United States
Environmental Protection
Agency

Office of Pollution
Prevention and Toxics
(7408)

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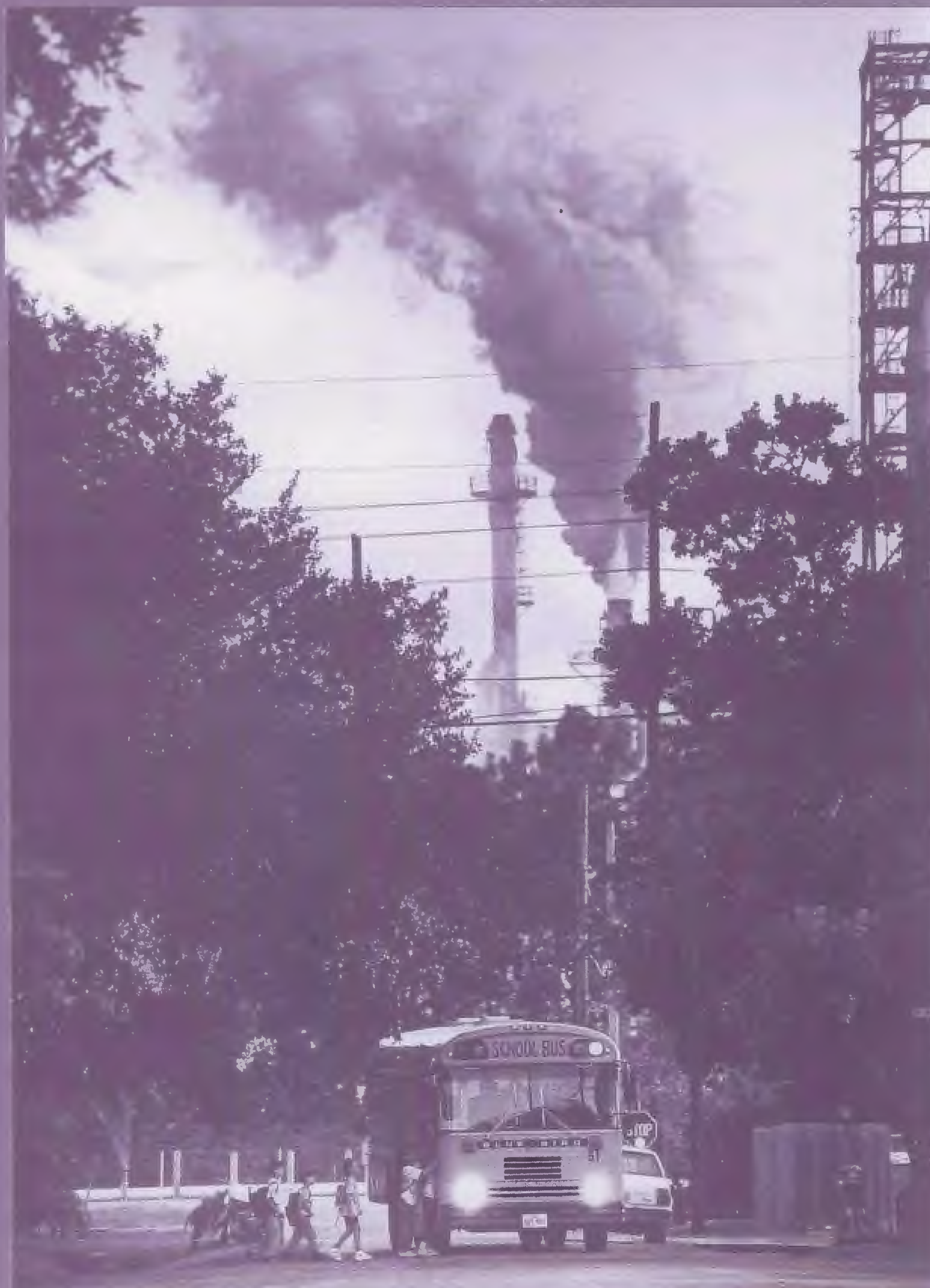
EPA

1993 Toxics Release Inventory

Public Data Release



1993

Toxics Release Inventory

Public Data Release

U.S. Environmental Protection Agency

Office of Pollution Prevention and Toxics (7408)

Washington, DC 20460

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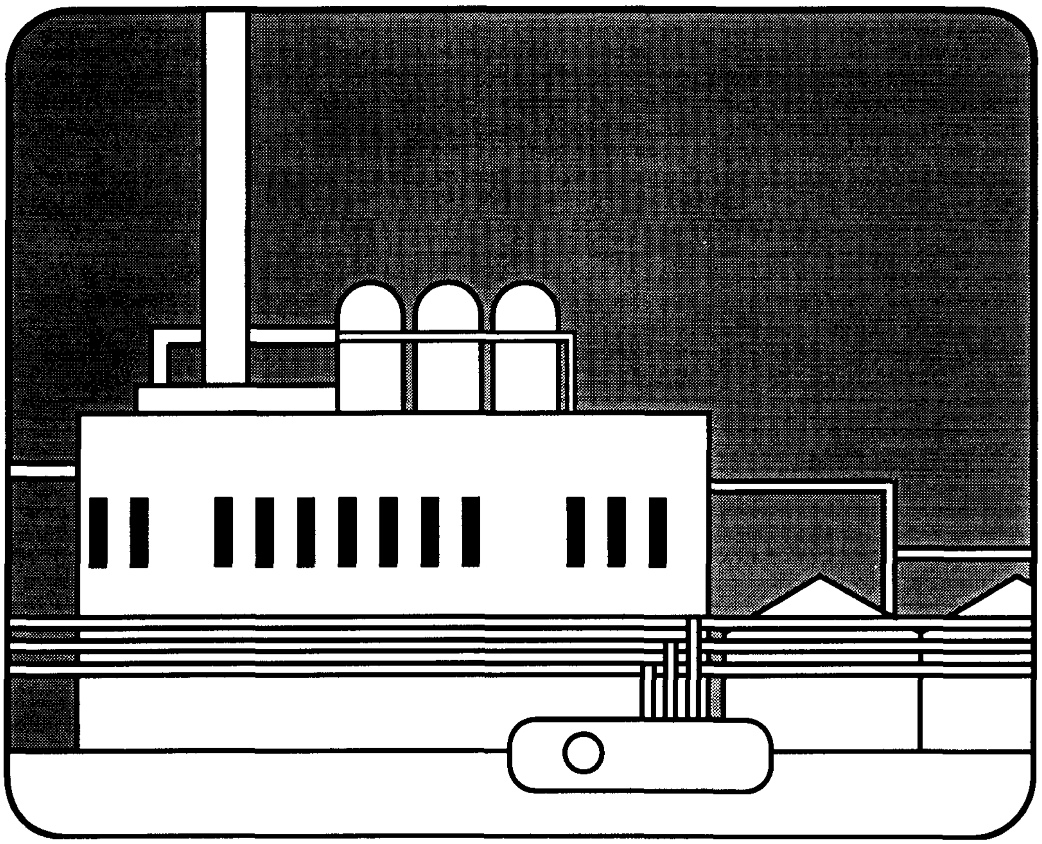


1993 TOXICS RELEASE INVENTORY

EXECUTIVE SUMMARY

INTRODUCTION: WHAT IS THE TOXICS RELEASE INVENTORY?

The Toxics Release Inventory (TRI) is a database which provides information to the public about releases of toxic chemicals from manufacturing facilities into the environment. TRI was established under the Emergency Planning and Community Right-to-Know Act of 1986 and expanded under the Pollution Prevention Act of 1990. Facilities report their TRI information annually to EPA and to the state in which they are located.

Who Must Report to TRI?

A facility must report to TRI if it:

- Conducts manufacturing operations within Standard Industrial Classification (SIC) codes 20 through 39 (see Box E-5);
- Has 10 or more full-time employees; and
- Manufactures or processes more than 25,000 pounds or uses more than 10,000 pounds of any listed chemical during the calendar year.

