	0	2,274,771
18	6	3421	Cutlery	18	37	3	720,956	83,229	804,185
23	29	3423	Hand & Edge Tools, nec*	33	68	2	367,187	43,042	410,229
37	36	3425	Saw Blades & Handsaws	12	21	2	7,057	60,330	67,387
10	10	3429	Hardware, nec*	55	158	4	1,242,921	632,806	1,875,727
31	30	3431	Metal Sanitary Ware	6	32	3	58,460	127,650	186,110
32	5	3432	Plumbing Fixture Fittings & Trim	34	92	1	70,851	69,729	140,580
27	31	3433	Heating Equipment, Except Electric	21	43	0	328,601	2,009	330,610
11	20	3441	Fabricated Structural Metal	132	341	159	1,682,724	141,818	1,824,542
7	27	3442	Metal Doors, Sash, & Trim	62	127	10	2,283,760	1,380	2,285,140
15	17	3443	Fabricated Plate Work (Boiler Shops)	91	269	22	1,424,326	92,391	1,516,717
13	26	3444	Sheet Metal Work	55	139	14	1,577,583	52,417	1,630,000
26	33	3446	Architectural Metal Work	7	24	1	228,864	108,861	337,725
16	19	3448	Prefabricated Metal Buildings	35	83	5	1,055,416	101,243	1,156,659
24	32	3449	Miscellaneous Metal Work	24	51	12	404,639	270	404,909
21	12	3451	Screw Machine Products	60	113	6	424,315	5,259	429,574
20	24	3452	Bolts, Nuts, Rivets, & Washers	62	139	12	373,233	81,970	455,203
9	11	3462	Iron & Steel Forgings	68	200	11	702,204	1,256,282	1,958,486
33	13	3463	Nonferrous Forgings	17	38	0	71,130	44,077	115,207
29	15	3465	Automotive Stampings	35	105	12	273,918	15,616	289,534
39	40	3466	Crowns & Closures	2	3	0	28,867	0	28,867
3	8	3469	Metal Stampings, nec*	144	303	27	2,451,432	8,254,646	10,706,078
4	2	3471	Plating & Polishing	551	1,241	29	4,102,006	2,739,869	6,841,875
2	3	3479	Metal Coating & Allied Services	301	883	33	8,459,218	3,094,957	11,554,175
28	18	3482	Small Arms Ammunition	14	50	2	106,877	222,280	329,157
36	37	3483	Ammunition, Exc. For Small Arms, nec*	4	5	0	69,364	0	69,364
34	34	3484	Small Arms	8	24	0	46,709	39,569	86,278
30	35	3489	Ordnance & Accessories, nec*	6	12	0	196,083	66	196,149
22	25	3491	Industrial Valves	30	59	7	397,685	19,568	417,253
38	28	3492	Fluid Power Valves & Hose Fittings	14	34	0	42,041	5,805	47,846
35	38	3493	Steel Springs, Except Wire	6	10	0	77,504	4,968	82,472
25	7	3494	Valves & Pipe Fittings, nec*	74	196	12	275,759	63,222	338,981
40	39	3495	Wire Springs	6	12	1	12,602	12,372	24,974
14	16	3496	Misc. Fabricated Wire Products	79	213	27	888,558	699,516	1,588,074
19	14	3497	Metal Foil & Leaf	16	47	0	432,014	40,523	472,537
17	23	3498	Fabricated Pipe & Fittings	36	81	4	743,525	95,250	838,775
6	9	3499	Fabricated Metal Products, nec*	289	623	34	5,467,702	323,144	5,790,846
3	3		Multiple within SIC Code 34	249	688	62	4,624,980	1,287,991	5,912,971
20	20		Invalid SIC Code within SIC Code 34	31	102	0	1,589,812	50,435	1,640,247
			Total for SIC Code 34	2,883	7,416	521	70,320,466	19,933,901	90,254,367

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amounts were as follows: 30 pounds of total releases, 3,209,773 pounds of other on-site waste management, 207,776 pounds of transfers off-site for further waste management and 3,417,119 pounds of total production-related waste.

*nec: not elsewhere classified.

Table 12-1. Summary of TRI Information by 4-digit SIC Code, 1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3411	Metal Cans	35,667,283	10,824,509	71,182,816	2,131
3412	Metal Barrels, Drums, & Pails	1,663,926	1,335,250	5,275,763	0
3421	Cutlery	46,494,092	457,713	47,731,906	0
3423	Hand & Edge Tools, nec*	896,310	678,473	1,982,201	0
3425	Saw Blades & Handsaws	0	298,513	378,514	0
3429	Hardware, nec*	7,414,322	9,789,085	19,565,567	1,936
3431	Metal Sanitary Ware	1,019,805	411,364	1,611,185	0
3432	Plumbing Fixture Fittings & Trim	8,938,665	41,492,381	50,408,702	0
3433	Heating Equipment, Except Electric	2,464	686,653	1,024,058	0
3441	Fabricated Structural Metal	96,333	7,516,467	6,021,248	33,230
3442	Metal Doors, Sash, & Trim	64,438	458,215	3,011,206	0
3443	Fabricated Plate Work (Boiler Shops)	1,415,576	4,797,964	8,249,623	110
3444	Sheet Metal Work	894,945	1,064,348	4,081,744	0
3446	Architectural Metal Work	180,396	422,383	830,928	0
3448	Prefabricated Metal Buildings	6,495,718	161,992	7,924,646	500
3449	Miscellaneous Metal Work	291,332	233,314	969,868	0
3451	Screw Machine Products	454,674	17,833,718	18,885,627	200
3452	Bolts, Nuts, Rivets, & Washers	2,986,542	1,187,571	4,660,551	0
3462	Iron & Steel Forgings	1,925,299	16,169,388	19,350,370	0
3463	Nonferrous Forgings	12,878,364	2,019,402	15,149,775	0
3465	Automotive Stampings	394,704	10,936,788	11,635,959	0
3466	Crowns & Closures	0	2,388	31,117	0
3469	Metal Stampings, nec*	1,680,923	31,797,117	36,001,327	27,165
3471	Plating & Polishing	55,575,656	25,686,313	90,428,587	2,341
3479	Metal Coating & Allied Services	34,651,671	30,134,062	74,812,903	21,190
3482	Small Arms Ammunition	573,145	7,168,594	7,939,935	61,973
3483	Ammunition, Exc. For Small Arms, nec*	0	239,855	311,988	0
3484	Small Arms	34,897	460,186	582,721	0
3489	Ordnance & Accessories, nec*	67,500	183,656	446,427	1,128
3491	Industrial Valves	57,980	3,866,723	4,341,729	0
3492	Fluid Power Valves & Hose Fittings	8,500	2,620,998	2,674,981	0
3493	Steel Springs, Except Wire	0	39,687	123,555	0
3494	Valves & Pipe Fittings, nec*	14,269,079	23,606,655	38,596,711	0
3495	Wire Springs	25,000	39,649	91,871	0
3496	Misc. Fabricated Wire Products	1,487,363	5,021,257	8,779,077	760
3497	Metal Foil & Leaf	5,978,807	8,241,623	14,467,295	820
3498	Fabricated Pipe & Fittings	202,025	3,634,947	5,219,743	0
3499	Fabricated Metal Products, nec*	4,323,607	12,621,331	25,561,096	1,576
	Multiple within SIC Code 34	31,598,570	50,045,354	100,052,011	4,658
	Invalid SIC Code within SIC Code 34	2,025,199	2,356,109	5,844,321	0
	Total for SIC Code 34	282,735,110	336,541,995	716,239,652	159,718

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amounts were as follows: 30 pounds of total releases, 3,209,773 pounds of other on-site waste management, 207,776 pounds of transfers off-site for further waste management and 3,417,119 pounds of total production-related waste.

***nec:** not elsewhere classified.

Table 12-2. Multiple SIC Codes, 1996: Fabricated Metals, SIC Code 34

SIC Codes					Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3411	3412	3479	3499		9	0	128,407	250	128,657	223,817	162,656	522,425	0
3411	3469				1	0	52,514	0	52,514	0	0	52,514	0
3411	3479				12	0	227,715	0	227,715	828,141	157,277	1,212,831	0
3412	3479				3	0	56,457	0	56,457	41,310	0	97,767	0
3412	3494				4	0	1,010	500	1,510	26,300	84,348	110,560	0
3423	3462	3471			1	0	18,246	0	18,246	0	2,390	20,636	0
3423	3471				7	0	2,728	7,979	10,707	0	49,253	59,937	0
3425	3432				3	0	16,870	108,543	125,413	0	161,454	294,014	0
3429	3441	3452	3462	3495	2	0	1,155	380	1,535	37,000	370,081	407,771	0
3429	3442	3471			8	1	19,755	31	19,786	882	928,879	945,251	0
3429	3451	3469	3471		5	5	0	0	0	0	0	0	0
3429	3469	3471			6	4	520	0	520	11,242,729	1,918,169	12,351,228	0
3429	3469	3499			1	0	2,597	0	2,597	16,772	250	19,662	0
3429	3471				22	0	193,763	5,956	199,719	309,527	1,308,726	1,834,204	0
3429	3471	3492			4	1	0	0	0	0	127,115	126,860	0
3429	3471	3497			10	0	227,406	0	227,406	733,540	99,447	1,109,631	0
3429	3499				7	0	236,795	0	236,795	28,422	10,627	295,228	0
3431	3469				4	0	356	893	1,249	45,773	10	51,360	0
3431	3469	3499			6	0	0	0	0	0	0	0	0
3432	3451	3471			4	0	11	11	22	12,375	549	7,292,887	0
3432	3471				6	0	57	27,614	27,671	0	921,000	2,298,094	0
3432	3494				4	0	41,243	0	41,243	0	689,405	4,911,130	0
3441	3442				4	0	755	6,620	7,375	0	134,122	146,531	0
3441	3442	3444	3446	3469	4	1	2,325	832	3,157	0	23,497	26,993	0
3441	3443				31	20	218,536	1,250	219,786	0	5,314	11,134	0
3441	3443	3444	3498		2	0	500	0	500	0	21,000	21,170	0
3441	3443	3449			1	0	11,088	0	11,088	0	0	11,088	0
3441	3444				1	1	0	0	0	0	0	0	0
3441	3446	3479			4	0	122,366	250	122,616	39,182	8,769	171,362	0
3441	3449				1	1	0	0	0	0	0	0	0
3441	3479				10	0	1,255	9,100	10,355	500	310,856	319,621	0
3441	3496				2	0	500	0	500	0	41,676	41,697	0
3441	3499				4	0	64,770	0	64,770	0	490	65,220	0
3442	3444	3446	3479	3499	8	0	158,969	0	158,969	140,969	87,322	473,628	0
3442	3446				1	0	0	1	1	0	25,200	25,001	0
3442	3446	3469	3471		3	0	36	86,884	86,920	0	119,553	207,394	3,600
3442	3446	3471			1	0	0	0	0	0	0	0	0
3442	3452				1	1	0	0	0	0	0	0	0
3442	3471	3499			3	0	20	0	20	30,142	62	60,352	0
3442	3490				7	0	184,373	0	184,373	0	0	157,589	0
3443	3471	3498			4	0	30	0	30	17,280	20,363	37,855	0
3443	3479				1	0	8,850	0	8,850	21,000	8,850	38,200	0
3443	3498				8	0	6,249	8,460	14,709	59,000	353,265	426,797	0
3443	3499				1	0	19,742	0	19,742	0	0	19,742	0
3444	3449				5	0	30,029	0	30,029	15,340	33,313	46,078	0
3444	3469	3499			5	0	56,691	42,243	98,934	1,665	7,719	64,206	0
3444	3471	3499			1	0	0	0	0	1,300	2,110	3,410	0
3444	3479				9	0	127,413	0	127,413	114,706	374,894	617,014	0
3444	3498				1	0	467	0	467	5,250,000	420,000	5,670,467	0
3444	3499				4	0	55,150	0	55,150	0	61,500	61,880	0
3446	3449				8	2	41,065	2,530	43,595	11,450	3,510	56,820	0
3446	3471				5	0	106,505	0	106,505	48,000	35,600	83,616	0
3449	3469				5	0	10,505	1,246	11,751	0	779,611	791,164	0
3449	3469	3479	3499		1	1	0	0	0	0	0	0	0
3449	3479				2	0	82,724	0	82,724	12,750	0	95,474	0
3449	3492	3494			2	0	0	30	30	0	537,274	537,302	0
3451	3452				2	0	0	0	0	0	18,800	18,800	0
3451	3452	3499			1	0	3,700	0	3,700	0	0	3,700	0
3451	3463				4	0	0	1,750	1,750	237,300	505	253,033	0
3451	3465	3482			1	0	12	0	12	24,488	0	24,500	0
3451	3469				1	0	14,900	0	14,900	0	1,363	16,263	0
3451	3471				7	1	1,108	4,012	5,120	0	616,341	621,194	0
3451	3471	3491	3499		2	0	8,049	0	8,049	28,292	6,305	42,641	0
3451	3471	3492			4	0	0	1,500	1,500	0	523,005	523,632	0
3451	3491				2	0	20,000	0	20,000	0	0	20,000	0

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 12-2. Multiple SIC Codes, 1996: Fabricated Metals, SIC Code 34, Continued

SIC Codes	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3451 3492	2	0	0	0	0	0	5,315,012	5,354,043	0
3451 3492 3494	4	0	0	750	750	0	17,033,398	17,857,600	0
3451 3498	5	0	0	0	0	0	553	195,774	0
3451 3499	3	0	8,712	0	8,712	0	472,359	481,068	0
3452 3458	3	0	15	0	15	0	5,413	5,416	0
3452 3465 3479 3489	3	0	2,658	0	2,658	134,784	236,372	373,814	0
3452 3469	1	0	0	0	0	0	228,414	228,414	0
3452 3471	10	0	76,339	4,350	80,689	65,814	41,364	187,226	0
3452 3471 3479	8	2	148,682	47,098	195,780	621,373	67,743	906,538	0
3452 3479	1	0	144,000	0	144,000	0	2,900	146,900	0
3452 3496	3	3	0	0	0	0	0	0	0
3462 3463	25	2	22,717	7,440	30,157	6	1,509,550	1,714,418	0
3462 3463 3465 3482 3489	7	0	327,594	13,100	340,694	832,000	253,300	1,396,790	0
3462 3471	5	0	0	12,303	12,303	737	51,672	64,712	0
3462 3479	3	0	2,055	0	2,055	0	2,055	2,061	0
3462 3494	4	0	0	0	0	0	124,100	124,100	0
3463 3483	1	0	0	0	0	115,575	29,700	145,275	0
3463 3491 3492	3	0	12	250	262	5,261,000	454,255	5,732,135	0
3465 3469	15	0	67,783	383	68,166	54,820	1,338,800	1,472,337	130
3465 3471 3499	1	0	255	0	255	46,665	0	46,910	0
3465 3479	5	0	34,010	16,944	50,954	6,600	12,743	69,252	0
3468 3479	4	0	58,794	0	58,794	0	28,766	87,562	0
3469 3471	13	0	81,133	12,210	93,343	947,693	171,825	1,206,113	0
3469 3471 3479	2	0	17,650	0	17,650	0	433	17,833	0
3469 3471 3495	4	0	50,271	0	50,271	28,000	82,947	161,363	0
3469 3471 3499	1	0	11,627	0	11,627	9,852	53,460	73,800	0
3469 3479	7	0	71,075	4,798	75,873	278,642	25,847	379,929	0
3469 3479 3499	12	2	9,130	0	9,130	0	545,915	554,887	0
3469 3493	1	0	0	0	0	15,000	0	15,000	0
3469 3493 3495	1	0	16,730	0	16,730	0	12,000	29,000	0
3469 3493 3495 3496	1	0	500	1,841	2,341	0	10,623	12,664	0
3469 3495	3	0	17,969	6,880	24,849	0	66,883	91,479	0
3469 3496	1	0	42,700	0	42,700	20,377	7,250	32,369	0
3469 3499	6	0	36,091	0	36,091	0	5,610,717	5,641,911	0
3471 3479	96	1	339,403	605,492	944,895	2,705,799	2,036,590	5,225,551	205
3471 3479 3493 3495	2	0	935	53	988	22,000	44,000	66,993	0
3471 3479 3498	3	0	22,646	0	22,646	5,998	420	28,564	0
3471 3479 3499	10	0	31,027	2,112	33,139	121,170	112,853	267,332	0
3471 3484 3499	1	1	0	0	0	0	0	0	0
3471 3490	2	0	255	0	255	78	20	156	0
3471 3491 3494	3	0	5	252	257	0	219,005	219,500	0
3471 3496	6	0	0	1,462	1,462	9,400	4,036	13,892	0
3471 3496 3499	4	0	11,155	13,705	24,860	21,000	500	45,648	0
3471 3497	3	0	255	0	255	18,188	3,683	21,933	0
3471 3499	14	2	62,113	4,229	66,342	89,395	372,317	572,672	0
3474 3479	15	0	39,839	2,593	42,432	371,522	106,325	520,053	723
3479 3494 3498	2	0	1	72	73	0	27,115	27,272	0
3479 3496 3499	2	0	2,996	0	2,996	36,220	6,370	46,178	0
3479 3498	2	0	986	168,700	169,686	0	811,034	980,720	0
3479 3499	14	3	47,982	1,728	49,710	78,910	9,743	141,919	0
3482 3483	3	0	56,900	0	56,900	0	40,800	97,700	0
3482 3489	4	4	0	0	0	0	0	0	0
3489 3499	1	1	0	0	0	0	0	0	0
3490 3499	7	0	91,170	1,014	92,184	80,000	125,596	297,335	0
3491 3494	14	0	20	2,682	2,702	0	592,655	595,596	0
3493 3495	3	0	26,810	500	27,310	0	82,600	109,420	0
3493 3495 3496	2	0	30,604	0	30,604	0	7,007	37,611	0
3494 3479	1	0	37	11,138	11,175	0	72,491	75,663	0
3496 3499	3	2	25,052	25,047	50,099	0	0	25,052	0
Total for SIC Code 34	688	62	4,624,980	1,287,991	5,912,971	31,598,570	50,045,354	100,052,011	4,658

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

combination of screw machine products (SIC code 3451), fluid power valves and hose fittings (SIC code 3492), and miscellaneous valves and pipe fittings (SIC code 3494) reported the largest total production-related waste (17.9 million pounds).

On- and Off-site Releases

Air emissions of 69.2 million pounds accounted for three-fourths (76.7%) of the fabricated metal sector's reporting of total on- and off-site releases in 1996. Most of the remainder (22.1%) was reported as off-site releases (transfers to disposal), which totaled 19.9 million pounds. Other types of releases amounted to less than 1% each of the sector's total on- and off-site releases.

Table 12-3 presents the sector's reporting of on- and off-site releases in 1996, and Figure 12-1 illustrates their distribution by type of release.

The metal cans industry (SIC code 3411) reported 24.7 million pounds of air emissions (35.7% of the sector's total), including 11.6 million pounds of

Table 12-3. TRI On-site and Off-site Releases, 1996: Fabricated Metals, SIC Code 34 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3411	Metal Cans	24,734,781	5	0	7	0	19	24,734,812	59,341	24,794,153
3479	Metal Coating & Allied Services	8,362,159	31,510	0	0	250	65,299	8,459,218	3,094,957	11,554,175
3469	Metal Stampings, nec*	2,449,391	1,344	0	0	0	697	2,451,432	8,254,646	10,706,078
3471	Plating & Polishing	3,663,224	254,456	0	0	147,914	36,412	4,102,006	2,739,869	6,841,875
	Multiple within SIC Code 34	4,453,568	22,701	0	0	10,959	137,752	4,624,980	1,287,991	5,912,971
3499	Fabricated Metal Products, nec*	5,448,732	2,411	0	0	8,891	7,668	5,467,702	323,144	5,790,846
3442	Metal Doors, Sash, & Trim	2,282,988	0	0	0	0	772	2,283,760	1,380	2,285,140
3412	Metal Barrels, Drums, & Pails	2,268,519	0	0	0	0	6,252	2,274,771	0	2,274,771
3462	Iron & Steel Forgings	672,111	3,038	0	0	0	27,055	702,204	1,256,282	1,958,486
3429	Hardware, nec*	1,239,849	2,509	563	0	0	0	1,242,921	632,806	1,875,727
3441	Fabricated Structural Metal	1,587,099	2,299	0	0	7,500	85,826	1,682,724	141,818	1,824,542
	Invalid SIC Code within SIC Code 34	1,589,643	169	0	0	0	0	1,589,812	50,435	1,640,247
3444	Sheet Metal Work	1,573,852	4	0	0	0	3,727	1,577,583	52,417	1,630,000
3496	Misc. Fabricated Wire Products	884,031	4,093	0	0	0	434	888,558	699,516	1,588,074
3443	Fabricated Plate Work (Boiler Shops)	1,404,833	2,706	0	0	5	16,782	1,424,326	92,391	1,516,717
3448	Prefabricated Metal Buildings	1,040,811	5	0	0	0	14,600	1,055,416	101,243	1,156,659
3498	Fabricated Pipe & Fittings	641,696	4,045	0	0	0	97,784	743,525	95,250	838,775
3421	Cutlery	720,701	5	0	0	0	250	720,956	83,229	804,185
3497	Metal Foil & Leaf	365,164	550	0	0	0	66,300	432,014	40,523	472,537
3452	Bolts, Nuts, Rivets, & Washers	373,150	83	0	0	0	0	373,233	81,970	455,203
3451	Screw Machine Products	423,035	770	0	0	10	500	424,315	5,259	429,574
3491	Industrial Valves	397,154	271	0	0	5	255	397,685	19,568	417,253
3423	Hand & Edge Tools, nec*	366,887	280	0	0	0	20	367,187	43,042	410,229
3449	Miscellaneous Metal Work	404,639	0	0	0	0	0	404,639	270	404,909
3494	Valves & Pipe Fittings, nec*	246,715	657	0	0	27,622	765	275,759	63,222	338,981
3446	Architectural Metal Work	228,778	86	0	0	0	0	228,864	108,861	337,725
3433	Heating Equipment, Except Electric	328,585	11	0	0	5	0	328,601	2,009	330,610
3482	Small Arms Ammunition	91,513	15,364	0	0	0	0	106,877	222,280	329,157
3465	Automotive Stampings	272,544	84	0	0	420	870	273,918	15,616	289,534
3489	Ordnance & Accessories, nec*	196,076	7	0	0	0	0	196,083	66	196,149
3431	Metal Sanitary Ware	55,895	10	0	0	0	2,555	58,460	127,650	186,110
3432	Plumbing Fixture Fittings & Trim	68,509	1,592	0	0	750	0	70,851	69,729	140,580
3463	Nonferrous Forgings	71,109	6	0	0	0	15	71,130	44,077	115,207
3484	Small Arms	46,704	5	0	0	0	0	46,709	39,569	86,278
3493	Steel Springs, Except Wire	77,500	4	0	0	0	0	77,504	4,968	82,472
3483	Ammunition, Exc. For Small Arms, nec*	69,364	0	0	0	0	0	69,364	0	69,364
3425	Saw Blades & Handsaws	7,057	0	0	0	0	0	7,057	60,330	67,387
3492	Fluid Power Valves & Hose Fittings	42,041	0	0	0	0	0	42,041	5,805	47,846
3466	Crowns & Closures	28,867	0	0	0	0	0	28,867	0	28,867
3495	Wire Springs	12,602	0	0	0	0	0	12,602	12,372	24,974
	Total for SIC Code 34	69,191,876	351,080	563	7	204,331	572,609	70,320,466	19,933,901	90,254,367

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
*nec: not elsewhere classified.

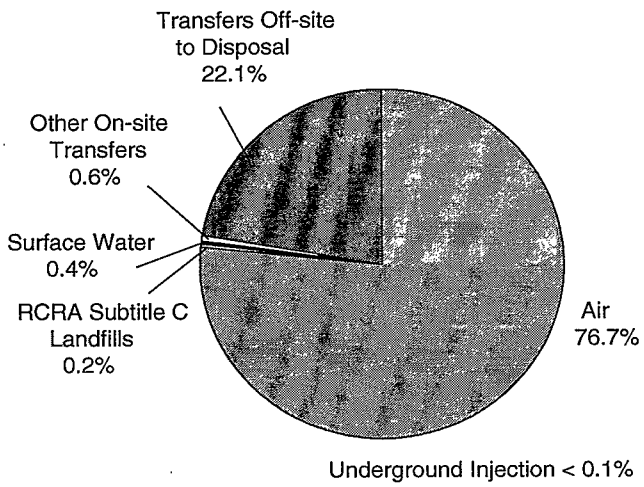


Figure 12-1. Distribution of TRI On-site and Off-site Releases, 1996: Fabricated Metals (SIC Code 34)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

glycol ethers. The miscellaneous metal stampings industry (SIC code 3469) reported 8.3 million pounds of off-site releases (transfers to disposal). This amount was 41.4% of the sector's total off-site releases. One facility in SIC code 3469 reported off-site releases of 8.0 million pounds of aluminum oxide. The metal coating industry (SIC code 3479) ranked second for both air emissions (8.4 million pounds, or 12.1%) and off-site releases (3.1 million pounds of transfers to disposal, or 15.5%). Miscellaneous fabricated metal products (SIC code 3499) ranked third for air emissions with 5.4 million pounds (7.9%), and the plating and polishing industry (SIC code 3471) ranked third for off-site releases with 2.7 million pounds (13.7%).

Figure 12-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

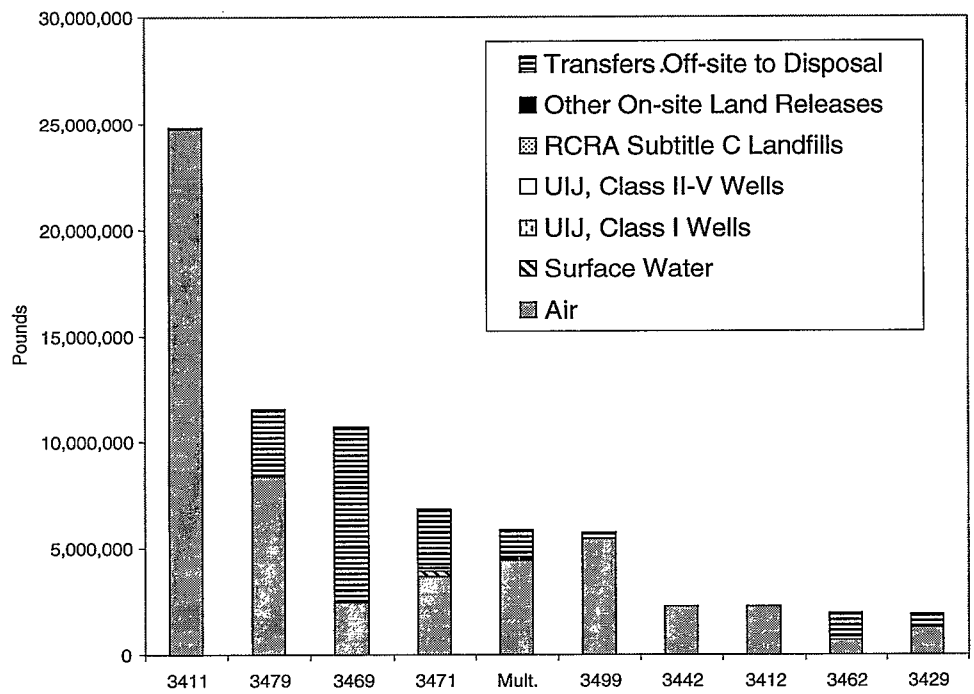


Figure 12-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Fabricated Metals (SIC Code 34)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.

Other On-site Waste Management

As shown in Table 12-4, the fabricated metals sector reported 148.0 million pounds of on-site recycling in 1996, half (52.4%) of the sector's other on-site waste management. The sector also reported 113.7 million pounds of on-site treatment (40.2% of the total other on-site waste management). On-site energy recovery totaled 21.0 million pounds (7.4%). Figure 12-3 illustrates the percentage distribution of on-site waste management methods, as reported by the fabricated metals sector.

Table 12-4. TRI Other On-site Waste Management, 1996: Fabricated Metals, SIC Code 34 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3471	Plating & Polishing	20,459,311	13,266	35,103,079	55,575,656
3421	Cutlery	46,457,548	0	36,544	46,494,092
3411	Metal Cans	258,637	6,163,803	29,244,843	35,667,283
3479	Metal Coating & Allied Services	1,245,002	9,999,980	23,406,689	34,651,671
	Multiple within SIC Code 34	23,291,102	522,460	7,785,008	31,598,570
3494	Valves & Pipe Fittings, nec*	14,223,712	0	45,367	14,269,079
3463	Nonferrous Forgings	12,789,900	0	88,464	12,878,364
3432	Plumbing Fixture Fittings & Trim	8,769,918	0	168,747	8,938,665
3429	Hardware, nec*	6,289,366	29,981	1,094,975	7,414,322
3448	Prefabricated Metal Buildings	6,208,600	0	287,118	6,495,718
3497	Metal Foil & Leaf	539,848	0	5,438,959	5,978,807
3499	Fabricated Metal Products, nec*	2,211,011	0	2,112,596	4,323,607
3452	Bolts, Nuts, Rivets, & Washers	28,450	2,100,000	858,092	2,986,542
	Invalid SIC Code within SIC Code 34	586,283	468,800	970,116	2,025,199
3462	Iron & Steel Forgings	1,808,995	0	116,304	1,925,299
3469	Metal Stampings, nec*	993,999	2,091	684,833	1,680,923
3412	Metal Barrels, Drums, & Pails	87,895	1,247,496	328,535	1,663,926
3496	Misc. Fabricated Wire Products	283,909	0	1,203,454	1,487,363
3443	Fabricated Plate Work (Boiler Shops)	5,105	0	1,410,471	1,415,576
3431	Metal Sanitary Ware	942,805	0	77,000	1,019,805
3423	Hand & Edge Tools, nec*	403	0	895,907	896,310
3444	Sheet Metal Work	68,155	335,100	491,690	894,945
3482	Small Arms Ammunition	500	0	572,645	573,145
3451	Screw Machine Products	135,700	94,003	224,971	454,674
3465	Automotive Stampings	16,848	0	377,856	394,704
3449	Miscellaneous Metal Work	168,070	0	123,262	291,332
3498	Fabricated Pipe & Fittings	8,000	0	194,025	202,025
3446	Architectural Metal Work	14,168	0	166,228	180,396
3441	Fabricated Structural Metal	64,522	0	31,811	96,333
3489	Ordnance & Accessories, nec*	1,000	0	66,500	67,500
3442	Metal Doors, Sash, & Trim	36,070	0	28,368	64,438
3491	Industrial Valves	7,980	0	50,000	57,980
3484	Small Arms	0	0	34,897	34,897
3495	Wire Springs	25,000	0	0	25,000
3492	Fluid Power Valves & Hose Fittings	600	0	7,900	8,500
3433	Heating Equipment, Except Electric	2,464	0	0	2,464
3425	Saw Blades & Handsaws	0	0	0	0
3466	Crowns & Closures	0	0	0	0
3483	Ammunition, Exc. For Small Arms, nec*	0	0	0	0
3493	Steel Springs, Except Wire	0	0	0	0
	Total for SIC Code 34	148,030,876	20,976,980	113,727,254	282,735,110

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amount was 3,209,773 pounds of other on-site waste management. The rank for other on-site waste management for SIC code 3499 changes from 12 to 9.
*nec: not elsewhere classified.

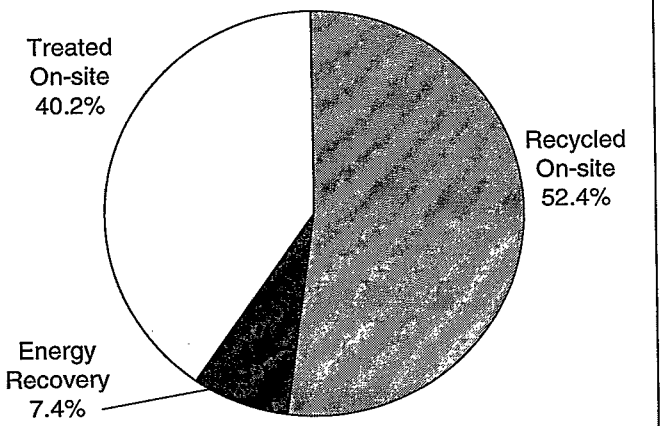


Figure 12-3. Distribution of TRI Other On-site Waste Management, 1996: Fabricated Metals (SIC Code 34)

Note: Data from Section 8 of Form R.

The cutlery industry (SIC code 3421) ranked first in this sector for on-site recycling, with 46.5 million pounds (31.4% of the sector's total). Almost all of this amount was recycling of trichloroethylene (46.5 million pounds), including 40.5 million pounds reported by one facility. Ranking second for on-site recycling, the multiple-codes group in SIC code 34 reported 23.3 million pounds (15.7%). The plating and polishing industry (SIC code 3471) ranked third with 20.5 million pounds (13.8%).

The plating and polishing industry (SIC code 3471) accounted for 30.9% of the sector's on-site treatment, reporting 35.1 million pounds. This included on-site treatment of 15.8 million pounds of nitric acid. The metal cans industry (SIC code 3411) ranked second with 29.2 million pounds (25.7%) of on-site treatment, and the metal coating industry (SIC code 3479) ranked third with 23.4 million pounds (20.6%).

The metal coating industry (SIC code 3479) reported the sector's largest on-site energy recovery: 10.0 million pounds, or 47.7% of the total. The metal cans industry (SIC code 3411) ranked second with 6.2 million pounds (29.4%), and the bolts, nuts, rivets, and washers industry (SIC code 3452) ranked third with 2.1 million pounds (10.0%).

Figure 12-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

In 1996, the fabricated metals sector reported more than 90% of its transfers off-site for further waste management as transfers off-site to recycling. The sector reported 303.4 million pounds of transfers to recycling. Other types of transfers represented less than 5% each of the sector's total transfers off-site for further waste management. These were 13.7 million pounds of transfers to energy recovery, 12.7 million pounds of transfers to treatment, and 6.6 million pounds of transfers to POTWs. The sector's reported amounts of transfers off-site for further waste management in 1996 appears in Table 12-5. Figure 12-5 illustrates the percentage distribution of these transfers by type.

Multiple-codes forms in SIC code 34 ranked first in the fabricated metals sector for reporting of transfers to recycling, with 47.2 million pounds, which was 15.6% of the sector's total. This amount included 26.4 million pounds of copper. One multiple-codes facility (reporting SIC codes 3451, 3492, and 3494) reported transferring 12.7 million pounds of copper off-site to recycling. Ranking second, the plumbing fixture fittings and trim industry (SIC code 3432) reported 41.3 million pounds (13.6%). This industry reported transfers to recycling of 17.8 million pounds of copper and 14.7 million pounds of copper compounds. One facility in SIC code 3432 reported transfers of 9.8 million pounds of copper to recycling. Another facility in this industry reported transfers of 12.3 million pounds of copper compounds to recycling. The

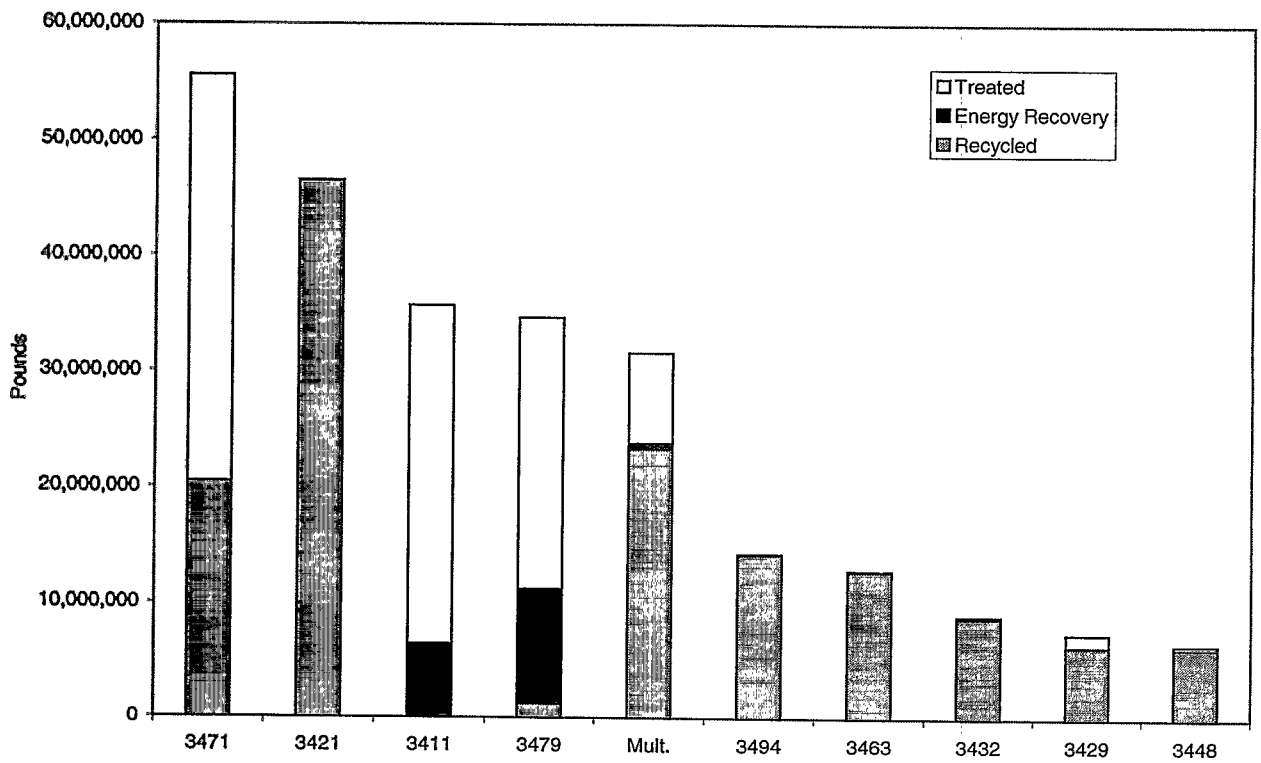


Figure 12-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Fabricated Metals (SIC Code 34)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amount was 3,209,773 pounds of other on-site waste management. The rank for other on-site waste management for SIC code 3499 changes from 12 to 9.

miscellaneous metal stampings industry (SIC code 3469) ranked third for transfers to recycling, reporting 30.7 million pounds (10.1%).

Two industries reported approximately one-third each of the sector's transfers to energy recovery. The metal cans industry (SIC code 3411) reported 4.5 million pounds (32.5%), and the metal coating industry (SIC code 3479) reported 4.3 million pounds (31.3%). The third-ranked industry for transfers to energy recovery was metal barrels, drums, and pails (SIC code 3412), with 979,000 pounds (7.1%).

The plating and polishing industry (SIC code 3471) reported 4.6 million pounds of transfers to treatment, 36.3% of the sector's 1996 total in this category. The metal coating industry (SIC code 3479) ranked second with 2.1 million pounds (16.8%), and the multiple-codes group ranked third with 1.5 million pounds (11.5%). The same three industry groups reported the sector's largest transfers to POTWs: plating and polishing with 2.1 million pounds (31.5%), metal coating with 1.7 million pounds (25.5%), and multiple-codes forms with 736,000 pounds (11.2%).

Figure 12-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

Table 12-5. TRI Transfers Off-site for Further Waste Management, 1996: Fabricated Metals, SIC Code 34 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
	Multiple within SIC Code 34	47,221,144	615,413	1,453,163	735,732	19,902	50,045,354
3432	Plumbing Fixture Fittings & Trim	41,274,389	5,949	204,871	7,167	5	41,492,381
3469	Metal Stampings, nec*	30,748,969	352,175	194,262	496,259	5,452	31,797,117
3479	Metal Coating & Allied Services	22,021,698	4,303,215	2,128,630	1,680,519	0	30,134,062
3471	Plating & Polishing	18,587,147	418,791	4,600,560	2,079,565	250	25,686,313
3494	Valves & Pipe Fittings, nec*	23,507,538	8,683	69,197	21,237	0	23,606,655
3451	Screw Machine Products	17,710,495	17,194	64,610	41,419	0	17,833,718
3462	Iron & Steel Forgings	15,964,855	32,785	158,173	13,575	0	16,169,388
3499	Fabricated Metal Products, nec*	11,315,170	257,452	739,282	309,427	0	12,621,331
3465	Automotive Stampings	10,743,633	62,147	49,906	81,102	0	10,936,788
3411	Metal Cans	6,045,016	4,455,356	308,355	1,982	13,800	10,824,509
3429	Hardware, nec*	9,533,569	7,370	122,281	125,865	0	9,789,085
3497	Metal Foil & Leaf	6,902,837	855,826	461,935	3,625	17,400	8,241,623
3441	Fabricated Structural Metal	7,105,567	282,509	99,094	29,297	0	7,516,467
3482	Small Arms Ammunition	7,068,030	10,176	82,660	7,728	0	7,168,594
3496	Misc. Fabricated Wire Products	4,433,511	17,829	554,471	15,446	0	5,021,257
3443	Fabricated Plate Work (Boiler Shops)	4,525,659	43,886	159,186	37,751	31,482	4,797,964
3491	Industrial Valves	3,854,842	1,001	2,525	8,355	0	3,866,723
3498	Fabricated Pipe & Fittings	3,562,584	255	71,544	564	0	3,634,947
3492	Fluid Power Valves & Hose Fittings	2,588,247	6,702	1,143	24,906	0	2,620,998
	Invalid SIC Code within SIC Code 34	1,727,460	327,042	301,250	357	0	2,356,109
3463	Nonferrous Forgings	1,628,596	459	331,012	59,335	0	2,019,402
3412	Metal Barrels, Drums, & Pails	181,164	979,127	19,549	155,410	0	1,335,250
3452	Bolts, Nuts, Rivets, & Washers	740,302	19,047	32,087	396,135	0	1,187,571
3444	Sheet Metal Work	791,565	76,158	97,337	99,283	5	1,064,348
3433	Heating Equipment, Except Electric	524,113	147,482	14,284	774	0	686,653
3423	Hand & Edge Tools, nec*	590,467	3,220	67,074	17,712	0	678,473
3484	Small Arms	408,092	12,279	39,496	319	0	460,186
3442	Metal Doors, Sash, & Trim	116,223	271,698	50,674	19,620	0	458,215
3421	Cutlery	424,802	0	10,845	22,066	0	457,713
3446	Architectural Metal Work	384,716	2,177	35,475	15	0	422,383
3431	Metal Sanitary Ware	358,251	0	53,091	22	0	411,364
3425	Saw Blades & Handsaws	119,133	0	75,286	104,094	0	298,513
3483	Ammunition, Exc. For Small Arms, nec*	237,555	1,095	1,205	0	0	239,855
3449	Miscellaneous Metal Work	221,576	7,832	3,900	6	0	233,314
3489	Ordnance & Accessories, nec*	80,100	97,853	5,630	73	0	183,656
3448	Prefabricated Metal Buildings	126,109	21,152	13,726	755	250	161,992
3493	Steel Springs, Except Wire	39,687	0	0	0	0	39,687
3495	Wire Springs	34,287	5,337	0	25	0	39,649
3466	Crowns & Closures	0	2,388	0	0	0	2,388
	Total for SIC Code 34	303,449,098	13,729,060	12,677,769	6,597,522	88,546	336,541,995

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

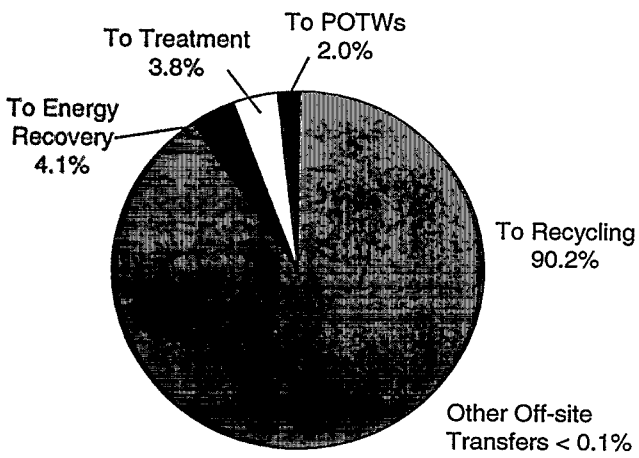


Figure 12-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Fabricated Metals (SIC Code 34)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site transfers are transfers reported without a valid waste management code.

1996 TRI Data by State for Fabricated Metals

Table 12-6 presents 1996 summary TRI data by state for the fabricated metals sector. Facilities in the fabricated metals sector are found throughout the United States. The sector submitted 683 forms in Illinois and 671 forms in Ohio. These numbers represented approximately 9% each of the sector's total of 7,416 forms. The sector submitted 485 forms in Pennsylvania, 465 forms in California, and 447 forms in Michigan, each about 6% of the total.

Illinois ranked first for on-site releases by the fabricated metals sector in 1996. Illinois' on-site releases totaled 6.4 million pounds, or 9.1% of the

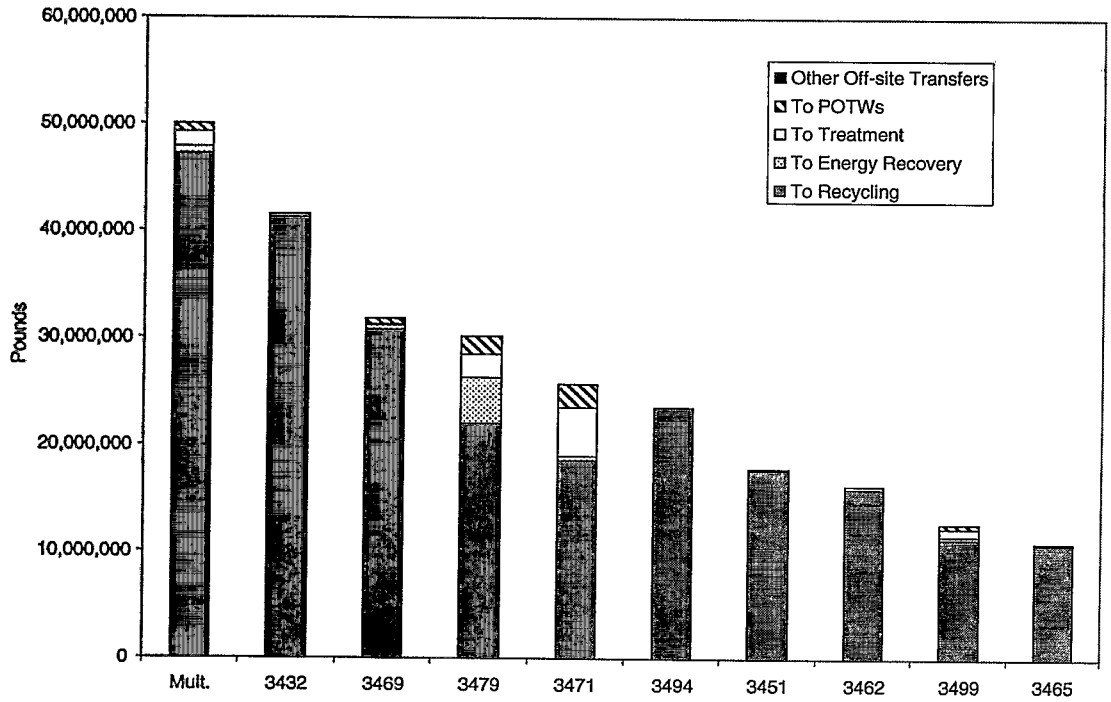


Figure 12-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Fabricated Metals (SIC Code 34)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.

sector's total. Ohio reported the second-largest on-site releases, with 5.9 million pounds (8.4%), Indiana ranked third with 4.0 million pounds (5.7%).

Wisconsin reported the sector's largest off-site releases (8.3 million pounds, or 41.6% of the sector's total) and the largest total on- and off-site releases (11.0 million pounds, or 12.2%). Texas ranked second for off-site releases, with 1.6

Table 12-6. Summary of TRI Information by State, 1996: Fabricated Metals, SIC Code 34

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	63	167	7	2,588,559	123,813	2,712,372	7,731,805	6,819,872	17,361,405	0
Arizona	24	45	1	231,787	452	232,239	4,830,451	4,188,378	9,289,793	0
Arkansas	40	131	17	781,135	351,952	1,133,087	2,350,466	4,971,081	8,705,157	0
California	191	465	33	3,060,608	419,582	3,480,190	16,491,688	10,151,580	32,616,108	520
Colorado	20	50	4	1,033,497	558,985	1,592,482	879,317	9,594,205	11,525,219	0
Connecticut	88	221	5	1,154,205	211,254	1,365,459	2,649,897	8,414,798	12,541,376	211
Delaware	1	1	0	0	500	500	3,000	2,500	5,830	0
Florida	53	114	26	1,774,079	7,568	1,781,647	1,520,546	4,813,416	8,045,211	2,126
Georgia	44	118	14	1,472,345	59,449	1,531,794	3,800,952	3,189,672	8,596,585	500
Hawaii	1	5	0	137,142	71	137,213	67,357	41,548	246,119	126
Idaho	5	14	0	1,127	19,017	20,144	449,980	412,860	855,627	27,300
Illinois	261	683	46	6,406,711	1,329,550	7,736,261	27,120,565	17,963,064	54,227,591	28,270
Indiana	147	383	21	3,983,506	648,994	4,632,500	23,996,072	41,797,469	71,928,698	4,985
Iowa	43	109	4	1,231,512	71,794	1,303,306	10,763,146	4,212,001	16,328,222	0
Kansas	32	70	3	1,057,353	118,568	1,175,921	725,535	1,124,718	3,560,908	820
Kentucky	49	132	7	798,804	309,866	1,108,670	961,120	1,994,131	3,780,774	110
Louisiana	24	66	9	655,822	147,230	803,052	467,762	1,552,362	2,838,102	0
Maine	8	25	4	41,247	7,700	48,947	30,573	450,094	528,323	0
Maryland	17	54	12	597,444	64,129	661,573	913,348	1,394,609	2,961,219	0
Massachusetts	81	195	8	761,589	82,999	844,588	3,161,077	3,817,798	7,788,132	382
Michigan	176	447	24	2,102,759	325,550	2,428,309	11,497,321	32,826,108	51,969,052	1
Minnesota	77	157	3	2,337,399	29,941	2,367,340	2,117,078	3,437,166	8,239,230	2
Mississippi	40	127	11	1,783,871	185,861	1,969,732	5,074,299	3,586,912	10,598,761	0
Missouri	64	210	17	2,357,698	384,347	2,742,045	6,681,472	9,370,987	18,534,894	34,673
Montana	1	1	1	0	0	0	0	0	0	0
Nebraska	16	46	0	698,281	104,738	803,019	781,703	730,158	2,190,662	0
Nevada	4	6	0	20,328	21,082	41,410	0	892,017	914,996	0
New Hampshire	13	34	16	90,535	25,333	115,868	482,120	4,383,995	4,987,826	0
New Jersey	68	180	5	1,578,183	59,296	1,637,479	5,904,740	5,058,928	12,363,726	743
New Mexico	2	2	0	11,505	250	11,755	0	250	11,960	0
New York	87	194	15	2,362,424	401,261	2,763,685	6,829,805	10,428,716	20,180,401	54
North Carolina	53	138	14	1,749,408	98,532	1,847,940	14,952,079	19,950,708	35,768,639	15
Ohio	269	671	49	5,938,733	1,466,023	7,404,756	18,505,482	26,109,424	51,974,070	15
Oklahoma	52	143	21	1,046,954	604,941	1,651,895	5,413,470	6,626,296	13,318,396	0
Oregon	24	46	3	252,797	13,488	266,285	858,287	909,273	2,051,941	0
Pennsylvania	169	485	16	3,243,480	744,673	3,988,153	13,989,286	27,217,457	42,470,851	1,943
Puerto Rico	10	32	0	283,818	695	284,513	234,237	709,221	1,229,278	750
Rhode Island	27	66	6	190,820	114,389	305,209	750,914	2,045,683	3,098,995	200
South Carolina	49	122	10	1,133,563	39,444	1,173,007	2,646,794	9,465,880	13,642,394	0
South Dakota	9	10	2	135,355	1,400	136,755	0	26,221	162,776	60
Tennessee	74	197	6	3,066,866	256,427	3,323,293	4,323,792	5,434,659	13,150,343	65
Texas	152	344	23	3,248,523	1,602,456	4,850,979	5,041,862	16,816,606	34,150,793	21,672
Utah	20	65	30	492,577	6,410	498,987	6,216	359,545	1,000,598	0
Vermont	1	2	0	15,692	0	15,692	0	20,543	36,235	0
Virginia	38	94	17	1,817,940	49,814	1,867,754	56,209,254	3,099,912	61,455,119	805
Washington	30	72	1	1,290,287	560,239	1,850,526	404,601	1,501,500	3,535,977	10
West Virginia	19	75	2	2,334,433	13,951	2,348,384	1,974,837	977,890	5,317,171	0
Wisconsin	146	398	8	2,754,773	8,289,637	11,044,410	9,106,804	17,648,289	29,905,019	33,360
Wyoming	1	4	0	212,992	250	213,242	34,000	1,495	249,150	0
Total for SIC Code 34	2,883	7,416	521	70,320,466	19,933,901	90,254,367	282,735,110	336,541,995	716,239,652	159,718

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). One facility in Colorado reported incorrectly in SIC code 39 for 1996. The facility should have reported in SIC code 34. The incorrectly reported amounts were as follows: 30 pounds of total releases, 3,209,773 pounds of other on-site waste management, 207,776 pounds of transfers off-site for further waste management and 3,417,119 pounds of total production-related waste.

million pounds (8.0%). Ohio was third with 1.5 million pounds (7.4%). For total on- and off-site releases, Illinois ranked second with 7.7 million pounds (8.6%), while Ohio ranked third with 7.4 million pounds (8.2%).

Virginia was the state with the largest other on-site waste management reported by the fabricated metals sector, with 56.2 million pounds, or 19.9% of the sector's total other on-site waste management. Ranking second, Illinois forms reported 27.1 million pounds (9.6%). Indiana followed with 24.0 million pounds (8.5%).

The fabricated metals sector reported 41.8 million pounds of transfers off-site for further waste management in Indiana, which was 12.4% of the sector's total. Michigan had 32.8 million pounds (9.8%) and Pennsylvania 27.2 million pounds (8.1%) of transfers off-site for further waste management.

Indiana ranked first for total production-related waste reported by the fabricated metals sector with 71.9 million pounds (10.0%), followed by Virginia with 61.5 million pounds (8.6%) and Illinois with 54.2 million pounds (7.6%).

Map 12-1 illustrates the geographic distribution of total on- and off-site releases in the fabricated metals sector.

1996 TRI Data by Chemical for Fabricated Metals

The top 15 chemicals and chemical categories for total on- and off-site releases reported by the fabricated metals sector in 1996 appear in Table 12-7. Releases of these chemicals totaled 78.7 million pounds, or 87.1% of all releases reported by the sector. Air emissions of 62.8 million pounds of these chemicals accounted for 90.8% of the sector's total air emissions. The sector also reported 15.4 million pounds of off-site releases (transfers to disposal) of these chemicals, which was 77.3% of the sector's total reporting in that category. Air emissions represented 98% or more of the total on- and off-site releases of 11 of the top 15 chemicals. The majority of releases for the remaining four chemicals were reported as off-site releases (transfers to disposal).

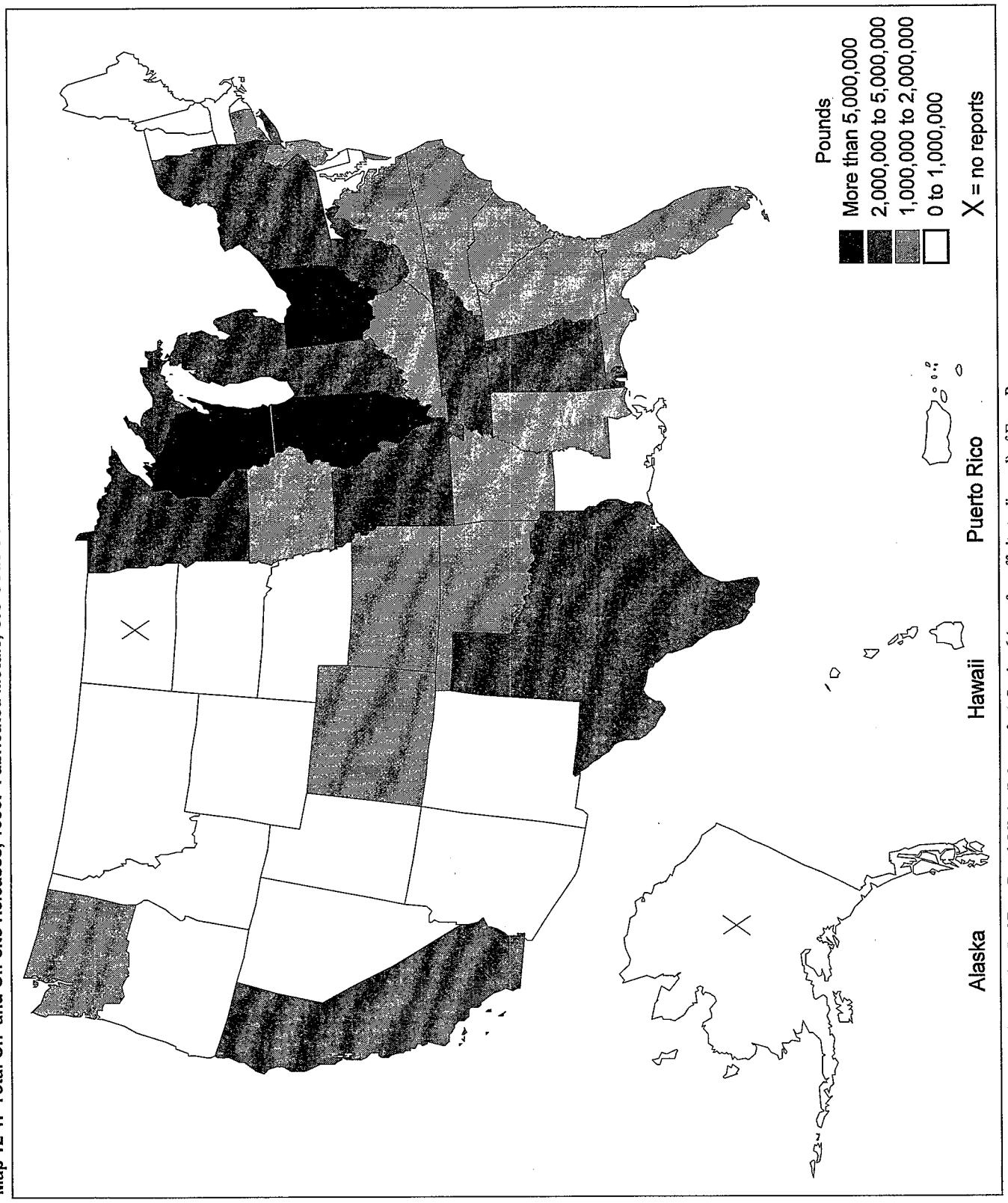
The fabricated metals sector reported 17.2 million pounds of releases of glycol ethers, the top-ranked chemical in this sector for releases, as shown in Table 12-7. Glycol ethers may be used in surface coatings, as a solvent for enamels and spray lacquers, and as a degreaser. As noted earlier, the metal cans industry (SIC code 3411) reported 11.6 million pounds of glycol ethers releases to air. Reported releases of n-butyl alcohol, which ranked second, totaled 9.8 million pounds. The largest use of n-butyl alcohol is in coatings, specifically in nitrocellulose lacquers. Xylenes, also a solvent used in coatings, ranked third with 9.4 million pounds. Air emissions dominated the reported releases for all three chemicals. Aluminum oxide ranked fourth for total releases, with 8.5 million pounds, almost entirely as off-site releases (transfers to disposal). As noted earlier, one facility in the miscellaneous metal stamping industry (SIC code 3469) reported 8.0 million pounds of off-site releases (transfers to disposal) of aluminum oxide.

OSHA Carcinogens

The fabricated metals sector reported 13.4 million pounds of releases of chemicals designated as OSHA carcinogens in 1996, as shown in Table 12-8. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) The majority—12.3 million pounds or 91.6%—was reported as air emissions. The sector also reported 994,000 pounds of off-site releases (transfers to disposal) of OSHA carcinogens.

Three of the sector's top 15 chemicals for total on- and off-site releases were OSHA carcinogens

Map 12-1. Total On- and Off-site Releases, 1996: Fabricated Metals, SIC Code 34



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

Table 12-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Fabricated Metals, SIC Code 34 (In Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
--	Glycol ethers	17,208,967	1,326	0	0	0	208	17,210,501	10,854	17,221,355
71-36-3	n-Butyl alcohol	9,784,045	250	0	0	250	78	9,784,623	526	9,785,149
1330-20-7	Xylene (mixed isomers)	9,383,016	16	0	0	250	3,983	9,387,265	20,400	9,407,665
1344-28-1	Aluminum oxide (fibrous forms)	13,000	0	0	0	0	0	13,000	8,505,770	8,518,770
79-01-6	Trichloroethylene	7,600,608	116	0	0	550	1,200	7,602,474	14,444	7,616,918
--	Zinc compounds	228,336	20,021	0	0	19,923	83,578	351,858	5,218,403	5,570,261
78-93-3	Methyl ethyl ketone	5,432,423	13,420	0	0	0	66,275	5,512,118	4,946	5,517,064
108-88-3	Toluene	4,386,423	5	0	0	0	13,292	4,399,720	24,324	4,424,044
127-18-4	Tetrachloroethylene	2,511,011	7	0	0	0	0	2,511,018	0	2,511,018
75-09-2	Dichloromethane	1,787,938	5	0	0	0	0	1,787,943	0	1,787,943
110-54-3	n-Hexane	1,727,985	0	0	0	0	0	1,727,985	0	1,727,985
108-10-1	Methyl isobutyl ketone	1,667,080	5	0	0	0	0	1,667,085	272	1,667,357
--	Chromium compounds	24,443	1,714	78	0	108,603	28,193	163,031	991,081	1,154,112
7439-96-5	Manganese	194,066	2,133	0	7	7,755	59,523	263,484	621,238	884,722
71-55-6	1,1,1-Trichloroethane	845,247	10	0	0	4,500	10,518	860,275	0	860,275
	Subtotal	62,794,588	39,028	78	7	141,831	266,848	63,242,380	15,412,258	78,654,638
	Total for SIC Code 34	69,191,876	351,080	563	7	204,331	572,609	70,320,466	19,933,901	90,254,367

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.

(see Table 12-7). These were trichloroethylene with 7.6 million pounds of releases, tetrachloroethylene with 2.5 million pounds, and dichloromethane with 1.8 million pounds. The great majority of these reported releases was air emissions. The sector also reported releases of 479,000 pounds of nickel and 416,000 pounds of nickel compounds, among other OSHA carcinogens. These were both largely off-site releases (transfers to disposal).

As shown in Table 12-8, the miscellaneous fabricated metal products industry (SIC code 3499) reported the largest releases of OSHA carcinogens in the fabricated metals sector. This industry reported 2.7 million pounds of total releases of these chemicals. The plating and polishing industry (SIC code 3471) ranked second, reporting 2.03 million pounds of OSHA carcinogen releases. The multiple-codes group ranked third with 1.97 million pounds, and the miscellaneous metal stampings industry (SIC code 3469) ranked fourth with 1.7 million pounds. In all four industries, half or more of the total on- and off-site releases consisted of air emissions of trichloroethylene (miscellaneous fabricated metal products, 1.5 million pounds; plating and polishing, 1.2 million pounds; multiple-codes forms, 964,000 pounds; and miscellaneous metal stampings, 1.2 million pounds).

Figure 12-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Fabricated Metals

Table 12-9 presents waste management data for the four-digit SIC codes in the fabricated metals sector. Nearly half (44.7%) of all production-related waste was recycled off-site, 319.9 million pounds out of 716.2 million pounds. On-site recycling accounted for another 148.0 million pounds, or 20.7%. The third-largest waste management option in the fabricated metals sector was on-site treatment, with 113.7 million pounds

Table 12-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Fabricated Metals, SIC Code 34 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3499	Fabricated Metal Products, nec*	2,645,026	781	0	0	6,640	250	2,652,697	56,790	2,709,487
3471	Plating & Polishing	1,572,298	1,874	0	0	5,119	3,545	1,582,836	442,621	2,025,457
	Multiple within SIC Code 34	1,854,128	1,032	0	0	4,364	54,929	1,914,453	59,305	1,973,758
3469	Metal Stampings, nec*	1,660,571	532	0	0	0	5	1,661,108	49,420	1,710,528
3429	Hardware, nec*	705,157	610	0	0	0	0	705,767	21,802	727,569
3421	Cutlery	518,077	5	0	0	0	0	518,082	0	518,082
3444	Sheet Metal Work	471,792	4	0	0	0	2,356	474,152	28,413	502,565
3479	Metal Coating & Allied Services	436,969	688	0	0	0	592	438,249	32,136	470,385
3451	Screw Machine Products	419,174	5	0	0	5	0	419,184	751	419,935
3498	Fabricated Pipe & Fittings	321,802	250	0	0	0	8,889	330,941	7,604	338,545
3496	Misc. Fabricated Wire Products	290,467	36	0	0	0	0	290,503	45,626	336,129
3452	Bolts, Nuts, Rivets, & Washers	319,481	0	0	0	0	0	319,481	9,160	328,641
3443	Fabricated Plate Work (Boiler Shops)	143,520	899	0	0	0	919	145,338	46,621	191,959
3494	Valves & Pipe Fittings, nec*	139,847	34	0	0	3,411	5	143,297	7,180	150,477
3412	Metal Barrels, Drums, & Pails	101,914	0	0	0	0	0	101,914	0	101,914
3423	Hand & Edge Tools, nec*	64,324	260	0	0	0	0	64,584	37,201	101,785
3462	Iron & Steel Forgings	16,049	2,010	0	0	0	4,805	22,864	67,610	90,474
	Invalid SIC Code within SIC Code 34	73,776	10	0	0	0	0	73,786	7,915	81,701
3442	Metal Doors, Sash, & Trim	81,259	0	0	0	0	5	81,264	0	81,264
3449	Miscellaneous Metal Work	75,320	0	0	0	0	0	75,320	255	75,575
3465	Automotive Stampings	57,271	0	0	0	0	0	57,271	6,552	63,823
3446	Architectural Metal Work	58,071	0	0	0	0	0	58,071	2,358	60,429
3432	Plumbing Fixture Fittings & Trim	47,139	507	0	0	250	0	47,896	10,113	58,009
3448	Prefabricated Metal Buildings	54,795	0	0	0	0	0	54,795	35	54,830
3484	Small Arms	42,383	5	0	0	0	0	42,388	3,517	45,905
3441	Fabricated Structural Metal	18,841	1,174	0	0	0	23,033	43,048	1,305	44,353
3482	Small Arms Ammunition	24,296	0	0	0	0	0	24,296	19,267	43,563
3463	Nonferrous Forgings	23,028	2	0	0	0	5	23,035	11,326	34,361
3489	Ordnance & Accessories, nec*	22,000	0	0	0	0	0	22,000	0	22,000
3492	Fluid Power Valves & Hose Fittings	16,271	0	0	0	0	0	16,271	3,110	19,381
3491	Industrial Valves	12,851	5	0	0	0	0	12,856	776	13,632
3495	Wire Springs	9,788	0	0	0	0	0	9,788	3,400	13,188
3411	Metal Cans	10,846	0	0	0	0	0	10,846	0	10,846
3497	Metal Foil & Leaf	222	1	0	0	0	0	223	8,257	8,480
3483	Ammunition, Exc. For Small Arms, nec*	4,557	0	0	0	0	0	4,557	0	4,557
3425	Saw Blades & Handsaws	301	0	0	0	0	0	301	3,123	3,424
3493	Steel Springs, Except Wire	0	3	0	0	0	0	3	292	295
3433	Heating Equipment, Except Electric	274	0	0	0	0	0	274	10	284
3431	Metal Sanitary Ware	30	0	0	0	0	0	30	0	30
	Subtotal	12,313,915	10,727	0	0	19,789	99,338	12,443,769	993,851	13,437,620
	Total for SIC Code 34	69,191,876	351,080	563	7	204,331	572,609	70,320,466	19,933,901	90,254,367

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

or 15.9%. The sector reported 83.4 million pounds of quantities released on- and off-site, which was 11.6% of total production-related waste. Other waste management methods represented less than 5% each of the sector's total. Figure 12-8 shows the distribution of on-site waste management, off-site waste management, and quantities released on- and off-site in this sector.

A total of six industry groups at the four-digit SIC code level ranked first or second in the various waste management types shown in Table 12-9.

Multiple-codes forms in SIC code 34 reported the sector's largest total production-related waste, with 100.1 million pounds. This multiple-codes group ranked second for on-site recycling, with

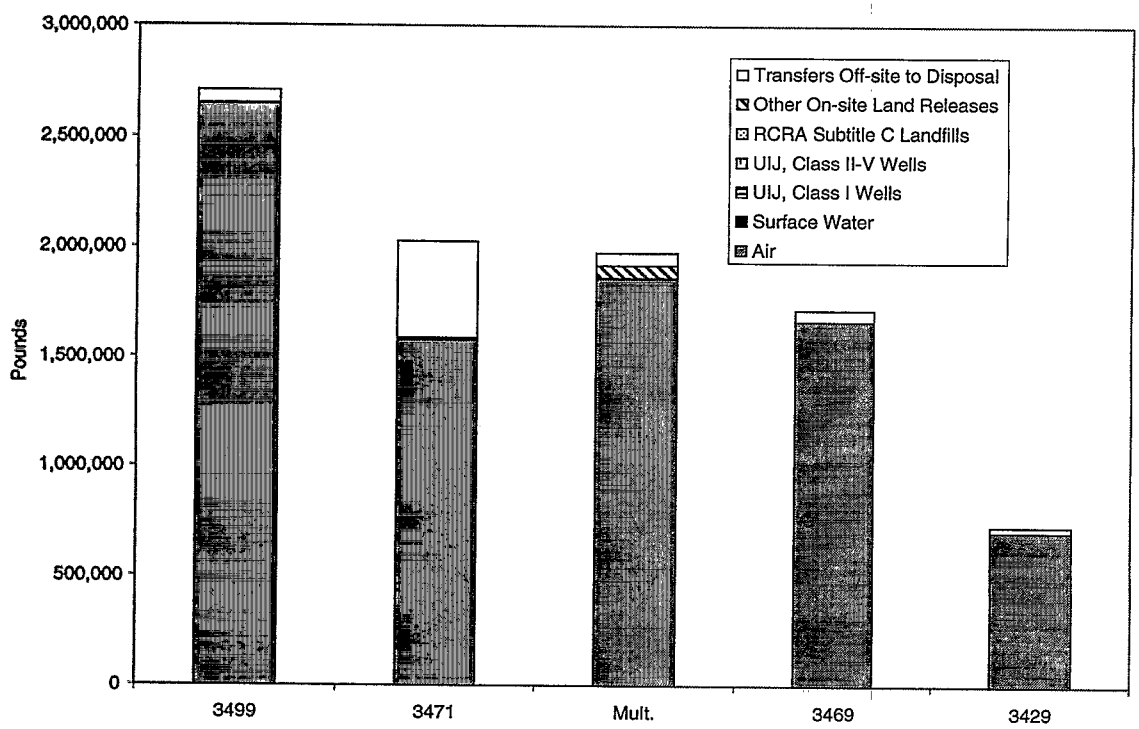


Figure 12-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Fabricated Metals (SIC Code 34)

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.

23.3 million pounds, and first for off-site recycling, with 60.4 million pounds. One multiple-codes facility (reporting SIC codes 3451, 3492, and 3494) reported off-site recycling of 12.7 million pounds of copper, and a second facility (SIC codes 3432, 3451, and 3471) reported off-site recycling of 6.9 million pounds of copper compounds.

The cutlery industry (SIC code 3421) ranked first for on-site recycling, with 46.5 million pounds. The plumbing fixture fittings and trim (SIC code 3432) ranked second for off-site recycling, with 41.1 million pounds.

The plating and polishing industry (SIC code 3471) ranked second among fabricated metals industries for total production-related waste. This industry reported 90.4 million pounds of production-related waste, including 35.1 million pounds of on-site treatment and 6.8 million pounds of off-site treatment. Plating and polishing ranked first in this sector in amounts reported for both on- and off-site treatment.

The metal coating industry (SIC code 3479) reported the sector's largest amount of on-site energy recovery, with 10.0 million pounds, and ranked second in three waste management categories: off-site energy recovery (4.3 million pounds), off-site treatment (2.3 million pounds), and quantities released (11.7 million pounds).

The metal cans industry (SIC code 3411) reported the sector's largest quantities released, with 24.8 million pounds. This industry also reported the largest amount of off-site energy recovery, with 4.4 million pounds. The metal cans industry ranked second for on-site energy recovery (6.2

Table 12-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Fabricated Metals, SIC Code 34 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
	Multiple within SIC Code 34	23,291,102	522,460	7,785,008	60,410,417	618,871	1,478,535	5,945,618	100,052,011	4,658
3471	Plating & Polishing	20,459,311	13,266	35,103,079	19,296,648	445,161	6,821,735	8,289,387	90,428,587	2,341
3479	Metal Coating & Allied Services	1,245,002	9,999,980	23,406,689	21,824,249	4,301,138	2,302,872	11,732,973	74,812,903	21,190
3411	Metal Cans	258,637	6,163,803	29,244,843	6,074,340	4,409,525	245,748	24,785,920	71,182,816	2,131
3432	Plumbing Fixture Fittings & Trim	8,769,918	0	168,747	41,093,067	5,237	81,506	290,227	50,408,702	0
3421	Cutlery	46,457,548	0	36,544	412,449	0	32,896	792,469	47,731,906	0
3494	Valves & Pipe Fittings, nec*	14,223,712	0	45,367	23,857,923	8,673	73,928	387,108	38,596,711	0
3469	Metal Stampings, nec*	993,999	2,091	684,833	30,812,183	355,988	682,666	2,469,567	36,001,327	27,165
3499	Fabricated Metal Products, nec*	2,211,011	0	2,112,596	14,430,455	269,956	838,551	5,698,527	25,561,096	1,576
3429	Hardware, nec*	6,289,366	29,981	1,094,975	10,194,798	11,686	209,810	1,734,951	19,565,567	1,936
3462	Iron & Steel Forgings	1,808,995	0	116,304	15,986,785	10,000	53,851	1,374,435	19,350,370	0
3451	Screw Machine Products	135,700	94,003	224,971	17,735,483	16,934	250,554	427,982	18,885,627	200
3463	Nonferrous Forgings	12,789,900	0	88,464	1,716,274	0	390,245	164,892	15,149,775	0
3497	Metal Foil & Leaf	539,848	0	5,438,959	6,891,896	838,544	462,349	295,699	14,467,295	820
3465	Automotive Stampings	16,848	0	377,856	10,754,533	73,077	112,588	301,057	11,635,959	0
3496	Misc. Fabricated Wire Products	283,909	0	1,203,454	5,545,555	17,829	582,559	1,145,771	8,779,077	760
3443	Fabricated Plate Work (Boiler Shops)	5,105	0	1,410,471	4,852,262	55,298	243,710	1,682,777	8,249,623	110
3482	Small Arms Ammunition	500	0	572,645	6,993,739	10,175	32,215	330,661	7,939,935	61,973
3448	Prefabricated Metal Buildings	6,208,600	0	287,118	125,620	34,862	13,726	1,254,720	7,924,646	500
3441	Fabricated Structural Metal	64,522	0	31,811	3,682,573	267,132	139,412	1,835,798	6,021,248	33,230
	Invalid SIC Code within SIC Code 34	586,283	468,800	970,116	1,717,004	217,138	229,991	1,654,989	5,844,321	0
3412	Metal Barrels, Drums, & Pails	87,895	1,247,496	328,535	176,279	981,818	48,843	2,404,897	5,275,763	0
3498	Fabricated Pipe & Fittings	8,000	0	194,025	3,693,542	579	72,956	1,250,641	5,219,743	0
3452	Bolts, Nuts, Rivets, & Washers	28,450	2,100,000	858,092	754,898	24,370	453,374	441,367	4,660,551	0
3491	Industrial Valves	7,980	0	50,000	3,858,672	421	13,107	411,549	4,341,729	0
3444	Sheet Metal Work	68,155	335,100	491,690	1,307,938	75,942	190,499	1,612,420	4,081,744	0
3442	Metal Doors, Sash, & Trim	36,070	0	28,368	121,469	272,080	86,438	2,466,781	3,011,206	0
3492	Fluid Power Valves & Hose Fittings	600	0	7,900	2,586,372	6,701	25,519	47,889	2,674,981	0
3423	Hand & Edge Tools, nec*	403	0	895,907	562,443	3,675	92,031	427,742	1,982,201	0
3431	Metal Sanitary Ware	942,805	0	77,000	357,928	0	157	233,295	1,611,185	0
3433	Heating Equipment, Except Electric	2,464	0	0	514,757	147,491	15,867	343,479	1,024,058	0
3449	Miscellaneous Metal Work	168,070	0	123,262	264,457	7,832	3,906	402,341	969,868	0
3446	Architectural Metal Work	14,168	0	166,228	380,960	37,883	2,358	229,331	830,928	0
3484	Small Arms	0	0	34,897	408,648	12,279	39,361	87,536	582,721	0
3489	Ordnance & Accessories, nec*	1,000	0	66,500	80,100	97,853	5,680	195,294	446,427	1,128
3425	Saw Blades & Handsaws	0	0	0	131,991	0	162,356	84,167	378,514	0
3483	Ammunition, Exc. For Small Arms, nec*	0	0	0	240,350	1,095	1,202	69,341	311,988	0
3493	Steel Springs, Except Wire	0	0	0	41,071	0	0	82,484	123,555	0
3495	Wire Springs	25,000	0	0	37,488	5,337	903	23,143	91,871	0
3466	Crowns & Closures	0	0	0	0	2,252	0	28,865	31,117	0
	Total for SIC Code 34	148,030,876	20,976,980	113,727,254	319,927,616	13,644,832	16,494,004	83,438,090	716,239,652	159,718

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds of treatment on-site, 206,766 pounds of recycling off-site, 567 pounds of treatment off-site, 13 pounds of quantity released on- and off-site and 3,417,119 pounds of total production-related waste.
***nec:** not elsewhere classified.

million pounds) and on-site treatment (29.2 million pounds).

Distribution of production-related waste for the top industries in the sector appears in Figure 12-9.

Projected Quantities of TRI Chemicals in Waste

The fabricated metals sector's projections of waste management data through 1998 appear in Table 12-10. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) Total production-related waste was projected to decrease 4.3% from 716.2 million pounds in 1996 to 685.5 million pounds in 1998. The projected 30.8 million-pound reduction in total production-related waste reflected projected decreases in all waste management methods except on-site energy recovery.

The largest reduction (in pounds) was projected in quantities released, from 83.4 million pounds in 1996 to 73.4 million pounds in 1998. Off-site recycling was projected to decrease from 319.9 million pounds to 310.5 million pounds. Each of these represented a reduction of more than 9 million pounds. The sector projected a reduction in on-site recycling from 148.0 million pounds to 142.6 million pounds and a reduction in on-site treatment from 113.7 million pounds to 108.8 million pounds. Each of these represented a reduction of about 5 million pounds.

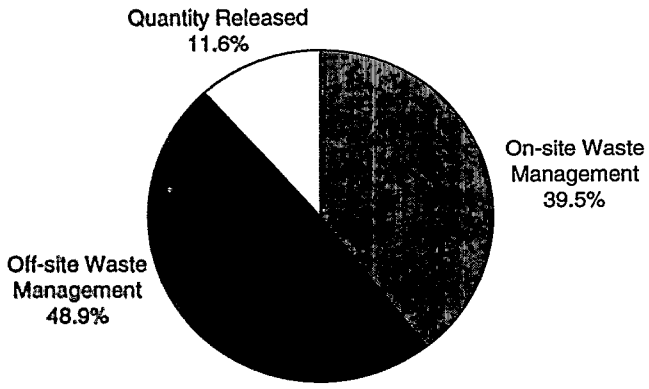


Figure 12-8. Distribution of TRI Production-related Waste, 1996: Fabricated Metals (SIC Code 34)

Note: Data from Section 8 of Form R.

Smaller (absolute) reductions were projected in off-site energy recovery, from 13.6 million pounds to 11.8 million pounds (1.8 million-pound reduction) and in off-site treatment, from 16.5 million pounds to 15.7 million pounds (an 806,000 pound reduction).

In percentage terms, these reductions ranged from a 2.9% decrease in off-site recycling, the sector's largest reported method of waste management, to a 13.5% decrease in off-site energy recovery, the sector's smallest reported method.

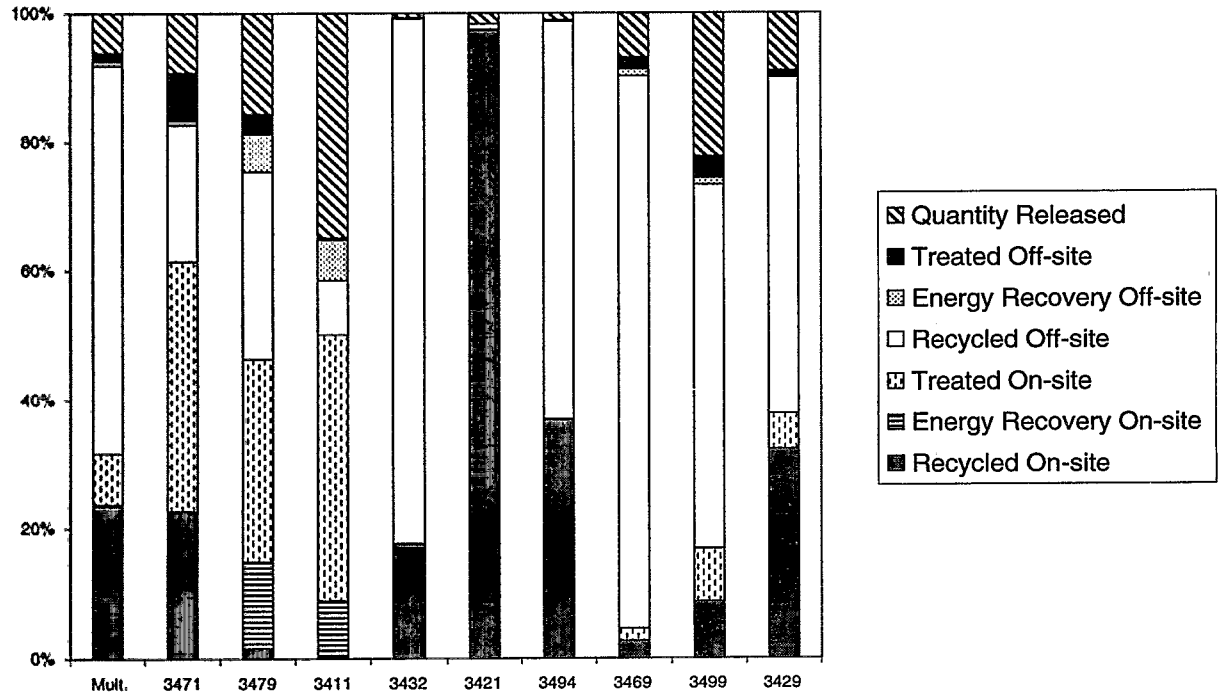


Figure 12-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Fabricated Metals (SIC Code 34)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.

Table 12-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Fabricated Metals, SIC Code 34

Waste Management Activity	Current Year 1996 Total Pounds	Current Year 1996 Percent of Total	Projected 1997 Total Pounds	Projected 1997 Percent of Total	Projected 1998 Total Pounds	Projected 1998 Percent of Total
On-site Waste Management						
Recycled On-site	148,030,876	20.7	146.389	21.3	142,623,630	20.8
Energy Recovery On-site	20,976,980	2.9	22,274,077	3.2	22,545,277	3.3
Treated On-site	113,727,254	15.9	108,249,701	15.8	108,833,060	15.9
Off-site Waste Management						
Recycled Off-site	319,927,616	44.7	306,732,133	44.7	310,549,043	45.3
Energy Recovery Off-site	13,644,832	1.9	12,406,580	1.8	11,808,668	1.7
Treated Off-site	16,494,004	2.3	16,601,195	2.3	15,688,349	2.3
Quantity Released On- and Off-site	83,438,090	11.6	74,583,524	10.9	73,430,246	10.7
Total Production-related Waste for SIC Code 34	716,239,652	100.0	686,697,161	100.0	685,478,273	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-1.1	-2.6	-3.7
Energy Recovery On-site	6.2	1.2	7.5
Treated On-site	-4.8	0.5	-4.3
Off-site Waste Management			
Recycled Off-site	-4.1	1.2	-2.9
Energy Recovery Off-site	-9.1	-4.8	-13.5
Treated Off-site	-2.6	-2.3	-4.9
Quantity Released On- and Off-site	-10.6	-1.5	-12.0
Total Production-related Waste for SIC Code 34	-4.1	-0.2	-4.3

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

A 1.6 million-pound increase was projected in on-site energy recovery, from 21.0 million pounds to 22.5 million pounds (a 7.5% increase).

Figure 12-10 illustrates the projected percentage changes in the fabricated metals sector's waste management methods.

The projected changes represent little potential difference in the ways in which the fabricated metals sector manages its TRI chemicals in waste. The sector's releases were projected to decline from 11.6% of total production-related waste in 1996 to 10.7% in 1998. Essentially no change at all was expected in the proportion of total production-related waste managed by recycling, energy recovery, and treatment. Thus, the sector projected no real movement up the waste management hierarchy, explained in Chapter 1.

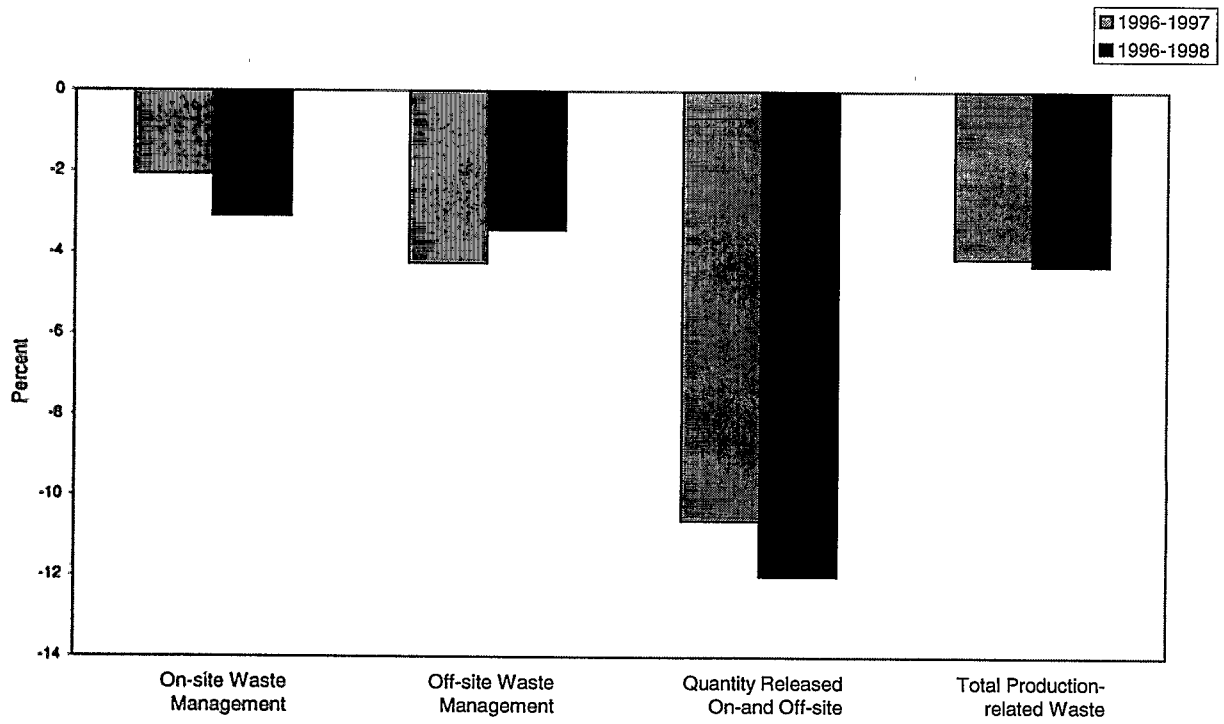


Figure 12-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Fabricated Metals (SIC Code 34)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

Source Reduction Activity

Of the 7,416 forms submitted by the fabricated metals sector, 1,440 forms indicated one or more source reduction activities underway during 1996, as shown in Table 12-11. The plating and polishing industry (SIC code 3471) submitted 290 forms indicating such activity. The metal coating industry (SIC code 3479) submitted 205 forms indicating source reduction activity. These submissions represented approximately 23% of the forms in both industries. In three industrial groups, more than 100 forms reported source reduction activity in 1996. These were the multiple-codes group (124 forms), the metal cans industry (SIC code 3411, 121 forms), and miscellaneous fabricated metal products (SIC code 3499, 114 forms). In these groups, the forms reporting source reduction activity represented 18% to 20% of all forms submitted.

As shown in Table 12-11, half (728 forms) of the forms reporting source reduction activity indicated improved operating practices. Other activities frequently cited were process modifications (338 forms) and raw material modifications (224 forms).

Year-to-Year Comparisons for Fabricated Metals

1995-1996 TRI Data for Fabricated Metals

The fabricated metals sector submitted 7,893 forms in 1995 and 7,416 forms in 1996, a 6% decrease, as shown in Table 12-12. Although the number of Form As submitted was relatively

Table 12-11. Number of Forms Reporting Source Reduction Activity, 1996: Fabricated Metals, SIC Code 34

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3411	Metal Cans	601	121	20.1	84	10	13	53	9	12	59	11
3412	Metal Barrels, Drums, & Pails	149	58	38.9	21	6	3	16	12	2	28	0
3421	Cutlery	37	6	16.2	1	0	2	0	1	2	1	0
3423	Hand & Edge Tools, nec*	68	12	17.6	6	0	1	0	2	0	1	2
3425	Saw Blades & Handsaws	21	1	4.8	1	0	0	0	0	0	0	0
3429	Hardware, nec*	158	19	12.0	7	1	2	4	7	4	4	2
3431	Metal Sanitary Ware	32	6	18.8	0	0	0	1	4	0	0	1
3432	Plumbing Fixture Fittings & Trim	92	29	31.5	16	6	11	6	7	3	1	4
3433	Heating Equipment, Except Electric	43	7	16.3	5	0	0	0	0	0	0	2
3441	Fabricated Structural Metal	341	31	9.1	12	5	1	7	5	2	8	2
3442	Metal Doors, Sash, & Trim	127	30	23.6	11	0	3	8	7	1	5	3
3443	Fabricated Plate Work (Boiler Shops)	269	54	20.1	33	7	1	9	5	2	7	1
3444	Sheet Metal Work	139	27	19.4	13	8	1	3	2	2	6	1
3446	Architectural Metal Work	24	0	0.0	0	0	0	0	0	0	0	0
3448	Prefabricated Metal Buildings	83	17	20.5	4	0	1	5	3	0	6	6
3449	Miscellaneous Metal Work	51	8	15.7	3	0	0	5	0	2	2	0
3451	Screw Machine Products	113	11	9.7	4	0	0	0	2	5	0	0
3452	Bolts, Nuts, Rivets, & Washers	139	19	13.7	16	1	3	0	3	1	0	1
3462	Iron & Steel Forgings	200	24	12.0	15	3	1	5	6	0	2	1
3463	Nonferrous Forgings	38	9	23.7	7	0	0	0	0	0	2	0
3465	Automotive Stampings	105	10	9.5	1	0	0	1	0	0	0	8
3466	Crowns & Closures	3	0	0.0	0	0	0	0	0	0	0	0
3469	Metal Stampings, nec*	303	74	24.4	30	1	11	5	23	14	3	2
3471	Plating & Polishing	1,241	290	23.4	153	38	48	25	86	62	7	4
3479	Metal Coating & Allied Services	883	205	23.2	130	19	11	8	35	20	30	9
3482	Small Arms Ammunition	50	6	12.0	1	0	1	3	0	1	0	0
3483	Ammunition, Exc. For Small Arms, nec*	5	1	20.0	1	0	0	0	0	0	0	0
3484	Small Arms	24	3	12.5	2	0	0	0	0	1	0	0
3489	Ordnance & Accessories, nec*	12	5	41.7	0	2	0	0	2	1	0	0
3491	Industrial Valves	59	10	16.9	3	1	6	4	1	4	0	0
3492	Fluid Power Valves & Hose Fittings	34	5	14.7	1	0	0	0	4	1	1	0
3493	Steel Springs, Except Wire	10	4	40.0	4	0	0	1	0	0	0	0
3494	Valves & Pipe Fittings, nec*	196	20	10.2	13	2	4	0	2	4	1	0
3495	Wire Springs	12	4	33.3	0	0	0	3	0	1	0	0
3496	Misc. Fabricated Wire Products	213	20	9.4	11	0	4	4	7	3	2	0
3497	Metal Foil & Leaf	47	20	42.6	9	0	0	6	10	1	3	1
3498	Fabricated Pipe & Fittings	81	12	14.8	7	1	0	1	3	3	0	0
3499	Fabricated Metal Products, nec*	623	114	18.3	47	14	7	17	35	14	15	10
	Multiple within SIC Code 34	688	124	18.0	43	12	17	22	42	23	15	5
	Invalid SIC Code within SIC Code 34	102	24	23.5	13	8	8	2	13	1	9	0
	Total for SIC Code 34	7,416	1,440	19.4	728	145	160	224	338	192	218	76

Note: Forms with more than one 4-digit SIC code within code 34 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

small, these submissions increased 27.7% from 408 forms to 521. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the Form A certification statement in its second year of availability.