Box E-1.

What Must Be Reported?

Information reported by facilities includes:

- 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 the chemical present on-site at the facility during the year;
- Types of activities conducted at the facility involving the toxic chemical;
- Source reduction activities undertaken to prevent pollution and waste generation;
- Environmental permits held by the facility;
- Name and telephone number of a person to contact at the facility for more information.

Box E-2.

An Explanation of Releases

Releases. A release is an on-site discharge of a toxic chemical to the environment. This includes emissions to the air, discharges to bodies of water, releases at the facility to land, as well as contained disposal into underground injection wells.

Air Releases. Releases to air are reported either as stack or fugitive emissions. Stack emissions are releases to air that 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 Releases. 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 a contained release of a fluid into a subsurface well for the purpose of waste disposal. Most underground injection reported to TRI involves injection of waste into Class I or Class V wells. Class I wells are used to inject liquid hazardous wastes or industrial and municipal wastewaters beneath the lowermost underground source of drinking water. Class V wells are generally used to inject non-hazardous fluid into or above an underground source of drinking water. Currently, TRI reporting does not distinguish between these two types of wells, although there are important differences in environmental impact.

Land Releases. 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 spills, leaks, or waste piles).

Box E-3.

CHAPTER 1: 1993 TRI RELEASES AND TRANSFERS

For 1993, TRI reporting was required for 316 chemicals and 20 chemical categories. Facilities file a separate reporting form, called a "Form R," for each chemical they manufacture, process, or use in excess of reporting thresholds. Facilities report the amount of each listed chemical they release to the air, water, and land, as well as the amount they inject into underground disposal wells. Box E-3 explains these release types.

TRI data alone cannot indicate the risk that chemical releases pose to human health and the environment. Though the TRI data are useful as a starting point in identifying potential risks, other information is required to evaluate the risk in a particular area. A determination of risk depends on many factors, including: the toxicity of the chemical, the extent of exposure, the type of release, and the conditions of the environment. For example, small releases of highly toxic chemicals may present a greater risk than large releases of less toxic chemicals. Direct releases, such as air emissions, may pose a greater threat to human health and the environment than more contained releases, such as underground injection.

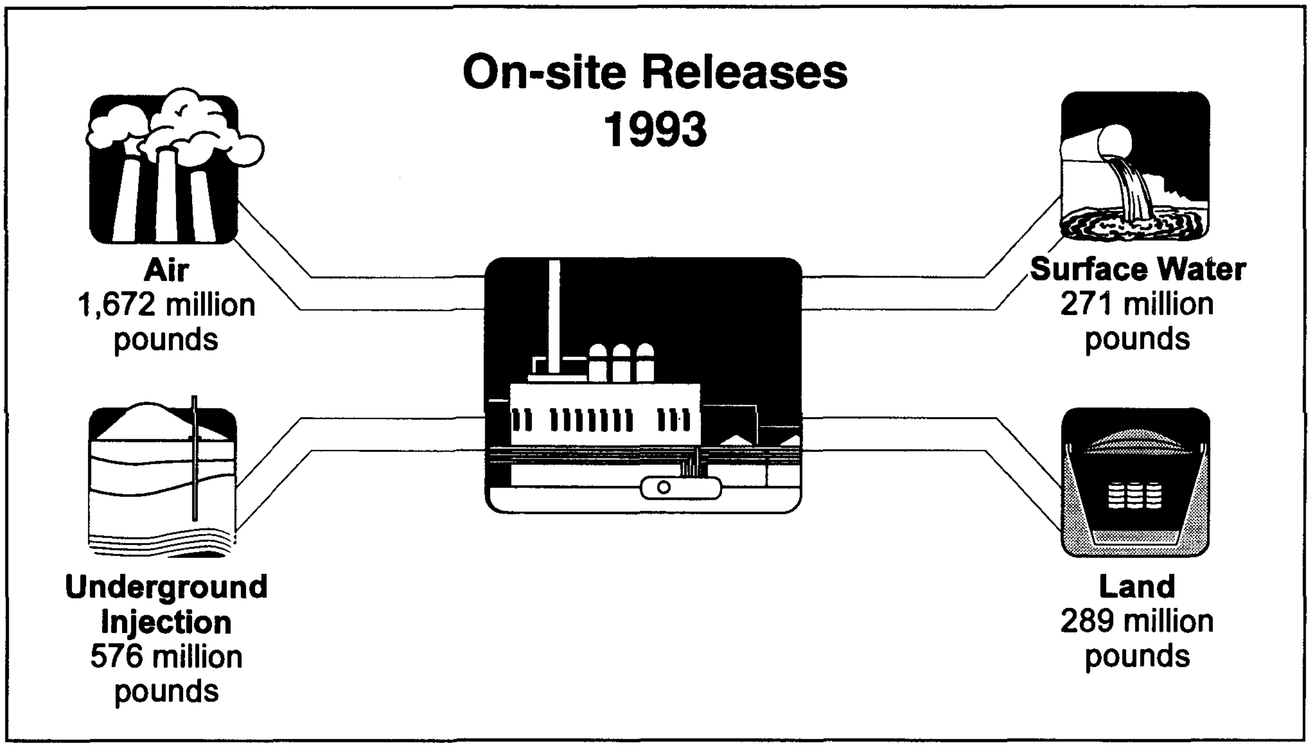


Figure E-1.

On-Site Releases

More than 23,000 facilities filed nearly 80,000 Form Rs for 1993. These facilities released more than 2.8 billion pounds of listed toxic chemicals into the nation's environment in 1993. Figure E-1 shows the quantity of listed chemicals released to the air, water, and land and injected underground.

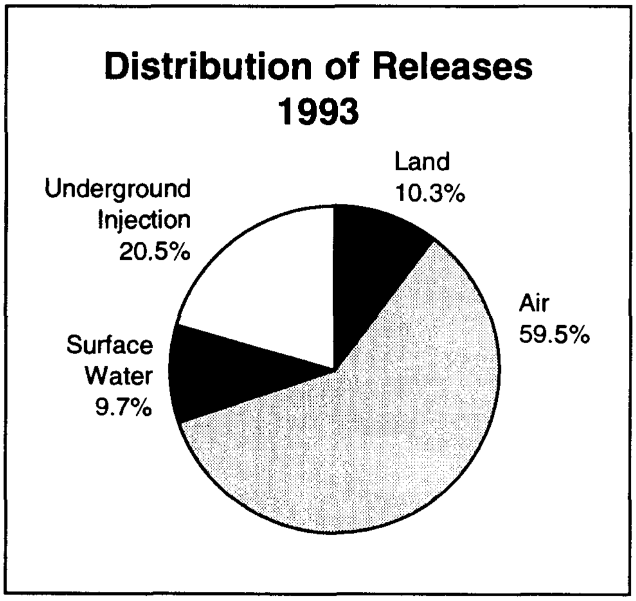


Figure E-2.

Figure E-2 shows the distribution of toxic chemical releases by type of release. Air emissions constituted nearly 60% of all toxic chemical releases in 1993. Surface water releases, which include releases to rivers, lakes, oceans, and other bodies of water, accounted for nearly 10% of all releases. Releases to land, which include landfills, surface impoundments, and other types of land disposal, accounted for about 10% of all releases.

An Explanation of Off-site Transfers

Off-site Transfers. An off-site transfer is a shipment of toxic chemicals in waste to a facility that is geographically or physically separate from the facility reporting under TRI. Off-site transfers represent a movement of the chemical away from the reporting facility.

Transfers to Publicly Owned Treatment Works (POTWs). A POTW is a wastewater treatment facility (sewage treatment plant) that is owned by a state or municipality. Wastewaters 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 used by the POTW. Not all TRI chemicals can be treated or removed by a POTW. Some chemicals are destroyed in treatment. Others may evaporate into the atmosphere. Some chemicals, such as metals, are removed but are not destroyed by treatment and may be disposed of in landfills. Some chemicals pass through the POTW and are discharged to receiving waters.