On- and Off-site Releases

Total on- and off-site releases reported by the fabricated metals sector decreased 7.0% from 1995 to 1996, despite a 51.9% increase in off-site releases (transfers to disposal), as shown in Table 12-12 and Figure 12-11. On- and off-site releases totaled 97.0 million pounds in 1995 and 90.3 million pounds in 1996, a reduction of 6.8 million pounds. Off-site releases (transfers to disposal) increased from 13.1 million pounds in 1995 to 19.9 million pounds in 1996, an increase of 6.8 million pounds. One facility in the miscellaneous metal stampings industry (SIC code 3469) reported off-site releases of 1.2 million pounds of

Table 12-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Fabricated Metals, SIC Code 34

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	2,973	2,883	-3.0
Total Forms	7,893	7,416	-6.0
Form Rs	7,485	6,895	-7.9
Form As	408	521	27.7
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	82,836,389	69,191,876	-16.5
Fugitive Air	28,648,445	23,613,262	-17.6
Point Source Air	54,187,944	45,578,614	-15.9
Surface Water Discharges	395,001	351,080	-11.1
Underground Injection	931	570	-38.8
On-site Land Releases	685,640	776,940	13.3
Total On-site Releases	83,917,961	70,320,466	-16.2
Off-site Releases			
Transfers Off-site to Disposal	13,120,660	19,933,901	51.9
Total On- and Off-site Releases	97,038,621	90,254,367	-7.0
Other On-site Waste Management			
Recycled On-site	152,113,451	148,030,876	-2.7
Energy Recovery On-site	19,352,037	20,976,980	8.4
Treated On-site	134,688,285	113,727,254	-15.6
Total Other On-site Waste Management	306,153,773	282,735,110	-7.6
Transfers Off-site for Further Waste Management			
Transfers to Recycling	316,886,128	303,449,098	-4.2
Transfers to Energy Recovery	14,491,702	13,729,060	-5.3
Transfers to Treatment	11,332,910	12,677,769	11.9
Transfers to POTWs	5,786,056	6,597,522	14.0
Other Off-site Transfers	142,224	88,546	-37.7
Total Transfers Off-site for Further Waste Management	348,639,020	336,541,995	-3.5

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

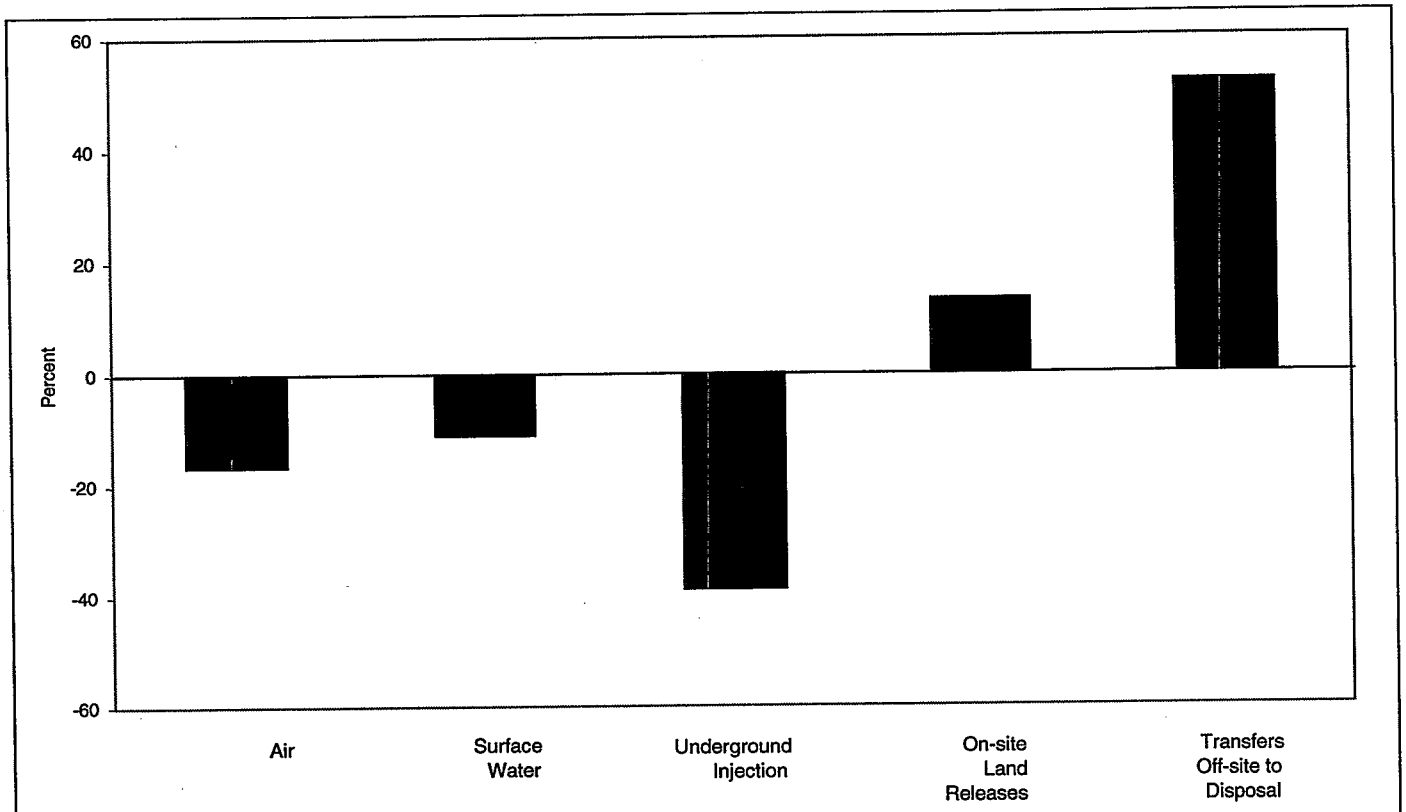


Figure 12-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Fabricated Metals (SIC Code 34)

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

aluminum oxide in 1995 and 8.0 million pounds in 1996, an increase of 6.9 million pounds.

The largest factor in the overall reduction was a 16.5% decrease in air emissions, from 82.8 million pounds to 69.2 million pounds, a reduction of 13.6 million pounds. About two-thirds (63.1%) of this reduction in releases to air was reported in point-source emissions, and the remaining third (36.9%) in fugitive emissions.

The sector reported much smaller amounts in other release types. Surface water discharges decreased from 395,000 pounds in 1995 to 351,000 pounds in 1996. Underground injection was less than 1,000 pounds in both years. The only on-site release type to show an increase was on-site land releases, which increased from 686,000 pounds to 777,000 pounds.

Other On-site Waste Management

The fabricated metals sector reported 306.2 million pounds of other on-site waste management in 1995 and 282.7 million pounds in 1996. These data also appear in Table 12-12. This 7.6% reduction amounted to a decrease of 23.4 million pounds. Much of this reduction occurred in reporting of on-site treatment, which decreased 15.6% (or 21.0 million pounds), from 134.7 million pounds in 1995 to 113.7 million pounds in 1996.

On-site recycling also decreased from 152.1 million pounds to 148.0 million pounds (a 2.7% reduction), while on-site energy recovery increased from 19.4 million pounds to 21.0 million pounds (an 8.4% increase).

Transfers Off-site for Further Waste Management

Table 12-12 also presents the fabricated metals sector's reporting of transfers off-site for further waste management for 1995 and 1996. Total transfers off-site for further waste management decreased 3.5% (12.1 million pounds) from 348.6 million pounds in 1995 to 336.5 million pounds in 1996.

Transfers to recycling were both the largest type of transfer reported by this sector and the type with the largest reduction (in pounds). The sector reported 316.9 million pounds of transfers to recycling in 1995 and 303.4 million pounds in 1996. This 4.2% reduction amounted to a decrease of 13.4 million pounds. A smaller reduction was reported in transfers to energy recovery (from 14.5 million pounds to 13.7 million pounds).

The sector reported increased amounts for transfers to treatment (from 11.3 million pounds to 12.7 million pounds) and to POTWs (from 5.8 million pounds to 6.6 million pounds).

1988-1996 TRI Data for Fabricated Metals

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

From 1988 to 1996, the fabricated metals sector's reporting of on- and off-site releases of the "core" chemicals decreased by 51.6%, from 160.4 million pounds to 77.6 million pounds, as shown in Table 12-13. The largest reduction (in pounds) was reported in air emissions, from 125.6 million pounds to 65.5 million pounds. Decreases in both fugitive and point-source emissions contributed to this 47.9% reduction in releases to air. The sector also reported reductions in other on-site release types. Although these decreases ranged from 81.8% to 99.6%, they represented smaller amounts.

The fabricated metals sector reported 30.0 million pounds of off-site releases (transfers to disposal) in 1988 and 11.3 million pounds in 1996, a 62.3% reduction.

Figure 12-12 illustrates the sector's 1988-1996 percentage change in on- and off-site releases.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, the fabricated metals sector recorded a 121.9 million-pound reduction in other on-site waste management, from 378.2 million pounds to 256.3 million pounds. This was largely attributable to a reduction of 112.3 million pounds in on-site recycling, from 258.5 million pounds to 146.2 million pounds. On-site treatment also decreased, from 98.9 million pounds to 89.1 million pounds (a 9.8 million-pound reduction). The sector reported an increase in on-site energy recovery from 20.7 million pounds to 21.0 million pounds (a 250,000 pound increase). These data also appear in Table 12-13.

The sector reported decreases of 41.0% and 57.2%, respectively, in transfers to treatment and to POTWs from 1988 to 1996, as shown in Table 12-13. The sector reported 18.4 million pounds of transfers to treatment in 1988 and 10.9 million

Table 12-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Fabricated Metals, SIC Code 34

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	2,747	2,845	2,763	2,744	-0.1
Total Forms	6,978	7,048	6,915	6,768	-3.0
Form Rs	6,978	7,048	6,579	6,310	-9.6
Form As	NA	NA	336	458	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	125,627,135	86,251,804	78,389,865	65,503,836	-47.9
Fugitive Air	49,533,320	30,142,237	26,193,451	21,822,343	-55.9
Point Source Air	76,093,815	56,109,567	52,196,414	43,681,493	-42.6
Surface Water Discharges	633,439	73,099	100,161	79,268	-87.5
Underground Injection	154,199	1,885	681	570	-99.6
On-site Land Releases	3,991,275	623,380	631,871	728,061	-81.8
Total On-site Releases	130,406,048	86,950,168	79,122,578	66,311,735	-49.1
Off-site Releases					
Transfers Off-site to Disposal	29,963,711	12,621,888	11,318,363	11,298,798	-62.3
Total On- and Off-site Releases	160,369,759	99,572,056	90,440,941	77,610,533	-51.6
Other On-site Waste Management					
Recycled On-site	NA	258,540,179	136,804,493	146,220,552	NA
Energy Recovery On-site	NA	20,727,035	19,352,037	20,976,980	NA
Treated On-site	NA	98,882,878	90,407,188	89,055,195	NA
Total Other On-site Waste Management	NA	378,150,092	246,563,718	256,252,727	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	286,771,401	315,161,842	312,080,751	NA
Transfers to Energy Recovery	NA	14,190,390	14,307,596	13,533,239	NA
Transfers to Treatment	18,398,215	9,276,894	9,294,577	10,861,766	-41.0
Transfers to POTWs	5,577,568	1,771,545	1,995,529	2,387,467	-57.2
Other Off-site Transfers	5,563,733	185,370	100,256	71,544	-98.7
Total Transfers Off-site for Further Waste Management	NA	312,195,600	340,859,8900	328,934,767	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. **NA:** not required to be reported in that year.

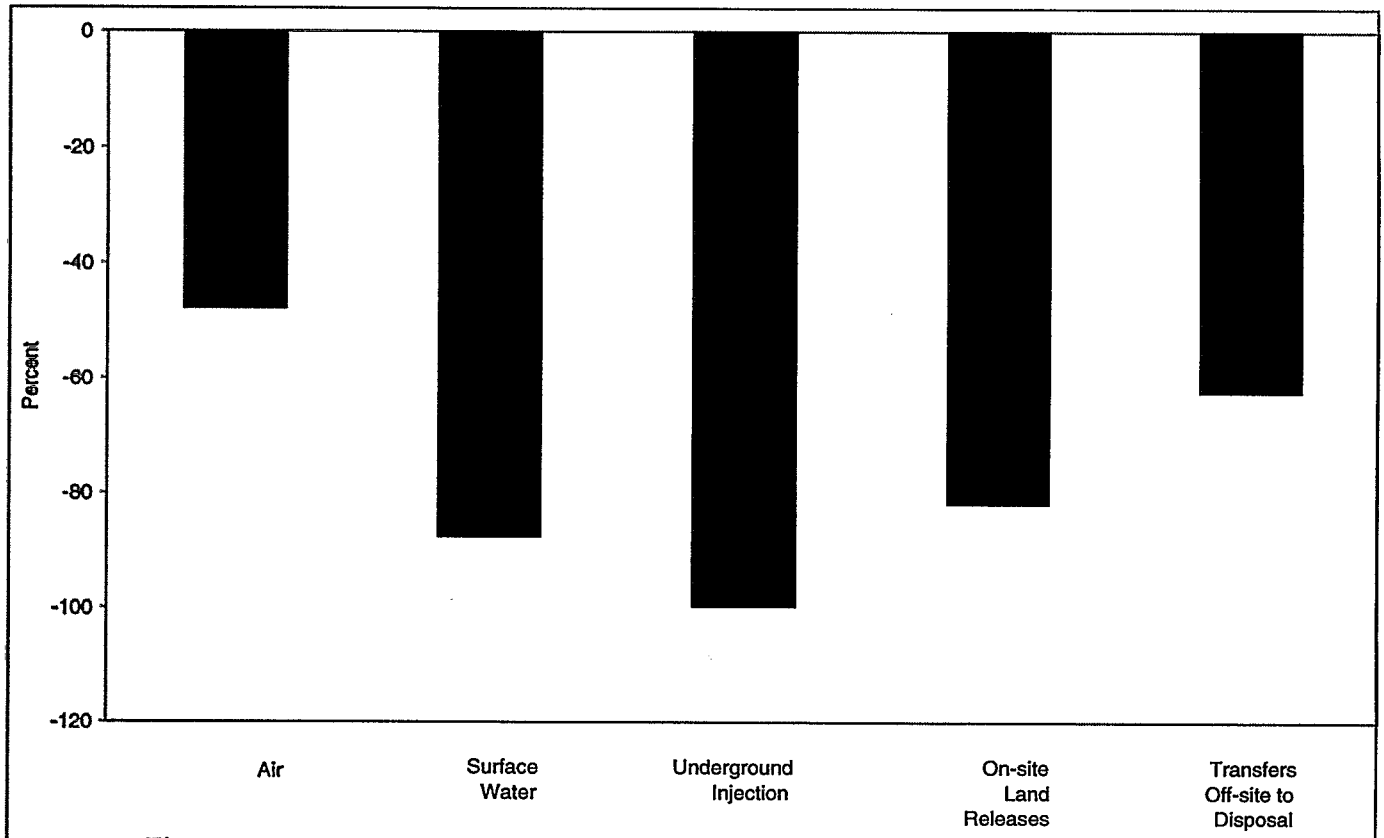


Figure 12-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Fabricated Metals (SIC Code 34)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

pounds in 1996. The sector also reported 5.6 million pounds of transfers to POTWs in 1988 and 2.4 million pounds in 1996.

1988-1996 Data for Four-Digit Industries in Fabricated Metals

Tables 12-14 through 12-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 34. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The metal cans industry (SIC code 3411) reported the fabricated metals sector's largest decrease in on- and off-site releases from 1988 to 1996. This industry reported releases totaling 37.6 million pounds in 1988 and 23.4 million pounds in 1996. The reduction was attributable to decreases in reported air emissions. The plating and polishing industry (SIC code 3471) ranked second for decreases, from 17.5 million pounds to 6.4 million pounds. Miscellaneous fabricated metal products (SIC code 3499) reported the third-

largest decrease, from 15.0 million pounds to 5.6 million pounds. For plating and polishing and for miscellaneous fabricated metal products, the overall reductions reflected decreases in all release types.

The sheet metal work industry (SIC code 3444) ranked first for increases in total releases, reporting 1.2 million pounds in 1988 and 1.6 million pounds in 1996. The increase was largely attributable to air emissions. The industrial valves industry (SIC code 3491) reported the sector's second-largest increase, from 128,000 pounds to 417,000 pounds. This industry reported a larger increase in air emissions, partly offset by a reduction in off-site releases (transfers to disposal). However, both industries showed a decrease from 1995 to 1996. No other fabricated metals industry reported an increase in total releases from 1988 to 1996.

Table 12-14 provides release data for all four-digit SIC codes in the fabricated metals sector, for 1988-1996.

Other On-site Waste Management

The cutlery industry (SIC code 3421) reported the largest decrease in other on-site waste management reported in the fabricated metals sector for 1994-1996 (on-site waste management data were not collected in 1988). This industry reported 111.9 million pounds in 1994 and 46.5 million pounds in 1996. Miscellaneous fabricated metals products (SIC code 3499) reported the second-largest reduction, from 64.7 million pounds to 4.2 million pounds. (One facility erroneously reported in SIC code 39 in 1996. The facility should have reported in SIC code 3499. This error does not affect the ranking of SIC code 3499 as second for decreases in other on-site waste management.) Ranking third for decreases, the multiple-codes group reported 50.8 million pounds in 1994 and 29.9 million pounds in 1996. The majority of the reduction in all three industry groups was reported in on-site recycling.

The nonferrous forgings industry (SIC code 3463) reported the sector's largest increase in other on-site waste management, from 283,000 pounds in 1994 to 12.9 million pounds in 1996. One facility in SIC code 3463 submitted forms for copper in 1994 and 1995 with no on-site recycling; in 1996, this facility reported recycling 12.8 million pounds of copper on-site. The plating and polishing industry (SIC code 3471) ranked second, reporting 36.0 million pounds in 1994 and 44.8 million pounds in 1996, although the total was smaller (33.1 million pounds) in 1995. The plumbing fixture fittings and trim industry (SIC code 3432) reported the third-largest increase, from 1.6 million pounds to 8.9 million pounds. The primary component of all three industries' increases was on-site recycling.

On-site waste management data for 1994-1996 appear in Table 12-15.

Transfers Off-site for Further Waste Management

The metal cans industry (SIC code 3411) ranked first for decreases in transfers off-site for further waste management from 1994 to 1996 (data for some types of off-site transfers were not collected in 1988). This industry reported 16.5 million pounds in 1994 and 10.8 million pounds in 1996. Miscellaneous fabricated metal products (SIC code 3499) ranked second, decreasing from 17.8 million pounds to 12.4 million pounds. The multiple-codes group ranked third, reporting 52.7 million pounds in 1994 and 48.7 million pounds in 1996. For both the miscellaneous fabricated metal products industry and the multiple-codes group, the 1995 levels were higher (18.2 million pounds and 68.7 million pounds, respectively). In all three industry groups, transfers to recycling accounted for the majority of the reduction.

Table 12-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3411	Metal Cans	96	23,314,059	5	7	19	23,314,090	59,341	23,373,431
		95	27,235,626	0	9	0	27,235,635	55,474	27,291,109
		94	28,822,995	0	8	0	28,823,003	21,637	28,844,640
		88	36,052,557	0	500	80,500	36,133,557	1,465,777	37,599,334
3412	Metal Barrels, Drums, & Pails	96	2,231,300	0	0	6,252	2,237,552	0	2,237,552
		95	2,327,732	0	0	12,594	2,340,326	36,413	2,376,739
		94	3,164,033	0	0	10,310	3,174,343	54,162	3,228,505
		88	4,927,647	250	0	150,355	5,078,252	150,608	5,228,860
3421	Cutlery	96	681,224	5	0	250	681,479	83,229	764,708
		95	709,197	5	0	1,342	710,544	70,289	780,833
		94	681,687	0	0	1,706	683,393	86,430	769,823
		88	1,268,381	0	0	220	1,268,601	34,190	1,302,791
3423	Hand & Edge Tools, nec*	96	362,004	280	0	20	362,304	43,042	405,346
		95	386,140	267	0	0	386,407	44,518	430,925
		94	686,059	255	0	10	686,324	39,977	726,301
		88	1,240,196	92	0	1,538	1,241,826	115,729	1,357,555
3425	Saw Blades & Handsaws	96	1,283	0	0	0	1,283	7,134	8,417
		95	66,513	0	0	0	66,513	112,197	178,710
		94	67,507	0	0	0	67,507	70,805	138,312
		88	590,018	0	0	0	590,018	50,870	640,888
3429	Hardware, nec*	96	1,216,840	1,509	563	0	1,218,912	472,142	1,691,054
		95	1,211,840	1,258	667	750	1,214,515	334,249	1,548,764
		94	979,696	897	1,117	0	981,710	374,619	1,356,329
		88	3,406,366	4,187	52,780	9,050	3,472,383	3,477,744	6,950,127
3431	Metal Sanitary Ware	96	52,095	10	0	2,555	54,660	127,650	182,310
		95	113,619	260	0	5,692	119,571	12,521	132,092
		94	49,818	275	0	35	50,128	488,437	538,565
		88	225,080	75	0	0	225,155	221,054	446,209
3432	Plumbing Fixture Fittings & Trim	96	68,429	1,592	0	750	70,771	69,729	140,500
		95	74,700	153	0	0	74,853	106,256	181,109
		94	214,313	617	760	5,710	221,400	136,866	358,266
		88	961,953	330	0	0	962,283	1,289,305	2,251,588
3433	Heating Equipment, Except Electric	96	328,585	11	0	5	328,601	2,009	330,610
		95	440,053	10	0	5	440,068	2,697	442,765
		94	449,233	5	0	0	449,238	2,158	451,396
		88	413,631	250	0	0	413,881	23,643	437,524
3441	Fabricated Structural Metal	96	1,587,099	2,299	0	93,326	1,682,724	85,658	1,768,382
		95	1,534,345	573	0	83,333	1,618,251	137,913	1,756,164
		94	1,347,934	22	0	29,914	1,377,870	110,175	1,488,045
		88	3,198,102	500	0	1,000	3,199,602	148,727	3,348,329
3442	Metal Doors, Sash, & Trim	96	1,962,929	0	0	762	1,963,691	0	1,963,691
		95	2,119,315	0	0	368	2,119,683	0	2,119,683
		94	2,290,999	0	0	255	2,291,254	500	2,291,754
		88	3,286,382	380	0	2,480	3,289,242	78,958	3,368,200

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 12-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3443	Fabricated Plate Work (Boiler Shops)	96	1,402,578	2,706	0	16,787	1,422,071	92,391	1,514,462
		95	1,761,970	1,122	0	7,049	1,770,141	262,628	2,032,769
		94	2,511,766	1,392	0	5,516	2,518,674	337,399	2,856,073
		88	2,907,676	19,766	0	3,036	2,930,478	255,416	3,185,894
3444	Sheet Metal Work	96	1,543,976	4	0	3,727	1,547,707	52,417	1,600,124
		95	1,810,836	0	0	5,280	1,816,116	3,565	1,819,681
		94	1,621,423	0	0	6,375	1,627,798	37,657	1,665,455
		88	1,120,077	0	0	250	1,120,327	33,635	1,153,962
3446	Architectural Metal Work	96	228,778	86	0	0	228,864	108,861	337,725
		95	315,063	250	0	130,000	445,313	5,988	451,301
		94	351,559	250	0	142,200	494,009	4,610	498,619
		88	597,439	250	0	0	597,689	10,347	608,036
3448	Prefabricated Metal Buildings	96	829,116	5	0	14,600	843,721	85,173	928,894
		95	1,590,039	5	0	9,435	1,599,479	143,732	1,743,211
		94	1,902,360	10	0	0	1,902,370	199,813	2,102,183
		88	1,855,897	250	0	250	1,856,397	49,540	1,905,937
3449	Miscellaneous Metal Work	96	404,509	0	0	0	404,509	270	404,779
		95	643,019	0	0	0	643,019	15	643,034
		94	591,795	0	0	0	591,795	775	592,570
		88	970,422	52,800	0	1,250	1,024,472	27,370	1,051,842
3451	Screw Machine Products	96	422,323	520	0	510	423,353	5,259	428,612
		95	504,571	20	0	10	504,601	12,640	517,241
		94	782,309	15	0	28	782,352	16,052	798,404
		88	1,273,027	0	0	500	1,273,527	531,581	1,805,108
3452	Bolts, Nuts, Rivets, & Washers	96	363,972	83	0	0	364,055	81,970	446,025
		95	413,085	80	0	250	413,415	79,125	492,540
		94	456,698	225	0	250	457,173	229,284	686,457
		88	1,817,464	3,052	0	79,567	1,900,083	257,259	2,157,342
3462	Iron & Steel Forgings	96	84,311	3,038	0	27,055	114,404	1,086,282	1,200,686
		95	206,201	2,798	0	27,238	236,237	1,189,045	1,425,282
		94	181,425	2,818	0	26,160	210,403	912,635	1,123,038
		88	237,452	502	0	47,000	284,954	2,030,355	2,315,309
3463	Nonferrous Forgings	96	71,109	6	0	15	71,130	44,077	115,207
		95	72,970	10	0	10	72,990	96,804	169,794
		94	90,705	306	0	10	91,021	88,324	179,345
		88	171,431	25,963	0	0	197,394	81,689	279,083
3465	Automotive Stampings	96	272,034	84	0	1,290	273,408	15,616	289,024
		95	323,889	10	0	15	323,914	14,487	338,401
		94	333,691	10	0	10	333,711	38,723	372,434
		88	864,388	250	0	9,846	874,484	43,193	917,677
3466	Crowns & Closures	96	No reports received						
		95	750	0	0	0	750	0	750
		94	65,405	0	0	729	66,134	0	66,134
		88	995,065	0	0	0	995,065	12,540	1,007,605

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 12-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3469	Metal Stampings, nec*	96	2,368,960	1,344	0	697	2,371,001	214,646	2,585,647
		95	2,789,488	433	0	273	2,790,194	247,892	3,038,086
		94	2,939,896	1,326	0	280	2,941,502	301,171	3,242,673
		88	3,972,651	543	0	500	3,973,694	662,686	4,636,380
3471	Plating & Polishing	96	3,505,835	6,018	0	184,318	3,696,171	2,707,044	6,403,215
		95	4,027,353	6,661	0	4,625	4,038,639	3,207,460	7,246,099
		94	4,682,848	7,499	0	33,919	4,724,266	3.559,529	8,283,795
		88	8,439,292	377,114	919	3,048,609	11,865,934	5,601,634	17,467,568
3479	Metal Coating & Allied Services	96	8,112,310	26,418	0	30,492	8,169,220	3,059,720	11,228,940
		95	11,146,061	32,497	0	12,892	11,191,450	2,679,565	13,871,015
		94	11,541,567	11,397	0	15,966	11,568,930	2,963,148	14,532,078
		88	6,750,966	2,623	0	57,609	6,811,198	5,118,560	11,929,758
3482	Small Arms Ammunition	96	91,505	15,339	0	0	106,844	222,280	329,124
		95	83,343	34,855	0	42	118,240	84,007	202,247
		94	124,505	24,382	0	1,288	150,175	114,325	264,500
		88	258,100	1,752	0	38,410	298,262	412,168	710,430
3483	Ammunition, Exc. For Small Arms, nec*	96	55,664	0	0	0	55,664	0	55,664
		95	94,205	0	0	0	94,205	0	94,205
		94	225,979	197	0	0	226,176	1,190	227,366
		88	716,938	1,500	0	250	718,688	70,661	789,349
3484	Small Arms	96	44,199	5	0	0	44,204	39,319	83,523
		95	30,232	0	0	0	30,232	38,209	68,441
		94	68,729	0	0	0	68,729	30,985	99,714
		88	223,521	154	0	0	223,675	44,015	267,690
3489	Ordnance & Accessories, nec*	96	78,299	7	0	0	78,306	66	78,372
		95	153,347	22	0	0	153,369	18	153,387
		94	207,055	318	0	12,526	219,899	24,625	244,524
		88	1,530,020	950	0	18,600	1,549,570	10,327	1,559,897
3491	Industrial Valves	96	397,154	271	0	260	397,685	19,568	417,253
		95	461,766	273	0	505	462,544	16,954	479,498
		94	429,057	22	0	0	429,079	10,214	439,293
		88	13,616	0	0	374	13,990	114,300	128,290
3492	Fluid Power Valves & Hose Fittings	96	42,041	0	0	0	42,041	5,805	47,846
		95	113,624	0	0	0	113,624	8,059	121,683
		94	85,335	0	0	0	85,335	8,291	93,626
		88	357,384	0	0	0	357,384	4,160	361,544
3493	Steel Springs, Except Wire	96	77,500	4	0	0	77,504	4,968	82,472
		95	31,680	500	0	500	32,680	5,570	38,250
		94	29,124	500	0	500	30,124	6,432	36,556
		88	149,997	0	0	0	149,997	83,324	233,321
3494	Valves & Pipe Fittings, nec*	96	246,080	657	0	28,387	275,124	63,222	338,346
		95	445,073	1,079	0	16,597	462,749	60,126	522,875
		94	379,483	1,074	0	31,795	412,352	54,039	466,391
		88	2,229,920	2,262	0	18,905	2,251,087	1,118,995	3,370,082

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 12-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3495	Wire Springs	96	12,602	0	0	0	12,602	12,372	24,974
		95	26,772	0	0	0	26,772	12,853	39,625
		94	106,676	0	0	0	106,676	19,180	125,856
		88	118,327	0	0	0	118,327	1,726	120,053
3496	Misc. Fabricated Wire Products	96	846,804	4,093	0	434	851,331	699,516	1,550,847
		95	1,172,130	719	0	524	1,173,373	163,763	1,337,136
		94	1,283,568	1,692	0	250	1,285,510	181,894	1,467,404
		88	2,747,779	11,345	0	59,491	2,818,615	1,315,814	4,134,429
3497	Metal Foil & Leaf	96	358,873	550	0	66,300	425,723	40,523	466,246
		95	532,665	1,732	0	0	534,397	41,434	575,831
		94	481,614	1,048	0	0	482,662	38,802	521,464
		88	1,246,449	421	0	0	1,246,870	42,391	1,289,261
3498	Fabricated Pipe & Fittings	96	632,902	4,045	0	97,784	734,731	95,250	829,981
		95	625,758	5,081	5	253,208	884,052	83,997	968,049
		94	786,877	8,526	0	220,192	1,015,595	10,417	1,026,012
		88	895,559	30	0	25,020	920,609	52,527	973,136
3499	Fabricated Metal Products, nec*	96	5,329,824	2,411	0	16,559	5,348,794	257,456	5,606,250
		95	5,989,579	2,150	0	18,480	6,010,209	417,962	6,428,171
		94	6,554,956	2,721	0	18,706	6,576,383	309,456	6,885,839
		88	13,588,763	82,133	0	72,521	13,743,417	1,276,892	15,020,309
	Multiple within SIC Code 34	96	4,286,514	5,694	0	134,907	4,427,115	1,284,358	5,711,473
		95	5,207,361	7,308	0	40,604	5,255,273	1,456,899	6,712,172
		94	6,737,816	5,265	0	48,591	6,791,672	1,643,991	8,435,663
		88	10,574,515	10,985	0	252,669	10,838,169	3,146,626	13,984,795
	Invalid SIC Code within SIC Code 34	96	1,588,217	169	0	0	1,588,386	50,435	1,638,821
		95	1,597,955	30	0	250	1,598,235	73,039	1,671,274
		94	1,943,309	35	0	10,149	1,953,493	93,161	2,046,654
		88	3,432,687	32,730	100,000	11,475	3,576,892	497,375	4,074,267
	Total for SIC Code 34	96	65,503,836	79,268	570	728,061	66,311,735	11,298,798	77,610,533
		95	78,389,865	100,161	681	631,871	79,122,578	11,318,363	90,440,941
		94	86,251,804	73,099	1,885	623,380	86,950,168	12,621,888	99,572,056
		88	125,627,135	633,439	154,199	3,991,275	130,406,048	29,963,711	160,369,759

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 12-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3411	Metal Cans	96	258,637	6,163,803	22,829,437	29,251,877
		95	293,875	4,889,951	20,608,164	25,791,990
		94	307,740	3,864,648	23,299,886	27,472,274
		88	NA	NA	NA	NA
3412	Metal Barrels, Drums, & Pails	96	87,895	1,247,496	312,318	1,647,709
		95	201,708	1,445,459	883,816	2,530,983
		94	220,659	1,713,714	1,536,250	3,470,623
		88	NA	NA	NA	NA
3421	Cutlery	96	46,457,548	0	0	46,457,548
		95	64,387,100	0	0	64,387,100
		94	110,554,000	1,365,532	8,000	111,927,532
		88	NA	NA	NA	NA
3423	Hand & Edge Tools, nec*	96	403	0	785,907	786,310
		95	2,476	0	190,000	192,476
		94	10,055	0	101,805	111,860
		88	NA	NA	NA	NA
3425	Saw Blades & Handsaws	96	0	0	0	0
		95	528	0	4,530	5,058
		94	528	0	3,750	4,278
		88	NA	NA	NA	NA
3429	Hardware, nec*	96	6,289,366	29,981	515,788	6,835,135
		95	6,967,251	53,624	501,789	7,522,664
		94	7,147,007	51,389	792,431	7,990,827
		88	NA	NA	NA	NA
3431	Metal Sanitary Ware	96	942,805	0	43,000	985,805
		95	1,981,600	0	47,000	2,028,600
		94	2,740,000	0	51,000	2,791,000
		88	NA	NA	NA	NA
3432	Plumbing Fixture Fittings & Trim	96	8,769,918	0	125,655	8,895,573
		95	2,078,221	0	164,023	2,242,244
		94	1,338,720	0	233,084	1,571,804
		88	NA	NA	NA	NA
3433	Heating Equipment, Except Electric	96	2,464	0	0	2,464
		95	2,950	0	0	2,950
		94	2,810	0	0	2,810
		88	NA	NA	NA	NA
3441	Fabricated Structural Metal	96	64,522	0	31,811	96,333
		95	123,310	0	6,289	129,599
		94	300,500	0	47,209	347,709
		88	NA	NA	NA	NA
3442	Metal Doors, Sash, & Trim	96	36,070	0	28,368	64,438
		95	79,391	0	67,286	146,677
		94	71,383	0	360,069	431,452
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds of treatment on-site and 3,209,773 pounds of other on-site waste management.
*nec: not elsewhere classified.

Table 12-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3443	Fabricated Plate Work (Boiler Shops)	96	5,105	0	1,410,471	1,415,576
		95	9,550	0	1,535,500	1,545,050
		94	6,675	0	1,298,050	1,304,725
		88	NA	NA	NA	NA
3444	Sheet Metal Work	96	68,155	335,100	482,190	885,445
		95	45,416	359,166	578,798	983,380
		94	476,356	263,720	850,990	1,591,066
		88	NA	NA	NA	NA
3446	Architectural Metal Work	96	14,168	0	136,136	150,304
		95	48,884	0	187,832	236,716
		94	29,252	0	169,613	198,865
		88	NA	NA	NA	NA
3448	Prefabricated Metal Buildings	96	6,208,600	0	252,118	6,460,718
		95	6,200,400	0	256,116	6,456,516
		94	6,207,800	0	266,377	6,474,177
		88	NA	NA	NA	NA
3449	Miscellaneous Metal Work	96	168,070	0	123,262	291,332
		95	0	0	72,562	72,562
		94	0	0	78,117	78,117
		88	NA	NA	NA	NA
3451	Screw Machine Products	96	135,700	94,003	197,222	426,925
		95	224,446	0	363,976	588,422
		94	188,722	81,829	303,488	574,039
		88	NA	NA	NA	NA
3452	Bolts, Nuts, Rivets, & Washers	96	28,450	2,100,000	677,436	2,805,886
		95	35,450	0	509,945	545,395
		94	28,185	0	543,423	571,608
		88	NA	NA	NA	NA
3462	Iron & Steel Forgings	96	1,806,295	0	116,304	1,922,599
		95	1,795,000	0	172,047	1,967,047
		94	616,000	10,330	91,791	718,121
		88	NA	NA	NA	NA
3463	Nonferrous Forgings	96	12,789,900	0	66,464	12,856,364
		95	66,800	0	150,377	217,177
		94	76,577	0	206,160	282,737
		88	NA	NA	NA	NA
3465	Automotive Stampings	96	16,848	0	224,856	241,704
		95	33,715	0	235,800	269,515
		94	27,381	0	170,431	197,812
		88	NA	NA	NA	NA
3466	Crowns & Closures	96	No reports received			
		95	0	0	0	0
		94	52,830	0	0	52,830
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds of treatment on-site and 3,209,773 pounds of other on-site waste management.
***nec:** not elsewhere classified.

Table 12-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3469	Metal Stampings, nec*	96	993,999	2,091	665,833	1,661,923
		95	1,091,295	2,372	446,501	1,540,168
		94	1,795,266	522	728,054	2,523,842
		88	NA	NA	NA	NA
3471	Plating & Polishing	96	19,810,694	13,266	24,979,119	44,803,079
		95	8,629,140	14,792	24,437,215	33,081,147
		94	9,868,600	0	26,173,498	36,042,098
		88	NA	NA	NA	NA
3479	Metal Coating & Allied Services	96	645,002	9,999,980	20,495,570	31,140,552
		95	663,769	8,988,691	26,845,295	36,497,755
		94	1,070,017	9,874,535	28,172,972	39,117,524
		88	NA	NA	NA	NA
3482	Small Arms Ammunition	96	500	0	409,152	409,652
		95	500	0	501,520	502,020
		94	500	0	622,525	623,025
		88	NA	NA	NA	NA
3483	Ammunition, Exc. For Small Arms, nec*	96	0	0	0	0
		95	0	0	0	0
		94	3,025	0	0	3,025
		88	NA	NA	NA	NA
3484	Small Arms	96	0	0	12,896	12,896
		95	3,566	0	30,397	33,963
		94	0	0	20,031	20,031
		88	NA	NA	NA	NA
3489	Ordnance & Accessories, nec*	96	1,000	0	17,500	18,500
		95	5,300	0	20,000	25,300
		94	13,555	0	45,870	59,425
		88	NA	NA	NA	NA
3491	Industrial Valves	96	7,980	0	50,000	57,980
		95	6,680	0	6	6,686
		94	6,280	0	20,008	26,288
		88	NA	NA	NA	NA
3492	Fluid Power Valves & Hose Fittings	96	600	0	7,900	8,500
		95	600	0	3,671	4,271
		94	600	0	2,070	2,670
		88	NA	NA	NA	NA
3493	Steel Springs, Except Wire	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3494	Valves & Pipe Fittings, nec*	96	14,223,712	0	45,367	14,269,079
		95	13,565,186	0	76,315	13,641,501
		94	8,632,474	1,000	68,233	8,701,707
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds of treatment on-site and 3,209,773 pounds of other on-site waste management.
*nec: not elsewhere classified.

Table 12-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3495	Wire Springs	96	25,000	0	0	25,000
		95	25,000	0	0	25,000
		94	37,600	0	0	37,600
		88	NA	NA	NA	NA
3496	Misc. Fabricated Wire Products	96	283,909	0	300,921	584,830
		95	732	0	295,209	295,941
		94	20,636	0	503,818	524,454
		88	NA	NA	NA	NA
3497	Metal Foil & Leaf	96	539,848	0	4,518,981	5,058,829
		95	428,107	1,363,000	3,678,721	5,469,828
		94	186,926	1,258,948	3,875,782	5,321,656
		88	NA	NA	NA	NA
3498	Fabricated Pipe & Fittings	96	8,000	0	194,025	202,025
		95	67,710	0	168,053	235,763
		94	22,710	0	83,068	105,778
		88	NA	NA	NA	NA
3499	Fabricated Metal Products, nec*	96	2,211,011	0	1,945,324	4,156,335
		95	2,452,031	770	2,141,963	4,594,764
		94	61,910,007	145,796	2,688,407	64,744,210
		88	NA	NA	NA	NA
	Multiple within SIC Code 34	96	23,284,902	522,460	6,090,065	29,897,427
		95	25,062,439	1,960,808	4,412,996	31,436,243
		94	44,181,211	1,801,172	4,829,329	50,811,712
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 34	96	33,476	468,800	963,799	1,466,075
		95	224,367	273,404	813,476	1,311,247
		94	387,592	293,900	637,289	1,318,781
		88	NA	NA	NA	NA
	Total for SIC Code 34	96	146,220,552	20,976,980	89,055,195	256,252,727
		95	136,804,493	19,352,037	90,407,188	246,563,718
		94	258,540,179	20,727,035	98,882,878	378,150,092
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3999 for 1996. The facility should have reported in SIC code 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds of treatment on-site and 3,209,773 pounds of other on-site waste management.
***nec:** not elsewhere classified.

The plumbing fixture fittings and trim industry (SIC code 3432) reported the sector's largest increase for 1994 to 1996. This industry reported an increase from 26.7 million pounds to 41.5 million pounds. The miscellaneous metal stampings industry (SIC code 3469) reported 24.9 million pounds in 1994 and 31.3 million pounds in 1996, the second-largest increase. Ranking third, the screw machine products industry (SIC code 3451) reported an increase from 12.1 million pounds to 17.8 million pounds. In all three industries, the increases were principally attributable to transfers to recycling.

Table 12-16 presents data for the fabricated metals sector's reporting of transfers off-site for further waste management from 1988 to 1996.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Metal Container Corporation in New Windsor, New York (SIC code 3411), ranked first in increases of releases with 808,000 pounds. A manufacturer of aluminum can bodies (for end use by beer and soft drink producers), this facility reported a 455,000 pound increase in air emissions of glycol ethers between 1988 and 1996 (56% of the overall change). The chemical is a solvent in the coatings used to decorate and protect the cans, according to the facility contact. The solvent is emitted to the air when the coated cans are dried in curing ovens. The facility contact attributed the facility's ranking to lower production in 1988. The facility was built in 1988 and did not reach full production by the end of the reporting year. The contact also stated that the facility plans, this year, to install control equipment that will reduce future air emissions by over 40%.

Metal Impact Corporation in Rosemont, Illinois (did not report in 1988, SIC code 3499 in 1996), was second in increases with 636,000 pounds. Because the facility did not report in 1988, the increase is equal to total releases reported in 1996. Air emissions of tetrachloroethylene accounted for 99.9% of the 1996 releases. The facility contact chose not to comment on the chemical's usage or the reason for the increase.

U.S. Can Company in Weirton, West Virginia (SIC code 3411), ranked third with an overall increase of 581,000 pounds. The metal sheet coating and printing facility uses glycol ethers as a wash-up solvent and as a constituent of the coatings and varnishes applied to metal sheets. The facility contact stated that these solvents, coatings, and varnishes are purchased from outside suppliers. Reported air emissions of the chemical accounted for 71% of the facility's increase. Two reasons were given for the increase: coating and varnish consumption has increased and the facility switched to butyl cellosolve, a glycol ether, as its primary wash-up solvent.

Plateco, Inc., in Reedsburg, Wisconsin (SIC code 3471 in 1988, did not report in 1996), was first in decreases of releases with 4.0 million pounds. The facility is a zinc-plating job shop. Metal fasteners for the automotive industry are among Plateco's primary products. Releases of chromium compounds totaled 1.5 million pounds in 1988. The facility did not submit a Form R in 1995 or 1996. No information was provided by the facility before the deadline for this publication.

Double Eagle Steel Coating Company in Dearborn, Michigan (SIC code 3479), ranked second in decreases with 2.9 million pounds. A manufacturer of electrogalvanized steel automotive body parts, the facility reported no releases of zinc compounds in 1996, accounting for nearly 100% of the decrease. Zinc is the primary constituent of the coating used in the metal galvanization process. Excess zinc compounds were formerly transferred off-site for disposal but are now purified and sold as a product to a battery manufacturer, according to the facility contact.

Table 12-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3411	Metal Cans	96	6,045,016	4,434,501	300,786	1,982	13,800	10,796,085
		95	11,521,736	4,171,986	110,661	8,010	0	15,812,393
		94	11,935,395	4,389,916	136,549	3,798	0	16,465,658
		88	NA	NA	1,755,052	218,686	8,113	NA
3412	Metal Barrels, Drums, & Pails	96	181,164	979,125	19,549	10	0	1,179,848
		95	102,989	1,143,273	247,185	3,806	0	1,497,253
		94	140,621	1,332,243	104,655	4,296	0	1,581,815
		88	NA	NA	1,353,410	7,200	260,375	NA
3421	Cutlery	96	415,202	0	10,818	284	0	426,304
		95	280,749	0	9,375	1,226	0	291,350
		94	402,856	1,638	5,394	2,059	0	411,947
		88	NA	NA	6,040	0	0	NA
3423	Hand & Edge Tools, nec*	96	590,467	3,220	67,074	1,917	0	662,678
		95	274,081	5,047	109,287	1,927	0	390,342
		94	686,609	9,334	99,899	3,698	0	799,540
		88	NA	NA	173,253	4,160	27,788	NA
3425	Saw Blades & Handsaws	96	119,133	0	1,018	13	0	120,164
		95	327,713	0	0	4,598	0	332,311
		94	358,113	0	250	3,811	0	362,174
		88	NA	NA	35,583	2,831	0	NA
3429	Hardware, nec*	96	9,533,569	7,370	121,996	22,763	0	9,685,698
		95	6,744,170	7,034	150,720	17,662	0	6,919,586
		94	6,643,029	10,076	143,052	12,441	0	6,808,598
		88	NA	NA	508,572	368,953	49,639	NA
3431	Metal Sanitary Ware	96	358,251	0	52,941	22	0	411,214
		95	359,829	9,779	181,137	3,817	0	554,562
		94	638,894	5,595	72,838	28	0	717,355
		88	NA	NA	20	1,004	0	NA
3432	Plumbing Fixture Fittings & Trim	96	41,274,389	5,949	165,735	7,167	5	41,453,245
		95	32,062,748	0	166,514	4,279	0	32,233,541
		94	26,344,433	2,460	321,396	8,533	0	26,676,822
		88	NA	NA	111,477	12,631	3,250	NA
3433	Heating Equipment, Except Electric	96	524,113	147,482	14,284	774	0	686,653
		95	763,284	110,324	22,718	530	0	896,856
		94	779,515	155,720	23,651	285	0	959,171
		88	NA	NA	16,008	764	300,000	NA
3441	Fabricated Structural Metal	96	7,105,567	282,509	99,094	29,297	0	7,516,467
		95	902,918	125,160	88,015	25,850	0	1,141,943
		94	1,792,731	175,457	46,463	4,040	0	2,018,691
		88	NA	NA	111,335	83,704	803	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 12-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3442	Metal Doors, Sash, & Trim	96	110,123	271,698	45,742	320	0	427,883
		95	89,833	202,873	42,620	290	0	335,616
		94	85,456	205,524	31,696	10,048	250	332,974
		88	NA	NA	221,494	3,377	0	NA
3443	Fabricated Plate Work (Boiler Shops)	96	4,515,842	43,886	151,680	37,751	31,482	4,780,641
		95	3,980,552	71,703	212,642	14,497	0	4,279,394
		94	4,541,085	76,517	173,431	55,742	90,287	4,937,062
		88	NA	NA	27,740	135,575	5	NA
3444	Sheet Metal Work	96	791,565	76,117	97,337	78,683	5	1,043,707
		95	1,455,902	61,362	235,020	69,530	0	1,821,814
		94	1,667,157	52,333	245,438	32,867	500	1,998,295
		88	NA	NA	283,452	11,590	30,085	NA
3446	Architectural Metal Work	96	384,716	2,177	35,475	15	0	422,383
		95	342,728	67,081	0	0	0	409,809
		94	362,961	71,406	15	15	0	434,397
		88	NA	NA	49,040	3,925	78,750	NA
3448	Prefabricated Metal Buildings	96	126,109	21,152	12,866	755	250	161,132
		95	79,152	64,044	16,022	255	0	159,473
		94	107,191	79,055	6,699	10	0	192,955
		88	NA	NA	50,645	500	1,500	NA
3449	Miscellaneous Metal Work	96	221,576	7,832	3,900	6	0	233,314
		95	180,118	57,081	1,100	47,980	0	286,279
		94	194,963	24,532	0	44,373	0	263,868
		88	NA	NA	83,407	250	0	NA
3451	Screw Machine Products	96	17,710,495	17,194	64,610	1,199	0	17,793,498
		95	13,495,796	91,953	19,230	903	0	13,607,882
		94	11,917,443	48,614	86,560	843	55,128	12,108,588
		88	NA	NA	267,130	16,877	17,781	NA
3452	Bolts, Nuts, Rivets, & Washers	96	740,302	19,047	31,498	2,693	0	793,540
		95	747,803	15,333	34,852	3,366	0	801,354
		94	812,175	7,578	77,521	3,766	33,155	934,195
		88	NA	NA	479,683	55,142	4,358	NA
3462	Iron & Steel Forgings	96	15,728,051	22,785	129,873	13,575	0	15,894,284
		95	19,336,512	748	121,616	20,638	0	19,479,514
		94	13,714,985	10,777	99,528	16,827	3,430	13,845,547
		88	NA	NA	62,223	102,954	0	NA
3463	Nonferrous Forgings	96	1,628,596	459	331,012	1,747	0	1,961,814
		95	1,624,444	968	215,188	3,815	0	1,844,415
		94	2,669,772	0	24,178	1,527	0	2,695,477
		88	NA	NA	514,250	188,746	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 12-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3465	Automotive Stampings	96	10,743,633	62,147	49,906	33,612	0	10,889,298
		95	9,899,277	71,123	122,533	25,087	0	10,118,020
		94	9,568,013	89,425	53,079	5,834	0	9,716,351
		88	NA	NA	204,730	48,897	264,200	NA
3466	Crowns & Closures	96	No reports received					
		95	0	0	0	0	0	0
		94	0	37,100	27,750	0	0	64,850
		88	NA	NA	38,390	500	0	NA
3469	Metal Stampings, nec*	96	30,736,747	301,491	189,218	91,182	5,452	31,324,090
		95	26,786,427	291,442	152,540	110,697	0	27,341,106
		94	24,340,949	187,745	235,176	114,160	0	24,878,030
		88	NA	NA	467,019	1,004,872	1	NA
3471	Plating & Polishing	96	17,633,721	418,158	4,385,981	222,678	250	22,660,788
		95	14,008,357	640,711	2,695,609	205,735	21,990	17,572,402
		94	17,596,775	572,808	2,575,412	211,741	1,250	20,957,986
		88	NA	NA	2,325,740	1,928,136	381,261	NA
3479	Metal Coating & Allied Services	96	21,889,673	4,300,916	1,633,099	1,464,948	0	29,288,636
		95	27,661,672	4,626,145	1,530,203	1,015,950	77,750	34,911,720
		94	25,217,167	4,543,399	2,079,082	508,995	0	32,348,643
		88	NA	NA	3,098,204	460,521	566,805	NA
3482	Small Arms Ammunition	96	7,068,030	10,176	82,660	3,263	0	7,164,129
		95	7,921,453	4,241	51,811	2,787	0	7,980,292
		94	10,957,260	10,649	114,740	3,768	0	11,086,417
		88	NA	NA	1,945	9,750	52,000	NA
3483	Ammunition, Exc. For Small Arms, nec*	96	234,205	1,095	1,205	0	0	236,505
		95	245,500	0	3,505	0	0	249,005
		94	209,797	25,981	514	130	0	236,422
		88	NA	NA	84,049	750	750	NA
3484	Small Arms	96	408,092	12,279	39,496	119	0	459,986
		95	153,947	15,007	28,650	10	0	197,614
		94	91,164	14,877	25,905	5	0	131,951
		88	NA	NA	102,557	142	2,500	NA
3489	Ordnance & Accessories, nec*	96	80,100	200	5,630	73	0	86,003
		95	142,984	550	17,946	34	0	161,514
		94	241,750	1,720	21,200	36	0	264,706
		88	NA	NA	106,420	25,444	0	NA
3491	Industrial Valves	96	3,854,842	1,001	2,525	8,355	0	3,866,723
		95	4,908,065	282	3,520	6,031	0	4,917,898
		94	5,274,399	133	1,796	13,863	0	5,290,191
		88	NA	NA	0	0	59,978	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 12-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Fabricated Metals, SIC Code 34, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3492	Fluid Power Valves & Hose Fittings	96	2,588,247	6,702	1,143	24,906	0	2,620,998
		95	3,378,959	6,297	15,624	13,188	0	3,414,068
		94	3,053,272	6,550	19,612	13,357	0	3,092,791
		88	NA	NA	250	615	0	NA
3493	Steel Springs, Except Wire	96	39,687	0	0	0	0	39,687
		95	39,055	0	0	0	0	39,055
		94	106,764	0	3,000	0	0	109,764
		88	NA	NA	5,300	1,500	0	NA
3494	Valves & Pipe Fittings, nec*	96	23,507,538	8,683	69,197	2,122	0	23,587,540
		95	24,480,591	3,726	97,631	1,826	0	24,583,774
		94	19,096,723	9,059	88,116	3,551	0	19,197,449
		88	NA	NA	82,874	10,259	453,434	NA
3495	Wire Springs	96	34,287	5,337	0	25	0	39,649
		95	24,074	7,176	5,296	25	0	36,571
		94	30,869	0	3,312	25	0	34,206
		88	NA	NA	500	2,099	0	NA
3496	Misc. Fabricated Wire Products	96	4,433,511	17,829	493,284	15,446	0	4,960,070
		95	4,793,620	17,355	399,396	11,311	0	5,221,682
		94	4,131,061	17,489	203,650	14,636	0	4,366,836
		88	NA	NA	430,851	27,657	1,000	NA
3497	Metal Foil & Leaf	96	6,902,837	855,826	461,935	3,625	17,400	8,241,623
		95	7,942,154	936,568	378,345	0	0	9,257,067
		94	9,141,279	712,113	289,894	0	0	10,143,286
		88	NA	NA	949,999	1,418	2,310	NA
3498	Fabricated Pipe & Fittings	96	3,562,584	255	68,744	564	0	3,632,147
		95	2,696,403	10,115	386,748	1,386	0	3,094,652
		94	3,260,904	2,310	328,539	16,740	0	3,608,493
		88	NA	NA	180,611	12,248	2,056	NA
3499	Fabricated Metal Products, nec*	96	11,315,170	252,790	723,652	136,393	0	12,428,005
		95	16,827,327	611,273	614,381	168,817	516	18,222,314
		94	16,280,483	477,411	700,151	308,928	0	17,766,973
		88	NA	NA	1,454,680	280,606	2,691,269	NA
	Multiple within SIC Code 34	96	47,216,141	608,809	666,815	178,826	2,900	48,673,491
		95	66,928,862	746,374	795,924	199,099	0	68,670,259
		94	50,830,296	786,297	780,940	277,427	1,370	52,676,330
		88	NA	NA	2,041,925	187,742	264,096	NA
	Invalid SIC Code within SIC Code 34	96	1,727,460	327,042	229,988	357	0	2,284,847
		95	1,650,058	113,462	11,013	567	0	1,775,100
		94	1,547,092	36,549	25,813	69,342	0	1,678,796
		88	NA	NA	712,357	355,543	39,626	NA
	Total for SIC Code 34	96	302,080,751	13,533,239	10,861,766	2,387,467	71,544	328,934,767
		95	315,161,842	14,307,596	9,294,577	1,995,529	100,256	340,859,800
		94	286,771,401	14,190,390	9,276,894	1,771,545	185,370	312,195,600
		88	NA	NA	18,398,215	5,577,568	5,563,733	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 34 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Crown Cork & Seal Company, Inc., in Winchester, Virginia (SIC code 3411), was third in decreases with 2.4 million pounds. Metal is cut and coated to customer specifications at this plant. Reported reductions in air emissions of xylene (mixed isomers), a constituent of solvent-based coatings and used as a wash-up solvent, accounted for 76% of the facility's total decrease. Coating processes were eliminated at the plant resulting in a significant reduction in xylene usage.

1991-1996 Waste Management Data for Fabricated Metals

Table 12-17 summarizes on- and off-site waste management data for the fabricated metals sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). From 1991 to 1996, the sector reported a 5.9% increase in total production-related waste, from 639.3 million pounds to 676.8 million pounds.

This 37.5 million-pound increase in total production-related waste reflected a larger increase in reporting of off-site recycling, partly offset by sizable reductions in on-site recycling and quantities released. The sector reported 233.2 million pounds of off-site recycling in 1991 and 318.6 million pounds in 1996, an increase of 36.6% or 85.4 million pounds. At the same time, on-site recycling decreased 13.0%, from 168.0 million pounds to 146.2 million pounds (a 21.8 million-pound reduction), and quantities released decreased 34.8%, from 118.4 million pounds to 77.2 million pounds (a 41.2 million-pound reduction).

Other waste management types showed smaller absolute changes. The sector reported increases in on-site energy recovery (from 17.2 million pounds to 21.0 million pounds), on-site treatment (from 76.5 million pounds to 89.1 million pounds), and off-site energy recovery (from 12.9 million pounds to 13.4 million pounds). These increases ranged from 22.3% for on-site energy recovery to 3.9% for off-site energy recovery. The sector reported a 13.1% decrease in off-site treatment (from 13.1 million pounds to 11.4 million pounds).

Figure 12-13 shows the percentage changes for on- and off-site waste management types.

These changes indicate substantial improvement in the fabricated metals sector's management of TRI chemicals in waste over time. Specifically, they show a shift from releases to recycling. The proportion of total production-related waste reported as releases decreased (from 18.5% in 1991 to 11.4% in 1996), while the proportion of total production-related waste recycled on- and off-site increased (from 62.8% to 68.7%). In terms of the waste management hierarchy (explained in Chapter 1), recycling is the most desirable method for managing waste that cannot be prevented, while releases are the least desirable waste management option.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

American Safety Razor, Inc., in Verona, Virginia (SIC code 3421), ranked first in increases of waste managed with a 40.7 million-pound increase. A manufacturer of products ranging from industrial razor blades to surgical scalpels, the facility uses trichloroethylene as a degreaser. Reported on-site recycling of the chemical accounted for 100% of the increase. According to the facility contact, the increase in on-site recycling was likely due to a change in interpretation of how to report this category.[1]

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[1] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

Table 12-17. TRI Waste Management Data, 1991, 1994-1996: Fabricated Metals, SIC Code 34

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	168,024,776	258,540,179	136,804,493	146,220,552
Energy Recovery On-site	17,153,824	20,727,035	19,352,037	20,976,980
Treated On-site	76,466,086	98,882,878	90,407,188	89,055,195
Total On-site Waste Management	261,644,686	378,150,092	246,563,718	256,252,727
Off-site Waste Management				
Recycled Off-site	233,163,866	298,902,616	315,297,383	318,552,041
Energy Recovery Off-site	12,944,794	14,307,407	14,530,472	13,448,619
Treated Off-site	13,103,332	11,540,713	11,208,922	11,389,617
Total Off-site Waste Management	259,211,992	324,750,736	341,036,777	343,390,277
Quantity Released On- and Off-site	118,413,991	100,079,501	89,133,446	77,165,101
Total Production-related Waste	639,270,669	802,980,329	676,733,941	676,808,105
Non-Production-related Waste	908,811	94,112	185,465	144,777

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-47.1	6.9	-13.0
Energy Recovery On-site	-6.6	8.4	22.3
Treated On-site	-8.6	-1.5	16.5
Total On-site Waste Management	-34.8	3.9	-2.1
Off-site Waste Management			
Recycled Off-site	5.5	1.0	36.6
Energy Recovery Off-site	1.6	-7.4	3.9
Treated Off-site	-2.9	1.6	-13.1
Total Off-site Waste Management	5.0	0.7	32.5
Quantity Released On- and Off-site	-10.9	-13.4	-34.8
Total Production-related Waste	-15.7	0.0	5.9
Non-Production-related Waste	97.1	-21.9	-84.1

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

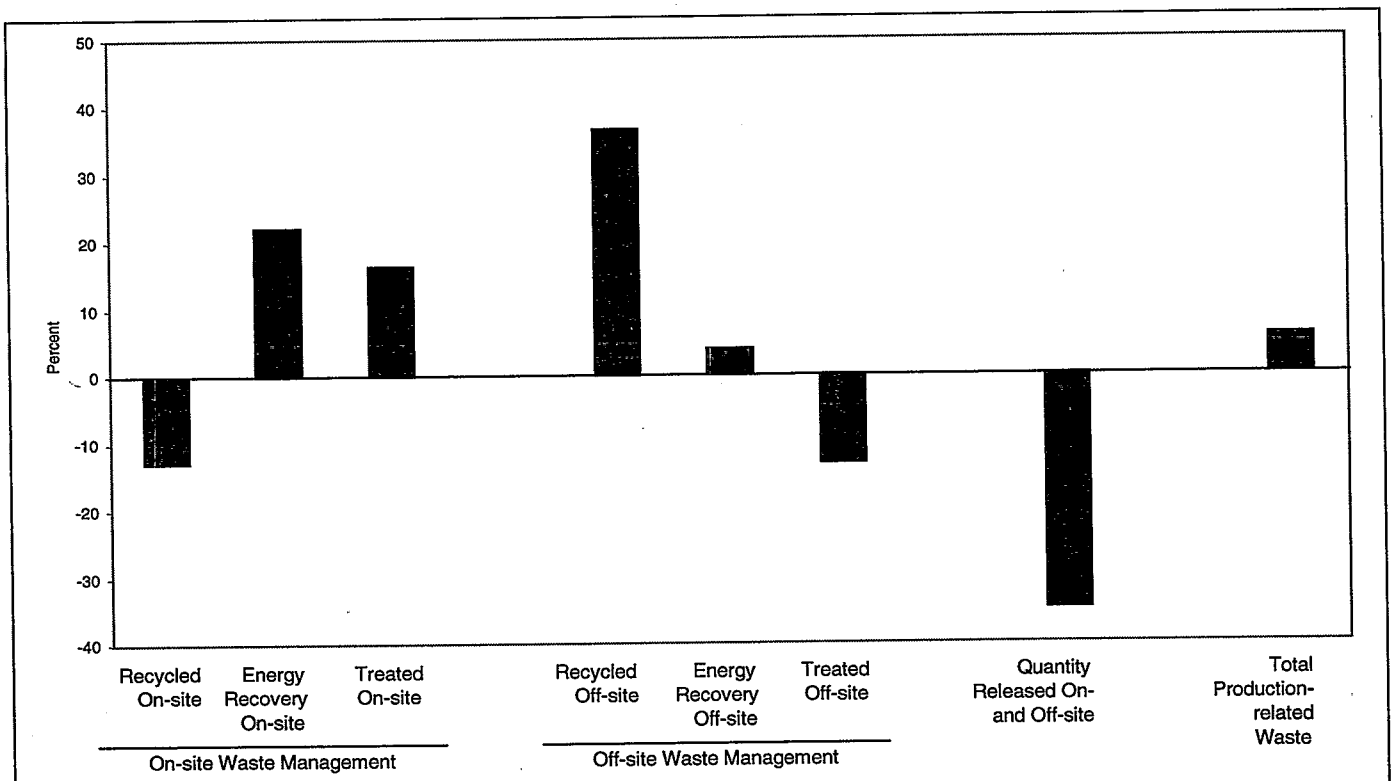


Figure 12-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Fabricated Metals (SIC Code 34)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

Ilco Unican Corporation in Rocky Mount, North Carolina (SIC codes 3429, 3469, 3471), was second in increases with 12.3 million pounds. Reported on- and off-site recycling of copper compounds accounted for 79% of the increase. No data were reported in either category in 1991. This facility manufactures keys and produces brass on site. Copper is a constituent of brass. The facility contact stated that no recycling data were reported for copper compounds in 1991 because the recycling system had not yet been implemented.

A.Y. MacDonald Manufacturing Company in Dubuque, Iowa (SIC code 3494), was the third ranking facility with an 11.7 million-pound increase. A manufacturer of brass castings, this facility provides service products for oil, water, and gas service industries. On- and off-site recycling of copper between 1991 and 1996 increased a reported 11.0 million pounds (94% of the overall increase). Excess brass is remelted and recast at the plant. The facility contact stated that two reasons likely contributed to the increase: a change in interpretation of how to calculate recycling data[2] and a production increase.

Warner-Lambert Company in Milford, Connecticut (SIC code 3421), ranked first in decreases of waste managed with a 70.5 million-pound decrease. The facility, a razor blade manufacturer, replaced a solvent degreasing

[2] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

system with an aqueous cleaning process. The process substitution resulted in the elimination of trichloroethylene usage at the plant. In 1991, 70.4 million pounds of trichloroethylene were managed as waste.

Double Eagle Steel Coating Company in Dearborn, Michigan (SIC code 3479), was second in decreases with 40.7 million pounds. The facility also ranked second in decreases of releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996"). The manufacturer of galvanized metal auto-body parts formerly sent zinc waste off-site for recycling. Prior to the 1996 reporting year, the facility began purifying zinc from waste and selling it as a product to a battery manufacturer. This process and a reporting interpretation change resulted in a 40.6 million-pound decrease in reported waste management of zinc compounds. No data were reported for zinc in 1996. Aeroquip Corporation in Van Wert, Ohio (SIC code 3429, 3471, 3492), was third in decreases with 3.7 million pounds. The manufacturer of industrial connectors reported 2.2 million-pounds less off-site recycling of copper in 1996 than 1991. This accounted for 61% of the overall change. The reason for the decrease was elimination of some products, according to the facility contact.

Other Apparent Increases and Decreases in Production-Related Waste, 1991-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the metal finishing sector:

Signet Systems, Inc., Harrodsburg, Kentucky, decrease of 43.9 million pounds, reported incorrect SIC code.

Facilities Contacted for Explanations (alphabetical by facility):

A.Y. MacDonald Manufacturing Company, Dubuque, Iowa: Jim Houtakker, October 15, 1998 (explanation provided)

Aeroquip Corporation, Van Wert, Ohio: Brian Delucenay, October 19, 1998 (explanation provided)

American Safety Razor, Inc., Verona, Virginia: Thomas N. Gay, October 15, 1998 (explanation provided)

Crown Cork & Seal Company, Inc., Winchester, Virginia: Charles M. Heck, October 19, 1998 (explanation provided)

Double Eagle Steel Coating Company, Dearborn, Michigan: Andrew Yaksic, September 29, 1998 (explanation provided)

Ilco Unican Corporation, Rocky Mount, North Carolina: Brian E. Wells, September 29, 1998 (explanation provided)

Metal Container Corporation, New Windsor, New York: Bob Lanham, October 22, 1998 (explanation provided)

Metal Impact Corporation, Rosemont, Illinois (no explanation provided)

Plateco, Inc., Reedsburg, Wisconsin (no explanation provided)

Signet Systems, Inc., Harrodsburg, Kentucky: Stephen J. Evans, September 4, 1998 (explanation provided)

U.S. Can Company, Weirton, West Virginia: Scott McCuen, September 29, 1998 and Nathan Sohocki, October 2, 1998 (explanation provided)

Warner-Lambert Company, Milford, Connecticut: Scott Sutkowski, September 4, 1998 (explanation provided)

Chapter 13

Toxics Release Inventory Data for Industrial Machinery (SIC Code 35)

A Look at the Industrial and Commercial Machinery and Computer Equipment Industry (SIC Code 35)

The industrial machinery sector (SIC code 35) manufactures machinery for agriculture, construction, mining, and oil and gas extraction. The sector produces industrial engines, as well as elevators, escalators, conveyors, cranes, hoists, and monorails. It also manufactures industrial trucks and related equipment, such as forklifts. This sector produces machinery and equipment for metalworking, including machine tools, dies and tools, and rolling mill machinery. Other products include machinery for special industries such as textile manufacture, woodworking, paper production, printing, and food processing. General industrial machinery manufactured in SIC code 35 includes pumps, compressors, high-speed drives and gears, and furnaces and ovens. Other major industry groups in this sector are computer and office equipment, and refrigeration and service industry machinery. Although computers are classified in SIC code 35, electronic components such as semiconductors and circuit boards are classified in the electrical equipment sector (SIC code 36).

Box 13-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

Shipments in the industrial machinery sector rose from $353.34 billion in 1995 to $381.79 billion in 1996 (both in current dollars). Employment totaled nearly 2.0 million in both years. Although the sector experienced a sharp drop in production from 1989 to 1991, rapid recovery followed. By 1996, industrial machinery production had increased 51.8% over 1989 levels, compared to an increase of 17.6% for all U.S. manufacturing. Only the electrical equipment sector (SIC code 36) grew faster (90.3%) during that period (see Chapter 1, Table 1-10).

The computers and office equipment industry (SIC code 357 at the three-digit level) shipped products valued at $103.27 billion, more than one-fourth of the sector's value of shipments in 1996. However, this industry group contributed only one-eighth of the sector's 1996 employment (259,000 employees). This industry group has provided much of the sector's growth in the 1990s.

Box 13-1. SIC Code 35, Industrial and Commercial Machinery and Computer Equipment: Codes and Classifications

SIC Code		Industry Description
351	**Engines and Tubines**	
3511	Steam, Gas, and Hydraulic Turbines and Turbine Generator Set Units	Manufacture of steam turbines, hydraulic turbines, gas turbines except aircraft, and complete steam, gas, and hydraulic turbine generator sets. Manufacture of wind- and solar-powered turbine generators and windmills for generating electric power.
3519	Internal Combustion Engines, nec*	Manufacture of miscellaneous diesel, semidiesel, or other internal combustion engines for stationary, marine, traction, and other uses.
352	**Farm and Garden Machinery and Equipment**	
3523	Farm Machinery and Equipment	Manufacture of farm machinery and equipment, including wheel tractors, for use in preparing and maintaining the soil, planting and harvesting crops, preparing crops for market on the farm, or performing other farm operations. Manufacture of commercial mowing equipment and equipment for other turf and grounds care.
3524	Lawn and Garden Tractors and Home Lawn and Garden Equipment	Manufacture of lawnmowers, lawn and garden tractors, and other equipment used for home lawn and garden care. Manufacture of snowblowers and throwers for residential use.
353	**Construction, Mining, and Materials Handling Machinery and Equipment**	
3531	Construction Machinery and Equipment	Manufacture of heavy machinery and equipment of a type used primarily by the construction industries, such as bulldozers, concrete mixers, non-industrial type cranes, dredging machinery, pavers, and power shovels. Manufacture of forestry equipment. Manufacture of miscellaneous specialized equipment, similar to that used by construction industries, such as elevating platforms, ship cranes and capstans, aerial work platforms, and automobile wrecker hoists.
3532	Mining Machinery and Equipment, Except Oil and Gas Field Machinery and Equipment	Manufacture of heavy machinery and equipment used by mining industries, such as coal breakers, mine cars, mineral-cleaning machinery, concentration machinery, core drills, coal cutters, portable rock drills, and rock-crushing machinery.
3533	Oil and Gas Field Machinery and Equipment	Manufacture of machinery and equipment for use in oil and gas fields or for drilling water wells, including portable drilling rigs. (Excludes manufacture of offshore oil and gas well drilling and production platforms.)
3534	Elevators and Moving Stairways	Manufacture of passenger or freight elevators, automobile lifts, dumbwaiters, and moving stairways.
3535	Conveyors and Conveying Equipment	Manufacture of conveyors and conveying equipment for installation in factories, warehouses, mines, and other industrial and commercial establishments.
3536	Overhead Traveling Cranes, Hoists, and Monorails	Manufacture of overhead traveling cranes, hoists, and monorail systems for installation in factories, warehouses, marinas, and other industrial and commercial establishments.
3537	Industrial Trucks, Tractors, Trailers, and Stackers	Manufacture of industrial trucks, tractors, trailers, stackers (truck type), and related equipment used for handling materials on floors and paved surfaces in and around industrial and commercial plants, depots, docks, airports, and terminals.
354	**Metalworking Machinery and Equipment**	
3541	Machine Tools, Metal Cutting Types	Manufacture of metal-cutting type machine tools, not handheld, that shape metal by cutting or use of electrical techniques. Rebuilding of such machine tools. Manufacture of replacement parts for such machine tools.
3542	Machine Tools, Metal Forming Types	Manufacture of metal-forming machine tools, not handheld, for pressing, hammering, extruding, shearing, die-casting, or otherwise forming metal into shape. Rebuilding of such machine tools. Manufacture of repair parts for such machine tools.
3543	Industrial Patterns	Manufacture of industrial patterns.
3544	Special Dies and Tools, Die Sets, Jigs and Fixtures, and Industrial Molds	Manufacture, on a job or order basis, of special tools and fixtures for use with machine tools, hammers, die-casting machines, and presses. (Known as contract tool and die shops.) Includes production of a wide variety of special toolings, such as dies, punches, die sets and components, jigs and fixtures, and special checking devices.
3545	Cutting Tools, Machine Tool Accessories, and Machinists' Precision Measuring Devices	Manufacture of cutting tools, machinists' precision measuring tools, and miscellaneous attachments and accessories for machine tools and for other metalworking machinery.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 13-1. SIC Code 35, Industrial and Commercial Machinery and Computer Equipment: Codes and Classifications, Continued

SIC Code		Industry Description
3546	Power-driven Handtools	Manufacture of power-driven handtools, such as drills, pneumatic and snagging grinders, and electric hammers.
3547	Rolling Mill Machinery and Equipment	Manufacture of rolling mill machinery and processing equipment for metal production, such as cold forming mills, structural mills, and finishing equipment.
3548	Electric and Gas Welding and Soldering Equipment	Manufacture of electric and gas welding and soldering equipment and accessories. Coating of welding wire.
3549	Metalworking Machinery, nec*	Manufacture of miscellaneous metalworking machinery.
355	**Special Industrial Machinery, Except Metalworking Machinery**	
3552	Textile Machinery	Manufacture of machinery for the textile industries, including parts, attachments, and accessories.
3553	Woodworking Machinery	Manufacture of machinery for sawmills, for making particleboard and similar products, and for otherwise working or producing wood products..
3554	Paper Industries Machinery	Manufacture of machinery for the pulp, paper, and paper product industries.
3555	Printing Trades Machinery and Equipment	Manufacture of machinery and equipment used by the printing and bookbinding trades.
3556	Food Products Machinery	Manufacture of machinery for use by the food products and beverage manufacturing industries and of similar machinery for use in manufacturing animal foods.
3559	Special Industry Machinery, nec*	Manufacture of miscellaneous special industry machinery, such as smelting and refining equipment, cement making, clayworking, cotton ginning, glass making, and numerous others.
356	**General Industrial Machinery and Equipment**	
3561	Pumps and Pumping Equipment	Manufacture of pumps and pumping equipment for general industrial, commercial, or household use, except fluid power pumps and motors. (Includes production of domestic water and sump pumps.)
3562	Ball and Roller Bearings	Manufacture of ball and roller bearings and parts.
3563	Air and Gas Compressors	Manufacture of air and gas compressors for general industrial use. Manufacture of non-agricultural spraying and dusting equipment.
3564	Industrial and Commercial Fans and Blowers and Air Purification Equipment	Manufacture of industrial and commercial blowers, industrial and commercial exhaust and ventilating fans, and attic fans. Manufacture of dust collection and other air purification equipment for heating, ventilating, and air-conditioning systems or for industrial gas cleaning systems.
3565	Packaging Machinery	Manufacture of packing machinery, including wrapping and bottling machinery.
3566	Speed Changers, Industrial High-Speed Drives, and Gears	Manufacture of speed changers, industrial high-speed drives (except hydrostatic drives), and gears.
3567	Industrial Process Furnaces and Ovens	Manufacture of industrial process furnaces, ovens, induction and dielectric heating equipment, and related devices.
3568	Mechanical Power Transmission Equipment, nec*	Manufacture of miscellaneous mechanical power transmission equipment and parts, for industrial machinery.
3569	General Industrial Machinery and Equipment, nec*	Manufacture of machinery, equipment, and components for general industrial use, for which no special classification is provided.
357	**Computer and Office Equipment**	
3571	Electronic Computers	Manufacture of electronic computers, which store programs and data needed to execute programs, can be freely programmed in accordance with the user's requirements, perform user-specified arithmetical computations, and execute (without human intervention) a processing program which requires them to modify their execution by logical decision during the processing run. Includes digital, analog, and hybrid digital/analog computers.
3572	Computer Storage Devices	Manufacture of computer storage devices (including disk drives, magnetic storage devices, optical storage devices, and others).
3573	Computer Terminals	Manufacture of computer terminals.

***nec:** not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 13-1. SIC Code 35, Industrial and Commercial Machinery and Computer Equipment: Codes and Classifications, Continued

SIC Code		Industry Description
3577	Computer Peripheral Equipment, nec*	Manufacture of miscellaneous computer peripheral equipment, including printers, plotters, and graphic displays. (Excludes modems and other communications interface equipment.)
3578	Calculating and Accounting Machines, Except Electronic Computers	Manufacture of point-of-sale devices, funds transfer devices, and other calculating and accounting machines, except electronic computers. Includes electronic calculating and accounting machines which must be paced by operator intervention.
3579	Office Machines, nec*	Manufacture of miscellaneous office machines and devices, including typewriters and word processing equipment.
358	**Refrigeration and Service Industry Machinery**	
3581	Automatic Vending Machines	Manufacture of automatic vending machines and coin-operated mechanisms for such machines.
3582	Commercial Laundry, Drycleaning, and Pressing Machines	Manufacture of laundry and drycleaning equipment and pressing machines for commercial and industrial use.
3585	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment	Manufacture of refrigeration equipment and systems and similar equipment for commercial and industrial use; complete air-conditioning units for domestic, commercial, and industrial use; and warm air furnaces. Includes soda fountains, beer dispensing equipment, and non-portable humidifiers and dehumidifiers.
3586	Measuring and Dispensing Pumps	Manufacture of measuring and dispensing pumps commonly used in service stations for dispensing gasoline, oil, and grease, including grease guns.
3589	Service Industry Machinery, nec*	Manufacture of miscellaneous machines and equipment for use in service industries, such as floor sanders, industrial vacuum cleaners, scrubbing machines, commercial cooking and food warming equipment, and commercial dishwashers.
359	**Miscellaneous Industrial and Commercial Machinery and Equipment**	
3592	Carburetors, Pistons, Piston Rings, and Valves	Manufacture of carburetors, pistons, piston rings, and engine intake and exhaust valves.
3593	Fluid Power Cylinders and Actuators	Manufacture of hydraulic and pneumatic cylinders and actuators for use in fluid power systems.
3594	Fluid Power Pumps and Motors	Manufacture of hydraulic and pneumatic fluid power pumps and motors, including hydrostatic transmissions.
3596	Scales and Balances, Except Laboratory	Manufacture of weighing and force-measuring machines and devices of all types, except those regarded as scientific apparatus for laboratory work.
3599	Industrial and Commercial Machinery and Equipment, nec*	Manufacture of miscellaneous machinery and equipment, such as amusement park equipment, flexible metal hose and tubing, filters for internal combustion engines except motor vehicle engines, ship and boat propellers, and other products. Includes production or repair of miscellaneous machinery and equipment parts on a job or order basis.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Rubber and Plastics Industry,* Sector Notebook project, EPA/310-R-95-016, September 1995 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

Six major industry groups shipped products valued at $35 billion to $42 billion each in 1996. These were construction machinery (SIC code 353), metalworking machinery (SIC code 354), special industry machinery (SIC code 355), general industrial machinery (SIC code 356), refrigeration and service machinery (SIC code 358), and miscellaneous industrial machinery (SIC code 359). Employment in these more labor-intensive machinery manufacturing groups ranged from 192,000 to 392,000, or roughly one-tenth to one-fifth of the sector's total. These industry groups are particularly sensitive to the economic conditions that influence the decisions of companies in other sectors about major equipment purchases.

At the four-digit SIC code level, one industry in this sector—refrigeration and heating equipment (SIC code 3585)—reported the largest TRI releases and waste management in almost all categories. This industry shipped $28.09 billion in products in 1996 and employed 135,000. Only two four-digit industries in SIC code 35 had a higher dollar value of shipments: electronic computers (SIC code 3571) with $59.41 billion and miscellaneous industrial machinery (SIC code 3599) with $30.75 billion. The United States' ban on the production of ozone-depleting chlorofluorocarbons (CFCs), once widely used as refrigerants, has helped stimulate this industry to new production of alternative air conditioning and refrigeration equipment.

This sector produces the machinery and equipment that makes possible much of the business conducted in other sectors of the economy, including manufacturing, construction, and farming. Some processes used in this sector are similar to those applied in other sectors, such as metal fabrication (SIC code 34), electrical equipment (SIC code 36), or transportation equipment (SIC code 37). Basic production processes in metal fabrication consist of casting and molding, shearing and forming (cutting and bending materials), machining, heat treatment, finishing, and assembly. In SIC code 35, these processes and others are applied in building farm, construction, and mining equipment, among other products. Industrial machinery may be built to be powered electrically, by turbines, or by other means. Machines produced in this sector vary in their degree of automation, ranging from mechanical repetition of a single process such as stamping to programmable computer-aided manufacturing. Producers of industrial machinery may specialize in discrete products such as drills or conveyors, or they may offer manufacturing systems which integrate a variety of machine tools, robots, materials-handling equipment, and other components.

As in other industrial sectors with comparable processes, chemical and electrochemical finishing processes and solvent-based cleaning and surface preparation represent potentially significant sources of chemical releases and waste.

1996 TRI Data for Industrial Machinery

Table 13-1 summarizes TRI reporting by the industrial machinery sector for 1996. The sector submitted 2,791 forms in 1996. Of these, 172 were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The refrigeration and heating equipment industry (SIC code 3585) submitted the most forms (455) in the industrial machinery sector in 1996, as shown in Table 13-1. These forms represented 16.3% of all forms submitted by the sector. The construction machinery industry (SIC code 3531) ranked second with 202 forms, or 7.2% of the total. Three other industries submitted more than 150 forms each: farm machinery (SIC code 3523) with 179 forms, miscellaneous internal combustion engines (SIC code 3519) with 163 forms, and ball and roller bearings (SIC code 3562) with 152. These

Table 13-1. Summary of TRI Information by 4-digit SIC Code, 1996: Industrial Machinery, SIC Code 35

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
16	12	3511	Turbines & Turbine Generator Sets	14	44	0	50,502	239,962	290,464
4	2	3519	Internal Combustion Engines, nec*	39	163	4	1,108,520	360,442	1,468,962
2	9	3523	Farm Machinery & Equipment	70	179	7	3,696,779	49,435	3,746,214
20	39	3524	Lawn & Garden Equipment	15	37	0	237,539	2,000	239,539
3	4	3531	Construction Machinery	55	202	16	2,058,727	87,770	2,146,497
35	32	3532	Mining Machinery	18	37	4	64,708	2,633	67,341
23	20	3533	Oil & Gas Field Machinery	26	62	2	181,321	55,091	236,412
10	27	3534	Elevators & Moving Stairways	10	35	4	519,167	340	519,507
15	29	3535	Conveyors & Conveying Equipment	19	36	0	292,900	1,250	294,150
40	24	3536	Hoists, Cranes, & Monorails	7	19	1	36,123	9,142	45,265
12	31	3537	Industrial Trucks & Tractors	24	58	4	387,267	1,055	388,322
37	22	3541	Machine Tools, Metal Cutting Types	20	42	1	37,965	23,822	61,787
43	26	3542	Machine Tools, Metal Forming Types	5	19	6	21,669	14,250	35,919
44	48	3543	Industrial Patterns	4	6	2	12,578	13,028	25,606
39	18	3544	Special Dies, Tools, Jigs & Fixtures	26	52	2	46,025	6,586	52,611
8	8	3545	Machine Tool Accessories	29	50	2	215,916	372,165	588,081
30	28	3546	Power-driven Handtools	12	30	2	96,427	4,610	101,037
51	51	3547	Rolling Mill Machinery	6	12	0	6,548	2,730	9,278
22	16	3548	Welding Apparatus	16	46	0	169,966	67,332	237,298
41	46	3549	Metalworking Machinery, nec*	3	7	0	37,307	3,000	40,307
50	50	3552	Textile Machinery	2	4	0	8,974	1,005	9,979
47	44	3553	Woodworking Machinery	2	6	0	12,443	4,860	17,303
36	19	3554	Paper Industries Machinery	13	35	2	62,067	1,000	63,067
7	11	3555	Printing Trades Machinery	8	14	0	777,800	0	777,800
32	25	3556	Food Products Machinery	11	35	3	29,467	54,199	83,666
14	7	3559	Special Industry Machinery, nec*	34	72	7	264,655	62,574	327,229
13	6	3561	Pumps & Pumping Equipment	54	137	19	246,520	81,107	327,627
9	5	3562	Ball & Roller Bearings	71	152	2	255,047	279,177	534,224
18	34	3563	Air & Gas Compressors	17	42	0	220,791	33,303	254,094
24	37	3564	Blowers & Fans	19	47	11	154,214	64,323	218,537
49	47	3565	Packaging Machinery	1	5	0	11,708	0	11,708
21	30	3566	Speed Changers, Drives, & Gears	20	45	2	143,585	95,276	238,861
26	35	3567	Industrial Furnaces & Ovens	12	33	0	138,565	2,005	140,570
11	14	3568	Power Transmission Equipment, nec*	20	54	1	421,861	10,409	432,270
19	13	3569	General Industrial Machinery, nec*	24	56	5	228,260	13,008	241,268
46	36	3571	Electronic Computers	8	12	2	18,226	0	18,226
33	15	3572	Computer Storage Devices	9	13	0	26,165	49,389	75,554
42	33	3577	Computer Peripheral Equipment, nec*	7	16	0	37,352	0	37,352
29	17	3579	Office Machines, nec*	5	24	1	105,818	250	106,068
34	42	3581	Automatic Vending Machines	7	22	0	71,030	399	71,429
38	23	3582	Commercial Laundry Equipment	5	11	0	54,707	1,005	55,712
1	1	3585	Refrigeration & Heating Equipment	167	455	39	4,268,454	219,070	4,487,524
48	49	3586	Measuring & Dispensing Pumps	2	3	2	16,751	0	16,751
25	40	3589	Service Industry Machinery, nec*	18	41	11	157,174	716	157,890
5	10	3592	Carburetors, Pistons, Rings, Valves	23	58	2	748,486	441,260	1,189,746
45	41	3593	Fluid Power Cylinders & Actuators	9	18	0	18,323	2,038	20,361
27	38	3594	Fluid Power Pumps & Motors	10	26	1	113,049	17,776	130,825
31	45	3596	Scales & Balances, Exc. Laboratory	2	6	0	98,118	0	98,118
17	21	3599	Industrial Machinery, nec*	30	54	2	254,234	790	255,024
6	3		Multiple within SIC Code 35	50	145	1	843,947	107,727	951,674
28	43		Invalid SIC Code within SIC Code 35	9	14	2	115,386	280	115,666
			Total for SIC Code 35	1,087	2,791	172	19,201,131	2,859,589	22,060,720

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 2,400,000 pounds of transfers off-site for further waste management and total production-related waste for 1996 under SIC code 3519. The correct amount is 0 pounds.
*nec: not elsewhere classified.

Table 13-1. Summary of TRI Information by 4-digit SIC Code, 1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3511	Turbines & Turbine Generator Sets	110,000	2,944,632	3,374,973	0
3519	Internal Combustion Engines, nec*	2,942,385	5,952,228	10,359,010	2,000
3523	Farm Machinery & Equipment	276,749	1,164,499	4,898,949	100
3524	Lawn & Garden Equipment	95,045	222,728	539,710	0
3531	Construction Machinery	1,239,596	3,989,008	7,138,631	529
3532	Mining Machinery	144,449	799,431	904,925	0
3533	Oil & Gas Field Machinery	115,054	1,178,995	1,536,110	53
3534	Elevators & Moving Stairways	26,457	508,795	1,056,587	0
3535	Conveyors & Conveying Equipment	78,394	621,168	970,787	0
3536	Hoists, Cranes, & Monorails	196	1,068,560	1,124,463	0
3537	Industrial Trucks & Tractors	76,898	457,560	936,755	0
3541	Machine Tools, Metal Cutting Types	151,507	774,313	1,204,474	0
3542	Machine Tools, Metal Forming Types	110,785	911,399	1,057,520	0
3543	Industrial Patterns	12,583	0	50,517	0
3544	Special Dies, Tools, Jigs & Fixtures	555,089	1,206,295	2,126,666	0
3545	Machine Tool Accessories	4,293,055	718,154	5,557,467	9,727
3546	Power-driven Handtools	267,400	645,943	1,014,644	0
3547	Rolling Mill Machinery	0	9,378	19,156	0
3548	Welding Apparatus	733,440	1,453,950	2,498,423	0
3549	Metalworking Machinery, nec*	0	25,498	65,940	0
3552	Textile Machinery	12,543	3,850	26,125	0
3553	Woodworking Machinery	12,000	92,972	122,090	0
3554	Paper Industries Machinery	186,700	1,062,137	1,584,220	0
3555	Printing Trades Machinery	2,539,620	328,386	3,642,423	0
3556	Food Products Machinery	192,800	796,071	1,061,656	0
3559	Special Industry Machinery, nec*	3,090,146	2,434,372	5,911,808	0
3561	Pumps & Pumping Equipment	1,141,917	4,266,884	6,488,298	131
3562	Ball & Roller Bearings	1,456,014	4,614,161	6,628,850	4
3563	Air & Gas Compressors	55,221	463,503	769,766	0
3564	Blowers & Fans	1,200	416,688	622,815	1,550
3565	Packaging Machinery	0	40,593	52,200	0
3566	Speed Changers, Drives, & Gears	76,000	456,554	960,370	0
3567	Industrial Furnaces & Ovens	121,205	400,410	667,001	1
3568	Power Transmission Equipment, nec*	145,087	2,201,832	2,932,825	2,000
3569	General Industrial Machinery, nec*	1,311,465	1,301,759	2,996,350	28
3571	Electronic Computers	150	619,366	637,738	0
3572	Computer Storage Devices	31,901	2,674,599	2,855,026	15
3577	Computer Peripheral Equipment, nec*	360,570	488,782	903,889	0
3579	Office Machines, nec*	1,219,067	2,101,577	2,367,813	0
3581	Automatic Vending Machines	12,915	57,475	142,826	0
3582	Commercial Laundry Equipment	0	1,113,704	1,167,185	0
3585	Refrigeration & Heating Equipment	34,663,897	12,875,748	65,533,355	33,990
3586	Measuring & Dispensing Pumps	0	15,649	32,400	0
3589	Service Industry Machinery, nec*	26,490	1,305,120	492,237	0
3592	Carburetors, Pistons, Rings, Valves	722,607	2,414,647	4,437,830	5
3593	Fluid Power Cylinders & Actuators	6,000	282,186	372,136	1,800
3594	Fluid Power Pumps & Motors	150	426,507	568,667	4,307
3596	Scales & Balances, Exc. Laboratory	17,500	4,534	120,654	0
3599	Industrial Machinery, nec*	429,712	987,719	1,414,154	10
	Multiple within SIC Code 35	119,543	5,084,962	7,414,126	0
	Invalid SIC Code within SIC Code 35	800	68,557	123,212	0
	Total for SIC Code 35	59,182,302	74,053,838	169,485,752	56,250

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 2,400,000 pounds of transfers off-site for further waste management and total production-related waste for 1996 under SIC code 3519. The correct amount is 0 pounds.
***nec:** not elsewhere classified.

industries each represented roughly 6% of the sector's 1996 submissions.

The refrigeration and heating equipment industry (SIC code 3585) also ranked first in the industrial machinery sector for all categories of TRI reporting summarized in Table 13-1, except off-site releases. This industry reported 4.5 million pounds of total on- and off-site releases, including 4.3 million pounds of on-site releases. These amounts were more than 20% of the sector's total on- and off-site releases of 22.1 million pounds and on-site releases of 19.2 million pounds. The refrigeration and heating equipment industry also reported 34.7 million pounds of other on-site waste management, 58.6% of the sector's 59.2 million-pound total. The industry reported 12.9 million pounds of transfers off-site for further waste management, which was 17.4% of the sector's total of 74.1 million pounds in that category. Refrigeration and heating equipment also accounted for 65.5 million pounds of total production-related waste, 38.7% of the sector total of 169.5 million pounds.

For both on-site releases and total releases, the farm machinery industry (SIC code 3523) ranked second and the construction machinery industry (SIC code 3531) ranked third. The farm machinery industry reported 3.7 million pounds of total releases, almost all as on-site releases. This industry accounted for 19.3% of the sector's on-site releases and 17.0% of the total releases. The construction machinery industry reported 2.1 million pounds of on-site releases and total releases, which was 10.7% and 9.7%, respectively, of the sector's total amounts in those categories.

The carburetors, pistons, rings, and valves industry (SIC code 3592) ranked first for off-site releases reported in the industrial machinery sector, with 441,000 pounds. This was 15.4% of the sector's total of 2.9 million pounds. The machine tool accessories industry (SIC code 3545) reported the second-largest off-site releases, with 372,000 pounds (13.0%). Ranking third, the miscellaneous internal combustion engines industry (SIC code 3519) reported 360,000 pounds (12.6%).
The machine tool accessories industry (SIC code 3545) reported 4.3 million pounds of other on-site waste management, or 7.3% of the sector's total. The miscellaneous special industry machinery industry (SIC code 3559) reported 3.1 million pounds (5.2%). These industries ranked second and third for other on-site waste management, after the refrigeration and heating equipment industry (SIC code 3585).

Miscellaneous internal combustion engines (SIC code 3519) ranked second for transfers off-site for further waste management with 6.0 million pounds (8.0%) and second for total production-related waste with 10.4 million pounds (6.1%). However, both of these amounts included 2.4 million pounds of aluminum that one facility reported in error. Only fume and dust forms of aluminum are reportable to TRI, but the aluminum that this facility sent to recycling was dross, a waste material that is neither fume nor dust. Taking into account this error, forms reporting more than one SIC code in SIC code 35 ("multiple-codes" forms) ranked second for off-site transfers (with 5.1 million pounds, or 6.9%), and ball roller bearings (SIC code 3562) ranked third (with 4.6 million pounds, or 6.2%). The "multiple-codes" forms ranked third for total production-related waste (with 7.4 million pounds, or 4.4%). (The "multiple-codes" forms are explained below.)