Transfers Off-site for Recycling. Toxic chemicals sent off-site for recycling may be recovered or regenerated by a variety of methods, including solvent recovery, metals recovery, and acid regeneration. Once recycled, these chemicals may be returned to the originating facility or sold for further processing or use.

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

Transfers Off-site for Treatment. Toxic chemicals sent off-site may be treated through a variety of methods, including biological treatment, neutralization, incineration, and physical separation. These methods 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 Off-site for Disposal. Toxic chemicals sent off-site to a facility for disposal generally are either released to land or injected underground (see Box E-3 above) at the off-site location.

Other Off-site Transfers. In this report, "other off-site transfers" means transfers that were reported without an appropriate waste management activity code and therefore could not be assigned to a transfer category.

Box E-4.

Off-site Transfers

Facilities also must report the amounts of each listed chemical they ship to other locations for recycling, energy recovery, treatment, or disposal. Except for off-site transfers for disposal, these quantities do not necessarily represent entry of the chemical into the environment. Box E-4 explains each transfer type.

Transfers for treatment and disposal have been reported since 1987. Transfers for recycling and energy recovery have been reported since 1991.

In addition to quantities transferred, facilities also must provide the name and location of the site which will receive the shipment.

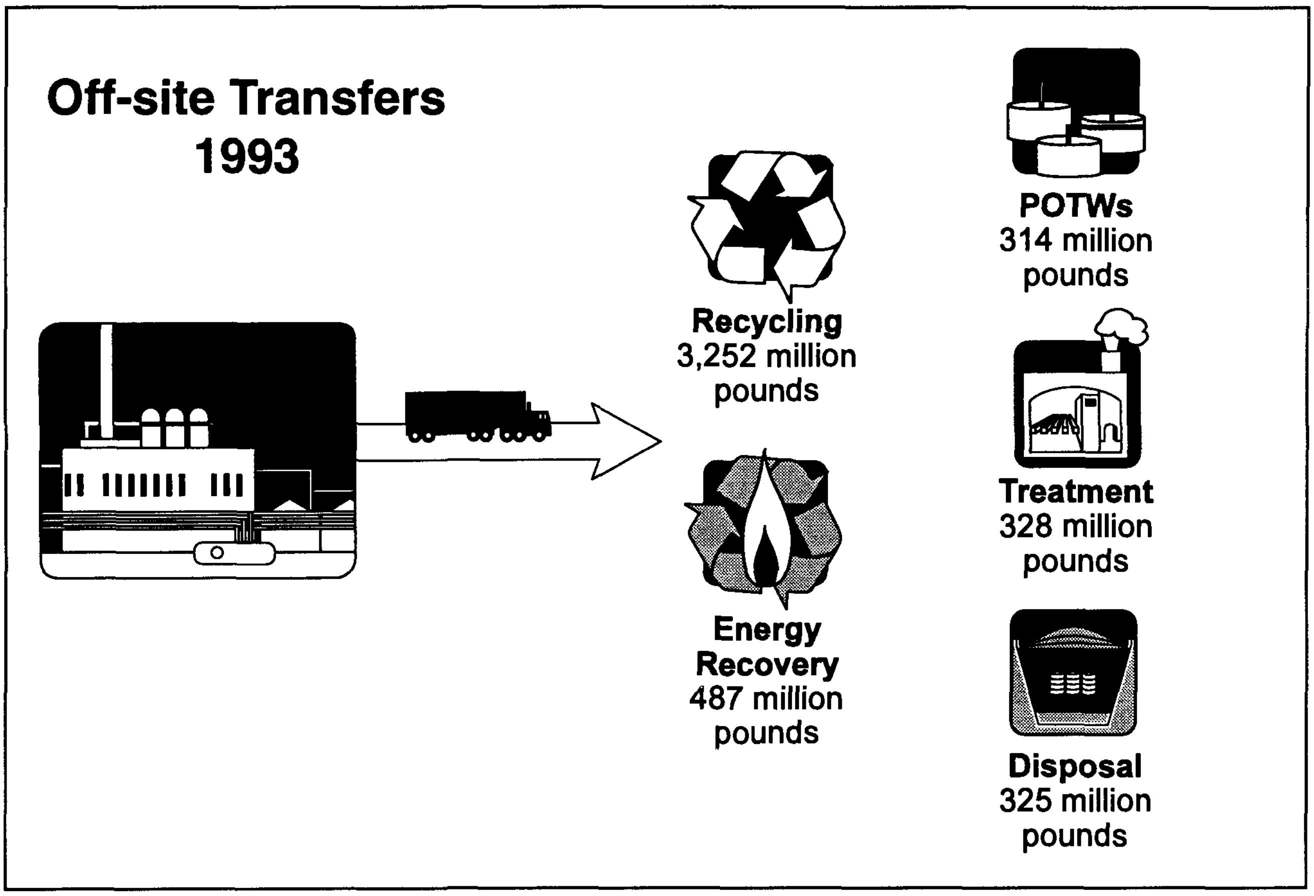


Figure E-3.❶

In 1993, facilities transferred more than 4.7 billion pounds of toxic chemicals in waste to off-site locations for recycling, energy recovery, treatment, and disposal. Figure E-3 shows the quantity of toxic chemicals transferred to off-site locations for each type of waste management activity.

Figure E-4 shows the distribution of transfers by waste management activity. Transfers of toxic chemicals to off-site locations for recycling accounted for 69% of all transfers. Less than 7% of all transfers were sent to off-site locations for disposal.

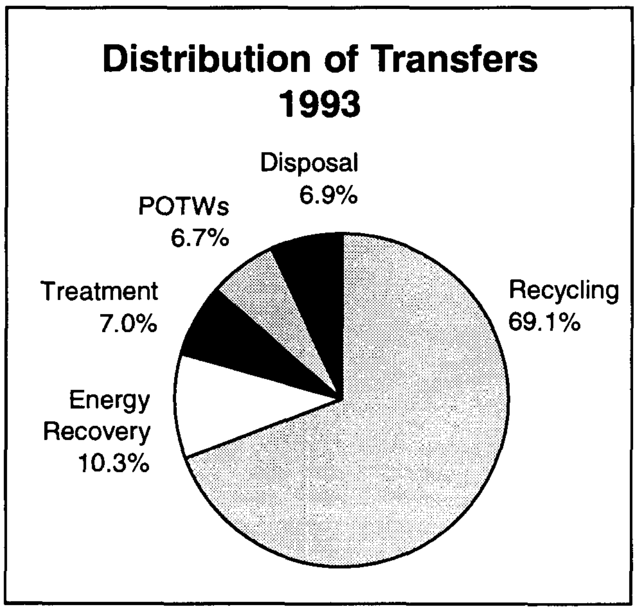


Figure E-4.❶

❶ Does not include "other" off-site transfers, i.e., those reported without valid waste management codes (2 million pounds).

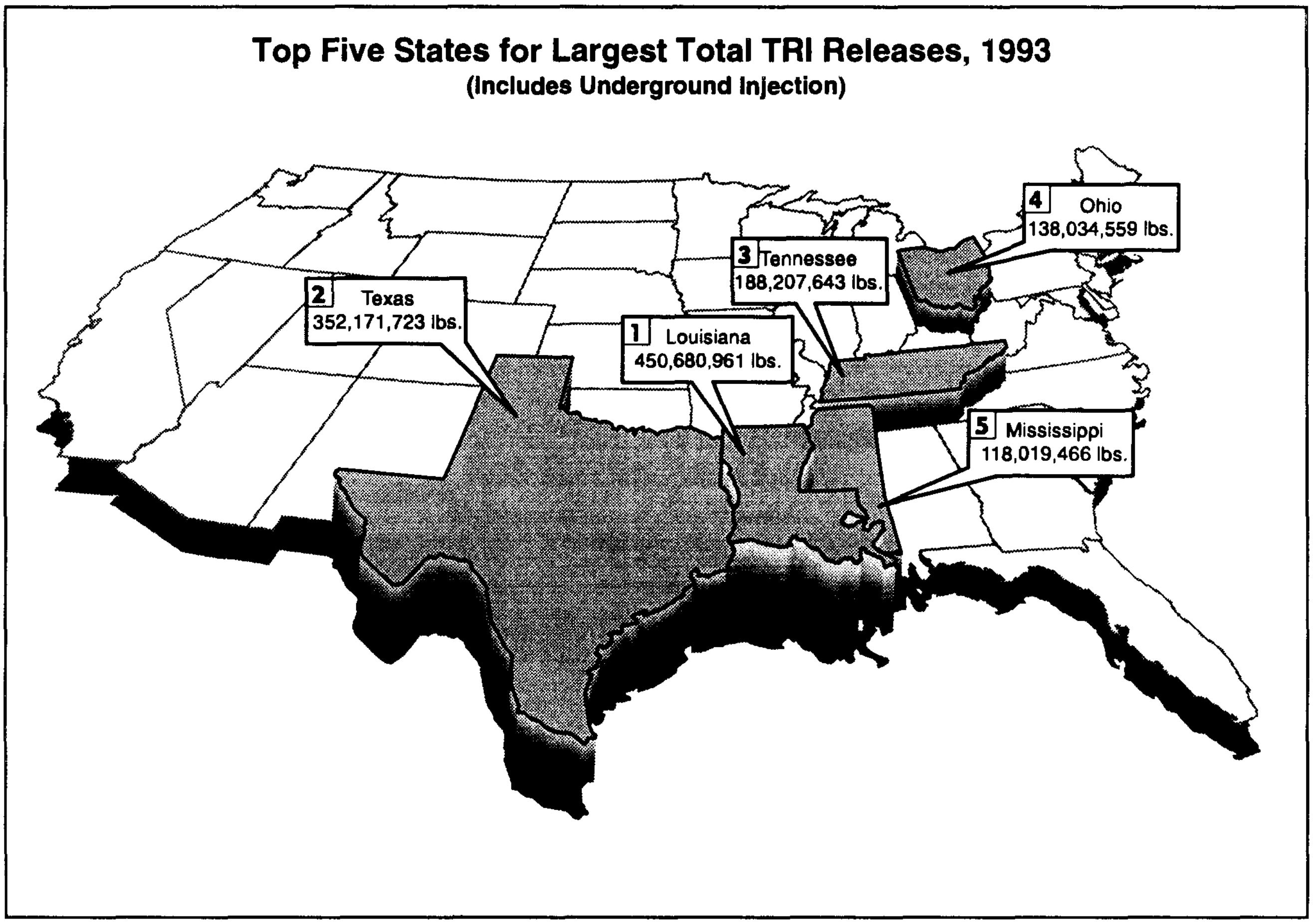


Figure E-5.

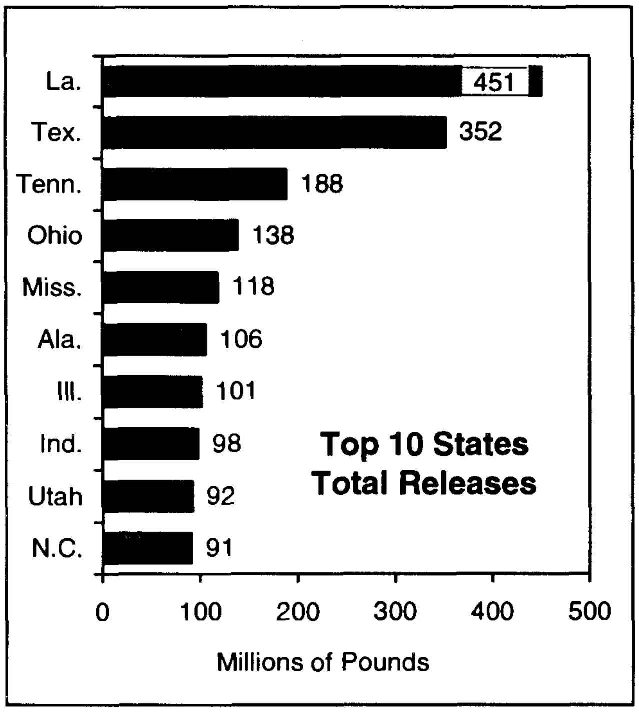


Figure E-6.

Total Releases by State, 1993

(Includes Underground Injection)

Figures E-5 and E-6 show the states with the largest quantities of reported toxic chemical releases in 1993, including releases to air, water, and land, as well as underground injection.

The total quantity of releases reported by these states does not necessarily indicate that risks from toxic chemicals are highest in these states. Release totals do not take into account the geographic size of the state or the size of the state's population. As discussed above, the risk from releases of toxic chemicals depends on a variety of factors, including the type of release, the toxicity of the chemical, and the proximity of populations to the releases.

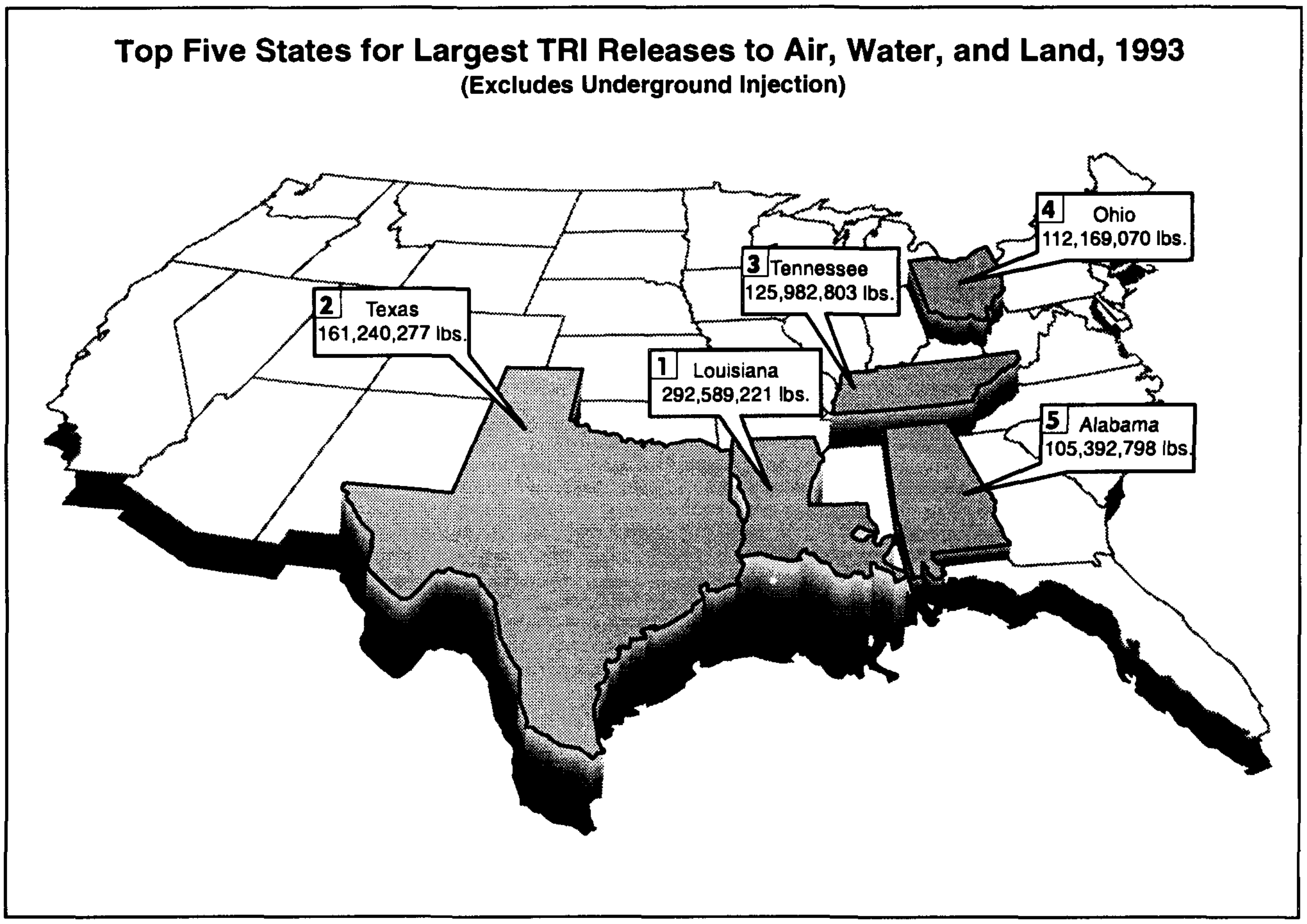


Figure E-7.