Multiple SIC Codes in SIC Code 35

Some facilities in the industrial machinery sector manufacture distinct, but related, products that are classified in different SIC codes. A facility that produces equipment for farm use such as tractors or harvesters (SIC code 3523) may also produce lawn and garden equipment (SIC code 3524). A facility may produce machinery for use in oil and gas fields (SIC code 3533) and also manufacture pumps and pumping equipment (SIC code 3561). Such facilities may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains

reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Table 13-2 further examines multiple-codes reporting in SIC code 35 in 1996. The most frequent combination in this sector, reported on 17 forms, was farm machinery (SIC code 3523) and construction machinery (SIC code 3531). This combination also reported the largest total on- and off-site releases (302,000 pounds) and the second-largest total production-related waste (1.2 million pounds) among multiple-codes groups in SIC code 35. The combination of mining machinery (SIC code 3532), hoists, cranes, and monorails (SIC code 3536) and miscellaneous general industrial machinery (SIC code 3569) submitted 12 forms. This group ranked first among multiple-codes forms for total production-related waste, reporting 2.3 million pounds. Machinery for paper industries (SIC code 3554) and miscellaneous special industry machinery (SIC code

Table 13-2. Multiple SIC Codes, 1996: Industrial Machinery, SIC Code 35

SIC Codes			Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3519	3523		2	0	12,645	258	12,903	0	69,092	81,989	0
3519	3531		8	0	109,976	0	109,976	18,212	62,400	190,812	0
3523	3524		8	0	80,673	0	80,673	1,250	691,699	632,373	0
3523	3531		17	0	300,922	910	301,832	2,000	874,477	1,177,578	0
3523	3534		1	0	28,676	0	28,676	0	1,966	30,642	0
3523	3535		3	0	12	0	12	0	0	12	0
3523	3546		5	0	32,374	0	32,374	0	19,000	230,074	0
3523	3556		3	0	260	0	260	0	0	25	0
3524	3564		1	0	20	0	20	0	97,000	97,020	0
3531	3535		1	0	52,000	0	52,000	0	750	52,520	0
3531	3563		1	0	250	0	250	0	750	855	0
3531	3569		2	0	60,718	0	60,718	1,733	17,425	90,331	0
3532	3536	3569	12	0	250	0	250	0	1,705,366	2,261,561	0
3533	3561		3	0	0	0	0	0	30,718	30,718	0
3535	3569		2	0	998	0	998	0	46,306	46,306	0
3536	3546		1	0	1,850	0	1,850	0	0	1,850	0
3536	3559		1	0	10,148	0	10,148	0	1,350	11,498	0
3541	3545		2	0	9,489	0	9,489	5,884	21,996	31,208	0
3541	3547	3599	2	0	20	11,400	11,420	0	0	10,700	0
3542	3544		3	0	826	0	826	0	750	831	0
3543	3564	3585	1	0	7,000	0	7,000	0	4,105	10,007	0
3545	3544		1	0	15	0	15	24,000	1,500	25,520	0
3552	3582	3599	6	0	9,562	0	9,562	11,290	346,877	367,259	0
3553	3559		2	0	1,068	0	1,068	0	48,900	49,968	0
3554	3559		12	0	33,099	83,824	116,923	28,483	365,277	498,008	0
3555	3567		3	0	0	638	638	0	67,903	68,541	0
3556	3559		5	0	0	0	0	0	71,505	71,380	0
3561	3563		4	0	38	3,868	3,906	0	156,862	160,768	0
3561	3569		5	0	0	2,386	2,386	0	21,470	701,146	0
3561	3589		1	0	5	0	5	0	11,413	14,415	0
3561	3599		3	0	650	750	1,400	0	1,250	3,340	0
3562	3566	3568	4	0	218	0	218	0	155,726	155,944	0
3563	3592		3	0	224	0	224	12,927	27,697	40,848	0
3564	3599		4	1	157	1,500	1,657	0	46,180	46,337	0
3566	3568		6	0	264	450	714	0	98,968	99,682	0
3569	3586		3	0	29,581	1,743	31,324	13,764	12,571	56,237	0
3569	3599		2	0	32,939	0	32,939	0	1,063	34,003	0
3581	3585		2	0	27,020	0	27,020	0	4,650	31,820	0
Total for SIC Code 35			145	1	843,947	107,727	951,674	119,543	5,084,962	7,414,126	0

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

3559), also reported on 12 forms, ranked second for total on- and off-site releases, with 117,000 pounds.

On- and Off-site Releases

The industrial machinery sector reported 19.0 million pounds of air emissions and 2.9 million pounds of off-site releases (transfers to disposal), as shown in Table 13-3. These amounts represented 86.3% and 13.0%, respectively, of the sector's total reported releases in 1996. Surface water discharges, on-site releases to RCRA subtitle C landfills, and other on-site land releases each made up 0.5% or

Table 13-3. TRI On-site and Off-site Releases, 1996: Industrial Machinery, SIC Code 35 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3585	Refrigeration & Heating Equipment	4,263,085	3,110	0	0	5	2,254	4,268,454	219,070	4,487,524
3523	Farm Machinery & Equipment	3,696,455	224	0	0	0	100	3,696,779	49,435	3,746,214
3531	Construction Machinery	1,981,020	24,374	0	0	0	53,333	2,058,727	87,770	2,146,497
3519	Internal Combustion Engines, nec*	1,107,851	192	0	0	0	477	1,108,520	360,442	1,468,962
3592	Carburetors, Pistons, Rings, Valves	748,476	10	0	0	0	0	748,486	441,260	1,189,746
	Multiple within SIC Code 35	836,499	1,273	0	0	0	6,175	843,947	107,727	951,674
3555	Printing Trades Machinery	777,550	250	0	0	0	0	777,800	0	777,800
3545	Machine Tool Accessories	200,122	0	0	0	0	15,794	215,916	372,165	588,081
3562	Ball & Roller Bearings	221,141	376	0	0	6,889	26,641	255,047	279,177	534,224
3534	Elevators & Moving Stairways	519,152	0	0	0	0	15	519,167	340	519,507
3568	Power Transmission Equipment, nec*	420,845	505	0	0	0	511	421,861	10,409	432,270
3537	Industrial Trucks & Tractors	386,992	255	0	0	0	20	387,267	1,055	388,322
3561	Pumps & Pumping Equipment	245,033	54	0	0	0	1,433	246,520	81,107	327,627
3559	Special Industry Machinery, nec*	263,639	260	0	0	0	756	264,655	62,574	327,229
3535	Conveyors & Conveying Equipment	292,645	0	0	0	0	255	292,900	1,250	294,150
3511	Turbines & Turbine Generator Sets	48,402	1,600	0	0	0	500	50,502	239,962	290,464
3599	Industrial Machinery, nec*	253,464	255	0	0	250	265	254,234	790	255,024
3563	Air & Gas Compressors	218,578	23	0	0	0	2,190	220,791	33,303	254,094
3569	General Industrial Machinery, nec*	228,260	0	0	0	0	0	228,260	13,008	241,268
3524	Lawn & Garden Equipment	236,852	0	0	0	0	687	237,539	2,000	239,539
3566	Speed Changers, Drives, & Gears	143,580	0	0	0	0	5	143,585	95,276	238,861
3548	Welding Apparatus	169,966	0	0	0	0	0	169,966	67,332	237,298
3533	Oil & Gas Field Machinery	181,003	264	0	0	0	54	181,321	55,091	236,412
3564	Blowers & Fans	154,213	1	0	0	0	0	154,214	64,323	218,537
3589	Service Industry Machinery, nec*	157,174	0	0	0	0	0	157,174	716	157,890
3567	Industrial Furnaces & Ovens	137,775	0	0	0	0	790	138,565	2,005	140,570
3594	Fluid Power Pumps & Motors	113,049	0	0	0	0	0	113,049	17,776	130,825
	Invalid SIC Code within SIC Code 35	115,386	0	0	0	0	0	115,386	280	115,666
3579	Office Machines, nec*	105,818	0	0	0	0	0	105,818	250	106,068
3546	Power-driven Handtools	96,154	23	0	0	0	250	96,427	4,610	101,037
3596	Scales & Balances, Exc. Laboratory	98,118	0	0	0	0	0	98,118	0	98,118
3556	Food Products Machinery	28,957	510	0	0	0	0	29,467	54,199	83,666
3572	Computer Storage Devices	26,165	0	0	0	0	0	26,165	49,389	75,554
3581	Automatic Vending Machines	71,030	0	0	0	0	0	71,030	399	71,429
3532	Mining Machinery	64,703	5	0	0	0	0	64,708	2,633	67,341
3554	Paper Industries Machinery	59,429	20	0	0	0	2,618	62,067	1,000	63,067
3541	Machine Tools, Metal Cutting Types	37,965	0	0	0	0	0	37,965	23,822	61,787
3582	Commercial Laundry Equipment	53,957	0	0	0	0	750	54,707	1,005	55,712
3544	Special Dies, Tools, Jigs & Fixtures	45,525	500	0	0	0	0	46,025	6,586	52,611
3536	Hoists, Cranes, & Monorails	35,873	0	0	0	0	250	36,123	9,142	45,265
3549	Metalworking Machinery, nec*	37,307	0	0	0	0	0	37,307	3,000	40,307
3577	Computer Peripheral Equipment, nec*	37,102	0	0	0	0	250	37,352	0	37,352
3542	Machine Tools, Metal Forming Types	21,669	0	0	0	0	0	21,669	14,250	35,919
3543	Industrial Patterns	12,578	0	0	0	0	0	12,578	13,028	25,606
3593	Fluid Power Cylinders & Actuators	17,014	5	0	0	0	1,304	18,323	2,038	20,361
3571	Electronic Computers	18,226	0	0	0	0	0	18,226	0	18,226
3553	Woodworking Machinery	12,443	0	0	0	0	0	12,443	4,860	17,303
3586	Measuring & Dispensing Pumps	16,751	0	0	0	0	0	16,751	0	16,751
3565	Packaging Machinery	11,708	0	0	0	0	0	11,708	0	11,708
3552	Textile Machinery	8,974	0	0	0	0	0	8,974	1,005	9,979
3547	Rolling Mill Machinery	3,124	0	0	0	0	3,424	6,548	2,730	9,278
	Total for SIC Code 35	19,038,797	34,089	0	0	7,144	121,101	19,201,131	2,859,589	22,060,720

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category.
*nec: not elsewhere classified.

less of the sector's total releases. The industrial machinery sector reported no underground injection. Figure 13-1 displays the distribution of the industrial machinery sector's releases by type.

The refrigeration and heating equipment industry (SIC code 3585) reported 4.3 million pounds of air emissions, 22.4% of the sector's total air emissions in 1996. Emissions reported by the refrigeration and heating equipment industry included 1.4 million pounds of chlorodifluoromethane (HCFC-22) and 835,000 pounds of trichloroethylene. Farm machinery (SIC code 3523) ranked second for releases to air with 3.7 million pounds of air emissions (19.4%), including 2.2 million pounds of xylenes. Construction machinery (SIC code 3531) ranked third with 2.0 million pounds (10.4%).

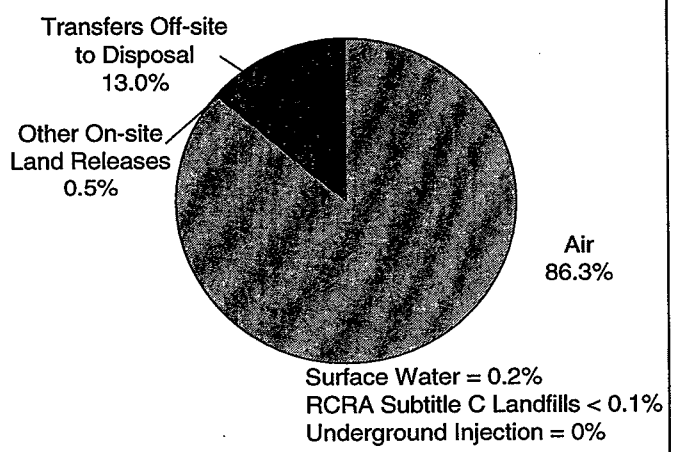


Figure 13-1. Distribution of TRI On-site and Off-site Releases, 1996: Industrial Machinery (SIC Code 35)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

As noted, the carburetors, pistons, rings, and valves industry (SIC code 3592) ranked first among industrial machinery industries for off-site releases, with 441,000 pounds, followed by machine tool accessories (SIC code 3545), with 372,000 pounds, and miscellaneous internal combustion engines industry (SIC code 3519), with 360,000 pounds. These amounts ranged from 12.6% to 15.4% of the sector's total off-site releases.

Figure 13-2 shows the distribution of on- and off-site releases for the industries (four- digit SIC code) with the sector's largest releases.

Other On-site Waste Management

The industrial machinery sector reported 49.6 million pounds of on-site recycling in 1996, as shown in Table 13-4. This amount accounted for 83.8% of the sector's other on-site waste management. Almost all of the remainder was reported as on-site treatment: 9.4 million pounds, or 15.9% of the total. Only two of the 50 industry groups in SIC code 35—industrial furnaces and ovens (SIC code 3567) and construction machinery (SIC code 3531)—reported energy recovery, for a total of 131,000 pounds, or 0.2% of the sector's total other on-site waste management. Figure 13-3 illustrates the distribution of other on-site waste management data for the industrial machinery sector.

The refrigeration and heating equipment industry (SIC code 3585) reported more than two-thirds (69.1%) of the sector's on-site recycling. This industry reported 34.3 million pounds of on-site recycling, including 22.2 million pounds of 1,1,1-trichloroethane (TCA). Three facilities in the refrigeration and heating equipment industry, owned by the same parent company, reported a total of 21.3 million pounds of on-site recycling of TCA. (As described later in this chapter, amounts reported by these facilities represented reductions from earlier years.) Ranking second for on-site recycling, the machine tool accessories industry (SIC code 3545) reported 4.2 million pounds, 8.4% of the sector's total. The miscellaneous internal combustion engines industry (SIC code 3519) ranked third with 2.4 million pounds (4.7%).

Miscellaneous special industry machinery (SIC code 3559) accounted for one-third (32.4%) of the sector's on-site treatment, with 3.1 million pounds. Miscellaneous general industrial machinery (SIC code 3569) ranked second for on-site treatment

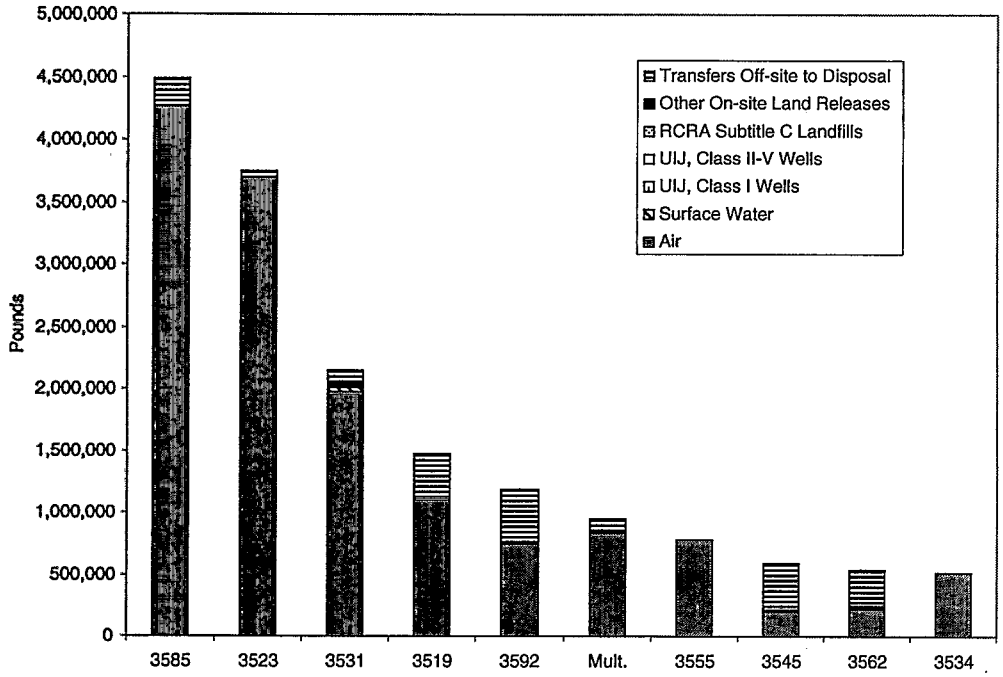


Figure 13-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Industrial Machinery (SIC Code 35)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal). UIJ = underground injection. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category.

with 1.3 million pounds (13.9%). Printing trades machinery (SIC code 3555) ranked third with 759,000 pounds (8.0%).

Figure 13-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

Transfers to recycling accounted for the majority of transfers off-site for further waste management reported by the industrial machinery sector in 1996, as shown in Table 13-5. The sector reported 64.0 million pounds of transfers to recycling, 86.4% of the sector's total transfers off-site for further waste management. The sector also reported 2.5 million pounds (3.4%) of transfers to energy recovery, 1.3 million pounds (1.8%) of transfers to treatment, and 4.2 million pounds (5.6%) of transfers to POTWs. Figure 13-5 illustrates the distribution of these transfers by type.

The refrigeration and heating equipment industry (SIC code 3585) reported 12.4 million pounds of transfers to recycling, 19.3% of the total transfers to recycling. This amount included 7.1 million pounds of copper. Ranking second in this category, the miscellaneous internal combustion engines industry (SIC code 3519) reported 5.1 million pounds (8.0%), including 2.6 million pounds of aluminum. However, as noted above, one facility in SIC code 3519 reported in error 2.4 million pounds of aluminum transferred off-site to recycling. Taking into account this error, the multiple-codes forms in SIC code 35 ranked second in this category with 5.0 million pounds (7.8%), and ball and roller bearings (SIC code 3562) ranked third with 4.5 million pounds (7.0%).

Table 13-4. TRI Other On-site Waste Management, 1996: Industrial Machinery, SIC Code 35 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3585	Refrigeration & Heating Equipment	34,289,502	0	374,395	34,663,897
3545	Machine Tool Accessories	4,180,054	0	113,001	4,293,055
3559	Special Industry Machinery, nec*	31,166	0	3,058,980	3,090,146
3519	Internal Combustion Engines, nec*	2,355,177	0	587,208	2,942,385
3555	Printing Trades Machinery	1,780,420	0	759,200	2,539,620
3562	Ball & Roller Bearings	1,398,000	0	58,014	1,456,014
3569	General Industrial Machinery, nec*	0	0	1,311,465	1,311,465
3531	Construction Machinery	749,326	20,702	469,568	1,239,596
3579	Office Machines, nec*	909,155	0	309,912	1,219,067
3561	Pumps & Pumping Equipment	1,141,917	0	0	1,141,917
3548	Welding Apparatus	634,040	0	99,400	733,440
3592	Carburetors, Pistons, Rings, Valves	667,344	0	55,263	722,607
3544	Special Dies, Tools, Jigs & Fixtures	238,351	0	316,738	555,089
3599	Industrial Machinery, nec*	185,656	0	244,056	429,712
3577	Computer Peripheral Equipment, nec*	4,100	0	356,470	360,570
3523	Farm Machinery & Equipment	128,223	0	148,526	276,749
3546	Power-driven Handtools	10,000	0	257,400	267,400
3556	Food Products Machinery	192,800	0	0	192,800
3554	Paper Industries Machinery	0	0	186,700	186,700
3541	Machine Tools, Metal Cutting Types	775	0	150,732	151,507
3568	Power Transmission Equipment, nec*	30,415	0	114,672	145,087
3532	Mining Machinery	126,000	0	18,449	144,449
3567	Industrial Furnaces & Ovens	11,205	110,000	0	121,205
	Multiple within SIC Code 35	75,052	0	44,491	119,543
3533	Oil & Gas Field Machinery	73,992	0	41,062	115,054
3542	Machine Tools, Metal Forming Types	110,785	0	0	110,785
3511	Turbines & Turbine Generator Sets	0	0	110,000	110,000
3524	Lawn & Garden Equipment	0	0	95,045	95,045
3535	Conveyors & Conveying Equipment	5,194	0	73,200	78,394
3537	Industrial Trucks & Tractors	76,898	0	0	76,898
3566	Speed Changers, Drives, & Gears	76,000	0	0	76,000
3563	Air & Gas Compressors	54,870	0	351	55,221
3572	Computer Storage Devices	0	0	31,901	31,901
3589	Service Industry Machinery, nec*	90	0	26,400	26,490
3534	Elevators & Moving Stairways	26,457	0	0	26,457
3596	Scales & Balances, Exc. Laboratory	17,500	0	0	17,500
3581	Automatic Vending Machines	0	0	12,915	12,915
3543	Industrial Patterns	12,583	0	0	12,583
3552	Textile Machinery	0	0	12,543	12,543
3553	Woodworking Machinery	12,000	0	0	12,000
3593	Fluid Power Cylinders & Actuators	6,000	0	0	6,000
3564	Blowers & Fans	1,200	0	0	1,200
	Invalid SIC Code within SIC Code 35	800	0	0	800
3536	Hoists, Cranes, & Monorails	0	0	196	196
3571	Electronic Computers	0	0	150	150
3594	Fluid Power Pumps & Motors	0	0	150	150
3547	Rolling Mill Machinery	0	0	0	0
3549	Metalworking Machinery, nec*	0	0	0	0
3565	Packaging Machinery	0	0	0	0
3582	Commercial Laundry Equipment	0	0	0	0
3586	Measuring & Dispensing Pumps	0	0	0	0
	Total for SIC Code 35	49,613,047	130,702	9,438,553	59,182,302

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

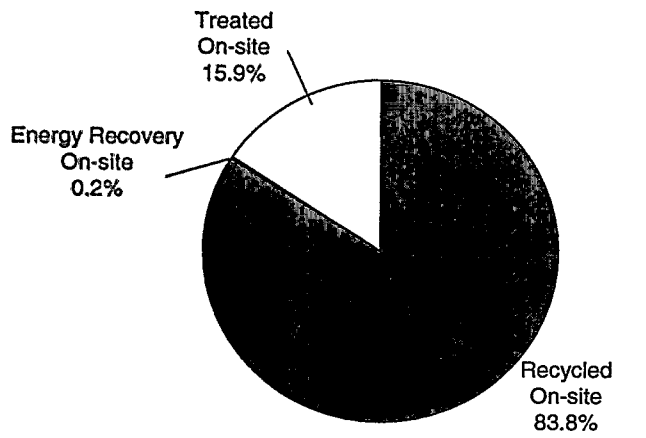


Figure 13-3. Distribution of TRI Other On-site Waste Management, 1996: Industrial Machinery (SIC Code 35)

Note: Data from Section 8 of Form R.

The construction machinery industry (SIC code 3531) ranked first in the industrial machinery sector for transfers to energy recovery, with 682,000 pounds (26.9% of the total). The miscellaneous internal combustion engines industry (SIC code 3519) ranked second with 375,000 pounds (14.8%), and the electronic computers industry (SIC code 3571) ranked third with 363,000 pounds (14.3%).

The miscellaneous general industrial machinery industry (SIC code 3569) reported the sector's largest amount—235,000 pounds—of transfers to treatment. This represented 17.8% of all transfers to treatment reported by the industrial machinery sector. The machine tool accessories industry (SIC code 3545) ranked second with 190,000 pounds (14.4%). Ranking third, the carburetors, pistons, rings, and valves industry (SIC code 3592) reported 92,000 pounds (7.0%) of transfers to treatment.

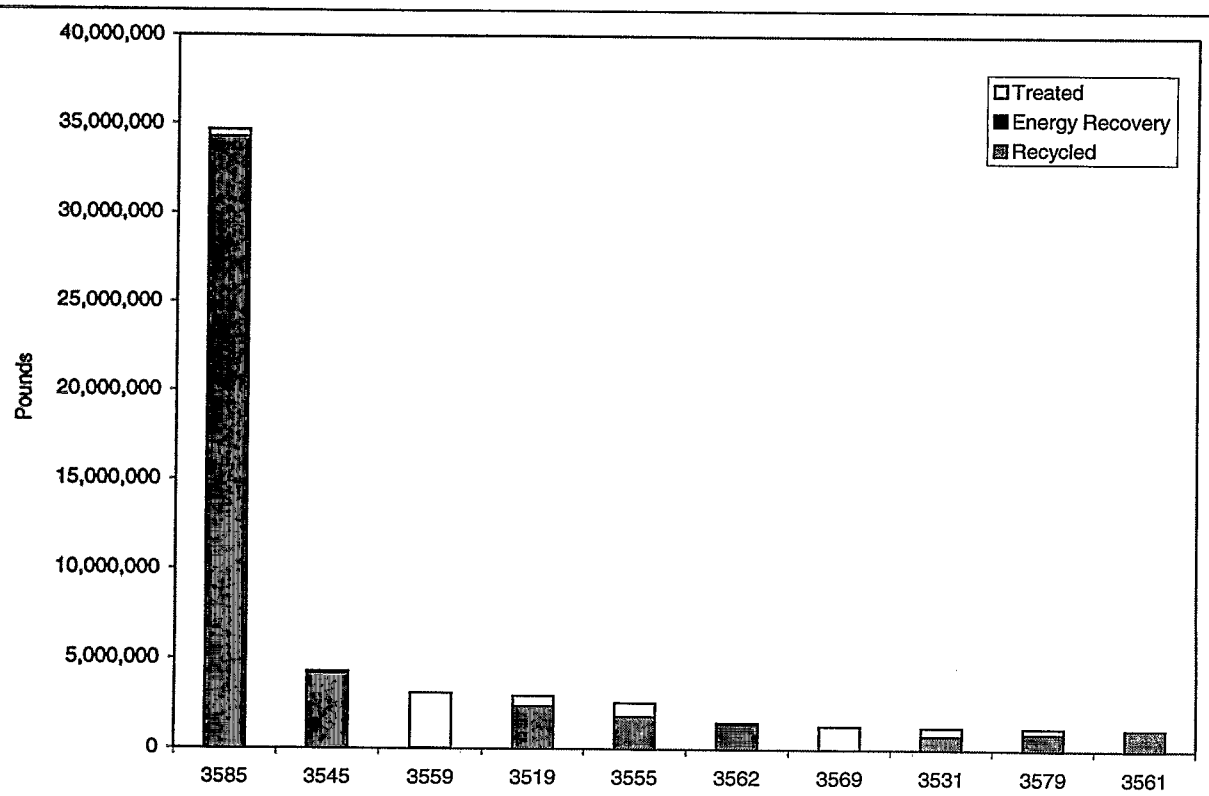


Figure 13-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Industrial Machinery (SIC Code 35)

Note: Other On-site Waste Management from Section 8 of Form R.

Table 13-5. TRI Transfers Off-site for Further Waste Management, 1996: Industrial Machinery, SIC Code 35 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3585	Refrigeration & Heating Equipment	12,377,624	157,697	68,322	272,105	0	12,875,748
3519	Internal Combustion Engines, nec*	5,125,182	375,260	31,921	419,865	0	5,952,228
	Multiple within SIC Code 35	4,994,499	44,598	45,636	229	0	5,084,962
3562	Ball & Roller Bearings	4,494,328	22,528	33,003	64,302	0	4,614,161
3561	Pumps & Pumping Equipment	4,157,134	81,910	8,288	19,552	0	4,266,884
3531	Construction Machinery	3,109,494	681,866	84,605	113,043	0	3,989,008
3511	Turbines & Turbine Generator Sets	2,901,025	14,900	28,622	85	0	2,944,632
3572	Computer Storage Devices	1,678,134	20,374	1,489	974,602	0	2,674,599
3559	Special Industry Machinery, nec*	2,316,637	32,050	78,939	6,746	0	2,434,372
3592	Carburetors, Pistons, Rings, Valves	2,297,465	110	92,391	24,681	0	2,414,647
3568	Power Transmission Equipment, nec*	1,938,420	30,301	68,730	163,881	500	2,201,832
3579	Office Machines, nec*	64,669	10,685	53,305	1,555	1,971,363	2,101,577
3548	Welding Apparatus	1,352,673	12,405	17,487	71,385	0	1,453,950
3589	Service Industry Machinery, nec*	313,860	750	0	990,510	0	1,305,120
3569	General Industrial Machinery, nec*	760,029	79,194	234,717	227,069	750	1,301,759
3544	Special Dies, Tools, Jigs & Fixtures	1,149,656	11,602	44,707	330	0	1,206,295
3533	Oil & Gas Field Machinery	1,141,523	30,095	7,089	288	0	1,178,995
3523	Farm Machinery & Equipment	795,998	259,187	19,184	90,130	0	1,164,499
3582	Commercial Laundry Equipment	1,112,474	1,200	0	30	0	1,113,704
3536	Hoists, Cranes, & Monorails	1,062,448	6,110	0	2	0	1,068,560
3554	Paper Industries Machinery	1,044,724	0	14,795	0	2,618	1,062,137
3599	Industrial Machinery, nec*	957,933	4,050	25,711	25	0	987,719
3542	Machine Tools, Metal Forming Types	866,494	14,283	30,622	0	0	911,399
3532	Mining Machinery	797,376	0	1,900	155	0	799,431
3556	Food Products Machinery	750,449	0	30,261	15,361	0	796,071
3541	Machine Tools, Metal Cutting Types	693,466	0	13,907	19,940	47,000	774,313
3545	Machine Tool Accessories	508,532	0	190,208	19,414	0	718,154
3546	Power-driven Handtools	451,365	3,359	840	190,379	0	645,943
3535	Conveyors & Conveying Equipment	591,538	25,423	1,870	0	2,337	621,168
3571	Electronic Computers	228,356	362,581	28,419	10	0	619,366
3534	Elevators & Moving Stairways	445,990	62,545	0	260	0	508,795
3577	Computer Peripheral Equipment, nec*	61,290	6,600	7,590	413,302	0	488,782
3563	Air & Gas Compressors	459,003	4,159	69	272	0	463,503
3537	Industrial Trucks & Tractors	352,630	82,616	1,000	21,314	0	457,560
3566	Speed Changers, Drives, & Gears	456,513	0	21	20	0	456,554
3594	Fluid Power Pumps & Motors	420,212	5,408	0	887	0	426,507
3564	Blowers & Fans	405,787	7,042	3,837	22	0	416,688
3567	Industrial Furnaces & Ovens	365,674	34,236	0	500	0	400,410
3555	Printing Trades Machinery	296,000	3,443	28,938	5	0	328,386
3593	Fluid Power Cylinders & Actuators	273,763	0	8,316	107	0	282,186
3524	Lawn & Garden Equipment	165,727	12,491	4	44,506	0	222,728
3553	Woodworking Machinery	89,907	2,810	250	5	0	92,972
	Invalid SIC Code within SIC Code 35	58,411	0	7,920	1,113	1,113	68,557
3581	Automatic Vending Machines	29,445	27,022	1,000	8	0	57,475
3565	Packaging Machinery	40,593	0	0	0	0	40,593
3549	Metalworking Machinery, nec*	25,450	0	48	0	0	25,498
3586	Measuring & Dispensing Pumps	15,649	0	0	0	0	15,649
3547	Rolling Mill Machinery	9,378	0	0	0	0	9,378
3596	Scales & Balances, Exc. Laboratory	3,534	0	1,000	0	0	4,534
3552	Textile Machinery	3,600	0	0	250	0	3,850
3543	Industrial Patterns	0	0	0	0	0	0
	Total for SIC Code 35	64,012,061	2,530,890	1,316,961	4,168,245	2,025,681	74,053,838

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 2,400,000 pounds of transfers to recycling for 1996 under SIC code 3519. The correct amount is 0 pounds. The rank of SIC code 3519 for transfers to recycling changes from 2 to 7 and for total off-site transfers for further waste management changes from 2 to 6.
***nec:** not elsewhere classified.

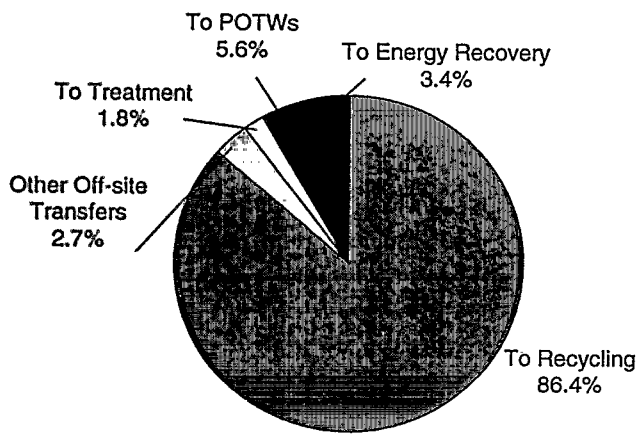


Figure 13-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Industrial Machinery (SIC Code 35)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

For transfers to POTWs, the miscellaneous service industry machinery industry (SIC code 3589) and the computer storage devices industry (SIC code 3572) reported comparable amounts, ranking first and second in the sector. Miscellaneous service industry machinery accounted for 991,000 pounds of transfers to POTWs and computer storage devices for 975,000 pounds of such transfers. These amounts represented approximately 24% each of the sector's total transfers to POTWs. Ranking third, the miscellaneous internal combustion engines (SIC code 3519) reported 420,000 pounds, or 10.1% of the total.

Figure 13-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

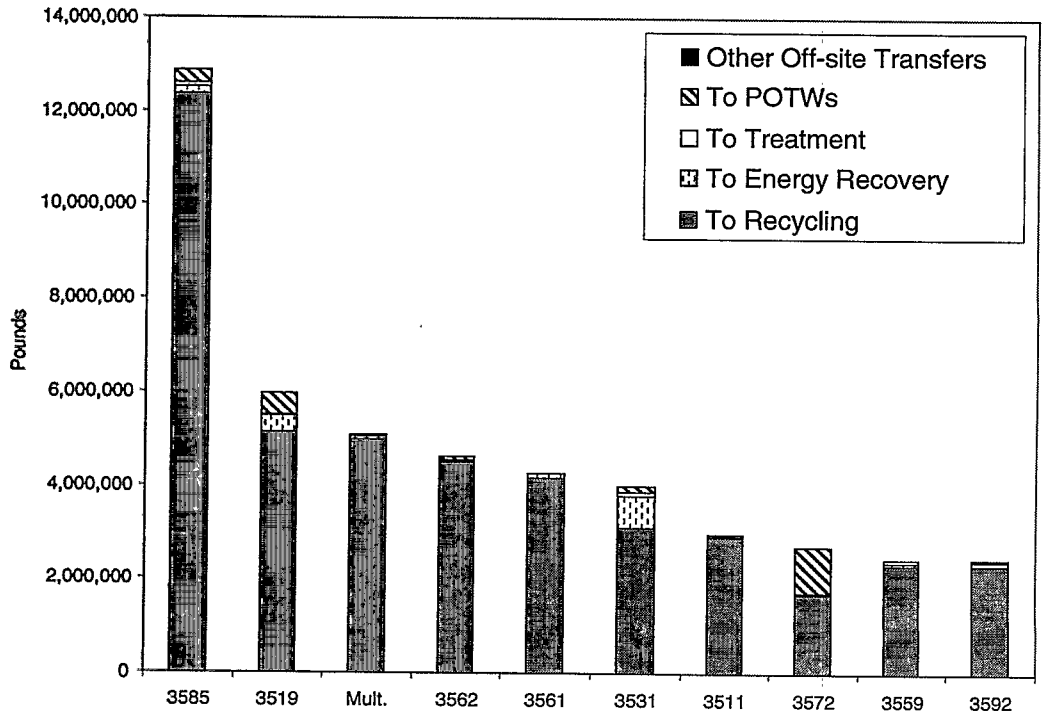


Figure 13-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Industrial Machinery (SIC Code 35)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 2,400,000 pounds of transfers to recycling for 1996 under SIC code 3519. The correct amount is 0 pounds. The rank of SIC code 3519 for total off-site transfers for further waste management changes from 2 to 6.

1996 TRI Data by State for Industrial Machinery

As shown in Table 13-6, the industrial machinery sector submitted more than 200 forms in each of four states in 1996: Wisconsin (218 forms), Ohio (214 forms), Illinois (213 forms), and Pennsylvania (206 forms). These numbers represented nearly 8% each of all forms submitted by the sector in 1996.

Although the manufacture of industrial machinery and equipment historically centered in the Midwest, production of such goods has spread through much of the United States in recent years. The sector's current geographic diversity is evident in the pattern of releases and waste management reported to TRI. As seen in Table 13-6, no single state or territory accounted for as much as 10% of the sector's total releases or as much as 12% of the sector's total production-related waste in 1996.

The industrial machinery sector reported 1.69 million pounds of on-site releases in Iowa and 1.68 million pounds in Illinois, approximately 8.8% each of the sector's total on-site releases. Indiana ranked third with 1.2 million pounds (6.5%). For total on- and off-site releases, Illinois ranked first with 1.9 million pounds (8.5%), followed by Iowa with 1.7 million pounds (7.8%) and Wisconsin with 1.5 million pounds (6.8%).

For off-site releases, the top-ranked states were South Carolina with 521,000 pounds, or 18.2% of the sector's total; Wisconsin with 395,000 pounds, or 13.8%; and Ohio with 375,000 pounds, or 13.1%.

Puerto Rico ranked first for other on-site waste management reported by the industrial machinery sector, with 9.6 million pounds, or 16.2% of the sector's total other on-site waste management. One facility in Puerto Rico reported on-site recycling of 9.0 million pounds of 1,1,1-trichlorethane in 1996. Georgia ranked second with 7.5 million pounds, or 12.6%. A facility in Georgia reported on-site recycling of 7.0 million pounds of 1,1,1-trichlorethane. Both the Puerto Rico and Georgia facilities, owned by the same parent company, reported in the refrigeration and heating equipment industry (SIC code 3585). Ranking third and fourth, Tennessee and Minnesota reported comparable amounts of other on-site waste management, with 5.5 million pounds each (approximately 9.4%).

Wisconsin was the state with the largest transfers off-site for further waste management reported by the industrial machinery sector. These transfers totaled 8.3 million pounds in Wisconsin, 11.2% of the sector's total. However, one Wisconsin facility reported in error 2.4 million pounds of aluminum transferred off-site for recycling, as mentioned earlier. Taking into account this error, New York ranked first in this category, with 6.4 million pounds (8.6%), Illinois ranked second with 5.1 million pounds (6.9%), and Ohio ranked third with 4.8 million pounds (6.5%).

Indiana ranked first for total production-related waste with 19.1 million pounds (11.2%), followed by Wisconsin with 15.7 million pounds (9.2%) and Georgia with 10.3 million pounds (6.1%).

Map 13-1 illustrates the geographic distribution of total on- and off-site releases in the industrial machinery sector.

1996 TRI Data by Chemical for Industrial Machinery

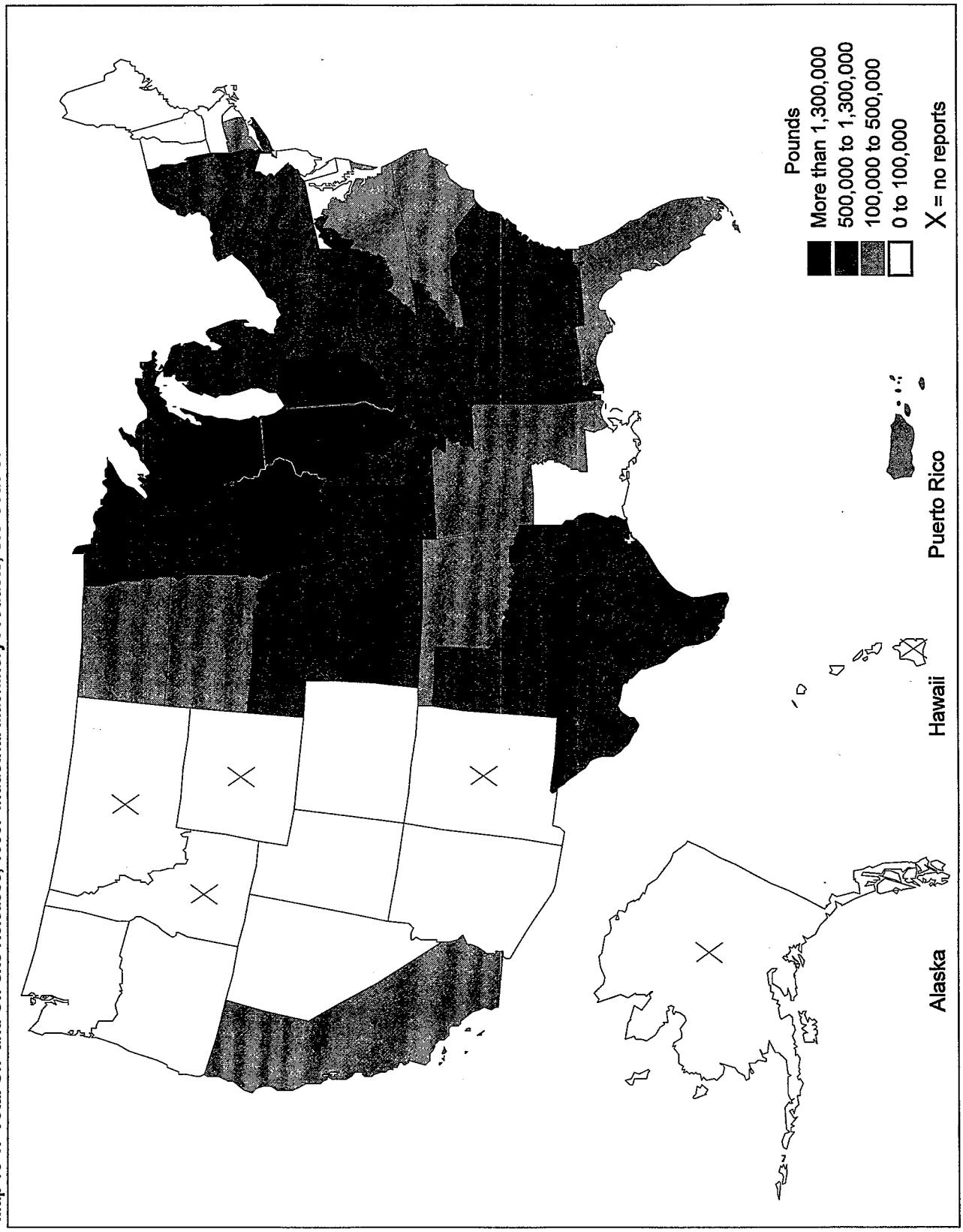
The top 15 chemicals for total on- and off-site releases in industrial machinery manufacture appear in Table 13-7. Releases of these chemicals totaled 18.2 million pounds, or 82.6% of the sector's total releases. Xylenes led this list, with 5.2 million pounds of total releases. Trichloroethylene ranked second with 2.0 million pounds, and toluene ranked third with 1.8 million pounds. These solvents are

Table 13-6. Summary of TRI Information by State, 1996: Industrial Machinery, SIC Code 35

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	21	36	2	520,358	27,114	547,472	35,507	886,394	1,453,065	0
Arizona	11	25	2	14,130	64,321	78,451	773,799	471,468	1,322,025	0
Arkansas	23	53	9	384,709	275	384,984	93,933	499,361	981,065	250
California	33	62	1	142,299	47,414	189,713	40,245	4,011,334	3,206,727	0
Colorado	8	19	0	80,807	16,700	97,507	58,908	198,801	468,247	582
Connecticut	15	29	1	119,621	53,332	172,953	522,304	516,006	1,344,311	28
Delaware	2	4	0	28,216	250	28,466	28,200	10,785	67,423	0
Florida	10	14	0	315,529	1,000	316,529	1,747,332	968,621	3,051,384	0
Georgia	31	81	4	926,736	74,964	1,001,700	7,475,723	1,314,829	10,277,076	0
Illinois	71	213	22	1,676,155	197,291	1,873,446	959,649	5,124,597	7,809,192	628
Indiana	51	164	4	1,245,772	180,856	1,426,628	494,896	4,722,946	19,057,880	2,124
Iowa	36	116	8	1,686,381	30,721	1,717,102	89,004	2,406,079	4,162,665	7,500
Kansas	30	86	1	932,997	18,780	951,777	761,515	2,273,054	3,893,122	0
Kentucky	26	67	5	543,449	75,764	619,213	137,194	944,031	1,748,274	1,800
Louisiana	5	13	0	31,093	0	31,093	11,290	532,288	574,197	0
Maine	3	7	3	3	0	3	0	235,237	235,239	0
Maryland	8	13	5	2,383	0	2,383	24,953	194,367	215,089	0
Massachusetts	15	30	0	32,700	32,368	65,068	436,093	757,115	1,381,756	0
Michigan	26	73	3	510,496	34,553	545,049	1,625,422	2,759,136	5,286,263	0
Minnesota	34	84	7	553,879	16,294	570,173	5,514,690	1,910,643	8,223,948	15
Mississippi	12	40	1	162,559	37,476	200,035	18,249	465,253	1,237,366	0
Missouri	26	73	6	748,931	4,468	753,399	4,344,134	1,469,671	6,576,187	5
Nebraska	16	35	4	1,056,956	90,770	1,147,726	431,462	449,836	2,073,214	4,308
Nevada	5	7	3	12,415	0	12,415	50,532	113,872	175,979	0
New Hampshire	9	20	1	11,303	8,809	20,112	136,536	212,289	446,016	0
New Jersey	14	27	2	31,683	1,245	32,928	26,370	794,185	935,559	13
New York	40	121	12	742,172	82,426	824,598	1,942,132	6,385,681	7,909,391	25,181
North Carolina	42	95	15	99,381	67,643	167,024	166,305	2,307,730	2,737,071	0
North Dakota	6	18	0	282,254	1,108	283,362	11,759	884,376	1,218,090	0
Ohio	85	214	9	822,003	375,052	1,197,055	1,980,528	4,819,462	8,475,946	2,000
Oklahoma	31	80	4	412,430	12,186	424,616	78,152	3,236,781	4,134,110	0
Oregon	6	15	0	5,078	6,960	12,038	4,100	138,384	152,616	0
Pennsylvania	76	206	6	902,702	207,767	1,110,469	1,656,060	4,360,789	7,402,875	1
Puerto Rico	2	8	3	148,602	0	148,602	9,609,000	124,148	9,882,645	0
Rhode Island	1	2	2	0	0	0	0	0	0	0
South Carolina	35	94	0	250,528	521,325	771,853	399,520	3,031,371	4,308,701	0
South Dakota	13	26	0	180,598	63,323	243,921	165,540	232,451	636,042	0
Tennessee	39	85	5	582,646	19,495	602,141	5,544,168	2,919,940	9,137,117	10
Texas	56	133	4	1,146,009	67,599	1,213,608	2,388,806	1,934,284	5,720,257	53
Utah	5	16	2	12,175	783	12,958	12,915	61,597	87,513	0
Vermont	4	7	0	2,005	17,980	19,985	4,200	29,654	60,644	9,600
Virginia	14	27	4	154,336	3,827	158,163	2,760,250	622,842	3,505,133	725
Washington	8	14	2	71,131	0	71,131	931,000	36,262	1,044,597	0
West Virginia	9	21	1	516,935	1,960	518,895	329,000	379,763	1,193,350	0
Wisconsin	74	218	9	1,098,586	395,390	1,493,976	5,360,927	8,306,125	15,676,385	1,427
Total for SIC Code 35	1,087	2,791	172	19,201,131	2,859,589	22,060,720	59,182,302	74,053,838	169,485,752	56,250

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). One facility in Wisconsin incorrectly reported 2,400,000 pounds of transfers to recycling and total production-related waste for 1996. The correct amount is 0 pounds. The rank of Wisconsin for total transfers off-site for further waste management changes from 1 to 2.

Map 13-1. Total On- and Off-site Releases, 1996: Industrial Machinery Products, SIC Code 35



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

Table 13-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Industrial Machinery, SIC Code 35 (In Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
1330-20-7	Xylene (mixed isomers)	5,221,840	1	0	0	0	0	5,221,841	943	5,222,784
79-01-6	Trichloroethylene	1,991,696	5	0	0	0	0	1,991,701	1,580	1,993,281
108-88-3	Toluene	1,804,667	0	0	0	0	0	1,804,667	235	1,804,902
75-45-6	Chlorodifluoromethane (HCFC-22)	1,394,037	0	0	0	0	1	1,394,038	4,008	1,398,046
78-93-3	Methyl ethyl ketone	1,347,671	0	0	0	0	0	1,347,671	0	1,347,671
--	Glycol ethers	1,173,680	16,366	0	0	0	0	1,190,046	28,745	1,218,791
7440-47-3	Chromium	41,482	698	0	0	5,627	48,425	96,232	724,371	820,603
127-18-4	Tetrachloroethylene	742,012	250	0	0	0	0	742,262	755	743,017
75-09-2	Dichloromethane	647,709	0	0	0	0	0	647,709	0	647,709
7439-96-5	Manganese	60,527	2,136	0	0	1,512	9,769	73,944	527,081	601,025
108-10-1	Methyl isobutyl ketone	596,640	0	0	0	0	0	596,640	0	596,640
7664-41-7	Ammonia	521,481	500	0	0	0	0	521,981	0	521,981
7440-02-0	Nickel	33,869	961	0	0	0	3,057	37,887	410,715	448,602
71-55-6	1,1,1-Trichloroethane	440,181	1	0	0	0	0	440,182	0	440,182
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)	412,154	0	0	0	0	0	412,154	6,777	418,931
	Subtotal	16,429,646	20,918	0	0	7,139	61,252	16,518,955	1,705,210	18,224,165
	Total for SIC Code 35	19,038,797	34,089	0	0	7,144	121,101	19,201,131	2,859,589	22,060,720

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R.

used in degreasing metals, among other applications. For 12 of the 15 top chemicals, including the three top-ranked chemicals, air emissions represented 95% or more of the sector's total releases. As noted earlier, the farm machinery industry (SIC code 3523) reported 2.2 million pounds of xylene air emissions, and the refrigeration and heating equipment industry (SIC code 3585) reported 835,000 pounds of trichloroethylene air emissions in 1996.

Off-site releases (transfers to disposal) were the predominant release type reported for the remaining three chemicals. The sector reported transfers to disposal of 725,000 pounds of chromium, 527,000 pounds of manganese, and 411,000 pounds of nickel.

OSHA Carcinogens

On- and off-site releases in this sector of chemicals designated OSHA carcinogens totaled 4.3 million pounds in 1996, as shown in Table 13-8. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) The majority (3.8 million pounds, or 88.4%) was released to air, and most of the remainder was released off-site (transfers to disposal; 490,000 pounds, or 11.5%).

Four of the top 15 chemicals for total releases by the industrial machinery sector were carcinogens. These included trichloroethylene with 2.0 million pounds of releases, tetrachloroethylene with 743,000 pounds, dichloromethane with 648,000 pounds, and nickel with 449,000 pounds. These chemicals ranked second, eighth, ninth, and thirteenth, respectively, for total releases reported by the industrial machinery sector, as shown in Table 13-7. All three are used in metal cleaning and degreasing.

The refrigeration and heating equipment industry (SIC code 3585) reported the sector's largest releases of OSHA carcinogens, a total of 1.1 million pounds. As mentioned earlier, this included 835,000 pounds of air emissions of trichloroethylene. The carburetors, pistons, rings, and valves industry (SIC code 3592) ranked second for releases of OSHA carcinogens with 793,000 pounds, and the miscellaneous industrial machinery

Table 13-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Industrial Machinery, SIC Code 35 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3585	Refrigeration & Heating Equipment	1,092,190	66	0	0	0	105	1,092,361	8,256	1,100,617
3592	Carburetors, Pistons, Rings, Valves	710,199	5	0	0	0	0	710,204	82,731	792,935
3599	Industrial Machinery, nec*	184,665	0	0	0	0	5	184,670	765	185,435
3545	Machine Tool Accessories	176,826	0	0	0	0	0	176,826	6,645	183,471
3559	Special Industry Machinery, nec*	137,484	5	0	0	0	500	137,989	45,276	183,265
3511	Turbines & Turbine Generator Sets	11,595	432	0	0	0	250	12,277	166,156	178,433
3568	Power Transmission Equipment, nec*	144,632	250	0	0	0	41	144,923	791	145,714
3534	Elevators & Moving Stairways	137,604	0	0	0	0	5	137,609	85	137,694
3566	Speed Changers, Drives, & Gears	107,793	0	0	0	0	0	107,793	7,701	115,494
3569	General Industrial Machinery, nec*	110,751	0	0	0	0	0	110,751	2,887	113,638
3564	Blowers & Fans	88,877	1	0	0	0	0	88,878	23,386	112,264
3594	Fluid Power Pumps & Motors	86,166	0	0	0	0	0	86,166	5,293	91,459
3548	Welding Apparatus	81,999	0	0	0	0	0	81,999	3,756	85,755
3562	Ball & Roller Bearings	25,216	16	0	0	0	1,285	26,517	52,106	78,623
3519	Internal Combustion Engines, nec*	49,647	8	0	0	0	0	49,655	8,117	57,772
3533	Oil & Gas Field Machinery	23,119	0	0	0	0	45	23,164	29,139	52,303
3579	Office Machines, nec*	49,369	0	0	0	0	0	49,369	250	49,619
3561	Pumps & Pumping Equipment	43,563	8	0	0	0	221	43,792	5,199	48,991
	Multiple within SIC Code 35	25,440	9	0	0	0	9	25,458	21,360	46,818
3546	Power-driven Handtools	44,573	6	0	0	0	0	44,579	0	44,579
3523	Farm Machinery & Equipment	38,090	0	0	0	0	0	38,090	6,105	44,195
	Invalid SIC Code within SIC Code 35	42,250	0	0	0	0	0	42,250	280	42,530
3589	Service Industry Machinery, nec*	40,455	0	0	0	0	0	40,455	158	40,613
3549	Metalworking Machinery, nec*	35,800	0	0	0	0	0	35,800	1,500	37,300
3536	Hoists, Cranes, & Monorails	28,274	0	0	0	0	110	28,384	3,368	31,752
3555	Printing Trades Machinery	31,581	0	0	0	0	0	31,581	0	31,581
3544	Special Dies, Tools, Jigs & Fixtures	29,038	250	0	0	0	0	29,288	251	29,539
3556	Food Products Machinery	24,285	255	0	0	0	0	24,540	2,738	27,278
3531	Construction Machinery	23,396	255	0	0	0	250	23,901	102	24,003
3537	Industrial Trucks & Tractors	21,256	250	0	0	0	10	21,516	0	21,516
3593	Fluid Power Cylinders & Actuators	16,164	0	0	0	0	0	16,164	1,476	17,640
3535	Conveyors & Conveying Equipment	16,659	0	0	0	0	0	16,659	500	17,159
3586	Measuring & Dispensing Pumps	16,751	0	0	0	0	0	16,751	0	16,751
3596	Scales & Balances, Exc. Laboratory	13,442	0	0	0	0	0	13,442	0	13,442
3577	Computer Peripheral Equipment, nec*	12,538	0	0	0	0	0	12,538	0	12,538
3565	Packaging Machinery	11,693	0	0	0	0	0	11,693	0	11,693
3567	Industrial Furnaces & Ovens	10,010	0	0	0	0	270	10,280	505	10,785
3552	Textile Machinery	8,955	0	0	0	0	0	8,955	1,005	9,960
3581	Automatic Vending Machines	2,800	0	0	0	0	0	2,800	0	2,800
3532	Mining Machinery	1,961	0	0	0	0	0	1,961	214	2,175
3547	Rolling Mill Machinery	1,060	0	0	0	0	0	1,060	560	1,620
3542	Machine Tools, Metal Forming Types	1,168	0	0	0	0	0	1,168	264	1,432
3554	Paper Industries Machinery	510	10	0	0	0	0	520	500	1,020
3582	Commercial Laundry Equipment	250	0	0	0	0	250	500	250	750
3524	Lawn & Garden Equipment	0	0	0	0	0	0	0	500	500
3563	Air & Gas Compressors	461	0	0	0	0	5	466	5	471
3572	Computer Storage Devices	38	0	0	0	0	0	38	0	38
3541	Machine Tools, Metal Cutting Types	35	0	0	0	0	0	35	0	35
3571	Electronic Computers	1	0	0	0	0	0	1	0	1
	Subtotal	3,760,629	1,826	0	0	0	3,361	3,765,816	490,180	4,255,996
	Total for SIC Code 35	19,038,797	34,089	0	0	7,144	121,101	19,201,131	2,859,589	22,060,720

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

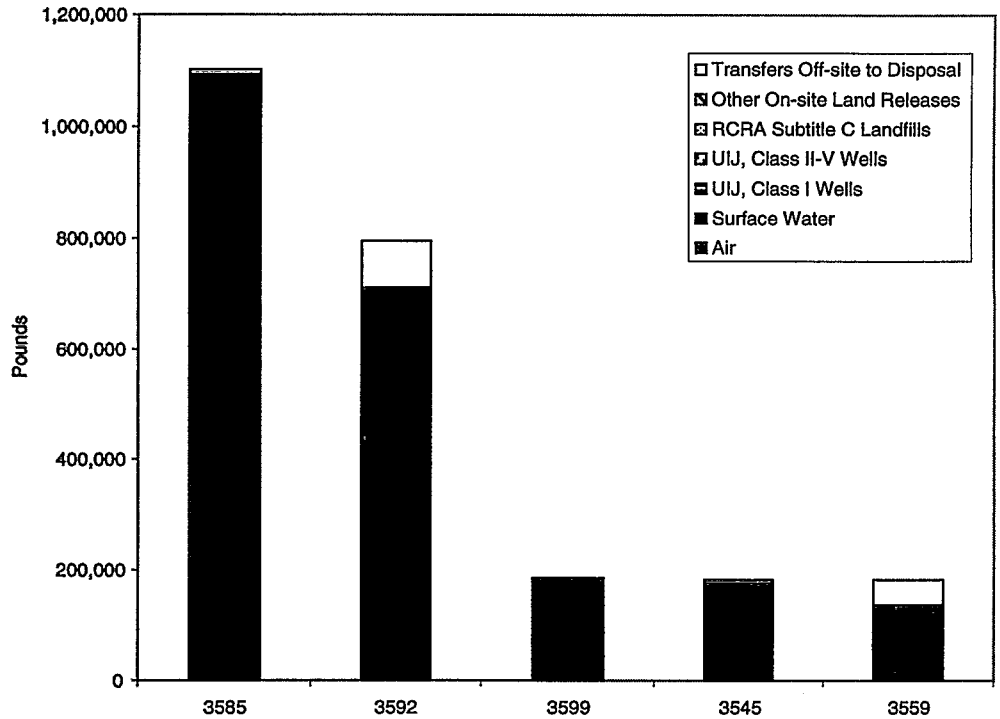


Figure 13-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Industrial Machinery (SIC Code 35)

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category.

industry (SIC code 3599) ranked third with 185,000 pounds.

Figure 13-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Industrial Machinery

The industrial machinery sector reported a total of 169.5 million pounds of total production-related waste in 1996, as shown in Table 13-9. Nearly half (47.6%) of this consisted of off-site recycling, which totaled 80.7 million pounds. On-site recycling of 49.6 million pounds amounted to 29.3% of total production-related waste. Quantities released on- and off-site totaled 22.3 million pounds (13.1%), constituting the third-largest type of waste management reported by the industrial machinery sector in 1996.

Figure 13-8 illustrates the distribution of production-related waste by waste management method for the industrial machinery sector.

The refrigeration and heating equipment industry (SIC code 3585) reported 34.3 million pounds of on-site recycling and 25.8 million pounds of off-site recycling. These amounts represented, respectively, two-thirds (69.1%) of the sector's reported on-site recycling and one-third (32.0%) of the reported off-site recycling. Together, these two amounts also represented more than one-third (35.5%) of all production-related waste reported by

Table 13-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Industrial Machinery, SIC Code 35 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3585	Refrigeration & Heating Equipment	34,289,502	0	374,395	25,826,709	222,437	432,055	4,388,257	65,533,355	33,990
3519	Internal Combustion Engines, nec*	2,355,177	0	587,208	5,147,059	375,016	358,268	1,536,282	10,359,010	2,000
	Multiple within SIC Code 35	75,052	0	44,491	6,203,581	43,158	39,887	1,007,957	7,414,126	0
3531	Construction Machinery	749,326	20,702	469,568	2,957,033	691,520	199,643	2,050,839	7,138,631	529
3562	Ball & Roller Bearings	1,398,000	0	58,014	4,412,392	22,122	82,860	655,462	6,628,850	4
3561	Pumps & Pumping Equipment	1,141,917	0	0	4,771,523	46,361	7,587	520,910	6,488,298	131
3559	Special Industry Machinery, nec*	31,166	0	3,058,980	2,425,715	37,838	104,217	253,892	5,911,808	0
3545	Machine Tool Accessories	4,180,054	0	113,001	438,910	3,688	205,045	616,769	5,557,467	9,727
3523	Farm Machinery & Equipment	128,223	0	148,526	827,783	299,665	132,156	3,362,596	4,898,949	100
3592	Carburetors, Pistons, Rings, Valves	667,344	0	55,263	2,297,995	110	129,713	1,287,405	4,437,830	5
3555	Printing Trades Machinery	1,780,420	0	759,200	300,688	3,443	23,790	774,882	3,642,423	0
3511	Turbines & Turbine Generator Sets	0	0	110,000	2,919,196	14,900	28,543	302,334	3,374,973	0
3569	General Industrial Machinery, nec*	0	0	1,311,465	882,703	14,445	493,999	293,738	2,996,350	28
3568	Power Transmission Equipment, nec*	30,415	0	114,672	1,947,109	35,902	353,811	450,916	2,932,825	2,000
3572	Computer Storage Devices	0	0	31,901	1,678,134	20,324	988,785	135,882	2,855,026	15
3548	Welding Apparatus	634,040	0	99,400	1,351,496	12,060	87,943	313,484	2,498,423	0
3579	Office Machines, nec*	909,155	0	309,912	975,441	57,203	9,797	106,305	2,367,813	0
3544	Special Dies, Tools, Jigs & Fixtures	238,351	0	316,738	1,453,147	11,517	51,926	54,987	2,126,666	0
3554	Paper Industries Machinery	0	0	186,700	1,131,990	24,000	17,403	224,127	1,584,220	0
3533	Oil & Gas Field Machinery	73,992	0	41,062	1,162,616	32,574	7,121	218,745	1,536,110	53
3599	Industrial Machinery, nec*	185,656	0	244,056	689,228	3,872	25,831	265,511	1,414,154	10
3541	Machine Tools, Metal Cutting Types	775	0	150,732	937,336	0	54,413	61,218	1,204,474	0
3582	Commercial Laundry Equipment	0	0	0	1,112,474	1,200	0	53,511	1,167,185	0
3536	Hoists, Cranes, & Monorails	0	0	196	1,074,348	6,110	2	43,807	1,124,463	0
3556	Food Products Machinery	192,800	0	0	750,719	0	28,449	89,688	1,061,656	0
3542	Machine Tools, Metal Forming Types	110,785	0	0	865,411	14,283	30,622	36,419	1,057,520	0
3534	Elevators & Moving Stairways	26,457	0	0	461,361	62,545	0	506,224	1,056,587	0
3546	Power-driven Handtools	10,000	0	257,400	452,015	3,359	206,140	85,730	1,014,644	0
3535	Conveyors & Conveying Equipment	5,194	0	73,200	635,539	26,768	1,660	228,426	970,787	0
3566	Speed Changers, Drives, & Gears	76,000	0	0	554,464	0	5	329,901	960,370	0
3537	Industrial Trucks & Tractors	76,898	0	0	351,002	96,994	22,006	389,855	936,755	0
3532	Mining Machinery	126,000	0	18,449	690,678	0	3,327	66,471	904,925	0
3577	Computer Peripheral Equipment, nec*	4,100	0	356,470	61,490	6,600	418,702	56,527	903,889	0
3563	Air & Gas Compressors	54,870	0	351	459,004	4,159	83	251,299	769,766	0
3567	Industrial Furnaces & Ovens	11,205	110,000	0	374,723	23,031	43	147,999	667,001	1
3571	Electronic Computers	0	0	150	228,356	362,581	28,421	18,230	637,738	0
3564	Blowers & Fans	1,200	0	0	468,910	8,590	6,234	137,881	622,815	1,550
3594	Fluid Power Pumps & Motors	0	0	150	420,057	5,408	13,688	129,364	568,667	4,307
3524	Lawn & Garden Equipment	0	0	95,045	165,727	12,491	58,533	207,914	539,710	0
3589	Service Industry Machinery, nec*	90	0	26,400	312,348	966	0	152,433	492,237	0
3593	Fluid Power Cylinders & Actuators	6,000	0	0	282,817	7,150	8,427	67,742	372,136	1,800
3581	Automatic Vending Machines	0	0	12,915	29,830	27,022	1,004	72,055	142,826	0
	Invalid SIC Code within SIC Code 35	800	0	0	51,335	0	0	71,077	123,212	0
3553	Woodworking Machinery	12,000	0	0	89,907	2,810	30	17,343	122,090	0
3596	Scales & Balances, Exc. Laboratory	17,500	0	0	3,534	0	751	98,869	120,654	0
3549	Metalworking Machinery, nec*	0	0	0	26,085	0	48	39,807	65,940	0
3565	Packaging Machinery	0	0	0	40,500	0	0	11,700	52,200	0
3543	Industrial Patterns	12,583	0	0	0	0	0	37,934	50,517	0
3586	Measuring & Dispensing Pumps	0	0	0	15,649	0	0	16,751	32,400	0
3552	Textile Machinery	0	0	12,543	3,600	0	1,008	8,974	26,125	0
3547	Rolling Mill Machinery	0	0	0	9,378	0	0	9,778	19,156	0
	Total for SIC Code 35	49,613,047	130,702	9,438,553	80,729,045	2,644,222	4,663,976	22,266,207	169,485,752	56,250

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 2,400,000 pounds recycled off-site for 1996 under SIC code 3519. The correct amount is 0 pounds. The rank of SIC code 3519 for recycling off-site changes from 3 to 7.

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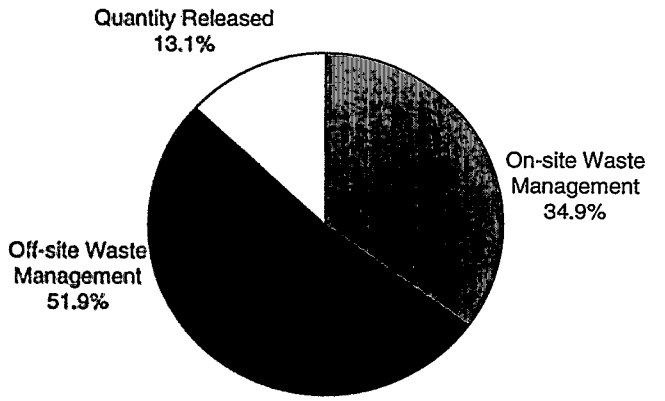

Figure 13-8. Distribution of TRI Production-related Waste, 1996: Industrial Machinery (SIC Code 35)

Note: Data from Section 8 of Form R.

the industrial machinery sector in 1996. This industry also reported the sector's largest quantities released, 4.4 million pounds or 19.7% of the total in that category.

The machine tool accessories industry (SIC code 3545) reported the sector's second-largest amount of on-site recycling: 4.2 million pounds, or 8.4% of the total in that category. The multiple-codes group ranked second for reporting of off-site recycling with 6.2 million pounds, or 7.7%. The farm machinery industry (SIC code 3523) reported 3.4 million pounds of releases (15.1% of the total) and ranked second in that category.

The industrial furnaces and ovens industry (SIC code 3567) reported 110,000 pounds of on-site energy recovery, and the construction machinery industry (SIC code 3531) reported 21,000 pounds. These were the only industrial machinery industries to report on-site energy recovery in 1996.

Miscellaneous special industry machinery production (SIC code 3559) accounted for the largest reported amount of on-site treatment, with 3.1 million pounds (32.4%), followed by miscellaneous general industrial machinery (SIC code 3569) with 1.3 million pounds (13.9%).

In the remaining off-site waste management methods, the construction machinery industry (SIC code 3531) ranked first for off-site energy recovery, reporting 692,000 pounds (26.2%). Miscellaneous internal combustion engines (SIC code 3519) ranked second with 375,000 (14.2%). The computer storage devices industry (SIC code 3572) ranked first for off-site treatment, reporting 989,000 pounds (21.2%), and miscellaneous general industrial machinery (SIC code 3569) ranked second, reporting 494,000 pounds (10.6%).

Distribution of production-related waste for the top industries in the sector appears in Figure 13-9.

Projected Quantities of TRI Chemicals in Waste

Table 13-10 summarizes the industrial machinery sector's projections for on- and off-site waste management through 1998. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) Total production-related waste was projected to decrease by 17.9% (30.3 million pounds) from 169.5 million pounds in 1996 to 139.2 million pounds in 1998.

The industrial machinery sector projected decreases in all waste management types except off-site recycling and off-site treatment. The largest reduction, in pounds and percent, was projected in on-site recycling, a 52.8% decrease from 49.6 million pounds in 1996 to 23.4 million pounds in 1998. This would amount to a 26.2 million-pound reduction. Three facilities in SIC code 3585 that reported on-site recycling of large amounts of 1,1,1-trichloroethane (TCA) in 1996, as mentioned earlier in this chapter, projected zero amounts of on-site recycling for this chemical in 1998. Production of TCA, an ozone-depleting chemical, was banned effective January 1, 1996, under the United States' implementation of the Montreal Protocol to reduce ozone-depleting chemicals.

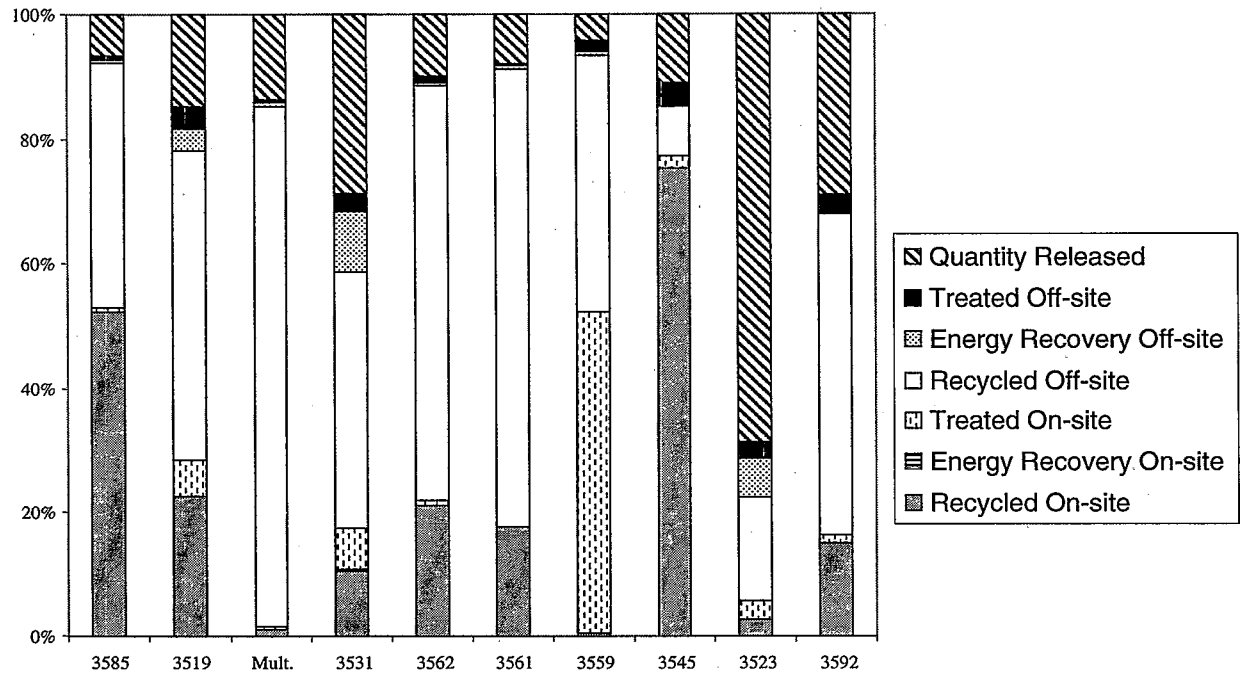

Figure 13-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Industrial Machinery (SIC Code 35)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category.

Together, these facilities would account for a reduction of 21.3 million pounds. Another facility in this industry projected a decrease in on-site recycling of dichloromethane, an OSHA carcinogen, from 3.2 million pounds in 1996 to zero pounds in 1998.

Quantities released were expected to decrease from 22.3 million pounds to 18.1 million pounds, a reduction of 18.9% or 4.2 million pounds. The sector also projected a 25.3% reduction, or 2.4 million pounds, in on-site treatment from 9.4 million pounds to 7.0 million pounds.

Smaller reductions were projected for on-site energy recovery (from 131,000 pounds to 110,000 pounds) and off-site energy recovery (from 2.6 million pounds to 2.2 million pounds), approximately 15% each.

Off-site recycling, the largest type of waste management reported by the sector in 1996, was projected to increase 2.3% from 80.7 million pounds to 82.6 million pounds. Off-site treatment was projected to increase 22.6%, from 4.7 million pounds to 5.7 million pounds. These two projected increases would total an increase of 2.9 million pounds by 1998.

Figure 13-10 displays the sector's projected percentage changes in on-site waste management, off-site waste management, quantities released, and total production-related waste from 1996 to 1998.

As shown in Table 13-10, the sector projected a partial shift in where it recycles TRI chemicals in waste, from on-site to off-site, rather than a change in waste management methods. On-site recycling would decrease from 29.3% of total production-

Table 13-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Industrial Machinery, SIC Code 35

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	49,613,047	29.3	39,206,456	25.4	23,438,940	16.8
Energy Recovery On-site	130,702	0.1	110,000	0.1	110,000	0.1
Treated On-site	9,438,553	5.6	7,095,423	4.6	7,048,587	5.1
Off-site Waste Management						
Recycled Off-site	80,729,045	47.6	79,943,584	51.9	82,587,823	59.3
Energy Recovery Off-site	2,644,222	1.6	2,493,316	1.6	2,242,238	1.6
Treated Off-site	4,663,976	2.8	5,291,662	3.4	5,717,164	4.1
Quantity Released On- and Off-site	22,266,207	13.1	20,030,892	13.0	18,054,244	13.0
Total Production-related Waste for SIC Code 35	169,485,752	100.0	154,171,333	100.0	139,198,996	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-21.0	-40.2	-52.8
Energy Recovery On-site	-15.8	0.0	-15.8
Treated On-site	-24.8	-0.7	-25.3
Off-site Waste Management			
Recycled Off-site	-1.0	3.3	2.3
Energy Recovery Off-site	-5.7	-10.1	-15.2
Treated Off-site	13.5	8.0	22.6
Quantity Released On- and Off-site	-10.0	-9.9	-18.9
Total Production-related Waste for SIC Code 35	-9.0	-9.7	-17.9

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

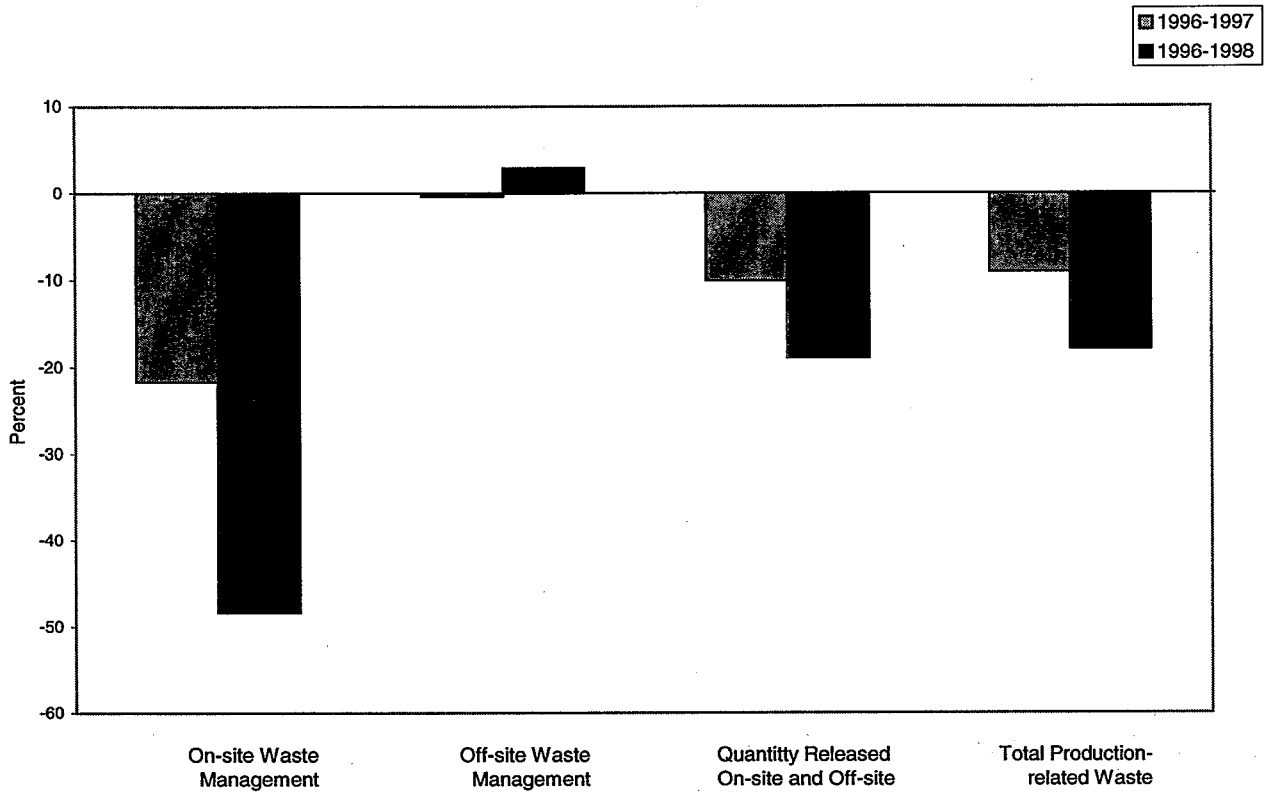

Figure 13-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Industrial Machinery (SIC Code 35)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

related waste in 1996 to 16.8% in 1998, while off-site recycling would increase from 47.6% to 59.3%. The proportion of waste managed by other methods was projected to remain essentially static through 1998.

The industrial machinery sector reported recycling more than three-fourths (76.9%) of its production-related waste in 1996 and, as indicated by the projections, the sector planned to continue that high level of recycling activity (76.2%) in 1998. In terms of the waste management hierarchy, explained in Chapter 1, recycling is the most desirable option for managing waste that cannot be prevented. However, the projections suggest no improvement in relation to the proportion (13%) of its waste that the sector reported as releases.

Source Reduction Activity

In 1996, the industrial machinery sector submitted 510 forms that indicated one or more source reduction activities underway, as shown in Table 13-11. These forms represented 18.3% of the sector's total submissions for 1996. The refrigeration and heating equipment industry (SIC code 3585) filed 106 of these forms, 23.3% of its submissions and the largest number submitted by any industrial machinery industry in 1996. In the farm machinery industry (SIC code 3523), 61 forms indicated source reduction activity, which was 34.1% of that industry's submissions. Two other industries in this sector submitted more than 30 forms indicating source reduction activity in 1996: construction machinery (SIC code 3531) with 39

Table 13-11. Number of Forms Reporting Source Reduction Activity, 1996: Industrial Machinery, SIC Code 35

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3511	Turbines & Turbine Generator Sets	44	13	29.5	6	4	0	0	6	0	2	5
3519	Internal Combustion Engines, nec*	163	19	11.7	5	1	0	5	6	0	3	5
3523	Farm Machinery & Equipment	179	61	34.1	19	4	1	11	17	3	17	4
3524	Lawn & Garden Equipment	37	7	18.9	1	0	1	0	1	0	5	0
3531	Construction Machinery	202	39	19.3	9	3	6	6	12	1	11	2
3532	Mining Machinery	37	1	2.7	0	0	0	1	0	0	0	0
3533	Oil & Gas Field Machinery	62	12	19.4	2	0	5	0	4	0	4	3
3534	Elevators & Moving Stairways	35	10	28.6	0	0	0	4	4	0	1	1
3535	Conveyors & Conveying Equipment	36	5	13.9	1	0	0	1	0	0	1	2
3536	Hoists, Cranes, & Monorails	19	0	0.0	0	0	0	0	0	0	0	0
3537	Industrial Trucks & Tractors	58	11	19.0	5	0	2	0	0	0	6	0
3541	Machine Tools, Metal Cutting Types	42	2	4.8	0	0	0	1	2	1	0	0
3542	Machine Tools, Metal Forming Types	19	3	15.8	0	0	0	0	2	1	2	0
3543	Industrial Patterns	6	2	33.3	1	0	1	0	0	0	0	0
3544	Special Dies, Tools, Jigs & Fixtures	52	8	15.4	2	1	1	5	0	1	0	0
3545	Machine Tool Accessories	50	8	16.0	4	0	1	1	2	0	0	1
3546	Power-driven Handtools	30	5	16.7	2	0	0	1	2	0	0	0
3547	Rolling Mill Machinery	12	0	0.0	0	0	0	0	0	0	0	0
3548	Welding Apparatus	46	12	26.1	1	0	0	0	7	1	4	0
3549	Metalworking Machinery, nec*	7	0	0.0	0	0	0	0	0	0	0	0
3552	Textile Machinery	4	1	25.0	0	0	0	0	0	1	0	0
3553	Woodworking Machinery	6	0	0.0	0	0	0	0	0	0	0	0
3554	Paper Industries Machinery	35	0	0.0	0	0	0	0	0	0	0	0
3555	Printing Trades Machinery	14	0	0.0	0	0	0	0	0	0	0	0
3556	Food Products Machinery	35	3	8.6	2	1	0	0	0	0	0	0
3559	Special Industry Machinery, nec*	72	24	33.3	11	9	3	4	3	0	2	4
3561	Pumps & Pumping Equipment	137	8	5.8	5	0	1	1	2	1	0	2
3562	Ball & Roller Bearings	152	32	21.1	16	1	0	7	9	3	0	2
3563	Air & Gas Compressors	42	11	26.2	2	2	2	0	2	3	1	2
3564	Blowers & Fans	47	5	10.6	0	0	0	0	0	0	4	1
3565	Packaging Machinery	5	1	20.0	0	0	0	0	0	1	0	0
3566	Speed Changers, Drives, & Gears	45	2	4.4	0	0	0	0	1	1	0	0
3567	Industrial Furnaces & Ovens	33	6	18.2	1	0	0	2	4	1	0	2
3568	Power Transmission Equipment, nec*	54	5	9.3	4	0	0	0	1	0	0	0
3569	General Industrial Machinery, nec*	56	1	1.8	0	0	0	0	1	0	0	0
3571	Electronic Computers	12	1	8.3	0	0	0	0	0	0	1	0
3572	Computer Storage Devices	13	9	69.2	3	0	0	1	5	1	0	2
3577	Computer Peripheral Equipment, nec*	16	7	43.8	5	1	0	0	0	0	1	0
3579	Office Machines, nec*	24	3	12.5	2	0	0	1	0	0	0	0
3581	Automatic Vending Machines	22	9	40.9	0	0	1	1	3	0	4	0
3582	Commercial Laundry Equipment	11	4	36.4	0	3	0	0	0	1	0	0
3585	Refrigeration & Heating Equipment	455	106	23.3	59	2	7	14	26	10	8	22
3586	Measuring & Dispensing Pumps	3	1	33.3	1	0	0	0	1	0	0	0
3589	Service Industry Machinery, nec*	41	10	24.4	8	0	0	0	0	2	0	0
3592	Carburetors, Pistons, Rings, Valves	58	8	13.8	5	1	0	2	0	1	1	0
3593	Fluid Power Cylinders & Actuators	18	1	5.6	1	0	0	0	0	0	0	0
3594	Fluid Power Pumps & Motors	26	1	3.8	1	0	0	0	0	0	0	0
3596	Scales & Balances, Exc. Laboratory	6	1	16.7	1	0	0	0	0	0	0	0
3599	Industrial Machinery, nec*	54	12	22.2	5	2	7	0	5	1	1	2
	Multiple within SIC Code 35	145	18	12.4	4	1	0	1	0	0	12	2
	Invalid SIC Code within SIC Code 35	14	2	14.3	1	0	0	0	1	0	0	0
	Total for SIC Code 35	2,791	510	18.3	195	36	39	70	129	35	91	64

Notes: Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category.
*nec: not elsewhere classified.

such forms (19.3% of its forms) and ball and roller bearings (SIC code 3562) with 32 forms (21.1%).

Improvements in operating practices were the most frequently reported source reduction activity (195 forms). Process modifications, which more often indicate innovative actions to reduce TRI chemicals in waste at their source, were the second most frequently reported source reduction activity, cited on 129 forms. Surface preparation and finishing ranked third with 91 forms.

Year-to-Year Comparisons for Industrial Machinery

1995-1996 TRI Data for Industrial Machinery

From 1995 to 1996, the number of forms submitted with industrial machinery SIC codes decreased 4.5%, as shown in Table 13-12. Although the number of Form A certification statements submitted was small, Form A submissions increased 19.4%. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the Form A certification statement in its second year of availability.

On- and Off-site Releases

On- and off-site releases reported by the industrial machinery sector decreased 15.8% from 1995 to 1996, as shown in Table 13-12. The sector reported 26.2 million pounds of total releases in 1995 and 22.1 million pounds in 1996. The largest reduction (in pounds) was reported in air emissions, which decreased from 22.6 million pounds to 19.0 million pounds. Approximately one-third of the decrease in releases to air was reported in fugitive emissions and two-thirds in point-source emissions. The net reduction in air emissions was 15.6%. The sector reported only small amounts of other types of on-site releases in the two years.

Reported off-site releases (transfers to disposal) also decreased, from 3.5 million pounds in 1995 to 2.9 million pounds in 1996, a 17.4% reduction.

Figure 13-11 shows the sector's percentage change in on- and off-site release types for 1995 to 1996.

Other On-site Waste Management

The industrial machinery sector reported a reduction in other on-site waste management from 69.7 million pounds in 1995 to 59.2 million pounds in 1996. These data also appear in Table 13-12. The 15.1% reduction in total other on-site waste management resulted largely from an 18.5% decrease in on-site recycling, from 60.8 million pounds to 49.6 million pounds. This reduction included decreases of approximately 6 million pounds each by two of the three facilities that reported large amounts of on-site recycling of 1,1,1-trichlorethane in 1996.

The industrial machinery sector's reported on-site energy recovery was also reduced, from 188,000 pounds in 1995 to 131,000 pounds in 1996 (a 30.4% reduction). The sector reported an 8.3% increase in on-site treatment, from 8.7 million pounds to 9.4 million pounds.

Transfers Off-site for Further Waste Management

Table 13-12 also presents transfers off-site for further waste management reported by the industrial machinery sector in 1995 and 1996. The sector reported an increase of 3.1%, from 71.8 million pounds to 74.1 million pounds. The sector reported an increase in transfers to recycling from 63.6 million pounds to 64.0 million pounds. However, this included reporting errors by two facilities. One facility, previously mentioned, reported 2.4 million pounds of transfers to

Table 13-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Industrial Machinery, SIC Code 35

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	1,102	1,087	-1.4
Total Forms	2,924	2,791	-4.5
Form Rs	2,780	2,619	-5.8
Form As	144	172	19.4
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	22,560,364	19,038,797	-15.6
Fugitive Air	7,824,579	6,665,652	-14.8
Point Source Air	14,735,785	12,373,145	-16.0
Surface Water Discharges	27,604	34,089	23.5
Underground Injection	0	0	--
On-site Land Releases	154,722	128,245	-17.1
Total On-site Releases	22,742,690	19,201,131	-15.6
Off-site Releases			
Transfers Off-site to Disposal	3,460,216	2,859,589	-17.4
Total On- and Off-site Releases	26,202,906	22,060,720	-15.8
Other On-site Waste Management			
Recycled On-site	60,837,599	49,613,047	-18.5
Energy Recovery On-site	187,816	130,702	-30.4
Treated On-site	8,718,746	9,438,553	8.3
Total Other On-site Waste Management	69,744,161	59,182,302	-15.1
Transfers Off-site for Further Waste Management			
Transfers to Recycling	63,576,274	64,012,061	0.7
Transfers to Energy Recovery	3,132,512	2,530,890	-19.2
Transfers to Treatment	1,714,030	1,316,961	-23.2
Transfers to POTWs	3,396,326	4,168,245	22.7
Other Off-site Transfers	2,055	2,025,681	98,473.3
Total Transfers Off-site for Further Waste Management	71,821,197	74,053,838	3.1

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code. One facility incorrectly reported 2,400,000 pounds of transfers to recycling for 1996. The correct amount is 0 pounds. Another facility incorrectly reported 29 pounds of transfers to recycling for 1995. The correct amount is 1,272,858 pounds. The percentage change from 1995 to 1996 in transfers to recycling changes from 0.7% to -5.0% and in total transfers off-site for further waste management changes from 3.1% to -1.9%.

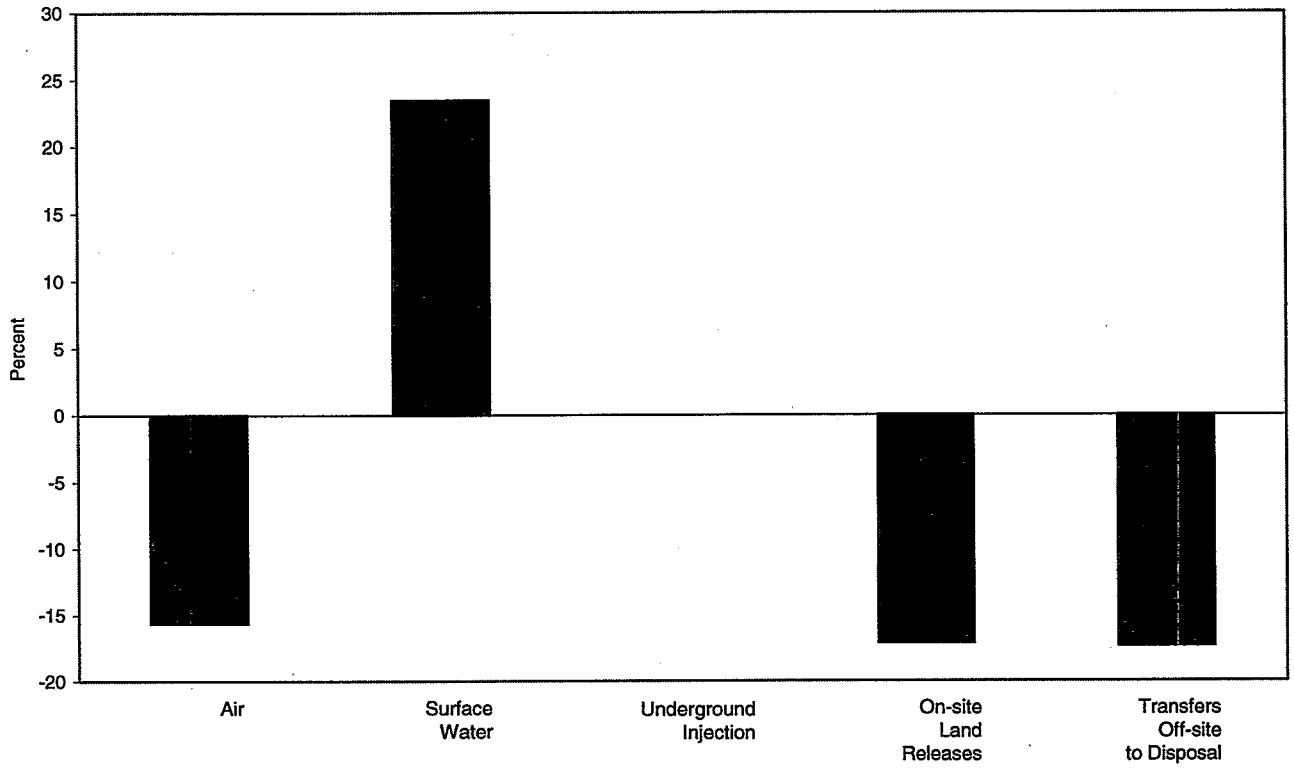

Figure 13-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Industrial Machinery (SIC Code 35)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

recycling in error in 1996. Another facility reported 29 pounds of transfers to recycling in 1995, but should have reported nearly 1.3 million pounds. When these errors are taken into account, the sector's reported transfers to recycling show a reduction from 1995 to 1996 of 3.2 million pounds (a decrease of 5.0%), and total transfers off-site for further waste management show a reduction of 1.4 million pounds (a decrease of 1.9%).

The sector reported an increase in transfers to POTWs from 3.4 million pounds to 4.2 million pounds The sector reported decreases in transfers to energy recovery (from 3.1 million pounds to 2.5 million pounds) and in transfers to treatment (from 1.7 million pounds to 1.3 million pounds).

The largest increase in transfers off-site for further waste management resulted from forms that reported amounts with invalid codes or no codes to indicate the type of transfer. These errors rose from 2,000 pounds in 1995 to 2.0 million pounds in 1996. One facility reported 2.0 million pounds of transfers with invalid codes in 1996, including 1.8 million pounds of dichloromethane. In previous years, this facility reported most of its off-site transfers as transfers to recycling.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate

to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Industrial Machinery

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

Table 13-13 summarizes the sector's TRI data for 1988 to 1996. The number of forms submitted by the industrial machinery sector showed little net change from 1988 (2,463 forms) to 1996 (2,456 forms), although more forms were submitted in this sector in 1994 and 1995.

The industrial machinery sector reported a 72.5% reduction in total on- and off-site releases from 1988 to 1996, as shown in Table 13-13. The sector reported 69.7 million pounds of total releases in 1988 and 19.2 million pounds in 1996. Much of this 50.6 million-pound reduction occurred in reported air emissions, which totaled 59.1 million pounds in 1988 and 16.3 million pounds in 1996. Fugitive and point-source emissions each accounted for roughly half of this 42.9 million-pound reduction in releases to air. The industrial machinery sector reported 10.3 million pounds of off-site releases (transfers to disposal) in 1988 and 2.7 million pounds in 1996. Percentage reductions in air emissions and in transfers to disposal were both approximately 73%. Figure 13-12 illustrates the sector's percentage change in on- and off-site releases for 1988 to 1996.

The sector reported only small amounts of surface water discharges and on-site land releases from 1988 to 1996, both of which also decreased as shown in Table 13-13. No underground injection was reported.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, on-site recycling decreased from 68.4 million pounds to 47.9 million pounds (a 20.5 million-pound reduction). This accounted for most of the overall decrease in other on-site waste management, from 73.2 million pounds to 55.4 million pounds (a 17.9 million-pound reduction). On-site treatment increased from 4.8 million pounds to 7.5 million pounds (an increase of 2.7 million pounds). The sector reported very little on-site energy recovery.

For the full comparison period, 1988 to 1996, transfers to treatment decreased 85.1%, from 8.2 million pounds to 1.2 million pounds, while transfers to POTWs increased 67.6%, from 1.5 million pounds to 2.6 million pounds.

As noted earlier in this chapter, production of industrial machinery increased by more than 50%, while the sector's reporting of releases and waste management decreased by even larger percentages from 1988 to 1996. (TRI facilities report absolute amounts of waste managed and of environmental releases, not adjusted for changes in production levels.) One factor has been the United States' ban on production of ozone-depleting chemicals such as 1,1,1-trichloroethane (TCA). As discussed above, facilities that reported large amounts of recycling of TCA were already reducing these amounts by 1996 and expected to eliminate them by 1998.