Air/Water/Land Releases by State, 1993 (Excludes Underground Injection)

Figures E-7 and E-8 show the states with the largest quantities of reported toxic chemical releases in 1993, excluding underground injection. This alternative ranking method is presented because releases to properly designed and constructed Class I injection wells have much lower exposure potentials than other, more direct forms of release.

Excluding underground injection from the release totals does not change the rankings for the top four states. However, Mississippi, which is ranked fifth for total releases, drops to 14th if underground injection is excluded.

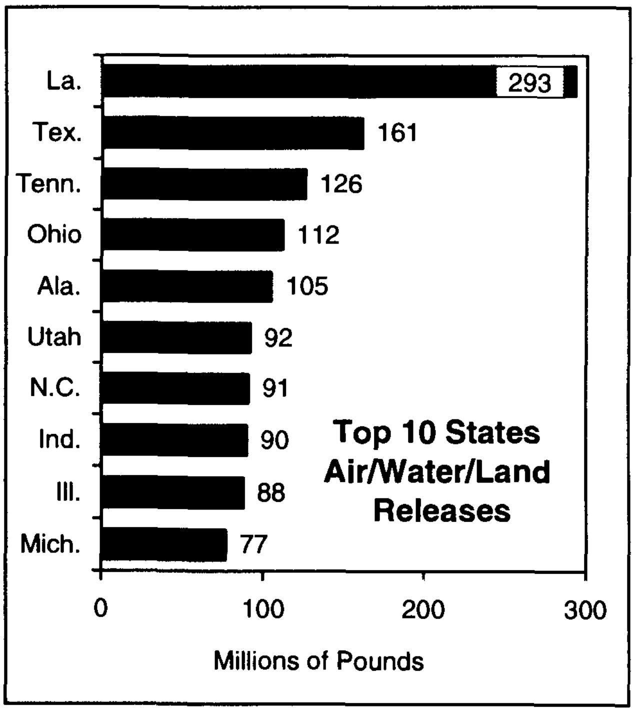


Figure E-8.

Standard Industrial Classification (SIC) Codes

20 Food and kindred products
21 Tobacco products
22 Textile mill products
23 Apparel and other finished products made from fabrics and similar materials
24 Lumber and wood products, except furniture
25 Furniture and fixtures
26 Paper and allied products
27 Printing, publishing, and allied industries
28 Chemicals and allied products
29 Petroleum refining and related industries
30 Rubber and miscellaneous plastics products
31 Leather and leather products
32 Stone, clay, glass, and concrete products
33 Primary metal industries
34 Fabricated metal products, except machinery and transportation equipment
35 Industrial and commercial machinery and computer equipment
36 Electronic and other electrical equipment and components, except computer equipment
37 Transportation equipment
38 Measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks
39 Miscellaneous manufacturing industries

Box E-5.

Releases and Transfers by Industry, 1993

Only manufacturing facilities in SIC codes 20 through 39 were required to report to TRI for 1993. Box E-5 lists the industry groups currently subject to TRI, along with their corresponding SIC codes. Federal facilities will be required to report to TRI beginning with the 1994 reporting year, and other industry groups are currently under consideration for future addition to the reporting requirements.

Figure E-9 presents the 10 industries with the largest quantities of reported toxic chemical releases, including underground injection, in 1993. The same industries comprise the top 10 for releases to air, water, and land (excluding underground injection). Figure E-10 presents the 10 industries with the largest total transfers to off-site locations.

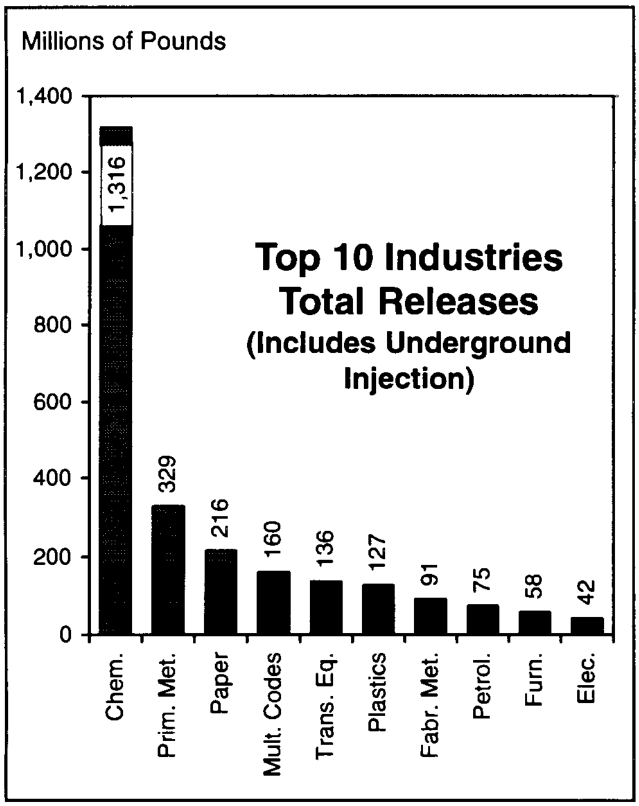


Figure E-9.❷

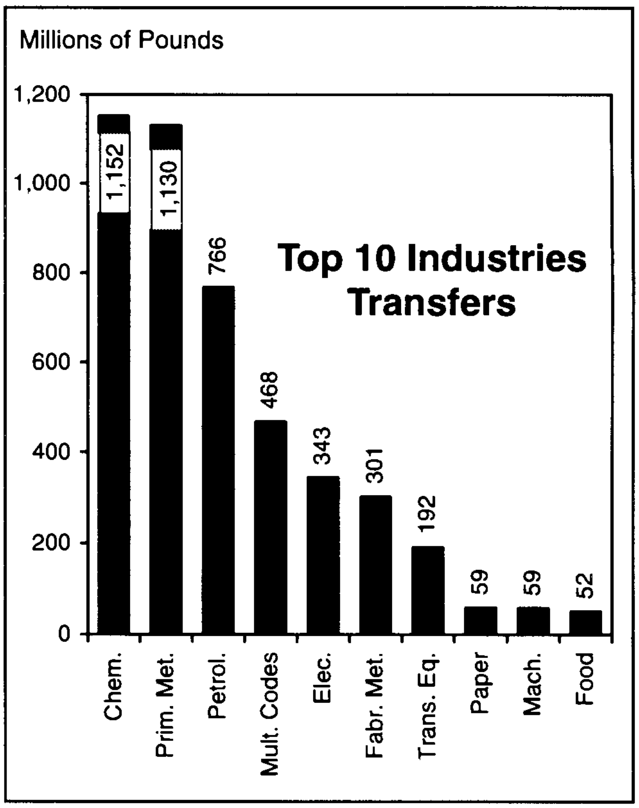


Figure E-10.

❷ Multiple Codes: Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

Top 10 Facilities for Largest Total TRI Releases, 1993
(Includes Underground Injection)

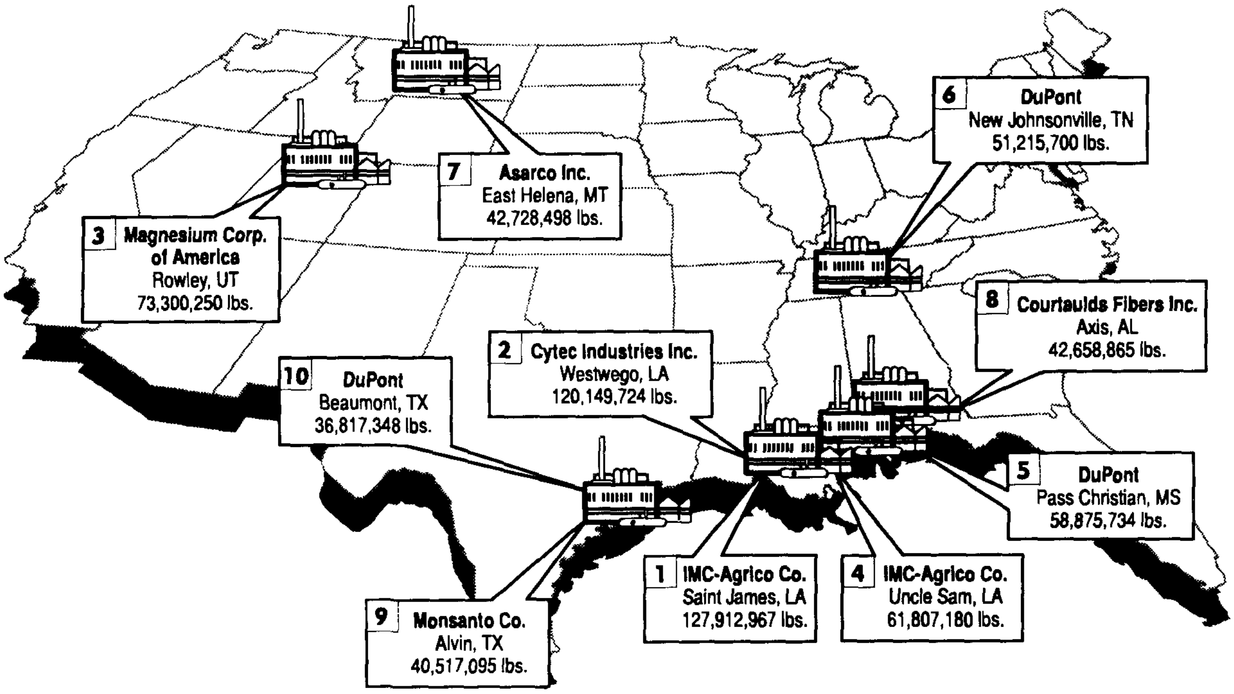


Figure E-11.

Figure E-11 shows the 10 facilities which reported the largest quantities of TRI releases, including underground injection, in 1993. The label next to each facility on the map lists the facility name, the city and state in which it is located, and the total quantity of TRI releases in 1993.

All facilities must report the name of their parent company, if applicable, on their Form Rs. The parent company is the highest-level company which owns or controls the reporting facility. Table E-1 lists the top ten parent companies for total TRI releases, including underground injection. Together, these 10 companies accounted for only 1.6% of all TRI reporting facilities and 4.0% of all forms filed, yet they accounted for 31.5% of total TRI releases in 1993.

Top 10 Parent Companies Total Releases

Company Name	Facilities Number	Total Releases Pounds
DuPont	77	206,025,321
Freeport-McMoran Inc.	4	193,760,607
American Cyanamid	32	124,640,754
Renco Holdings Inc.	6	74,507,492
Asarco Inc.	13	57,057,182
Monsanto Co.	29	55,032,422
Eastman Kodak Co.	21	49,926,822
BP America	56	44,534,370
Courtaulds United States	11	43,728,541
General Motors Corp.	129	36,319,810
Subtotal	378	885,533,321
Total for All TRI Facilities	23,321	2,808,618,413

Table E-1. ❸

❸ American Cyanamid no longer exists, but was in existence during 1993. Many of the releases attributed to American Cyanamid in 1993 will be associated with Cytec Industries in future years.

Top 10 Facilities for Largest TRI Releases to Air, Water, and Land, 1993
(Excludes Underground Injection)

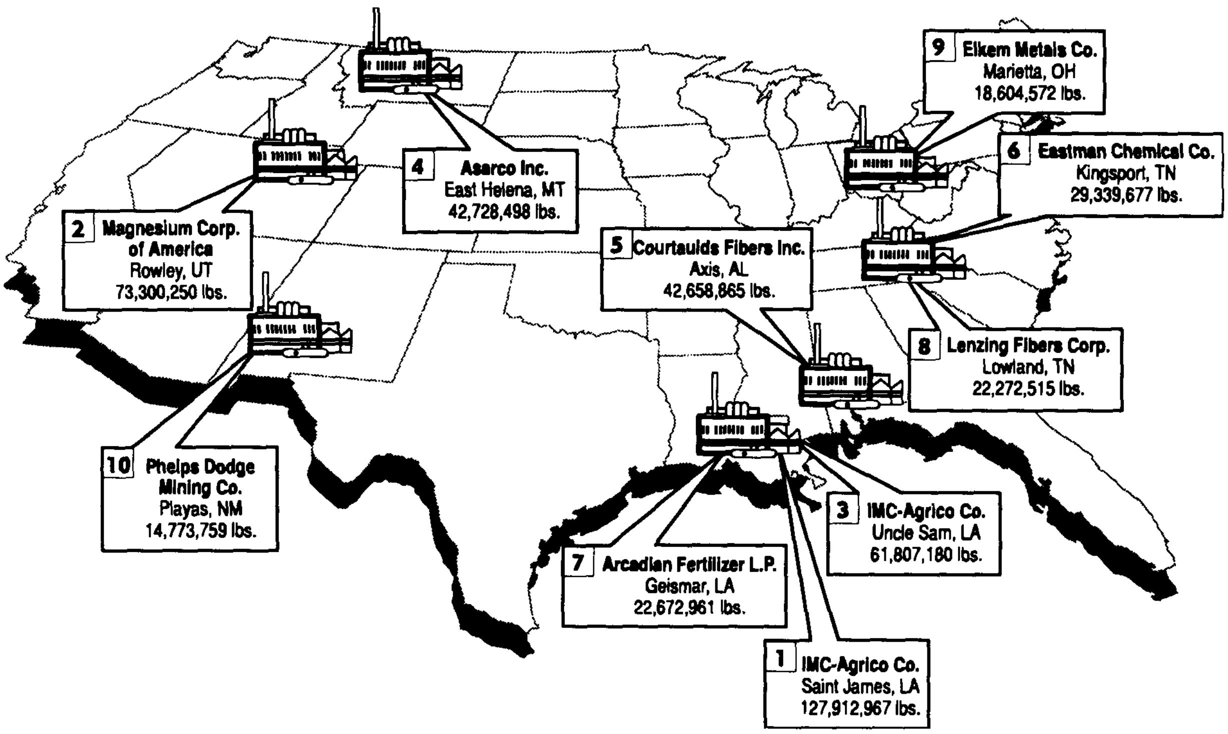


Figure E-12.