Table 13-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1994-1996: Industrial Machinery, SIC Code 35

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	1,017	1,028	1,001	990	-2.7
Total Forms	2,463	2,573	2,532	2,456	-0.3
Form Rs	2,463	2,573	2,431	2,332	-5.3
Form As	NA	NA	101	124	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	59,123,683	23,568,657	19,603,851	16,272,214	-72.5
Fugitive Air	24,892,112	7,297,586	5,858,731	4,835,762	-80.6
Point Source Air	34,231,571	16,271,071	13,745,120	11,436,452	-66.6
Surface Water Discharges	147,837	106,126	17,164	27,668	-81.3
Underground Injection	0	0	0	0	--
On-site Land Releases	216,387	153,872	103,861	127,557	-41.1
Total On-site Releases	59,487,907	23,828,655	19,724,876	16,427,439	-72.4
Off-site Releases					
Transfers Off-site to Disposal	10,259,389	3,291,560	3,126,757	2,734,615	-73.3
Total On- and Off-site Releases	69,747,296	27,120,215	22,851,633	19,162,054	-72.5
Other On-site Waste Management					
Recycled On-site	NA	68,376,171	58,973,068	47,879,059	NA
Energy Recovery On-site	NA	67,313	57,816	20,702	NA
Treated On-site	NA	4,777,889	4,556,760	7,451,458	NA
Total Other On-site Waste Management	NA	73,221,373	63,587,644	55,351,219	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	60,984,257	61,496,394	62,044,697	NA
Transfers to Energy Recovery	NA	3,013,190	3,018,079	2,525,352	NA
Transfers to Treatment	8,165,084	1,640,838	1,545,286	1,212,687	-85.1
Transfers to POTWs	1,529,736	1,847,024	2,312,926	2,563,405	67.6
Other Off-site Transfers	1,895,070	8,899	1,755	2,025,636	6.9
Total Transfers Off-site for Further Waste Management	NA	67,494,208	68,374,440	70,371,777	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. One facility incorrectly reported 1,500,000 pounds for 1994 and 2,400,000 pounds for 1996 of transfers to recycling. The correct amounts are 0 pounds. Another facility incorrectly reported 29 pounds of transfers to recycling in 1995. The correct amount is 1,272,858 pounds. **NA:** not required to be reported in that year.

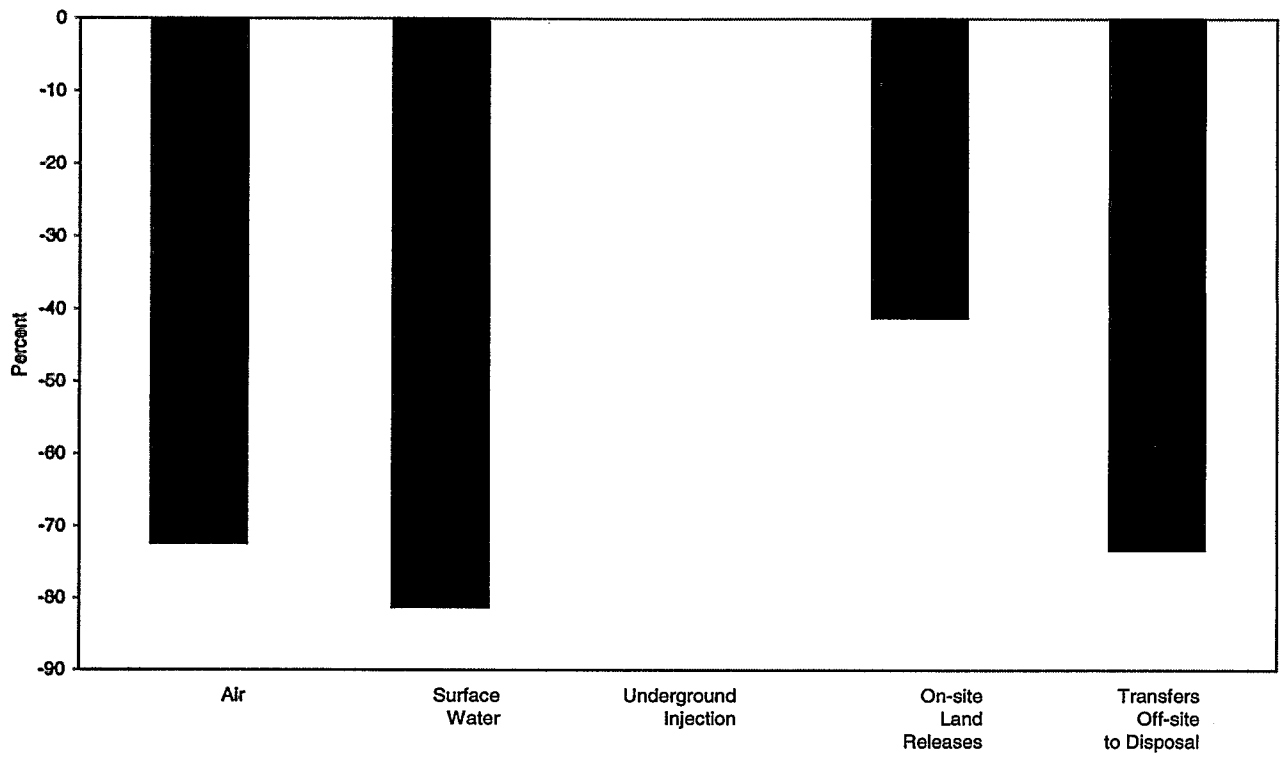

Figure 13-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Industrial Machinery (SIC Code 35)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

1988-1996 Data for Four-Digit Industries in Industrial Machinery

Tables 13-14 through 13-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 35. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The refrigeration and heating equipment industry (SIC code 3585) reported the sector's largest decrease in releases. This industry reported 16.8 million pounds of releases in 1988 and 2.8 million pounds in 1996. The miscellaneous internal combustion engines industry (SIC code 3519) ranked second, reporting 5.3 million pounds in 1988 and 1.4 million pounds in 1996. In both industries, air emissions accounted for the majority of the reduction. The welding apparatus industry (SIC code 3548) ranked third with a decrease from 3.5 million pounds to 237,000 pounds, but this reflected a reporting error in 1988 of 2.9 million pounds by one facility that should have reported in SIC code 2899 (miscellaneous chemical preparations).

The farm machinery industry (SIC code 3523) ranked first for increased releases, reporting 3.0 million pounds in 1988 and 3.7 million pounds in 1996. The fluid power pumps and motors industry (SIC code 3594) reported the second-largest

increase, from 57,000 pounds to 128,000 pounds. In both of these industries, reported releases decreased from 1994 to 1996. Ranking third, the non-laboratory scales and balances industry (SIC code 3596) reported 38,000 pounds in 1988 and 98,000 pounds in 1996 (although the 1995 level was 180,000 pounds). Only one other industry in this sector showed an increase from 1988 to 1996. The industrial patterns industry (SIC code 3543) reported an increase of less than 1,000 pounds from 1988 to 1996. In all four industries, air emissions were the largest factor in the increase.

Table 13-14 provides release data for all four-digit SIC codes in the industrial machinery sector, for 1988-1996.

Other On-site Waste Management

The refrigeration and heating equipment industry (SIC code 3585) also reported the sector's largest decrease in other on-site waste management, from 51.2 million in 1994 to 33.0 million in 1996 (on-site waste management data were not collected in 1988). On-site recycling accounted for this reduction. The printing trades machinery industry (SIC code 3555) ranked second with a reduction from 3.2 million pounds to 2.5 million pounds. This decrease was also attributable to on-site recycling, although offset in part by increasing on-site treatment.

Miscellaneous office machines (SIC code 3579) ranked third for decreases, reporting 1.6 million pounds in 1994 and 1.0 million pounds in 1996, reflecting decreases in both on-site recycling and on-site treatment. However, this industry reported only 73,000 pounds of other on-site waste management in 1995. One facility reported in SIC code 3579 in 1994 and 1996, but reported in SIC code 3861 (photographic equipment and supplies) in 1995. This facility reported increasing amounts of on-site recycling of dichloromethane (from 396,000 pounds in 1994 to 621,000 in 1996) and methyl ethyl ketone (from zero pounds in 1994 to 230,000 pounds in 1996). On-site recycling that this facility reported in 1995, however, is not included in SIC code 3579 because the facility filed that year in SIC code 3861. The facility's 1995 reports included on-site recycling of 510,000 pounds of dichloromethane and 75,000 pounds of methyl ethyl ketone.

The miscellaneous special industry machinery industry (SIC code 3559) reported the largest increase in on-site waste management in the industrial machinery sector for 1994 to 1996. This industry's increase—from 698,000 pounds to 3.1 million pounds—reflects an increase by one facility from 290,000 pounds of on-site treatment of ethylene oxide in 1994 to 2.7 million pounds in 1996 when it installed new on-site treatment equipment (see "Facilities with Large Increases and Decreases in Waste Management, 1991-1996," later in this chapter).

The machine tool accessories industry (SIC code 3545) ranked second for increases with 3.7 million pounds in 1994 and 4.3 million pounds in 1996. The carburetors, pistons, rings, and valves industry (SIC code 3592) ranked third, with an increase from 195,000 pounds to 710,000 pounds. In both industries, 1995 levels were lower, and in both industries, the increase principally involved on-site recycling.

On-site waste management data for 1994-1996 appear in Table 13-15.

Transfers Off-site for Further Waste Management

The multiple-codes group in SIC code 35 ranked first for decreased reporting of transfers off-site for further waste management in the industrial machinery sector from 1994 to 1996 (data for some types of off-site transfers were not collected in 1988). Multiple-codes forms reported 8.0 million pounds in 1994 and 5.1 million pounds in 1996. Almost all of the reduction was reported in transfers to recycling.

Table 13-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3511	Turbines & Turbine Generator Sets	96	44,897	1,600	0	500	46,997	239,962	286,959
		95	118,868	467	0	0	119,335	8,382	127,717
		94	319,874	281	0	1,750	321,905	13,446	335,351
		88	1,123,673	42,674	0	155	1,166,502	64,081	1,230,583
3519	Internal Combustion Engines, nec*	96	1,084,132	192	0	477	1,084,801	351,226	1,436,027
		95	999,829	15	0	1	999,845	343,357	1,343,202
		94	1,829,630	20	0	17	1,829,667	467,522	2,297,189
		88	4,771,780	2,502	0	0	4,774,282	505,233	5,279,515
3523	Farm Machinery & Equipment	96	3,658,350	224	0	100	3,658,674	38,435	3,697,109
		95	3,903,924	460	0	9,153	3,913,537	43,424	3,956,961
		94	4,596,354	226	0	60,959	4,657,539	55,938	4,713,477
		88	2,951,265	1,207	0	80,350	3,032,822	17,131	3,049,953
3524	Lawn & Garden Equipment	96	236,172	0	0	0	236,172	2,000	238,172
		95	361,766	0	0	0	361,766	0	361,766
		94	406,184	0	0	0	406,184	0	406,184
		88	682,461	0	0	0	682,461	44,224	726,685
3531	Construction Machinery	96	1,769,366	18,458	0	53,333	1,841,157	87,765	1,928,922
		95	2,375,767	12,609	0	28,873	2,417,249	114,022	2,531,271
		94	1,874,406	8,707	0	27,135	1,910,248	139,739	2,049,987
		88	2,424,542	4,494	0	54,991	2,484,027	552,318	3,036,345
3532	Mining Machinery	96	64,703	5	0	0	64,708	2,633	67,341
		95	56,416	5	0	0	56,421	39,246	95,667
		94	55,189	5	0	1,000	56,194	38,473	94,667
		88	185,758	0	0	0	185,758	22,550	208,308
3533	Oil & Gas Field Machinery	96	136,511	264	0	54	136,829	55,091	191,920
		95	199,312	51	0	0	199,363	41,445	240,808
		94	275,255	72	0	0	275,327	71,843	347,170
		88	505,726	256	0	3,400	509,382	40,317	549,699
3534	Elevators & Moving Stairways	96	499,147	0	0	15	499,162	340	499,502
		95	517,244	0	0	20	517,264	811	518,075
		94	414,401	0	0	15	414,416	753	415,169
		88	1,112,066	0	0	0	1,112,066	9,360	1,121,426
3535	Conveyors & Conveying Equipment	96	292,645	0	0	255	292,900	1,250	294,150
		95	329,998	0	0	5	330,003	750	330,753
		94	223,546	0	0	5	223,551	500	224,051
		88	336,898	0	0	0	336,898	11,207	348,105
3536	Hoists, Cranes, & Monorails	96	35,873	0	0	250	36,123	9,142	45,265
		95	81,536	0	0	500	82,036	4,685	86,721
		94	100,355	0	0	0	100,355	1,136	101,491
		88	285,102	0	0	0	285,102	4	285,106
3537	Industrial Trucks & Tractors	96	386,992	255	0	20	387,267	1,055	388,322
		95	570,915	260	0	10	571,185	850	572,035
		94	467,642	260	0	10	467,912	840	468,752
		88	590,335	0	0	0	590,335	35,235	625,570

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for total releases in 1995. The facility should have reported in SIC code 3579. The incorrectly reported amount was 141,121 pounds of total releases. Another facility reported incorrectly in SIC code 3548 for 1988. The facility should have reported in SIC code 2899. The incorrectly reported amounts were 43,810 pounds of total air emissions and 2,902,304 pounds of transfers off-site to disposal.
*nec: not elsewhere classified.

Table 13-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3541	Machine Tools, Metal Cutting Types	96	37,960	0	0	0	37,960	23,822	61,782
		95	48,544	0	0	0	48,544	12,885	61,429
		94	59,321	0	0	260	59,581	11,364	70,945
		88	458,199	250	0	0	458,449	82,050	540,499
3542	Machine Tools, Metal Forming Types	96	21,669	0	0	0	21,669	14,250	35,919
		95	34,900	0	0	0	34,900	9,687	44,587
		94	11,447	0	0	3	11,450	13,414	24,864
		88	298,995	0	0	0	298,995	16,160	315,155
3543	Industrial Patterns	96	0	0	0	0	0	12,778	12,778
		95	12,111	0	0	0	12,111	4,893	17,004
		94	750	0	0	0	750	6,302	7,052
		88	11,819	0	0	0	11,819	0	11,819
3544	Special Dies, Tools, Jigs & Fixtures	96	30,925	500	0	0	31,425	6,586	38,011
		95	7,087	0	0	0	7,087	13,897	20,984
		94	1,657	0	0	2,400	4,057	5,391	9,448
		88	433,171	0	0	0	433,171	250	433,421
3545	Machine Tool Accessories	96	200,122	0	0	15,794	215,916	372,165	588,081
		95	186,360	0	0	13,027	199,387	386,386	585,773
		94	239,835	13,825	0	13,889	267,549	401,305	668,854
		88	338,496	500	0	0	338,996	365,927	704,923
3546	Power-driven Handtools	96	95,501	23	0	250	95,774	3,150	98,924
		95	129,875	13	0	250	130,138	4,150	134,288
		94	78,525	33	0	250	78,808	11,115	89,923
		88	656,720	0	0	0	656,720	682,570	1,339,290
3547	Rolling Mill Machinery	96	3,124	0	0	3,424	6,548	2,730	9,278
		95	3,206	0	0	3,593	6,799	33,680	40,479
		94	2,656	0	0	3,305	5,961	28,020	33,981
		88	40,250	0	0	0	40,250	32,995	73,245
3548	Welding Apparatus	96	169,850	0	0	0	169,850	67,332	237,182
		95	284,312	0	0	275	284,587	65,097	349,684
		94	387,140	0	0	0	387,140	138,301	525,441
		88	598,644	0	0	0	598,644	2,942,368	3,541,012
3549	Metalworking Machinery, nec*	96	37,307	0	0	0	37,307	3,000	40,307
		95	37,603	0	0	0	37,603	2,600	40,203
		94	49,000	0	0	0	49,000	1	49,001
		88	197,844	0	0	0	197,844	35,879	233,723
3552	Textile Machinery	96	8,974	0	0	0	8,974	1,005	9,979
		95	24,699	0	0	0	24,699	1,200	25,899
		94	37,810	0	0	0	37,810	250	38,060
		88	146,178	0	0	0	146,178	10,286	156,464
3553	Woodworking Machinery	96	12,443	0	0	0	12,443	4,860	17,303
		95	15,501	0	0	0	15,501	0	15,501
		94	16,087	0	0	0	16,087	0	16,087
		88	62,745	42,000	0	0	104,745	40	104,785

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for total releases in 1995. The facility should have reported in SIC code 3579. The incorrectly reported amount was 141,121 pounds of total releases. Another facility reported incorrectly in SIC code 3548 for 1988. The facility should have reported in SIC code 2899. The incorrectly reported amounts were 43,810 pounds of total air emissions and 2,902,304 pounds of transfers off-site to disposal.
***nec:** not elsewhere classified.

Table 13-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3554	Paper Industries Machinery	96	59,429	20	0	2,618	62,067	1,000	63,067
		95	69,425	25	0	0	69,450	18,840	88,290
		94	56,384	20	0	0	56,404	12,327	68,731
		88	115,546	0	0	0	115,546	1,798,910	1,914,456
3555	Printing Trades Machinery	96	777,050	0	0	0	777,050	0	777,050
		95	778,819	15	0	85	778,919	0	778,919
		94	1,035,723	20	0	0	1,035,743	500	1,036,243
		88	2,423,985	500	0	0	2,424,485	3,502	2,427,987
3556	Food Products Machinery	96	28,947	510	0	0	29,457	54,199	83,656
		95	38,606	510	0	5	39,121	82,444	121,565
		94	51,834	10	0	10	51,854	80,347	132,201
		88	127,573	0	0	0	127,573	70,200	197,773
3559	Special Industry Machinery, nec*	96	248,005	10	0	756	248,771	62,574	311,345
		95	285,051	265	0	10	285,326	21,569	306,895
		94	696,666	10	0	5	696,681	37,521	734,202
		88	1,241,560	0	0	250	1,241,810	78,167	1,319,977
3561	Pumps & Pumping Equipment	96	125,698	54	0	1,433	127,185	39,907	167,092
		95	160,457	55	0	2,701	163,213	51,245	214,458
		94	190,609	118	0	4,445	195,172	48,286	243,458
		88	1,470,915	23	0	412	1,471,350	117,048	1,588,398
3562	Ball & Roller Bearings	96	74,322	371	0	33,530	108,223	267,064	375,287
		95	308,398	607	0	40,103	349,108	503,107	852,215
		94	347,730	608	0	26,859	375,197	477,710	852,907
		88	2,387,182	1,261	0	1,304	2,389,747	612,985	3,002,732
3563	Air & Gas Compressors	96	167,755	23	0	2,190	169,968	33,303	203,271
		95	143,032	15	0	270	143,317	26,777	170,094
		94	210,563	20	0	20	210,603	21,098	231,701
		88	152,587	500	0	0	153,087	579,249	732,336
3564	Blowers & Fans	96	154,213	1	0	0	154,214	64,323	218,537
		95	267,480	0	0	0	267,480	52,409	319,889
		94	197,989	0	0	0	197,989	43,329	241,318
		88	479,541	0	0	0	479,541	9,750	489,291
3565	Packaging Machinery	96	11,708	0	0	0	11,708	0	11,708
		95	31,270	0	0	0	31,270	250	31,520
		94	93,951	0	0	0	93,951	0	93,951
		88	13,723	0	0	0	13,723	10,797	24,520
3566	Speed Changers, Drives, & Gears	96	111,044	0	0	5	111,049	95,276	206,325
		95	221,734	0	0	307	222,041	198,664	420,705
		94	255,289	0	0	0	255,289	164,222	419,511
		88	531,065	250	0	19	531,334	112,802	644,136
3567	Industrial Furnaces & Ovens	96	137,005	0	0	790	137,795	2,005	139,800
		95	167,789	0	0	540	168,329	1,533	169,862
		94	159,695	0	0	1,005	160,700	12,925	173,625
		88	620,065	0	0	0	620,065	1,439	621,504

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for total releases in 1995. The facility should have reported in SIC code 3579. The incorrectly reported amount was 141,121 pounds of total releases. Another facility reported incorrectly in SIC code 3548 for 1988. The facility should have reported in SIC code 2899. The incorrectly reported amounts were 43,810 pounds of total air emissions and 2,902,304 pounds of transfers off-site to disposal.
*nec: not elsewhere classified.

Table 13-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3568	Power Transmission Equipment, nec*	96	158,829	505	0	511	159,845	10,409	170,254
		95	166,771	505	0	0	167,276	8,964	176,240
		94	151,772	505	0	0	152,277	4,667	156,944
		88	298,244	0	0	276	298,520	40,933	339,453
3569	General Industrial Machinery, nec*	96	196,829	0	0	0	196,829	13,008	209,837
		95	226,561	0	0	5	226,566	16,161	242,727
		94	532,050	0	0	5	532,055	12,086	544,141
		88	1,104,276	25,260	0	0	1,129,536	9,927	1,139,463
3571	Electronic Computers	96	17,778	0	0	0	17,778	0	17,778
		95	58,664	0	0	0	58,664	0	58,664
		94	117,628	0	0	0	117,628	5	117,633
		88	671,566	22	0	0	671,588	8,767	680,355
3572	Computer Storage Devices	96	208	0	0	0	208	49,389	49,597
		95	2,958	0	0	0	2,958	41,147	44,105
		94	51,344	78,659	0	0	130,003	45,656	175,659
		88	1,383,856	9,145	0	0	1,393,001	24,416	1,417,417
3577	Computer Peripheral Equipment, nec*	96	37,102	0	0	250	37,352	0	37,352
		95	36,345	0	0	0	36,345	0	36,345
		94	40,590	0	0	0	40,590	0	40,590
		88	943,381	764	0	0	944,145	7,460	951,605
3578	Calculating & Accounting Equipment	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	21,000	0	0	0	21,000	0	21,000
3579	Office Machines, nec*	96	102,823	0	0	0	102,823	250	103,073
		95	28,703	0	0	0	28,703	250	28,953
		94	285,905	0	0	0	285,905	255	286,160
		88	404,995	0	0	0	404,995	2,049	407,044
3581	Automatic Vending Machines	96	48,023	0	0	0	48,023	0	48,023
		95	134,290	0	0	0	134,290	63,300	197,590
		94	300,156	0	0	0	300,156	154,000	454,156
		88	501,015	0	0	7,240	508,255	0	508,255
3582	Commercial Laundry Equipment	96	53,957	0	0	750	54,707	1,005	55,712
		95	56,267	0	0	5	56,272	1,015	57,287
		94	67,463	750	0	750	68,963	515	69,478
		88	58,808	0	0	0	58,808	5,399	64,207
3585	Refrigeration & Heating Equipment	96	2,584,860	3,110	0	2,258	2,590,228	169,739	2,759,967
		95	3,359,544	859	0	2,835	3,363,238	225,032	3,588,270
		94	4,072,687	1,257	0	2,679	4,076,623	259,549	4,336,172
		88	16,284,657	9,454	0	1,850	16,295,961	537,954	16,833,915
3586	Measuring & Dispensing Pumps	96	16,751	0	0	0	16,751	0	16,751
		95	9,570	0	0	0	9,570	0	9,570
		94	4,585	0	0	0	4,585	0	4,585
		88	27,100	0	0	0	27,100	11,450	38,550

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for total releases in 1995. The facility should have reported in SIC code 3579. The incorrectly reported amount was 141,121 pounds of total releases. Another facility reported incorrectly in SIC code 3548 for 1988. The facility should have reported in SIC code 2899. The incorrectly reported amounts were 43,810 pounds of total air emissions and 2,902,304 pounds of transfers off-site to disposal.
***nec:** not elsewhere classified.

Table 13-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3589	Service Industry Machinery, nec*	96	157,174	0	0	0	157,174	716	157,890
		95	127,348	0	0	0	127,348	626	127,974
		94	121,061	0	0	0	121,061	7,858	128,919
		88	167,743	0	0	0	167,743	24,590	192,333
3592	Carburetors, Pistons, Rings, Valves	96	747,976	10	0	0	747,986	441,260	1,189,246
		95	530,735	10	0	750	531,495	434,905	966,400
		94	586,202	20	0	5	586,227	250,753	836,980
		88	1,588,937	262	0	1,061	1,590,260	37,078	1,627,338
3593	Fluid Power Cylinders & Actuators	96	17,014	5	0	1,304	18,323	2,038	20,361
		95	19,566	0	0	265	19,831	4,170	24,001
		94	14,855	0	0	15	14,870	745	15,615
		88	32,980	0	0	5	32,985	0	32,985
3594	Fluid Power Pumps & Motors	96	110,099	0	0	0	110,099	17,776	127,875
		95	136,453	0	0	0	136,453	17,875	154,328
		94	181,059	0	0	0	181,059	10,071	191,130
		88	49,800	0	0	0	49,800	7,560	57,360
3596	Scales & Balances, Exc. Laboratory	96	98,118	0	0	0	98,118	0	98,118
		95	174,999	0	0	0	174,999	4,635	179,634
		94	77,921	0	0	0	77,921	0	77,921
		88	19,000	0	0	0	19,000	19,000	38,000
3599	Industrial Machinery, nec*	96	251,714	255	0	515	252,484	790	253,274
		95	346,636	0	0	265	346,901	3,534	350,435
		94	231,396	0	0	270	231,666	1,265	232,931
		88	373,536	300	0	28,124	401,960	184,160	586,120
	Multiple within SIC Code 35	96	836,489	1,273	0	6,175	843,937	107,727	951,664
		95	904,913	418	0	8	905,339	212,511	1,117,850
		94	1,178,639	700	0	6,806	1,186,145	201,300	1,387,445
		88	1,852,838	5,713	0	36,950	1,895,501	178,493	2,073,994
	Invalid SIC Code within SIC Code 35	96	114,631	0	0	0	114,631	280	114,911
		95	511,694	0	0	0	511,694	4,347	516,041
		94	809,847	0	0	0	809,847	38,917	848,764
		88	5,563,542	500	0	0	5,564,042	295,119	5,859,161
	Total for SIC Code 35	96	16,272,214	27,668	0	127,557	16,427,439	2,734,615	19,162,054
		95	19,603,851	17,164	0	103,861	19,724,876	3,126,757	22,851,633
		94	23,568,657	106,126	0	153,872	23,828,655	3,291,560	27,120,215
		88	59,123,683	147,837	0	216,387	59,487,907	10,259,389	69,747,296

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for total releases in 1995. The facility should have reported in SIC code 3579. The incorrectly reported amount was 141,121 pounds of total releases. Another facility reported incorrectly in SIC code 3548 for 1988. The facility should have reported in SIC code 2899. The incorrectly reported amounts were 43,810 pounds of total air emissions and 2,902,304 pounds of transfers off-site to disposal.
*nec: not elsewhere classified.

Table 13-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3511	Turbines & Turbine Generator Sets	96	0	0	40,000	40,000
		95	96,800	0	516,416	613,216
		94	55,400	0	393,695	449,095
		88	NA	NA	NA	NA
3519	Internal Combustion Engines, nec*	96	2,355,177	0	505,161	2,860,338
		95	1,832,191	0	182,832	2,015,023
		94	2,173,314	0	648,483	2,821,797
		88	NA	NA	NA	NA
3523	Farm Machinery & Equipment	96	128,223	0	145,226	273,449
		95	28,972	52,234	131,910	213,116
		94	34,099	55,099	103,275	192,473
		88	NA	NA	NA	NA
3524	Lawn & Garden Equipment	96	0	0	95,045	95,045
		95	0	0	148,857	148,857
		94	0	0	104,424	104,424
		88	NA	NA	NA	NA
3531	Construction Machinery	96	665,326	20,702	127,937	813,965
		95	778,737	0	134,001	912,738
		94	630,181	0	115,204	745,385
		88	NA	NA	NA	NA
3532	Mining Machinery	96	126,000	0	18,449	144,449
		95	8,900	0	15,912	24,812
		94	6,200	0	10,973	17,173
		88	NA	NA	NA	NA
3533	Oil & Gas Field Machinery	96	73,992	0	41,062	115,054
		95	428,260	0	70,091	498,351
		94	415,883	0	50,777	466,660
		88	NA	NA	NA	NA
3534	Elevators & Moving Stairways	96	26,457	0	0	26,457
		95	28,106	0	0	28,106
		94	2,141	0	0	2,141
		88	NA	NA	NA	NA
3535	Conveyors & Conveying Equipment	96	5,194	0	73,200	78,394
		95	7,941	0	96,700	104,641
		94	16,095	0	75,000	91,095
		88	NA	NA	NA	NA
3536	Hoists, Cranes, & Monorails	96	0	0	196	196
		95	0	0	196	196
		94	0	0	0	0
		88	NA	NA	NA	NA
3537	Industrial Trucks & Tractors	96	76,898	0	0	76,898
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3541	Machine Tools, Metal Cutting Types	96	775	0	150,732	151,507
		95	350	0	14,212	14,562
		94	4,625	0	22,610	27,235
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 585,400 pounds of recycling on-site, 19,244 pounds of treatment on-site and 604,644 pounds of total other on-site waste management.
***nec:** not elsewhere classified.

Table 13-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3542	Machine Tools, Metal Forming Types	96	110,785	0	0	110,785
		95	140,445	0	0	140,445
		94	115,787	0	0	115,787
		88	NA	NA	NA	NA
3543	Industrial Patterns	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3544	Special Dies, Tools, Jigs & Fixtures	96	238,351	0	302,950	541,301
		95	254,444	0	0	254,444
		94	156,000	0	96,023	252,023
		88	NA	NA	NA	NA
3545	Machine Tool Accessories	96	4,180,054	0	72,801	4,252,855
		95	3,106,710	0	25,891	3,132,601
		94	3,675,205	0	7,109	3,682,314
		88	NA	NA	NA	NA
3546	Power-driven Handtools	96	10,000	0	257,100	267,100
		95	0	0	373,353	373,353
		94	0	0	394,549	394,549
		88	NA	NA	NA	NA
3547	Rolling Mill Machinery	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3548	Welding Apparatus	96	634,040	0	99,400	733,440
		95	605,696	0	68,045	673,741
		94	586,325	0	50,855	637,180
		88	NA	NA	NA	NA
3549	Metalworking Machinery, nec*	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3552	Textile Machinery	96	0	0	12,543	12,543
		95	0	0	13,800	13,800
		94	0	0	12,200	12,200
		88	NA	NA	NA	NA
3553	Woodworking Machinery	96	12,000	0	0	12,000
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3554	Paper Industries Machinery	96	0	0	186,700	186,700
		95	0	0	180,300	180,300
		94	0	0	161,614	161,614
		88	NA	NA	NA	NA
3555	Printing Trades Machinery	96	1,780,420	0	730,200	2,510,620
		95	2,697,435	0	676,245	3,373,680
		94	2,727,350	0	450,644	3,177,994
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 585,400 pounds of recycling on-site, 19,244 pounds of treatment on-site and 604,644 pounds of total other on-site waste management.
*nec: not elsewhere classified.

Table 13-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3556	Food Products Machinery	96	192,800	0	0	192,800
		95	283,880	0	0	283,880
		94	274,300	0	0	274,300
		88	NA	NA	NA	NA
3559	Special Industry Machinery, nec*	96	31,166	0	3,058,980	3,090,146
		95	24,000	0	587,620	611,620
		94	38,300	0	660,027	698,327
		88	NA	NA	NA	NA
3561	Pumps & Pumping Equipment	96	1,141,917	0	0	1,141,917
		95	1,322,717	0	8,609	1,331,326
		94	1,301,023	0	3,887	1,304,910
		88	NA	NA	NA	NA
3562	Ball & Roller Bearings	96	1,398,000	0	19,677	1,417,677
		95	1,838,000	0	40,968	1,878,968
		94	1,485,300	0	71,724	1,557,024
		88	NA	NA	NA	NA
3563	Air & Gas Compressors	96	19,560	0	351	19,911
		95	293	183	559	1,035
		94	0	12,214	191	12,405
		88	NA	NA	NA	NA
3564	Blowers & Fans	96	1,200	0	0	1,200
		95	44,072	0	0	44,072
		94	53,070	0	0	53,070
		88	NA	NA	NA	NA
3565	Packaging Machinery	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3566	Speed Changers, Drives, & Gears	96	76,000	0	0	76,000
		95	90,000	0	0	90,000
		94	90,000	0	0	90,000
		88	NA	NA	NA	NA
3567	Industrial Furnaces & Ovens	96	11,205	0	0	11,205
		95	11,712	0	0	11,712
		94	10,500	0	0	10,500
		88	NA	NA	NA	NA
3568	Power Transmission Equipment, nec*	96	29,015	0	70,152	99,167
		95	48,856	5,399	19,340	73,595
		94	33,899	0	22,300	56,199
		88	NA	NA	NA	NA
3569	General Industrial Machinery, nec*	96	0	0	411,433	411,433
		95	72,540	0	156,790	229,330
		94	76,500	0	101,227	177,727
		88	NA	NA	NA	NA
3571	Electronic Computers	96	0	0	150	150
		95	18,300	0	182,943	201,243
		94	32,300	0	78,230	110,530
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 585,400 pounds of recycling on-site, 19,244 pounds of treatment on-site and 604,644 pounds of total other on-site waste management.
***nec:** not elsewhere classified.

Table 13-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3572	Computer Storage Devices	96	0	0	0	0
		95	0	0	0	0
		94	0	0	31,669	31,669
		88	NA	NA	NA	NA
3577	Computer Peripheral Equipment, nec*	96	4,100	0	356,470	360,570
		95	0	0	381,900	381,900
		94	0	0	333,160	333,160
		88	NA	NA	NA	NA
3578	Calculating & Accounting Equipment	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
3579	Office Machines, nec*	96	909,155	0	124,017	1,033,172
		95	63,624	0	9,466	73,090
		94	1,179,500	0	452,339	1,631,839
		88	NA	NA	NA	NA
3581	Automatic Vending Machines	96	0	0	11,215	11,215
		95	0	0	82,000	82,000
		94	0	0	79,000	79,000
		88	NA	NA	NA	NA
3582	Commercial Laundry Equipment	96	0	0	0	0
		95	0	0	1,400	1,400
		94	0	0	1,400	1,400
		88	NA	NA	NA	NA
3585	Refrigeration & Heating Equipment	96	32,688,807	0	331,705	33,020,512
		95	44,283,742	0	332,051	44,615,793
		94	51,141,669	0	86,350	51,228,019
		88	NA	NA	NA	NA
3586	Measuring & Dispensing Pumps	96	0	0	0	0
		95	19,401	0	0	19,401
		94	0	0	0	0
		88	NA	NA	NA	NA
3589	Service Industry Machinery, nec*	96	90	0	0	90
		95	90	0	0	90
		94	90	0	0	90
		88	NA	NA	NA	NA
3592	Carburetors, Pistons, Rings, Valves	96	667,344	0	42,563	709,907
		95	64,063	0	61,141	125,204
		94	94,394	0	100,322	194,716
		88	NA	NA	NA	NA
3593	Fluid Power Cylinders & Actuators	96	6,000	0	0	6,000
		95	0	0	0	0
		94	280,800	0	0	280,800
		88	NA	NA	NA	NA
3594	Fluid Power Pumps & Motors	96	0	0	150	150
		95	0	0	1	1
		94	0	0	0	0
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 585,400 pounds of recycling on-site, 19,244 pounds of treatment on-site and 604,644 pounds of total other on-site waste management.
*nec: not elsewhere classified.

Table 13-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3596	Scales & Balances, Exc. Laboratory	96	17,500	0	0	17,500
		95	15,000	0	0	15,000
		94	14,000	0	0	14,000
		88	NA	NA	NA	NA
3599	Industrial Machinery, nec*	96	185,656	0	121,402	307,058
		95	114,500	0	0	114,500
		94	198,500	0	0	198,500
		88	NA	NA	NA	NA
	Multiple within SIC Code 35	96	75,052	0	44,491	119,543
		95	643,291	0	43,211	686,502
		94	574,621	0	58,628	633,249
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 35	96	800	0	0	800
		95	0	0	0	0
		94	898,800	0	0	898,800
		88	NA	NA	NA	NA
	Total for SIC Code 35	96	47,879,059	20,702	7,451,458	55,351,219
		95	58,973,068	57,816	4,556,760	63,587,644
		94	68,376,171	67,313	4,777,889	73,221,373
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 585,400 pounds of recycling on-site, 19,244 pounds of treatment on-site and 604,644 pounds of total other on-site waste management.
***nec:** not elsewhere classified.

The miscellaneous office machines industry (SIC code 3579) ranked second with 3.9 million pounds of transfers off-site for further waste management in 1994 and 2.1 million pounds in 1996. This reduction reflected a larger decrease from 1994 to 1995 in transfers to recycling, partly offset by a sizable increase from 1995 to 1996 in reporting of transfers without a valid code (to identify the type of transfer). As noted earlier in this chapter, one facility reported 2.0 million pounds of transfers with invalid codes in 1996, including 1.8 million pounds of dichloromethane. In previous years, this facility reported transferring dichloromethane to recycling. This is the same facility that reported in SIC code 3579 in 1994 and 1996, but reported in SIC code 3861 in 1995, which also accounts for the miscellaneous office machines industry's decreased total for transfers off-site for further waste management in 1995.

The third-ranked industry for decreases—special dies, tools, jigs, and fixtures (SIC code 3544)—reported a decrease from 2.4 million pounds to 1.2 million pounds (although the 1995 level was much higher—4.2 million pounds). This reduction was entirely attributable to transfers to recycling.

Although the refrigeration and heating equipment industry (SIC code 3585) recorded the largest decreases in on- and off-site releases and other on-site waste management, discussed above, this industry ranked first for increases in transfers off-site for further waste management in the industrial machinery sector. The refrigeration and heating equipment industry reported 10.3 million pounds of transfers off-site for further waste management in 1994 and 12.5 million pounds in 1996. This increase was attributable to transfers to recycling. The miscellaneous internal combustion engines industry (SIC code 3519) ranked second in the sector for increases, reporting 3.6 million pounds in

1994 and 5.6 million pounds in 1996. However, these amounts reflected one facility's reporting errors for transfers to recycling of 1.5 million pounds in 1994 and 2.4 million pounds in 1996 (both amounts should have been zero). Taking into account this error, miscellaneous internal combustion engines ranked third, and the miscellaneous special industry machinery industry (SIC code 3559) ranked second, reporting 1.3 million pounds in 1994 and 2.4 million pounds in 1996. In this industry, the 1995 level was considerably higher (5.0 million pounds). The 1994-1996 increase was attributable to transfers to recycling.

Table 13-16 presents data on transfers off-site for further waste management for four-digit SIC codes in SIC code 35.

Facilities with Large Increases and Decreases in Releases, 1988-1996

New Holland N.A., Inc., in Grand Island, Nebraska (SIC code 3523), was first in increases with 309,000 pounds. Xylene (mixed isomers)—a paint constituent—was responsible for 100% of the increase. A production increase was cited as the reason for the overall reporting increase by this manufacturer of farming machinery (combines, haying equipment, wagons, etc.).

John Deere Ottumwa Works in Ottumwa, Iowa (SIC codes 3523 and 3524 in 1988 and 3523 in 1996), ranked second in increases with 289,000 pounds. No data were reported for the chemical, sec-butyl alcohol, in 1988. Total releases for sec-butyl alcohol in 1996 were 238,000 pounds. This accounted for 82% of the increase. No reason was given for the increase. The facility contact stated that John Deere Ottumwa Works does not discuss TRI reporting.

Kobelco America, Inc., in Calhoun, Georgia (did not report in 1988, SIC code 3531 in 1996), was third in increases with 167,000 pounds. Because there were no data in 1988, the 1996 data equal the overall increase. Point-source air emissions of methyl ethyl ketone constituted 91% of the facility's total releases in the latter year. A manufacturer of hydraulic excavation machinery, the plant uses the chemical, methyl ethyl ketone (MEK), to flush out paint lines. Reported point-source air emissions of MEK totaled 152,000 pounds (91% of the overall releases for the year). The facility began operation in July 1989.

Heatcraft, Inc., in Grenada, Mississippi (SIC code 3585 in 1988 and codes 3585, 3351, and 3366 in 1996), was the top decreaser with an overall 1.9 million-pound reduction. Heatcraft manufactures heat transfer coils, A-coils, copper tubing, and replacement and steam coils. Reduction of trichloroethylene air emissions accounted for 93% of the decrease. A lubricant is required in the manufacture of the coil assemblies. Traditionally, petroleum-based lubricants were used but had to be removed by solvent degreasing systems prior to paint application. Heatcraft developed a proprietary, non-petroleum-based lubricant that does not require removal from coil assemblies prior to painting. Consequently, the facility greatly reduced the need for solvent degreasing.

Beloit Corporation in Beloit, Wisconsin (SIC code 3554), ranked second in decreases with a 1.0 million-pound reduction. Beloit Corporation manufactures papermaking machinery. Principal operations at the facility in Beloit have changed from manufacturing to service and maintenance. The facility continues to manufacture machinery, but on a very small scale, according to the facility contact. The change in operations was given as the main reason for the decrease in reported releases between 1988 and 1996. Chromium, a constituent of stainless steel used in machinery production, accounted for 60% of the decrease. Scrap stainless steel was sent to an off-site landfill. In 1988, 606,000 pounds of chromium releases were reported. The facility reported no releases of chromium in 1996.

Table 13-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3511	Turbines & Turbine Generator Sets	96	2,901,025	14,900	28,622	85	0	2,944,632
		95	2,835,209	10,960	154,194	79	0	3,000,442
		94	2,618,948	29,024	34,179	335	0	2,682,486
		88	NA	NA	434,365	7,570	1,837	NA
3519	Internal Combustion Engines, nec*	96	5,125,182	375,260	31,921	99,601	0	5,631,964
		95	2,465,077	429,225	178,134	113,473	0	3,185,909
		94	3,037,621	308,525	138,147	128,268	0	3,612,561
		88	NA	NA	577,394	423,201	57,821	NA
3523	Farm Machinery & Equipment	96	795,998	259,187	19,182	90,128	0	1,164,495
		95	1,018,907	206,282	29,701	99,700	0	1,354,590
		94	1,702,597	236,378	74,230	73,740	2,950	2,089,895
		88	NA	NA	143,845	20,704	1,100	NA
3524	Lawn & Garden Equipment	96	165,727	12,491	4	5,826	0	184,048
		95	81,082	184,064	0	1,530	0	266,676
		94	37,240	174,329	27	3,027	0	214,623
		88	NA	NA	242,649	0	2,857	NA
3531	Construction Machinery	96	3,109,494	681,866	84,105	107,554	0	3,983,019
		95	1,926,366	662,364	107,746	100,720	0	2,797,196
		94	2,454,341	524,049	87,795	156,083	0	3,222,268
		88	NA	NA	312,194	135,743	333,531	NA
3532	Mining Machinery	96	797,376	0	1,900	155	0	799,431
		95	785,714	5	10,958	67	0	796,744
		94	1,163,747	5	8,836	269	0	1,172,857
		88	NA	NA	6,200	250	0	NA
3533	Oil & Gas Field Machinery	96	1,046,983	30,095	7,089	288	0	1,084,455
		95	1,037,904	81,445	795	557	0	1,120,701
		94	1,074,551	79,031	214	291	0	1,154,087
		88	NA	NA	12,675	1,354	0	NA
3534	Elevators & Moving Stairways	96	445,990	62,445	0	260	0	508,695
		95	395,451	26,693	0	530	0	422,674
		94	331,736	22,991	2,419	25	0	357,171
		88	NA	NA	36,015	4	0	NA
3535	Conveyors & Conveying Equipment	96	591,538	25,423	1,870	0	2,337	621,168
		95	594,691	22,908	3,502	0	0	621,101
		94	263,514	22,938	750	0	0	287,202
		88	NA	NA	17,062	3	0	NA
3536	Hoists, Cranes, & Monorails	96	1,062,448	6,110	0	2	0	1,068,560
		95	456,777	2,900	3,002	5	0	462,684
		94	238,660	4,350	3,570	12	0	246,592
		88	NA	NA	50,500	0	19,350	NA
3537	Industrial Trucks & Tractors	96	352,630	82,616	1,000	4,289	0	440,535
		95	1,113,053	96,158	0	1,510	0	1,210,721
		94	917,566	61,477	11,018	15	0	990,076
		88	NA	NA	8,409	17,783	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 1,500,000 pounds for 1994 and 2,400,000 pounds for 1996 of transfers to recycling under SIC code 3519. The correct amounts are 0 pounds. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 1,369,940 pounds of transfers to recycling, 51,692 pounds of transfers to energy recovery, 10,243 pounds of transfers to treatment, 55 pounds of transfers to POTWs and 1,431,930 pounds of transfers off-site for further waste management. Another facility incorrectly reported 29 pounds of transfers to recycling in 1995 under multiple codes within SIC code 35. The correct amount is 1,272,858 pounds.
***nec:** not elsewhere classified.

Table 13-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3541	Machine Tools, Metal Cutting Types	96	693,466	0	13,907	19,940	47,000	774,313
		95	594,771	500	31,681	14,105	0	641,057
		94	792,939	1,464	34,000	1,959	5,699	836,061
		88	NA	NA	64,900	2,275	191,856	NA
3542	Machine Tools, Metal Forming Types	96	866,494	14,283	30,622	0	0	911,399
		95	287,008	17,171	0	0	0	304,179
		94	214,222	23,517	0	0	0	237,739
		88	NA	NA	143,036	0	0	NA
3543	Industrial Patterns	96	0	0	0	0	0	0
		95	0	0	0	0	0	0
		94	0	7,250	0	0	0	7,250
		88	NA	NA	2,560	0	0	NA
3544	Special Dies, Tools, Jigs & Fixtures	96	1,149,656	11,602	44,707	330	0	1,206,295
		95	4,085,893	15,600	48,312	350	0	4,150,155
		94	2,435,272	0	7,708	100	0	2,443,080
		88	NA	NA	581	1,156	0	NA
3545	Machine Tool Accessories	96	508,532	0	190,208	19,409	0	718,149
		95	456,291	28,741	95,742	14,529	0	595,303
		94	389,262	27,384	120,261	49,353	0	586,260
		88	NA	NA	52,267	15,060	28,213	NA
3546	Power-driven Handtools	96	451,365	3,359	840	204	0	455,768
		95	399,698	5,363	50,120	1,068	0	456,249
		94	455,058	2,290	44,197	915	0	502,460
		88	NA	NA	96,655	35,540	0	NA
3547	Rolling Mill Machinery	96	9,378	0	0	0	0	9,378
		95	9,841	0	0	0	0	9,841
		94	9,054	0	0	0	0	9,054
		88	NA	NA	0	250	0	NA
3548	Welding Apparatus	96	1,352,673	12,405	17,487	40,215	0	1,422,780
		95	1,004,772	5,550	15,830	34,622	0	1,060,774
		94	1,257,794	7,850	28,921	20,117	0	1,314,682
		88	NA	NA	0	1,625	156,500	NA
3549	Metalworking Machinery, nec*	96	25,450	0	48	0	0	25,498
		95	11,590	0	22	0	0	11,612
		94	7,810	0	10	0	0	7,820
		88	NA	NA	0	11,830	0	NA
3552	Textile Machinery	96	3,600	0	0	250	0	3,850
		95	20,380	0	0	250	0	20,630
		94	24,043	7,315	0	0	0	31,358
		88	NA	NA	29,278	500	0	NA
3553	Woodworking Machinery	96	89,907	2,810	250	5	0	92,972
		95	15,455	3,647	0	0	0	19,102
		94	16,039	3,785	0	0	0	19,824
		88	NA	NA	0	7,000	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 1,500,000 pounds for 1994 and 2,400,000 pounds for 1996 of transfers to recycling under SIC code 3519. The correct amounts are 0 pounds. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 1,369,940 pounds of transfers to recycling, 51,692 pounds of transfers to energy recovery, 10,243 pounds of transfers to treatment, 55 pounds of transfers to POTWs and 1,431,930 pounds of transfers off-site for further waste management. Another facility incorrectly reported 29 pounds of transfers to recycling in 1995 under multiple codes within SIC code 35. The correct amount is 1,272,858 pounds.
*nec: not elsewhere classified.

Table 13-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3554	Paper Industries Machinery	96	1,044,724	0	14,795	0	2,618	1,062,137
		95	1,254,318	0	21,507	0	0	1,275,825
		94	1,192,468	0	15,804	0	0	1,208,272
		88	NA	NA	14,485	1,750	0	NA
3555	Printing Trades Machinery	96	296,000	3,443	28,438	5	0	327,886
		95	218,293	0	40,288	6	0	258,587
		94	373,913	30,372	49,592	251	0	454,128
		88	NA	NA	207,655	80,961	5,800	NA
3556	Food Products Machinery	96	750,449	0	28,612	525	0	779,586
		95	774,751	0	10,406	1,020	0	786,177
		94	477,003	5	13,539	530	0	491,077
		88	NA	NA	0	250	0	NA
3559	Special Industry Machinery, nec*	96	2,316,637	32,050	78,939	6,746	0	2,434,372
		95	4,703,116	37,941	82,450	163,151	0	4,986,658
		94	931,738	52,983	91,278	214,012	0	1,290,011
		88	NA	NA	1,495,975	22,570	21,652	NA
3561	Pumps & Pumping Equipment	96	4,157,134	81,910	8,288	19,302	0	4,266,634
		95	4,152,134	48,655	6,875	2,347	0	4,210,011
		94	3,861,945	50,401	7,604	428	0	3,920,378
		88	NA	NA	69,318	2,449	0	NA
3562	Ball & Roller Bearings	96	4,489,238	22,528	9,548	41,767	0	4,563,081
		95	5,071,651	66,402	12,872	36,536	5	5,187,466
		94	4,680,176	36,573	45,324	46,369	0	4,808,442
		88	NA	NA	979,702	176,299	10,000	NA
3563	Air & Gas Compressors	96	459,003	4,159	0	272	0	463,434
		95	556,624	3,839	2,399	510	0	563,372
		94	263,376	3,549	314	1,053	0	268,292
		88	NA	NA	38,290	250	0	NA
3564	Blowers & Fans	96	405,787	7,042	3,837	22	0	416,688
		95	118,001	6,410	1,300	15	0	125,726
		94	95,684	1,873	5	15	0	97,577
		88	NA	NA	35,197	255	1,980	NA
3565	Packaging Machinery	96	40,593	0	0	0	0	40,593
		95	48,335	0	0	0	0	48,335
		94	45,814	250	0	0	0	46,064
		88	NA	NA	0	0	0	NA
3566	Speed Changers, Drives, & Gears	96	456,263	0	21	10	0	456,294
		95	553,006	0	750	10	0	553,766
		94	526,078	0	1,750	10	0	527,838
		88	NA	NA	5,780	750	51,655	NA
3567	Industrial Furnaces & Ovens	96	365,674	34,236	0	500	0	400,410
		95	295,293	23,323	0	500	250	319,366
		94	259,201	13,510	0	750	250	273,711
		88	NA	NA	21,250	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 1,500,000 pounds for 1994 and 2,400,000 pounds for 1996 of transfers to recycling under SIC code 3519. The correct amounts are 0 pounds. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 1,369,940 pounds of transfers to recycling, 51,692 pounds of transfers to energy recovery, 10,243 pounds of transfers to treatment, 55 pounds of transfers to POTWs and 1,431,930 pounds of transfers off-site for further waste management. Another facility incorrectly reported 29 pounds of transfers to recycling in 1995 under multiple codes within SIC code 35. The correct amount is 1,272,858 pounds.
***nec:** not elsewhere classified.

Table 13-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3568	Power Transmission Equipment, nec*	96	1,938,420	29,475	68,730	163,054	500	2,200,179
		95	2,686,041	47,595	38,547	3,535	0	2,775,718
		94	2,832,580	38,159	50,227	2,406	0	2,923,372
		88	NA	NA	17,174	532	94,292	NA
3569	General Industrial Machinery, nec*	96	759,279	76,872	185,400	137,856	750	1,160,157
		95	876,940	17,916	91,583	214,111	0	1,200,550
		94	598,249	17,982	87,046	118,173	0	821,450
		88	NA	NA	114,040	58,432	166,250	NA
3571	Electronic Computers	96	228,356	362,581	1,848	10	0	592,795
		95	353,028	362,520	2,509	41,733	0	759,790
		94	301,481	302,780	64,983	51,533	0	720,777
		88	NA	NA	40,510	423	3,850	NA
3572	Computer Storage Devices	96	10,000	18,224	658	968,018	0	996,900
		95	7,100	17,183	2,600	734,629	0	761,512
		94	4,180	113,043	42,176	610,325	0	769,724
		88	NA	NA	124,300	114,482	0	NA
3577	Computer Peripheral Equipment, nec*	96	61,290	6,600	7,590	252,202	0	327,682
		95	35,545	8,100	3,800	248,439	0	295,884
		94	21,200	8,250	16,650	138,135	0	184,235
		88	NA	NA	103,575	17,505	0	NA
3578	Calculating & Accounting Equipment	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA
3579	Office Machines, nec*	96	64,669	10,685	53,305	1,555	1,971,318	2,101,532
		95	34,691	13,083	16,587	1,500	750	66,611
		94	3,809,693	91,369	11,011	1,557	0	3,913,630
		88	NA	NA	20,936	14,231	8,748	NA
3581	Automatic Vending Machines	96	29,360	27,022	0	8	0	56,390
		95	0	74,200	0	1,000	0	75,200
		94	2,070	46,300	21,700	7	0	70,077
		88	NA	NA	7,992	0	0	NA
3582	Commercial Laundry Equipment	96	1,112,474	1,200	0	30	0	1,113,704
		95	920,401	250	2,515	4,340	0	927,506
		94	298,648	750	3,769	4,225	0	307,392
		88	NA	NA	187,974	5,711	1,170	NA
3585	Refrigeration & Heating Equipment	96	12,179,109	157,557	67,942	70,050	0	12,474,658
		95	11,963,224	352,732	68,271	62,399	750	12,447,376
		94	9,609,448	444,871	140,246	69,694	0	10,264,259
		88	NA	NA	1,165,664	313,655	277,933	NA
3586	Measuring & Dispensing Pumps	96	15,649	0	0	0	0	15,649
		95	7,512	0	0	0	0	7,512
		94	0	14,400	0	0	0	14,400
		88	NA	NA	0	0	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 1,500,000 pounds for 1994 and 2,400,000 pounds for 1996 of transfers to recycling under SIC code 3519. The correct amounts are 0 pounds. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 1,369,940 pounds of transfers to recycling, 51,692 pounds of transfers to energy recovery, 10,243 pounds of transfers to treatment, 55 pounds of transfers to POTWs and 1,431,930 pounds of transfers off-site for further waste management. Another facility incorrectly reported 29 pounds of transfers to recycling in 1995 under multiple codes within SIC code 35. The correct amount is 1,272,858 pounds.
*nec: not elsewhere classified.

Table 13-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Industrial Machinery, SIC Code 35, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3589	Service Industry Machinery, nec*	96	313,860	750	0	485,890	0	800,500
		95	226,568	3,155	0	270,483	0	500,206
		94	158,411	4,341	0	142,837	0	305,589
		88	NA	NA	704	0	24,390	NA
3592	Carburetors, Pistons, Rings, Valves	96	2,297,465	110	92,391	24,681	0	2,414,647
		95	1,442,571	303	87,715	137,427	0	1,668,016
		94	1,678,328	289	101,034	3,006	0	1,782,657
		88	NA	NA	151,289	1,833	0	NA
3593	Fluid Power Cylinders & Actuators	96	273,763	0	8,316	107	0	282,186
		95	294,780	0	76,188	862	0	371,830
		94	105,454	0	24,605	105	0	130,164
		88	NA	NA	0	43	200	NA
3594	Fluid Power Pumps & Motors	96	420,212	5,408	0	887	0	426,507
		95	467,421	6,716	15,249	290	0	489,676
		94	440,891	9,790	0	1,515	0	452,196
		88	NA	NA	0	14	0	NA
3596	Scales & Balances, Exc. Laboratory	96	3,534	0	1,000	0	0	4,534
		95	17,894	4,635	1,000	528	0	24,057
		94	0	0	1,000	0	0	1,000
		88	NA	NA	0	0	0	NA
3599	Industrial Machinery, nec*	96	957,933	4,050	25,711	25	0	987,719
		95	838,403	13,848	33,005	10	0	885,266
		94	1,036,934	11,735	18,000	10	0	1,066,679
		88	NA	NA	9,335	500	49,424	NA
	Multiple within SIC Code 35	96	4,994,499	44,598	45,636	229	0	5,084,962
		95	3,868,050	100,995	38,700	390	0	4,008,135
		94	7,827,766	158,421	33,282	2,704	0	8,022,173
		88	NA	NA	236,106	1,030	384,661	NA
	Invalid SIC Code within SIC Code 35	96	58,411	0	7,920	1,113	1,113	68,557
		95	114,773	8,702	158,431	4,060	0	285,966
		94	109,514	17,242	203,617	2,865	0	333,238
		88	NA	NA	887,248	33,963	0	NA
	Total for SIC Code 35	96	62,044,697	2,525,352	1,212,687	2,563,405	2,025,636	70,371,777
		95	61,496,394	3,018,079	1,545,286	2,312,926	1,755	68,374,440
		94	60,984,257	3,013,190	1,640,838	1,847,024	8,899	67,494,208
		88	NA	NA	8,165,084	1,529,736	1,895,070	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 35 are assigned to the "multiple" category. One facility incorrectly reported 1,500,000 pounds for 1994 and 2,400,000 pounds for 1996 of transfers to recycling under SIC code 3519. The correct amounts are 0 pounds. One facility reported incorrectly in SIC code 3861 for 1995. The facility should have reported in SIC code 3579. The incorrectly reported amounts were as follows: 1,369,940 pounds of transfers to recycling, 51,692 pounds of transfers to energy recovery, 10,243 pounds of transfers to treatment, 55 pounds of transfers to POTWs and 1,431,930 pounds of transfers off-site for further waste management. Another facility incorrectly reported 29 pounds of transfers to recycling in 1995 under multiple codes within SIC code 35. The correct amount is 1,272,858 pounds.
***nec:** not elsewhere classified.

Brunswick Corporation in Fond du Lac, Wisconsin (SIC code 3519), was the third largest decreaser with an 838,000 pound reduction. Elimination of 1,1,1-trichloroethane, used in degreasing and cleaning operations and to soften rubber hoses for applications, accounted for 24% of the total decrease. The facility switched to aqueous cleaning and degreasing systems and substituted warm water for the chemical for softening hoses.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There are four such facilities in the industrial machinery sector:

Caterpillar Inc. Mossville Eng., Mossville, Illinois, increase of 418,000 pounds, reporting error.

Lennox Industries, Inc., Fort Worth, Texas, decrease of 889,000 pounds, plant closure.

Lincoln Electric Company, Euclid, Ohio, decrease of 3.4 million pounds, reported incorrect SIC code.

Mobile Pulley & Machine Works, Mobile, Alabama, increase of 256,000 pounds, reported incorrect SIC code.

1991-1996 Waste Management Data for Industrial Machinery

Table 13-17 summarizes on- and off-site waste management data for the industrial machinery sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste reported by the industrial machinery sector decreased by more than one-fourth (27.7%) from 1991 to 1996. The sector reported a total of 220.7 million pounds of production-related waste in 1991 and 159.6 million pounds in 1996.

The sector's largest reduction, in pounds and percent, occurred in reporting of on-site recycling, which decreased 60.9% from 122.4 million pounds in 1991 to 47.9 million pounds in 1996. The second-largest reduction was reported in quantities released, which decreased 55.5% from 43.3 million pounds to 19.3 million pounds. Off-site energy recovery decreased from 3.3 million pounds to 2.6 million pounds, a 19.5% reduction.

At the same time, off-site recycling increased 79.6% from 43.9 million pounds to 78.8 million pounds. Reporting errors in 1994, 1995, and 1996, described earlier in this chapter, have little effect on this overall increase. The sector also reported an increase of 71.1% in on-site treatment, from 4.4 million pounds to 7.5 million pounds. A small increase was reported in off-site treatment, along with a small decrease in on-site energy recovery.

Figure 13-13 illustrates the percentage changes in amounts reported for these waste management methods from 1991 to 1996.

The industrial machinery sector's reporting indicates some improvement from 1991 to 1996 in how the sector manages its waste, as measured by the waste management hierarchy (explained in Chapter 1). The sector reported releasing a smaller portion of its total production-related waste in 1996 (12.1%) than in 1991 (19.6%). Releases are the least desirable waste management option.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Carrier Corporation in Indianapolis, Indiana (SIC code 3585), ranked first for increases in waste managed with 12.9 million pounds. Nickel compounds, a constituent of the steel used to manufacture fan coils and natural gas furnaces,

Table 13-17. TRI Waste Management Data, 1991, 1994-1996: Industrial Machinery, SIC Code 35

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	122,388,527	68,397,051	58,982,163	47,879,059
Energy Recovery On-site	22,205	67,313	57,816	20,702
Treated On-site	4,355,638	4,777,889	4,556,760	7,451,458
Total On-site Waste Management	126,766,370	73,242,253	63,596,739	55,351,219
Off-site Waste Management				
Recycled Off-site	43,876,235	61,362,244	61,872,177	78,784,013
Energy Recovery Off-site	3,275,294	3,627,485	3,135,411	2,636,326
Treated Off-site	3,540,023	3,627,485	3,678,413	3,584,053
Total Off-site Waste Management	50,691,552	67,961,983	68,686,001	85,004,392
Quantity Released On- and Off-site	43,274,908	26,937,872	22,120,683	19,259,227
Total Production-related Waste	220,732,830	168,142,108	154,403,423	159,614,838
Non-Production-related Waste	485,707	222,504	316,123	23,731

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-13.8	-18.8	-60.9
Energy Recovery On-site	-14.1	-64.2	-6.8
Treated On-site	-4.6	63.5	71.1
Total On-site Waste Management	-13.2	-13.0	-56.3
Off-site Waste Management			
Recycled Off-site	0.8	27.3	79.6
Energy Recovery Off-site	5.5	-15.9	-19.5
Treated Off-site	1.4	-2.6	1.2
Total Off-site Waste Management	1.1	23.8	-67.7
Quantity Released On- and Off-site	-17.9	-12.9	-55.5
Total Production-related Waste	-8.2	3.4	-27.7
Non-Production-related Waste	42.1	-92.5	-95.1

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated. One facility incorrectly reported 1,500,000 pounds for 1994 and 2,400,000 pounds for 1996 of recycling off-site. The correct amounts are 0 pounds. One facility incorrectly reported 29 pounds of recycling off-site in 1995. The correct amount is 1,272,858 pounds.

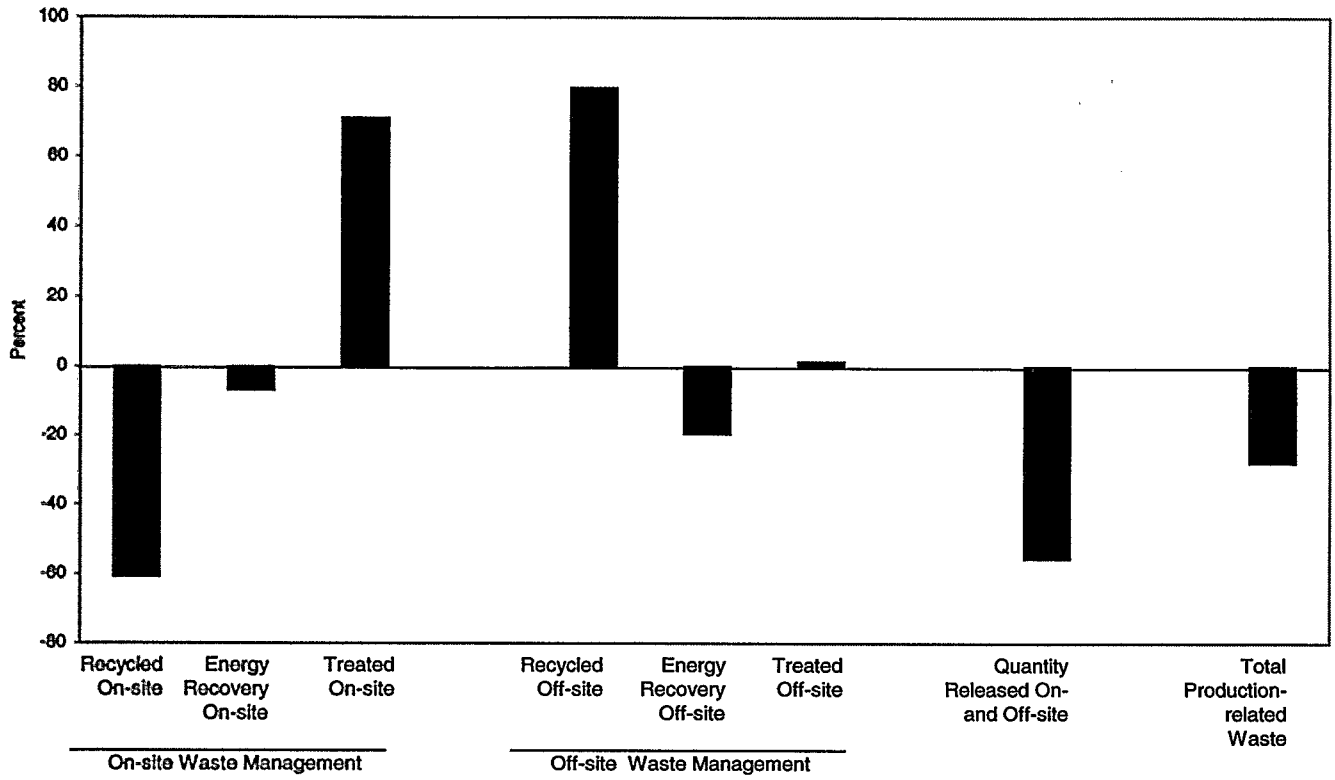

Figure 13-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Industrial Machinery (SIC Code 35)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

accounted for 94% of the increase. All of the 1996 data for nickel compounds was reported as recycled off-site (the facility recycles metal offal). The facility cited a production increase as the reason for the change.

Thermo King Corporation in Bloomington, Minnesota (SIC code 3585), was second in increases with 4.0 million pounds. A manufacturer of components for transport refrigeration units, the Thermo King plant used 1,1,1-trichloroethane in a degreasing operation. The chemical was recycled through distillation and then reused. The facility contact attributed the increase only to increased hours of operation of an integral distillation unit. The contact also stated that aqueous cleaning operations replaced solvent degreasing at the end of 1997.

Sterilization Services of Virginia in Richmond, Virginia (SIC code 3559), was third in increases with 2.8 million pounds. An increase in reported on-site treatment of ethylene oxide, used as a sterilant for medical devices, accounted for 93% of the change. The facility contact cited the installation of scrubbers as the reason for the increase in on-site treatment.

Amana Refrigeration, Inc., in Fayetteville, Tennessee (SIC code 3585), ranked first in decreases of waste managed with 34.8 million pounds. The heating and air conditioning equipment manufacturing plant eliminated a

degreasing process that used tricholorethylene as a degreasing agent. Elimination of the process resulted in a reported 34.6 million-pound decrease between 1991 and 1996 (99% of the overall decrease). The reduction was achieved by replacing lubricants (used in the manufacture of heat exchanger coils) requiring solvent degreasing with an evaporative lubricant that does not require physical removal.

Thermo King de Puerto Rico in Arecibo, Puerto Rico (SIC code 3585), was second in decreases with 7.7 million pounds. The facility manufactures transport refrigeration units. Almost all of the facility's decrease is accounted for by a reduction in the amount 1,1,1-trichloroethane reported as recycled on-site. The chemical was used in a solvent degreasing system. The facility contact stated that much of the reduction was attributable to increased efficiency of the degreasing operation. Subsequently, in March 1998, the solvent degreasing system was replaced by an aqueous cleaning system.

Modine Manufacturing Company in Lawrenceburg, Tennessee (SIC code 3585), ranked third in decreases of waste managed with an overall 6.9 million-pound reduction. The chemical, 1,1,1-trichloroethane, accounted for 82% of the facility's overall decrease. The change is the result of substituting another chemical for 1,1,1-trichloroethane, according to the facility contact. Aluminum donut oil coolers and charge air coolers for trucks are manufactured at the facility.

Facilities Contacted for Explanations (alphabetical by facility):

Amana Refrigeration, Inc., Fayetteville, Tennessee: R.R. Mahal, October 16, 1998 (explanation provided)

Beloit Corporation, Beloit, Wisconsin: Douglas R. McLeish, September 9, 1998 (explanation provided)

Brunswick Corporation, Fond du Lac, Wisconsin: Tom Baumgartner, September 22 and October 15, 1998 (explanation provided)

Carrier Corporation, Indianapolis, Indiana: Jami Gay, October 16, 1998 (explanation provided)

Caterpillar Inc. Mossville Eng., Mossville, Illinois: J.F. Dallmeyer, September 9, 1998 (explanation provided)

Heatcraft, Inc., Grenada, Mississippi: Melvin Noland, October 5, 1998 (explanation provided)

John Deere Ottumwa Works, Ottumwa, Iowa (no explanation provided)

Kobelco America, Inc., Calhoun, Georgia: John J. Beck, October 23 and 28, 1998 (explanation provided)

Lennox Industries, Inc., Fort Worth, Texas (could not be reached for comment)

Lincoln Electric Company, Euclid, Ohio: Jim Balazs, October 15, 1998 (explanation provided)

Mobile Pulley & Machine Works, Mobile, Alabama: Ron Bishop, September 9, 1998 (explanation provided)

Modine Manufacturing Company, Lawrenceburg, Tennessee: Kelly M. Weller, October 16, 1998 (explanation provided)

New Holland N.A., Inc., Grand Island, Nebraska: Gerry L. Johnson, October 5, 1998 (explanation provided)

P&H Mining Equipment, Milwaukee, Wisconsin: Stuart Brock, September 16 and October 13, 1998 (explanation provided)

Sterilization Services of Virginia, Richmond, Virginia: Jonathan Wallace, October 19, 1998 (explanation provided)

Thermo King Corporation, Bloomington, Minnesota: Pedro Arce and Tim Rumon, October 19, 1998 (explanation provided)

Thermo King de Puerto Rico, Arecibo, Puerto Rico: Janice E. Casado, September 16, 1998 (explanation provided)

Xerox Corp., Webster, New York: Carla Santos, Tom Roberts, John Flaherty, and Annick Fraissinet, September 22-29, 1998 (explanation provided)

Chapter 14

Toxics Release Inventory Data for Transportation (SIC Code 37)

A Look at the Transportation Equipment Industry (SIC Code 37)

The transportation equipment industry (SIC code 37) manufactures equipment to transport passengers and cargo by land, air, and water. Its best known product is the automobile. Automobile manufacture (including parts) dominates this sector; the largest industries are the production of motor vehicles and car bodies (SIC code 3711) and motor vehicle parts and accessories (SIC code 3714). Facilities that manufacture both motor vehicles and parts are also classified in SIC code 3711. Other forms of transportation equipment manufacturing range from aircraft to bicycles to space vehicles. Box 14-1 lists the Standard Industrial Classification (SIC) codes and their designations for the various transportation equipment categories. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

Makers of transportation equipment shipped $465.17 billion (in current dollars) in products in 1996 and employed 1.47 million. Approximately one out of every 12 U.S. manufacturing employees in 1996 worked in this sector. The value of transportation equipment shipments was up slightly from $461.80 billion (in current dollars) in 1995, while employment was 1.52 million. Production in this sector dropped in 1990 and 1991 but generally increased thereafter. By 1996, production in the transportation equipment sector showed a net increase of just 1.0% since 1989, well behind the average growth (17.6%) for all manufacturing sectors during this period (see Chapter 1, Table 1-10). Employment in transportation equipment steadily decreased through those years.

Motor Vehicles and Equipment

Motor vehicles and equipment (SIC code 371 at the three-digit SIC code level) accounted for 70.8% of the sector's 1996 value of shipments, $329.15 billion (in current dollars). This consisted of nearly two-thirds ($200.70 billion) from motor vehicles and car bodies (SIC code 3711), one-third ($110.99 billion) from motor vehicle parts and accessories (SIC code 3714), and small amounts from other industries such as the manufacture of truck and bus bodies (SIC code 3713). Motor vehicles and equipment also provided more than half the sector's employment, 772,000 employees. Within this, parts and accessories accounted for the larger portion, employing 460,000, while production of motor

Box 14-1. SIC Code 37, Transportation Equipment: Codes and Classifications

SIC Code		Industry Description
371 Motor Vehicles and Motor Vehicle Equipment		
3711	Motor Vehicles and Passenger Car Bodies	Manufacture or assembly of complete passenger automobiles, trucks, commercial cars and buses, and special purpose motor vehicles for highway use. Manufacture of chassis and passenger car bodies.
3713	Truck and Bus Bodies	Manufacture of truck and bus bodies and cabs. Assembly of truck and bus bodies on purchased chassis.
3714	Motor Vehicle Parts and Accessories	Manufacture of motor vehicle parts and accessories (excludes tires, glass, automobile stampings, lighting equipment, ignition systems, batteries, carburetors, and engine parts).
3715	Truck Trailers	Manufacture of truck trailers, detachable truck bodies (cargo containers), and chassis.
3716	Motor Homes	Manufacture of self-contained motor homes on purchased chassis.
372 Aircraft and Parts		
3721	Aircraft	Manufacture or assembly of complete aircraft. Research and development on aircraft (establishments owned by aircraft manufacturers). Repair and rebuilding of aircraft on a factory basis.
3724	Aircraft Engines and Engine Parts	Manufacture of aircraft engines and engine parts (including research and development; factory repair and rebuilding of engines).
3728	Aircraft Parts and Auxiliary Equipment, nec*	Manufacture of miscellaneous aircraft parts and equipment (including research and development).
373 Ship and Boat Building and Repairing		
3731	Ship Building and Repairing	Building and repairing of ships, barges, and lighters. Conversion and alteration of ships. Manufacture of off-shore oil and gas well drilling and production platforms.
3732	Boat Building and Repairing	Building and repairing of boats (excluding rubber and nonrigid plastics boats).
374 Railroad Equipment		
3743	Railroad Equipment	Building and rebuilding of locomotives (including frames and parts). Building and rebuilding of railroad, street, and rapid transit cars and equipment for operation on rails (except mining cars).
375 Motorcycles, Bicycles, and Parts		
3751	Motorcycles, Bicycles, and Parts	Manufacture of motorcycles, bicycles, and similar equipment, and parts.
376 Guided Missiles and Space Vehicles and Parts		
3761	Guided Missiles and Space Vehicles	Manufacture of complete guided missiles and space vehicles (including research and development).
3764	Guided Missile and Space Vehicle Propulsion Units and Propulsion Unit Parts	Manufacture of guided missile propulsion units and parts (including research and development
3769	Guided Missile and Space Vehicle Parts and Auxiliary Equipment, nec*	Manufacture of miscellaneous guided missile and space vehicle parts and equipment.
379 Miscellaneous Transportation Equipment		
3792	Travel Trailers and Campers	Manufacture of travel trailers and campers for attachment to cars or other vehicles. Manufacture of campers and caps for pickup trucks.
3795	Tanks and Tank Components	Manufacture of complete tanks, specialized components for tanks, and self-propelled weapons.
3799	Transportation Equipment, nec*	Manufacture of miscellaneous transportation equipment, including all-terrain vehicles, boat trailers, golfcarts, snowmobiles, wheelbarrows, and others.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

vehicles and car bodies employed about half that number (225,000). Accounting for nearly three-quarters of the sector's value of shipments and more than half of the sector's employment, these two industry sectors accounted for much of the sector's TRI reporting.

Motor vehicle producers are consolidating and simplifying production. The Big Three U.S. auto producers—General Motors, Ford, and Chrysler—are involved in controlling, owning, or merging with foreign automotive companies, while also engaging in alliances to produce foreign automobiles in the United States. In addition, foreign auto manufacturers from abroad have located independent plants in the U.S. states over the last 15 years. Automotive parts suppliers are similarly undergoing consolidation into fewer, larger companies. At the same time, basic automotive structures (a vehicle's "platform") are being simplified to reduce cost by reducing parts and enabling the interchange of parts.

Motor vehicle parts production (SIC code 3714) includes the manufacture of a number of fundamental automotive parts, including non-diesel engines, brakes, wiring harnesses, drive shafts, differentials, exhaust systems, steering mechanisms, and others. Many vehicle parts, however, are classified outside of the transportation equipment sector. Tires are a rubber product (SIC code 30); automobile glass is classified with other glass in SIC code 32; automobile stampings are fabricated metals (SIC code 34); lighting systems are electrical equipment (SIC code 36); carburetors, pistons, piston rings, and engine intake and exhaust valves are classified in industrial machinery (SIC code 35). Automotive seats are considered furniture (SIC code 25).

Approximately 80% of the parts and accessories industry has provided vehicle manufacturers original automotive equipment. The remaining 20% supplied replacement parts for the aftermarket. In recent years, however, the improved quality and durability of original equipment have kept the replacement parts market constant.

Steel remains the largest material used (by weight) in vehicle production, followed by iron, plastics and composites, fluids and lubricants, aluminum, and rubber. Although production processes vary widely, as evidenced by the variety of materials, most include casting, forging, molding, extrusion, stamping, and welding. Metal parts may be cleaned, coated, painted, etched, or electroplated. Major structural pieces are welded together, including the underbody, side assemblies, roof supports, and roof. Assembled vehicles must then be welded in as many as 4,000 places. Finishing operations include anti-corrosion processes, priming, joint sealing, and color- and clear-coat applications. Finally, all components are assembled, hard trim, soft trim, gas tank, exhaust system, bumpers, engine, and tires.

Sources

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U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Motor Vehicle Assembly Industry,* Sector Notebook project, EPA/310-R-95-009, September 1995; *Profile of the Shipbuilding and Repair Industry,* Sector Notebook project, EPA/310-R-97-008, November 1997 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

Table 14-1. Summary of TRI Information by 4-digit SIC Code, 1996: Transportation Equipment, SIC Code 37

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
1	2	3711	Motor Vehicles & Car Bodies	71	1,006	53	40,587,234	1,517,251	42,104,485
5	7	3713	Truck & Bus Bodies	55	238	16	4,770,261	133,698	4,903,959
2	1	3714	Motor Vehicle Parts & Accessories	495	1,389	48	16,080,845	4,348,414	20,429,259
9	11	3715	Truck Trailers	43	110	2	1,821,756	16,370	1,838,126
11	13	3716	Motor Homes	22	71	6	1,353,532	1,438	1,354,970
6	8	3721	Aircraft	36	154	3	4,280,481	62,547	4,343,028
13	4	3724	Aircraft Engines & Engine Parts	58	199	20	644,882	430,432	1,075,314
8	9	3728	Aircraft Parts & Equipment, nec*	76	172	6	2,412,299	120,680	2,532,979
7	5	3731	Ship Building & Repairing	41	171	3	2,750,991	191,201	2,942,192
4	6	3732	Boat Building & Repairing	166	287	28	11,301,287	11,007	11,312,294
10	10	3743	Railroad Equipment	33	83	3	1,328,152	210,868	1,539,020
15	12	3751	Motorcycles, Bicycles, & Parts	7	30	2	721,200	9,050	730,250
19	19	3761	Guided Missiles & Space Vehicles	4	11	0	97,590	35,314	132,904
16	16	3764	Space Propulsion Units & Parts	5	8	0	475,327	975	476,302
17	17	3769	Space Vehicle Equipment, nec*	2	17	3	213,862	256	214,118
12	15	3792	Travel Trailers & Campers	35	50	1	1,276,632	49,181	1,325,813
18	18	3795	Tanks & Tank Components	9	20	0	178,435	4,385	182,820
14	14	3799	Transportation Equipment, nec*	23	53	5	900,726	7,101	907,827
3	3		Multiple within SIC Code 37	65	252	14	12,331,760	578,421	12,910,181
20	20		Invalid SIC Code within SIC Code 37	2	10	1	95,832	1,096	96,928
			Total for SIC Code 37	1,248	4,331	214	103,623,084	7,729,685	111,352,769

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category. One facility incorrectly reported 6,211,171 pounds of total releases under multiple codes in SIC code 37. The correct amount is 750. The total releases rank of multiple codes within SIC code 37 changes from 3 to 4.

*nec: not elsewhere classified.

Materials in most of these processes—from binders used in sand-casting iron components to adhesives used in attaching trim—may contribute to releases or other waste management of toxic chemicals. Many processes involve solvents, in addition to wide-ranging uses of metals. During automotive assembly, the most significant chemical releases and wastes occur during vehicle painting and finishing. Air emissions result from both the paint/finish applications and cleaning operations, and consist primarily of organic solvents. In addition to their use as a cleaning agent, solvents such as xylenes are components of many finishes and coatings.

Aerospace and Shipbuilding

Aircraft (SIC code 372) represented the second-largest economic activity in the transportation equipment sector, with 1996 shipments valued at $83.39 billion (in current dollars) and 377,000 employees. Guided missiles and space vehicles (SIC code 376) was third with $17.93 billion in shipments. Employment in the guided missiles and space vehicles category was comparatively small at 81,000. These two SIC codes (372 and 376) make up the aerospace industry. Ship and boat building and repair (SIC code 373) was fourth in economic activity in the sector, with shipments of $15.63 billion and employment of 141,000. Although TRI reporting is dominated by vehicle manufacturing, the production of aircraft, ships, boats, and their parts also contributed to releases and waste management reported to TRI in this sector in 1996.

Table 14-1. Summary of TRI Information by 4-digit SIC Code, 1996: Transportation Equipment, SIC Code 37, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3711	Motor Vehicles & Car Bodies	14,741,945	46,128,216	108,642,104	12,141
3713	Truck & Bus Bodies	441,106	4,308,171	9,383,177	50
3714	Motor Vehicle Parts & Accessories	16,813,336	103,728,587	145,532,921	33,970
3715	Truck Trailers	115,775	996,221	2,929,762	1,183
3716	Motor Homes	10,799	255,175	1,663,970	0
3721	Aircraft	1,627,828	2,283,762	8,282,570	23,050
3724	Aircraft Engines & Engine Parts	5,341,491	11,984,305	18,474,826	64,854
3728	Aircraft Parts & Equipment, nec*	1,296,527	2,504,350	6,312,036	1,257
3731	Ship Building & Repairing	2,740,363	7,760,908	12,528,303	0
3732	Boat Building & Repairing	1,200	469,057	11,767,867	37,995
3743	Railroad Equipment	96,610	1,983,439	3,636,132	0
3751	Motorcycles, Bicycles, & Parts	222,010	679,411	1,768,278	0
3761	Guided Missiles & Space Vehicles	77,954	80,087	271,040	15,700
3764	Space Propulsion Units & Parts	55,754	810,222	1,340,458	319
3769	Space Vehicle Equipment, nec*	182,510	133,450	525,297	0
3792	Travel Trailers & Campers	5,500	41,456	1,350,125	2,460
3795	Tanks & Tank Components	181,097	128,960	502,511	0
3799	Transportation Equipment, nec*	140,493	330,419	1,412,522	0
	Multiple within SIC Code 37	3,407,047	8,561,588	18,724,061	3,903
	Invalid SIC Code within SIC Code 37	0	25,518	121,350	0
	Total for SIC Code 37	47,499,345	193,193,302	355,169,310	196,882

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category. One facility incorrectly reported 6,211,171 pounds of total releases under multiple codes in SIC code 37. The correct amount is 750. The total releases rank of multiple codes within SIC code 37 changes from 3 to 4.
***nec:** not elsewhere classified.

1996 TRI Data for Transportation Equipment

Table 14-1 summarizes TRI reporting by the transportation equipment sector for 1996. More than 4,300 forms were submitted in this industry for 1996. Of these, 214, or 4.9%, were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. This is less than half the percentage of Form As (10.1%) submitted in all industries. (The Form A certification statement is explained in Chapter 1.)

Motor vehicle manufacture—specifically, motor vehicle parts and accessories (SIC code 3714) with 1,389 forms and motor vehicles and car bodies (SIC code 3711) with 1,006 forms—accounted for more than half (55.3%) of the submitted forms. Boat building and repairing (SIC code 3732) was third with 287.

As shown in Table 14-1, the two motor vehicle industries also reported the largest amounts of releases and waste management, ranking first or second in the summary categories and accounted for more than half the reporting in the transportation equipment SIC code. Producers of motor vehicles and car bodies (SIC code 3711) reported 42.1 million pounds of on-and off-site releases, 37.8% of the sector's total. On-site releases were 40.6 million pounds for motor vehicles and car bodies, 39.2% of the sector's total.

Producers of motor vehicle parts and accessories (SIC code 3714) reported the largest amounts in other categories, as shown in Table 14-1. Off-site releases reported by motor vehicle parts manufacturing equaled 4.3 million pounds, representing 56.3% of the sector's total off-site releases. This industry reported 16.8 million pounds in other on-site waste management, which was 35.4% of the sector's total. Reporting in SIC code 3714 totaled 103.7 million pounds in transfers off-site for waste management (53.7% of the total) and 145.5 million pounds in production-related waste (41.0%).

Boat building and repairing (SIC code 3732) ranked third for total releases with 11.3 million pounds. (The larger amount of releases in the multiple-codes category reflects a facility reporting error). Aircraft engines and engine parts (SIC code 3724) ranked third for other on-site waste management (5.3 million pounds) and third for transfers off-site for further waste management (12.0 million pounds). For total production-related waste, forms submitted with more than one four-digit SIC code ranked third. This reporting of multiple SIC codes, explained below, accounted for 18.7 million pounds of production-related waste.

Multiple SIC Codes in SIC Code 37

Some facilities in the transportation equipment sector manufacture products in similar but distinct categories, as designated in the Standard Industrial Classification (SIC) system. One common combination is manufacturing both automobiles (SIC code 3711) and motor vehicle parts (SIC code 3714). To describe their operations, some of these facilities may report both SIC codes on their TRI forms (others may report only SIC code 3711, which covers both automobiles and parts when they are manufactured by the same facility). Facilities in other segments of the transportation equipment sector may also produce multiple items—for example, miscellaneous parts for aircraft (SIC code 3728) and miscellaneous parts for guided missiles or space vehicles (SIC code 3769). These facilities also may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

There were 252 forms that reported more than one four-digit SIC code within SIC code 37 in 1996. Table 14-2 examines reporting by this multiple-codes group. The most frequent pairing, reported on 61 forms, combined manufacturing activities of the two biggest industries: motor vehicles and passenger car bodies (SIC code 3711) and motor vehicle parts and accessories (SIC code 3714). This combination reported 2.7 million pounds of total on- and off-site releases and 7.6 million pounds of total production-related waste in 1996. These amounts represented the largest total releases and the largest total production-related waste reported by multiple-codes groups in SIC code 37. (One facility reporting SIC codes 3731 and 3743 reported 6.2 million pounds of air emissions in error.)

On- and Off-site Releases

Air emissions constituted the overwhelming majority of on- and off-site releases in 1996 by the transportation equipment sector: 102.7 million pounds (including a facility reporting error of 6.2 million pounds). On-site land releases totaled 705,000 pounds, mostly in land disposal other than RCRA subtitle C landfills. Surface water discharges were 224,000 pounds. No underground injection was reported. Off-site releases totaled 7.7 million pounds, the next-largest release type after

Table 14-2. Multiple SIC Codes, 1996: Transportation Equipment, SIC Code 37

SIC Codes				Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3711	3713			23	0	670,439	22,768	693,207	396,364	944,168	2,029,701	0
3711	3713	3714		3	0	112,379	177,412	289,791	0	0	289,791	0
3711	3714			61	1	2,643,322	16,741	2,660,063	1,126,390	3,774,429	7,574,110	0
3711	3751			26	0	101,416	1,551	102,967	7,864	47,110	155,805	0
3713	3714			4	0	98,408	0	98,408	31,709	8,637	138,755	0
3713	3714	3792		1	0	163,678	0	163,678	0	0	163,678	0
3713	3715			5	2	8,450	0	8,450	0	5,270	17,720	0
3713	3732			2	0	60,799	0	60,799	0	1,848	62,647	0
3713	3799			1	0	25,028	0	25,028	0	10,784	32,642	0
3714	3751			14	4	19,452	311,604	331,056	1,166,400	305,028	1,798,213	0
3714	3795			2	0	78,945	0	78,945	0	500	82,293	0
3714	3799			1	0	17,236	0	17,236	0	2,008	19,244	0
3715	3799			7	2	78,989	0	78,989	0	28,464	115,867	0
3716	3792			4	0	71,493	0	71,493	1,280	6,367	78,672	0
3716	3792	3798		1	0	28,278	0	28,278	0	1,000	28,927	0
3716	3799			1	0	10,521	0	10,521	0	7,892	18,413	0
3720	3721			3	0	64,010	3,735	67,745	0	23,589	91,393	0
3721	3724			4	1	19,410	0	19,410	0	183,132	202,137	0
3721	3724	3728		2	0	30,800	0	30,800	5,000	3,450	39,100	0
3721	3728			6	0	89,589	108	89,697	4,640	8,273	101,789	0
3724	3728			7	0	45,941	0	45,941	16,632	79,103	132,764	0
3724	3728	3769		2	0	8,690	0	8,690	0	3,340	12,030	1,100
3724	3728	3769	3795	1	0	16,553	0	16,553	0	343	16,896	0
3724	3769			3	0	12,694	0	12,694	1,668	32,116	46,313	0
3728	3764			9	2	182,521	0	182,521	95,400	85,626	403,124	0
3728	3769			23	0	483,781	20,237	504,018	518,700	585,711	1,628,742	0
3731	3732			7	0	86,185	0	86,185	0	58,930	150,582	0
3731	3743			6	0	6,365,071	0	6,365,071	30,000	402,481	586,331	0
3732	3799			5	2	103,443	0	103,443	0	11,480	114,923	0
3743	3799			10	0	324,494	24,195	348,689	0	1,909,938	2,241,138	3
3764	3769			3	0	93,910	70	93,980	5,000	0	103,920	2,800
3792	3799			3	0	206,223	0	206,223	0	10,073	216,296	0
3	3714			2	0	9,612	0	9,612	0	20,498	30,105	0
Total for SIC Code 37				252	14	12,331,760	578,421	12,910,447	3,407,047	8,561,588	18,724,061	3,903

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). One facility incorrectly reported 6,211,171 pounds of air emissions under SIC codes 3731 and 3743. The correct amount is 750.

air emissions. Table 14-3 and Figure 14-1 present the sector's releases by type.

As noted earlier, two industries accounted for the majority of the sector's releases: motor vehicles and car bodies (SIC code 3711) and motor vehicle parts and accessories (SIC code 3714). Figure 14-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

Table 14-4 and Figure 14-3 show other on-site waste management reported in the transportation equipment sector. The largest category was treatment, 29.5 million pounds or nearly two-thirds (62.1%) of the total other on-site waste management. Recycling was 16.5 million pounds; relatively little energy recovery (1.5 million pounds) was reported on-site.

The motor vehicles and car bodies industry (SIC code 3711) reported 14.0 million pounds, or 47.4% of all on-site treatment in this sector. For on-site recycling, the motor vehicle parts industry (SIC code 3714) reported the largest amount, 9.1 million pounds (55.0%). Of the 18 industries in the sector,

Table 14-3. TRI On-site and Off-site Releases, 1996: Transportation Equipment, SIC Code 37 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3711	Motor Vehicles & Car Bodies	40,561,496	10,428	0	0	14,445	865	40,587,234	1,517,251	42,104,485
3714	Motor Vehicle Parts & Accessories	15,634,030	83,564	0	0	51,929	311,322	16,080,845	4,348,414	20,429,259
	Multiple within SIC Code 37	12,323,358	2,901	0	0	266	5,235	12,331,760	578,421	12,910,181
3732	Boat Building & Repairing	11,274,153	0	0	0	0	27,134	11,301,287	11,007	11,312,294
3713	Truck & Bus Bodies	4,719,018	3,257	0	0	0	47,986	4,770,261	133,698	4,903,959
3721	Aircraft	4,247,896	16,719	0	0	15,830	36	4,280,481	62,547	4,343,028
3731	Ship Building & Repairing	2,707,317	19,752	0	0	0	23,922	2,750,991	191,201	2,942,192
3728	Aircraft Parts & Equipment, nec*	2,396,026	324	0	0	4,128	11,821	2,412,299	120,680	2,532,979
3715	Truck Trailers	1,705,764	265	0	0	0	115,727	1,821,756	16,370	1,838,126
3743	Railroad Equipment	1,328,150	1	0	0	0	1	1,328,152	210,868	1,539,020
3716	Motor Homes	1,353,532	0	0	0	0	0	1,353,532	1,438	1,354,970
3792	Travel Trailers & Campers	1,276,385	0	0	0	0	247	1,276,632	49,181	1,325,813
3724	Aircraft Engines & Engine Parts	484,200	86,909	0	0	0	73,773	644,882	430,432	1,075,314
3799	Transportation Equipment, nec*	900,151	28	0	0	0	547	900,726	7,101	907,827
3751	Motorcycles, Bicycles, & Parts	721,200	0	0	0	0	0	721,200	9,050	730,250
3764	Space Propulsion Units & Parts	475,327	0	0	0	0	0	475,327	975	476,302
3769	Space Vehicle Equipment, nec*	213,862	0	0	0	0	0	213,862	256	214,118
3795	Tanks & Tank Components	178,348	0	0	0	87	0	178,435	4,385	182,820
3761	Guided Missiles & Space Vehicles	97,590	0	0	0	0	0	97,590	35,314	132,904
	Invalid SIC Code within SIC Code 37	95,832	0	0	0	0	0	95,832	1,096	96,928
	Total for SIC Code 37	102,693,635	224,148	0	0	86,685	618,616	103,623,084	7,729,685	111,352,769

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category. One facility incorrectly reported 6,211,171 pounds of air emissions under multiple codes in SIC code 37. The correct amount is 750. The total releases rank of multiple codes within SIC code 37 changes from 3 to 4.
*nec: not elsewhere classified.

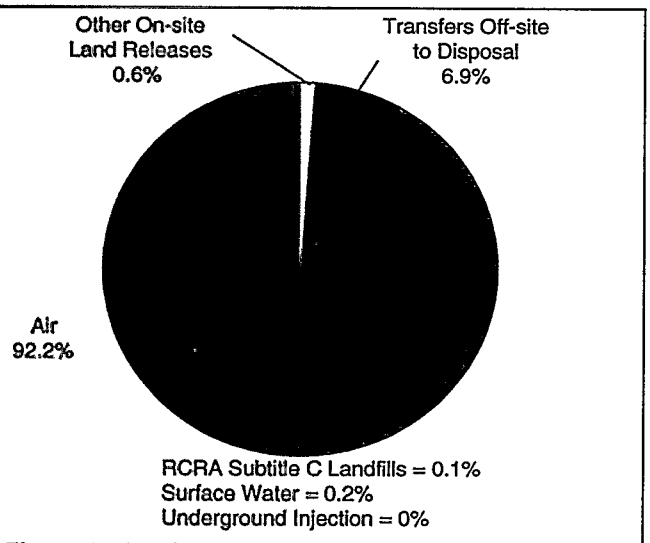


Figure 14-1. Distribution of TRI On-site and Off-site Releases, 1996: Transportation Equipment (SIC Code 37)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

three reported on-site energy recovery. Figure 14-4 illustrates the distribution of on-site waste management reporting for the top 10 industries in this sector.

Transfers Off-site for Further Waste Management

Table 14-5 presents transfers off-site for further waste management for industries in the transportation equipment sector. Transfers to recycling were 165.0 million pounds, or 85.4% of all such transfers in this sector. Motor vehicle parts manufacturers (SIC code 3714) reported 95.5 million pounds, or 57.9%, of transfers to recycling, and producers of motor vehicles and car bodies (SIC code 3711) reported 36.8 million pounds, or 22.3%.

These two industries also ranked first or second for most other types of transfers. The exception was transfers off-site to treatment. The second-largest amount of transfers off-site to treatment was

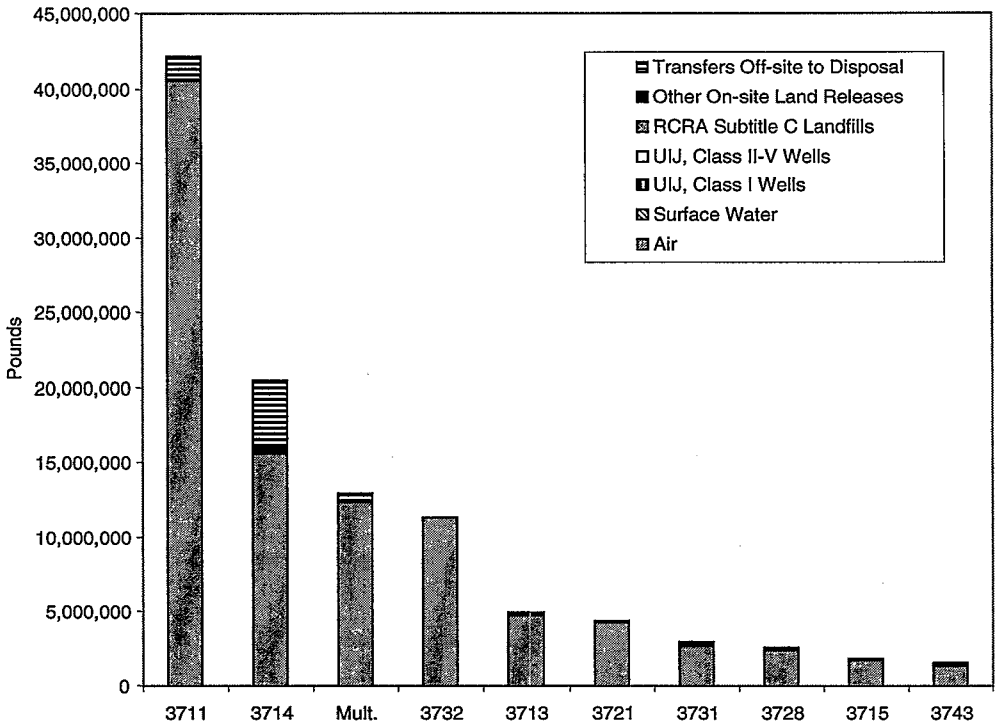


Figure 14-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Transportation Equipment (SIC Code 37)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal). **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category. One facility incorrectly reported 6,211,171 pounds of air emissions under multiple codes in SIC code 37. The correct amount is 750. The total releases rank of multiple codes within SIC code 37 changes from 3 to 4.

reported by makers of aircraft engines and engine parts (2.1 million pounds, SIC code 3724).

Figure 14-5 illustrates the distribution of types of off-site transfers for further waste management, and Figure 14-6 shows the data for the top industries in this sector.

1996 TRI Data by State for Transportation Equipment

States prominent in motor vehicle manufacturing led TRI reporting in this sector, as would be expected. Michigan produces more than 3 million vehicles per year, and Ohio, Missouri, and Kentucky each produce more than 1 million annually. Detroit hosts 19 assembly plants for cars or light trucks, all owned by one of the Big Three automakers (General Motors, Ford, and Chrysler). Missouri also produces vehicles for the Big Three (mostly light trucks), but 33% of Ohio's vehicle output is for Honda, and 40% of Kentucky's is for Toyota. Other states manufacturing from 500,000 to 1 million vehicles per year are Alabama, Illinois, New York, South Carolina, Tennessee, and Texas. To reduce shipping costs, automakers and their suppliers in the parts and accessories industry have traditionally located close to one another.

Shipbuilding, as would be expected, occurs largely in coastal states, including Washington, California, several Gulf Coast states, and Virginia. Centers of aircraft production include Kansas (small aircraft) and Washington state.

As shown in Table 14-6, more forms in SIC code 37 were submitted in Michigan (683) than in any other state. Ohio was second with 488 and Indiana was third with 394. Together, these three states accounted for more than one third (36.1%) of all forms in the sector.

These three states also led for total on- and off-site releases. Michigan reported 15.6 million pounds, Indiana 10.0 million pounds, and Ohio 9.5 million pounds. The three states accounted for 31.5% of the total releases. Michigan had the largest on-site releases, 15.0 million pounds, and Indiana was second with 9.2 million pounds. Ranking third was Missouri with 8.3 million pounds. For off-site releases, Ohio had the largest amount, 2.1 million pounds; other states and territories all had less than 1 million pounds in this release type.

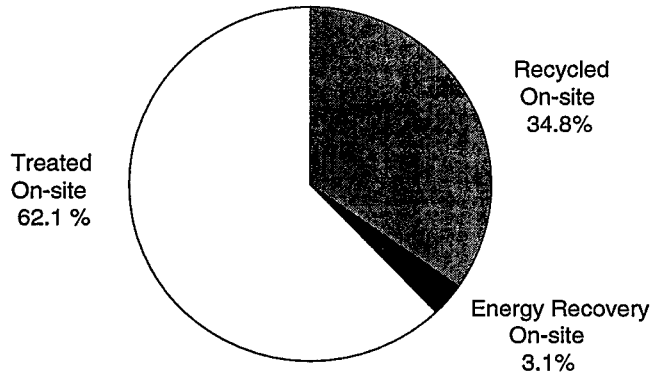


Figure 14-3. Distribution of TRI Other On-site Waste Management, 1996: Transportation Equipment (SIC Code 37)

Note: Data from Section 8 of Form R.

Table 14-4. TRI Other On-site Waste Management, 1996: Transportation Equipment, SIC Code 37 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3714	Motor Vehicle Parts & Accessories	9,082,191	13,903	7,717,242	16,813,336
3711	Motor Vehicles & Car Bodies	217,094	535,506	13,989,345	14,741,945
3724	Aircraft Engines & Engine Parts	4,146,424	0	1,195,067	5,341,491
	Multiple within SIC Code 37	1,666,978	852,360	887,709	3,407,047
3731	Ship Building & Repairing	51,741	0	2,688,622	2,740,363
3721	Aircraft	533,700	0	1,094,128	1,627,828
3728	Aircraft Parts & Equipment, nec*	83,108	57,190	1,156,229	1,296,527
3713	Truck & Bus Bodies	73,230	0	367,876	441,106
3751	Motorcycles, Bicycles, & Parts	69,810	0	152,200	222,010
3769	Space Vehicle Equipment, nec*	142,910	0	39,600	182,510
3795	Tanks & Tank Components	156,390	0	24,707	181,097
3799	Transportation Equipment, nec*	108,491	0	32,002	140,493
3715	Truck Trailers	93,375	0	22,400	115,775
3743	Railroad Equipment	80,498	0	16,112	96,610
3761	Guided Missiles & Space Vehicles	295	0	77,659	77,954
3764	Space Propulsion Units & Parts	0	0	55,754	55,754
3716	Motor Homes	10,799	0	0	10,799
3792	Travel Trailers & Campers	5,500	0	0	5,500
3732	Boat Building & Repairing	700	0	500	1,200
	Invalid SIC Code within SIC Code 37	0	0	0	0
	Total for SIC Code 37	16,523,234	1,458,959	29,517,152	47,499,345

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
*nec: not elsewhere classified.

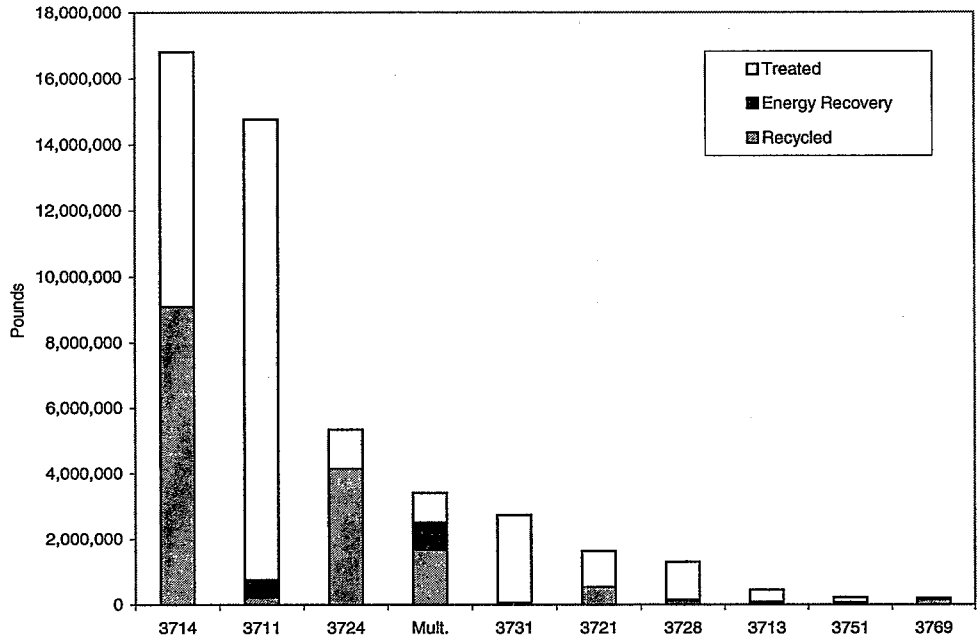


Figure 14-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Transportation Equipment (SIC Code 37)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.

Table 14-5. TRI Transfers Off-site for Further Waste Management, 1996: Transportation Equipment, SIC Code 37 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3714	Motor Vehicle Parts & Accessories	95,508,335	2,494,903	3,644,407	2,080,692	250	103,728,587
3711	Motor Vehicles & Car Bodies	36,825,062	5,209,256	1,278,966	2,814,932	0	46,128,216
3724	Aircraft Engines & Engine Parts	9,574,732	38,782	2,099,992	263,153	7,646	11,984,305
	Multiple within SIC Code 37	7,172,331	960,037	370,295	58,925	0	8,561,588
3731	Ship Building & Repairing	6,677,056	965,576	115,758	2,518	0	7,760,908
3713	Truck & Bus Bodies	2,723,533	1,406,098	88,149	90,391	0	4,308,171
3728	Aircraft Parts & Equipment, nec*	1,696,287	316,132	452,660	39,271	0	2,504,350
3721	Aircraft	799,247	949,147	417,523	117,845	0	2,283,762
3743	Railroad Equipment	1,400,556	546,857	34,779	1,247	0	1,983,439
3715	Truck Trailers	796,026	142,220	57,105	620	250	996,221
3764	Space Propulsion Units & Parts	762,576	39,071	8,570	5	0	810,222
3751	Motorcycles, Bicycles, & Parts	619,863	58,273	770	505	0	679,411
3732	Boat Building & Repairing	84,831	323,954	10,296	49,976	0	469,057
3799	Transportation Equipment, nec*	24,086	282,898	15,275	8,160	0	330,419
3716	Motor Homes	130,410	94,838	5,004	24,923	0	255,175
3769	Space Vehicle Equipment, nec*	65,200	33,055	35,195	0	0	133,450
3795	Tanks & Tank Components	88,599	0	40,356	5	0	128,960
3761	Guided Missiles & Space Vehicles	34,694	20,093	676	24,624	0	80,087
3792	Travel Trailers & Campers	515	40,691	250	0	0	41,456
	Invalid SIC Codes within SIC Code 37	2,464	23,044	0	10	0	25,518
	Total for SIC Code 37	164,986,403	13,944,925	8,676,026	5,577,802	8,146	193,193,302

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

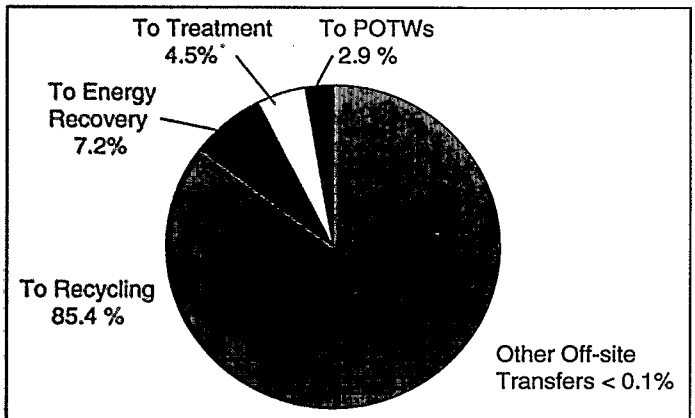


Figure 14-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Transportation Equipment (SIC Code 37)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

Michigan also had the largest other on-site waste management, 10.4 million pounds, followed by Ohio with 7.5 million pounds. Third was Texas with 4.4 million pounds. For transfers off-site for further waste management, Ohio ranked first with 43.6 million pounds. Indiana was second with 28.0 million pounds, and Michigan was third with 20.9 Michigan also had the largest other on-site waste management, 10.4 million pounds, followed by million pounds. All other states reported less than 10 million pounds in transfers off-site for further waste management.

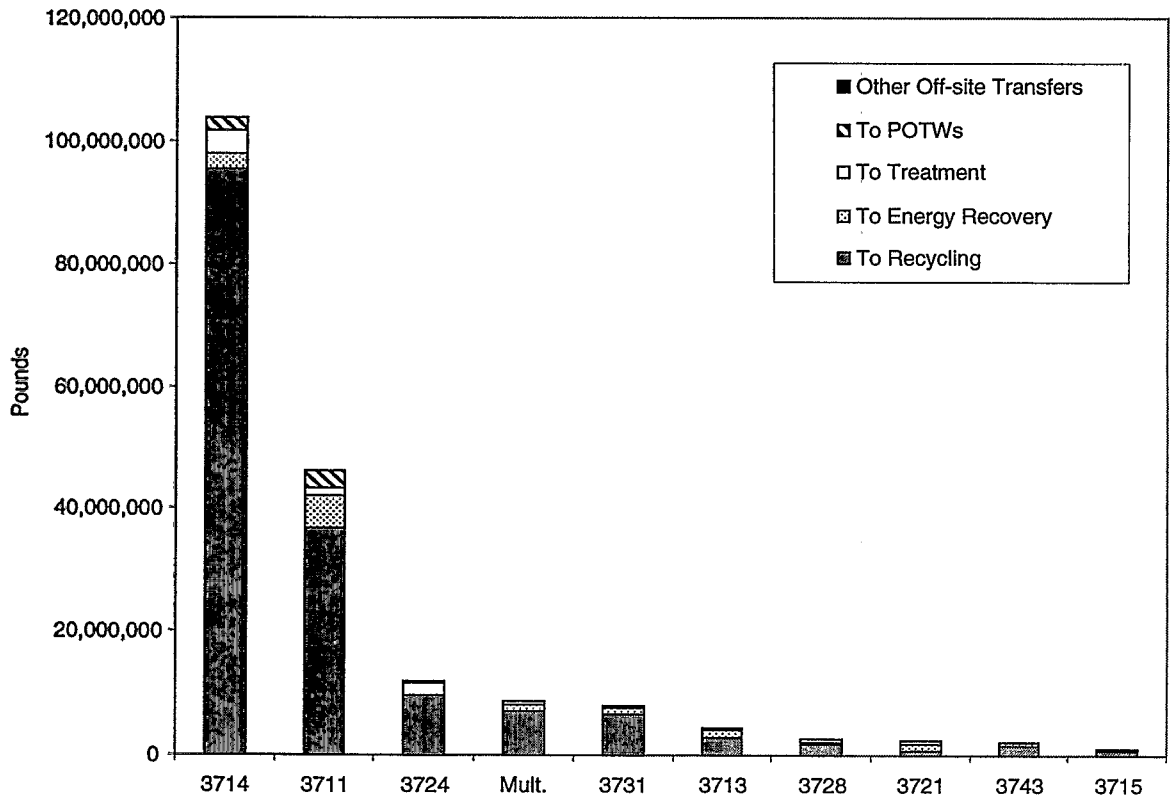


Figure 14-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Transportation Equipment (SIC Code 37)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.

Table 14-6. Summary of TRI Information by State, 1996: Transportation Equipment, SIC Code 37

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	28	75	4	1,897,506	79,749	1,977,362	209,835	2,069,576	4,220,480	12,158
Arizona	10	33	2	328,735	361,510	690,290	187,815	4,117,579	4,993,020	15,770
Arkansas	19	56	2	1,093,596	2,165	1,095,838	168,680	532,909	1,777,997	20
California	69	169	8	2,826,891	255,688	3,082,825	1,864,859	2,223,971	7,271,702	26,095
Colorado	5	9	0	59,096	7,435	66,545	0	87,092	175,526	1,100
Connecticut	23	61	0	285,131	132,572	417,787	726,200	3,028,776	4,317,358	35
Delaware	2	22	1	686,694	3,350	690,069	72,933	743,409	1,507,111	0
Florida	69	146	21	3,379,853	18,918	3,399,007	137,315	605,304	3,948,552	10,000
Georgia	36	122	4	4,971,496	98,807	5,070,465	3,007,356	4,883,247	12,588,842	12,537
Hawaii	1	2	0	54,500	2,150	56,653	0	0	56,000	0
Idaho	3	5	0	47,115	0	47,123	141,700	302	189,103	0
Illinois	49	154	13	2,407,382	415,844	2,823,442	2,664,938	7,870,450	13,372,924	4,335
Indiana	124	394	29	9,158,621	798,127	9,957,295	1,419,081	28,010,292	41,093,386	750
Iowa	18	55	3	863,379	44,205	907,660	20,201	2,296,331	3,049,651	0
Kansas	26	85	1	2,298,781	23,492	2,322,385	324,106	1,744,653	4,492,754	16
Kentucky	36	164	4	7,161,312	510,709	7,672,225	2,659,668	7,718,853	19,619,287	0
Louisiana	13	62	2	687,664	161,529	849,270	458,400	2,444,879	3,733,667	767
Maine	8	31	0	212,458	8,971	221,468	45,000	2,832,983	1,568,829	0
Maryland	12	41	0	1,318,674	39,521	1,358,248	162,809	1,518,889	3,034,025	300
Massachusetts	7	12	0	19,158	35,452	54,629	214,179	115,313	372,302	0
Michigan	131	683	29	14,957,040	675,737	15,633,620	10,430,286	20,881,129	51,532,371	1,051
Minnesota	20	59	9	1,631,165	9,645	1,640,898	264,500	1,497,996	3,408,239	0
Mississippi	17	23	1	340,430	10,373	350,844	70,000	7,003,824	7,424,255	0
Missouri	39	195	1	8,283,279	191,666	8,475,180	1,531,121	7,948,441	18,772,403	9,875
Nebraska	10	39	2	655,674	84,899	740,624	384,023	946,139	2,061,261	20
Nevada	2	3	0	6,581	0	6,586	1,995,132	357,754	2,359,434	0
New Hampshire	3	7	0	14,465	22,750	37,225	36,621	234,491	219,839	64,610
New Jersey	9	42	3	910,300	42,849	953,203	329,405	1,002,994	2,270,647	0
New Mexico	2	12	0	38,848	1,317	40,179	55,447	831,163	926,346	0
New York	25	67	2	622,302	44,851	667,247	238,794	2,566,961	4,613,715	0
North Carolina	37	103	7	1,499,664	241,266	1,741,077	183,773	2,519,779	4,592,783	0
North Dakota	3	10	0	58,978	750	59,741	31,000	27,012	92,402	0
Ohio	102	488	40	7,467,538	2,050,635	9,518,803	7,486,310	43,648,669	61,464,229	4,286
Oklahoma	20	61	1	1,527,141	65,565	1,592,788	342,276	845,685	2,786,286	0
Oregon	17	53	0	7,405,804	44,060	7,449,934	353,774	5,812,805	7,423,762	60
Pennsylvania	32	94	2	1,804,100	167,802	1,972,030	2,064,350	3,353,979	7,078,720	3
Puerto Rico	1	1	0	2,210	0	2,212	0	7,370	9,580	0
Rhode Island	5	13	0	46,869	1,021	47,908	0	5,368	53,109	0
South Carolina	26	56	0	878,202	12,204	890,488	403,944	1,154,668	2,618,663	0
South Dakota	8	16	0	112,982	798	113,804	0	238,989	352,395	0
Tennessee	47	159	9	5,910,733	208,516	6,119,464	991,798	5,068,471	11,891,194	0
Texas	36	134	5	2,756,266	196,636	2,953,077	4,359,090	4,089,465	11,605,294	2,385
Utah	14	24	0	649,570	39,655	689,263	322	562,189	1,238,886	19
Vermont	3	13	0	1,558	8,657	10,231	50,660	2,254,628	2,305,571	0
Virginia	19	84	6	2,586,819	474,722	3,061,650	604,491	1,243,418	5,777,906	30,000
Washington	32	87	1	1,903,327	49,941	1,953,388	332,786	2,132,156	4,466,902	690
West Virginia	2	5	1	100,646	30,180	130,834	0	324,445	425,037	0
Wisconsin	28	102	1	1,692,551	52,996	1,745,678	474,367	3,788,506	6,015,565	0
Total for SIC Code 37	1,248	4,331	214	103,623,084	7,729,685	111,358,562	47,499,345	193,193,302	355,169,310	196,882

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). One facility in Oregon incorrectly reported 6,211,171 pounds of total releases. The correct amount is 750.

Ohio reported the largest total production-related waste (61.5 million pounds), followed by Michigan (51.5 million pounds) and Indiana (41.1 million pounds). All other states and territories had less than 20 million pounds each in this category.

Map 14-1 illustrates the geographic distribution of total on- and off-site releases in the transportation equipment sector.

1996 TRI Data by Chemical for Transportation Equipment

As shown in Table 14-7, the top 15 chemicals reported in the transportation equipment sector amounted to 97.1 million pounds of on- and off-site releases, or 87.2% of the sector's total of 111.4 million pounds. The bulk of this reporting occurred in air emissions, which totaled 94.0 million pounds, or 96.8% of total on- and off-site releases, for the 15 chemicals. (Excluding a reporting error of 6.2 million pounds of air emissions of manganese would not substantially alter this analysis.) Only for the 15th-ranked chemical, asbestos, was the majority of releases to another category, which was to off-site releases (transfers to disposal). All of the off-site releases of asbestos were reported by the motor vehicle parts and accessories industry (SIC code 3714); asbestos is used in clutch and brake linings.

The chemical reported in the largest amount was xylenes, with 25.5 million pounds of on- and off-site releases. The second-largest was styrene, with 13.4 million pounds, followed by glycol ethers, with 9.0 million pounds. The largest industrial source of xylenes was the motor vehicle and car bodies industry, which reported 16.2 million pounds of air emissions of this chemical, largely as point source emissions. This amounted to two-thirds (63.3%) of the sector's total releases of that chemical. Xylenes and other solvents such as toluene and methyl ethyl ketone are used in cleaning and finishing operations, especially coating and painting, in vehicle production.

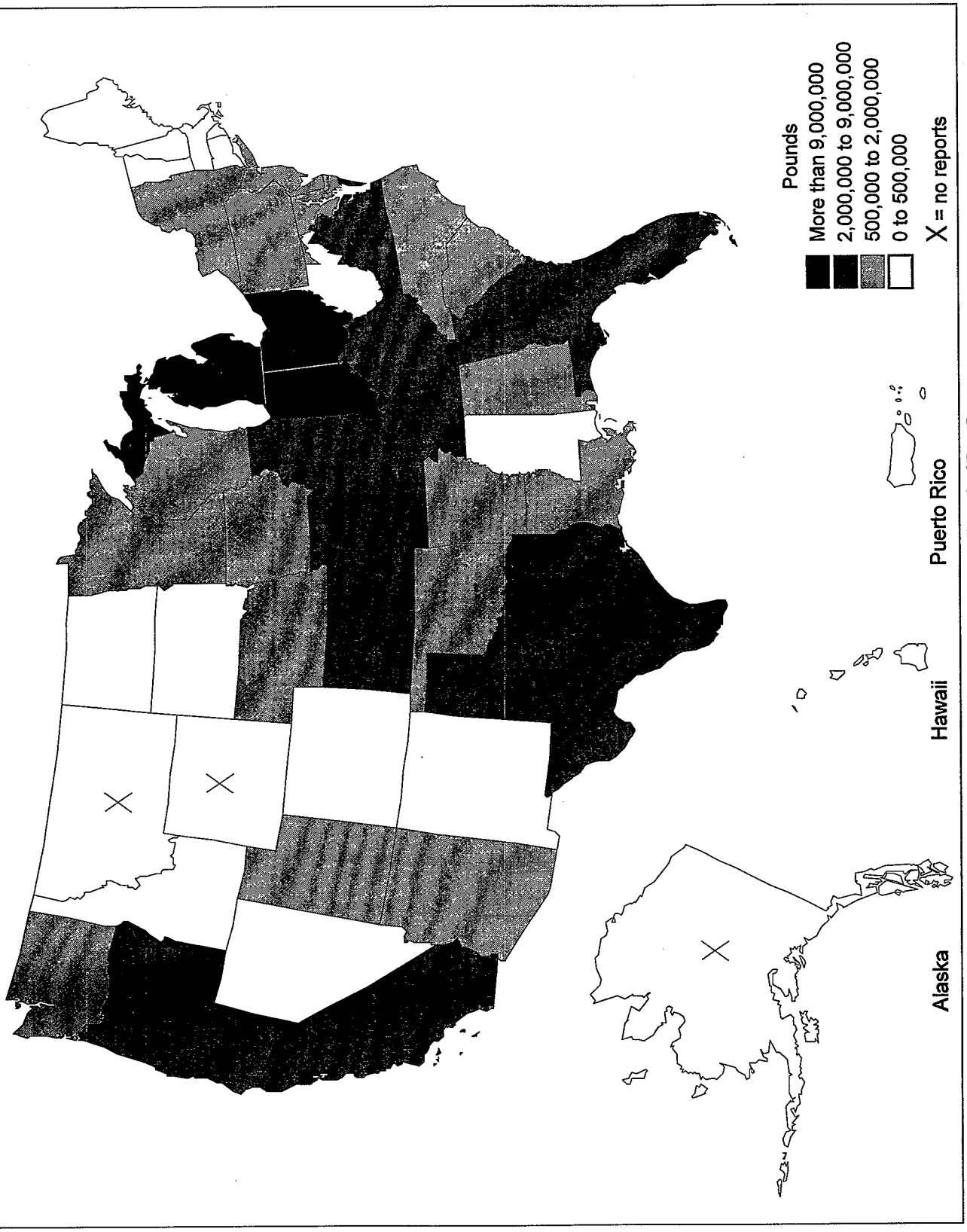
Boat building and repair (SIC code 3732) reported the largest styrene releases. The 9.2 million pounds of styrene air emissions reported in boat building and repair were 68.6% of all styrene releases. A principal use of styrene in this industry is in the manufacture and repair of fiberglass ships and boats (primarily in small and medium-sized shipyards). Some fiberglass construction processes involve use of gelcoat, a polyester resin that contains approximately 35% styrene.

OSHA Carcinogens

Table 14-8 shows the on- and off-site releases of chemicals designated as OSHA carcinogens for the four-digit industries in the transportation equipment sector. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) The industry with the largest releases of these chemicals was boat building and repairing (SIC code 3732). This industry's total was 10.2 million pounds of OSHA carcinogens, almost all of it released to air. The motor vehicle parts and accessories industry (SIC code 3714) was second with 4.4 million pounds; this included 2.5 million pounds emitted to air and 1.7 million pounds transferred off-site to disposal.

Four of the top 15 chemicals for total releases in this sector were OSHA carcinogens: styrene, trichloroethylene, dichloromethane, and asbestos (see Table 14-7). As noted, the great majority of releases of these chemicals were reported as air emissions, except for asbestos, which was largely released off-site (transferred to disposal). These four chemicals represented 91.0% of the sector's releases of OSHA carcinogens. The OSHA carcinogen with the next-highest releases in this sector was tetrachloroethylene, with 763,000 pounds.

Map 14-1. Total On- and Off-site Releases, 1996: Transportation Equipment, SIC Code 37



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

Table 14-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Transportation Equipment, SIC Code 37 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
1330-20-7	Xylene (mixed isomers)	25,433,986	10,571	0	0	1,716	1	25,446,274	97,202	25,543,476
100-42-5	Styrene	12,941,411	250	0	0	39,050	500	12,981,211	379,030	13,360,241
--	Glycol ethers	8,864,990	267	0	0	0	22,463	8,887,720	88,120	8,975,840
108-88-3	Toluene	7,275,585	556	0	0	16,867	26,634	7,319,642	24,489	7,344,131
78-93-3	Methyl ethyl ketone	7,186,517	520	0	0	0	0	7,187,037	25,326	7,212,363
7439-96-5	Manganese	6,399,724	1,360	0	0	0	47,759	6,448,843	608,903	7,057,746
108-10-1	Methyl isobutyl ketone	6,299,251	5	0	0	0	0	6,299,259	6,082	6,305,341
71-36-3	n-Butyl alcohol	4,927,040	3,744	0	0	0	0	4,930,784	40,345	4,971,129
100-41-4	Ethylbenzene	3,073,692	27	0	0	0	0	3,073,719	20,891	3,094,610
67-56-1	Methanol	2,772,937	6,401	0	0	250	0	2,779,588	4,507	2,784,095
79-01-6	Trichloroethylene	2,362,096	13	0	0	0	2,640	2,364,749	36,217	2,400,966
71-55-6	1,1,1-Trichloroethane	2,256,684	5	0	0	0	11,280	2,267,969	19,879	2,287,848
75-09-2	Dichloromethane	2,258,379	18	0	0	0	0	2,258,397	3,684	2,262,081
95-63-6	1,2,4-Trimethylbenzene	1,973,604	5	0	0	0	0	1,973,609	24,727	1,998,336
1332-21-4	Asbestos (friable)	902	0	0	0	0	58,090	58,992	1,486,697	1,545,689
	Subtotal	94,026,798	23,742	0	0	57,886	169,367	94,277,793	2,866,099	97,143,892
	Total for SIC Code 37	102,693,635	224,148	0	0	86,685	618,616	103,623,084	7,729,685	111,352,769

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. One facility incorrectly reported 6,211,171 pounds of air emissions of manganese. The correct amount is 750. The total releases rank of manganese changes from 6 to 19.

Table 14-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Transportation Equipment, SIC Code 37 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3732	Boat Building & Repairing	10,145,665	0	0	0	0	500	10,146,165	11,007	10,157,172
3714	Motor Vehicle Parts & Accessories	2,531,867	1,764	0	0	39,304	69,473	2,642,408	1,709,046	4,351,454
	Multiple within SIC Code 37	1,150,640	227	0	0	10	5	1,150,882	198,514	1,349,396
3721	Aircraft	1,193,790	15	0	0	0	0	1,193,805	3,649	1,197,454
3792	Travel Trailers & Campers	661,158	0	0	0	0	0	661,158	48,931	710,089
3728	Aircraft Parts & Equipment, nec*	648,803	31	0	0	0	338	649,172	4,530	653,702
3713	Truck & Bus Bodies	599,129	5	0	0	0	0	599,134	18,737	617,871
3711	Motor Vehicles & Car Bodies	348,604	1,148	0	0	0	5	349,757	189,757	539,514
3716	Motor Homes	479,272	0	0	0	0	0	479,272	0	479,272
3731	Ship Building & Repairing	376,894	662	0	0	0	0	377,556	5,359	382,915
3724	Aircraft Engines & Engine Parts	221,182	1,529	0	0	0	25,633	248,344	121,279	369,623
3799	Transportation Equipment, nec*	243,183	0	0	0	0	250	243,433	6,299	249,732
3795	Tanks & Tank Components	165,583	0	0	0	1	0	165,584	1	165,585
3715	Truck Trailers	103,941	5	0	0	0	18,684	122,630	2,750	125,380
3743	Railroad Equipment	122,112	0	0	0	0	0	122,112	921	123,033
3769	Space Vehicle Equipment, nec*	23,550	0	0	0	0	0	23,550	0	23,550
3751	Motorcycles, Bicycles, & Parts	265	0	0	0	0	0	265	6,900	7,165
	Invalid SIC Code within SIC Code 37	1,759	0	0	0	0	0	1,759	0	1,759
	Subtotal	19,017,397	5,386	0	0	39,315	114,888	19,176,986	2,327,680	21,504,666
	Total for SIC Code 37	102,693,635	224,148	0	0	86,685	618,616	103,623,084	7,729,685	111,352,769

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Figure 14-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Transportation Equipment

Table 14-9 presents waste management data for the four-digit SIC codes in the transportation equipment sector. Nearly half (48.4%) of the production-related waste was recycled off-site, 171.8 million pounds of the 355.2-million-pound total. The next largest waste management activity was on- and off-site releases. On- and off-site releases totaled 105.7 million pounds, or 19.8% of the total waste managed. Other types of waste management (recycling, energy recovery, and treatment on-site, along with energy recovery and treatment off-site) were all less than 30 million pounds each. Figure 14-8 illustrates the distribution of on- and off-site waste management and quantities released for this sector.

Off-site recycling was reported in the largest amounts by makers of motor vehicle parts and accessories (SIC code 3714), with 98.7 million pounds, and motor vehicles and car bodies (SIC code 3711), with 41.6 million pounds. Off-site recycling by these two industries amounted to 39.5% of all production-related waste reported in the sector.

Distribution of production-related waste for the top four-digit SIC codes appears in Figure 14-9.

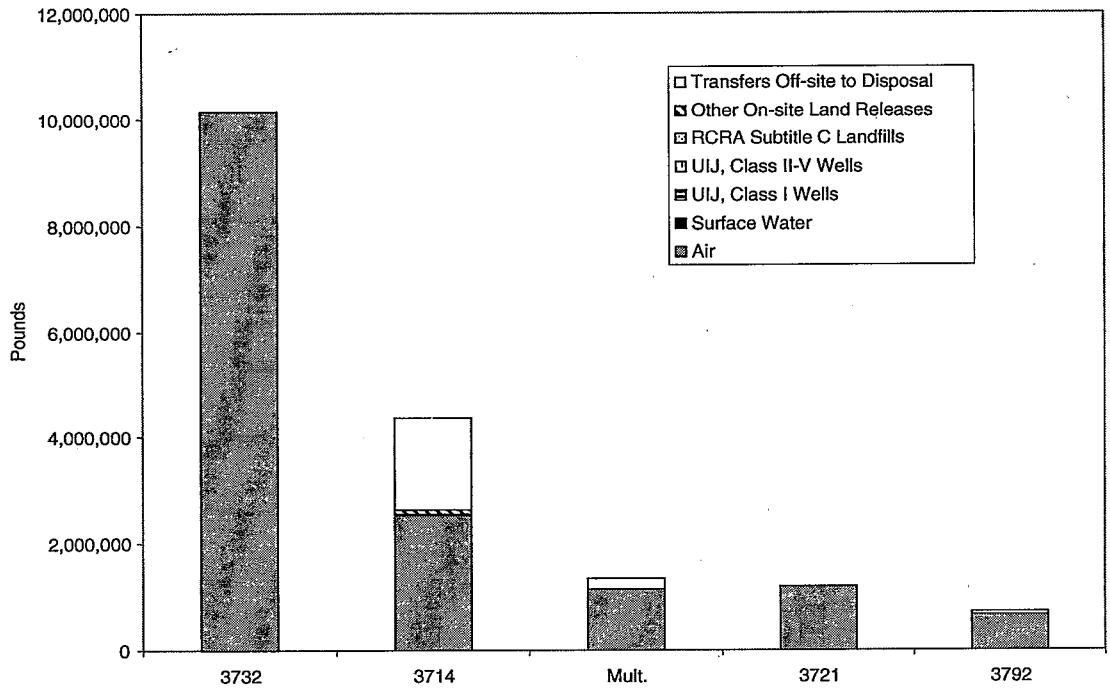


Figure 14-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Transportation Equipment (SIC Code 37)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.

Table 14-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Transportation Equipment, SIC Code 37 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3714	Motor Vehicle Parts & Accessories	9,082,191	13,903	7,717,242	98,735,280	3,977,606	5,841,070	20,165,629	145,532,921	33,970
3711	Motor Vehicles & Car Bodies	217,094	535,506	13,989,345	41,635,550	5,399,134	4,499,123	42,366,352	108,642,104	12,141
	Multiple within SIC Code 37	1,666,978	852,360	887,709	7,161,446	975,624	496,966	6,682,978	18,724,061	3,903
3724	Aircraft Engines & Engine Parts	4,146,424	0	1,195,067	9,831,291	38,782	2,305,458	957,804	18,474,826	64,854
3731	Ship Building & Repairing	51,741	0	2,688,622	5,163,707	794,377	115,178	3,714,678	12,528,303	0
3732	Boat Building & Repairing	700	0	500	83,831	294,110	56,281	11,332,445	11,767,867	37,995
3713	Truck & Bus Bodies	73,230	0	367,876	2,694,885	1,418,121	169,592	4,659,473	9,383,177	50
3721	Aircraft	533,700	0	1,094,128	806,133	908,320	466,111	4,474,178	8,282,570	23,050
3728	Aircraft Parts & Equipment, nec*	83,108	57,190	1,156,229	1,730,595	335,274	514,314	2,435,326	6,312,036	1,257
3743	Railroad Equipment	80,498	0	16,112	1,396,465	562,942	82,574	1,497,541	3,636,132	0
3715	Truck Trailers	93,375	0	22,400	857,599	132,700	68,556	1,755,132	2,929,762	1,183
3751	Motorcycles, Bicycles, & Parts	69,810	0	152,200	611,850	61,087	60	873,271	1,768,278	0
3716	Motor Homes	10,799	0	0	129,660	93,602	25,153	1,404,756	1,663,970	0
3799	Transportation Equipment, nec*	108,491	0	32,002	24,006	280,436	38,738	928,849	1,412,522	0
3792	Travel Trailers & Campers	5,500	0	0	325	28,574	185	1,315,541	1,350,125	2,460
3764	Space Propulsion Units & Parts	0	0	55,754	760,964	39,071	9,005	475,664	1,340,458	319
3769	Space Vehicle Equipment, nec*	142,910	0	39,600	65,200	31,570	32,862	213,155	525,297	0
3795	Tanks & Tank Components	156,390	0	24,707	98,857	0	40,968	181,589	502,511	0
3761	Guided Missiles & Space Vehicles	295	0	77,659	34,719	19,844	922	137,601	271,040	15,700
	Invalid SIC Code within SIC Code 37	0	0	0	2,464	23,044	0	95,842	121,350	0
	Total for SIC Code 37	16,523,234	1,458,959	29,517,152	171,824,827	15,414,218	14,763,116	105,667,804	355,169,310	196,882

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
*nec: not elsewhere classified.

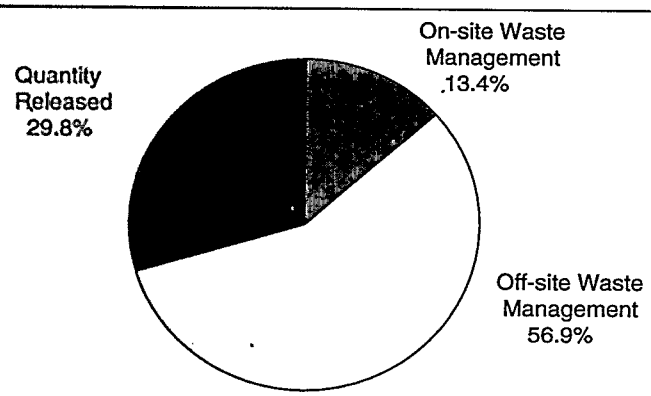


Figure 14-8. Distribution of TRI Production-related Waste, 1996: Transportation Equipment (SIC Code 37)

Note: Data from Section 8 of Form R.

Projected Quantities of TRI Chemicals in Waste

Facilities reporting in the transportation equipment sector projected relatively little change in their waste management through 1998, as shown in Table 14-10. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) Total production-related waste is projected to decrease by just 0.7% (2.6 million pounds) over the 1996-1998 period. The largest component of this reduction is a projected decrease in quantities released on- and off-site of 4.7 million pounds, a 4.4% reduction. A decrease is also projected in off-site energy recovery, of 1.8 million pounds, or 11.9%.

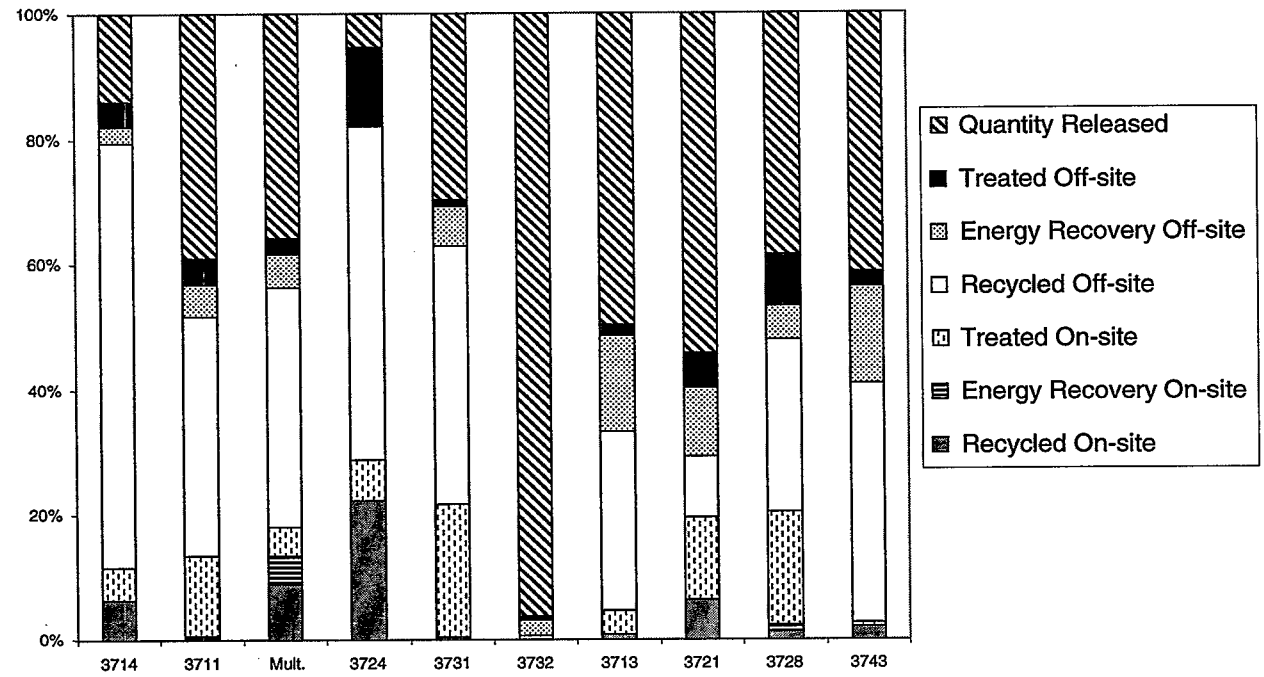


Figure 14-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Transportation Equipment (SIC Code 37)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.

Off-site recycling, the largest waste management option in this sector, was projected to increase 1.5% (2.6 million pounds) from 1996 to 1998, the net result of a projected decrease in the first year and increase in the second year. Other waste management options show smaller projected increases (in pounds) for the period.

The projected changes suggest little difference in the ways facilities in this sector expect to manage their TRI chemicals in waste. Off-site recycling would represent a slightly larger portion of overall waste management (increasing from 48.4% of production-related waste in 1996 to 49.5% in 1998). At the same time, releases would decrease from 29.8% of production-related waste, to 28.6%. These changes, while small in both percentage and absolute terms, nonetheless represent small positive movement, as measured by the environmental waste management hierarchy, explained in Chapter 1. In that hierarchy, recycling represents the most favorable waste management option for waste that cannot be or is not prevented in the first place, and releases represent the least favorable option.

Figure 14-10 shows the percentage change projected in quantities of TRI chemicals in waste for 1996-1998.

Source Reduction Activity

One form out of every five submitted in the transportation equipment sector reported undertaking one or more source reduction activities during 1996, as shown in Table 14-11. The largest number of forms (295) came from the motor vehicle parts and accessories industry (SIC code 3714) and the next-largest (136) came from the motor vehicles and car bodies industry (SIC code 3711). These numbers represent one-fifth of all forms from motor vehicle parts manufacturing and less than one-seventh of all forms in motor vehicle production. Because these two industries also

reported the largest releases and the largest production-related waste, their activities to reduce toxic chemicals at the source could have important results for the sector's performance. For both groups, good operating practices was the source reduction activity most frequently cited. Raw material and process modifications, which are more likely to represent innovative source reduction projects, were the activities cited on the next largest number of forms in both industries.

Year-to-Year Comparisons for Transportation Equipment

1995-1996 TRI Data for Transportation Equipment

From 1995 to 1996, the number of forms submitted in the transportation equipment sector decreased by

Table 14-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Transportation Equipment, SIC Code 37

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	16,523,234	4.7	16,374,031	4.7	17,235,383	4.9
Energy Recovery On-site	1,458,959	0.4	1,512,020	0.4	1,499,329	0.4
Treated On-site	29,517,152	8.3	30,422,443	8.7	29,923,155	8.5
Off-site Waste Management						
Recycled Off-site	171,824,827	48.4	169,806,023	48.5	174,465,832	49.5
Energy Recovery Off-site	15,414,218	4.3	13,423,889	3.8	13,582,601	3.9
Treated Off-site	14,763,116	4.2	14,951,267	4.3	14,918,751	4.2
Quantity Released On- and Off-site	105,667,804	29.8	103,278,981	29.5	100,966,087	28.6
Total Production-related Waste for SIC Code 37	355,169,310	100.0	349,768,654	100.0	352,591,138	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-0.9	5.3	4.3
Energy Recovery On-site	3.6	-0.8	2.8
Treated On-site	3.1	-1.6	1.4
Off-site Waste Management			
Recycled Off-site	-1.2	2.7	1.5
Energy Recovery Off-site	-12.9	1.2	-11.9
Treated Off-site	1.3	-0.2	1.1
Quantity Released On- and Off-site	-2.3	-2.2	-4.4
Total Production-related Waste for SIC Code 37	-1.5	0.8	-0.7

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

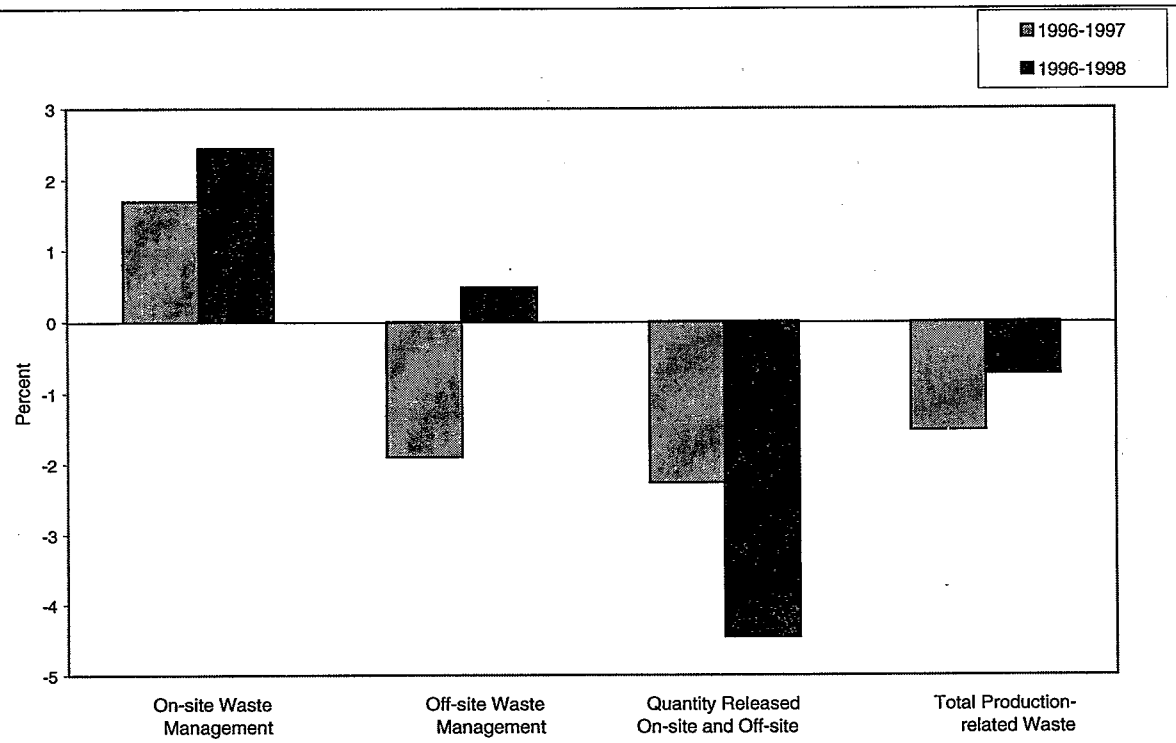


Figure 14-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Transportation Equipment (SIC Code 37)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

4.6% (approximately 200 fewer forms in 1996). As shown in Table 14-12, the number of Form A certification statements increased markedly: 37.2% (an increase of 58 forms). This may reflect more widespread awareness of the Form A certification statement in its second year of availability. (The Form A certification statement is explained in Chapter 1.)

On- and Off-site Releases

Total on- and off-site releases, also shown in Table 14-12, decreased from 121.2 million pounds in 1995 to 111.4 million pounds in 1996, a decrease of 8.1%. The change in releases to the environmental media varied considerably. Air emissions, by far the largest release type in this sector, decreased 6.9% (or 7.6 million pounds). This represented a decrease in point source emissions of 9.0 million pounds (10.7% reduction), partly offset by a 1.3 million-pound increase in fugitive emissions (5.0% increase). This analysis includes a facility reporting error of 6.2 million pounds of air emissions in 1996. Without this error, percentage reductions would be larger.

As noted earlier in this chapter, transportation equipment manufacturers reported much smaller amounts in the other release types. However, small changes in absolute terms resulted in significant changes in percentage terms: a 71.6% increase in on-site land releases and a 23.4% decrease in off-site releases (transfers to disposal).

Figure 14-11 shows the percentage changes by release type for the transportation equipment sector.

Table 14-11. Number of Forms Reporting Source Reduction Activity, 1996: Transportation Equipment, SIC Code 37

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3711	Motor Vehicles & Car Bodies	1,006	136	13.5	71	12	13	36	27	1	21	9
3713	Truck & Bus Bodies	238	40	16.8	11	12	2	17	2	6	7	2
3714	Motor Vehicle Parts & Accessories	1,389	295	21.2	136	27	38	56	65	26	33	32
3715	Truck Trailers	110	23	20.9	9	2	2	5	3	0	7	0
3716	Motor Homes	71	23	32.4	1	3	0	15	0	3	7	1
3721	Aircraft	154	56	36.4	16	12	6	9	13	9	25	2
3724	Aircraft Engines & Engine Parts	199	30	15.1	5	3	1	4	20	7	0	0
3728	Aircraft Parts & Equipment, nec*	172	37	21.5	13	7	6	4	8	8	6	4
3731	Ship Building & Repairing	171	32	18.7	19	14	8	2	4	0	17	0
3732	Boat Building & Repairing	287	71	24.7	20	7	3	9	26	7	18	6
3743	Railroad Equipment	83	28	33.7	15	0	1	1	1	0	10	1
3751	Motorcycles, Bicycles, & Parts	30	0	0.0	0	0	0	0	0	0	0	0
3761	Guided Missiles & Space Vehicles	11	3	27.3	1	0	0	0	1	1	0	0
3764	Space Propulsion Units & Parts	8	3	37.5	2	0	0	0	0	1	0	0
3769	Space Vehicle Equipment, nec*	17	10	58.8	7	0	1	2	4	3	3	2
3792	Travel Trailers & Campers	50	21	42.0	8	1	4	7	5	0	3	1
3795	Tanks & Tank Components	20	9	45.0	5	0	1	2	2	1	1	1
3799	Transportation Equipment, nec*	53	23	43.4	9	0	0	5	1	0	10	2
	Multiple within SIC Code 37	252	70	27.8	38	2	5	15	13	11	7	6
	Invalid SIC Code within SIC Code 37	10	4	40.0	0	4	2	0	0	2	0	0
	Total for SIC Code 37	4,331	914	21.1	386	106	93	189	195	86	175	69

Note: Forms with more than one 4-digit SIC code within code 37 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Other On-site Waste Management

Table 14-12 also shows the changes from 1995 to 1996 in this sector's on-site waste management. The overall decrease of 42.2% was accomplished primarily in on-site recycling. In 1995, recycling was the largest on-site waste management option, with 48.4 million pounds. A reduction of two thirds (65.9%, or 31.9 million pounds), to 16.5 million pounds in 1996, made on-site recycling the second-largest type of on-site management, behind treatment. (More than half of this reduction was the action of one facility, Preferred Technical Group, Inc., in Columbia City, Indiana, which eliminated a vapor degreaser in the plant, substituting an aqueous process. This facility reported 18.3 million pounds of on-site recycling of trichloroethylene in 1995 and none in 1996.)

On-site treatment also decreased, by 6.2%, or 1.9 million pounds. Energy recovery, much smaller in absolute amounts, dropped by more than one third (35.7%), or 809,000 pounds.

Transfers Off-site for Further Waste Management

All but one type of transfers off-site for further waste management decreased from 1995 to 1996 for the transportation equipment sector. As shown in Table 14-12, the exception was an increase of 12.4% (616,000 pounds) in transfers to POTWs.

The largest transfer type—to recycling—showed very little change, a decrease of 0.4%. This was a reduction of 688,000 pounds, from 165.7 million pounds in 1995 to 165.0 million pounds in 1996. Reductions in energy recovery and treatment were notably larger in both pounds and percentage. Reporting of energy recovery decreased 10.2%, or 1.6 million pounds. Treatment decreased 22.0%, or 2.4 million pounds.

Table 14-12. Comparison of TRI On-site and Off-Site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Transportation Equipment, SIC Code 37

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	1,298	1,248	-3.9
Total Forms	4,538	4,331	-4.6
Form Rs	4,382	4,117	-6.0
Form As	156	214	37.2
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	110,305,552	102,693,635	-6.9
Fugitive Air	26,941,770	28,283,393	5.0
Point Source Air	83,363,782	74,410,242	-10.7
Surface Water Discharges	350,644	224,148	-36.1
Underground Injection	0	0	--
On-site Land Releases	410,995	705,301	71.6
Total On-site Releases	111,067,191	103,623,084	-6.7
Off-site Releases			
Transfers Off-site to Disposal	10,087,330	7,729,685	-23.4
Total On- and Off-site Releases	121,154,521	111,352,769	-8.1
Other On-site Waste Management			
Recycled On-site	48,440,164	16,523,234	-65.9
Energy Recovery On-site	2,268,436	1,458,959	-35.7
Treated On-site	31,454,243	29,517,152	-6.2
Total Other On-site Waste Management	82,162,843	47,499,345	-42.2
Transfers Off-site for Further Waste Management			
Transfers to Recycling	165,674,410	164,986,403	-0.4
Transfers to Energy Recovery	15,532,668	13,944,925	-10.2
Transfers to Treatment	11,121,508	8,676,026	-22.0
Transfers to POTWs	4,962,177	5,577,802	12.4
Other Off-site Transfers	500	8,146	1,529.2
Total Transfers Off-site for Further Waste Management	197,291,263	193,193,302	-2.1

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code. One facility incorrectly reported 6,211,171 pounds of fugitive air emissions for 1996. The correct amount is 750 pounds. The percentage change from 1995 to 1996 in total air emissions changes from –6.9% to –12.5%, in fugitive air emissions changes from 5.0% to –18.1%, in total on-site releases changes from –6.7% to –12.3%, and in total on- and off-site releases changes from –8.1% to –13.2%.

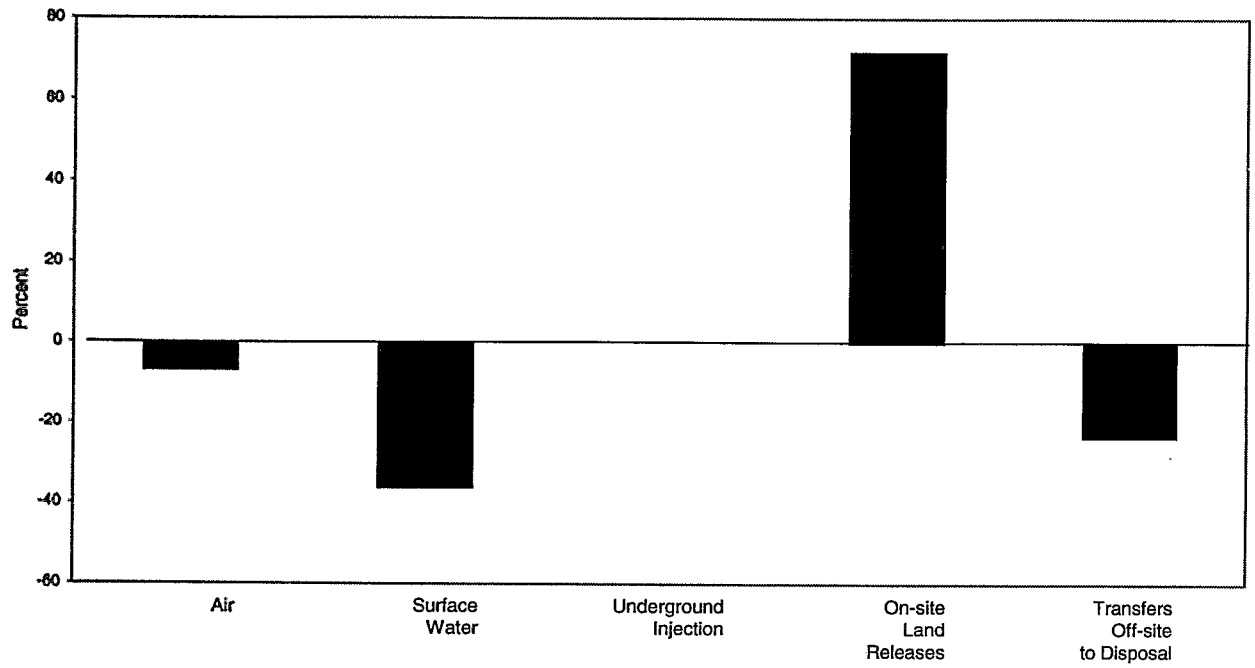


Figure 14-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Transportation Equipment (SIC Code 37)

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. One facility incorrectly reported 6,211,171 pounds of fugitive air emissions for 1996. The correct amount is 750 pounds. The percentage change from 1995 to 1996 in total air emissions changes from –6.9% to –12.5%.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Transportation Equipment

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

On- and off-site releases of the "core" chemicals in the transportation equipment sector declined by half (49.5%) from 1988 to 1996, as shown in Table 14-13. This was a reduction of 103.2 million pounds. The largest component of this reduction was air emissions, also the largest release type for the sector. Point source emissions dropped by 42.6%, or 53.0 million pounds. Another 34.5 million pounds of the decrease was reported in fugitive emissions, a 56.0% decrease. Altogether,

Table 14-13. Comparison of TRI On-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Transportation Equipment, SIC Code 37

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	1,146	1,251	1,241	1,196	4.4
Total Forms	4,038	4,131	4,018	3,840	-4.9
Form Rs	4,038	4,131	3,924	3,699	-8.4
Form As	NA	NA	94	141	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	185,947,325	119,327,514	105,335,919	98,432,463	-47.1
Fugitive Air	61,559,358	29,842,389	25,157,276	27,078,402	-56.0
Point Source Air	124,387,967	89,485,125	80,178,643	71,354,061	-42.6
Surface Water Discharges	272,596	65,549	67,423	48,537	-82.2
Underground Injection	76,185	5	0	0	-100.0
On-site Land Releases	2,333,399	188,560	322,550	659,438	-71.7
Total On-site Releases	188,629,505	119,581,628	105,725,892	99,140,438	-47.4
Off-site Releases					
Transfers Off-site to Disposal	19,762,341	8,557,725	9,020,364	6,091,120	-69.2
Total On- and Off-site Releases	208,391,846	128,139,353	114,746,256	105,231,558	-49.5
Other On-site Waste Management					
Recycled On-site	NA	53,488,818	47,899,715	16,066,124	NA
Energy Recovery On-site	NA	1,683,039	2,243,166	1,429,559	NA
Treated On-site	NA	26,110,553	23,769,239	25,528,963	NA
Total Other On-site Waste Management	NA	81,282,410	73,912,120	43,024,646	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	161,844,672	164,554,642	162,201,692	NA
Transfers to Energy Recovery	NA	16,396,952	15,045,145	13,608,973	NA
Transfers to Treatment	24,158,554	6,118,487	4,895,860	4,560,417	-81.1
Transfers to POTWs	4,016,448	3,156,448	2,365,799	2,738,328	-31.8
Other Off-site Transfers	3,632,015	2,260,713	500	8,146	-99.8
Total Transfers Off-site for Further Waste Management	NA	189,777,272	186,861,946	183,117,556	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. One facility incorrectly reported 6,211,171 pounds of fugitive air emissions for 1996. The correct amount is 750 pounds. The percentage change from 1988 to 1996 in total air emissions changes from –47.1% to –50.4%, in fugitive air emissions changes from –56.0% to –66.1%, in total on-site releases changes from –47.4% to –50.7%, and in total on- and off-site releases changes from –49.5% to –52.2%. **NA:** not required to be reported in that year.

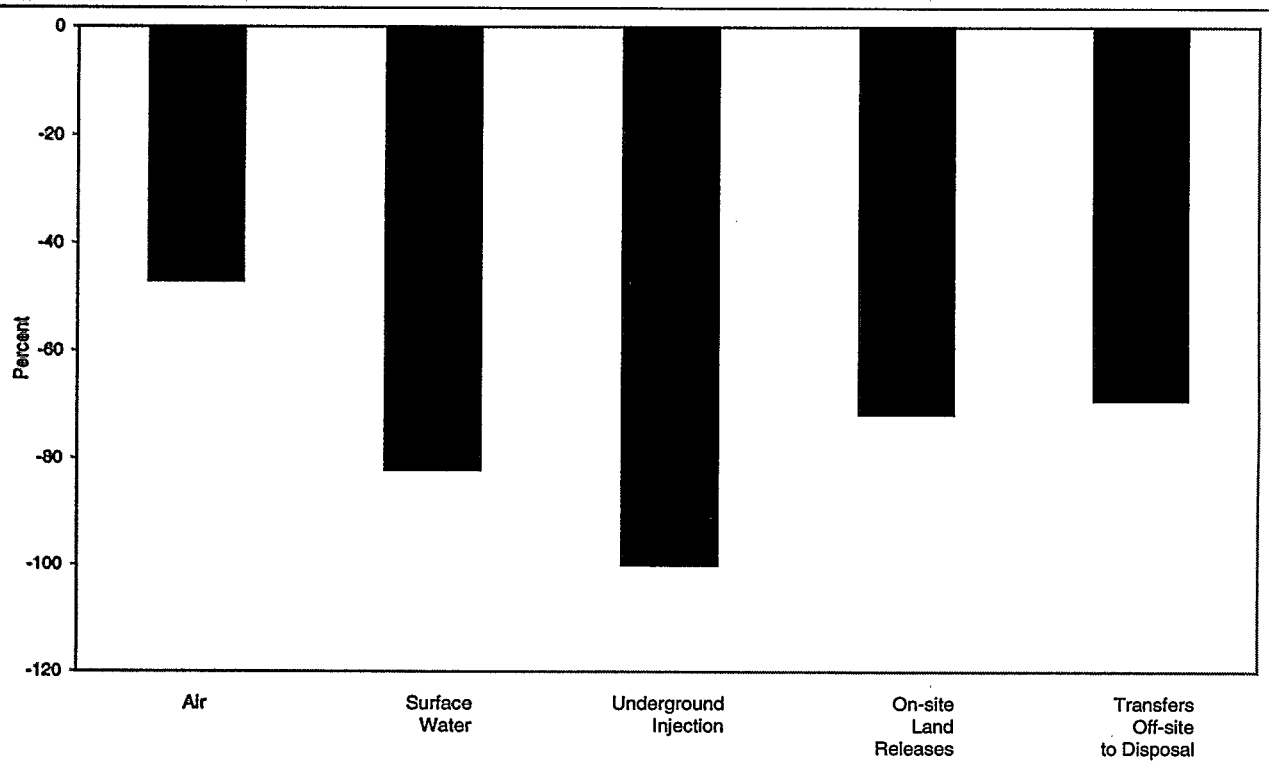


Figure 14-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Transportation Equipment (SIC Code 37)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. One facility incorrectly reported 6,211,171 pounds of total air emissions for 1996. The correct amount is 750 pounds. The percentage change from 1988 to 1996 in total air emissions changes from –47.1% to –50.4%.

releases to air decreased 47.1%, or 87.5 million pounds. This analysis includes a facility reporting error of 6.2 million pounds of air emissions in 1996. Without this error, percentage reductions would be larger.

Other on-site release types also decreased, as shown in Table 14-13. On-site land releases decreased 1.7 million pounds, or 71.7%. Surface water discharges decreased 224,000 pounds, or 82.2%. Underground injection was reported in 1988 (76,000 pounds), but not in 1996. Off-site releases (transfers to disposal) decreased by more than two-thirds (69.2%), a reduction of 13.7 million pounds.

Figure 14-12 displays the percentage of percentage change in on- and off-site releases by medium.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, on-site waste management in this sector decreased 38.3 million pounds. The great majority of this reduction (37.4 million pounds) was reported in on-site recycling.

Other categories also showed decreases, except for transfers off-site to recycling. This category showed little change since 1994 (a net increase of 357,000 pounds).

For the two transfer categories reported across the full 1988-1996 comparison period, reductions amounted to 81.1% (19.6 million pounds) in treatment and 31.8% (1.3 million pounds) in transfers to POTWs.

Although the sector experienced little net expansion in production during this period, some new facilities opened and others expanded production as a result of joint ventures between U.S. and foreign-owned companies. Decreases in releases continued in the more recent years, even as the sector recovered its earlier production levels, as noted earlier in this chapter.

1988-1996 Data for Four-Digit Industries in Transportation Equipment

Tables 14-14 through 14-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 37. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Two industries reported decreases in on- and off-site releases of 22 million pounds from 1988 to 1996, the largest such decreases. These were the two industries with the largest releases: motor vehicle parts and accessories (SIC code 3714), with a 22.4 million-pound reduction, and motor vehicles and car bodies (SIC code 3711), with a decrease of 22.1 million pounds. One other industry had a decrease of more than 10 million pounds: aircraft production (SIC code 3721), with 17.3 million pounds less in releases in 1996 than in 1988.

Producers of motor vehicle parts and accessories reported their largest reductions in air emissions, a decrease of 14.4 million pounds across the comparison period. Another 6.5 million-pound decrease was reported in off-site releases (transfers to disposal) and 1.3 million pounds in on-site land releases. Almost all of the reduction for makers of motor vehicles and car bodies was in air emissions (20.6 million pounds), along with 1.5 million pounds in off-site releases. In the aircraft industry, air emissions were also the largest area of reduction (13.7 million pounds), and off-site releases were reduced by 3.5 million.

A few industries reported increases in total on- and off-site releases over the period. The largest occurred in manufacture of travel trailers and campers (653,000 pound increase, SIC code 3792). This increase occurred before 1994; since that time, releases have been declining for this industry.

Table 14-14 provides release data for all four-digit SIC codes in the transportation equipment sector, for 1988-1996.

Other On-site Waste Management

One of the dominant industries in the transportation equipment sector also reported large decreases in other on-site waste management since 1994 (on-site waste management data were not collected in 1988). The decrease for motor vehicle parts and accessories was 36.5 million pounds; the bulk of this reduction (34.8 million pounds) was in on-site recycling and much of it occurred from 1995 to 1996.

The next largest decrease occurred in reporting for miscellaneous aircraft parts and equipment (SIC code 3728). This was a net difference of 4.1 million pounds for 1994-1996. The largest component was a reduction in on-site recycling. For this industry, both on-site recycling and on-site waste management as a whole increased in the first year of this period (1994 to 1995) and decreased substantially for 1996. Total other on-site waste management was 5.2 million pounds in 1994, 7.0 million pounds in 1995, and 1.1 million pounds in 1996.

Smaller changes were reported in on-site waste management by motor vehicle and car body manufacturers (SIC code 3711). In this industry, recycling and treatment increased for 1994-1996, but this was offset by a decrease in energy

Table 14-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Transportation Equipment, SIC Code 37

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3711	Motor Vehicles & Car Bodies	96	39,686,967	9,062	0	15,310	39,711,339	1,087,718	40,799,057
		95	42,355,683	250	0	15,882	42,371,815	1,077,061	43;448,876
		94	47,429,041	250	0	11,767	47,441,058	1,294,303	48,735,361
		88	60,240,168	40,477	0	42,463	60,323,108	2,615,658	62,938,766
3713	Truck & Bus Bodies	96	4,599,018	1,384	0	47,986	4,648,388	130,772	4,779,160
		95	5,851,690	4,190	0	22,215	5,878,095	113,924	5,992,019
		94	7,156,982	4,138	0	21,164	7,182,284	102,089	7;284,373
		88	8,494,438	0	0	32,448	8,526,886	459,794	8,986,680
3714	Motor Vehicle Parts & Accessories	96	14,384,103	9,950	0	362,885	14,756,938	3,506,949	18,263,887
		95	15,625,573	7,576	0	273,783	15,906,932	4,408,018	20,314,950
		94	18,042,377	9,881	0	104,502	18,156,760	4,266,570	22,423,330
		88	28,832,435	125,338	1,378	1,656,308	30,615,459	10,019,878	40,635,337
3715	Truck Trailers	96	1,085,881	265	0	115,727	1,201,873	5,005	1,206,878
		95	2,077,484	20	0	1,500	2,079,004	604,029	2,683,033
		94	2,640,233	26	0	15,400	2,655,659	73,574	2,729,233
		88	2,331,013	0	0	0	2,331,013	55,957	2,386,970
3716	Motor Homes	96	1,222,812	0	0	0	1,222,812	1,438	1,224,250
		95	869,169	0	0	0	869,169	10,656	879,825
		94	1,293,916	0	0	0	1,293,916	1,270	1,295,186
		88	955,662	0	0	0	955,662	0	955,662
3721	Aircraft	96	4,118,781	1,719	0	15,866	4,136,366	62,547	4,198,913
		95	5,009,119	6,614	0	6,156	5,021,889	71,280	5,093,169
		94	5,881,852	2,450	0	1,941	5,886,243	356,850	6,243,093
		88	17,776,433	1,049	59,466	111,258	17,948,206	3,515,553	21,463,759
3724	Aircraft Engines & Engine Parts	96	326,661	3,151	0	28,773	358,585	196,579	555,164
		95	730,347	1,849	0	5	732,201	173,477	905,678
		94	1,290,320	2,717	0	20	1,293,057	135,770	1,428,827
		88	9,119,517	5,295	0	59,878	9,184,690	457,502	9,642,192
3728	Aircraft Parts & Equipment, nec*	96	2,363,767	324	0	15,949	2,380,040	46,922	2,426,962
		95	3,329,128	813	0	200	3,330,141	247,934	3,578,075
		94	3,459,368	1,031	5	325	3,460,729	163,858	3,624,587
		88	8,730,101	27,019	0	0	8,757,120	406,996	9,164,116
3731	Ship Building & Repairing	96	2,679,455	19,752	0	23,922	2,723,129	191,201	2,914,330
		95	2,405,561	29,715	0	1,500	2,436,776	248,980	2,685,756
		94	2,469,290	19,161	0	25,065	2,513,516	332,152	2,845,668
		88	4,010,237	1,010	250	0	4,011,497	608,486	4,619,983
3732	Boat Building & Repairing	96	11,196,267	0	0	27,134	11,223,401	11,007	11,234,408
		95	12,177,948	0	0	505	12,178,453	4,540	12,182,993
		94	10,972,637	0	0	4,194	10,976,831	3,668	10,980,499
		88	13,225,260	0	0	17,251	13,242,511	103,601	13,346,112
3743	Railroad Equipment	96	1,252,611	1	0	1	1,252,613	172,273	1,424,886
		95	1,389,483	765	0	0	1,390,248	170,921	1,561,169
		94	1,496,574	15	0	0	1,496,589	408,962	1,905,551
		88	2,016,238	750	1,000	0	2,017,988	191,956	2,209,944

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category. One facility reported 6,211,171 pounds of fugitive air emissions for 1996 under multiple codes within SIC code 37. The correct amount is 750 pounds.
*nec: not elsewhere classified.

Table 14-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Transportation Equipment, SIC Code 37, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3751	Motorcycles, Bicycles, & Parts	96	721,200	0	0	0	721,200	9,050	730,250
		95	983,016	510	0	0	983,526	10,050	993,576
		94	987,095	760	0	0	987,855	11,550	999,405
		88	319,813	1,500	0	0	321,313	6,070	327,383
3761	Guided Missiles & Space Vehicles	96	95,740	0	0	0	95,740	35,314	131,054
		95	204,683	0	0	0	204,683	80,166	284,849
		94	443,318	0	0	0	443,318	7	443,325
		88	3,564,892	250	0	216,520	3,781,662	54,950	3,836,612
3764	Space Propulsion Units & Parts	96	278,415	0	0	0	278,415	840	279,255
		95	842,627	5,517	0	0	848,144	12,838	860,982
		94	833,041	5,517	0	0	838,558	13,364	851,922
		88	5,961,063	0	0	15,221	5,976,284	123,318	6,099,602
3769	Space Vehicle Equipment, nec*	96	203,112	0	0	0	203,112	256	203,368
		95	12,830	0	0	0	12,830	0	12,830
		94	27,078	0	0	0	27,078	0	27,078
		88	589,170	0	0	0	589,170	87,642	676,812
3792	Travel Trailers & Campers	96	1,097,216	0	0	0	1,097,216	49,181	1,146,397
		95	1,437,374	0	0	0	1,437,374	108,747	1,546,121
		94	1,596,209	0	0	0	1,596,209	88,165	1,684,374
		88	439,875	0	0	0	439,875	53,602	493,477
3795	Tanks & Tank Components	96	178,333	0	0	87	178,420	1,185	179,605
		95	121,301	0	0	0	121,301	176	121,477
		94	126,503	0	0	0	126,503	377	126,880
		88	677,345	25,843	0	7,742	710,930	30,773	741,703
3799	Transportation Equipment, nec*	96	897,741	28	0	547	898,316	7,101	905,417
		95	1,129,420	51	0	769	1,130,240	12,035	1,142,275
		94	1,261,867	38	0	0	1,261,905	12,569	1,274,474
		88	502,292	0	0	0	502,292	1,500	503,792
	Multiple within SIC Code 37	96	11,948,551	2,901	0	5,251	11,956,703	574,686	12,531,389
		95	7,231,608	1,101	0	5	7,232,714	1,652,100	8,884,814
		94	9,652,733	11,271	0	32	9,664,036	1,249,723	10,913,759
		88	11,926,192	4,302	14,091	147,310	12,091,895	594,743	12,686,638
	Invalid SIC Code within SIC Code 37	96	95,832	0	0	0	95,832	1,096	96,928
		95	1,551,875	8,452	0	30	1,560,357	13,432	1,573,789
		94	2,267,080	8,294	0	4,150	2,279,524	42,904	2,322,428
		88	6,235,181	39,763	0	27,000	6,301,944	374,362	6,676,306
	Total for SIC Code 37	96	98,432,463	48,537	0	659,438	99,140,438	6,091,120	105,231,558
		95	105,335,919	67,423	0	322,550	105,725,892	9,020,364	114,746,256
		94	119,327,514	65,549	5	188,560	119,581,628	8,557,725	128,139,353
		88	185,947,325	272,596	76,185	2,333,399	188,629,505	19,762,341	208,391,846

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category. One facility reported 6,211,171 pounds of fugitive air emissions for 1996 under multiple codes within SIC code 37. The correct amount is 750 pounds.
***nec:** not elsewhere classified.

recovery. The net reduction in other on-site waste management of 450,000 pounds placed this industry third for decreases for the period.

The ship building and repairing industry (SIC code 3731) reported the largest increase, 2.6 million pounds. One facility accounted for this increase in 1996. In previous years, the facility's owners, adding barge services and a drydock to the facility's operations, classified its operations in SIC code 4491, outside TRI's reporting criteria. New owners in 1996 determined that more than 50% of the facility's income came from ship building and repairing (SIC code 3731). Accordingly, the facility filed in this SIC code for 1996.

On-site waste management data for 1994-1996 appear in Table 14-15.

Transfers Off-site for Further Waste Management

Four industries reported decreases of more than 1 million pounds each in transfers off-site for further waste management since 1994 (data for some types of off-site transfers were not collected in 1988). Leading these industries was the manufacture of truck trailers (SIC code 3715), with a 5.2 million-pound decrease. More than half of this reduction was reported in transfers to recycling (2.8 million pounds).

The multiple-codes group—forms submitted by facilities that used more than one SIC code to describe their operation—had the second largest reduction, a net decrease of 2.6 million pounds. As is typical of this more diverse group, no single transfer type accounted for this large decrease. Other industries with large reductions were aircraft engines and engine parts (1.7 million pounds, SIC code 3724) and railroad equipment (1.2 million pounds, SIC code 3743).

Two industries reported large increases in transfers off-site for further waste management from 1994 to 1996. These were ship building and repairing (SIC code 3731), with a net increase of 4.5 million pounds, and motor vehicles and car bodies (SIC code 3711) with an increase of 2.3 million pounds. In both cases, the increase occurred in transfers to recycling, only slightly offset by smaller reductions in other transfer types since 1994.

Table 14-16 provides data on transfers off-site for further waste management for all four-digit SIC codes in the transportation equipment sector.

Facilities with Large Increases and Decreases in Releases, 1988-1996

The facility with the largest increase in releases was Toyota Motor Manufacturing Kentucky in Georgetown, Kentucky (SIC codes 3711 and 3714), with a 2.0 million-pound increase. Over one-fourth of the change was accounted for by an increase in air emissions of xylene (mixed isomers). The facility, an automobile manufacturing plant, produced 18,527 vehicles in 1988 and 385,657 in 1996. Toyota attributes the increase in xylene emissions to the increase in production. Xylene is a component of the paint used on the new vehicles.

Saturn Corporation in Spring Hill, Tennessee (did not report in 1988, SIC code 3711 in 1996), ranked second for increases with a 1.2 million-pound change. The automobile manufacturing facility came into production in 1990; therefore, there were no data for 1988. There were 556,000 pounds of glycol ethers, a constituent of paint, reported as released to air in 1996.

Subaru-Isuzu Automotive, Inc., in Lafayette, Indiana (did not report in 1988, SIC code 3711 in 1996), was third in increases with 1.1 million pounds. This automobile manufacturing plant did not come into operation until after the 1988 reporting year. Therefore, the data for 1996 equals the total increase. Air emissions of xylene (mixed isomers), a paint constituent, accounted for almost half of this facility's overall increase.

Table 14-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Transportation Equipment, SIC Code 37

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3711	Motor Vehicles & Car Bodies	96	217,094	535,506	13,036,452	13,789,052
		95	214,485	1,412,284	12,043,838	13,670,607
		94	185,302	1,199,480	12,854,559	14,239,341
		88	NA	NA	NA	NA
3713	Truck & Bus Bodies	96	73,230	0	314,076	387,306
		95	196,346	0	496,727	693,073
		94	91,366	0	490,479	581,845
		88	NA	NA	NA	NA
3714	Motor Vehicle Parts & Accessories	96	8,876,680	13,903	6,142,531	15,033,114
		95	35,097,838	2,450	7,593,928	42,694,216
		94	43,715,261	28,330	7,750,641	51,494,232
		88	NA	NA	NA	NA
3715	Truck Trailers	96	93,375	0	20,000	113,375
		95	19,817	0	13,000	32,817
		94	86,017	0	16,000	102,017
		88	NA	NA	NA	NA
3716	Motor Homes	96	10,799	0	0	10,799
		95	2,288	0	0	2,288
		94	0	0	125,792	125,792
		88	NA	NA	NA	NA
3721	Aircraft	96	533,700	0	360,848	894,548
		95	570,370	0	310,269	880,639
		94	651,815	0	628,481	1,280,296
		88	NA	NA	NA	NA
3724	Aircraft Engines & Engine Parts	96	4,146,424	0	1,003,150	5,149,574
		95	4,356,967	0	1,193,740	5,550,707
		94	2,878,603	0	1,541,707	4,420,310
		88	NA	NA	NA	NA
3728	Aircraft Parts & Equipment, nec*	96	83,108	30,190	937,161	1,050,459
		95	6,058,525	31,852	919,427	7,009,804
		94	4,327,458	0	830,447	5,157,905
		88	NA	NA	NA	NA
3731	Ship Building & Repairing	96	51,741	0	2,688,622	2,740,363
		95	33,373	0	44,031	77,404
		94	70,421	0	40,061	110,482
		88	NA	NA	NA	NA
3732	Boat Building & Repairing	96	700	0	500	1,200
		95	43,799	0	0	43,799
		94	4,237	0	24,072	28,309
		88	NA	NA	NA	NA
3743	Railroad Equipment	96	80,498	0	16,112	96,610
		95	80,526	0	15,959	96,485
		94	80,313	0	132,417	212,730
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 14-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Transportation Equipment, SIC Code 37, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3751	Motorcycles, Bicycles, & Parts	96	69,810	0	152,200	222,010
		95	108,060	0	128,400	236,460
		94	97,100	0	112,960	210,060
		88	NA	NA	NA	NA
3761	Guided Missiles & Space Vehicles	96	295	0	75,259	75,554
		95	198,000	0	77,036	275,036
		94	301,500	0	74,045	375,545
		88	NA	NA	NA	NA
3764	Space Propulsion Units & Parts	96	0	0	322	322
		95	0	0	2,476	2,476
		94	154,800	0	5,299	160,099
		88	NA	NA	NA	NA
3769	Space Vehicle Equipment, nec*	96	142,000	0	39,600	181,600
		95	500	0	0	500
		94	1,453	0	0	1,453
		88	NA	NA	NA	NA
3792	Travel Trailers & Campers	96	5,500	0	0	5,500
		95	0	0	58,882	58,882
		94	0	0	64,339	64,339
		88	NA	NA	NA	NA
3795	Tanks & Tank Components	96	156,390	0	24,283	180,673
		95	84,669	0	64,200	148,869
		94	35,116	0	48,651	83,767
		88	NA	NA	NA	NA
3799	Transportation Equipment, nec*	96	108,491	0	32,002	140,493
		95	220,754	0	29,096	249,850
		94	191,834	0	50,216	242,050
		88	NA	NA	NA	NA
	Multiple within SIC Code 37	96	1,416,289	849,960	685,845	2,952,094
		95	582,198	796,580	729,164	2,107,942
		94	573,547	455,229	1,247,178	2,275,954
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 37	96	0	0	0	0
		95	31,200	0	49,066	80,266
		94	42,675	0	73,209	115,884
		88	NA	NA	NA	NA
	Total for SIC Code 37	96	16,066,124	1,429,559	25,528,963	43,024,646
		95	47,899,715	2,243,166	23,769,239	73,912,120
		94	53,488,818	1,683,039	26,110,553	81,282,410
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 14-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Transportation Equipment, SIC Code 37

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3711	Motor Vehicles & Car Bodies	96	36,777,515	5,148,595	1,213,559	1,694,161	0	44,833,830
		95	38,484,555	6,374,726	1,183,900	1,393,163	0	47,436,344
		94	32,554,874	6,733,875	1,445,253	1,789,222	750	42,523,974
		88	NA	NA	5,962,593	1,349,190	772,796	NA
3713	Truck & Bus Bodies	96	2,723,533	1,405,814	88,148	81,440	0	4,298,935
		95	3,638,042	1,426,697	119,716	89,456	250	5,274,161
		94	3,071,159	1,411,993	91,853	203,063	0	4,778,068
		88	NA	NA	501,109	528,883	227,851	NA
3714	Motor Vehicle Parts & Accessories	96	93,685,644	2,359,241	1,228,506	763,947	250	98,037,588
		95	92,156,631	2,596,956	1,248,673	758,851	0	96,761,111
		94	93,683,430	2,377,165	1,524,382	889,573	0	98,474,550
		88	NA	NA	2,658,575	1,284,525	1,305,687	NA
3715	Truck Trailers	96	795,526	141,970	57,105	620	250	995,471
		95	4,876,767	242,957	37,033	545	0	5,157,302
		94	3,592,516	296,290	41,248	47	2,259,813	6,189,914
		88	NA	NA	255,063	43,877	89,697	NA
3716	Motor Homes	96	130,410	94,838	5,004	0	0	230,252
		95	125,985	55,116	2,000	0	0	183,101
		94	141,443	43,518	1,460	0	0	186,421
		88	NA	NA	22,610	0	0	NA
3721	Aircraft	96	799,247	949,147	393,778	70,945	0	2,213,117
		95	982,609	784,891	534,756	30,556	0	2,332,812
		94	877,775	971,081	744,209	52,329	0	2,645,394
		88	NA	NA	5,392,161	118,773	413,892	NA
3724	Aircraft Engines & Engine Parts	96	9,572,020	38,782	539,580	14,927	7,646	10,172,955
		95	7,178,479	54,952	739,731	2,905	0	7,976,067
		94	11,102,829	92,073	663,180	2,816	0	11,860,898
		88	NA	NA	1,278,509	114,039	8,498	NA
3728	Aircraft Parts & Equipment, nec*	96	1,696,037	301,053	422,625	38,771	0	2,458,486
		95	1,700,861	216,838	171,951	54,822	0	2,144,472
		94	2,047,204	240,429	261,716	17,691	150	2,567,190
		88	NA	NA	736,565	201,877	198,120	NA
3731	Ship Building & Repairing	96	6,598,311	965,327	115,758	2,518	0	7,681,914
		95	4,527,162	711,624	149,222	6,578	0	5,394,586
		94	1,812,538	1,061,644	292,572	7,180	0	3,173,934
		88	NA	NA	3,438,897	960	0	NA
3732	Boat Building & Repairing	96	84,831	306,854	10,296	49,976	0	451,957
		95	163,277	265,752	20,982	12,921	250	463,182
		94	129,984	206,320	47,268	253	0	383,825
		88	NA	NA	196,377	812	90,096	NA
3743	Railroad Equipment	96	1,400,556	546,857	32,743	1,247	0	1,981,403
		95	2,810,090	555,833	91,814	568	0	3,458,305
		94	2,735,055	203,526	134,629	90,452	0	3,163,662
		88	NA	NA	356,140	85,392	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 14-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Transportation Equipment, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3751	Motorcycles, Bicycles, & Parts	96	619,863	58,273	770	505	0	679,411
		95	454,160	101,985	10,690	750	0	567,585
		94	171,004	101,850	4,175	0	0	277,029
		88	NA	NA	6,320	0	0	NA
3761	Guided Missiles & Space Vehicles	96	27,219	20,093	676	31	0	48,019
		95	25,196	9,790	12,286	27	0	47,299
		94	81,632	21,808	44,096	27	0	147,563
		88	NA	NA	324,090	2,500	56,216	NA
3764	Space Propulsion Units & Parts	96	69,251	0	8,570	5	0	77,826
		95	366,357	0	46,517	10	0	412,884
		94	363,054	1,300	149,200	10	0	513,564
		88	NA	NA	197,385	303	10,000	NA
3769	Space Vehicle Equipment, nec*	96	5,900	33,055	26,395	0	0	65,350
		95	188	0	0	0	0	188
		94	761	5,593	0	0	0	6,354
		88	NA	NA	302,744	24,500	48,750	NA
3792	Travel Trailers & Campers	96	515	40,691	250	0	0	41,456
		95	8,370	88,660	27,853	0	0	124,883
		94	500	79,019	0	0	0	79,519
		88	NA	NA	38,176	0	0	NA
3795	Tanks & Tank Components	96	88,599	0	40,356	0	0	128,955
		95	129,734	0	83,062	0	0	212,796
		94	537,808	902	74,027	1	0	612,738
		88	NA	NA	75,959	289	3,200	NA
3799	Transportation Equipment, nec*	96	24,086	263,298	14,843	8,160	0	310,387
		95	10,014	180,114	33,233	3,488	0	226,849
		94	15,673	186,126	43,698	7	0	245,504
		88	NA	NA	31,765	0	0	NA
	Multiple within SIC Code 37	96	7,100,165	912,041	361,455	11,065	0	8,384,726
		95	5,754,113	1,277,046	375,968	10,017	0	7,417,144
		94	8,010,287	2,299,022	549,743	102,775	0	10,961,827
		88	NA	NA	2,202,597	204,723	321,275	NA
	Invalid SIC Code within SIC Code 37	96	2,464	23,044	0	10	0	25,518
		95	1,162,052	101,208	6,473	1,142	0	1,270,875
		94	915,146	63,418	5,778	1,002	0	985,344
		88	NA	NA	180,919	55,805	85,937	NA
	Total for SIC Code 37	96	162,201,692	13,608,973	4,560,417	2,738,328	8,146	183,117,556
		95	164,554,642	15,045,145	4,895,860	2,365,799	500	186,861,946
		94	161,844,672	16,396,952	6,118,487	3,156,448	2,260,713	189,777,272
		88	NA	NA	24,158,554	4,016,448	3,632,015	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 37 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Alliant Techsystems, Inc., in Magna, Utah (SIC code 3764 in 1988 and codes 2892, 3089 and 3764 in 1996), ranked first in decreases of releases. This facility manufactures large solid fuel rocket motors for the Department of Defense and several commercial ventures. Alliant's rank was largely the result of the phase-out of dichloromethane (methylene chloride) as a conditioning agent in graphite fiber manufacturing. When the Department of Defense changed its material specifications for military contractors as a result of the Montreal Protocol, this facility engaged in a reduction program. Substitution of a water-soluble compound for dichloromethane accounted for almost half of this facility's 2.73 million-pound reduction of releases.

Ford Electronics in Connersville, Indiana (SIC code 3714), was second in decreases with an overall 2.4 million-pound reduction. This manufacturer of automobile air conditioning systems reduced trichloroethylene air emissions by 1.4 million pounds, 59% of the facility's total change, by substituting aqueous cleaning systems for vapor degreasing systems.

Chrysler Corporation in Fenton, Missouri (SIC code 3711), was third in decreases with a 2.2 million-pound reduction. Trucks and vans are manufactured at this Chrysler plant. The facility switched from solvent-based paints to water-based paints for new vehicles. Consequently, releases of paint solvents, such as xylene (mixed isomers), were significantly reduced. Xylene (mixed isomers) accounted for 63% of the facility's reduction in releases.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There are four such facilities in the transportation equipment sector:

Ford Motor Company, Claycomo, Missouri, increase of 1.2 million pounds, reporting error. The facility contact stated that there may be an error in their 1988 reporting. At the time of this writing, the facility is considering whether or not to revise its 1988 submission.

General Motors NAO Van Nuys Plant, Panorama City, California, decrease of 2.7 million pounds, plant closure.

Gulfstream Aerospace Corporation, Savannah, Georgia, decrease of 2.7 million pounds, reporting error.

Gunderson, Inc., Portland, Oregon, increase of 6.2 million pounds, reporting error.

1991-1996 Waste Management Data for Transportation Equipment

Table 14-17 summarizes on- and off-site waste management data for the transportation equipment sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste decreased from 382.7 million pounds in 1991 to 334.9 million pounds in 1996, a 12.5% reduction. This reduction masks an even larger decrease in more recent years, since production-related waste had increased to 413.9 million pounds by 1994.

The largest changes were reported in recycling, and these changes partly offset each other. On-site recycling dropped from 65.8 million pounds in 1991 to 16.1 million pounds in 1996. At the same time, off-site recycling rose from 111.3 million pounds to 169.0 million pounds. The net decrease on-site for recycling was 49.8 million pounds and the increase off-site was 57.7 million pounds.

Quantities released on- and off-site in this sector decreased from 141.4 million pounds in 1991 to

Table 14-17. TRI Waste Management Data, 1991, 1994-1996: Transportation Equipment, SIC Code 37

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	65,827,206	53,488,857	47,899,715	16,066,124
Energy Recovery On-site	2,173,685	1,683,039	2,243,166	1,429,559
Treated On-site	24,899,477	26,110,599	23,790,687	25,528,963
Total On-site Waste Management	92,900,368	81,282,495	73,933,568	43,024,646
Off-site Waste Management				
Recycled Off-site	111,282,173	179,735,895	167,879,298	169,017,748
Energy Recovery Off-site	22,851,506	16,627,429	15,075,555	15,053,396
Treated Off-site	14,294,515	9,543,937	7,811,174	8,167,845
Total Off-site Waste Management	148,428,194	205,907,261	190,766,027	192,238,989
Quantity Released On- and Off-site	141,357,987	126,712,093	112,730,438	99,612,655
Total Production-related Waste	382,686,549	413,901,849	377,430,033	334,876,290
Non-Production-related Waste	573,726	493,034	229,131	133,587

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-10.4	-66.5	-75.6
Energy Recovery On-site	33.3	-36.3	-34.2
Treated On-site	-8.9	7.3	2.5
Total On-site Waste Management	-9.0	-41.8	-53.7
Off-site Waste Management			
Recycled Off-site	-6.6	0.7	51.9
Energy Recovery Off-site	-9.3	-0.1	-34.1
Treated Off-site	-18.2	4.6	-42.9
Total Off-site Waste Management	-7.4	0.8	29.5
Quantity Released On- and Off-site	-11.0	-11.6	-29.5
Total Production-related Waste	-8.8	-11.3	-12.5
Non-Production-related Waste	-53.5	-41.7	-76.7

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

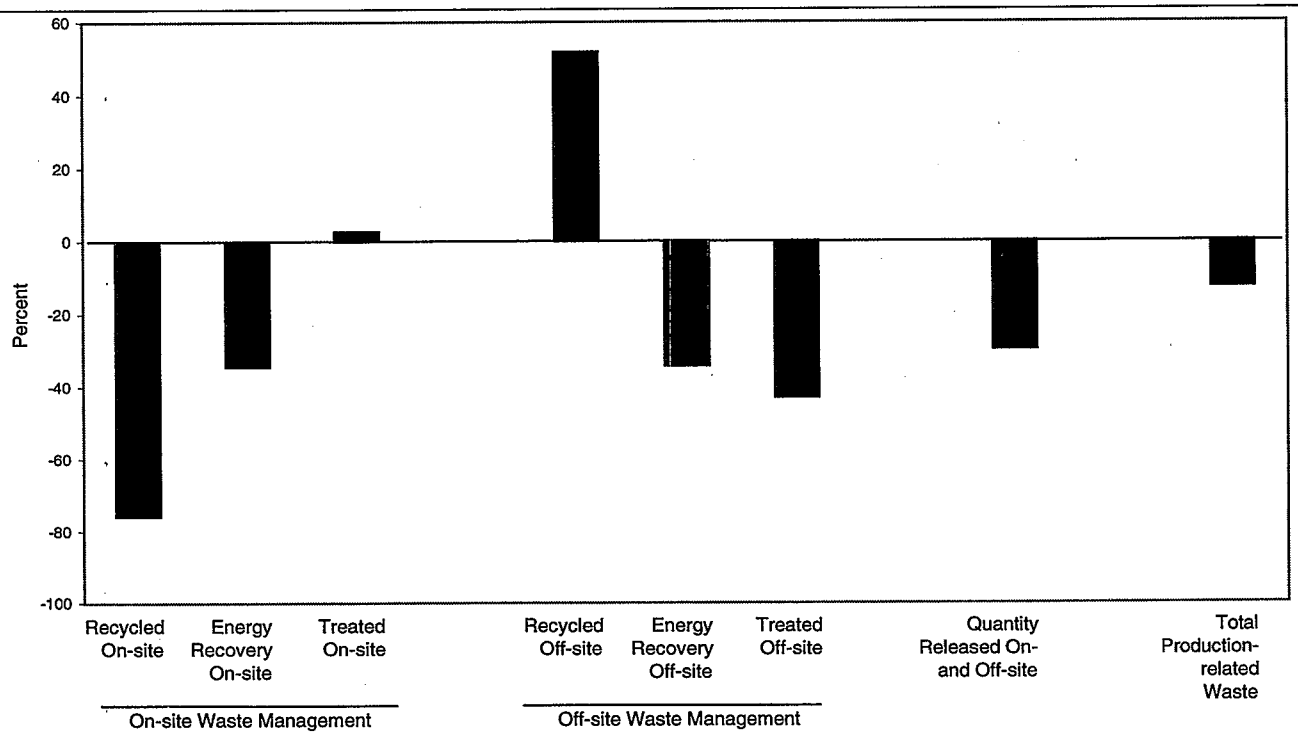


Figure 14-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Transportation Equipment (SIC Code 37)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

99.6 million pounds in 1996, a reduction of 29.5%. All other types of waste management decreased except on-site treatment, which had a net increase of 629,000 pounds for 1994-1996.