Top 10 Parent Companies Air/Water/Land Releases

Company Name	Facilities Number	Total Air/ Water/Land Releases Pounds
Freeport-McMoran Inc.	4	193,760,607
Renco Holdings Inc.	6	74,507,492
Asarco Inc.	13	51,224,547
Eastman Kodak Co.	21	49,926,822
Courtaulds United States	11	43,728,541
General Motors Corp.	129	36,319,810
Arcadian Fertilizer L.P.	8	35,252,458
DuPont	77	33,514,790
3M Co.	50	27,232,882
Phelps Dodge Corp.	18	27,128,900
Subtotal	337	572,596,849
Total for All TRI Facilities	23,321	2,232,333,180

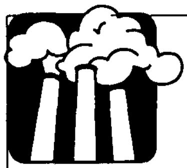
Table E-2.

Figure E-12 shows the 10 facilities which reported the largest quantities of TRI releases to air, water, and land, excluding underground injection, in 1993. As discussed above, this alternative ranking method is presented because releases to properly designed and constructed Class I injection wells have much lower exposure potential than other, more direct, forms of release.

Table E-2 lists the top 10 parent companies for releases to air, water, and land, excluding underground injection, in 1993. Together, these 10 companies accounted for only 1.4% of reporting facilities and 3.7% of all forms, but 25.7% of releases to air, water, and land in 1993.

The following page shows the 10 chemicals released in the greatest quantity for each release type.

Top Chemicals by Release Media, 1993



Top 10 Chemicals Air

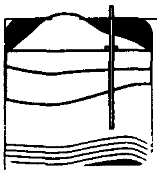
	Pounds
Toluene	177,301,671
Methanol	172,292,981
Ammonia	138,057,165
Acetone	125,152,462
Xylene (mixed isomers)	111,189,613
Carbon disulfide	93,307,339
Methyl ethyl ketone	84,814,923
Hydrochloric acid	79,073,655
Chlorine	75,410,108
Dichloromethane	64,313,211
Subtotal	1,120,913,128
Total for All TRI Chemicals	1,672,127,735

Table E-3.

Top 10 Chemicals Surface Water

	Pounds
Phosphoric acid	175,861,627
Ammonia	35,938,643
Sulfuric acid	27,542,946
Methanol	10,011,681
Ammonium nitrate (solution)	7,386,387
Ammonium sulfate (solution)	3,872,980
Ethylene glycol	1,170,533
Zinc compounds	1,046,444
Acetone	990,315
Hydrochloric acid	719,541
Subtotal	264,541,097
Total for All TRI Chemicals	271,152,864

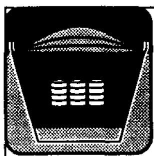
Table E-4.



Top 10 Chemicals Underground Injection

	Pounds
Ammonia	168,725,501
Hydrochloric acid	145,097,099
Sulfuric acid	105,872,094
Ammonium nitrate (solution)	35,211,208
Methanol	27,899,963
Nitric acid	19,213,898
Acetonitrile	15,707,895
Ammonium sulfate (solution)	6,189,894
Ethylene glycol	5,943,528
Formaldehyde	5,912,425
Subtotal	535,773,505
Total for All TRI Chemicals	576,285,233

Table E-5.



Top 10 Chemicals Land

	Pounds
Zinc compounds	67,413,392
Manganese compounds	47,671,055
Copper compounds	40,082,409
Phosphoric acid	35,491,946
Chromium compounds	22,675,748
Lead compounds	10,950,924
Zinc (fume or dust)	10,449,577
Ammonia	10,144,184
Manganese	6,650,151
Ammonium nitrate (solution)	6,457,512
Subtotal	257,986,898
Total for All TRI Chemicals	289,052,581

Table E-6.

Carcinogen Releases to Air/Water/Land, 1993

(Excludes Underground Injection)

For reporting purposes, TRI designates 118 chemicals as carcinogens based on criteria set forth in the Occupational Safety and Health Administration's Hazard Communication Standards. Some of these chemicals, such as benzene or asbestos, are known to cause cancer in humans. Others are suspected to cause cancer in humans because they have been shown to cause cancer in laboratory animals.

Nearly 180 million pounds of TRI-listed carcinogens were released to the air, water, and land (excluding underground injection) in 1993. Figures E-13 and E-14 show the 10 states and 10 industries with the largest quantities of carcinogen releases to air, water, and land in 1993. Table E-7 lists the 10 TRI carcinogens released in the largest quantities to air, water, and land in 1993.

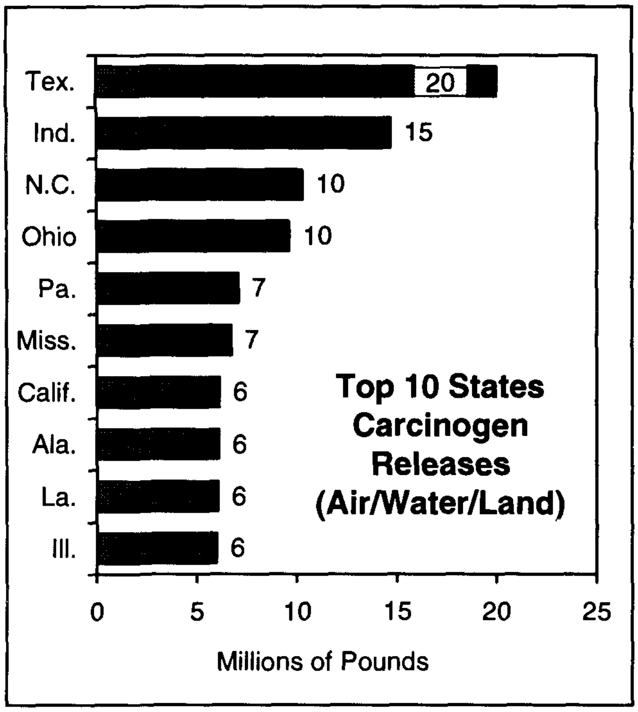


Figure E-13.

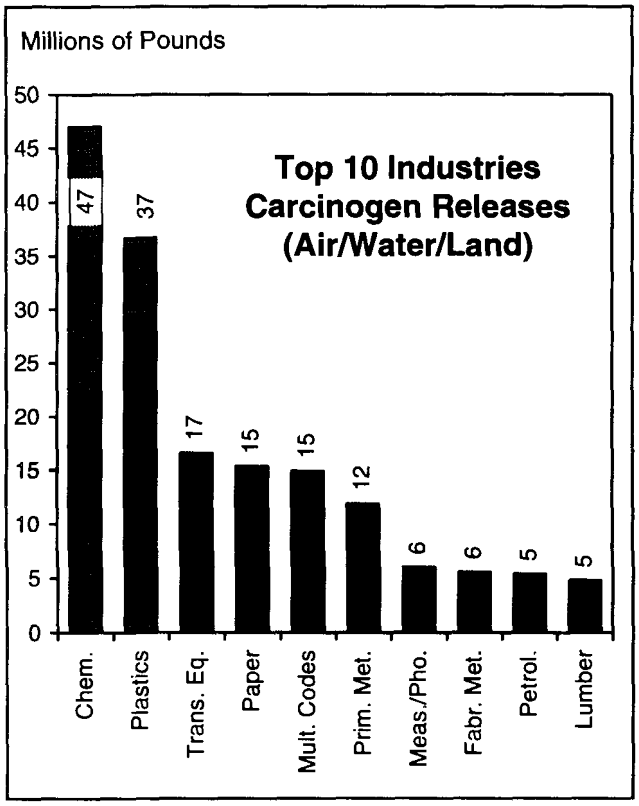


Figure E-14.❹

Carcinogens with Largest Air/Water/Land Releases	Pounds
Dichloromethane	64,454,387
Styrene	32,776,445
Chloroform	14,292,980
Formaldehyde	12,207,744
Tetrachloroethylene	11,570,197
Benzene	10,845,433
Acetaldehyde	6,543,215
Lead	4,056,624
1,3-Butadiene	3,282,261
Nickel compounds	3,099,677
Subtotal	163,128,963
Total for All Carcinogens	179,858,444

Table E-7.