Thus, the largest changes in waste management in the transportation equipment sector for the comparison period were a reduction in quantities of TRI chemicals released on- and off-site accompanied by a net increase in recycling (on-and off-site combined). These changes suggest some improvements over time in how waste has been managed in this sector, in relation to the waste management hierarchy (described in Chapter 1). Furthermore, reductions in production-related waste altogether have continued in recent years, even as the sector has seen recovery to its earlier production levels. Notably, some facilities in this sector with large increases in production-related waste attribute those increases to expanding production, while some facilities with substantial reductions have undertaken process and material modifications that resulted in lesser quantities of toxic waste.

Figure 14-13 displays the 1994-1996 percentage changes in production-related waste by waste management type for this sector.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Arvin N.A. Automotive in Franklin, Indiana (SIC code 3714), ranked first in increases of production-related waste. The facility buys stock stainless steel and produces finished tubing for automobiles. Scrap material is sent off-site for recycling. Manganese (a constituent of stainless steel) reported as recycled off-site accounted for 82 percent of the overall 14.3 million-pound increase.

The facility attributes this change to increased production over the 1991-1996 period.

Delphi Packard Electric Systems in Warren, Ohio (SIC codes 3714), was the second-largest increaser with a total change of 7.0 million pounds. The Delphi Packard facility manufactures wire harnesses for automobiles. Wire and wire terminal scrap are sent off-site for recycling. The facility reported a 7.5 million-pound increase in off-site recycling of copper compounds, a major component of the wire and wire terminals, as a result of a production increase. Decreases in other production-related waste categories resulted in an overall increase that was smaller than the increase in off-site recycling (for copper compounds).

The facility with the third largest increase is Mitsubishi Motor Manufacturing in Normal, Illinois (SIC code 3711), with a 5.4 million-pound increase. The increase is largely due to a change in the interpretation of TRI reporting requirements, according to the facility contact.[1] Nickel, a constituent of the metal used in the production of automobile body parts, was the chemical with the single-largest increase (1.0 million pounds, off-site recycling).

Preferred Technical Group, Inc., in Mitchell, Indiana (SIC code 3714 in 1988, did not report in 1996), had the biggest reduction in production-related waste with a total decrease of 22.4 million pounds. The facility, a manufacturer of automobile air conditioner components, eliminated the use of trichloroethylene as a degreaser by substituting water-based detergents. This was the only chemical reported to TRI by Preferred Technical Group (1987 to 1994), and it accounted for 100 percent of the facility's reduction.

Second was Modine Manufacturing Company in Logansport, Indiana (SIC code 3714). The facility, a manufacturer of air conditioner parts—historically for automobiles and currently for home and commercial applications—phased-out the use of 1,1,1-trichloroethane from a degreasing operation. An aqueous cleaner was substituted. The elimination of 1,1,1-trichloroethane was predominantly responsible for the overall decrease of 7.1 million pounds in production-related waste.

The third-ranked facility for decreases was the Cessna Aircraft Company in Columbus, Georgia (SIC code 3728), with a 4.1 million-pound reduction. The Cessna facility manufactures aircraft structural detail and assemblies such as wing flaps, ailerons, and stabilizers. 1,1,1-Trichloroethane (TCA), the chemical primarily responsible for the facility's ranking, was used in a degreasing process and was replaced by trichloroethylene. Because of the phase-out of TCA, no data were reported for the chemical in 1996. Therefore, the 1991 data for the chemical equals the total decrease. Nearly all of the 1991 data for TCA were reported as recycled on-site (4.08 million pounds). The facility states that its interpretation of how to calculate this quantity in 1991 resulted in a deceptively large figure. On-site recycling estimation methods at the plant have since changed.[2]

Other Apparent Increases and Decreases in Production-Related Waste, 1991-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have

[1] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

[2] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the transportation equipment sector:

TRW Automotive Electronics, Union Springs, New York, decrease of 4.7 million pounds, plant closure.

Facilities Contacted for Explanations (alphabetical by facility):

Alliant Techsystems, Inc., Magna, Utah: Mike Parker, July 21, 1998 (explanation provided)

Arvin N.A. Automotive, Franklin, Indiana: Dan Boucher, July 21, 1998 (explanation provided)

Cessna Aircraft Company, Columbus, Georgia: Michael Freier, August 5, 1998 (explanation provided)

Chrysler Corporation, Fenton, Missouri: Gary S. Sczepanski, August 27, 1998 (explanation provided)

Delphi Packard Electric Systems, Warren, Ohio: Dominic Imburgia, July 27, 1998 (explanation provided)

Ford Electronics, Connersville, Indiana: Joseph King, August 11, 1998 (explanation provided)

Ford Motor Company, Claycomo, Missouri: Ghani Baig, July 24, August 5, and September 2, 1998; Martin Whitehead, August 24, 1998 (explanation provided)

General Motors NAO Van Nuys Plant, Panorama City, California: Ed Piasecki, August 10, 1998 (explanation provided)

Gulfstream Aerospace Corp., Savannah, Georgia: William D. Sherrod, August 24, 1998 (explanation provided)

Gunderson, Inc, Portland, Oregon: Robert A. Bridgers, July 21, 1998 (explanation provided)

Mitsubishi Motor Manufacturing, Normal, Illinois: Troy Weirick, July 21, 1998 (explanation provided)

Modine Manufacturing Company, Logansport, Indiana: Thomas S. Sanicola, July 22 and July 30, 1990 (explanation provided)

Preferred Technical Group, Inc., Columbus City, Indiana: William S. Cochrane, July 31, 1998 (explanation provided)

Preferred Technical Group, Inc., Mitchell, Indiana: Dearl C. Reynolds, July 21, 1998 (explanation provided)

Saturn Corporation, Spring Hill, Tennessee: William R. Miller, III, August 4, 1998 (explanation provided)

Southwest Shipyard, L.P., Channelview, Texas: Lynn R. Jones, August 10, 1998 (explanation provided)

Subaru-Isuzu Automotive, Inc., Lafayette, Indiana: Michelle Byrd, August 26, 1998 (explanation provided)

Toyota Motor Manufacturing Kentucky, Georgetown, Kentucky: Robert Ernest, July 22, 1998 (explanation provided)

TRW Automotive Electronics, Union Springs, New York: Thomas C. Battaglia, July 21, 1998 (explanation provided)

Chapter 15

Instruments and Photographic Equipment (SIC Code 38)

A Look at the Instruments and Photographic Equipment Industry (SIC Code 38)

The instruments and photographic equipment industry (SIC code 38) produces instruments and equipment for a variety of purposes as indicated by its full title: measuring, analyzing, and controlling instruments; photographic, medical, and optical goods; watches and clocks (see Box 15-1). Instruments and controls manufactured in SIC code 38 include search and navigation equipment such as radar and sonar, laboratory apparatus, environmental controls such as thermostats for residential and commercial use, and industrial instruments to measure, display and control process variables. The sector produces medical instruments, equipment, and supplies (including x-ray apparatus) and ophthalmic goods (such as eyeglasses). Photographic goods produced in this sector include not only equipment and parts, but also photographic film, paper, and chemicals. Box 15-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The instruments and photographic equipment sector shipped products valued at $151.02 billion in 1996, up from $144.72 billion in 1995 (both in current dollars). However, the sector's employment decreased from 831,000 in 1995 to 821,000 in 1996. This sector has shown little growth in the 1990s, but it has also been one of the more economically stable sectors. From 1989 to 1996, production in this sector increased 4.7%, compared to 17.6% for all U.S. manufacturing. During those years, however, production in the instruments and photographic equipment sector never fell below the 1989 level (see Chapter 1, Table 1-10).

At the four-digit SIC code level, the search and navigation equipment industry (SIC code 3612) shipped products valued at $30.37 billion in 1996. The photographic equipment industry (SIC code 3861) shipped products valued at $22.30 billion. Two other industries in this sector had shipments valued at more than $15 billion in 1996: surgical and medical instruments (SIC code 3841) with $17.04 billion and surgical appliances (SIC code 3842) with $15.87 billion. As noted throughout this chapter, the manufacture of photographic equipment and supplies in SIC code 3861 was associated with the sector's largest releases and waste management of TRI chemicals. Production of surgical, medical, and dental instruments (industries in SIC code 384, at the three-digit level) also contributed significantly to the sector's TRI reporting.

Box 15-1. SIC Code 38, Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks: Codes and Classifications

SIC Code		Industry Description
381	**Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems, Instruments, and Equipment**	
3812	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Systems and Instruments	Manufacture of search, detection, navigation, guidance, aeronautical, and nautical systems and instruments. Includes radar and sonar; countermeasures equipment; aircraft and missile control systems; flight and navigation sensors, transmitters, and displays; and gyroscopes.
382	**Laboratory Apparatus and Analytical, Optical, Measuring, and Controlling Instruments**	
3821	Laboratory Apparatus and Furniture	Manufacture of laboratory apparatus and furniture, including laboratory balances and scales, furnaces and ovens, and centrifuges.
3822	Automatic Controls for Regulating Residential and Commercial Environments and Appliances	Manufacture of temperature and related controls for heating and air-conditioning installations and refrigeration applications. Manufacture of automatic regulators used as components of household appliances.
3823	Industrial Instruments for Measurement, Display, and Control of Process Variables; and Related Products	Manufacture of industrial instruments and related products for measuring, displaying, transmitting, and controlling process variables in manufacturing, energy conversion, and public service utilities.
3824	Totalizing Fluid Meters and Counting Devices	Manufacture of totalizing (registering) meters that monitor fluid flows, such as water and gas meters. Production of mechanical and electromechanical counters and associated metering devices.
3825	Instruments for Measuring and Testing of Electricity and Electrical Signals	Manufacture of instruments for measuring the characteristics of electricity and electrical signals, such as voltmeters, ammeters, demand meters, and equipment for testing electrical, radio, and communication circuits and electrical characteristics of internal combustion engines.
3826	Laboratory Analytical Instruments	Manufacture of laboratory instruments and instrumentation systems for chemical or physical analysis of the composition or concentration of samples of solid, fluid, gaseous, or composite material.
3827	Optical Instruments and Lenses	Manufacture of instruments and apparatus that measure an optical property and optically project, measure, or magnify an image, such as binoculars, microscopes, prisms, and lenses.
3829	Measuring and Controlling Devices, nec*	Manufacture of miscellaneous measuring and controlling devices, including meteorological instruments. Includes equipment to test physical properties, instrumentation to detect and measure nuclear radiation, aircraft engine instruments, and thermometers. Also includes surveying and drafting instruments.
384	**Surgical, Medical, and Dental Instruments and Supplies**	
3841	Surgical and Medical Instruments and Apparatus	Manufacture of medical, surgical, ophthalmic, and veterinary instruments and apparatus.
3842	Orthopedic, Prosthetic, and Surgical Appliances and Supplies	Manufacture of orthopedic, prosthetic, and surgical appliances and supplies; arch supports and other foot appliances; fracture appliances, elastic hosiery, abdominal supporters, braces, and trusses; bandages; surgical gauze and dressings; sutures; adhesive tapes and medicated plasters; and personal safety appliances and equipment.
3843	Dental Equipment and Supplies	Manufacture of artificial teeth, dental metals, alloys, and amalgams, and equipment, instruments, and supplies used by dentists, dental laboratories, and dental colleges.
3844	X-ray Apparatus and Tubes and Related Irradiation Apparatus	Manufacture of radiographic, fluoroscopic, and therapeutic X-ray apparatus and tubes for medical, industrial, research, and control applications. Manufacture of other irradiation equipment, including gamma and beta-ray equipment.
3845	Electromedical and Electrotherapeutic Equipment	Manufacture of electromedical and electrotherapeutic apparatus.
385	**Ophthalmic Goods**	
3851	Ophthalmic Goods	Manufacture of ophthalmic frames, lenses, and sunglass lenses.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

Box 15-1. SIC Code 38, Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks: Codes and Classifications, Continued

SIC Code		Industry Description
386	**Photographic Equipment and Supplies**	
3861	Photographic Equipment and Supplies	Manufacture of photographic apparatus, equipment, parts, attachments, and accessories; photocopy and microfilm equipment; blueprinting and diazotype (white printing) apparatus, and other photographic equipment. Manufacture of sensitized film, paper, cloth, and plates, and prepared photographic chemicals for use with photographic equipment.
387	**Watches, Clocks, Clockwork Operated Devices, and Parts**	
3873	Watches, Clocks, Clockwork Operated Devices, and Parts	Manufacture of clocks (including electric), watches, watchcases, mechanisms for clockwork-operated devices, and clock and watch parts. Assembly of clocks and watches from purchased movements and cases.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

The manufacture of instruments and photographic equipment involves processes common to some other industrial sectors, such as fabrication of metal products, production of articles from plastics materials or glass, and manufacture of electronic equipment. However, in the instruments and photographic equipment sector, some products may require machining to finer tolerances or testing to stricter product and performance standards. Many medical and surgical products, for example, must meet additional criteria such as the ability of pacemakers to withstand sterilization in an autoclave.

Photographic equipment and supplies (SIC code 3861) ranked first in this sector for releases and for production-related waste in 1996. Recycling is common in photographic film manufacture, to recover valuable silver from wastes. Traditional silver-based processes continue to dominate the photographic industry's market, although new techniques (such as digital photography) are advancing. Manufacture of photographic film generally begins with production of a thin sheet of plastic from a cellulose acetate base (a solvent-based process). Silver nitrate, produced by dissolving silver in nitric acid, is added to a gelatin chemically treated with iodide and potassium bromide, yielding an emulsion of silver halide salts.

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

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How Products Are Made: An Illustrated Guide to Product Manufacturing, Gale Research, 1996: industry processes and technologies.

McGraw-Hill Encyclopedia of Science and Technology, 8th ed., 1997: industry processes and technologies.

Table 15-1. Summary of TRI Information by 4-digit SIC Code, 1996: Instruments and Photographic Equipment, SIC Code 38

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
9	12	3812	Search & Navigation Equipment	11	13	1	125,441	4,000	129,441
10	14	3821	Laboratory Apparatus & Furniture	10	22	5	99,184	265	99,449
4	3	3822	Environmental Controls	19	62	4	438,113	66,290	504,403
11	7	3823	Process Control Instruments	15	23	2	74,703	0	74,703
14	9	3824	Fluid Meters & Counting Devices	7	19	3	34,833	1,005	35,838
18	11	3825	Instruments to Measure Electricity	5	9	1	1,156	0	1,156
17	18	3826	Analytical Instruments	2	2	0	11,000	0	11,000
5	8	3827	Optical Instruments & Lenses	7	12	1	55,249	425,442	480,691
8	10	3829	Measuring & Controlling Devices, nec*	9	17	0	146,866	0	146,866
2	2	3841	Surgical & Medical Instruments	70	121	7	1,594,470	70,351	1,664,821
6	4	3842	Surgical Appliances & Supplies	27	45	4	462,966	13,061	476,027
13	15	3843	Dental Equipment & Supplies	14	19	0	31,275	5,450	36,725
12	13	3844	X-ray Apparatus & Tubes	4	13	0	26,942	11,910	38,852
15	16	3845	Electromedical Equipment	7	9	0	20,692	7,100	27,792
7	6	3851	Ophthalmic Goods	16	27	0	395,622	48,258	443,880
1	1	3861	Photographic Equipment & Supplies	49	251	15	10,407,088	189,101	10,596,189
16	17	3873	Watches, Clocks, Watchcases & Parts	3	3	1	26,500	0	26,500
3	5		Multiple within SIC Code 38	16	40	2	549,403	6,335	555,738
			Total for SIC Code 38	291	707	46	14,501,503	848,568	15,350,071

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category. There may be forms but no facilities in a single 4-digit SIC code because a facility reported different 4-digit SIC codes in SIC code 38 on its individual forms.
*nec: not elsewhere classified.

1996 TRI Data for Instruments and Photographic Equipment

Table 15-1 summarizes TRI reporting by the instruments and photographic equipment sector for 1996. The sector submitted 707 forms in 1996. Of these, 46 were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The photographic equipment industry (SIC code 3861) submitted the sector's largest number of forms, 251 or 35.5% of the total. The surgical and medical instruments industry (SIC code 3841) ranked second with 121 forms, or 17.1%. Ranking third, the environmental controls industry (SIC code 3822) submitted 62 forms, or 8.8%.

The photographic equipment industry (SIC code 3861) also ranked first in the instruments and photographic equipment sector for all categories of TRI reporting summarized in Table 15-1, except off-site releases. This industry reported 10.6 million pounds of total on- and off-site releases, including 10.4 million pounds of on-site releases. These amounts were approximately 70% of the sector's total on- and off-site releases of 15.4 million pounds and on-site releases of 14.5 million pounds. The photographic equipment industry also reported 36.7 million pounds of other on-site waste management, 86.2% of the sector's 42.5 million-

Table 15-1. Summary of TRI Information by 4-digit SIC Code, 1996: Instruments and Photographic Equipment, SIC Code 38, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3812	Search & Navigation Equipment	51,700	62,125	241,573	50
3821	Laboratory Apparatus & Furniture	5	127,912	237,330	0
3822	Environmental Controls	305,355	4,017,440	4,897,977	0
3823	Process Control Instruments	24,060	554,486	651,260	0
3824	Fluid Meters & Counting Devices	44,229	367,834	454,026	0
3825	Instruments to Measure Electricity	27,471	74,161	247,194	0
3826	Analytical Instruments	0	42,200	53,850	0
3827	Optical Instruments & Lenses	30,372	93,179	611,557	0
3829	Measuring & Controlling Devices, nec*	24,448	81,099	251,487	0
3841	Surgical & Medical Instruments	3,618,136	1,836,875	7,282,007	52
3842	Surgical Appliances & Supplies	1,139,608	1,150,352	2,748,064	410
3843	Dental Equipment & Supplies	1,385	131,101	160,550	0
3844	X-ray Apparatus & Tubes	20,260	180,345	239,202	0
3845	Electromedical Equipment	21,000	94,422	142,412	0
3851	Ophthalmic Goods	225,056	519,000	1,190,177	1
3861	Photographic Equipment & Supplies	36,679,953	8,007,796	55,406,391	140,696
3873	Watches, Clocks, Watchcases & Parts	26,126	5,650	58,400	0
	Multiple within SIC Code 38	305,508	722,127	1,604,055	350
	Total for SIC Code 38	42,544,672	18,068,104	76,477,512	141,559

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category. There may be forms but no facilities in a single 4-digit SIC code because a facility reported different 4-digit SIC codes in SIC code 38 on its individual forms.
***nec:** not elsewhere classified.

pound total. The industry reported 8.0 million pounds of transfers off-site for further waste management, which was 44.3% of the sector's total of 18.1 million pounds in that category. The photographic equipment industry accounted for 55.4 million pounds of total production-related waste, 72.4% of the sector total of 76.5 million pounds.

The optical instruments and lenses industry (SIC code 3827) ranked first in this sector for off-site releases, with 425,000 pounds, 50.1% of the sector's total of 849,000 pounds. In this category, the photographic equipment industry (SIC code 3861) ranked second, with 189,000 pounds (22.3%).

The surgical and medical instruments industry (SIC code 3841) ranked second among instruments and photographic equipment industries in most other categories summarized in Table 15-1. This industry reported 1.6 million pounds of on-site releases (11.0% of the sector's total), 1.7 million pounds of total releases (10.8%), 3.6 million pounds of other on-site waste management (8.5%), and 7.3 million pounds of total production-related waste (9.5%). The environmental controls industry (SIC code 3822) ranked second with 4.0 million pounds (22.2%) of transfers off-site for further waste management.

The surgical and medical instruments industry (SIC code 3841) ranked third in this sector for both off-site releases (70,000 pounds, or 8.3%) and transfers off-site for further waste management (1.8 million pounds, or 10.2%).

Forms reporting multiple SIC codes in SIC code 38 (explained below) reported the sector's third largest amount of on-site releases, with 549,000 pounds (3.8%), and total releases, with 556,000 pounds (3.6%). The surgical appliances industry (SIC code 3842) ranked third for other on-site waste management, with 1.1 million pounds (2.7%), and the environmental controls industry (SIC code 3822) ranked third for total production-related waste, with 4.9 million pounds (6.4%).

Multiple SIC Codes in SIC Code 38

Some facilities in the instruments and photographic equipment sector manufacture distinct, but related, products that are classified in separate SIC codes within SIC code 38. A facility may manufacture both process control instruments for industry (SIC code 3823) and instruments to measure electricity (SIC code 3825). Another facility may produce both analytical instruments for laboratory use (SIC code 3826) and miscellaneous measuring and controlling devices (SIC code 3829). These facilities may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Table 15-2 further examines reporting on the 40 forms that reported multiple SIC codes in SIC code 38 in 1996. The surgical and medical instruments industry (SIC code 3841) appeared in the two combinations that were most frequently reported. This industry and the surgical appliances industry (SIC code 3842) was the most frequent combination, on 19 forms. Surgical and medical instruments and electromedical equipment (SIC code 3845) was the second most frequent combination, on 6 forms. Altogether, the multiple-codes forms in SIC code 38 reported 556,000 pounds of total on- and off-site releases and 1.6 million pounds of total production-related waste in 1996.

On- and Off-site Releases

The instruments and photographic equipment sector reported 13.2 million pounds of air emissions in 1996, amounting to 86.0% of all releases reported in this sector. Surface water discharges were the second-largest release type, with 1.3 million pounds (8.5%). Off-site releases (transfers to disposal) totaled 849,000 pounds (5.5%). The sector reported less than 3,000 pounds of other on-site land releases and no underground injection. Table 15-3 presents the sector's on- and off-site releases for

Table 15-2. Multiple SIC Codes, 1996: Instruments and Photographic Equipment, SIC Code 38

SIC Codes			Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3823	3824		1	1	0	0	0	0	0	0	0
3823	3825		4	1	50	0	50	9,020	22,548	53,675	0
3823	3825	3829	1	0	10,024	0	10,024	0	0	10,024	0
3823	3829		4	0	18,340	1,035	19,375	13,560	86,305	117,736	0
3826	3827		1	0	10	0	10	0	0	8	0
3826	3829		4	0	20,343	0	20,343	8,486	86,399	114,449	0
3841	3842		19	0	424,621	5,300	429,921	138,442	480,152	1,049,425	350
3841	3845		6	0	76,015	0	76,015	136,000	46,723	258,738	0
Total for SIC Code 38			40	2	549,403	6,335	555,738	305,508	722,127	1,604,055	350

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 15-3. TRI On-site and Off-site Releases, 1996: Instruments and Photographic Equipment, SIC Code 38

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3861	Photographic Equipment & Supplies	9,109,603	1,296,335	0	0	0	1,150	10,407,088	189,101	10,596,189
3841	Surgical & Medical Instruments	1,594,204	6	0	0	0	260	1,594,470	70,351	1,664,821
	Multiple within SIC Code 38	549,123	280	0	0	0	0	549,403	6,335	555,738
3822	Environmental Controls	437,011	60	0	0	0	1,042	438,113	66,290	504,403
3827	Optical Instruments & Lenses	54,439	810	0	0	0	0	55,249	425,442	480,691
3842	Surgical Appliances & Supplies	462,966	0	0	0	0	0	462,966	13,061	476,027
3851	Ophthalmic Goods	395,622	0	0	0	0	0	395,622	48,258	443,880
3829	Measuring & Controlling Devices, nec*	146,866	0	0	0	0	0	146,866	0	146,866
3812	Search & Navigation Equipment	125,441	0	0	0	0	0	125,441	4,000	129,441
3821	Laboratory Apparatus & Furniture	99,179	5	0	0	0	0	99,184	265	99,449
3823	Process Control Instruments	74,607	17	0	0	0	79	74,703	0	74,703
3844	X-ray Apparatus & Tubes	26,919	23	0	0	0	0	26,942	11,910	38,852
3843	Dental Equipment & Supplies	31,275	0	0	0	0	0	31,275	5,450	36,725
3824	Fluid Meters & Counting Devices	34,808	25	0	0	0	0	34,833	1,005	35,838
3845	Electromedical Equipment	20,692	0	0	0	0	0	20,692	7,100	27,792
3873	Watches, Clocks, Watchcases & Parts	26,500	0	0	0	0	0	26,500	0	26,500
3826	Analytical Instruments	11,000	0	0	0	0	0	11,000	0	11,000
3825	Instruments to Measure Electricity	1,156	0	0	0	0	0	1,156	0	1,156
	Total for SIC Code 38	13,201,411	1,297,561	0	0	0	2,531	14,501,503	848,568	15,350,071

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

1996, and Figure 15-1 illustrates their distribution by release type.

The photographic equipment industry (SIC code 3861) reported the sector's largest amounts of on-site releases. This industry reported releasing 9.1 million pounds to air and 1.3 million pounds to surface water. One facility in SIC code 3861 reported air emissions of 2.4 million pounds of dichloromethane, 1.4 million pounds of methanol, and 2.0 million pounds of hydrochloric acid in 1996. These were the three top chemicals for releases by this sector in 1996, as seen in the discussion of "1996 TRI Data by Chemical," below. The same facility and another facility owned by the same parent company reported a total of 940,000 pounds of surface water discharges of nitrate compounds.

The surgical and medical instruments industry (SIC code 3841) ranked second in this sector for air emissions, with 1.6 million pounds. No industry in this sector, other than the photographic equipment industry (SIC code 3861), reported more than 1,000 pounds of surface water discharges. The photographic equipment industry and the environmental controls industry (SIC code 3822) each reported approximately 1,000 pounds of other on-site land releases.

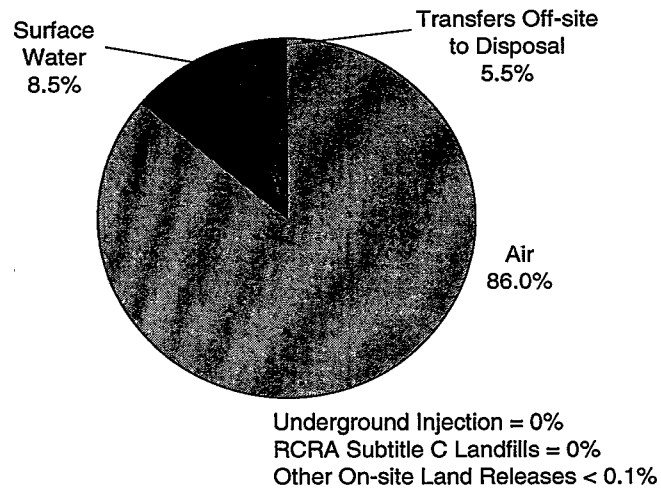


Figure 15-1. Distribution of TRI On-site and Off-site Releases, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

The optical instruments and lenses industry (SIC code 3827) ranked first in this sector for off-site releases, reporting 425,000 pounds, followed by photographic equipment (SIC code 3861) with 189,000 pounds. One optical instruments and lenses facility reported transfers to disposal of 212,000 of barium, and another facility in this industry reported transfers to disposal of 160,000 pounds of zinc compounds.

Figure 15-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

The instruments and photographic equipment sector reported on-site treatment totaling 37.6 million pounds in 1996, as shown in Table 15-4. On-site treatment amounted to 88.5% of the sector's total other on-site waste management. The sector reported 4.0 million pounds of on-site recycling and 939,000 pounds of on-site energy recovery. These amounts represented 9.3% and 2.2%, respectively, of the sector's total other on-site waste management.

The photographic equipment industry (SIC code 3861) reported the largest amounts in all three types of on-site waste management. This industry reported on-site treatment of 33.4 million pounds, including 14.0 million pounds of methanol reported by one facility. This one form for methanol represented one-third (32.9%) of the sector's total other on-site waste management in 1996. The surgical and medical instruments industry (SIC code 3841) ranked second in the sector for on-site treatment, with 2.9 million pounds.

The photographic equipment industry (SIC code 3861) reported 2.6 million pounds of on-site recycling and 684,000 pounds of on-site energy

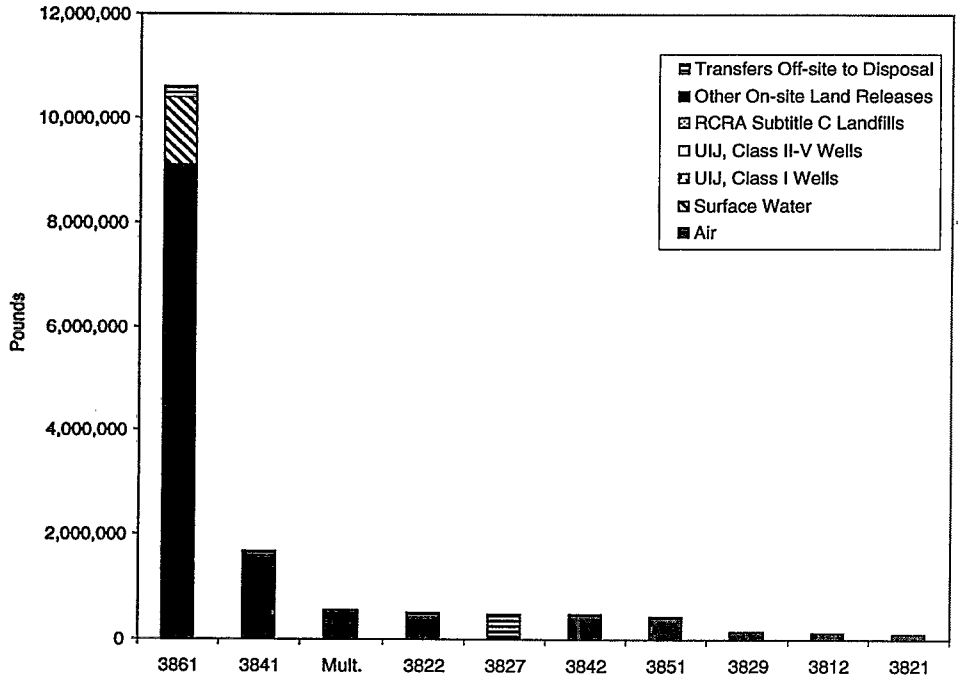


Figure 15-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal). UIJ = underground injection. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.

Table 15-4. TRI Other On-site Waste Management, 1996: Instruments and Photographic Equipment, SIC Code 38 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3861	Photographic Equipment & Supplies	2,645,308	683,500	33,351,145	36,679,953
3841	Surgical & Medical Instruments	678,671	0	2,939,465	3,618,136
3842	Surgical Appliances & Supplies	242,106	0	897,502	1,139,608
	Multiple within SIC Code 38	13,560	0	291,948	305,508
3822	Environmental Controls	44,905	255,185	5,265	305,355
3851	Ophthalmic Goods	220,186	0	4,870	225,056
3812	Search & Navigation Equipment	47,900	0	3,800	51,700
3824	Fluid Meters & Counting Devices	0	0	44,229	44,229
3827	Optical Instruments & Lenses	30,372	0	0	30,372
3825	Instruments to Measure Electricity	0	0	27,471	27,471
3873	Watches, Clocks, Watchcases & Parts	11,100	0	15,026	26,126
3829	Measuring & Controlling Devices, nec*	24,448	0	0	24,448
3823	Process Control Instruments	0	0	24,060	24,060
3845	Electromedical Equipment	0	0	21,000	21,000
3844	X-ray Apparatus & Tubes	2,179	0	18,081	20,260
3843	Dental Equipment & Supplies	0	0	1,385	1,385
3821	Laboratory Apparatus & Furniture	0	0	5	5
3826	Analytical Instruments	0	0	0	0
	Total for SIC Code 38	3,960,735	938,685	37,645,252	42,544,672

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

recovery. The surgical and medical instruments industry (SIC code 3841) ranked second for on-site recycling with 679,000 pounds. Only one industry in this sector, besides photographic equipment, reported on-site energy recovery. This was the environmental controls industry (SIC code 3822) with 255,000 pounds.

Figure 15-3 illustrates the percentage distribution of on-site waste management types reported by the instruments and photographic equipment sector in 1996. Figure 15-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

Two-thirds (67.8%) of the instruments and photographic equipment sector's 1996 reporting of transfers off-site for further waste management consisted of transfers to recycling, which totaled 12.2 million pounds. The sector reported 2.4 million pounds of transfers to energy recovery (13.1% of total transfers off-site for further waste management), 2.5 million pounds of transfers to treatment (13.7%), and 931,000 pounds of transfers to POTWs (5.2%). Table 15-5 presents these data and Figure 15-5 illustrates the percentage distribution.

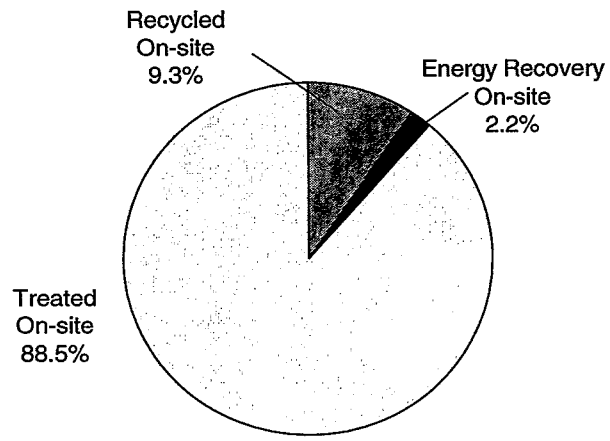


Figure 15-3. Distribution of TRI Other On-site Waste Management, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Data from Section 8 of Form R.

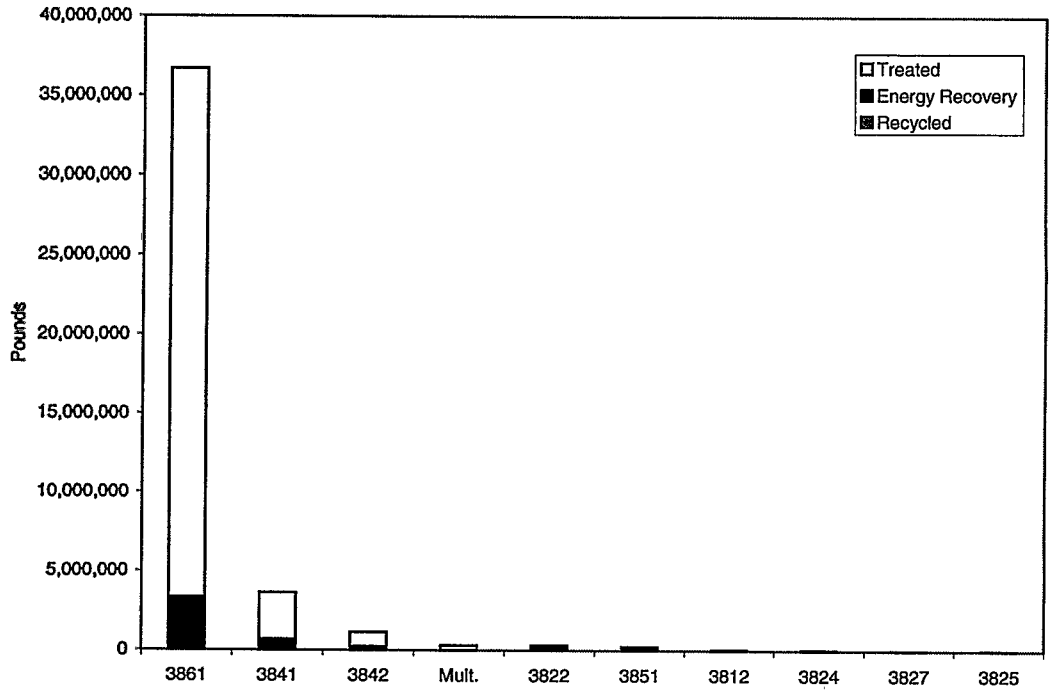


Figure 15-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC Code 38 are assigned to the "multiple" category.

The environmental controls industry (SIC code 3822) ranked first among instruments and photographic equipment industries for transfers to recycling, with 4.0 million pounds. This included 2.8 million pounds of copper. Two environmental controls facilities, owned by the same parent company, reported transferring a total of 1.3 million pounds of copper to recycling. The photographic equipment industry (SIC code 3861) ranked second for transfers to recycling, with 3.6 million pounds, including 2.2 million pounds of dichloromethane. Three unrelated facilities in this industry reported almost all of this industry's transfers of dichloromethane to recycling.

The photographic equipment industry (SIC code 3861) reported transfers of 2.0 million pounds to energy recovery and 2.1 million pounds to treatment. These were the sector's largest amounts in the two transfer types. No other industry in this sector reported as much as 125,000 pounds in either category. The photographic equipment industry also reported the sector's largest transfers to POTWs, with 381,000 pounds, followed by surgical and medical instruments (SIC code 3841), with 209,000 pounds.

Figure 15-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

1996 TRI Data by State for Instruments and Photographic Equipment

As shown in Table 15-6, the instruments and photographic equipment sector submitted 112 forms in New York in 1996, more than twice as many as in any other state. Massachusetts ranked second with 49 forms. There were 43 forms in both

Table 15-5. TRI Transfers Off-site for Further Waste Management, 1996: Instruments and Photographic Equipment, SIC Code 38 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3861	Photographic Equipment & Supplies	3,550,526	2,009,344	2,067,207	380,719	0	8,007,796
3822	Environmental Controls	3,964,314	4,506	47,551	1,069	0	4,017,440
3841	Surgical & Medical Instruments	1,427,241	71,149	84,899	208,998	44,588	1,836,875
3842	Surgical Appliances & Supplies	926,136	0	34,460	189,756	0	1,150,352
	Multiple within SIC Code 38	583,595	26,108	71,564	40,860	0	722,127
3823	Process Control Instruments	550,370	4,101	0	15	0	554,486
3851	Ophthalmic Goods	319,856	110,767	66,540	21,837	0	519,000
3824	Fluid Meters & Counting Devices	359,551	0	7,924	359	0	367,834
3844	X-ray Apparatus & Tubes	176,956	0	3,369	20	0	180,345
3843	Dental Equipment & Supplies	101,451	4,650	0	25,000	0	131,101
3821	Laboratory Apparatus & Furniture	44,938	67,349	1,545	14,080	0	127,912
3845	Electromedical Equipment	91,782	1,920	720	0	0	94,422
3827	Optical Instruments & Lenses	12,496	20,683	59,750	250	0	93,179
3829	Measuring & Controlling Devices, nec*	72,226	8,804	58	11	0	81,099
3825	Instruments to Measure Electricity	31,475	14,760	254	27,672	0	74,161
3812	Search & Navigation Equipment	32,755	0	29,120	250	0	62,125
3826	Analytical Instruments	0	22,200	0	20,000	0	42,200
3873	Watches, Clocks, Watchcases & Parts	250	0	5,400	0	0	5,650
	Total for SIC Code 38	12,245,918	2,366,341	2,480,361	930,896	44,588	18,068,104

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category. ***nec:** not elsewhere classified.

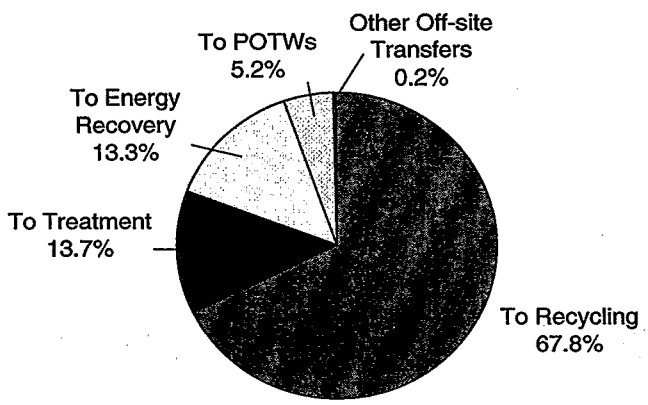


Figure 15-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code.

California and Illinois. These amounts represented 15.8% of the sector's forms in New York, 6.9% in Massachusetts, and 6.1% each in California and Illinois.

New York ranked first in this sector for on-site releases (7.68 million pounds), total on- and off-site releases (7.70 million pounds), other on-site waste management (27.4 million pounds), and total production-related waste (36.2 million pounds). Half or more of the sector's totals in these categories was reported in New York, including 64.4% of the total other on-site waste management. The photographic equipment facility (in SIC code 3861) that reported the majority of that industry's releases and on-site waste management, as discussed earlier in this chapter, is located in New York.

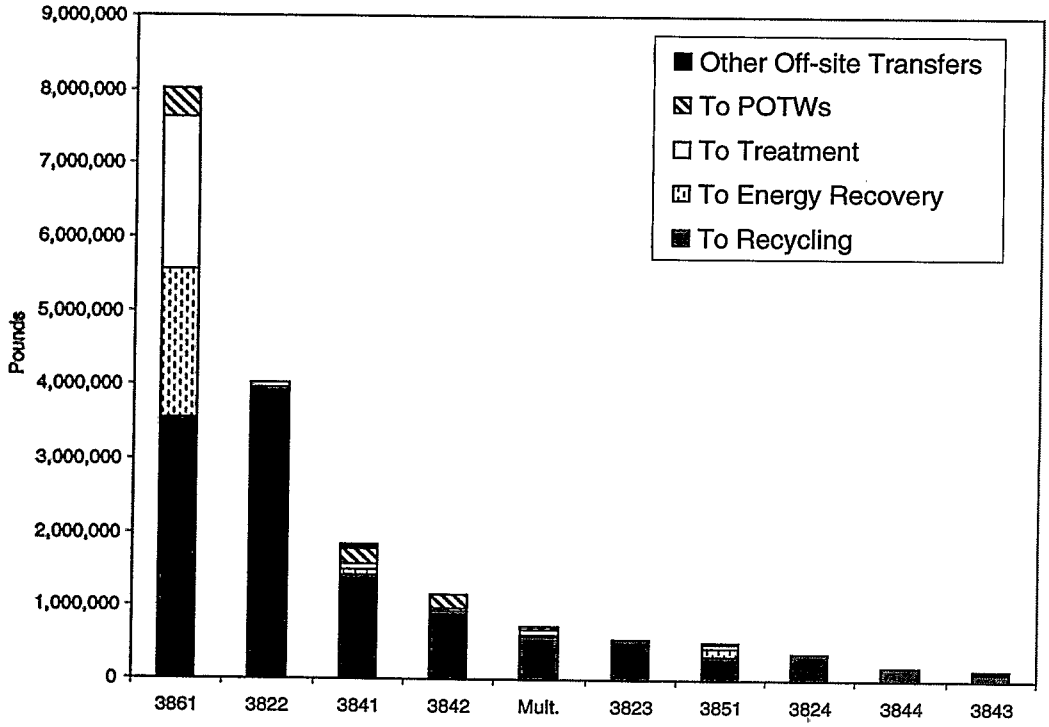


Figure 15-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.

Pennsylvania ranked second for on-site releases and total on- and off-site releases, followed by Colorado in both categories. The sector reported 826,000 pounds of total releases in Pennsylvania, 5.4% of the sector's total, and 743,000 pounds in Colorado, 4.8% of the total. The large majority of the releases in Pennsylvania and all of the releases in Colorado were reported as on-site releases.

For other on-site waste management and for total production-related waste, Massachusetts and Pennsylvania ranked second and third, after New York. The sector reported 4.2 million pounds of other on-site waste management in Massachusetts, which was 9.9% of the sector's total. In Pennsylvania, the sector reported 1.6 million pounds, 3.8% of the total.

The two categories not led by New York were off-site releases and transfers off-site for further waste management. The instruments and photographic equipment sector reported 217,000 pounds of off-site releases in Ohio and 214,000 pounds in Louisiana. These amounts were approximately 25% each of the sector's total off-site releases. South Carolina ranked third with 122,000 pounds (14.4%). Massachusetts ranked first for transfers off-site for further waste management in this sector, reporting 3.4 million pounds (19.0%). Ohio ranked second with 1.4 million pounds (7.9%), and Pennsylvania ranked third with 1.3 million pounds (7.3%).

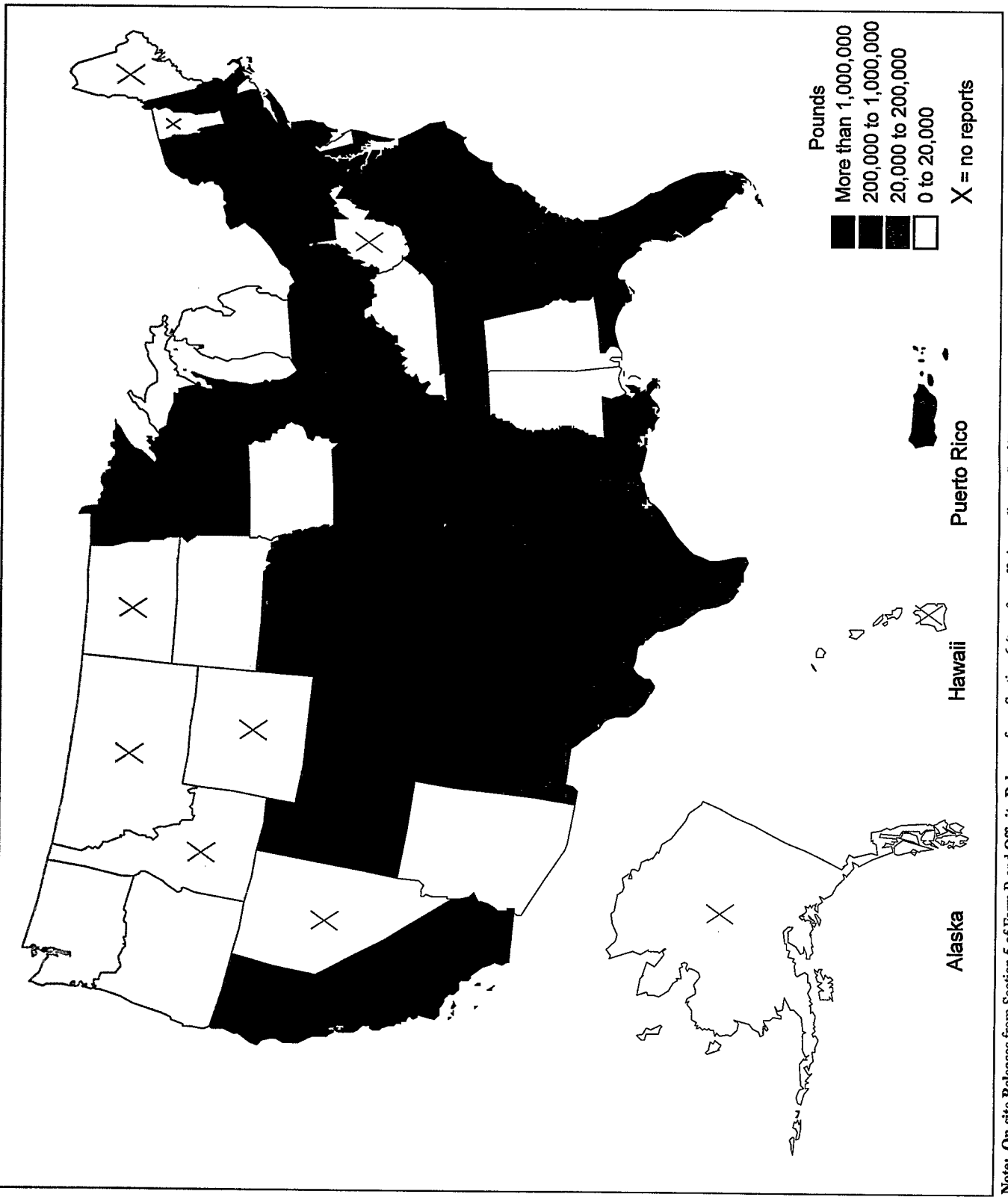
Map 15-1 illustrates the geographic distribution of total on- and off-site releases in the instruments and photographic equipment sector.

Table 15-6. Summary of TRI Information by State, 1996: Instruments and Photographic Equipment, SIC Code 38

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	1	5	0	540	1,005	1,545	0	0	359	0
Arizona	1	2	0	7,200	0	7,200	238,300	120,600	361,500	0
Arkansas	6	16	0	250,293	5,951	256,244	15,026	452,440	720,558	0
California	29	43	4	211,992	60,562	272,554	42,798	790,251	1,109,179	0
Colorado	8	29	5	742,567	0	742,567	1,575,900	790,730	3,014,185	1
Connecticut	8	16	0	324,614	1,035	325,649	82,060	351,268	757,442	350
Delaware	2	4	0	526	0	526	0	17,000	17,526	0
Florida	10	22	1	387,102	4,500	391,602	345,550	231,998	971,467	1
Georgia	9	15	1	78,330	65,848	144,178	313,100	245,449	652,936	52
Illinois	20	43	8	49,416	3,766	53,182	372,011	752,997	1,163,663	0
Indiana	8	30	3	681,075	927	682,002	1,359,932	430,013	2,567,928	0
Iowa	1	1	0	0	0	0	0	10,200	10,200	0
Kansas	2	4	0	265,957	0	265,957	0	148,060	405,762	0
Kentucky	1	1	0	0	0	0	0	186,236	186,236	0
Louisiana	1	3	1	982	213,600	214,582	0	51,000	265,000	0
Maryland	3	6	0	185,616	48,263	233,879	16,059	62,478	298,418	0
Massachusetts	22	49	1	486,210	25,700	511,910	4,206,863	3,431,062	8,176,996	15
Michigan	4	10	0	1,025	3,200	4,225	124,800	36,011	163,540	0
Minnesota	12	28	0	416,786	1,000	417,786	63,867	747,620	1,229,398	0
Mississippi	1	2	0	18,095	0	18,095	0	0	26,290	0
Missouri	9	18	1	88,245	500	88,745	26,200	935,246	1,123,796	0
Nebraska	4	18	0	342,614	10,214	352,828	356,270	158,066	1,113,161	0
New Hampshire	3	8	0	23,006	0	23,006	205,341	156,112	384,459	0
New Jersey	14	33	4	139,888	20,558	160,446	351,751	570,192	1,075,513	50
New Mexico	1	1	0	20,387	0	20,387	23,872	3,485	47,744	0
New York	22	112	5	7,675,288	26,636	7,701,924	27,399,425	1,006,908	36,186,024	10,030
North Carolina	10	30	4	342,197	0	342,197	198,836	446,392	1,138,102	650
Ohio	14	23	2	69,071	217,363	286,434	316,768	1,426,915	2,036,278	393
Oklahoma	4	12	0	65,052	0	65,052	1,332,883	1,204,012	2,741,216	0
Oregon	1	1	0	250	0	250	0	31,470	32,260	0
Pennsylvania	12	22	2	825,346	1,100	826,446	1,618,849	1,323,057	3,639,163	130,000
Puerto Rico	8	14	0	115,805	5	115,810	481,417	423,640	1,013,497	17
Rhode Island	3	5	1	1,158	0	1,158	0	38,212	38,898	0
South Carolina	4	11	0	264,437	122,155	386,592	403,568	92,749	884,413	0
South Dakota	1	2	0	265	500	765	0	2,505	2,440	0
Tennessee	4	9	0	39,393	0	39,393	292,488	303,478	636,062	0
Texas	10	18	2	195,582	2,005	197,587	514,091	275,755	980,058	0
Utah	3	8	0	117,122	0	117,122	205,327	115,958	438,415	0
Virginia	4	7	0	36,352	0	36,352	52,300	92,660	188,952	0
Washington	1	4	1	50	0	50	9,020	22,548	53,675	0
Wisconsin	10	22	0	31,669	12,175	43,844	0	583,331	624,803	0
Total for SIC Code 38	291	707	46	14,501,503	848,568	15,350,071	42,544,672	18,068,104	76,477,512	141,559

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Map 15-1. Total On- and Off-site Releases, 1996: Instruments and Photographic Equipment, SIC Code 38



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

1996 TRI Data by Chemical for Instruments and Photographic Equipment

The 15 chemicals with the largest on- and off-site releases reported by the instruments and photographic equipment sector in 1996 appear in Table 15-7. Releases of these chemicals totaled 13.3 million pounds, or 86.6% of the sector's total releases in 1996. Reported air emissions of 11.7 million pounds of the top 15 chemicals amounted to 88.9% of the sector's total air emissions. The sector also reported discharging 1.1 million pounds of these chemicals to surface waters, 84.6% of the total in that category. The top 15 chemicals represented half (52.6%) of the sector's off-site releases, with 447,000 pounds.

The top three chemicals, shown on Table 15-7, were dichloromethane with 3.5 million pounds of releases, methanol with 2.4 million pounds, and hydrochloric acid with 2.0 million pounds. More than 98% of these reported releases were air emissions. As noted earlier, one facility in the photographic equipment industry (SIC code 3861) accounted for the majority of these releases. This facility reported air emissions of 2.4 million pounds of dichloromethane (69.4% of the sector's air emissions of dichloromethane), 1.4 million pounds of methanol (59.9%), and 2.0 million pounds of hydrochloric acid (100.0%).

The fourth-ranked chemical, nitrate compounds, accounted for a large majority (77.6%)of the sector's surface water discharges. Two facilities in the photographic equipment industry (SIC code 3861) reported most of the sector's surface water discharges of nitrate compounds; they are owned

Table 15-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Instruments and Photographic Equipment, SIC Code 38 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
75-09-2	Dichloromethane	3,488,667	4,600	0	0	0	0	3,493,267	1,002	3,494,269
67-56-1	Methanol	2,336,220	34,716	0	0	0	0	2,370,936	104	2,371,040
7647-01-0	Hydrochloric acid	2,000,000	0	0	0	0	0	2,000,000	0	2,000,000
--	Nitrate compounds	84	1,007,000	0	0	0	4	1,007,088	0	1,007,088
1717-00-6	1,1-Dichloro-1-fluoro-ethane (HCFC-141b)	742,616	0	0	0	0	0	742,616	0	742,616
108-88-3	Toluene	646,920	260	0	0	0	0	647,180	2	647,182
78-93-3	Methyl ethyl ketone	584,814	690	0	0	0	0	585,504	1	585,505
79-01-6	Trichloroethylene	525,388	0	0	0	0	0	525,388	0	525,388
2837-89-0	2-Chloro-1,1,1,2-tetra-fluoroethane (HCFC-124)	513,173	0	0	0	0	0	513,173	0	513,173
7664-41-7	Ammonia	270,663	21,340	0	0	0	0	292,003	0	292,003
--	Zinc compounds	2,091	29,592	0	0	0	284	31,967	233,764	265,731
71-55-6	1,1,1-Trichloroethane	216,041	0	0	0	0	0	216,041	0	216,041
7440-39-3	Barium	5	0	0	0	0	0	5	211,842	211,847
76-13-1	Freon 113	209,543	0	0	0	0	0	209,543	0	209,543
110-82-7	Cyclohexane	204,193	0	0	0	0	0	204,193	2	204,195
	Subtotal	11,740,418	1,098,198	0	0	0	288	12,838,904	446,717	13,285,621
	Total for SIC Code 38	13,201,411	1,297,561	0	0	0	2,531	14,501,503	848,568	15,350,071

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

by the same parent company. One facility reported releasing 590,000 pounds of nitrate compounds to surface waters. The second facility (which also reported the air emissions cited above) reported 350,000 pounds. Together, they accounted for 93.3% of the surface water discharges of nitrate compounds reported by the instruments and photographic equipment sector in 1996.

The sector reported off-site releases (transfers to disposal) in the largest amounts for zinc compounds (234,000 pounds) and barium (212,000 pounds). Together, they accounted for 52.5% of the sector's total off-site releases. These chemicals ranked 11th and 13th, respectively, for total on- and off-site releases reported by the instruments and photographic equipment sector. As explained above, one facility reported 160,000 pounds of zinc compounds (71.4% of the total for this chemical), and one facility reported 212,000 pounds of barium (100.0% of the total for this chemical).

OSHA Carcinogens

On- and off-site releases in this sector of chemicals designated OSHA carcinogens totaled 4.5 million pounds in 1996, as shown in Table 15-8. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) Releases of OHSA carcinogens represented 29.1% of the sector's total releases. The majority (4.3 million pounds, or 96.3%) was released to air.

Two of the top 15 chemicals for total releases by the instruments and photographic equipment sector were carcinogens. These included the top-ranked chemical, dichloromethane, with 3.5 million pounds of releases, and the eighth-ranked chemical, trichloroethylene, with 525,000 pounds (see Table 15-7). The sector also reported releases of more than 50,000 pounds each for three other OSHA carcinogens: ethylene oxide (143,000 pounds), styrene (102,000 pounds), and acetaldehyde (51,000 pounds).

The photographic equipment industry (SIC code 3861) ranked first in the instruments and photographic equipment sector for releases of OSHA carcinogens, with a total of 3.3 million pounds, 72.9% of the sector's total. This industry reported 3.1 million pounds (72.4%) of the sector's air emissions of OSHA carcinogens; 50,000 pounds of surface water discharges (100.0%); and 91,000 pounds of off-site releases (transfers to disposal, 79.0%). The photographic equipment industry reported air emissions of dichloromethane totaling 3.0 million pounds, including 2.4 million pounds reported by one facility, mentioned earlier. The surgical and medical instruments industry (SIC code 3841) reported the second-largest total releases of OSHA carcinogens in this sector, with 388,000 pounds (8.7%), followed by the environmental controls industry (SIC code 3822) with 288,000 pounds (6.5%).

Figure 15-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Instruments and Photographic Equipment

The instruments and photographic equipment industry reported production-related waste totaling 76.5 million pounds in 1996, as shown in Table 15-9. Nearly half (49.2%) of this total consisted of on-site treatment, which was 37.6 million pounds. The sector's second-largest waste management option in 1996 was releases; quantities released on- and off-site site totaled 15.4 million pounds, or 20.2% of total production-related waste. The sector reported 12.7 million pounds of off-site recycling; this was 16.6% of total production-related waste and ranked third among waste management methods in the instruments and photographic equipment sector's reporting.

Table 15-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Instruments and Photographic Equipment, SIC Code 38 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3861	Photographic Equipment & Supplies	3,116,511	50,405	0	0	0	86	3,167,002	90,592	3,257,594
3841	Surgical & Medical Instruments	382,814	0	0	0	0	5	382,819	5,061	387,880
3822	Environmental Controls	282,071	0	0	0	0	260	282,331	5,959	288,290
3851	Ophthalmic Goods	163,578	0	0	0	0	0	163,578	0	163,578
3842	Surgical Appliances & Supplies	89,467	0	0	0	0	0	89,467	5,228	94,695
	Multiple within SIC Code 38	78,976	5	0	0	0	0	78,981	510	79,491
3823	Process Control Instruments	62,681	0	0	0	0	36	62,717	0	62,717
3827	Optical Instruments & Lenses	29,184	0	0	0	0	0	29,184	0	29,184
3873	Watches, Clocks, Watchcases & Parts	26,000	0	0	0	0	0	26,000	0	26,000
3843	Dental Equipment & Supplies	16,013	0	0	0	0	0	16,013	0	16,013
3845	Electromedical Equipment	8,747	0	0	0	0	0	8,747	7,100	15,847
3821	Laboratory Apparatus & Furniture	11,015	0	0	0	0	0	11,015	5	11,020
3824	Fluid Meters & Counting Devices	10,313	0	0	0	0	0	10,313	250	10,563
3829	Measuring & Controlling Devices, nec*	10,103	0	0	0	0	0	10,103	0	10,103
3812	Search & Navigation Equipment	9,155	0	0	0	0	0	9,155	0	9,155
3844	X-ray Apparatus & Tubes	6,018	0	0	0	0	0	6,018	5	6,023
3825	Instruments to Measure Electricity	257	0	0	0	0	0	257	0	257
	Subtotal	4,302,903	50,410	0	0	0	387	4,353,700	114,710	4,468,410
	Total for SIC Code 38	13,201,411	1,297,561	0	0	0	2,531	14,501,503	848,568	15,350,071

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC codes within SIC code 38 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

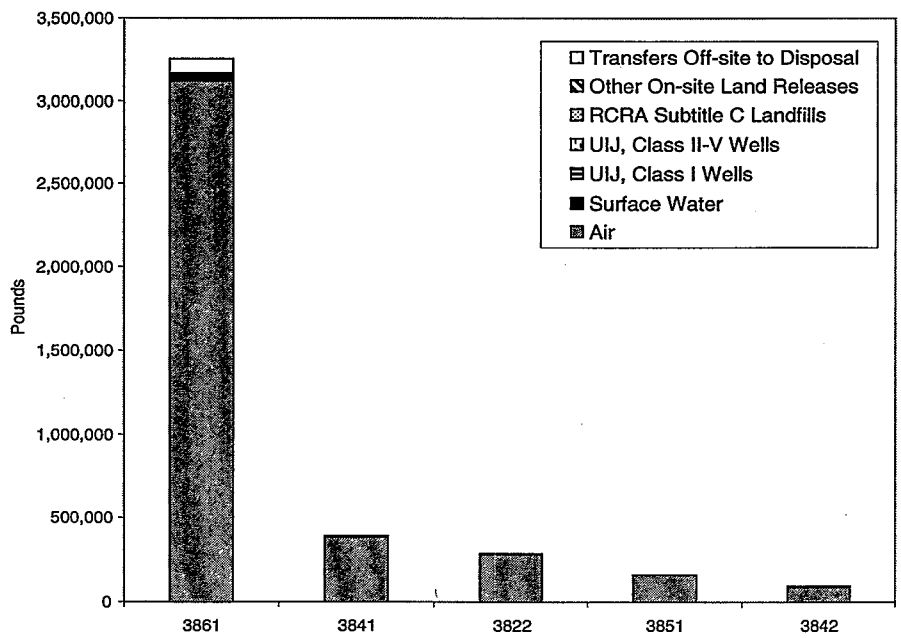


Figure 15-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection.

Table 15-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Instruments and Photographic Equipment, SIC Code 38 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3861	Photographic Equipment & Supplies	2,645,308	683,500	33,351,145	3,724,835	2,024,805	2,455,428	10,521,370	55,406,391	140,696
3841	Surgical & Medical Instruments	678,671	0	2,939,465	1,466,859	96,546	297,783	1,802,683	7,282,007	52
3822	Environmental Controls	44,905	255,185	5,265	4,020,145	4,486	45,800	522,191	4,897,977	0
3842	Surgical Appliances & Supplies	242,106	0	897,502	926,062	0	202,208	480,186	2,748,064	410
	Multiple within SIC Code 38	13,560	0	291,948	584,495	26,108	134,121	553,823	1,604,055	350
3851	Ophthalmic Goods	220,186	0	4,870	319,659	111,992	89,371	444,099	1,190,177	1
3823	Process Control Instruments	0	0	24,060	550,370	4,101	0	72,729	651,260	0
3827	Optical Instruments & Lenses	30,372	0	0	12,496	28,653	60,000	480,036	611,557	0
3824	Fluid Meters & Counting Devices	0	0	44,229	359,541	0	8,043	42,213	454,026	0
3829	Measuring & Controlling Devices, nec*	24,448	0	0	70,141	8,800	32	148,066	251,487	0
3825	Instruments to Measure Electricity	0	0	27,471	156,918	14,760	27,726	20,319	247,194	0
3812	Search & Navigation Equipment	47,900	0	3,800	37,552	3,493	25,037	123,791	241,573	50
3844	X-ray Apparatus & Tubes	2,179	0	18,081	180,143	0	12,107	26,692	239,202	0
3821	Laboratory Apparatus & Furniture	0	0	5	45,178	75,328	15,621	101,198	237,330	0
3843	Dental Equipment & Supplies	0	0	1,385	122,054	4,736	0	32,375	160,550	0
3845	Electromedical Equipment	0	0	21,000	91,970	1,920	0	27,522	142,412	0
3873	Watches, Clocks, Watchcases & Parts	11,100	0	15,026	0	0	5,800	26,474	58,400	0
3826	Analytical Instruments	0	0	0	0	22,200	20,400	11,250	53,850	0
	Total for SIC Code 38	3,960,735	938,685	37,645,252	12,668,418	2,427,928	3,399,477	15,437,017	76,477,512	141,559

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Figure 15-8 illustrates the distribution of production-related waste by waste management category for the instruments and photographic equipment sector.

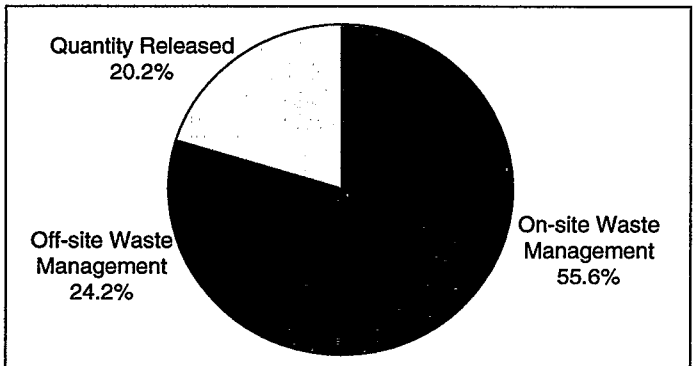


Figure 15-8. Distribution of TRI Production-related Waste, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Data from Section 8 of Form R.

The photographic equipment industry (SIC code 3861) reported two-thirds or more of the sector's total for each waste management type except off-site recycling. For on-site waste management, this industry reported 2.6 million pounds of recycling, 684,000 pounds of energy recovery, and 33.4 million pounds of treatment. These were 66.8%, 72.8%, and 88.6% of the sector's totals in these on-site waste management categories. In off-site waste management types, this industry reported 3.7 million pounds (29.4%) of recycling, 2.0 million pounds (83.4%) of energy recovery, and 2.5 million pounds (72.2%) of treatment. The photographic equipment industry also reported 10.5 million pounds as released on- and off-site, which was 68.2% of that category.

The environmental controls industry (SIC code 3822) reported the sector's largest amount of off-site recycling (4.0 million pounds, or 31.7%). As noted, the environmental controls industry was also the only other industry in this sector to report on-site energy recovery (255,000 pounds, or 27.2%), besides the photographic equipment industry (SIC code 3861).

The surgical and medical instruments industry (SIC code 3841) ranked second in this sector for reporting of on-site recycling (679,000 pounds, or 17.1%), on-site treatment (2.9 million pounds, or

7.8%), off-site treatment (298,000 pounds, or 8.8%) and quantities released (1.8 million pounds, or 11.7%). The ophthalmic goods industry (SIC code 3851) ranked second for off-site energy recovery (112,000 pounds, or 4.6%).

Distribution of production-related waste for the top industries in the sector appears in Figure 15-9.

Projected Quantities of TRI Chemicals in Waste

The instruments and photographic equipment sector's projections of waste management data through 1998 appear in Table 15-10. (As explained in Chapter 1, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.) Total production-related waste was projected to decrease 1.2% from 76.5 million pounds in 1996 to 75.5 million pounds in 1998.

The sector projected its largest reduction (in pounds and percent) in quantities released on- and off-site, from 15.4 million pounds to 13.4 million pounds, a projected 13.5% reduction. Decreases were also projected in on-site recycling, from 4.0 million pounds to 3.7 million pounds (a 6.4% reduction), and in off-site recycling, from 12.7 million pounds to 12.0 million pounds (a 5.5% reduction). A small reduction was expected in off-site treatment, from 3.40 million pounds to 3.36 million pounds (a 1.1% reduction).

On-site treatment was expected to increase 5.4%, from 37.6 million pounds to 39.7 million pounds. The sector projected a smaller absolute increase in on-site energy recovery (from 939,000 pounds to

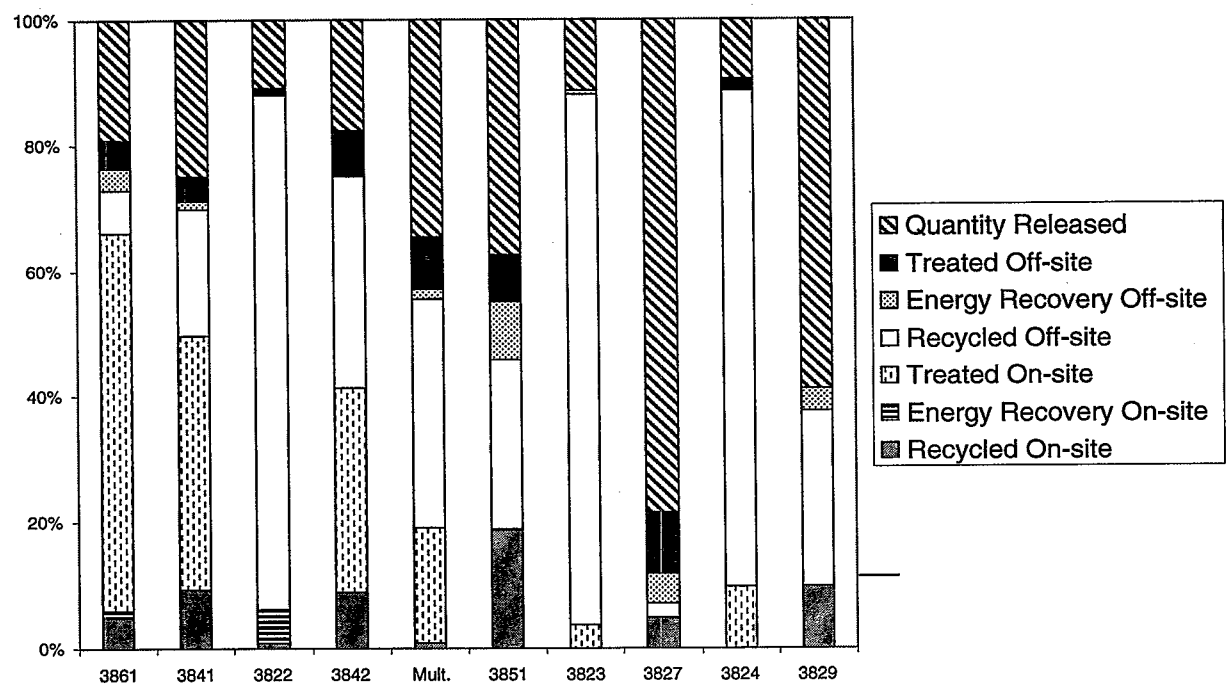


Figure 15-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.

Table 15-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Instruments and Photographic Equipment, SIC Code 38

Waste Management Activity	Current Year 1996 Total Pounds	Current Year 1996 Percent of Total	Projected 1997 Total Pounds	Projected 1997 Percent of Total	Projected 1998 Total Pounds	Projected 1998 Percent of Total
On-site Waste Management						
Recycled On-site	3,960,735	5.2	3,803,206	5.1	3,706,975	4.9
Energy Recovery On-site	938,685	1.2	1,040,000	1.4	1,040,000	1.4
Treated On-site	37,645,252	49.2	38,710,727	51.4	39,663,495	52.5
Off-site Waste Management						
Recycled Off-site	12,668,418	16.6	12,297,895	16.3	11,972,663	15.9
Energy Recovery Off-site	2,427,928	3.2	2,432,048	3.2	2,435,010	3.2
Treated Off-site	3,399,477	4.4	3,284,967	4.4	3,361,429	4.5
Quantity Released On- and Off-site	15,437,017	20.2	13,729,106	18.2	13,352,238	17.7
Total Production-related Waste for SIC Code 38	76,477,512	100.0	75,297,949	100.0	75,531,810	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-4.0	-2.5	-6.4
Energy Recovery On-site	10.8	0.0	10.8
Treated On-site	2.8	2.5	5.4
Off-site Waste Management			
Recycled Off-site	-2.9	-2.6	-5.5
Energy Recovery Off-site	0.2	0.1	0.3
Treated Off-site	-3.4	2.3	-1.1
Quantity Released On- and Off-site	-11.1	-2.7	-13.5
Total Production-related Waste for SIC Code 38	-1.5	0.3	-1.2

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

1.0 million pounds), although this represented a 10.8% increase. Minimal change was projected in off-site energy recovery.

Figure 15-10 illustrates the projected percentage changes for the instruments and photographic equipment sector from 1996 to 1998.

These projected changes represent some potential improvement in the sector's management of TRI chemicals in waste. Although total production-related waste was expected to decrease only modestly from 1996 to 1998, the projections indicate a shift from releases to treatment among methods of managing waste. Treatment (on- and

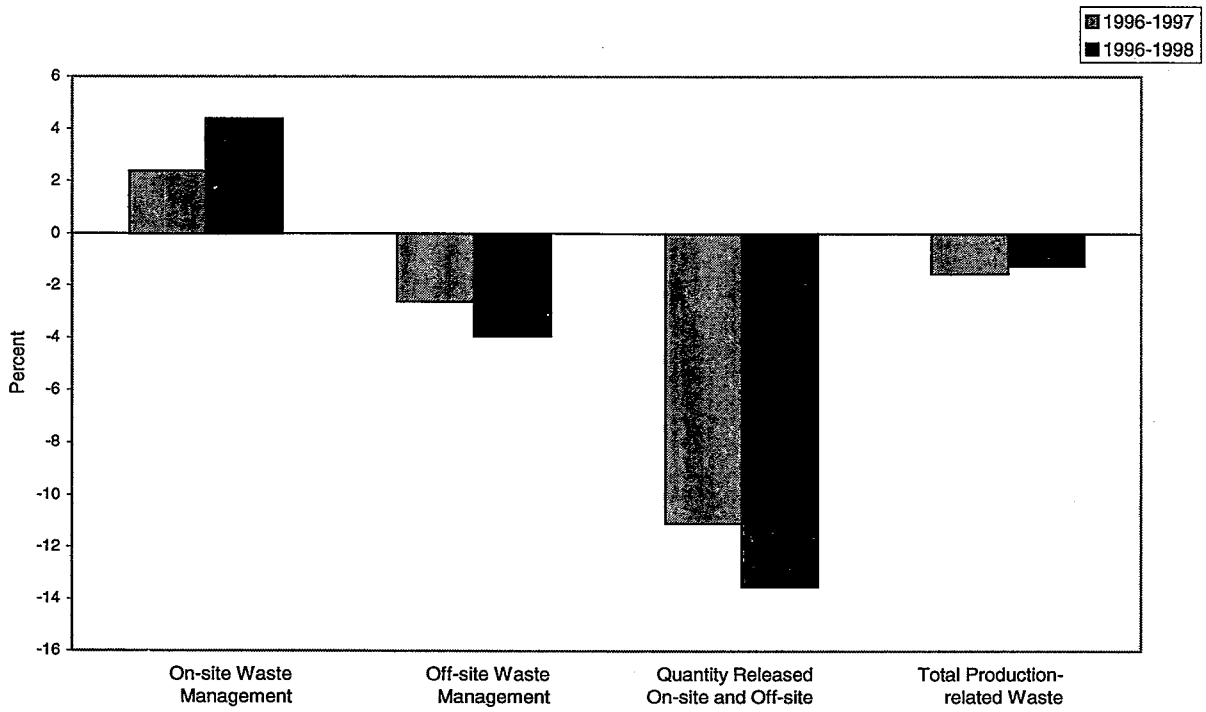


Figure 15-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Instruments and Photographic Equipment (SIC Code 38)

Note: Current year and projected year amounts are all taken from Section 8 of Form R. for 1996.

off-site) was projected to rise as a percentage of total production-related waste (from approximately 54% to 57%), while releases were expected to decline (from 20% to nearly 18%). Although not the most preferred option in the waste management hierarchy (explained in Chapter 1), treatment is more desirable than releases.

Source Reduction Activity

As shown in Table 15-11, more than one-fourth (27.9%) of the forms submitted by the instruments and photographic equipment sector indicated one or more source activities underway in 1996. Of the 197 forms indicating such activity, the photographic equipment industry (SIC code 3861) submitted 69 (also one-fourth, or 27.5%, of the forms in that industry). The surgical and medical instruments industry (SIC code 3841) submitted 31 forms indicating source reduction activity (25.6%). Improvements in operating practices were the most frequently reported source reduction activity (99 forms). Sixty forms reported process modifications, which more often indicate innovative actions to reduce TRI chemicals in waste at their source.

Year-to-Year Comparisons for Instruments and Photographic Equipment

1995-1996 TRI Data for Instruments and Photographic Equipment

From 1995 to 1996, the number of forms submitted in the instruments and photographic equipment sector decreased 9.7% from 783 forms to 707

Table 15-11. Number of Forms Reporting Source Reduction Activity, 1996: Instruments and Photographic Equipment, SIC Code 38

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3812	Search & Navigation Equipment	13	5	38.5	1	0	0	2	0	3	0	0
3821	Laboratory Apparatus & Furniture	22	4	18.2	1	0	0	3	0	0	0	3
3822	Environmental Controls	62	14	22.6	9	1	1	3	8	6	2	0
3823	Process Control Instruments	23	3	13.0	2	0	0	0	1	1	0	0
3824	Fluid Meters & Counting Devices	19	8	42.1	8	0	0	0	1	0	0	4
3825	Instruments to Measure Electricity	9	3	33.3	2	1	1	0	1	0	0	0
3826	Analytical Instruments	2	0	0.0	0	0	0	0	0	0	0	0
3827	Optical Instruments & Lenses	12	6	50.0	4	0	0	0	1	3	0	0
3829	Measuring & Controlling Devices, nec*	17	7	41.2	0	0	0	0	4	3	0	0
3841	Surgical & Medical Instruments	121	31	25.6	8	1	3	9	13	9	2	0
3842	Surgical Appliances & Supplies	45	15	33.3	11	5	4	0	5	0	0	0
3843	Dental Equipment & Supplies	19	1	5.3	1	1	0	0	1	0	0	0
3844	X-ray Apparatus & Tubes	13	4	30.8	1	1	0	0	0	2	0	0
3845	Electromedical Equipment	9	1	11.1	1	0	0	0	0	0	0	0
3851	Ophthalmic Goods	27	10	37.0	4	0	0	3	3	3	2	0
3861	Photographic Equipment & Supplies	251	69	27.5	42	15	7	15	14	9	3	10
3873	Watches, Clocks, Watchcases & Parts	3	2	66.7	1	0	1	1	0	0	1	0
	Multiple within SIC Code 38	40	14	35.0	3	1	0	1	8	3	0	1
	Total for SIC Code 38	707	197	27.9	99	26	17	37	60	42	10	18

Note: Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
*nec: not elsewhere classified.

forms, as shown in Table 15-12. There was no change in the number of Form A submissions. (The Form A certification statement is explained in Chapter 1.)

On- and Off-site Releases

On- and off-site releases reported by the instruments and photographic equipment sector decreased 14.0% from 17.9 million pounds in 1995 to 15.4 million pounds in 1996, as shown in Table 15-12. This reduction reflected a larger decrease in air emissions, from 16.2 million pounds in 1995 to 13.2 million pounds in 1996. The sector reported reductions in both fugitive and point-source emissions for a net reduction of 18.3% in air emissions. Partly off-setting the decrease in reported air emissions, surface water discharges increased 47.4% from 880,000 pounds to 1.3 million pounds. One facility reported 370,000 pounds of this 417,000 pound increase in surface water discharges. This facility reported discharges of 220,000 pounds of nitrate compounds in 1995 and 590,000 pounds in 1996.

The sector also reported a small reduction in on-site land releases (from 6,000 pounds to 3,000 pounds) and a small increase in off-site releases (transfers to disposal, from 812,000 pounds to 849,000 pounds).

Figure 15-11 illustrates the sector's percentage change in on- and off-site releases from 1995 to 1996.

Other On-site Waste Management

The instruments and photographic equipment sector reported a reduction in other on-site waste management from 43.5 million pounds in 1995 to 42.5 million pounds in 1996, as shown in Table 15-12. This reduction of 1.0 million pounds (or 2.3%) consisted primarily of a decrease in on-site recycling, from 4.8 million pounds to 4.0 million pounds (a 17.9% decrease). A smaller reduction, in

Table 15-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Instruments and Photographic Equipment, SIC Code 38

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	315	291	-7.6
Total Forms	783	707	-9.7
Form Rs	737	661	-10.3
Form As	46	46	0.0
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	16,161,028	13,201,411	-18.3
Fugitive Air	3,702,047	2,698,043	-27.1
Point Source Air	12,458,981	10,503,368	-15.7
Surface Water Discharges	880,407	1,297,561	47.4
Underground Injection	0	0	--
On-site Land Releases	5,766	2,531	-56.1
Total On-site Releases	17,047,201	14,501,503	-14.9
Off-site Releases			
Transfers Off-site to Disposal	811,573	848,568	4.6
Total On- and Off-site Releases	17,858,774	15,350,071	-14.0
Other On-site Waste Management			
Recycled On-site	4,823,958	3,960,735	-17.9
Energy Recovery On-site	906,685	938,685	3.5
Treated On-site	37,802,093	37,645,252	-0.4
Total Other On-site Waste Management	43,532,736	42,544,672	-2.3
Transfers Off-site for Further Waste Management			
Transfers to Recycling	14,557,030	12,245,918	-15.9
Transfers to Energy Recovery	2,331,285	2,366,341	1.5
Transfers to Treatment	3,698,259	2,480,361	-32.9
Transfers to POTWs	895,282	930,896	4.0
Other Off-site Transfers	0	44,588	--
Total Transfers Off-site for Further Waste Management	21,481,856	18,068,104	-15.9

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code.

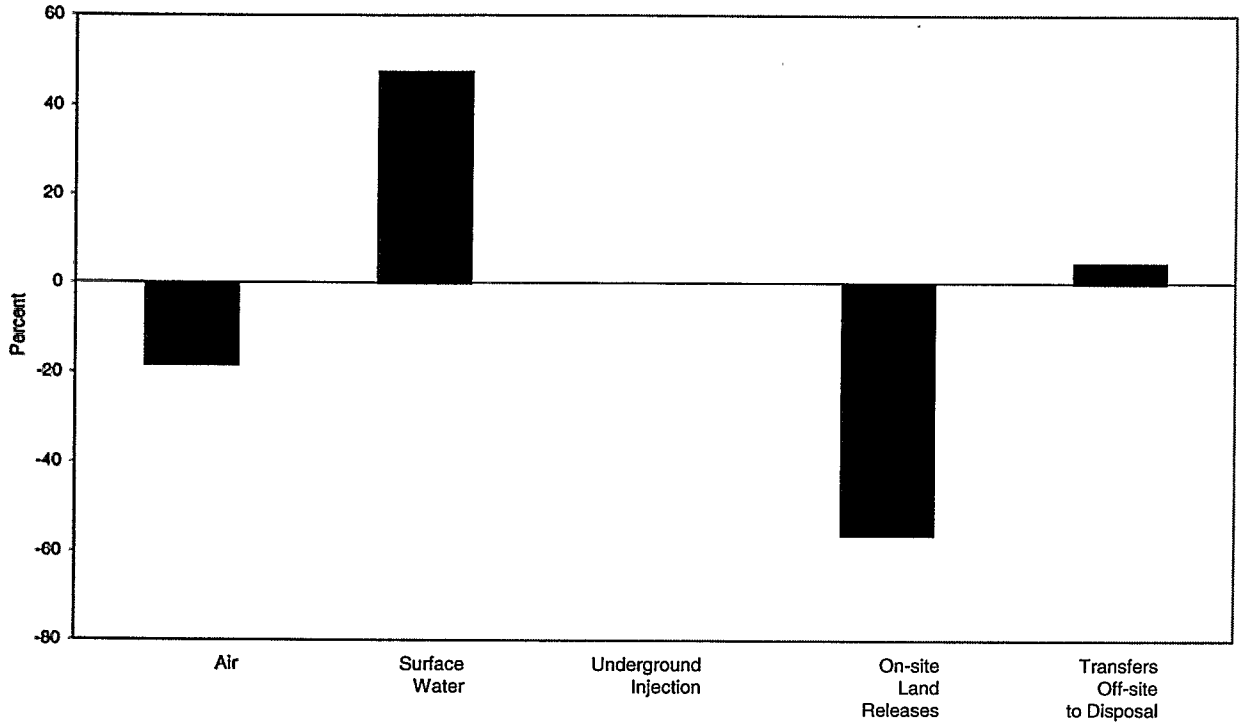


Figure 15-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Instruments and Photographic Equipment (SIC Code 38)

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

both pounds and percent, occurred in reported on-site treatment, from 37.8 million pounds to 37.6 million pounds (a 0.4% decrease). The sector reported a small increase in on-site energy recovery, from 907,000 pounds to 939,000 pounds (a 3.5% increase).

Transfers Off-site for Further Waste Management

Table 15-12 also presents the instruments and photographic equipment sector's reporting of transfers off-site for further waste management in 1995 and 1996. The sector reported 21.5 million pounds of such transfers in 1995 and 18.1 million pounds in 1996, a reduction of 15.9% or 3.4 million pounds.

The principal areas of reduction were transfers to recycling, from 14.6 million pounds to 12.2 million pounds, and transfers to treatment, from 3.7 million pounds to 2.5 million pounds. The 2.3 million-pound reduction in transfers to recycling represented a 15.9% decrease, while the 1.2 million-pound reduction in transfers to treatment represented a 32.9% decrease.

The sector reported small increases in the other types of transfers off-site for further waste management. Transfers to energy recovery increased from 2.33 million pounds to 2.37 million pounds and transfers to POTWs increased from 895,000 pounds to 931,000 pounds.

Changes in SIC Codes

As indicated in facility descriptions below, some facilities report different SIC codes over time. This may reflect new or discontinued lines of production, or it may represent a different understanding of how SIC code designations relate to a facility's business activities. These changes can contribute—sometimes largely—to apparent increases or decreases across comparison years in the amounts reported by the four-digit, or even two-digit, SIC codes.

1988-1996 TRI Data for Instruments and Photographic Equipment

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

As shown in Table 15-13, the number of forms submitted by the instruments and photographic equipment sector decreased by one-third (34.1%) from 900 forms in 1988 to 593 forms in 1996.

The sector reported decreases in all types of on- and off-site releases, for an overall reduction of 82.2% from 58.1 million pounds of total releases in 1988 to 10.4 million pounds in 1996. Most of this reduction occurred in reporting of air emissions, which decreased from 46.5 million pounds to 9.3 million pounds, an 80.0% decrease. About two-thirds of the reduction in air emissions was reported in point-source emissions and the remainder in fugitive emissions.

Off-site releases reported by the instruments and photographic equipment sector decreased by an even greater percentage—92.7%—from 10.9 million pounds in 1988 to 794,000 pounds in 1996. The sector also reported reductions from 1988 to 1996 in surface water discharges (from 390,000 pounds to 264,000 pounds), underground injection (250 pounds to zero), and on-site land releases (from 340,000 pounds to 3,000 pounds).

Figure 15-12 illustrates the sector's percentage reductions in on- and off-site releases from 1988 to 1996.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, the instruments and photographic equipment sector reported an increase in other on-site waste management from 34.3 million pounds to 39.7 million pounds, a 5.4 million-pound increase. On-site treatment increased from 30.1 million pounds to 35.6 million pounds, a 5.5 million-pound increase. One facility in the photographic equipment industry (SIC code 3861) reported treating 11.0 million pounds of methanol on-site in 1994 and 14.0 million pounds in both 1995 and 1996, accounting for 3.0 million pounds of this increase.

The sector reported 3.5 million pounds of on-site recycling in 1994 and 3.4 million pounds in 1996, a 129,000 pound reduction. Reporting of on-site energy recovery showed essentially no net change for 1994 to 1996.

The instruments and photographic equipment sector reported decreases for the two transfer types that were reportable for the full 1988-1996 comparison period. The sector reported 6.8 million pounds of transfers to treatment in 1988 and 2.0 million pounds in 1996, a 70.4% reduction. For transfers to POTWs, the sector reported 2.3 million pounds in

Table 15-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Instruments and Photographic Equipment, SIC Code 38

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	366	299	280	258	-29.5
Total Forms	900	696	658	593	-34.1
Form Rs	900	696	622	558	-38.0
Form As	NA	NA	36	35	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	46,478,774	13,192,730	11,917,203	9,298,517	-80.0
Fugitive Air	15,991,517	4,203,661	3,330,729	2,285,024	-85.7
Point Source Air	30,487,257	8,989,069	8,586,474	7,013,493	-77.0
Surface Water Discharges	390,382	319,552	249,173	264,207	-32.3
Underground Injection	250	0	0	0	-100.0
On-site Land Releases	340,403	7,074	5,766	2,527	-99.3
Total On-site Releases	47,209,809	13,519,356	12,172,142	9,565,251	-79.7
Off-site Releases					
Transfers Off-site to Disposal	10,875,015	808,871	783,071	793,368	-92.7
Total On- and Off-site Releases	58,084,824	14,328,227	12,955,213	10,358,619	-82.2
Other On-site Waste Management					
Recycled On-site	NA	3,545,406	4,394,514	3,416,096	NA
Energy Recovery On-site	NA	683,300	610,500	683,500	NA
Treated On-site	NA	30,110,570	34,798,073	35,644,985	NA
Total Other On-site Waste Management	NA	34,339,276	39,803,087	39,744,581	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	14,502,234	14,108,639	11,869,784	NA
Transfers to Energy Recovery	NA	3,084,265	2,278,045	2,294,303	NA
Transfers to Treatment	6,825,419	4,181,694	3,055,465	2,022,588	-70.4
Transfers to POTWs	2,267,406	695,744	558,049	498,696	-78.0
Other Off-site Transfers	196,621	0	0	44,588	-77.3
Total Transfers Off-site for Further Waste Management	NA	22,463,937	20,000,198	16,729,959	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. NA: not required to be reported in that year.

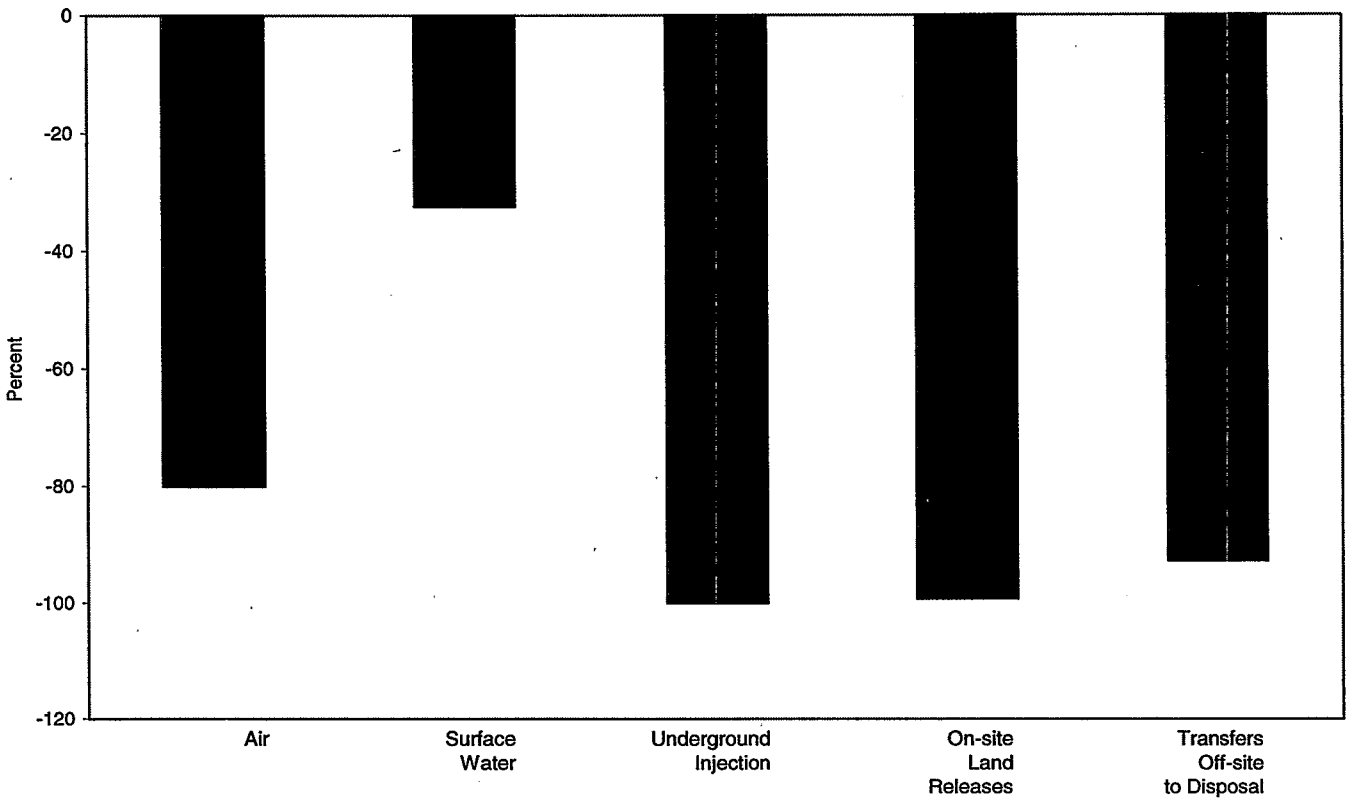


Figure 15-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

1988 and 499,000 pounds in 1996, a 78.0% reduction.

1988-1996 Data for Four-Digit Industries in Instruments and Photographic Equipment

Tables 15-14 through 15-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 38. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The photographic equipment industry (SIC code 3861) reported the instruments and photographic equipment sector's largest decrease in on- and off-site releases from 1988 to 1996. This industry reported 38.2 million pounds of total releases in 1988 and 7.5 million pounds in 1996. Roughly two-thirds of the photographic equipment industry's reduction was reported in air emissions and one-third in off-site releases (transfers to disposal). The surgical and medical instruments industry (SIC code 3841) ranked second for decreases, reporting 5.6 million pounds in 1988 and 769,000 pounds in 1996. Ranking third, the environmental controls industry (SIC code 3822) reported a reduction from 1.9 million pounds to 492,000 pounds. The majority of the reductions by the surgical and medical instruments industry and the environmental controls industry occurred in reporting of air emissions.

The optical instruments and lenses industry (SIC code 3827) ranked first for increased releases reported by the instruments and photographic equipment sector, with 213,000 pounds in 1988 and 481,000 pounds in 1996. The increase was attributable to increased reporting of off-site releases (transfers to disposal) since 1994. The x-ray apparatus and tubes industry (SIC code 3844) ranked second for increases. This industry submitted no reports in 1988, but reported 39,000 pounds of releases in 1996 (reported releases were higher in 1995 than in either 1994 or 1996). No other instruments and photographic equipment industry recorded an increase in total releases from 1988 to 1996.

Table 15-14 provides release data for all four-digit SIC codes in the instruments and photographic equipment sector, for 1988-1996.

Other On-site Waste Management

The surgical appliances and supplies industry (SIC code 3842) ranked first in the sector for reductions in other on-site waste management from 1994 to 1996 (on-site waste management data were not collected in 1988). This industry reported 1.5 million pounds in 1994 and 906,000 pounds in 1996, and the reduction occurred in reporting of on-site treatment. The miscellaneous measuring and controlling devices industry (SIC code 3829) reported the sector's second-largest decrease, from 459,000 pounds to 24,000 pounds. This decrease was attributable to a reduction in reporting of on-site recycling. Ranking third, the search and navigation equipment industry (SIC code 3812) reported a reduction from 398,000 pounds to 52,000 pounds. Most of this reduction also occurred in reporting of on-site recycling.

The photographic equipment industry (SIC code 3861) reported the largest increase, from 29.2 million pounds in 1994 to 34.9 million pounds in 1996. The surgical and medical instruments industry (SIC code 3841) ranked second for increases, reporting 2.1 million pounds in 1994 and 3.3 million pounds in 1996. These were also the industries with the largest decreases in releases for 1988 to 1996, as described above. In both the photographic equipment industry and the surgical and medical instruments industry, the increase in other on-site waste management occurred from 1994 to 1995, and both industries reported little change from 1995 to 1996. Most of the increase in both industries was reported in on-site treatment, as well as on-site recycling.

The multiple-codes forms in SIC code 38 reported the sector's third-largest increase, from 220,000 pounds to 306,000 pounds. This increase was attributable to on-site treatment.

On-site waste management data for 1994-1996 appear in Table 15-15.

Transfers Off-site for Further Waste Management

The photographic equipment industry (SIC code 3861) reported the sector's largest decrease in transfers off-site for further waste management from 1994 to 1996 (data for some types of off-site transfers were not collected in 1988). This industry also had the largest decrease in releases, but reported the largest increase in other on-site waste management, as discussed above. The photographic equipment industry reported 11.2 million pounds of transfers off-site for further waste management in 1994 and 7.3 million pounds in 1996, with decreases in all types, especially transfers to recycling and to treatment.

The environmental controls industry (SIC code 3822) ranked second for decreases, reporting 4.7 million pounds in 1994 and approximately 4.0 million pounds in both 1995 and 1996. The fluid meters and counting devices industry (SIC code 3824) ranked third, with 702,000 pounds in 1994 and 360,000 pounds in 1996 (the 1995 level was higher, at 728,000 pounds). For both industries, the largest reduction occurred in reporting of transfers to recycling.

Table 15-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Instruments and Photographic Equipment, SIC Code 38

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3812	Search & Navigation Equipment	96	88,965	0	0	0	88,965	4,000	92,965
		95	220,619	0	0	0	220,619	19,000	239,619
		94	557,333	0	0	0	557,333	12,600	569,933
		88	1,296,791	503	0	0	1,297,294	61,182	1,358,476
3821	Laboratory Apparatus & Furniture	96	99,179	5	0	0	99,184	265	99,449
		95	179,683	5	0	0	179,688	265	179,953
		94	196,859	5	0	5	196,869	1,000	197,869
		88	109,876	0	0	0	109,876	70	109,946
3822	Environmental Controls	96	424,755	60	0	1,042	425,857	66,290	492,147
		95	452,217	141	0	2,275	454,633	92,476	547,109
		94	702,300	69	0	2,040	704,409	104,350	808,759
		88	1,719,352	20	0	180,113	1,899,485	36,477	1,935,962
3823	Process Control Instruments	96	74,107	17	0	79	74,203	0	74,203
		95	89,122	0	0	750	89,872	550	90,422
		94	174,976	0	0	750	175,726	500	176,226
		88	784,215	304	0	0	784,519	159,821	944,340
3824	Fluid Meters & Counting Devices	96	11,108	25	0	0	11,133	1,005	12,138
		95	44,036	10	0	0	44,046	1,255	45,301
		94	51,581	0	0	0	51,581	1,505	53,086
		88	77,877	0	0	0	77,877	258,498	336,375
3825	Instruments to Measure Electricity	96	1,007	0	0	0	1,007	0	1,007
		95	7,767	0	0	0	7,767	0	7,767
		94	19,302	0	0	0	19,302	160	19,462
		88	910,268	0	0	0	910,268	46,816	957,084
3826	Analytical Instruments	96	11,000	0	0	0	11,000	0	11,000
		95	12,750	0	0	0	12,750	0	12,750
		94	21,250	0	0	0	21,250	0	21,250
		88	138,350	0	0	0	138,350	6,978	145,328
3827	Optical Instruments & Lenses	96	54,439	810	0	0	55,249	425,442	480,691
		95	107,144	64	0	0	107,208	135,768	242,976
		94	68,634	137	0	0	68,771	102,954	171,725
		88	137,757	0	0	0	137,757	75,700	213,457
3829	Measuring & Controlling Devices, nec*	96	138,014	0	0	0	138,014	0	138,014
		95	165,075	0	0	0	165,075	0	165,075
		94	57,871	0	0	0	57,871	0	57,871
		88	1,259,704	3	0	0	1,259,707	28,524	1,288,231
3841	Surgical & Medical Instruments	96	752,815	6	0	260	753,081	15,901	768,982
		95	1,289,094	6	0	5	1,289,105	130,450	1,419,555
		94	1,348,017	263	0	10	1,348,290	76,844	1,425,134
		88	5,365,785	1,558	0	0	5,367,343	219,067	5,586,410
3842	Surgical Appliances & Supplies	96	160,278	0	0	0	160,278	13,061	173,339
		95	168,498	0	0	0	168,498	12,570	181,068
		94	292,241	3	0	404	292,648	10,438	303,086
		88	1,454,143	0	0	0	1,454,143	119,928	1,574,071
3843	Dental Equipment & Supplies	96	31,275	0	0	0	31,275	5,450	36,725
		95	51,647	0	0	0	51,647	3,150	54,797
		94	93,227	0	0	0	93,227	3,550	96,777
		88	252,458	0	0	0	252,458	3,150	255,608

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category. One facility incorrectly reported 2,348,655 pounds of transfers off-site to disposal for 1988 under SIC code 3861. The correct amount is 0 pounds.
***nec:** not elsewhere classified.

Table 15-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Instruments and Photographic Equipment, SIC Code 38, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3844	X-ray Apparatus & Tubes	96	26,919	23	0	0	26,942	11,910	38,852
		95	43,887	18	0	0	43,905	0	43,905
		94	29,786	0	0	0	29,786	250	30,036
		88	No reports received						
3845	Electromedical Equipment	96	9,702	0	0	0	9,702	7,100	16,802
		95	76,687	0	0	0	76,687	9,109	85,796
		94	86,071	0	0	0	86,071	12,841	98,912
		88	303,114	0	0	0	303,114	9,652	312,766
3851	Ophthalmic Goods	96	275,975	0	0	0	275,975	48,258	324,233
		95	351,338	0	0	0	351,338	55,753	407,091
		94	406,048	0	0	0	406,048	58,789	464,837
		88	1,350,110	0	0	0	1,350,110	92,059	1,442,169
3861	Photographic Equipment & Supplies	96	7,015,141	262,981	0	1,146	7,279,268	188,351	7,467,619
		95	8,501,166	248,669	0	2,736	8,752,571	312,493	9,065,064
		94	8,814,427	319,055	0	3,865	9,137,347	407,238	9,544,585
		88	28,049,045	387,493	250	159,540	28,596,328	9,613,808	38,210,136
3873	Watches, Clocks, Watchcases & Parts	96	26,500	0	0	0	26,500	0	26,500
		95	23,415	0	0	0	23,415	0	23,415
		94	36,120	0	0	0	36,120	0	36,120
		88	333,733	0	0	250	333,983	250	334,233
	Multiple within SIC Code 38	96	97,338	280	0	0	97,618	6,335	103,953
		95	126,718	260	0	0	126,978	10,232	137,210
		94	124,728	20	0	0	124,748	9,927	134,675
		88	1,015,631	0	0	500	1,016,131	79,420	1,095,551
	Invalid SIC Code within SIC Code 38	96	No reports received						
		95	6,340	0	0	0	6,340	0	6,340
		94	111,959	0	0	0	111,959	5,925	117,884
		88	1,920,565	501	0	0	1,921,066	63,615	1,984,681
	Total for SIC Code 38	96	9,298,517	264,207	0	2,527	9,565,251	793,368	10,358,619
		95	11,917,203	249,173	0	5,766	12,172,142	783,071	12,955,213
		94	13,192,730	319,552	0	7,074	13,519,356	808,871	14,328,227
		88	46,478,774	390,382	250	340,403	47,209,809	10,875,015	58,084,824

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category. One facility incorrectly reported 2,348,655 pounds of transfers off-site to disposal for 1988 under SIC code 3861. The correct amount is 0 pounds.
*nec: not elsewhere classified.

Table 15-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Instruments and Photographic Equipment, SIC Code 38

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3812	Search & Navigation Equipment	96	47,900	0	3,800	51,700
		95	163,341	0	12,601	175,942
		94	384,665	0	13,001	397,666
		88	NA	NA	NA	NA
3821	Laboratory Apparatus & Furniture	96	0	0	0	0
		95	13,000	0	0	13,000
		94	0	0	1	1
		88	NA	NA	NA	NA
3822	Environmental Controls	96	44,905	0	5,265	50,170
		95	16,431	0	5,120	21,551
		94	64,503	0	6,500	71,003
		88	NA	NA	NA	NA
3823	Process Control Instruments	96	0	0	60	60
		95	0	0	12,462	12,462
		94	145,039	0	12,986	158,025
		88	NA	NA	NA	NA
3824	Fluid Meters & Counting Devices	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3825	Instruments to Measure Electricity	96	0	0	27,471	27,471
		95	0	0	29,241	29,241
		94	0	0	30,904	30,904
		88	NA	NA	NA	NA
3826	Analytical Instruments	96	0	0	0	0
		95	0	0	0	0
		94	0	0	12,000	12,000
		88	NA	NA	NA	NA
3827	Optical Instruments & Lenses	96	30,372	0	0	30,372
		95	27,947	0	0	27,947
		94	23,872	0	0	23,872
		88	NA	NA	NA	NA
3829	Measuring & Controlling Devices, nec*	96	24,448	0	0	24,448
		95	26,048	0	0	26,048
		94	458,784	0	2	458,786
		88	NA	NA	NA	NA
3841	Surgical & Medical Instruments	96	502,986	0	2,817,648	3,320,634
		95	502,751	0	2,816,485	3,319,236
		94	439,123	0	1,680,932	2,120,055
		88	NA	NA	NA	NA
3842	Surgical Appliances & Supplies	96	45,224	0	860,738	905,962
		95	3,819	0	762,898	766,717
		94	42,433	0	1,470,971	1,513,404
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one-4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 15-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Instruments and Photographic Equipment, SIC Code 38, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3843	Dental Equipment & Supplies	96	0	0	1,385	1,385
		95	19,320	0	512	19,832
		94	31,330	0	700	32,030
		88	NA	NA	NA	NA
3843	Dental Equipment & Supplies	96	0	0	1,385	1,385
		95	19,320	0	512	19,832
		94	31,330	0	700	32,030
		88	NA	NA	NA	NA
3844	X-ray Apparatus & Tubes	96	2,179	0	18,081	20,260
		95	2,800	0	12,016	14,816
		94	0	0	0	0
		88	No reports received			
3845	Electromedical Equipment	96	0	0	21,000	21,000
		95	5,790	0	22,000	27,790
		94	0	0	22,000	22,000
		88	NA	NA	NA	NA
3851	Ophthalmic Goods	96	50,657	0	4,870	55,527
		95	40,237	0	4,969	45,206
		94	72,571	0	8,620	81,191
		88	NA	NA	NA	NA
3861	Photographic Equipment & Supplies	96	2,642,765	683,500	31,577,693	34,903,958
		95	3,542,785	610,500	30,871,104	35,024,389
		94	1,840,886	683,300	26,660,355	29,184,541
		88	NA	NA	NA	NA
3873	Watches, Clocks, Watchcases & Parts	96	11,100	0	15,026	26,126
		95	9,200	0	18,928	28,128
		94	11,600	0	0	11,600
		88	NA	NA	NA	NA
	Multiple within SIC Code 38	96	13,560	0	291,948	305,508
		95	15,045	0	229,737	244,782
		94	28,300	0	191,598	219,898
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 38	96	No reports received			
		95	6,000	0	0	6,000
		94	2,300	0	0	2,300
		88	NA	NA	NA	NA
	Total for SIC Code 38	96	3,416,096	683,500	35,644,985	39,744,581
		95	4,394,514	610,500	34,798,073	39,803,087
		94	3,545,406	683,300	30,110,570	34,339,276
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
*nec: not elsewhere classified.

The process control instruments industry (SIC code 3823) reported the sector's largest increase in transfers off-site for further waste management. This industry reported 446,000 pounds in 1994 and 554,000 pounds in 1996. Ranking second, the x-ray apparatus and tubes industry (SIC code 3844) reported an increase from 103,000 pounds to 180,000 pounds. For both industries, the increase was attributable to transfers to recycling. The optical instruments and lenses industry (SIC code 3827) ranked third, reporting 26,000 pounds in 1994 and 93,000 pounds in 1996, principally in transfers to treatment.

Table 15-16 presents the sector's transfers off-site for further waste management for 1988-1996.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Morton International, Inc., in New Iberia, Louisiana (did not report in 1988, SIC code 3827 in 1996), was the top increaser in releases with 215,000 pounds. The facility did not begin operation until after the 1988 reporting year. Therefore, the total releases for 1996 equal the overall increase. Zinc compounds accounted for 75% of the 1996 release reporting. The facility contacts did not comment on the type of products manufactured or how zinc compounds are used. SIC code 3827 represents optical instruments and lenses.

White Rogers Div. Batesville in Batesville, Arkansas (SIC code 3822), was second with an overall increase of 190,000 pounds between 1988 and 1996. The facility manufactures natural gas valves for residential applications. Trichloroethylene (TCE) accounted for 84% of the total increase in reporting. The facility reported no releases for the chemical in 1988 and reported 160,000 pounds of air emissions in 1996. TCE replaced 1,1,1-trichloroethane (TCA) in a solvent vapor degreasing system prior to the 1996 reporting year. Conversely, the facility reported data for TCA in 1988 but not in 1996. The ranking as an increaser in releases is due to a change in air emissions estimation methodology, the result being that the decrease in TCA reporting did not equal the increase in TCE reporting. The facility contact stated that by early 1999, the solvent vapor degreasing system will be fully phased-out and replaced by an aqueous cleaning system.

Mita South Carolina, Inc., in Fountain Inn, South Carolina (did not report in 1988, SIC code 3861 in 1996), ranked third in increases with a total 124,000 pounds. Styrene reporting accounted for 71% of the total increase. Proprietary toner formulations for the photocopier industry are manufactured at this facility. Granular styrene resins are used as a toner constituent. The facility did not begin operation until 1992. Consequently, the total releases for the 1996 reporting year equal the total increase between 1988 and 1996.

Eastman Kodak Company in Rochester, New York (SIC code 3861), was the top decreaser in releases with a 13.4 million-pound reduction between 1988 and 1996. A reduction in dichloromethane reporting accounted for 50% of the facility's overall decrease. The chemical is used as a solvent in the production of acetate film-base. In addition to film and photographic paper, the plant also manufactures synthetic organic chemicals used in photographic products. The facility contact attributed the decrease to greater process efficiency and the installation of pollution control devices. This facility also ranked second for decreases in waste management (see "Facilities with Large Increases and Decreases in Waste Management, 1991-1996").

Du Pont in Towanda, Pennsylvania (SIC code 3861), ranked second in decreases with 7.4 million pounds. The facility manufactures coated film products used in electronics, printing and publishing, and medical industries. Dichloromethane, a solvent in coating and cleaning operations, accounted for 96% of the reported decrease. The facility contact cited improvements in pollution control technology as the primary

Table 15-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Instruments and Photographic Equipment, SIC Code 38

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3812	Search & Navigation Equipment	96	30,655	0	22,618	250	0	53,523
		95	33,025	13,356	66,023	270	0	112,674
		94	290,032	17,724	65,853	20,067	0	393,676
		88	NA	NA	456,343	79,721	4,300	NA
3821	Laboratory Apparatus & Furniture	96	44,938	67,349	1,000	14,080	0	127,367
		95	69,095	152,127	6,060	13,020	0	240,302
		94	121,992	124,879	3,850	11,020	0	261,741
		88	NA	NA	85,619	510	0	NA
3822	Environmental Controls	96	3,963,356	4,506	47,551	1,069	0	4,016,482
		95	3,883,697	18,898	56,799	1,857	0	3,961,251
		94	4,563,757	27,665	94,531	1,776	0	4,687,729
		88	NA	NA	255,619	9,510	11,122	NA
3823	Process Control Instruments	96	550,370	4,101	0	15	0	554,486
		95	426,582	9,671	10,524	2,360	0	449,137
		94	417,646	11,007	15,983	1,729	0	446,365
		88	NA	NA	123,625	515	23,249	NA
3824	Fluid Meters & Counting Devices	96	359,551	0	124	359	0	360,034
		95	725,429	728	595	505	0	727,257
		94	695,644	387	5,554	750	0	702,335
		88	NA	NA	7,750	500	350	NA
3825	Instruments to Measure Electricity	96	31,475	0	254	750	0	32,479
		95	83,455	0	0	750	0	84,205
		94	102,980	0	0	250	0	103,230
		88	NA	NA	45,600	176,871	0	NA
3826	Analytical Instruments	96	0	22,200	0	20,000	0	42,200
		95	0	32,900	9,250	17,700	0	59,850
		94	0	34,900	15,000	29,000	0	78,900
		88	NA	NA	25,980	16,650	0	NA
3827	Optical Instruments & Lenses	96	12,496	20,683	59,750	250	0	93,179
		95	11,989	20,892	4,433	250	0	37,564
		94	10,741	13,984	692	250	0	25,667
		88	NA	NA	10,950	0	0	NA
3829	Measuring & Controlling Devices, nec*	96	68,538	8,804	58	11	0	77,411
		95	72,622	0	1,962	21	0	74,605
		94	61,152	0	55	7	0	61,214
		88	NA	NA	76,408	67,520	41,791	NA
3841	Surgical & Medical Instruments	96	1,371,026	46,246	51,042	97,243	44,588	1,610,145
		95	917,985	61,766	190,070	94,834	0	1,264,655
		94	1,346,956	60,562	323,733	83,587	0	1,814,838
		88	NA	NA	489,294	107,717	16,539	NA
3842	Surgical Appliances & Supplies	96	926,136	0	34,460	181,756	0	1,142,352
		95	879,506	27,481	15,495	242,046	0	1,164,528
		94	913,638	62,788	39,785	276,159	0	1,292,370
		88	NA	NA	197,759	257,225	10,823	NA
3843	Dental Equipment & Supplies	96	101,451	4,650	0	25,000	0	131,101
		95	143,220	6,304	750	1,250	0	151,524
		94	53,163	11,023	4,430	755	0	69,371
		88	NA	NA	72,311	29,317	0	NA

Note: **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 15-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Instruments and Photographic Equipment, SIC Code 38, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3844	X-ray Apparatus & Tubes	96	176,956	0	3,369	20	0	180,345
		95	133,082	7,100	29,699	57	0	169,938
		94	94,810	0	8,610	5	0	103,425
		88	No reports received					
3845	Electromedical Equipment	96	91,782	1,920	720	0	0	94,422
		95	90,138	2,720	9,070	5	0	101,933
		94	85,787	4,800	9,300	0	0	99,887
		88	NA	NA	0	76,510	0	NA
3851	Ophthalmic Goods	96	263,856	89,392	52,377	5,837	0	411,462
		95	252,326	97,895	35,168	49,142	0	434,531
		94	267,096	166,247	85,991	70,292	0	589,626
		88	NA	NA	182,455	141,514	1,290	NA
3861	Photographic Equipment & Supplies	96	3,481,494	1,998,344	1,686,655	115,514	0	7,282,007
		95	6,038,028	1,791,638	2,550,319	85,443	0	10,465,428
		94	5,170,388	2,517,973	3,419,272	122,870	0	11,230,503
		88	NA	NA	4,311,813	1,229,940	79,657	NA
3873	Watches, Clocks, Watchcases & Parts	96	250	0	5,400	0	0	5,650
		95	0	0	5,038	0	0	5,038
		94	4,509	0	4,640	0	0	9,149
		88	NA	NA	73,221	538	0	NA
	Multiple within SIC Code 38	96	395,454	26,108	57,210	36,542	0	515,314
		95	344,260	32,764	46,210	48,539	0	471,773
		94	290,093	29,071	69,355	77,227	0	465,746
		88	NA	NA	172,075	15,455	0	NA
	Invalid SIC Code within SIC Code 38	96	No reports received					
		95	4,200	1,805	18,000	0	0	24,005
		94	11,850	1,255	15,060	0	0	28,165
		88	NA	NA	238,597	57,393	7,500	NA
	Total for SIC Code 38	96	11,869,784	2,294,303	2,022,588	498,696	44,588	16,729,959
		95	14,108,639	2,278,045	3,055,465	558,049	0	20,000,198
		94	14,502,234	3,084,265	4,181,694	695,744	0	22,463,937
		88	NA	NA	6,825,419	2,267,406	196,621	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 38 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

reason for the reduction. Since the 1996 reporting year, dichloromethane has been eliminated altogether through process substitutions.

Anitec International Paper in Binghamton, New York (SIC code 3861), was third in decreases with 2.7 million pounds. The facility ran film and photographic paper coating operations and manufactured film-base and photographic chemical processing solutions. Dichloromethane, used in the production of film-base, was responsible for 67% of the facility's reduction. The facility reported no releases of the chemical in 1996. The processes in which dichloromethane was used was shut down in late 1991 due to a declining market. One reason cited for this was the growing popularity of desk-top computer graphics imaging. This facility was also third in decreases of production-related waste

from 1991 to 1996. See "Facilities with Large Increases and Decreases in Waste Management, 1991-1996," for more information.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the instruments and photographic equipment sector:

> Xerox Corporation, Oklahoma City, Oklahoma, decrease of 3.1 million pounds, reporting error.

1991-1996 Waste Management Data for Instruments and Photographic Equipment

Table 15-17 summarizes on- and off-site waste management data for the instruments and photographic equipment sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). The sector reported a 41.5% reduction in total production-related waste, from 115.0 million pounds in 1991 to 67.3 million pounds in 1996. The largest factor in this 47.7 million-pound reduction was a reduction in quantities released on- and off-site from 35.8 million pounds to 10.4 million pounds. This represented a 71.0% reduction in quantities released. The sector also reported an 86.3% reduction in on-site recycling, from 25.1 million pounds to 3.5 million pounds.

Reporting of all types of off-site waste management decreased from 1991 to 1996: recycling from 16.4 million pounds to 12.3 million pounds, energy recovery from 3.4 million pounds to 2.4 million pounds, and treatment from 4.4 million pounds to 2.5 million pounds. These represented percentage decreases ranging from 25.0% to 43.5%. As noted earlier, one facility in the photographic equipment industry (SIC code 3861) reported a 3.0 million-pound increase in on-site treatment of methanol from 1994 to 1995.

The instruments and photographic equipment sector reported increases in on-site treatment (from 29.6 million pounds to 35.6 million pounds) and on-site energy recovery (from 269,000 pounds to 684,000 pounds). These were increases of 20.5% and 153.7%, respectively.

Figure 15-13 illustrates the percentage changes in waste management methods reported by the instruments and photographic equipment sector for 1991-1996.

The sector's changes in waste management amounts reported to TRI from 1991 to 1996 indicate progress in reducing the proportion of production-related waste that the sector releases to the environment. The sector reported cutting in half the proportion of its TRI chemicals in waste that it released from 1991 to 1996 (from about 30% to about 15% of total production-related waste). In terms of the waste management hierarchy (explained in Chapter 1), releases are the least desirable option for managing waste that cannot be prevented. Among other waste management options, however, treatment nearly doubled (from about 30% to 57% of production-related waste). Although this option is preferable to releases, it is less desirable than recycling or energy recovery. The sector reported less of its production-related waste as recycled over the 1991-1996 period, decreasing from 36% of production-related waste to 23%.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

Polaroid Corporation in Assonet, Massachusetts (SIC code 3861 in 1991 and codes 2869 and 3861

Table 15-17. TRI Waste Management Data, 1991, 1994-1996: Instruments and Photographic Equipment, SIC Code 38

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	25,138,826	3,785,836	4,485,631	3,451,467
Energy Recovery On-site	269,410	683,300	610,500	683,500
Treated On-site	29,570,270	30,301,062	34,896,489	35,645,001
Total On-site Waste Management	54,978,506	34,770,198	39,992,620	39,779,968
Off-site Waste Management				
Recycled Off-site	16,393,801	14,984,331	14,279,633	12,289,407
Energy Recovery Off-site	3,369,208	3,082,096	2,277,865	2,357,275
Treated Off-site	4,427,223	4,854,522	3,638,244	2,500,605
Total Off-site Waste Management	24,190,232	22,920,949	20,195,742	17,147,287
Quantity Released On- and Off-site	35,794,261	15,577,937	13,569,171	10,374,928
Total Production-related Waste	114,962,999	73,269,084	73,757,533	67,302,183
Non-Production-related Waste	78,899	4,915	4,330	139,891

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	18.5	-23.1	-86.3
Energy Recovery On-site	-10.7	12.0	153.7
Treated On-site	15.2	2.1	20.5
Total On-site Waste Management	15.0	-0.5	-27.6
Off-site Waste Management			
Recycled Off-site	-4.7	-13.9	-25.0
Energy Recovery Off-site	-26.1	3.5	-30.0
Treated Off-site	-25.1	-31.3	-43.5
Total Off-site Waste Management	-11.9	-15.1	-29.1
Quantity Released On- and Off-site	-12.9	-23.5	-71.0
Total Production-related Waste	0.7	-8.8	-41.5
Non-Production-related Waste	-11.9	3,130.7	77.3

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

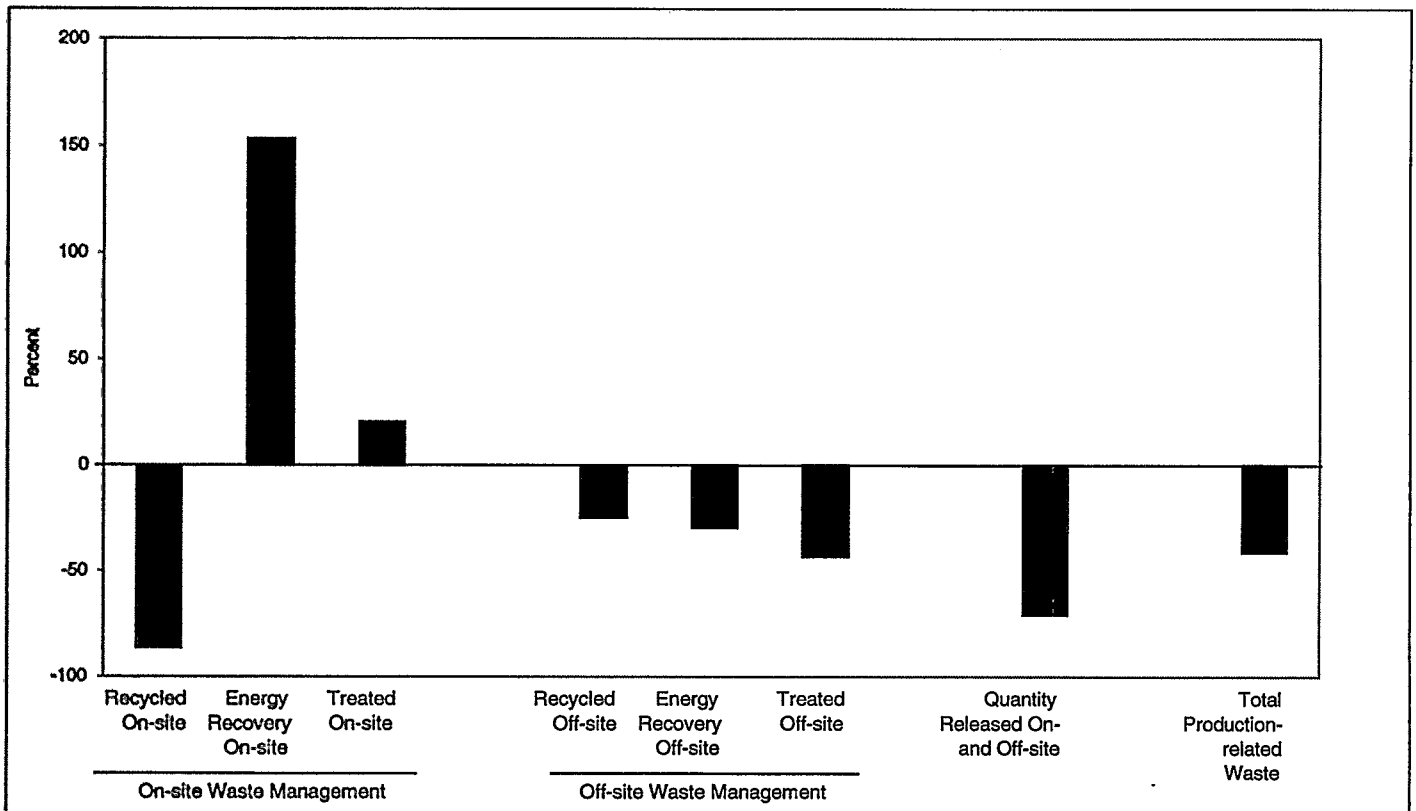


Figure 15-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Instruments and Photographic Equipment (SIC Code 38)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated.

in 1996), was first in increases of waste managed with 761,000 pounds. The facility produces chemicals used in the manufacture of Polaroid™ film. Dichloromethane, used as a solvent, accounted for 85% of the increase. No data for dichloromethane were reported in 1991. According to the facility contact, a categorical discharge regulation for organic chemicals, plastics, and synthetic fibers came into effect in 1991. The facility was not equipped to meet the new discharge levels and ceased using some chemicals, including dichloromethane, during part of 1991 until upgrades were made to their wastewater treatment operations. Full-time operations in subsequent years account for the increase.

Polaroid Corporation in New Bedford, Massachusetts (SIC code 3861), ranked second in increases with 729,000 pounds. This Polaroid facility, which manufactures medical imaging and graphic arts products, did not become operational until 1993. Therefore, there were no data reported in 1991. Methyl ethyl ketone data constituted 98% of the facility's 1996 waste management reporting. The chemical is used as a solvent in coating operations.

Azon Corporation in Johnson City, New York (SIC code 3861), was third in increases with 511,000 pounds. A manufacturer of diazo paper (e.g., blue-print paper), this facility uses methanol in a coating operation. The chemical was responsible for 38% of the overall increase. Two reasons were cited by the facility contact for the increase in methanol reporting: 1) another facility that ran coating operations was shut down and consolidated with

the Johnson City plant, and 2) most of the increase in methanol reporting was in on-site energy recovery—the facility added a boiler to its energy recovery system, thereby increasing the system's capacity to utilize methanol as a fuel.

Anitec International Paper in Binghamton, New York (SIC code 3861), was the top facility for decreases in waste managed. On-site recycling of dichloromethane dropped from 8.5 million pounds in 1991 to zero in 1996. The facility recovered and reused over 90% of the chemical before its film-base manufacturing processes were shut down. See "Facilities with Large Increases and Decreases in Releases, 1988-1996," for more information.

Eastman Kodak Company in Rochester, New York (SIC code 3861), was second in decreases with a 7.8 million-pound reduction. Dichloromethane waste management data decreased by 6.4 million pounds (82% of the overall decrease) between 1991 and 1996 at this photographic products manufacturing facility. The reporting category with the largest dichloromethane decrease was on-site recycling. This category dropped from 2.7 million pounds in 1991 to zero pounds in 1996. The facility contact cited a change in the interpretation of the recycling process as the reason.[1] This facility also ranked first for decreases in releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996").

Du Pont in Towanda, Pennsylvania (SIC code 3861), was third with a 4.6 million-pound decrease. Decreases in dichloromethane waste management reporting accounted for 100% of the decrease. The facility also ranked as a major decreaser in releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996"). Dichloromethane was used in cleaning and coating operations in the manufacture of coated film products. The chemical was phased-out by the end of 1996. Decreased usage prior to the chemical's elimination resulted in the decrease.

Facilities Contacted for Explanations (alphabetical by facility):

Anitec International Paper, Binghamton, New York: Maureen Hoke and Alan Markle, September 22, 1998 (explanation provided)

Azon Corporation, Johnson City, New York: Roger Philpott, September 22, 1998 (explanation provided)

Du Pont, Towanda, Pennsylvania: Jim Hasse, September 17, 1998 (explanation provided)

Eastman Kodak Company, Rochester, New York: Steven Vaughn, September 21, 1998 and Eileen Criswell, September 22, 1998 (explanation provided)

Mita South Carolina, Inc., Fountain Inn, South Carolina: Fred Hartwig, September 21, 1998 (explanation provided)

Morton International, Inc., New Iberia, Louisiana: Ruth Hohnstein, October 20, 1988 and Brian Leatherman, October 23, 1998 (explanation provided)

Polaroid Corporation, Assonet, Massachusetts: Michael Conway, September 18, 1998 and Tim Hawes, October 16, 1998 (explanation provided)

Polaroid Corporation, New Bedford, Massachusetts: Richard L. Chandler, September 18, 1998 (explanation provided)

White Rogers Div. Batesville, Batesville, Arkansas: Mark Carroll, September 22, 1998 (explanation provided)

Xerox Corporation, Oklahoma City, Oklahoma: Michael Hampton, September 21, 1998 (explanation provided)

[1] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

Chapter 16

Toxics Release Inventory Data for Miscellaneous Manufacturing (SIC Code 39)

A Look at the Miscellaneous Manufacturing Industries (SIC Code 39)

The miscellaneous manufacturing sector produces goods not classified in other manufacturing sectors. The miscellaneous manufacturing sector includes several industry groups—jewelry and silverware, musical instruments, toys and sporting goods, pens and artists' materials, and costume jewelry and fasteners. However, the largest group within this sector comprises industries not classified in those groups: miscellaneous manufactures. Products of this "miscellaneous" group (designated SIC code 399 at the three-digit level) are brooms and brushes, non-printed signs (electrical, mechanical, or other), burial caskets, hard surface floor coverings (such as linoleum), and a range of goods from hair dryers to umbrellas. Box 16-1 lists Standard Industrial Classification (SIC) codes and their designations for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The miscellaneous manufacturing sector shipped products valued at $48.60 billion in 1996, up from $46.67 billion in 1995 (both in current dollars). Employment in this sector was just under 400,000 in both years. Miscellaneous manufactures (SIC code 399) contributed $19.58 billion of the sector's 1996 value of shipments with employment of 179,000. Toys and sporting goods accounted for $14.75 billion and employed 103,000.

At the four-digit SIC code level, the miscellaneous manufacturing industries (SIC code 3999) were associated with the sector's largest amounts of releases and waste management of TRI chemicals. This industry shipped products valued at $7.79 billion in 1996, employing 73,000.

The diversity of products in this sector attests to a diversity of manufacturing processes. The sector's products include articles made of wood, metal, plastics, and other materials. Production of such articles involves processes used in wood finishing, metal fabrication, plastics products manufacture, and other relevant operations.

Box 16-1. SIC Code 39, Miscellaneous Manufacturing: Codes and Classifications

SIC Code			Industry Description
391	**Jewelry, Silverware, and Plated Ware**		
	3911	Jewelry, Precious Metal	Manufacture of jewelry and other articles worn on or carried about the person, made of precious metals (including base metals clad or rolled with precious metals), with or without stones. Includes cigarette cases and lighters, vanity cases and compacts, trimmings for umbrellas and canes, and jewel settings and mountings.
	3914	Silverware, Plated Ware, and Stainless Steel Ware	Manufacture of flatware (including knives, forks, and spoons), hollowware, ecclesiastical ware, trophies, trays, and related products made of sterling silver, plated metal (with silver, gold, or other metal), nickel silver, pewter, or stainless steel.
	3915	Jewelers' Findings Materials and Lapidary Work	Manufacture of unassembled jewelry parts and stock shop products, such as sheet, wire, and tubing. Processing stones (cutting, tumbling, faceting, etc.) from natural or manmade precious or semiprecious gem raw materials. Recutting, repolishing, and setting gem stones. Cutting, drilling, and preparing jewels for instruments, dies, watches, chronometers, and other industrial uses. Drilling, sawing, and peeling real or cultured pearls.
393	**Musical Instruments**		
	3931	Musical Instruments	Manufacture of pianos (with or without player attachments), organs, other musical instruments, and their parts and accessories.
394	**Dolls, Toys, Games and Sporting and Athletic Goods**		
	3941	Dolls and Stuffed Toys	Manufacture of dolls, doll parts, and doll clothing, except doll wigs. Manufacture of stuffed toys.
	3944	Games, Toys, and Children's Vehicles, Except Dolls and Bicycles	Manufacture of games and game sets for adults and children, and mechanical and nonmechanical toys. Includes toy furniture, doll carriages, construction sets, mechanical trains, toy guns and rifles, baby carriages and strollers, and children's tricycles, wagons, sleds, and similar outdoor goods except bicycles.
	3949	Sporting and Athletic Goods, nec*	Manufacture of sporting and athletic goods, such as fishing tackle; golf and tennis goods; baseball, football, basketball, and boxing equipment; roller and ice skates; gymnasium and playground equipment; billiard and pool tables; and bowling alleys and equipment.
395	**Pens, Pencils, and Other Artists' Materials**		
	3951	Pens, Mechanical Pencils, and Parts	Manufacture of pens (including ballpoint pens), refill cartridges, mechanical pencils, fine and broad tipped markers, and parts.
	3952	Lead Pencils, Crayons, and Artists' Materials	Manufacture of lead pencils, pencil leads, crayons, and materials and equipment for artwork, such as airbrushes, drawing tables, palettes, sketch boxes, artists' colors, drawing inks, and drafting materials.
	3953	Marking Devices	Manufacture of rubber and metal hand-stamps, dies, and seals; steel letters and figures; and stencils for use in painting or marking.
	3955	Carbon Paper and Inked Ribbons	Manufacture of carbon paper, stencil paper, and inked or carbon ribbons for business machines.
396	**Costume Jewelry and Costume Novelties, Except Precious Metal**		
	3961	Costume Jewelry and Costume Novelties, Except Precious Metal	Manufacture of costume jewelry, costume novelties, and ornaments made of all materials except precious metal, precious or semiprecious stones, or rolled goldplate and gold-filled materials.
	3965	Fasteners, Buttons, Needles, and Pins	Manufacture of notions, such as slide and snap fasteners and zippers, needles, pins, hooks and eyes, buckles, and buttons.
399	**Miscellaneous Manufacturing Industries**		
	3991	Brooms and Brushes	Manufacture of household, industrial, and street sweeping brooms. Manufacture of brushes, such as paintbrushes, toothbrushes, and household and industrial brushes.
	3993	Signs and Advertising Specialties	Manufacture of electrical, mechanical, cutout, or plate signs and advertising displays, including neon signs, and advertising specialties.
	3995	Burial Caskets	Manufacture of burial caskets and cases, including shipping cases, of wood or other material except concrete.
	3996	Linoleum, Asphalted-Felt-Base, and Other Hard Surface Floor Coverings, nec*	Manufacture of linoleum, asphalted-felt-base, and other hard surface floor coverings.
	3999	Manufacturing Industries, nec*	Manufacture of miscellaneous fabricated products, including beauty shop and barber shop equipment; hair work; tobacco pipes and cigarette holders; coin-operated amusement machines; matches; candles; lamp shades; feathers, artificial trees and flowers (except glass); dressed and dyed furs; umbrellas and canes; and other articles.

*nec: not elsewhere classified; these are generally referred to as "miscellaneous" products in their categories.

1996 TRI Data for Miscellaneous Manufacturing

Table 16-1 summarizes TRI reporting by the miscellaneous manufacturing sector for 1996. The miscellaneous manufacturing sector submitted 766 forms in 1996. Of these, 56 were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

The miscellaneous manufacturing industries (SIC code 3999) submitted 245 forms in 1996, 32.0% of the sector's total. Ranking second, the miscellaneous sporting and athletic goods industry (SIC code 3949) submitted 123 forms (16.1%). The burial caskets industry (SIC code 3995) submitted 90 forms (11.7%).

The miscellaneous manufacturing industries (SIC code 3999) reported the sector's largest amounts of on-site releases (3.3 million pounds) and total on- and off-site releases (3.4 million pounds). These amounts were approximately 34% of the sector's total on-site releases of 9.4 million pounds and total on- and off-site releases of 10.3 million pounds. Industries in SIC code 3999 also reported the largest amounts of on-site waste management (6.6 million pounds) and total production-related waste (13.1 million pounds). This represented 26.6% of the sector's total other on-site waste management of 24.7 million pounds and 22.7% of the sector's total production-related waste of 57.6 million pounds.

For both on-site releases and total on- and off-site releases, the burial caskets industry (SIC code 3995) ranked second and the miscellaneous sporting and athletic goods industry (SIC code 3949) ranked third. The burial casket industry reported 2.4 million pounds of total on- and off-site releases (23.0% of the sector's total), and the miscellaneous sporting and athletic goods industry reported 1.9 million pounds of total on- and off-site releases (18.8%). More than 95% of each industry's total releases was reported as on-site releases.

The miscellaneous hard surface floor coverings industry (SIC code 3996) ranked first in this sector for off-site releases, reporting 431,000 pounds, 51.3% of the sector's total of 839,000 pounds. Miscellaneous manufacturing industries (SIC code 3999) ranked second, with 129,000 pounds (15.4%), followed by miscellaneous sporting and athletic goods (SIC code 3949) 91,000 pounds (10.9%).

For other on-site waste management, the carbon paper and inked ribbons industry (SIC code 3955) ranked second (after the miscellaneous manufacturing industries in SIC code 3999). This industry reported other on-site waste management of 5.3 million pounds (21.4% of the total). The third-largest amount of other on-site waste

Sources

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.

U.S. Industry & Trade Outlook '98, DRI/McGraw Hill, Standard & Poor's, and U.S. Department of Commerce, International Trade Administration, 1998: economic analyses, also provides some information on environment and industrial processes for selected industries.

U.S. Census Bureau, *1996 Annual Survey of Manufactures: Statistics for Industry Groups and Industries,* M96(AS)-1, February 1998 <http://www.census.gov/prod/www/titles.html#mm>: value of shipments and employment. Supplemental data from U.S. Census Bureau <http://www.census.gov> for some industries.

Table 16-1. Summary of TRI Information by 4-digit SIC Code, 1996: Miscellaneous Manufacturing, SIC Code 39

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
13	13	3911	Jewelry, Precious Metal	14	25	1	16,374	38,760	55,134
9	7	3914	Silverware & Plated Ware	11	33	5	79,788	43,960	123,748
19	14	3915	Jewelers' Materials & Lapidary Work	8	14	2	2,880	500	3,380
6	10	3931	Musical Instruments	17	30	0	318,324	51,635	369,959
8	12	3944	Games, Toys, & Children's Vehicles	9	21	2	222,605	90	222,695
3	5	3949	Sporting & Athletic Goods, nec*	62	123	7	1,840,975	91,252	1,932,227
11	11	3951	Pens & Mechanical Pencils	10	23	0	103,753	5,993	109,746
16	18	3952	Lead Pencils & Art Goods	2	8	3	21,480	0	21,480
14	15	3953	Marking Devices	4	11	0	50,996	0	50,996
5	3	3955	Carbon Paper & Inked Ribbons	6	14	0	543,719	0	543,719
18	19	3961	Costume Jewelry	8	9	2	12,109	0	12,109
10	2	3965	Fasteners, Buttons, Needles, & Pins	10	23	0	106,490	13,804	120,294
17	16	3991	Brooms & Brushes	3	6	1	17,149	0	17,149
7	8	3993	Signs & Advertising Specialities	16	29	1	239,980	0	239,980
2	6	3995	Burial Caskets	21	90	0	2,329,930	33,652	2,363,582
4	9	3996	Hard Surface Floor Coverings, nec*	12	32	0	128,395	430,627	559,022
1	1	3999	Manufacturing Industries, nec*	133	245	27	3,293,617	128,985	3,422,602
12	17		Multiple within SIC Code 39	9	15	4	66,640	0	66,640
15	4		Invalid SIC Code within SIC Code 39	7	15	1	35,571	25	35,596
			Total for SIC Code 39	362	766	56	9,430,775	839,283	10,270,058

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 30 pounds of total releases, 3,209,773 pounds of other on-site waste management, 207,776 pounds of transfers off-site for further waste management and 3,417,119 pounds of total production-related waste. Another facility incorrectly reported under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 2,738 pounds of total releases, 2,867,591 pounds of other on-site waste management, 2,506,231 pounds of transfers off-site for further waste management and 5,376,558 pounds of total production-related waste. The total production-related waste rank for invalid SIC code within SIC code 39 changes from 4 to 10.
*nec: not elsewhere classified.

management consisted of 2.9 million pounds (11.7%) reported with invalid SIC codes in SIC code 39, a reporting error. One facility submitting such forms should have reported in SIC code 3714 (motor vehicle parts and accessories); this facility accounted for nearly all of the 2.9 million pounds. Taking into account this error, the fasteners, buttons, needles, and pins industry (SIC code 3965) would rank third with 2.8 million pounds of other on-site waste management.

The fasteners, buttons, needles, and pins industry (SIC code 3965) ranked first in this sector for transfers off-site for further waste management, reporting 5.0 million pounds (23.3%). The silverware and plated ware industry (SIC code 3914) ranked second, with 3.4 million pounds (15.7%). The miscellaneous manufacturing industries (SIC code 3999) reported the third-largest amount, with 3.0 million pounds (14.2%).

For total production-related waste, the fasteners, buttons, needles, and pins industry (SIC code 3965) ranked second (after miscellaneous manufacturing in SIC code 3999), with 7.9 million pounds (13.7%), and the carbon paper and inked ribbons industry (SIC code 3955) ranked third, with 6.6 million pounds (11.5%).

Multiple SIC Codes in SIC Code 39

A few facilities in the miscellaneous manufacturing sector engage in distinct, but related, manufacturing activities that are classified in different SIC codes

Table 16-1. Summary of TRI Information by 4-digit SIC Code, 1996: Miscellaneous Manufacturing, SIC Code 39, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3911	Jewelry, Precious Metal	133,340	35,190	236,610	500
3914	Silverware & Plated Ware	331,351	3,379,611	3,832,259	5,568
3915	Jewelers' Materials & Lapidary Work	23,352	192,652	219,593	0
3931	Musical Instruments	1,004,806	239,115	1,621,426	0
3944	Games, Toys, & Children's Vehicles	125,550	84,166	437,119	0
3949	Sporting & Athletic Goods, nec*	1,930,594	989,904	5,433,080	3,200
3951	Pens & Mechanical Pencils	42,130	372,128	504,361	0
3952	Lead Pencils & Art Goods	0	129,460	151,031	0
3953	Marking Devices	1,422	141,915	191,501	0
3955	Carbon Paper & Inked Ribbons	5,287,354	763,650	6,641,762	0
3961	Costume Jewelry	9,150	18,009	42,011	0
3965	Fasteners, Buttons, Needles, & Pins	2,812,643	5,002,326	7,913,738	0
3991	Brooms & Brushes	140,400	1,609	166,097	0
3993	Signs & Advertising Specialties	2,147,297	1,031,764	3,417,188	11,302
3995	Burial Caskets	12,486	2,396,683	4,824,516	530
3996	Hard Surface Floor Coverings, nec*	1,192,632	663,229	2,586,151	0
3999	Manufacturing Industries, nec*	6,570,885	3,047,148	13,106,360	2,327
	Multiple within SIC Code 39	12,919	74,523	159,044	0
	Invalid SIC Code within SIC Code 39	2,887,736	2,903,285	6,156,654	1,110
	Total for SIC Code 39	24,666,047	21,466,367	57,640,501	24,537

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 30 pounds of total releases, 3,209,773 pounds of other on-site waste management, 207,776 pounds of transfers off-site for further waste management and 3,417,119 pounds of total production-related waste. Another facility incorrectly reported under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 2,738 pounds of total releases, 2,867,591 pounds of other on-site waste management, 2,506,231 pounds of transfers off-site for further waste management and 5,376,558 pounds of total production-related waste. The total production-related waste rank for invalid SIC code within SIC code 39 changes from 4 to 10.
***nec:** not elsewhere classified.

within SIC code 39. For example, a facility might manufacture both precious-metal jewelry (SIC code 3911) and costume jewelry (SIC code 3961). Such facilities may report multiple SIC codes on their TRI forms. (Box 1-5 in Chapter 1 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Table 16-2 further examines reporting on these multiple-codes forms in SIC code 39. Of the 15 forms that reported multiple SIC codes within miscellaneous manufacturing, seven forms reported the combination of precious-metal jewelry (SIC code 3911) and jewelers' materials and lapidary work (SIC code 3915). The multiple-codes forms in SIC code 39 reported total on- and off-site releases of 67,000 pounds and total production-related waste of 159,000 pounds in 1996.

On- and Off-site Releases

The miscellaneous manufacturing sector reported 9.4 million pounds of air emissions in 1996, which was 91.6% of the sector's total releases. Off-site releases (transfers to disposal) reported by this sector totaled 839,000 pounds, or 8.2% of the sector's total. Other types of releases amounted to less than 0.5% each of the sector's total on- and off-site releases. The sector reported no underground injection. These data appear in Table 16-3. Figure 16-1 illustrates the percentage distribution of releases reported by this sector.

Table 16-2. Multiple SIC Codes, 1996: Miscellaneous Manufacturing, SIC Code 39

SIC Codes		Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3911	3915	7	2	3,425	0	3,425	8,866	27,021	39,327	0
3911	3961	3	1	5	0	5	0	23,353	28,208	0
3944	3949	2	0	61,474	0	61,474	0	24,149	85,690	0
3944	3998	2	1	1,670	0	1,670	0	0	1,700	0
3961	3965	1	0	66	0	66	4,053	0	4,119	0
Total for SIC Code 39		15	4	66,640	0	66,640	12,919	74,523	159,044	0

Note: **On-site Releases** from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** are transfers off-site to disposal from Section 6 of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 of Form R. **Total Production-related Waste** sums Section 8 of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents).

Table 16-3. TRI On-site and Off-site Releases, 1996: Miscellaneous Manufacturing, SIC Code 39 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3999	Manufacturing Industries, nec*	3,282,638	291	0	0	10,688	0	3,293,617	128,985	3,422,602
3995	Burial Caskets	2,329,150	515	0	0	0	265	2,329,930	33,652	2,363,582
3949	Sporting & Athletic Goods, nec*	1,831,638	475	0	0	1,269	7,593	1,840,975	91,252	1,932,227
3996	Hard Surface Floor Coverings, nec*	128,035	29	0	0	0	331	128,395	430,627	559,022
3955	Carbon Paper & Inked Ribbons	543,719	0	0	0	0	0	543,719	0	543,719
3931	Musical Instruments	318,324	0	0	0	0	0	318,324	51,635	369,959
3993	Signs & Advertising Specialities	239,980	0	0	0	0	0	239,980	0	239,980
3944	Games, Toys, & Children's Vehicles	222,605	0	0	0	0	0	222,605	90	222,695
3914	Silverware & Plated Ware	78,990	798	0	0	0	0	79,788	43,960	123,748
3965	Fasteners, Buttons, Needles, & Pins	106,279	211	0	0	0	0	106,490	13,804	120,294
3951	Pens & Mechanical Pencils	103,753	0	0	0	0	0	103,753	5,993	109,746
	Multiple within SIC Code 39	66,640	0	0	0	0	0	66,640	0	66,640
3911	Jewelry, Precious Metal	16,374	0	0	0	0	0	16,374	38,760	55,134
3953	Marking Devices	50,996	0	0	0	0	0	50,996	0	50,996
	Invalid SIC Code within SIC Code 39	35,526	45	0	0	0	0	35,571	25	35,596
3952	Lead Pencils & Art Goods	21,480	0	0	0	0	0	21,480	0	21,480
3991	Brooms & Brushes	17,149	0	0	0	0	0	17,149	0	17,149
3961	Costume Jewelry	12,109	0	0	0	0	0	12,109	0	12,109
3915	Jewelers' Materials & Lapidary Work	2,880	0	0	0	0	0	2,880	500	3,380
	Total for SIC Code 39	9,408,265	2,364	0	0	11,957	8,189	9,430,775	839,283	10,270,058

Note: **On-site Releases** from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Miscellaneous manufacturing industries (SIC code 3999) reported 3.3 million pounds (34.9%) of the sector's air emissions. Ranking second, the burial caskets industry (SIC code 3995) reported 2.3 million pounds (24.8%) of air emissions. The miscellaneous sporting and athletic goods industry (SIC code 3949) ranked third, reporting 1.8 million pounds (19.5%). In all three industries, toluene was reported in the largest amounts (see discussion of "1996 TRI Data by Chemical," later in this chapter). One facility in miscellaneous manufacturing reported 545,000 pounds of air emissions of toluene. Another facility that manufactures burial caskets reported emissions of 214,000 pounds of toluene. A sporting goods facility reported 402,000 pounds of toluene.

The miscellaneous hard surface floor coverings industry (SIC code 3996) reported the sector's largest amount of off-site releases (transfers to disposal). This industry reported 431,000 pounds of transfers to disposal. One facility in SIC code 3996

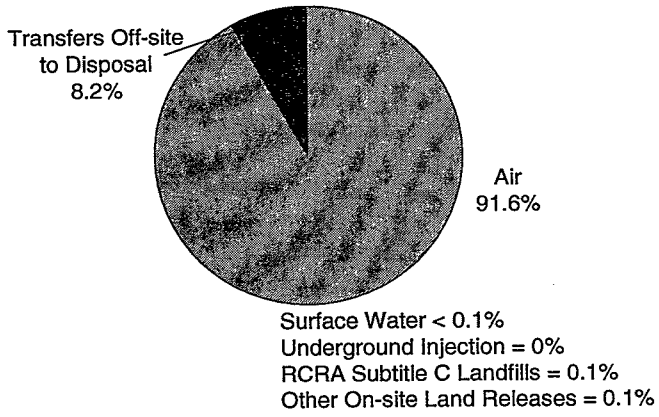


Figure 16-1. Distribution of TRI On-site and Off-site Releases, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R.

reported 329,000 pounds of di-(2-ethylhexyl) phthalate, the chemical accounting for most of the industry's off-site releases. (As explained in "Facilities with Large Increases and Decreases in Releases, 1988-1996," later in this chapter, this facility has reported large decreases of this chemical.)

Figure 16-2 shows the distribution of on- and off-site releases for the industries (four-digit SIC code) with the sector's largest releases.

Other On-site Waste Management

Two-thirds (67.0%) of the miscellaneous manufacturing sector's reported other on-site waste management in 1996 consisted of on-site recycling, which totaled 16.5 million pounds, as shown in Table 16-4. The sector reported 3.4 million pounds of on-site energy recovery and 4.8 million pounds of on-site treatment, amounting to 13.6% and 19.3%, respectively, of total other on-site waste management. Figure 16-3 illustrates the percentage distribution of the sector's other on-site waste management by type.

The miscellaneous manufacturing industries (SIC code 3999) reported 5.2 million pounds of on-site recycling, 31.5% of the sector's total. However, this includes an error by one facility that reported on-site recycling of 3.0 million pounds of zinc compounds. This facility reported in SIC code 3999 (miscellaneous manufacturing industries), but should have reported in SIC code 3499 (miscellaneous fabricated metal products). The sector's next-largest amount of on-site recycling appeared on the forms with invalid SIC codes in SIC code 39, also a reporting error. One facility submitting such forms reported on-site recycling of 1.6 million pounds of copper and 1.1 million pounds of lead; these forms should have been reported in SIC code 3714. Taking into account these reporting errors, the fasteners, buttons, needles and pins industry (SIC code 3965) would rank first in this sector for on-site recycling, reporting 2.8 million pounds. One facility in SIC code 3965, a zipper manufacturer, reported on-site recycling of 2.8 million pounds of copper. The signs and advertising specialties industry (SIC code 3993) would rank second with 2.1 million pounds, and the miscellaneous sporting and athletic goods industry (SIC code 3949) would rank third with 1.2 million pounds.

The carbon paper and inked ribbons industry (SIC code 3955) reported almost all (98.2%) of the industry's on-site energy recovery, with 3.3 million pounds. This industry reported combustion for energy recovery of 2.1 million pounds of methyl ethyl ketone and 1.1 million pounds of toluene. One facility accounted for the majority of this reporting of energy recovery, with 2.0 million pounds of methyl ethyl ketone and 830,000 pounds of toluene. Only three other industries in this sector reported on-site energy recovery in 1996, as shown in Table 16-4.

The carbon paper and inked ribbons industry (SIC code 3955) also ranked first in this sector for reporting of on-site treatment, with 1.7 million pounds (36.2%). The miscellaneous manufacturing industries (SIC code 3999) ranked second, with 1.4 million pounds (28.7%). Miscellaneous sporting

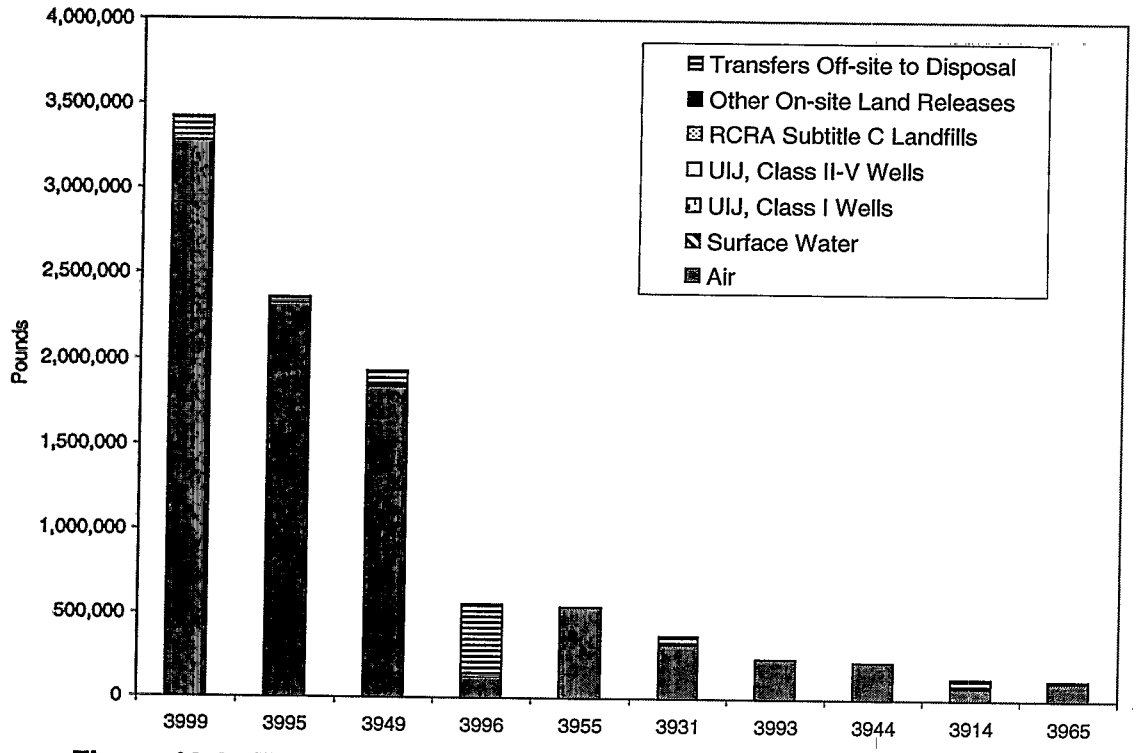


Figure 16-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal). UIJ = underground injection.

and athletic goods (SIC code 3949) reported the third-largest amount, 669,000 pounds (14.0%).

Figure 16-4 illustrates the distribution of on-site waste management reporting for the top industries in this sector.

Transfers Off-site for Further Waste Management

The miscellaneous manufacturing sector reported 17.8 million pounds of transfers to recycling in 1996, which amounted to 83.1% of the sector's transfers off-site for further waste management. Transfers to energy recovery totaled 2.5 million pounds (11.6%). Transfers to treatment and to POTWs each accounted for 3% or less of the sector's total transfers off-site for further waste management, as shown in Table 16-5. Figure 16-5 illustrates the percentage distribution of the miscellaneous manufacturing sector's reported transfers off-site for further waste management.

The fasteners, buttons, needles, and pins industry (SIC code 3965) reported transferring 4.9 million pounds to recycling, including 3.1 million pounds of copper and 1.7 million pounds of ethylene glycol. One facility reported transfers to recycling of 2.5 million pounds of copper. The facility mentioned above that reported substantial on-site recycling of copper reported all of the industry's transfers to recycling of ethylene glycol (1.7 million pounds). The two facilities are owned by the same parent company. The silverware and plated ware industry (SIC code 3914) ranked second for transfers to recycling, with 3.3 million pounds (18.8%), including 1.7 million pounds of chromium. One facility in this industry reported transferring 1.3 million pounds of chromium to recycling. Forms reporting invalid SIC codes in

Table 16-4. TRI Other On-site Waste Management, 1996: Miscellaneous Manufacturing, SIC Code 39 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3999	Manufacturing Industries, nec*	5,200,553	0	1,370,332	6,570,885
3955	Carbon Paper & Inked Ribbons	257,181	3,303,299	1,726,874	5,287,354
	Invalid SIC Code within SIC Code 39	2,869,736	0	18,000	2,887,736
3965	Fasteners, Buttons, Needles, & Pins	2,803,777	0	8,866	2,812,643
3993	Signs & Advertising Specialities	2,098,136	0	49,161	2,147,297
3949	Sporting & Athletic Goods, nec*	1,230,154	31,230	669,210	1,930,594
3996	Hard Surface Floor Coverings, nec*	837,196	0	355,436	1,192,632
3931	Musical Instruments	946,313	0	58,493	1,004,806
3914	Silverware & Plated Ware	201,557	0	129,794	331,351
3991	Brooms & Brushes	0	0	140,400	140,400
3911	Jewelry, Precious Metal	19,840	0	113,500	133,340
3944	Games, Toys, & Children's Vehicles	22,250	0	103,300	125,550
3951	Pens & Mechanical Pencils	17,622	24,508	0	42,130
3915	Jewelers' Materials & Lapidary Work	0	3,300	20,052	23,352
	Multiple within SIC Code 39	5,884	0	7,035	12,919
3995	Burial Caskets	12,486	0	0	12,486
3961	Costume Jewelry	9,150	0	0	9,150
3953	Marking Devices	1,422	0	0	1,422
3952	Lead Pencils & Art Goods	0	0	0	0
	Total for SIC Code 39	16,533,257	3,362,337	4,770,453	24,666,047

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds of treatment on-site and 3,209,773 pounds of other on-site waste management. The rank for SIC code 3999 changes from 1 to 2. Another facility incorrectly reported under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amount was 2,867,591 pounds of recycling on-site and total on-site waste management. The rank for invalid SIC code within SIC code 39 changes from 3 to 13.
***nec:** not elsewhere classified.

SIC code 39, explained above, reported 2.9 million pounds of transfers to recycling, the sector's third largest amount. This included forms from one facility totaling 2.5 million pounds; these forms should have been submitted in SIC code 3714.

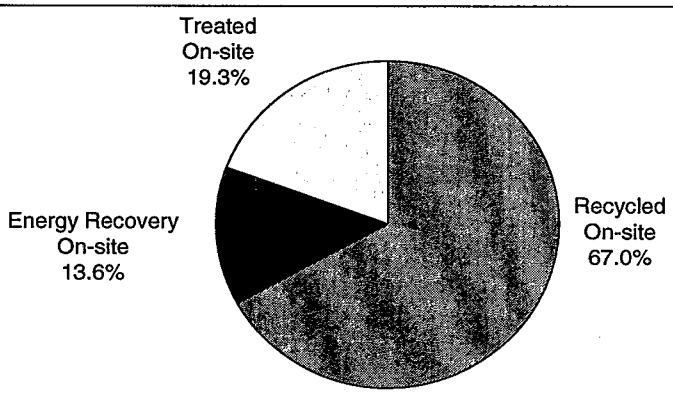


Figure 16-3. Distribution of TRI Other On-site Waste Management, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: Data from Section 8 of Form R.

Taking this error into account, the burial caskets industry (SIC code 3995) ranked third with 2.1 million pounds.

The miscellaneous manufacturing industries (SIC code 3999) reported half (50.8%) of the sector's transfers to energy recovery, with 1.3 million pounds. The chemical reported in the largest amount was toluene (594,000 pounds). The miscellaneous hard surface floor coverings industry (SIC code 3996) ranked second, with 438,000 pounds (17.7%), and the burial caskets industry (SIC code 3995) ranked third, with 257,000 pounds (10.3%).

The miscellaneous manufacturing industries (SIC code 3999) reported 166,000 pounds of transfers to treatment in 1996, which amounted to 32.2% of the sector's total in this category. The carbon paper and inked ribbons industry (SIC code 3955) ranked

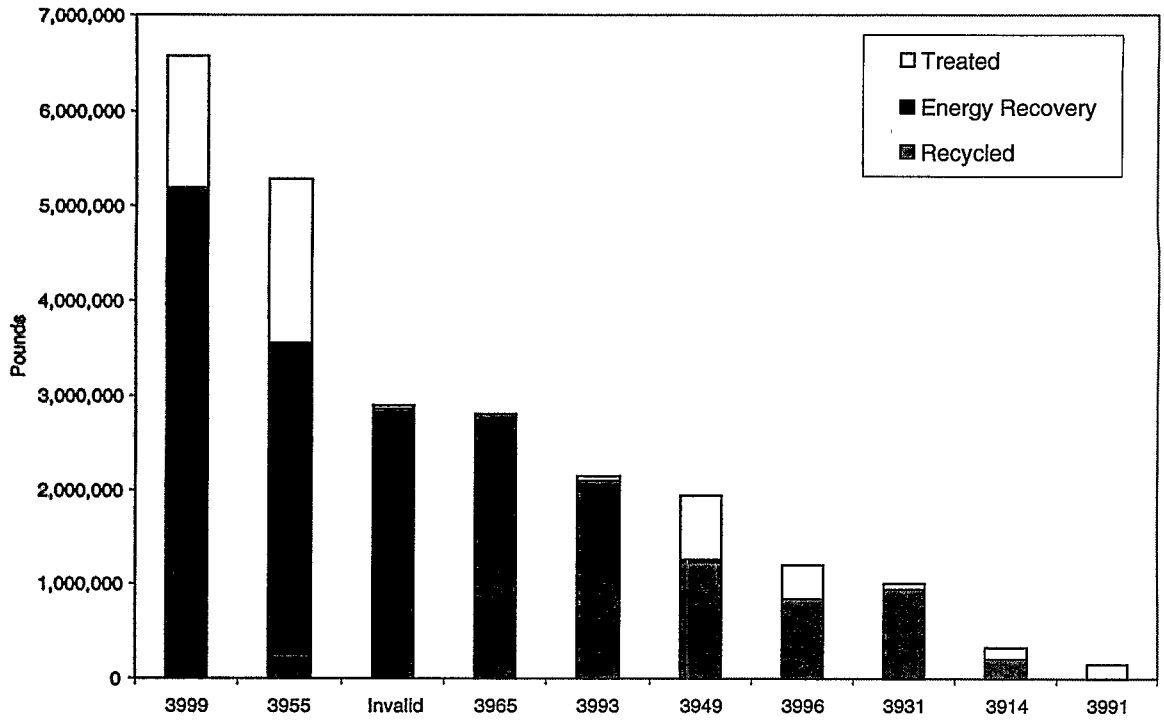


Figure 16-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: Other On-site Waste Management from Section 8 of Form R. Invalid SIC codes are codes beginning "39" that do not exist in the current Standard Industrial Classification code system. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds of treatment on-site and 3,209,773 pounds of other on-site waste management. The rank for SIC code 3999 changes from 1 to 2. Another facility incorrectly reported under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amount was 2,867,591 pounds of recycling on-site and of total on-site waste management. The rank for invalid SIC code within SIC code 39 changes from 3 to 13.

second, reporting 123,000 pounds (23.9%). Miscellaneous sporting and athletic goods (SIC code 3949) ranked third, reporting 55,000 pounds (10.7%).

The sector's largest transfers to POTWs were reported by the miscellaneous sporting and athletic goods industry (SIC code 3949), with 164,000 pounds (25.7%), followed by miscellaneous hard surface floor coverings (SIC code 3996) with 141,000 pounds (22.2%). Fasteners, buttons, needles, and pins (SIC code 3965) ranked third, with 101,000 pounds (15.8%).

Figure 16-6 illustrates the distribution of off-site transfers for further waste management for the top industries in this sector.

1996 TRI Data by State for Miscellaneous Manufacturing

The miscellaneous manufacturing sector submitted more than 50 forms in each of three states in 1996, as shown in Table 16-6. These states were Indiana (74 forms, or 9.7% of the sector's total), Pennsylvania (68 forms, or 8.9%), and Ohio (53 forms, or 6.9%).

Table 16-5. TRI Transfers Off-site for Further Waste Management, 1996: Miscellaneous Manufacturing, SIC Code 39 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3965	Fasteners, Buttons, Needles, & Pins	4,854,496	17,709	29,571	100,550	0	5,002,326
3914	Silverware & Plated Ware	3,349,597	0	29,757	257	0	3,379,611
3999	Manufacturing Industries, nec*	1,575,574	1,259,801	166,175	45,598	0	3,047,148
	Invalid SIC Code within SIC Code 39	2,884,775	0	15,727	2,783	0	2,903,285
3995	Burial Caskets	2,124,074	256,589	1,045	14,975	0	2,396,683
3993	Signs & Advertising Specialities	896,352	76,925	15,951	42,536	0	1,031,764
3949	Sporting & Athletic Goods, nec*	715,109	56,199	55,078	163,518	0	989,904
3955	Carbon Paper & Inked Ribbons	520,000	120,184	123,466	0	0	763,650
3996	Hard Surface Floor Coverings, nec*	80,033	437,871	4,027	141,298	0	663,229
3951	Pens & Mechanical Pencils	230,470	108,984	19,604	13,070	0	372,128
3931	Musical Instruments	174,318	30,006	34,281	510	0	239,115
3915	Jewelers' Materials & Lapidary Work	192,647	0	0	5	0	192,652
3953	Marking Devices	0	29,961	16,032	95,922	0	141,915
3952	Lead Pencils & Art Goods	129,460	0	0	0	0	129,460
3944	Games, Toys, & Children's Vehicles	23,366	60,800	0	0	0	84,166
	Multiple within SIC Code 39	34,886	24,149	1,390	14,098	0	74,523
3911	Jewelry, Precious Metal	33,284	0	1,881	25	0	35,190
3961	Costume Jewelry	16,819	233	707	250	0	18,009
3991	Brooms & Brushes	0	0	1,609	0	0	1,609
	Total for SIC Code 39	17,835,260	2,479,411	516,301	635,395	0	21,466,367

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amounts were: 2,490,481 pounds of transfers to recycling, 15,727 pounds of transfers to treatment, 23 pounds of transfers to POTWs and 2,506,231 pounds of transfers off-site for further waste management. The rank for invalid SIC code within SIC code 39 changes from 4 to 10.
***nec:** not elsewhere classified.

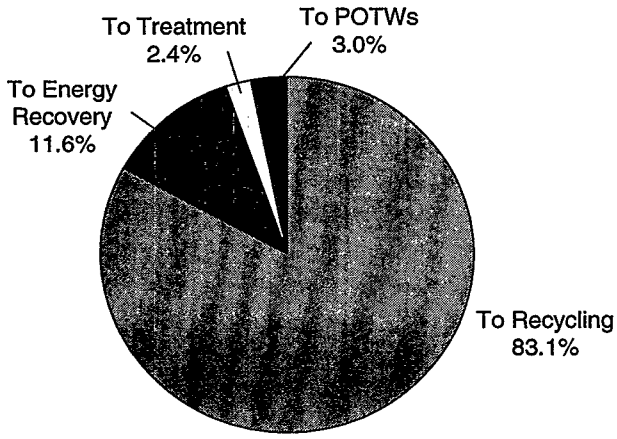


Figure 16-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

Indiana reported the largest total on- and off-site releases in this sector in 1996, 1.65 million pounds, or 16.0% of the sector's total. Pennsylvania ranked second with 1.58 million pounds (15.4%), and Puerto Rico ranked third with 548,000 pounds (5.3%). In all three locations, the miscellaneous manufacturing sector reported the majority of its releases as on-site releases. On-site releases totaled 1.6 million pounds (16.5% of the sector's total) in Indiana, 1.2 million pounds (13.0%) in Pennsylvania, and 548,000 (5.8%) pounds in Puerto Rico.

Pennsylvania ranked first for off-site releases (transfers to disposal) reported by the miscellaneous manufacturing sector, with 348,000 pounds (41.5% of the sector's total). A Pennsylvania facility reported the sector's largest transfers to disposal, 329,000 pounds of

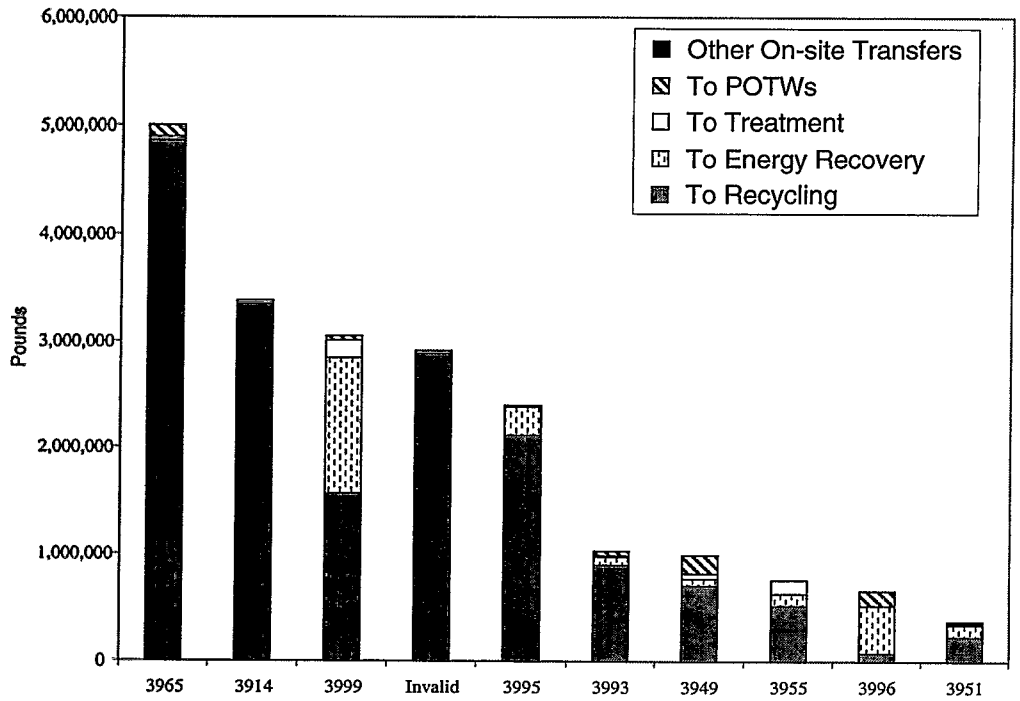


Figure 16-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: **Off-site Transfers for Further Waste Management** from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Invalid SIC codes are codes beginning "39" that do not exist in the current Standard Industrial Classification code system. One facility reported incorrectly under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amount was 2,506,231 pounds of transfers off-site for further waste management. The rank for invalid SIC code within SIC code 39 changes from 4 to 10.

di-(2-ethylhexyl) phthalate. Kentucky and Indiana followed Pennsylvania with 94,000 pounds (11.2%) and 89,000 pounds (10.6%), respectively.

The miscellaneous manufacturing sector reported 4.6 million pounds of other on-site waste management in New York, the state with the largest amount in this category. Ohio ranked second, with 3.3 million pounds, but this included the forms submitted erroneously with invalid SIC codes in SIC code 39, with on-site waste management of 2.9 million pounds. Colorado reported the third-largest amount, 3.2 million pounds, although this also included the facility that erroneously reported on-site recycling of 3.0 million pounds of zinc compounds in SIC code 3999 instead of in SIC code 3499. Taking into account the reporting errors in both states, Ohio would rank 10th and Colorado would rank last for other on-site waste management. Pennsylvania would rank second with 2.9 million pounds, and Georgia would rank third with 2.8 million pounds.

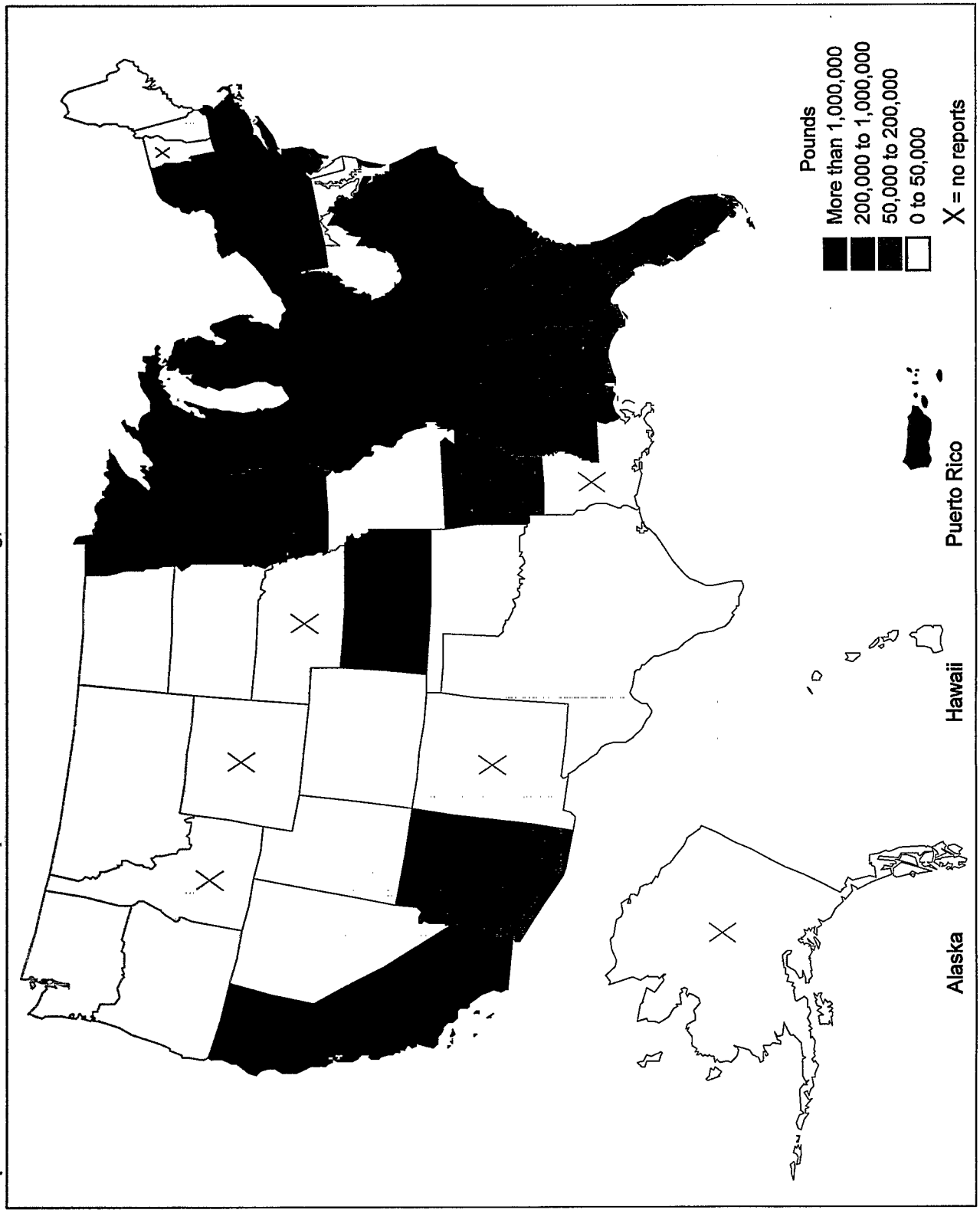
Georgia ranked first for transfers off-site for further waste management reported by the miscellaneous manufacturing sector in 1996. The Georgia total was 4.6 million pounds (21.5%), including one facility reporting 2.5 million pounds of copper and another facility (with the same parent company) reporting 1.7 million pounds of ethylene glycol. Both forms were for transfers to recycling. New York ranked second for transfers off-site for further waste management with 3.7 million pounds (17.4%). One New York facility reported transferring 1.3 million pounds of chromium off-site to recycling. Pennsylvania ranked third with 2.8 million pounds (13.0%).

Table 16-6. Summary of TRI Information by State, 1996: Miscellaneous Manufacturing, SIC Code 39

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	7	16	1	197,220	0	197,220	74,150	228,479	585,348	0
Arizona	5	8	0	169,238	4,396	173,634	12,947	136,629	317,869	0
Arkansas	4	8	2	172,314	0	172,314	0	17,239	176,983	0
California	19	37	1	256,958	9,149	266,107	266,855	224,500	705,996	0
Colorado	3	5	0	64	250	314	3,209,773	367,796	3,737,443	0
Connecticut	5	11	0	56,251	30,750	87,001	23,330	23,125	132,391	0
Delaware	1	1	0	1,912	0	1,912	0	0	1,912	0
Florida	9	10	0	96,899	0	96,899	98,006	16,333	209,977	0
Georgia	8	22	1	86,669	13,304	99,973	2,815,027	4,622,481	7,506,080	0
Hawaii	1	1	0	2,350	0	2,350	0	0	2,353	0
Illinois	27	48	5	317,960	55,992	373,952	9,765	862,192	1,465,854	0
Indiana	22	74	2	1,557,189	88,917	1,646,106	36,927	2,127,414	3,931,043	530
Iowa	6	10	1	115,660	0	115,660	22,550	17,900	161,320	0
Kansas	3	9	1	167,165	0	167,165	38,902	18,984	223,177	0
Kentucky	6	17	0	439,463	93,942	533,405	0	179,388	710,835	0
Maine	1	1	0	22,637	0	22,637	0	0	22,637	0
Maryland	4	5	0	1,010	0	1,010	1,055,336	100,280	1,152,833	3,164
Massachusetts	15	33	2	133,433	28,648	162,081	2,141,454	436,057	2,763,297	5,568
Michigan	11	26	0	359,173	4,955	364,128	943,260	267,080	1,595,156	1,110
Minnesota	4	5	1	53,290	0	53,290	40,818	41,558	135,666	0
Mississippi	7	17	1	408,931	0	408,931	26,470	42,258	476,284	0
Missouri	2	9	0	43,312	5,130	48,442	0	15,134	58,461	0
Montana	2	6	5	42,077	0	42,077	31,557	2,250	75,884	0
Nevada	2	5	0	0	0	0	0	26,121	37,319	0
New Hampshire	1	3	0	48,800	0	48,800	0	1,500	49,300	0
New Jersey	12	22	1	55,247	31,972	87,219	338,427	199,260	705,020	0
New York	17	42	0	329,397	80,193	409,590	4,593,116	3,745,642	8,855,761	0
North Carolina	12	18	1	102,739	14,028	116,767	153,266	804,676	1,417,724	1,100
North Dakota	2	4	0	46,213	0	46,213	5,188	0	51,140	0
Ohio	18	53	13	356,104	935	357,039	3,282,691	2,597,196	6,231,975	1,227
Oklahoma	3	7	0	260	1,792	2,052	41,400	44,922	87,949	0
Oregon	4	4	0	39,966	1,785	41,751	0	7,000	48,751	0
Pennsylvania	24	68	3	1,228,573	347,908	1,576,481	2,868,099	2,793,256	7,625,301	0
Puerto Rico	2	2	0	548,017	0	548,017	1,373,651	0	1,921,668	0
Rhode Island	26	41	8	62,330	1,150	63,480	231,441	301,971	610,313	500
South Carolina	7	10	0	377,040	7,352	384,392	66,741	12,685	462,666	11
South Dakota	5	6	1	34,763	0	34,763	0	25,293	59,046	0
Tennessee	10	29	0	462,859	1,705	464,564	31,463	573,869	1,067,331	0
Texas	14	20	3	21,887	750	22,637	0	54,640	88,711	15
Utah	4	6	1	21,407	0	21,407	590,000	55,966	662,127	10
Virginia	3	5	0	515,449	0	515,449	169,862	17,180	594,757	0
Washington	7	8	2	38,148	1,670	39,818	19,000	74,771	133,254	0
West Virginia	1	2	0	750	0	750	2,145	255	2,955	0
Wisconsin	16	32	0	439,651	12,610	452,261	52,430	383,087	778,634	11,302
Total for SIC Code 39	362	766	56	9,430,775	839,283	10,270,058	24,666,047	21,466,367	57,640,501	24,537

Note: On-site Releases from Section 5 of Form R. **On-site Waste Management** from Section 8 of Form R. **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. **Total Production-related Waste** sums Section 8 (Current Year, Column B) of Form R, except: **Non-production-related Waste** (remedial/catastrophic incidents). One facility in Colorado reported incorrectly under SIC code 39 for 1996. The correct SIC code is 34. The incorrectly reported amounts were as follows: 30 pounds of total releases, 3,209,773 pounds of other on-site waste management, 207,776 pounds of transfers off-site for further waste management and 3,417,119 pounds of total production-related waste. The on-site waste management rank for Colorado changes from 3 to last. The total production-related waste rank for Colorado changes from 6 to 25. Another facility in Ohio incorrectly reported under SIC code 39 for 1996. The correct SIC code is 37. The incorrectly reported amounts were as follows: 2,738 pounds of total releases, 2,867,591 pounds of other on-site waste management, 2,506,231 pounds of transfers off-site for further waste management and 5,376,558 pounds of total production-related waste. The on-site waste management rank for Ohio changes from 2 to 10. The transfers off-site for further waste management rank for Ohio changes from 4 to 19. The total production-related waste rank for Ohio changes from 4 to 12.

Map 16-1. Total On- and Off-site Releases, 1996: Miscellaneous Manufacturing, SIC Code 39



Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R.

Table 16-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Miscellaneous Manufacturing, SIC Code 39 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
108-88-3	Toluene	3,210,545	1	0	0	0	169	3,210,715	6,655	3,217,370
78-93-3	Methyl ethyl ketone	1,016,787	0	0	0	10,688	0	1,027,475	3,935	1,031,410
1330-20-7	Xylene (mixed isomers)	1,010,266	6	0	0	0	0	1,010,272	1,994	1,012,266
75-09-2	Dichloromethane	870,901	5	0	0	0	0	870,906	0	870,906
100-42-5	Styrene	859,291	250	0	0	519	0	860,060	900	860,960
108-10-1	Methyl isobutyl ketone	424,351	0	0	0	0	0	424,351	3,105	427,456
--	Glycol ethers	402,624	265	0	0	0	265	403,154	0	403,154
117-81-7	Di-(2-ethylhexyl) phthalate	22,306	0	0	0	0	162	22,468	358,638	381,106
79-01-6	Trichloroethylene	312,990	0	0	0	0	0	312,990	0	312,990
110-54-3	n-Hexane	206,320	0	0	0	0	0	206,320	0	206,320
71-36-3	n-Butyl alcohol	191,037	0	0	0	0	0	191,037	0	191,037
110-82-7	Cyclohexane	140,363	0	0	0	0	0	140,363	0	140,363
127-18-4	Tetrachloroethylene	130,808	0	0	0	0	0	130,808	0	130,808
67-56-1	Methanol	124,283	0	0	0	0	0	124,283	15	124,298
--	Zinc compounds	7,259	57	0	0	0	6,755	14,071	95,130	109,201
	Subtotal	8,930,131	584	0	0	11,207	7,351	8,949,273	470,372	9,419,645
	Total for SIC Code 39	9,408,265	2,364	0	0	11,957	8,189	9,430,775	839,283	10,270,058

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R.

The sector's production-related waste totaled 8.9 million pounds in New York, 7.6 million pounds in Pennsylvania, and 7.5 million pounds in Georgia. These top three states represented 15.4%, 13.2%, and 13.0%, respectively, of the sector's total production-related waste.

Map 16-1 illustrates the geographic distribution of total on- and off-site releases in the miscellaneous manufacturing sector.

1996 TRI Data by Chemical for Miscellaneous Manufacturing

In 1996, the miscellaneous manufacturing sector reported larger total on- and off-site releases for toluene than for any other chemical, 3.2 million pounds. The sector reported comparable amounts for the second- and third-ranked chemicals: 1.03 million pounds of methyl ethyl ketone and 1.01 million pounds of xylenes. Air emissions accounted for 98% or more of the releases reported for these three chemicals and for 10 others among the top 15. Table 16-7 presents the top 15 chemicals for total on- and off-site releases reported by the miscellaneous manufacturing sector in 1996.

As indicated earlier, three industries in this sector reported large air emissions of toluene. Miscellaneous manufacturing industries (SIC code 3999) reported 1.0 million pounds, including 545,000 pounds by one facility. The burial caskets industry (SIC code 3995) reported 993,000 pounds, including 214,000 pounds by one facility. The miscellaneous sporting and athletic goods industry (SIC code 3949) reported 718,000 pounds, including 402,000 pounds by one facility. Toluene is used in wood finishing and metal cutting processes that also apply in casket manufacturing. Production processes that use toluene in the manufacture of some sporting and athletic goods are the same as some processes used in the rubber and plastics sector.

Off-site releases (transfers to disposal) constituted the majority of the sector's reported releases for two of the top 15 chemicals: di-(2-ethylhexyl) phthalate (359,000 pounds, mostly by one facility

Table 16-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Miscellaneous Manufacturing, SIC Code 39 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3999	Manufacturing Industries, nec*	1,328,693	5	0	0	0	0	1,328,698	49,390	1,378,088
3996	Hard Surface Floor Coverings, nec*	31,470	0	0	0	0	162	31,632	358,638	390,270
3949	Sporting & Athletic Goods, nec*	330,153	440	0	0	519	395	331,507	5,650	337,157
3931	Musical Instruments	137,611	0	0	0	0	0	137,611	33,600	171,211
3993	Signs & Advertising Specialities	97,389	0	0	0	0	0	97,389	0	97,389
3914	Silverware & Plated Ware	77,639	568	0	0	0	0	78,207	7,456	85,663
3965	Fasteners, Buttons, Needles, & Pins	57,308	116	0	0	0	0	57,424	0	57,424
3951	Pens & Mechanical Pencils	47,805	0	0	0	0	0	47,805	0	47,805
3953	Marking Devices	45,220	0	0	0	0	0	45,220	0	45,220
3995	Burial Caskets	20,463	0	0	0	0	0	20,463	2,681	23,144
3952	Lead Pencils & Art Goods	20,980	0	0	0	0	0	20,980	0	20,980
3911	Jewelry, Precious Metal	10,374	0	0	0	0	0	10,374	0	10,374
	Invalid SIC Code within SIC Code 39	3,107	41	0	0	0	0	3,148	0	3,148
3991	Brooms & Brushes	1,255	0	0	0	0	0	1,255	0	1,255
3944	Games, Toys, & Children's Vehicles	1,100	0	0	0	0	0	1,100	0	1,100
	Multiple within SIC Code 39	66	0	0	0	0	0	66	0	66
	Subtotal	2,210,633	1,170	0	0	519	557	2,212,879	457,415	2,670,294
	Total for SIC Code 39	9,408,265	2,364	0	0	11,957	8,189	9,430,775	839,283	10,270,058

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category.
*nec: not elsewhere classified.

in SIC code 3996) and zinc compounds (95,000 pounds).

OSHA Carcinogens

As shown in Table 16-8, the miscellaneous manufacturing sector reported total releases in 1996 of 2.7 million pounds of chemicals designated as OSHA carcinogens, or one-fourth (26.0%) of all releases reported in this sector in 1996. (OSHA carcinogens and the bases for their designation appear in Box 1-9 in Chapter 1.) Reported releases of OSHA carcinogens amounted to one-fourth (23.5%) of the sector's total air emissions, but more than half (54.5%) of all off-site releases (transfers to disposal) reported by this sector.

Five of the top 15 chemicals for total releases reported by this sector were OSHA carcinogens. These were dichloromethane with releases totaling 871,000 pounds, styrene with 861,000 pounds, di-(2-ethylhexyl) phthalate with 381,000 pounds, trichloroethylene with 313,000 pounds, and tetrachloroethylene with 131,000 pounds (see Table 16-7). Reported releases of these OSHA carcinogens consisted almost entirely of air emissions, except for di-(2-ethylhexyl) phthalate, largely reported as off-site releases (transfers to disposal).

Miscellaneous manufacturing industries (SIC code 3999) ranked first in this sector for releases of OSHA carcinogens and reported air emissions of 1.3 million pounds of these chemicals, including much of the dichloromethane (590,000 pounds) and styrene (554,000 pounds). The miscellaneous hard surface floor coverings industry (SIC code 3996) ranked second with 359,000 pounds of off-site releases (transfers to disposal). As noted, one facility in this industry reported transfers to disposal of 329,000 pounds of di-(2-ethylhexyl) phthalate.

Figure 16-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

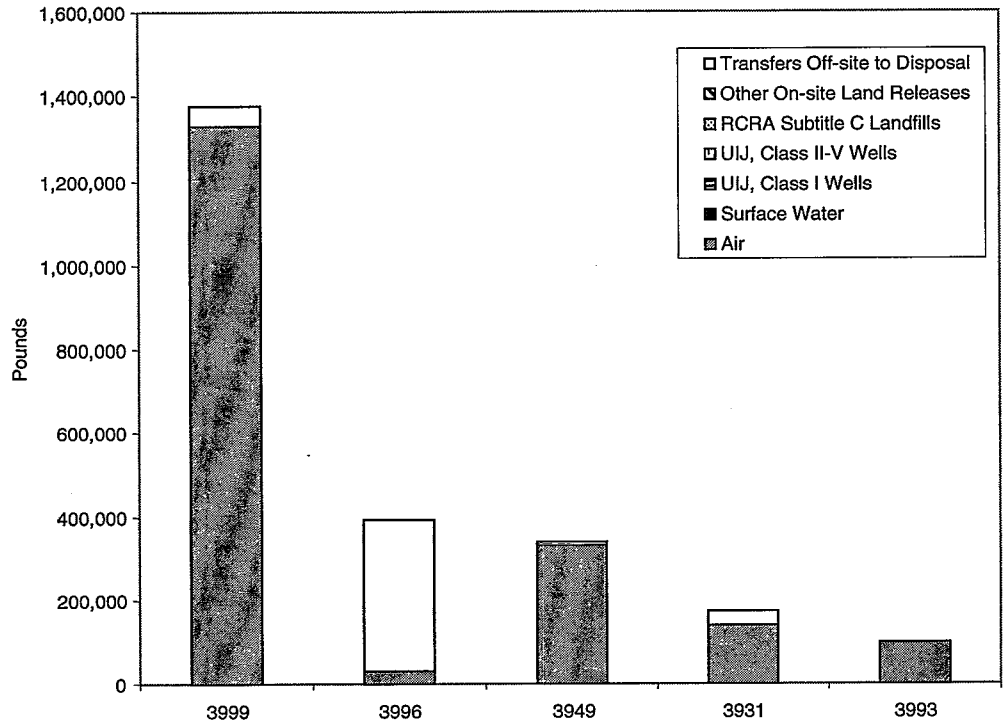


Figure 16-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. **UIJ** = underground injection.

1996 TRI Chemicals in Waste for Miscellaneous Manufacturing

Table 16-9 and Figure 16-8 present waste management data for all industries in SIC code 39. The miscellaneous manufacturing sector reported production-related waste totaling 57.6 million pounds in 1996. The sector reported 18.5 million pounds (32.0% of total production-related waste) as off-site recycling and another 16.5 million pounds (28.7%) as on-site recycling. Among waste management options, quantities released on- and off-site ranked third in this sector with 10.8 million pounds (18.8%). Other waste management options accounted for less than 10% each of the sector's total production-related waste.

The fasteners, buttons, needles, and pins industry (SIC code 3965) reported one-fourth (26.3%) of the sector's off-site recycling, with 4.9 million pounds. The silverware and plated ware (SIC code 3914) industry ranked second with 3.3 million pounds (18.1%), followed by the forms reporting invalid SIC codes within SIC code 39, explained earlier in this chapter, with 2.9 million pounds (15.5%). Forms reporting invalid SIC codes include 2.5 million pounds of off-site recycling reported by the facility that should have reported in SIC code 3714. Taking into account this error, the burial caskets industry (SIC code 3995) would rank third, with 2.2 million pounds.

Miscellaneous manufacturing industries (SIC code 3999) reported the largest on-site recycling, with 5.2 million pounds (31.5%), but as noted this included 3.0 million pounds of zinc compounds by a facility that should have reported in SIC code

3499. The forms with invalid SIC codes reported 2.9 million pounds (17.4%), which should have been reported in SIC code 3714. The fasteners, buttons, needles, and pins industry reported 2.8 million pounds (17.0%) and would rank first for on-site recycling when these errors are taken into account. As noted above, the signs and advertising specialties industry (SIC code 3993) would rank second with 2.1 million pounds, and the miscellaneous sporting and athletic goods industry (SIC code 3949) would rank third with 1.2 million pounds.

For quantities released on- and off-site, the miscellaneous manufacturing industries (SIC code 3999) reported this sector's largest amounts, totaling 3.5 million pounds (31.9% of the sector's total). The burial caskets industry (SIC code 3995) reported the second-largest amount, 2.3 million pounds (21.2%). The miscellaneous sporting and athletic goods industry (SIC code 3949) ranked third, reporting 2.0 million pounds (18.1%).

As noted earlier, the carbon paper and inked ribbon industry (SIC code 3955) reported almost all of the sector's on-site energy recovery in 1996. This industry reported 3.3 million pounds, which was 98.2% of the sector's total. This industry also

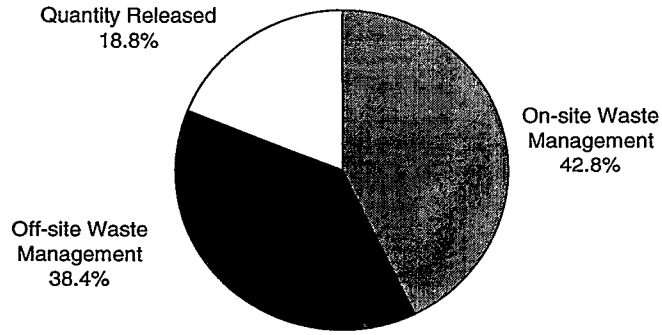


Figure 16-8. Distribution of TRI Production-related Waste, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: Data from Section 8 of Form R.

Table 16-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Miscellaneous Manufacturing, SIC Code 39 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3999	Manufacturing Industries, nec*	5,200,553	0	1,370,332	1,610,127	1,340,773	127,702	3,456,873	13,106,360	2,327
3965	Fasteners, Buttons, Needles, & Pins	2,803,777	0	8,866	4,850,068	9,499	123,345	118,183	7,913,738	0
3955	Carbon Paper & Inked Ribbons	257,181	3,303,299	1,726,874	520,000	120,184	171,505	542,719	6,641,762	0
	Invalid SIC Code within SIC Code 39	2,869,736	0	18,000	2,866,773	0	25	402,120	6,156,654	1,110
3949	Sporting & Athletic Goods, nec*	1,230,154	31,230	669,210	1,243,677	52,426	247,909	1,958,474	5,433,080	3,200
3995	Burial Caskets	12,486	0	0	2,216,905	256,990	40,559	2,297,576	4,824,516	530
3914	Silverware & Plated Ware	201,557	0	129,794	3,345,475	3,000	34,005	118,428	3,832,259	5,568
3993	Signs & Advertising Specialities	2,098,136	0	49,161	901,950	76,877	53,927	237,137	3,417,188	11,302
3996	Hard Surface Floor Coverings, nec*	837,196	0	355,436	80,242	398,740	181,190	733,347	2,586,151	0
3931	Musical Instruments	946,313	0	58,493	185,740	27,120	38,908	364,852	1,621,426	0
3951	Pens & Mechanical Pencils	17,622	24,508	0	204,304	109,547	32,324	116,056	504,361	0
3944	Games, Toys, & Children's Vehicles	22,250	0	103,300	23,204	60,730	0	227,635	437,119	0
3911	Jewelry, Precious Metal	19,840	0	113,500	31,326	0	1,881	70,063	236,610	500
3915	Jewelers' Materials & Lapidary Work	0	3,300	20,052	192,647	0	500	3,094	219,593	0
3953	Marking Devices	1,422	0	0	0	30,196	110,162	49,721	191,501	0
3991	Brooms & Brushes	0	0	140,400	0	0	1,590	24,107	166,097	0
	Multiple within SIC Code 39	5,884	0	7,035	39,886	23,690	14,253	68,296	159,044	0
3952	Lead Pencils & Art Goods	0	0	0	129,460	0	0	21,571	151,031	0
3961	Costume Jewelry	9,150	0	0	19,810	233	707	12,111	42,011	0
	Total for SIC Code 39	16,533,257	3,362,337	4,770,453	18,461,594	2,510,005	1,180,492	10,822,363	57,640,501	24,537

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site and 3,417,119 pounds of total production-related waste. The rank of SIC code 3999 for recycling on-site changes from 1 to 4. Another facility incorrectly reported under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 2,867,591 pounds of recycling on-site, 2,490,479 pounds of recycling off-site, 18,488 of quantity released and 5,376,558 pounds of total production-related waste. The total production-related waste rank for invalid SIC code within SIC code 39 changes from 4 to 10.
*nec: not elsewhere classified.

reported the largest on-site treatment, 1.7 million pounds, or 36.2%, followed by miscellaneous manufacturing industries (SIC code 3999) with 1.4 million pounds (28.7%) and miscellaneous sporting and athletic goods (SIC code 3949) with 669,000 pounds (14.0%).

The miscellaneous manufacturing industries (SIC code 3999) reported more than half (53.4%) of the sector's total for off-site energy recovery with 1.3 million pounds. The miscellaneous hard surface floor coverings industry (SIC code 3996) ranked second in this category, reporting 399,000 pounds (15.9%), and the burial caskets industry (SIC code 3995) ranked third, reporting 257,000 pounds (10.2%).

The miscellaneous sporting and athletic goods industry (SIC code 3949) reported 248,000 pounds of off-site treatment, which was 21.0% of the sector's total in this category. The miscellaneous hard surface floor coverings industry (SIC code 3996) ranked second with 181,000 pounds (15.3%). The carbon paper and inked ribbons industry (SIC code 3955) ranked third with 172,000 pounds (14.5%).

Distribution of production-related waste for the top industries in the sector appears in Figure 16-9.

Projected Quantities of TRI Chemicals in Waste

The miscellaneous manufacturing sector projected little net change in production-related waste from 1996, when the sector reported a total of 57.6 million pounds, to 1998, when it projected a total of 57.4 million pounds. This projection would represent a 0.5% decrease. The miscellaneous manufacturing sector's projections of waste management data through 1998 appear in Table 16-10. (As explained in Chapter 1, facilities not

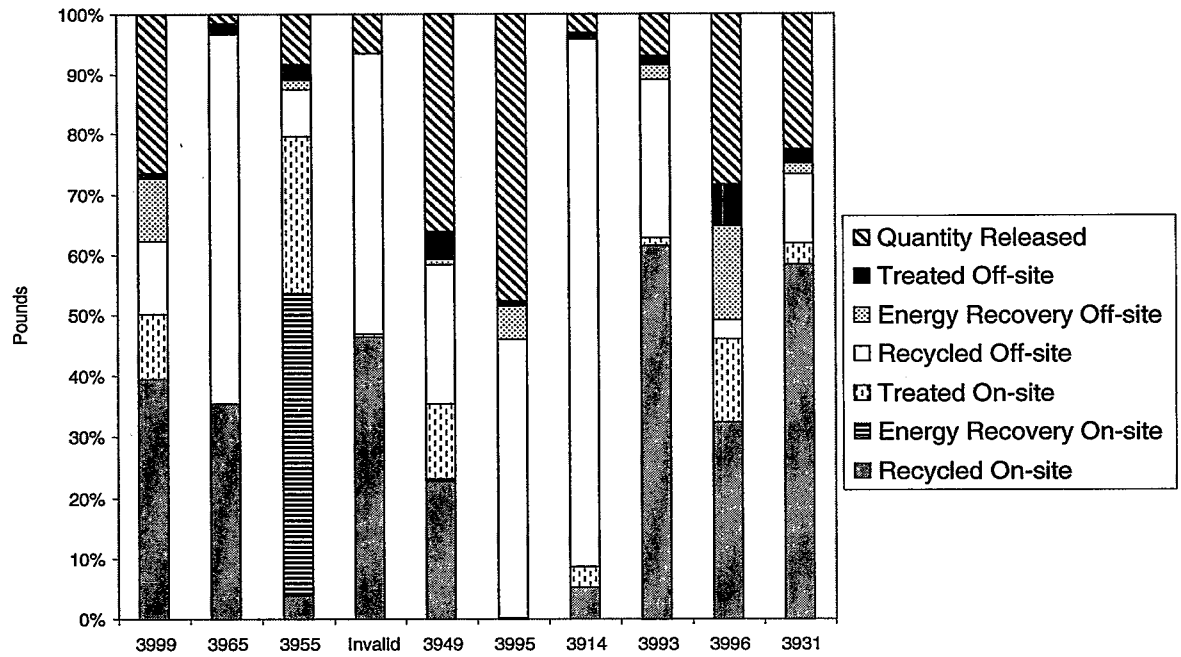


Figure 16-9. Distribution of Production-related Waste, SIC Codes with Largest Totals, 1996: Miscellaneous Manufacturing (SIC Code 39)

Note: Data from Section 8 of Form R. Invalid SIC codes are codes beginning "39" that do not exist in the current Standard Industrial Classification code system. One facility reported incorrectly under an invalid SIC code within SIC code 39 for 1996. The correct SIC code is 3714. The incorrectly reported amount was 5,376,558 pounds of total production-related waste. The rank for invalid SIC code within SIC code 39 changes from 4 to 10.

only report current data but project waste management quantities for the next two years in their TRI submissions.)

The sector projected an 8.2% reduction in quantities released on- and off-site, from 10.8 million pounds in 1996 to 9.9 million pounds in 1998, the largest projected decrease in both pounds and percent. The sector also expected a 4.3% reduction in off-site recycling, from 18.5 million pounds to 17.7 million pounds. Together, these two projected decreases would amount to a reduction of 1.7 million pounds from 1996 to 1998.

A smaller reduction was also projected in off-site treatment, from 1.2 million pounds to 1.1 million pounds (a 7.8% decrease). The sector projected essentially no change in off-site energy recovery.

Table 16-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Miscellaneous Manufacturing, SIC Code 39

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
On-site Waste Management						
Recycled On-site	16,533,257	28.7	16,218,327	28.4	16,901,445	29.5
Energy Recovery On-site	3,362,337	5.8	3,687,600	6.5	4,192,884	7.3
Treated On-site	4,770,453	8.3	5,030,925	8.8	5,078,412	8.9
Off-site Waste Management						
Recycled Off-site	18,461,594	32.0	18,283,897	32.0	17,662,211	30.8
Energy Recovery Off-site	2,510,005	4.4	2,616,519	4.6	2,505,492	4.4
Treated Off-site	1,180,492	2.0	1,082,775	1.9	1,088,925	1.9
Quantity Released On- and Off-site	10,822,363	18.8	10,156,678	17.8	9,940,334	17.3
Total Production-related Waste for SIC Code 39	57,640,501	100.0	57,076,721	100.0	57,369,703	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	-1.9	4.2	2.2
Energy Recovery On-site	9.7	13.7	24.7
Treated On-site	5.5	0.9	6.5
Off-site Waste Management			
Recycled Off-site	-1.0	-3.4	-4.3
Energy Recovery Off-site	4.2	13.7	-0.2
Treated Off-site	-8.3	0.9	-7.8
Quantity Released On- and Off-site	-6.2	-2.1	-8.2
Total Production-related Waste for SIC Code 39	-1.2	0.5	-0.5

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

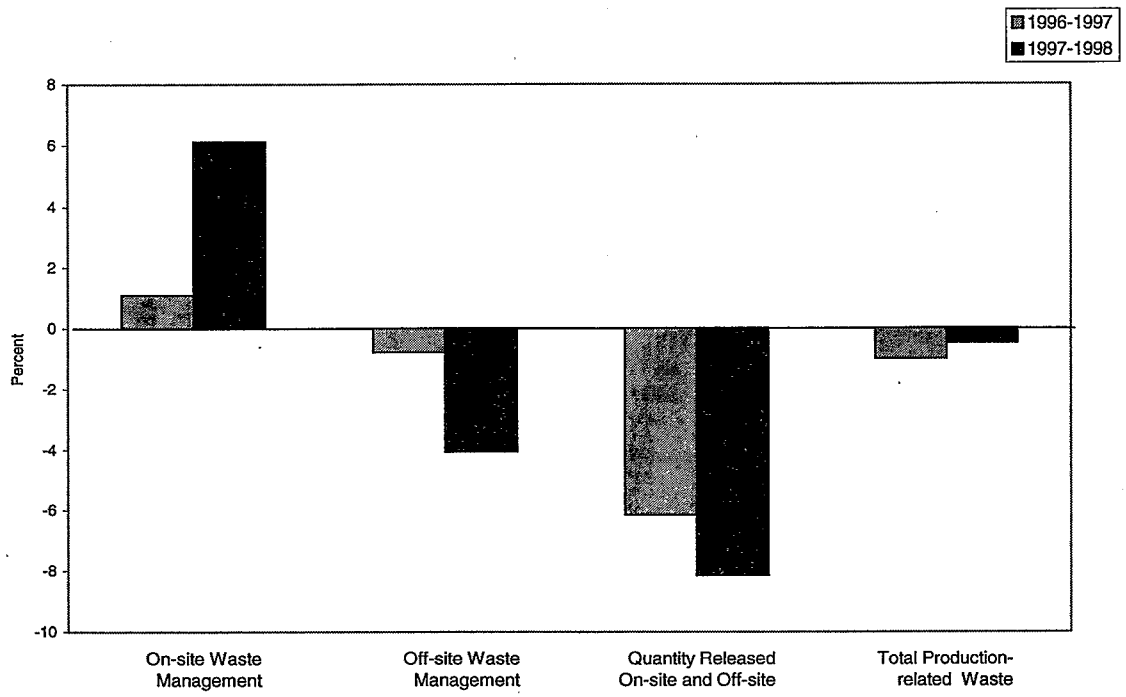


Figure 16-10. Projected Percentage Change in Quantities of TRI Chemicals in Waste, 1996-1998: Miscellaneous Manufacturing (SIC Code 39)

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

The sector projected its largest increase, in pounds and percent, in on-site energy recovery, from 3.4 million pounds to 4.2 million pounds, or 24.7%. Increases were also projected in on-site recycling, from 16.5 million pounds to 16.9 million pounds (a 2.2% increase) and in on-site treatment, from 4.8 million pounds to 5.1 million pounds (a 6.5% increase). These projected increases would total an increase of 1.5 million pounds.

Figure 16-10 illustrates the projected percentage changes in on-site waste management, off-site waste management, quantities released on- and off-site, and total production-related waste.

The miscellaneous manufacturing sector's projections primarily indicate changes in where, rather than how, the sector expects to manage its TRI chemicals in waste. The projected data do, however, represent some potential improvement in the sector's management of TRI chemicals in waste. Quantities released would decrease as a percentage of total production-related waste (from 18.8% in 1996 to 17.3% in 1998, as shown in Table 16-10). Energy recovery (on-site and off-site) would increase somewhat as a proportion of production-related waste. In terms of the waste management hierarchy, explained in Chapter 1, energy recovery is a more desirable option than releases for waste that cannot be prevented.

Source Reduction Activity

The miscellaneous manufacturing sector submitted 195 forms that indicated one or more source reduction activities underway in 1996, as shown in Table 16-11. These forms represented one-fourth (25.5%) of all forms submitted by the sector. The miscellaneous manufacturing industries (SIC code 3999) submitted 52 of these forms, the largest number submitted by any industry in this sector. This number amounted to one-fifth (21.1%) of the forms submitted in SIC code 3999. The miscellaneous sporting and athletic goods industry

Table 16-11. Number of Forms Reporting Source Reduction Activity, 1996: Miscellaneous Manufacturing, SIC Code 39

SIC Code	Industry	Total Forms Number	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
3911	Jewelry, Precious Metal	25	7	28.0	2	3	0	0	3	4	0	0
3914	Silverware & Plated Ware	33	6	18.2	1	0	2	2	2	1	0	0
3915	Jewelers' Materials & Lapidary Work	14	3	21.4	2	0	0	1	0	0	0	0
3931	Musical Instruments	30	10	33.3	1	0	0	0	0	3	6	0
3944	Games, Toys, & Children's Vehicles	21	5	23.8	3	0	0	2	0	0	0	0
3949	Sporting & Athletic Goods, nec*	123	31	25.2	13	2	4	8	4	1	1	4
3951	Pens & Mechanical Pencils	23	7	30.4	3	0	0	0	2	2	0	0
3952	Lead Pencils & Art Goods	8	0	0.0	0	0	0	0	0	0	0	0
3953	Marking Devices	11	3	27.3	3	0	2	2	0	0	0	0
3955	Carbon Paper & Inked Ribbons	14	12	85.7	12	0	0	0	4	0	0	0
3961	Costume Jewelry	9	1	11.1	0	0	0	0	0	0	1	0
3965	Fasteners, Buttons, Needles, & Pins	23	4	17.4	2	0	0	0	1	1	0	0
3991	Brooms & Brushes	6	2	33.3	2	0	1	0	0	0	0	0
3993	Signs & Advertising Specialities	29	10	34.5	3	0	1	5	0	3	2	1
3995	Burial Caskets	90	29	32.2	16	0	0	14	3	0	7	2
3996	Hard Surface Floor Coverings, nec*	32	8	25.0	3	0	3	1	6	0	0	0
3999	Manufacturing Industries, nec*	245	52	21.2	17	12	8	8	18	1	5	8
	Multiple within SIC Code 39	15	5	33.3	1	0	0	5	1	0	1	0
	Invalid SIC Code within SIC Code 39	15	0	0.0	0	0	0	0	0	0	0	0
	Total for SIC Code 39	766	195	25.5	84	17	21	48	44	16	23	15

Note: Forms with more than one 4-digit SIC code within code 39 are assigned to the "multiple" category.
*nec: not elsewhere classified.

(SIC code 3949) submitted the second-largest total, 31 forms, or one-fourth (25.2%) of that industry's forms. The burial caskets industry (SIC code 3995) ranked third with 29, nearly one-third (32.2%) of that industry's forms.

Improved operating practices were the most frequently cited source reduction activity, reported on 84 forms, as shown in Table 16-11. Raw material modifications appeared on 48 forms, and process modifications on 44 forms.

Year-to-Year Comparisons for Miscellaneous Manufacturing

1995-1996 TRI Data for Miscellaneous Manufacturing

The number of forms submitted by the miscellaneous manufacturing sector decreased from 813 in 1995 to 766 in 1996, a 5.8% reduction, as shown in Table 16-12. The sector submitted relatively few Form As, but these increased 19.1% from 47 in 1995 to 56 in 1996. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the Form A certification statement in its second year of availability.

On- and Off-site Releases

Total on- and off-site releases reported by the miscellaneous manufacturing sector, decreased 25.9%, from 13.9 million pounds in 1995 to 10.3 million pounds in 1996, as shown in Table 16-12. Approximately two-thirds of the overall 3.6 million-pound reduction was reported in air emissions. The sector reported a 20.2% reduction in air emissions, from 11.8 million pounds in 1995 to 9.4 million pounds in 1996. Both fugitive and point-source emissions decreased, as shown in Table 16-12. The remaining one-third of the overall reduction was reported as a decrease in off-site releases (transfers to disposal), which decreased

Table 16-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Miscellaneous Manufacturing, SIC Code 39

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	367	362	-1.4
Total Forms	813	766	-5.8
Form Rs	766	710	-7.3
Form As	47	56	19.1
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	11,794,890	9,408,265	-20.2
Fugitive Air	3,751,675	1,929,982	-48.6
Point Source Air	8,043,215	7,478,283	-7.0
Surface Water Discharges	2,005	2,364	17.9
Underground Injection	0	0	--
On-site Land Releases	18,818	20,146	7.1
Total On-site Releases	11,815,713	9,430,775	-20.2
Off-site Releases			
Transfers Off-site to Disposal	2,053,205	839,283	-59.1
Total On- and Off-site Releases	13,868,918	10,270,058	-25.9
Other On-site Waste Management			
Recycled On-site	13,537,716	16,533,257	22.1
Energy Recovery On-site	2,598,693	3,362,337	29.4
Treated On-site	6,027,332	4,770,453	-20.9
Total Other On-site Waste Management	22,163,741	24,666,047	11.3
Transfers Off-site for Further Waste Management			
Transfers to Recycling	15,956,147	17,835,260	11.8
Transfers to Energy Recovery	2,918,970	2,479,411	-15.1
Transfers to Treatment	601,499	516,301	-14.2
Transfers to POTWs	846,029	635,395	-24.9
Other Off-site Transfers	2,140	0	-100.0
Total Transfers Off-site for Further Waste Management	20,324,785	21,466,367	5.6

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995. Other Off-site Transfers are transfers reported without a valid waste management code. One facility reported incorrectly under SIC code 39 for 1996. The correct SIC code is 37. The incorrectly reported amounts were 3,209,200 pounds of recycling on-site and 3,209,773 pounds of total other on-site waste management. Another facility incorrectly reported under SIC code 39 for 1995 and 1996. The correct SIC code is 37. The incorrectly reported amounts for 1995 were as follows: 3,270,607 pounds of recycling on-site, 3,270,607 pounds of total other on-site waste management, 2,602,832 pounds of transfers to recycling and 2,614,809 pounds of total transfers off-site for further waste management. The incorrectly reported amounts for 1996 were as follows: 2,867,591 pounds of recycling on-site, 2,867,591 pounds of total on-site waste management, 2,490,481 pounds of transfers to recycling and 2,506,231 pounds of total transfers off-site for further waste management. Accounting for these two facility errors, the percentage change in recycling on-site changes from 22.1% to 1.8%, in total other on-site waste management changes from 11.3% to –14.9%, in transfers to recycling changes from 11.8% to 14.9% and in total transfers off-site for further waste management changes from 5.6% to 7.1%.

59.1% from 2.1 million pounds in 1995 to 839,000 pounds in 1996. Much of the reduction in off-site releases reflects a decrease in off-site releases of di-(2-ethylhexyl) phthalate. One facility in SIC code 3996 (miscellaneous hard surface floor coverings), mentioned earlier, reported 1.2 million pounds of off-site releases of this chemical in 1995 and 329,000 pounds in 1996.

The sector reported very small amounts of on-site releases to surface waters and to land in 1995 and 1996. Increases in these two release types totaled less than 2,000 pounds.

Figure 16-11 illustrates the percentage change in on- and off-site releases reported by the miscellaneous manufacturing sector from 1995 to 1996.

Other On-site Waste Management

The miscellaneous manufacturing sector reported 22.2 million pounds of other on-site waste management in 1995 and 24.7 million pounds in 1996, as shown in Table 16-12. This constituted an 11.3% increase. The sector reported an increase in on-site recycling from 13.5 million pounds to 16.5 million pounds, or 22.1%. Most of this increase consisted of a 2.7 million-pound increase by the facility, mentioned earlier in this chapter, that should have reported in SIC code 3499. Without this reporting error, on-site recycling would show an increase of 1.8% and total other on-site waste management would show a decrease of 14.9%. The miscellaneous manufacturing sector also reported an increase in on-site energy recovery, from 2.6 million pounds to 3.4 million pounds or 29.4%. These increases were partly offset by a reduction in on-site treatment from 6.0 million pounds to 4.8 million pounds, or 20.9%.

Transfers Off-site for Further Waste Management

Transfers off-site for further waste management increased from 20.3 million pounds in 1995 to 21.5 million pounds in 1996, as shown in Table 16-12. This 5.6% increase reflected an 11.8% increase in transfers to recycling (from 16.0 million pounds to 17.8 million pounds), partly offset by reductions in other transfer types. Without the reporting errors previously mentioned, the increase in total transfers off-site for further waste management would be 7.1% and the increase in transfers to recycling would be 14.9%. The sector reported a reduction in transfers to energy recovery from 2.9 million pounds in 1995 to 2.5 million pounds in 1996 (a 15.1% reduction). Transfers to treatment decreased 14.2% from 601,000 pounds to 516,000 pounds, and transfers to POTWs decreased 24.9% from 846,000 pounds to 635,000 pounds.

1988-1996 TRI Data for Miscellaneous Manufacturing

As explained in Chapter 1, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

The number of forms reporting miscellaneous manufacturing SIC codes dropped 24.0% from 867 in 1988 to 659 in 1996, as presented in Table 16-13. On- and off-site releases of the 1988-1996 "core" chemicals decreased by 69.8%, or 22.7 million pounds, and decreases occurred in all release media, as shown in Figure 16-12.

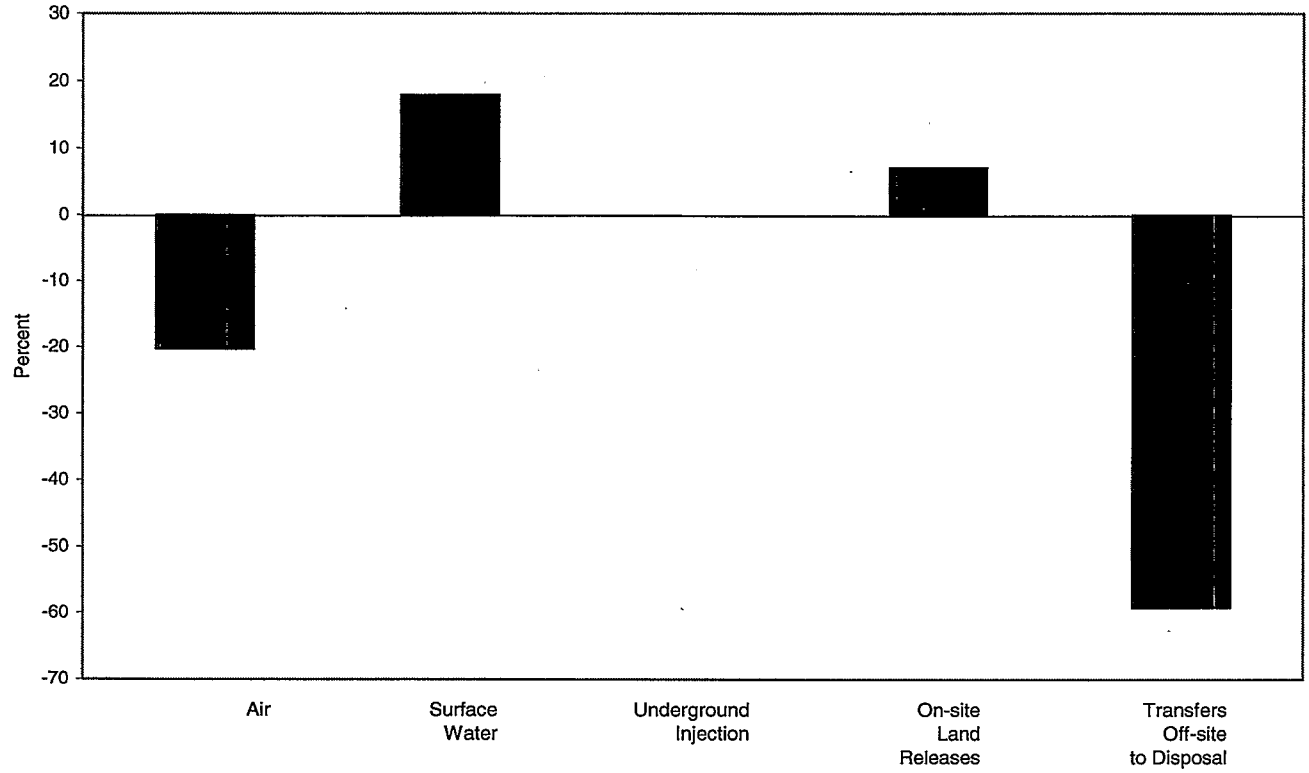


Figure 16-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Miscellaneous Manufacturing (SIC Code 39)

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required in 1995.

Reductions in air emissions accounted for most of the overall decrease. The sector reported decreases from 1988 to 1996 of 80.8% (from 9.1 million pounds to 1.7 million pounds) in fugitive emissions and 61.9% (from 19.1 million pounds to 7.3 million pounds) in point-source emissions. The reduction in off-site releases (transfers to disposal) amounted to 80.9% (from 4.1 million pounds to 785,000 pounds), again reflecting a decrease in transfers to disposal of di-(2-ethylhexyl) phthalate by one facility (see "Facilities with Large Increases and Decreases in Releases, 1988-1996," below).

The sector reported small amounts of surface water discharges, underground injection, and on-site land releases, all with reductions from 1988 to 1996.

On-site waste management and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, other on-site waste management activities reported by the miscellaneous manufacturing sector showed an increase of 566,000 pounds, from 23.3 million pounds to 23.9 million pounds. These data also appear in Table 16-13. The sector reported an increase from 2.2 million pounds to 3.4 million pounds in on-site energy recovery. Amounts reported for on-site recycling decreased from 16.8 million pounds to 16.2 million pounds. However, on-site recycling amounts for 1994 to 1996 include an increase from zero pounds to 3.2 million pounds by the facility that reported SIC code 3999 in error (instead of SIC code 3499). The sector also reported a small reduction in on-site treatment in 1996.

Table 16-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	391	356	333	327	-16.4
Total Forms	867	725	689	659	-24.0
Form Rs	867	725	670	628	-27.6
Form As	NA	NA	19	31	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	28,213,814	13,873,708	11,332,461	9,036,184	-68.0
Fugitive Air	9,086,683	3,910,089	3,501,401	1,747,636	-80.8
Point Source Air	19,127,131	9,963,619	7,831,060	7,288,548	-61.9
Surface Water Discharges	8,076	1,479	1,646	1,996	-75.3
Underground Injection	1	250	0	0	-100.0
On-site Land Releases	260,421	10,323	5,595	20,146	-92.3
Total On-site Releases	28,482,312	13,885,760	11,339,702	9,058,326	-68.2
Off-site Releases					
Transfers Off-site to Disposal	4,110,398	1,464,408	1,946,153	785,077	-80.9
Total On- and Off-site Releases	32,592,710	15,350,168	13,285,855	9,843,403	-69.8
Other On-site Waste Management					
Recycled On-site	NA	16,760,689	13,528,305	16,183,601	NA
Energy Recovery On-site	NA	2,195,201	2,598,693	3,362,337	NA
Treated On-site	NA	4,339,879	5,114,534	4,316,265	NA
Total Other On-site Waste Management	NA	23,295,769	21,241,532	23,862,203	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	18,360,745	15,943,140	17,806,220	NA
Transfers to Energy Recovery	NA	2,772,212	2,908,242	2,444,745	NA
Transfers to Treatment	5,060,326	832,811	572,659	490,100	-90.3
Transfers to POTWs	286,025	473,115	439,136	298,349	4.3
Other Off-site Transfers	369,598	19,107	2,140	0	-100.0
Total Transfers Off-site for Further Waste Management	NA	22,457,990	19,865,317	21,039,414	NA

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. **Other On-site Waste Management** from Section 8 of Form R. **Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996. For 1994-1996, Other Off-site Transfers are transfers reported without a valid waste management code. For 1988, Other Off-site Transfers are transfers reported without a valid waste management code or codes not required to be reported in 1988. One facility reported incorrectly under SIC code 39 for 1996. The correct SIC code is 34. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site and 3,209,773 pounds of other on-site waste management. Another facility incorrectly reported under SIC code 39 for 1995 and 1996. The correct SIC code is 37. The incorrectly reported amounts for 1995 were as follows: 3,270,607 pounds of recycling on-site, 3,270,607 pounds of total other on-site waste management, 2,602,832 pounds of transfers to recycling and 2,614,809 pounds of total transfers off-site for further waste management. The incorrectly reported amounts for 1996 were as follows: 2,867,591 pounds of recycling on-site, 2,867,591 pounds of total on-site waste management, 2,490,481 pounds of transfers to recycling and 2,506,231 pounds of total transfers off-site for further waste management.
NA: not required to be reported in that year.

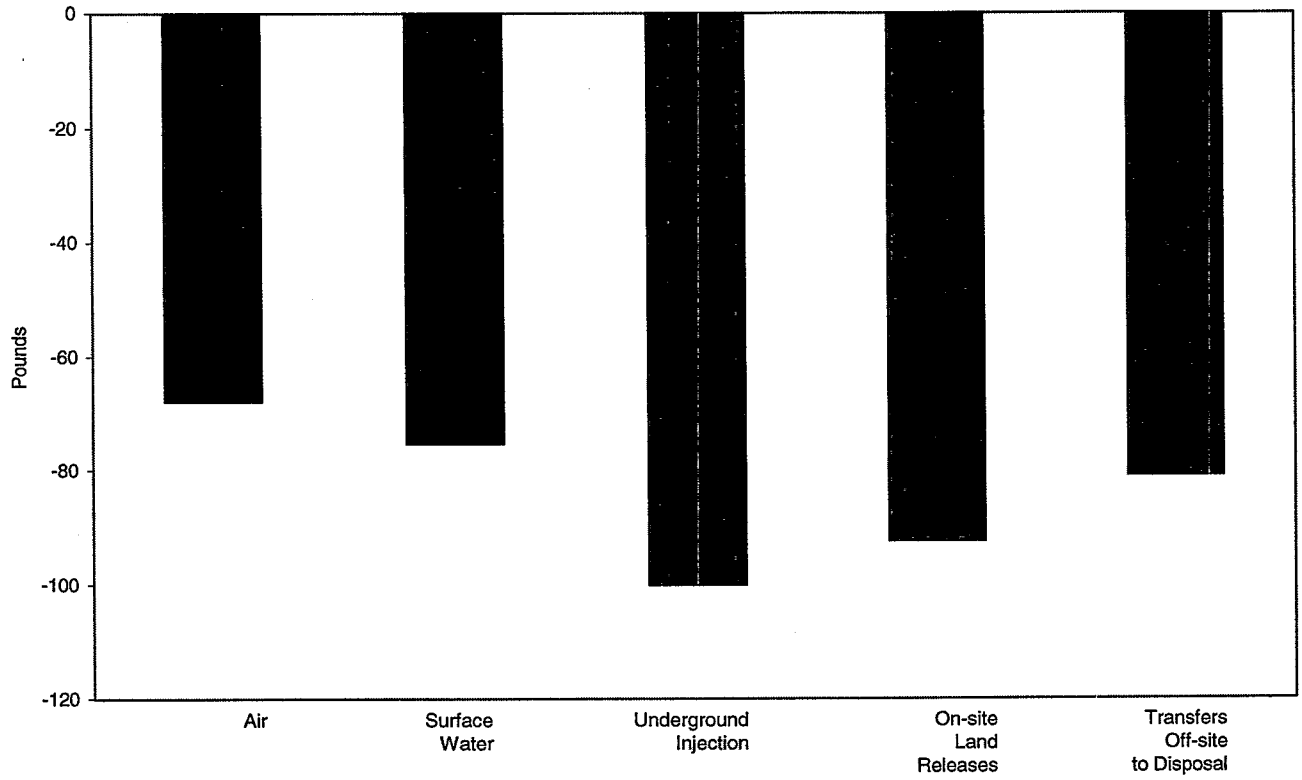


Figure 16-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Miscellaneous Manufacturing (SIC Code 39)

Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994, and 1995, and aluminum oxide, ammonia, hydrochloric acid, and sulfuric acid. **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Breakdown of Underground Injection and On-site Land Releases not required before 1996.

For the full 1988-1996 comparison period, the miscellaneous manufacturing sector reported a reduction in transfers to treatment from 5.1 million pounds to 490,000 pounds. Transfers to POTWs increased from 1988 to 1996, although the reported amounts represented a decrease in the more recent years (1994 to 1996), as shown in Table 16-13.

1988-1996 Data for Four-Digit Industries in Miscellaneous Manufacturing

Tables 16-14 through 16-16 summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 39. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

The miscellaneous hard surface floor coverings industry (SIC code 3996) reported the sector's largest decrease in on- and off-site releases from 1988 to 1996. This industry reported 6.4 million pounds of total releases in 1988 and 559,000 pounds in 1996. The miscellaneous manufacturing industries (SIC code 3999) ranked second, with a reduction from 7.6 million pounds to 3.3 million pounds. Ranking third, the miscellaneous sporting and athletic goods industry (SIC code 3949) reported 4.5 million pounds in 1988 and 1.7 million pounds in 1996. In all three industries, the largest portion of the reported reduction occurred in air emissions, along with a smaller reduction in off-site releases (transfers to disposal).

The burial caskets industry (SIC code 3995) ranked first for increases in total releases. This industry reported 2.3 million pounds in 1988 and 2.4 million pounds in 1996. The marking devices industry (SIC code 3953) reported the second-largest increase, from 34,000 pounds to 51,000 pounds, although this industry reported reductions from 1994 to 1996. The lead pencils and art goods industry (SIC code 3952) ranked third, with a small increase from 21,300 pounds to 21,500 pounds. In all three industries, an increase in air emissions was partly offset by a decrease in off-site releases (transfers to disposal). No other industry in SIC code 39 reported an increase in total releases from 1988 to 1996.

Table 16-14 provides release data for all four-digit SIC codes in the miscellaneous manufacturing sector, for 1988-1996.

Other On-site Waste Management

The miscellaneous hard surface floor coverings industry (SIC code 3996) reported 6.4 million pounds of other on-site waste management in 1994 and 1.2 million pounds in 1996, the sector's largest reduction (on-site waste management data were not collected in 1988). The musical instruments industry (SIC code 3931) reported the second-largest decrease, from 1.5 million pounds to 989,000 pounds. In these two industries, reductions reported in on-site recycling accounted for most or all of the overall decrease. The pens and mechanical pencils industry (SIC code 3951) ranked third for decreases, with a reduction from 62,000 pounds to 42,000 pounds. In this industry, on-site treatment along with on-site energy recovery accounted for the decrease.

The miscellaneous manufacturing industries (SIC code 3999) ranked first for increases, with 1.9 million pounds in 1994 and 6.2 million pounds in 1996. On-site recycling was the principal component of this increase, but this included a reporting error of 3.2 million pounds by the facility that should have reported in SIC code 3499. Without this error, the miscellaneous manufacturing industries (SIC code 3999) would rank second, behind the carbon paper and inked ribbons industry (SIC code 3955), which reported 3.8 million pounds in 1994 and 5.3 million pounds in 1996. In this industry, on-site energy recovery accounted for the largest portion of the increase. Ranking third, the fasteners, buttons, needles, and pins (SIC code 3965) reported an increase from 2.1 million pounds to 2.8 million pounds. This increase was attributable to on-site recycling.

On-site waste management data for 1994-1996 appear in Table 16-15.

Transfers Off-site for Further Waste Management

The silverware and plated ware industry (SIC code 3914) reported the sector's largest reduction in transfers off-site for further waste management, from 4.0 million pounds in 1994 to 3.4 million pounds in 1996 (data for some types of off-site transfers were not collected in 1988). However, this industry's 1995 level was lower (2.7 million pounds) than its 1996 total. The miscellaneous sporting and athletic goods industry (SIC code 3949) ranked second, reporting 1.3 million pounds in 1994 and 812,000 pounds in 1996. For both industries, the largest portion of the reduction was reported in transfers to recycling. The miscellaneous hard surface floor coverings industry (SIC code 3996) ranked third with a reduction from 821,000 pounds to 663,000 pounds. For this industry, transfers to POTWs and transfers to energy recovery showed the largest reductions.

The carbon paper and inked ribbons industry (SIC code 3955) ranked first for increases in the miscellaneous manufacturing sector's reporting of transfers off-site for further waste management. This industry reported 504,000 pounds in 1994 and 764,000 pounds in 1996. The signs and advertising specialties industry (SIC code 3993) ranked second, reporting 825,000 pounds in 1994 and 990,000

Table 16-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3911	Jewelry, Precious Metal	96	10,649	0	0	0	10,649	38,760	49,409
		95	2,929	0	0	0	2,929	100,865	103,794
		94	25,194	0	0	0	25,194	30	25,224
		88	291,901	0	0	0	291,901	9,195	301,096
3914	Silverware & Plated Ware	96	78,970	680	0	0	79,650	43,960	123,610
		95	48,622	447	0	0	49,069	38,371	87,440
		94	98,235	256	0	0	98,491	37,379	135,870
		88	339,251	1,284	0	0	340,535	4,812	345,347
3915	Jewelers' Materials & Lapidary Work	96	315	0	0	0	315	500	815
		95	510	0	0	0	510	500	1,010
		94	861	0	0	0	861	149,206	150,067
		88	166,283	0	0	0	166,283	160	166,443
3931	Musical Instruments	96	317,951	0	0	0	317,951	51,635	369,586
		95	494,111	0	0	0	494,111	42,999	537,110
		94	748,319	0	0	4,340	752,659	46,909	799,568
		88	1,013,580	0	0	0	1,013,580	44,273	1,057,853
3942	Dolls & Stuffed Toys	96	No reports received						
		95	No reports received						
		94	No reports received						
		88	128	0	0	0	128	16,948	17,076
3944	Games, Toys, & Children's Vehicles	96	222,605	0	0	0	222,605	90	222,695
		95	173,268	0	0	0	173,268	0	173,268
		94	426,145	0	0	0	426,145	0	426,145
		88	773,060	0	0	0	773,060	87,000	860,060
3949	Sporting & Athletic Goods, nec*	96	1,621,815	475	0	8,862	1,631,152	42,023	1,673,175
		95	2,049,037	204	0	5,076	2,054,317	177,415	2,231,732
		94	2,474,209	206	0	4,179	2,478,594	175,652	2,654,246
		88	4,108,832	0	0	0	4,108,832	368,389	4,477,221
3951	Pens & Mechanical Pencils	96	103,753	0	0	0	103,753	5,993	109,746
		95	161,991	0	0	0	161,991	10,016	172,007
		94	165,279	0	0	0	165,279	5,399	170,678
		88	574,835	0	0	0	574,835	204,703	779,538
3952	Lead Pencils & Art Goods	96	21,480	0	0	0	21,480	0	21,480
		95	22,601	0	0	0	22,601	0	22,601
		94	12,250	0	0	0	12,250	0	12,250
		88	21,000	0	0	0	21,000	250	21,250
3953	Marking Devices	96	50,996	0	0	0	50,996	0	50,996
		95	61,241	0	0	0	61,241	0	61,241
		94	95,942	0	0	0	95,942	0	95,942
		88	33,033	0	0	0	33,033	1,312	34,345
3955	Carbon Paper & Inked Ribbons	96	543,719	0	0	0	543,719	0	543,719
		95	633,085	0	0	0	633,085	46	633,131
		94	734,736	0	0	0	734,736	7,373	742,109
		88	3,109,334	180	0	0	3,109,514	362	3,109,876

Note: On-site Releases from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 16-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
3961	Costume Jewelry	96	12,109	0	0	0	12,109	0	12,109
		95	13,643	0	0	0	13,643	0	13,643
		94	27,890	0	0	0	27,890	0	27,890
		88	486,201	134	0	0	486,335	19,704	506,039
3965	Fasteners, Buttons, Needles, & Pins	96	106,058	211	0	0	106,269	13,804	120,073
		95	207,847	236	0	0	208,083	9,174	217,257
		94	148,154	225	0	0	148,379	11,267	159,646
		88	86,919	1,020	0	16	87,955	280,822	368,777
3991	Brooms & Brushes	96	16,738	0	0	0	16,738	0	16,738
		95	14,832	0	0	0	14,832	0	14,832
		94	206,733	0	0	0	206,733	0	206,733
		88	91,467	0	0	227,870	319,337	227,870	547,207
3993	Signs & Advertising Specialities	96	239,980	0	0	0	239,980	0	239,980
		95	380,481	0	0	0	380,481	0	380,481
		94	431,319	0	0	0	431,319	13,896	445,215
		88	681,748	0	0	0	681,748	0	681,748
3995	Burial Caskets	96	2,329,150	515	0	265	2,329,930	33,652	2,363,582
		95	2,271,762	250	0	0	2,272,012	35,263	2,307,275
		94	2,466,285	515	0	0	2,466,800	36,582	2,503,382
		88	2,213,561	0	0	0	2,213,561	80,241	2,293,802
3996	Hard Surface Floor Coverings, nec*	96	128,035	29	0	331	128,395	430,627	559,022
		95	285,150	500	0	500	286,150	1,319,129	1,605,279
		94	432,565	250	250	0	433,065	634,437	1,067,502
		88	4,202,628	0	0	0	4,202,628	2,158,525	6,361,153
3999	Manufacturing Industries, nec*	96	3,135,108	41	0	10,688	3,145,837	124,008	3,269,845
		95	4,225,691	9	0	19	4,225,719	177,517	4,403,236
		94	4,993,462	27	0	1,804	4,995,293	306,878	5,302,171
		88	7,008,928	1,627	1	28,168	7,038,724	527,007	7,565,731
	Multiple within SIC Code 39	96	63,227	0	0	0	63,227	0	63,227
		95	152,411	0	0	0	152,411	1,003	153,414
		94	166,596	0	0	0	166,596	15,514	182,110
		88	341,742	586	0	0	342,328	55,283	397,611
	Invalid SIC Code within SIC Code 39	96	33,526	45	0	0	33,571	25	33,596
		95	133,249	0	0	0	133,249	33,855	167,104
		94	219,534	0	0	0	219,534	23,886	243,420
		88	2,669,383	3,245	0	4,367	2,676,995	23,542	2,700,537
	Total for SIC Code 39	96	9,036,184	1,996	0	20,146	9,058,326	785,077	9,843,403
		95	11,332,461	1,646	0	5,595	11,339,702	1,946,153	13,285,855
		94	13,873,708	1,479	250	10,323	13,885,760	1,464,408	15,350,168
		88	28,213,814	8,076	1	260,421	28,482,312	4,110,398	32,592,710

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category.
*nec: not elsewhere classified.

Table 16-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3911	Jewelry, Precious Metal	96	19,840	0	113,500	133,340
		95	20,000	0	127,710	147,710
		94	52,389	0	82,935	135,324
		88	NA	NA	NA	NA
3914	Silverware & Plated Ware	96	201,557	0	94,007	295,564
		95	130,000	0	107,365	237,365
		94	133,000	0	107,427	240,427
		88	NA	NA	NA	NA
3915	Jewelers' Materials & Lapidary Work	96	0	3,300	19,153	22,453
		95	0	0	22,230	22,230
		94	0	0	27,491	27,491
		88	NA	NA	NA	NA
3931	Musical Instruments	96	946,313	0	43,083	989,396
		95	1,189,337	0	23,558	1,212,895
		94	1,446,757	0	27,945	1,474,702
		88	NA	NA	NA	NA
3942	Dolls & Stuffed Toys	96	No reports received			
		95	No reports received			
		94	No reports received			
		88	NA	NA	NA	NA
3944	Games, Toys, & Children's Vehicles	96	22,250	0	103,300	125,550
		95	29,450	0	132,000	161,450
		94	24,161	0	75,700	99,861
		88	NA	NA	NA	NA
3949	Sporting & Athletic Goods, nec*	96	1,109,605	31,230	406,610	1,547,445
		95	999,853	0	542,197	1,542,050
		94	593,211	0	646,721	1,239,932
		88	NA	NA	NA	NA
3951	Pens & Mechanical Pencils	96	17,622	24,508	0	42,130
		95	16,173	32,520	0	48,693
		94	10,800	33,633	18,000	62,433
		88	NA	NA	NA	NA
3952	Lead Pencils & Art Goods	96	0	0	0	0
		95	0	0	0	0
		94	0	0	0	0
		88	NA	NA	NA	NA
3953	Marking Devices	96	1,422	0	0	1,422
		95	3,383	0	0	3,383
		94	611	0	0	611
		88	NA	NA	NA	NA
3955	Carbon Paper & Inked Ribbons	96	257,181	3,303,299	1,726,874	5,287,354
		95	292,504	2,559,073	1,866,872	4,718,449
		94	256,025	2,161,568	1,394,335	3,811,928
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds treatment on-site and 3,209,773 pounds of other on-site waste management. Another facility incorrectly reported under an invalid SIC code within 39 for 1994, 1995 and 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 3,496,860 pounds of recycling on-site for 1994, 3,270,607 pounds of recycling on-site for 1995 and 2,867,591 pounds of recycling on-site for 1996.
***nec:** not elsewhere classified.

Table 16-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3961	Costume Jewelry	96	9,150	0	0	9,150
		95	6,000	0	0	6,000
		94	6,114	0	0	6,114
		88	NA	NA	NA	NA
3965	Fasteners, Buttons, Needles, & Pins	96	2,803,777	0	8,866	2,812,643
		95	1,983,270	0	19,712	2,002,982
		94	2,052,600	0	27,420	2,080,020
		88	NA	NA	NA	NA
3991	Brooms & Brushes	96	0	0	140,400	140,400
		95	0	0	150,000	150,000
		94	0	0	0	0
		88	NA	NA	NA	NA
3993	Signs & Advertising Specialties	96	2,098,136	0	49,161	2,147,297
		95	1,627,020	0	56,553	1,683,573
		94	1,992,975	0	126,816	2,119,791
		88	NA	NA	NA	NA
3995	Burial Caskets	96	12,486	0	0	12,486
		95	6,013	0	2,830	8,843
		94	17,760	0	5,336	23,096
		88	NA	NA	NA	NA
3996	Hard Surface Floor Coverings, nec*	96	837,196	0	355,436	1,192,632
		95	2,629,328	7,100	729,357	3,365,785
		94	5,657,244	0	712,052	6,369,296
		88	NA	NA	NA	NA
3999	Manufacturing Industries, nec*	96	4,971,452	0	1,237,875	6,209,327
		95	1,227,977	0	1,144,773	2,372,750
		94	940,548	0	964,205	1,904,753
		88	NA	NA	NA	NA
	Multiple within SIC Code 39	96	5,884	0	0	5,884
		95	11,861	0	21	11,882
		94	7,442	0	16,271	23,713
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC Code 39	96	2,869,730	0	18,000	2,887,730
		95	3,356,136	0	189,356	3,545,492
		94	3,569,052	0	107,225	3,676,277
		88	NA	NA	NA	NA
	Total for SIC Code 39	96	16,183,601	3,362,337	4,316,265	23,862,203
		95	13,528,305	2,598,693	5,114,534	21,241,532
		94	16,760,689	2,195,201	4,339,879	23,295,769
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 573 pounds treatment on-site and 3,209,773 pounds of other on-site waste management. Another facility incorrectly reported under an invalid SIC code within 39 for 1994, 1995 and 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 3,496,860 pounds of recycling on-site for 1994, 3,270,607 pounds of recycling on-site for 1995 and 2,867,591 pounds of recycling on-site for 1996.
*nec: not elsewhere classified.

pounds in 1996. The miscellaneous manufacturing industries (SIC code 3999) reported the third-largest increase, from 2.8 million pounds to 3.0 million pounds, although this included the facility that reported in SIC code 3999 in error. Without this facility, the miscellaneous manufacturing industries would show a small decrease. For all three industries, the increase was attributable to transfers to recycling.

Table 16-16 presents transfers off-site for further waste management reported by the miscellaneous manufacturing sector for 1988 to 1996.

Facilities with Large Increases and Decreases in Releases, 1988-1996

Coatings Incorporated & Company in Bayamon, Puerto Rico (SIC code 3999), had the largest increase in releases with 545,000 pounds. Point-source air emissions of toluene in 1996 accounted for 100% of the increase. No data were reported for toluene in 1988. The facility could not be reached for comment. See also "Facilities with Large Increases and Decreases in Waste Management, 1991-1996."

Pre Con, Inc., in Petersburg, Virginia (did not report in 1988, SIC code 3999 in 1996), ranked second with a 515,000 pound increase. This facility did not go into operation until 1992. Dichloromethane, used as a solvent in the production of a laminated web, accounted for 71% of the increase.

Batesville Casket Company, Inc., in Batesville, Mississippi (did not report in 1988, SIC code 3995 in 1996), was the third-ranked facility for increases with 246,000 pounds. The casket manufacturing plant started production in late 1988 and did not exceed the reporting threshold for any TRI chemical in that year. Xylene (mixed isomers) accounted for 46% of reported releases in 1996 and, therefore, 46% of the facility's increase. The 1996 xylene (mixed isomers) releases were reported as fugitive and point-source air emissions. The chemical is a constituent of wood stain.

Armstrong World Industries, Inc., in Lancaster, Pennsylvania (SIC code 3996), ranked first in decreases of releases with 3.2 million pounds. This facility produces vinyl tile and vinyl sheet flooring for home and commercial applications. Di-(2-ethylhexyl) phthalate was used as a plasticizer in production processes and was gradually replaced by another, unlisted, phthalate ester. Most di-(2-ethylhexyl) phthalate releases were reported under the category transfers off-site for disposal. The facility sent scrap material to off-site landfills. Di-(2-ethylhexyl) phthalate was eliminated from use following the 1996 reporting year, according to the facility contact.

Congoleum Corporation in Marcus Hook, Pennsylvania (SIC code 3996), was second in decreases with a 2.4 million-pound reduction. A manufacturer of vinyl sheet flooring, this facility phased out the usage of 1,1,1-trichloroethane as a solvent in a printing operation. This was achieved by reformulating the solvent. No data were reported for the chemical in 1996.

Kurz-Hastings, Inc., in Philadelphia, Pennsylvania (SIC code 3999), ranked third in decreases with 1.0 million pounds. The reduction was partly the result of improving systems for capturing solvent fumes. Fugitive air emissions of toluene accounted for 100% of the reduction. There were no reported fugitive emissions of toluene in 1996. The chemical is used in a solvent transfer system in the production of a wood-grain laminate product.

Table 16-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3911	Jewelry, Precious Metal	96	33,284	0	1,881	25	0	35,190
		95	45,698	0	3,930	100,015	0	149,643
		94	68,158	0	8,443	265	0	76,866
		88	NA	NA	2,240	179	0	NA
3914	Silverware & Plated Ware	96	3,349,597	0	29,757	257	0	3,379,611
		95	2,654,974	5,400	32,047	509	0	2,692,930
		94	3,973,455	9,800	65,284	515	0	4,049,054
		88	NA	NA	66,385	163	1,048	NA
3915	Jewelers' Materials & Lapidary Work	96	191,987	0	0	5	0	191,992
		95	266,634	0	0	5	0	266,639
		94	152,088	0	2,895	10,063	0	165,046
		88	NA	NA	8,229	33,914	0	NA
3931	Musical Instruments	96	174,318	30,006	34,281	510	0	239,115
		95	193,431	17,958	39,228	510	0	251,127
		94	193,093	122,786	23,508	265	0	339,652
		88	NA	NA	278,053	250	76,422	NA
3942	Dolls & Stuffed Toys	96	No reports received					
		95	No reports received					
		94	No reports received					
		88	NA	NA	0	0	0	NA
3944	Games, Toys, & Children's Vehicles	96	23,366	60,800	0	0	0	84,166
		95	23,500	33,000	2,600	0	0	59,100
		94	29,900	15,531	913	0	6,567	52,911
		88	NA	NA	43,341	0	25,409	NA
3949	Sporting & Athletic Goods, nec*	96	715,109	49,681	46,038	1,418	0	812,246
		95	743,309	51,891	107,474	1,507	0	904,181
		94	1,093,772	57,574	112,229	2,193	12,540	1,278,308
		88	NA	NA	85,295	70,606	1,703	NA
3951	Pens & Mechanical Pencils	96	230,470	108,984	19,604	13,070	0	372,128
		95	210,890	110,035	3,020	13,054	0	336,999
		94	262,702	85,095	1,460	364	0	349,621
		88	NA	NA	84,051	742	57,000	NA
3952	Lead Pencils & Art Goods	96	129,460	0	0	0	0	129,460
		95	211,334	0	0	3,900	0	215,234
		94	24,321	2,000	1,500	3,300	0	31,121
		88	NA	NA	1,900	250	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 206,766 pounds of transfers to recycling, 1,000 pounds of transfers to treatment, 10 pounds of transfers to POTWs and 207,776 pounds of total transfers off-site for further waste management. Another facility incorrectly reported under an invalid SIC code within 39 for 1994, 1995 and 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 2,601,069 pounds for 1994, 2,614,809 pounds for 1995 and 2,506,231 pounds for 1996 of total transfers off-site for further waste management.

*nec: not elsewhere classified.

Table 16-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3953	Making Devices	96	0	29,961	16,032	5	0	45,998
		95	9,001	22,647	2,290	37	0	33,975
		94	0	16,460	70,561	1,430	0	88,451
		88	NA	NA	19,375	80,200	0	NA
3955	Carbon Paper & Inked Ribbons	96	520,000	120,184	123,466	0	0	763,650
		95	36,000	530,078	124,109	0	0	690,187
		94	41,913	165,864	296,691	0	0	504,468
		88	NA	NA	99,676	430	0	NA
3961	Costume Jewelry	96	16,819	233	707	250	0	18,009
		95	20,267	407	845	250	0	21,769
		94	6,024	467	476	250	0	7,217
		88	NA	NA	2,436	1,000	1,795	NA
3965	Fasteners, Buttons, Needles, & Pins	96	4,854,496	17,709	29,571	80,550	0	4,982,326
		95	4,404,125	17,445	42,092	73,034	2,140	4,538,836
		94	4,878,380	1,269	38,615	65,048	0	4,983,312
		88	NA	NA	13,921	73	0	NA
3991	Brooms & Brushes	96	0	0	1,609	0	0	1,609
		95	3,800	0	461	0	0	4,261
		94	3,550	0	432	0	0	3,982
		88	NA	NA	13,187	0	0	NA
3993	Signs & Advertising Specialities	96	896,352	76,925	15,951	978	0	990,206
		95	887,131	88,882	2,773	275	0	979,061
		94	704,976	70,453	48,436	795	0	824,660
		88	NA	NA	88,455	500	9,000	NA
3995	Burial Caskets	96	2,124,074	256,589	1,045	14,975	0	2,396,683
		95	1,684,185	197,959	1,020	2,550	0	1,885,714
		94	2,197,376	154,024	1,045	19,696	0	2,372,141
		88	NA	NA	100,972	37,636	382	NA
3996	Hard Surface Floor Coverings, nec*	96	80,033	437,871	4,027	141,298	0	663,229
		95	64,652	554,876	13,471	137,227	0	770,226
		94	76	541,523	23,006	256,185	0	820,790
		88	NA	NA	589,682	0	75,800	NA
3999	Manufacturing Industries, nec*	96	1,547,804	1,231,653	149,014	42,954	0	2,971,425
		95	1,325,271	1,218,624	161,348	104,170	0	2,809,413
		94	1,134,331	1,466,622	124,088	102,865	0	2,827,906
		88	NA	NA	2,923,097	37,633	99,039	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 206,766 pounds of transfers to recycling, 1,000 pounds of transfers to treatment, 10 pounds of transfers to POTWs and 207,776 pounds of total transfers off-site for further waste management. Another facility incorrectly reported under an invalid SIC code within 39 for 1994, 1995 and 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 2,601,069 pounds for 1994, 2,614,809 pounds for 1995 and 2,506,231 pounds for 1996 of total transfers off-site for further waste management.

***nec:** not elsewhere classified.

Table 16-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Miscellaneous Manufacturing, SIC Code 39, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
	Multiple within SIC Code 39	96	34,276	24,149	1,390	26	0	59,841
		95	46,953	37,287	1,576	303	0	86,119
		94	28,240	42,588	2,513	7,087	0	80,428
		88	NA	NA	105,989	254	21,000	NA
	Invalid SIC Code within SIC Code 39	96	2,884,775	0	15,727	2,028	0	2,902,530
		95	3,111,985	21,753	34,375	1,790	0	3,169,903
		94	3,568,390	20,156	10,716	2,794	0	3,602,056
		88	NA	NA	534,042	22,195	1,000	NA
	Total for SIC Code 39	96	17,806,220	2,444,745	490,100	298,349	0	21,039,414
		95	15,943,140	2,908,242	572,659	439,136	2,140	19,865,317
		94	18,360,745	2,772,212	832,811	473,115	19,107	22,457,990
		88	NA	NA	5,060,326	286,025	369,598	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 39 are assigned to the "multiple" category. One facility reported incorrectly under SIC code 3999 for 1996. The correct SIC code is 3499. The incorrectly reported amounts were as follows: 206,766 pounds of transfers to recycling, 1,000 pounds of transfers to treatment, 10 pounds of transfers to POTWs and 207,776 pounds of total transfers off-site for further waste management. Another facility incorrectly reported under an invalid SIC code within 39 for 1994, 1995 and 1996. The correct SIC code is 3714. The incorrectly reported amounts were as follows: 2,601,069 pounds for 1994, 2,614,809 pounds for 1995 and 2,506,231 pounds for 1996 of total transfers off-site for further waste management.

Other Apparent Increases and Decreases in Releases, 1988-1996

In the TRI database, there are other facilities with large apparent increases and decreases, which have been identified as reporting errors or plant closures. Because these are errors or plant closures and not actual changes in the data, these facilities are not discussed in detail here. There is one such facility in the miscellaneous manufacturing sector:

> NER Data Products, Inc., Des Moines, Iowa, decrease of 1.4 million pounds, plant closure.

1991-1996 Waste Management Data for Miscellaneous Manufacturing

Table 16-17 summarizes on- and off-site waste management data for the miscellaneous manufacturing sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). The sector reported a 6.3% reduction in total production-related waste from 59.8 million pounds in 1991 to 56.0 million pounds in 1996. Without the facility reporting errors described in this chapter, the sector's reduction in total production-related waste would be 21.1%.

The sector recorded its largest reduction (in pounds) in quantities released, which decreased from 20.8 million pounds in 1991 to 10.3 million pounds in 1996. This represented a 50.4% reduction. The largest percentage decrease occurred in reporting of on-site treatment, a 58.7% reduction from 10.5 million pounds in 1991 to 4.3 million pounds in 1996. Decreases were also reported in off-site treatment (from 1.5 million pounds to 796,000 pounds) and in off-site energy recovery (from 2.6 million pounds to 2.5 million pounds).

Table 16-17. TRI Waste Management Data, 1991, 1994-1996: Miscellaneous Manufacturing, SIC Code 39

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
On-site Waste Management				
Recycled On-site	11,849,561	16,760,689	13,528,305	16,269,601
Energy Recovery On-site	75,628	2,195,201	2,598,693	3,362,337
Treated On-site	10,454,947	4,339,879	5,114,534	4,316,265
Total On-site Waste Management	22,380,136	23,295,769	21,241,532	23,948,203
Off-site Waste Management				
Recycled Off-site	12,552,543	19,096,279	16,484,511	18,449,724
Energy Recovery Off-site	2,555,525	2,730,907	2,943,948	2,473,379
Treated Off-site	1,503,661	1,279,271	1,100,684	795,812
Total Off-site Waste Management	16,611,729	23,106,457	20,529,143	21,718,915
Quantity Released On- and Off-site	20,762,514	15,966,769	13,792,739	10,300,340
Total Production-related Waste	59,754,379	62,368,995	55,563,414	55,967,458
Non-Production-related Waste	36,472	20,242	22,467	24,262

Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent
On-site Waste Management			
Recycled On-site	-19.3	20.3	37.3
Energy Recovery On-site	18.4	29.4	4,345.9
Treated On-site	17.8	-15.6	-58.7
Total On-site Waste Management	-8.8	12.7	7.0
Off-site Waste Management			
Recycled Off-site	-13.7	11.9	47.0
Energy Recovery Off-site	7.8	-16.0	-3.2
Treated Off-site	-14.0	-27.7	-47.1
Total Off-site Waste Management	-11.2	5.8	30.7
Quantity Released On- and Off-site	-13.6	-25.3	-50.4
Total Production-related Waste	-10.9	0.7	-6.3
Non-Production-related Waste	11.0	8.0	-33.5

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated. One facility reported incorrectly under SIC code 39 for 1996. The correct SIC code is 34. (Continued on next page.)

These represented reductions of 47.1% and 3.2%, respectively.

The sector reported a 47.0% increase in off-site recycling, from 12.6 million pounds in 1991 to 18.4 million pounds in 1996. Amounts reported for on-site recycling increased 37.3% from 11.8 million pounds to 16.3 million pounds. Increases in both on-site and off-site recycling reflect reporting errors previously mentioned. Without those errors, the sector's off-site recycling would show an increase of 27.1% and the sector's on-site recycling would show a *decrease* of 14.0%.

The sector's reporting of on-site energy recovery increased from 76,000 pounds in 1991 to 3.4 million pounds in 1996, which amounted to a percentage increase of more than 4,300%.

Figure 16-13 illustrates the percentage changes from 1991 to 1996 in the sector's reporting of total production-related waste by waste management type.

Facilities with Large Increases and Decreases in Waste Management, 1991-1996

YKK USA in Macon, Georgia (SIC codes 3964 and 3965 in 1991 and 3965 in 1996), ranked first in increases of waste managed with 1.9 million pounds. The zipper manufacturer reported a 1.6 million-pound increase in on-site recycling of copper between the comparison years. No information was provided on the reason for the increase before this publication's deadline.

Coatings Incorporated & Company in Bayamon, Puerto Rico (SIC code 3999), was second with an overall 1.23 million-pound increase. Toluene reporting accounted for 100% of the increase. The facility could not be reached for comment. See also "Facilities with Large Increases and Decreases in Releases, 1988-1996."

Batesville Casket Company in Batesville, Indiana (SIC code 3995), was the third-ranked increaser in waste managed with 1.21 million pounds. This plant stamps metal components used in casket production. A reported increase in off-site recycling of copper was responsible for 61% of the overall increase. According to the facility contact, the increase is largely due to a change in the

Note [Continued From Table 16-17]: The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site, 3,209,773 pounds of other on-site waste management and 3,417,119 pounds of total production-related waste. Another facility incorrectly reported under SIC code 39 for 1994, 1995 and 1996. The correct SIC code is 37. The incorrectly reported amounts for 1994 were as follows: 3,496,860 pounds of recycling on-site, 3,496,860 pounds of total on-site waste management, 2,591,830 pounds of recycling off-site and 6,102,905 pounds of total production-related waste. The incorrectly reported amounts for 1995 were as follows: 3,270,607 pounds of recycling on-site, 3,270,607 pounds of total on-site waste management, 2,602,830 of recycling off-site, and 5,890,387 pounds of total production-related waste. The incorrectly reported amounts for 1996 were as follows: 2,867,591 pounds of recycling on-site, 2,867,591 pounds of total on-site waste management, 2,490,479 pounds of recycling off-site and 5,376,558 pounds of total production-related waste. Accounting for these two facility errors, the percentage change of recycling on-site for 1994 to 1995 changes from –19.3% to –22.7%, for 1995 to 1996 changes from 20.3% to 0.6% and for 1991 to 1996 changes from 37.3% to –14.0%. The percentage change of total on-site waste management for 1994 to 1995 changes from –8.8% to 9.2%, for 1995 to 1996 changes from 12.7% to 0.6%, and for 1991 to 1996 changes from 7.0% to –20.1%. The percentage change of recycling off-site for 1994 to 1995 changes from -13.7% to –15.9%, for 1995 to 1996 changes from 11.9% to 15.0% and for 1991 to 1996 changes from 47.0% to 27.1%. The percentage change of total off-site waste management for 1994 to 1995 changes from –11.2% to –12.7%, for 1995 to 1996 changes from 5.8% to 7.3%, and for 1991 to 1996 changes from 30.7% to 15.8%. The percentage change of total production-related waste for 1994 to 1995 changes from –10.9% to –6.4%, for 1995 to 1996 changes from 0.7% to –10.4%, and for 1991 to 1996 changes from –6.3% to –21.1%.

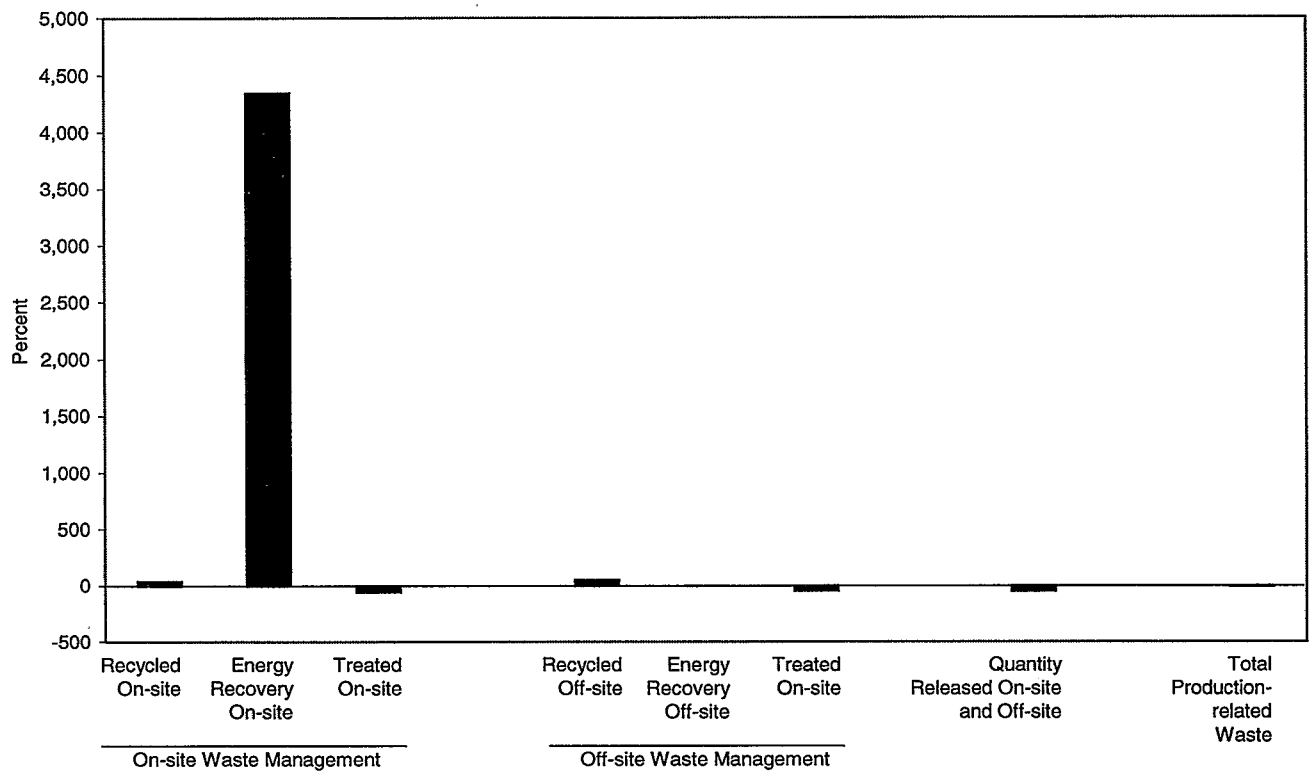


Figure 16-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Miscellaneous Manufacturing (SIC Code 39)

Note: Does not include delisted chemicals, chemicals added in 1994 and 1995, ammonia, hydrochloric acid, and sulfuric acid. Data from Section 8 of Form R (Current Year, Column B) of year indicated. One facility reported incorrectly under SIC code 39 for 1996. The correct SIC code is 34. The incorrectly reported amounts were as follows: 3,209,200 pounds of recycling on-site and 3,417,119 pounds of total production-related waste. Another facility incorrectly reported under SIC code 39 for 1996. The correct SIC code is 37. The incorrectly reported amounts were as follows: 2,867,591 pounds of recycling on-site, 2,490,479 pounds of recycling off-site and 5,376,558 pounds of total production-related waste. Accounting for these two facility errors, the percentage change of recycling on-site for 1991 to 1996 changes from 37.3% to –14.0%. The percentage change of recycling off-site for 1991 to 1996 changes from 47.0% to 27.1%. The percentage change of total production-related waste for 1991 to 1996 changes from –6.3% to –21.1%.

interpretation of how to calculate off-site recycling data.[1]

Congoleum Corporation in Marcus Hook, Pennsylvania (SIC code 3996), was the top decreaser with an overall 8.6 million-pound decrease. Methyl ethyl ketone (MEK), used as a solvent in a printing operation, was responsible for 100% of the reduction. Solvent-based printing was discontinued and substituted with water-based inks. The facility contact stated that a small amount of MEK is still used to clean presses. See also "Facilities with Large Increases and Decreases in Releases, 1988-1996."

Armstrong World Industries, Inc., in Lancaster, Pennsylvania (SIC code 3996), ranked second in decreases with 3.0 million pounds. Also ranked as a major decreaser in releases (see "Facilities with Large Increases and Decreases in Releases, 1988-1996"), this facility uses toluene as a solvent in a coating process. The process involves coating non-wax vinyl flooring with polyurethane. Toluene,

[1] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

which was responsible for 40% of the overall reduction in waste management reporting, was primarily reported in on-site recycling. The decrease is the result of a process change, according to the facility contact.

Yamaha Musical Products, Inc., in Grand Rapids, Michigan (SIC code 3931), was third with a 1.4 million-pound decrease. This facility is the site of brass and woodwind musical instrument production. Elimination of trichloroethylene as a degreasing agent resulted in 100% of this facility's reduction. An aqueous cleaning system replaced the solvent degreasing operation.

Facilities Contacted for Explanations (alphabetical by facility):

Armstrong World Industries, Inc., Lancaster, Pennsylvania: Jack B. Headley, September 21, 1998 (explanation provided)

Batesville Casket Company, Batesville, Indiana: Todd Bigelow, October 19, 1998 (explanation provided)

Batesville Casket Company, Batesville, Mississippi: Clyde Callihan, September 18, 1998 (explanation provided)

Coatings Incorporated & Company, Bayamon, Puerto Rico (could not be reached for comment)

Congoleum Corporation, Marcus Hook, Pennsylvania: Robert G. Rucker, October 16, 1998 (explanation provided)

Glacier Vandervell, Inc., Caldwell, Ohio: John Hirschfield and Rex Green, September 22, 1998 (explanation provided)

Kurz-Hastings, Inc., Philadelphia, Pennsylvania: Robert L. Wallace, October 19, 1998 (explanation provided)

NER Data Products, Inc., Des Moines, Iowa (could not be reached for comment)

Norgren Co., Littleton, Colorado: Stacy Guillaume, September 22, 1998 (explanation provided)

Pre Con, Inc., Petersburg, Virginia: Jack Wright and Brian Arvidson, October 16 and 20, 1998 (explanation provided)

Yamaha Musical Products, Inc., Grand Rapids, Michigan: James A. Blue, September 24, 1998 (explanation provided)

YKK USA, Macon, Georgia: Jeff Turner, October 19 and 23, 1998 (no explanation provided)

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Fax (340) 692-9794 (St. Croix)
(340) 774-3320 (St. Thomas)
Fax (340) 774-5416 (St. Thomas)

Virginia

Harry Gregori
Virginia Emergency Response Council
Virginia Department of Environmental Quality
5th Floor
P.O. Box 10009
Richmond, VA 23240-0009
(804) 698-4489
Fax (804) 698-4277
Email: hegregori@deq.state.va.us

Washington

Idell Hansen
Department of Ecology
Community Right-to-Know Unit
P.O. Box 47659
Olympia, WA 98504-7659
(360) 407-6727 or (800) 633-7585
Fax (360) 407-6715
Email: ihan461@ecy.wa.gov

West Virginia

John W. Pack, Jr.
West Virginia Emergency Response Commission
West Virginia Office of Emergency Services
Main Capitol Bldg. 1, Room EB-80
Charleston, WV 25305-0360
(304) 558-5380
Fax (304) 344-4538

Wisconsin

Jennifer Feyerherm (Mailcode SS/16)
SARA Section 313 Coordinator
Department of Natural Resources
101 South Webster
P.O. Box 7921
Madison, WI 53707
(608) 264-6005
Fax (608) 267-5231
Email: feyerj@dnr.state.wi.us

Wyoming

Bob Bezek
Wyoming Emergency Response Commission
Department of Environmental Quality
5500 Bishop Blvd.
Cheyenne, WY 82009-3320
(307) 777-4900
Fax (307) 635-6017
Email: hellerj@wy-iso.army.mil

APPENDIX B

TRI FORM R AND FORM A FOR 1996

Facilities reporting to the Toxics Release Inventory submit their information on TRI's Form R. If a facility's total annual reportable amount of a chemical does not exceed 500 pounds, and the facility does not manufacture, process, or otherwise use more than 1 million pounds of the chemical, it may submit a Form A certification statement. (Form A certification statement reporting is further explained in Chapter 1.) This appendix supplies copies of the Form R and Form A certification statement for the 1996 reporting year.

FORM R

The 1996 Form R is divided into two parts:

Part I, Facility Identification Information, contains information on such matters as name, address, parent company information, and contact names and phone numbers for the facility.

Part II, Chemical-Specific Information, contains information such as chemical identity, facility activities and uses of the chemical, amounts of on- and off-site releases and transfers off-site for further waste management, on-site waste treatment methods and efficiencies, on- and off-site waste management quantities, and information on source reduction and recycling activities.

FORM A CERTIFICATION STATEMENT

The 1996 Form A certification statement consists of facility identification information and chemical identification, as in Form R. Facilities do not report on the Form A certification statement amounts or other information about their use, releases, or waste management of the chemical.

Readers who are interested in a more in-depth understanding of who is required to report to TRI and how to fill out the forms, should refer to the EPCRA Information Hotline at 1-800-424-9346. Reporting software, forms, and instructions for the current reporting year are available from EPA's Web site at: **http://www.epa.gov/opptintr/tri/report.htm**.

EPA
United States Environmental Protection Agency

FORM R

TOXIC CHEMICAL RELEASE INVENTORY REPORTING FORM

Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986, also known as Title III of the Superfund Amendments and Reauthorization Act

WHERE TO SEND COMPLETED FORMS:
1. EPCRA Reporting Center
P.O. Box 3348
Merrifield, VA 22116-3348
ATTN: TOXIC CHEMICAL RELEASE INVENTORY
2. APPROPRIATE STATE OFFICE (See instructions in Appendix F)

Enter "X" here if this is a revision ☐

For EPA use only

IMPORTANT: See instructions to determine when "Not Applicable (NA)" boxes should be checked.

PART I. FACILITY IDENTIFICATION INFORMATION

SECTION 1. REPORTING YEAR 19 ___

SECTION 2. TRADE SECRET INFORMATION

2.1	Are you claiming the toxic chemical identified on page 2 trade secret? ☐ Yes (Answer question 2.2; Attach substantiation forms) ☐ No Do not answer 2.2; go to Section 3	2.2	Is this copy ☐ Sanitized ☐ Unsanitized (Answer only If "YES" in 2.1)

SECTION 3. CERTIFICATION (Important: Read and sign after completing all form sections.)

I hereby certify that I have reviewed the attached documents and that, to the best of my knowledge and belief, the submitted information is true and complete and that the amounts and values in this report are accurate based on reasonable estimates using data available to the preparers of this report.

Name and official title of owner/operator or senior management official:	Signature:	Date signed:

SECTION 4. FACILITY IDENTIFICATION

TRI Facility ID Number

4.1	Facility or Establishment Name	Facility or Establishment Name or Mailing Address (if different from street address)
	Street	Mailing Address
	City/County/State/Zip Code	City/County/State/Zip Code

4.2 This report contains information for: (Important: check a or b; check c if applicable) a. ☐ An entire facility b. ☐ Part of a facility c. ☐ A Federal facility

4.3	Technical Contact Name		Telephone Number (include area code)
4.4	Public Contact Name		Telephone Number (include area code)

4.5	SIC Code(s) (4 digits)	a.	b.	c.	d.	e.	f.

		Degrees	Minutes	Seconds		Degrees	Minutes	Seconds
4.6	Latitude				Longitude			

4.7	Dun & Bradstreet Number(s) (9 digits)	4.8	EPA Identification Number(s) (RCRA I.D. No.) (12 characters)	4.9	Facility NPDES Permit Number(s) (9 characters)	4.10	Underground Injection Well Code (UIC) I.D. Number(s) (12 digits)
	a.		a.		a.		a.
	b.		b.		b.		b.

SECTION 5. PARENT COMPANY INFORMATION

5.1	Name of Parent Company	☐ NA	
5.2	Parent Company's Dun & Bradstreet Number	☐ NA	(9 digits)

EPA FORM R
PART II. CHEMICAL - SPECIFIC INFORMATION

TRI FACILITY ID NUMBER

Toxic Chemical, Category, or Generic Name

SECTION 1.TOXIC CHEMICAL IDENTITY

(Important: DO NOT complete this section if you completed Section 2 below.)

1.1	CAS NUMBER (IMPORTANT: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)
1.2	Toxic Chemical or Chemical Category Name (Important: Enter only one name exactly as it appears on the Section 313 list.)
1.3	Generic Chemical Name (Important: Complete **only** if Part I, Section 2.1 is checked "yes". Generic name must be structurally descriptive.)

SECTION 2. MIXTURE COMPONENT IDENTITY

(Important: DO NOT complete this section if you complete Section 1 above.)

2.1	Generic Chemical Name Provided by Supplier (Important: Maximum of 70 characters, including numbers, letters, spaces, and punctuation.)

SECTION 3. ACTIVITIES AND USES OF THE TOXIC CHEMICAL AT THE FACILITY (Important: Check all that apply.)

3.1 Manufacture the toxic chemical:	3.2 Process the toxic chemical:	3.3 Otherwise use the toxic chemical:
a. ☐ Produce b. ☐ Import If produce or import: c. ☐ For on-site use/processing d. ☐ For sale/distribution e. ☐ As a byproduct f. ☐ As an impurity	a. ☐ As a reactant b. ☐ As a formulation component c. ☐ As an article component d. ☐ Repackaging	a. ☐ As a chemical processing aid b. ☐ As a manufacturing aid c. ☐ Ancillary or other use

SECTION 4. MAXIMUM AMOUNT OF THE TOXIC CHEMICAL ON-SITE AT ANY TIME DURING THE CALENDAR YEAR

4.1	☐ (Enter two-digit code from instruction package.)

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM

			A. Total Release (pounds/year)(enter range from instructions or estimate)	B. Basis of estimate (enter code)	C. % From Stormwater
5.1	Fugitive or non-point air emissions	NA ☐			
5.2	Stack or point air emissions	NA ☐			
5.3	Discharges to receiving streams or water bodies (enter one name per box)				
	Stream or Water Body Name				
5.3.1					
5.3.2					
5.3.3					
5.4.1	Underground Injection on-site to Class I Wells	NA ☐			
5.4.2	Underground Injection on-site to Class II-V Wells	NA ☐			

If additional pages of Part II, Section 5.3 are attached, indicate the total number of pages in this box ☐ and indicate which Part II, Section 5.3 page this is, here ☐ (example: 1,2,3, etc.)

Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

EPA FORM R
PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER

Toxic Chemical, Category, or Generic Name

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM

		NA	A. **Total Release** (pounds/year) (enter range code from instructions or estimate)	B. **Basis of Estimate** (enter code)
5.5	Disposal to land on-site			
5.5.1A	RCRA Subtitle C landfills	☐		
5.5.1B	Other landfills	☐		
5.5.2	Land treatment/application farming	☐		
5.5.3	Surface impoundment	☐		
5.5.4	Other disposal	☐		

SECTION 6. TRANSFERS OF THE TOXIC CHEMICAL IN WASTES TO OFF-SITE LOCATIONS

6.1 DISCHARGES TO PUBLICLY OWNED TREATMENT WORKS (POTWs)

6.1.A. Total Quantity Transferred to POTWs and Basis of Estimate

6.1.A.1. Total Transfers (pounds/year) (enter range code or estimate)	**6.1.A.2 Basis of Estimate** (enter code)

6.1.B. ___ POTW Name							
POTW Address							
City		State		County		Zip	
6.1.B. ___ POTW Name							
POTW Address							
City		State		County		Zip	

If additional pages of Part II, Section 6.1 are attached, indicate the total number of pages in this box ☐ and indicate which Part II, Section 6.1 page this is here ☐ (example: 1,2,3, etc.)

SECTION 6.2 TRANSFERS TO OTHER OFF-SITE LOCATIONS

6.2 ___OFF-SITE EPA IDENTIFICATION NUMBER (RCRA ID NO.)							
Off-Site Location Name							
Off-Site Address							
City		State		County		Zip	

Is location under control of reporting facility or parent company? ☐ **Yes** ☐ **No**

Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

EPA FORM R PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)	TRI FACILITY ID NUMBER Toxic Chemical, Category, or Generic Name

SECTION 6. 2 TRANSFERS TO OTHER OFF-SITE LOCATIONS (continued)

A. Total Transfers (pounds/year) (enter range code or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1.M
2.	2.	2.M
3.	3.	3.M
4.	4.	4.M

6.2 ___ OFF-SITE EPA IDENTIFICATION NUMBER (RCRA ID NO.)

Off-Site Location Name

Off-Site Address

City		State		County		Zip	

Is location under control of reporting facility or parent company? ☐ **Yes** ☐ **No**

A. Total Transfers (pound/year) (enter range code or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1.M
2.	2.	2.M
3.	3.	3.M
4.	4.	4.M

SECTION 7A. ON-SITE WASTE TREATMENT METHODS AND EFFICIENCY

☐ **Not Applicable (NA) - Check here if no on-site waste treatment is applied to any waste stream containing the toxic chemical or chemical category.**

a. General Waste Stream (enter code)	b. Waste Treatment Method(s) Sequence [enter 3-character code(s)]	c. Range of Influent Concentration	d. Waste Treatment Efficiency Estimate	e. Based on Operating Data?
7A.1a	7A.1b 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐	7A.1c	7A.1d	7A.1e
			%	Yes ☐ No ☐
7A.2a	7A.2b 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐	7A.2c	7A.2d	7A.2e
			%	Yes ☐ No ☐
7A.3a	7A.3b 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐	7A.3c	7A.3d	7A.3e
			%	Yes ☐ No ☐
7A.4a	7A.4b 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐	7A.4c	7A.4d	7A.4e
			%	Yes ☐ No ☐
7A.5a	7A.5b 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐	7A.5c	7A.5d	7A.5e
			%	Yes ☐ No ☐

If additional pages of Part II, Sections 6.2/7A are attached, indicate the total number of pages in this box ☐ **and indicate which Part II, Sections 6.2/7A page this is, here.** ☐ **(example: 1.2.3. etc.)**

Range Codes: A= 1-10 pounds; B=11- 499 pounds; C= 500 - 999 pounds.

EPA FORM R PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)	TRI FACILITY ID NUMBER Toxic Chemical, Category, or Generic Name

SECTION 7B. ON-SITE ENERGY RECOVERY PROCESSES

☐ **Not Applicable (NA) - Check here if no on-site energy recovery is applied to any waste stream containing the toxic chemical or chemical category.**

Energy Recovery Methods [enter 3-character code (s)]

1 ☐ 2 ☐ 3 ☐ 4 ☐

SECTION 7C. ON-SITE RECYCLING PROCESSES

☐ **Not applicable (NA) - Check here if no on-site recycling is applied to any waste stream containing the toxic chemical or chemical category.**

Recycling Methods [enter 3-character code(s)]

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

SECTION 8. SOURCE REDUCTION AND RECYCLING ACTIVITIES

All quantity estimates can be reported using up to two significant figures.		Column A Prior Year (pounds/year)	Column B Current Reporting Year (pounds/year)	Column C Following Year (pounds/year)	Column D Second Following Year (pounds/year)
8.1	Quantity released*				
8.2	Quantity used for energy recovery on-site				
8.3	Quantity used for energy recovery off-site				
8.4	Quantity recycled on-site				
8.5	Quantity recycled off-site				
8.6	Quantity treated on-site				
8.7	Quantity treated off-site				
8.8	Quantity released to the environment as a result of remedial actions, catastrophic events, or one-time events not associated with production processes (pounds/year)				
8.9	Production ratio or activity index				

8.10	Did your facility engage in any source reduction activities for this chemical during the reporting year? If not, enter "NA" in Section 8.10.1 and answer Section 8.11.			
	Source Reduction Activities [enter code(s)]	Methods to Identify Activity (enter codes)		
8.10.1		a.	b.	c.
8.10.2		a.	b.	c.
8.10.3		a.	b.	c.
8.10.4		a.	b.	c.

8.11	Is additional optional information on source reduction, recycling, or pollution control activities included with this report? (Check one box)	YES ☐	NO ☐

* Report releases pursuant to EPCRA Section 329(8) including "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment." Do not include any quantity treated on-site or off-site.

EPA United States Environmental Protection Agency

TOXIC CHEMICAL RELEASE INVENTORY FORM A

WHERE TO SEND THIS STATEMENT:
1. EPCRA Reporting Center
P.O. Box 3348
Merrifield, VA 22116-3348
ATTN: TOXIC CHEMICAL RELEASE INVENTORY
2. APPROPRIATE STATE OFFICE
(See instructions in Appendix F)

Enter "X" here if this is a revision ☐

PART I. FACILITY IDENTIFICATION INFORMATION

SECTION 1. REPORTING YEAR

19 ____

SECTION 2. TRADE SECRET INFORMATION

2.1	Are you claiming the toxic chemical identified on page 2 trade secret? ☐ Yes: Answer question 2.2 and attach substantiation forms. ☐ No: Do not answer 2.2; continue with Section 3.
2.2	If you answered yes in 2.1, is this copy: ☐ Sanitized ☐ Unsanitized

SECTION 3. CERTIFICATION (Important: Please read and sign after completing the statement.)

I hereby certify that to the best of my knowledge and belief, for the toxic chemical listed in this statement, the annual reportable amount, as defined in 40 CFR 372.27(a), did not exceed 500 pounds for this reporting year and that the chemical was manufactured, processed, or otherwise used in an amount not exceeding 1 million pounds during this reporting year.

Name and official title of owner/operator or senior management official

Signature | Date Signed

SECTION 4. FACILITY IDENTIFICATION

4.1	Facility or Establishment Name			TRI Facility ID Number
	Mailing Address (if different from street address)			
	City	State		Zip Code
	Street Address			
	City	County	State	Zip Code
4.2	**This report contains information for:** (Important: check c if applicable; a and b have been intentionally left blank)			c. ☐ A Federal facility
4.3	**Technical Contact**	Name		Telephone Number (include area code)

EPA United States Environmental Protection Agency

TOXIC CHEMICAL RELEASE INVENTORY FORM A

SECTION 4. FACILITY IDENTIFICATION (Continued)

4.4	Intentionally left blank						
4.5	SIC Code (4-digit)	a.	b.	c.	d.	e.	f.
4.6	Latitude and Longitude	Latitude			Longitude		
		Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

4.7	Dun & Bradstreet Number(s) (9 digits)	a.
		b.
4.8	EPA Identification Number(s) (RCRA I.D. No.) (12 characters)	a.
		b.
4.9	Facility NPDES Permit Number(s) (9 characters)	a.
		b.
4.10	Underground Injection Well Code (UIC) I.D. Number(s) (12 digits)	a.
		b.

SECTION 5. PARENT COMPANY INFORMATION

5.1	Name of Parent Company ☐ NA
5.2	Parent Company's Dun & Bradstreet Number ☐ NA (9 digits)

PART II. CHEMICAL IDENTIFICATION

SECTION 1. TOXIC CHEMICAL IDENTITY

1.1	CAS Number (Important: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)
1.2	Toxic Chemical or Chemical Category Name (Important: Enter only one name exactly as it appears on the Section 313 list.)
1.3	Generic Chemical Name (Important: Complete **only** if Part I, Section 2.1 is checked "yes." Generic Name must be structurally descriptive.)

SECTION 2. MIXTURE COMPONENT IDENTITY

(Important: DO NOT complete this section if you complete Section 1 above.)

2.1	Generic Chemical Name Provided by Supplier (Important: Maximum of 70 characters, including numbers,letters, spaces, and punctuation.)

EPA

United States
Environmental Protection Agency
(7408)
Washington, DC 20460

Official Business
Penalty for Private Use
$300