❹ Multiple Codes: Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

CHAPTER 2: PREVENTION AND MANAGEMENT OF TRI CHEMICALS IN WASTE

The Pollution Prevention Act of 1990 (PPA) expanded TRI to require reporting about quantities of TRI chemicals managed in waste and about source reduction activities undertaken to eliminate or reduce those quantities. Under the PPA, source reduction is considered the preferred approach to managing waste. Figure E-15 illustrates a hierarchy for waste management decision-making, with disposal of waste the last resort.

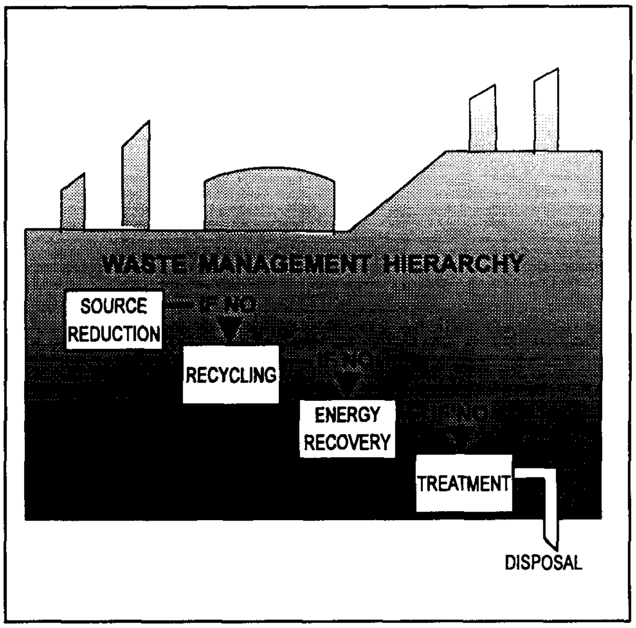


Figure E-15.

Figure E-16 illustrates the quantities of TRI chemicals undergoing each on-site and off-site waste management activity (recycling, energy recovery, treatment, and release/disposal). A total of 33.5 billion pounds of TRI chemicals was managed in waste in 1993.

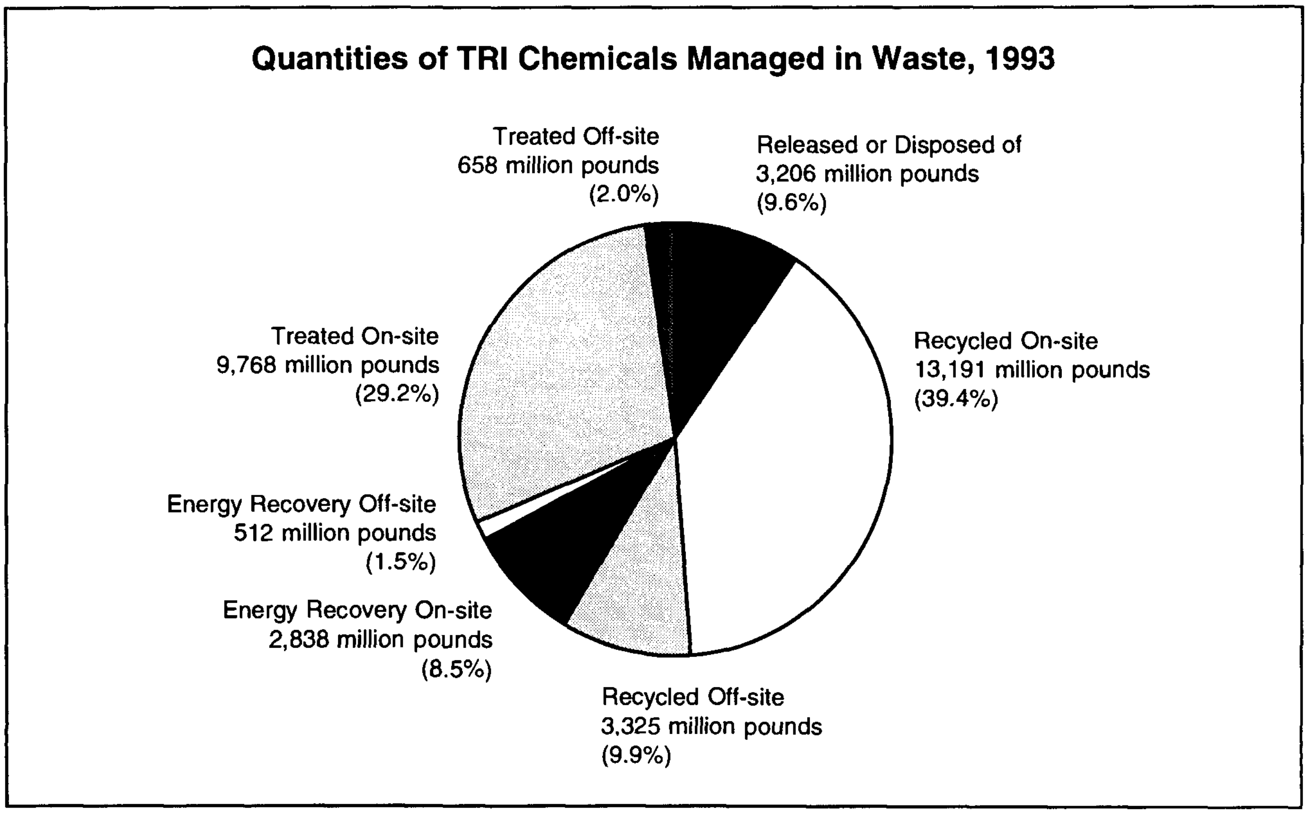


Figure E-16.

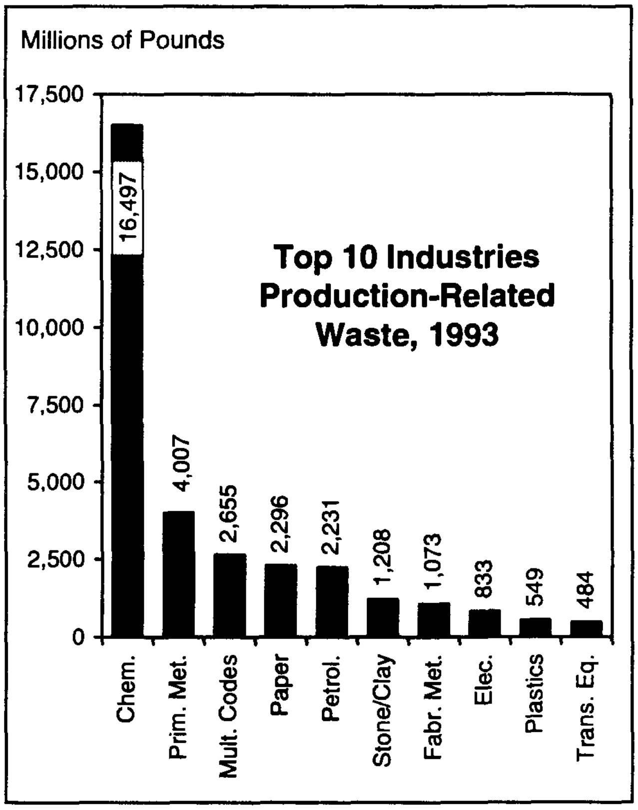


Figure E-17. ❺

Figure E-17 shows the top 10 industries for total production-related waste in 1993. The chemical industry reported more than 16 billion pounds of TRI chemicals in production-related waste, nearly half of the total quantity reported by all industries and more than four times the amount reported by the second-ranked industry.

Figure E-18 shows the actual quantities of TRI chemicals reported for each waste management activity for 1991 through 1993, and the projected quantities for 1994 and 1995. Although the total quantity of TRI chemicals in production-related waste is increasing, some movement up the waste management hierarchy is seen in increased recycling and decreased release or disposal.

The following page shows the 10 chemicals undergoing each waste management activity in the largest quantities.

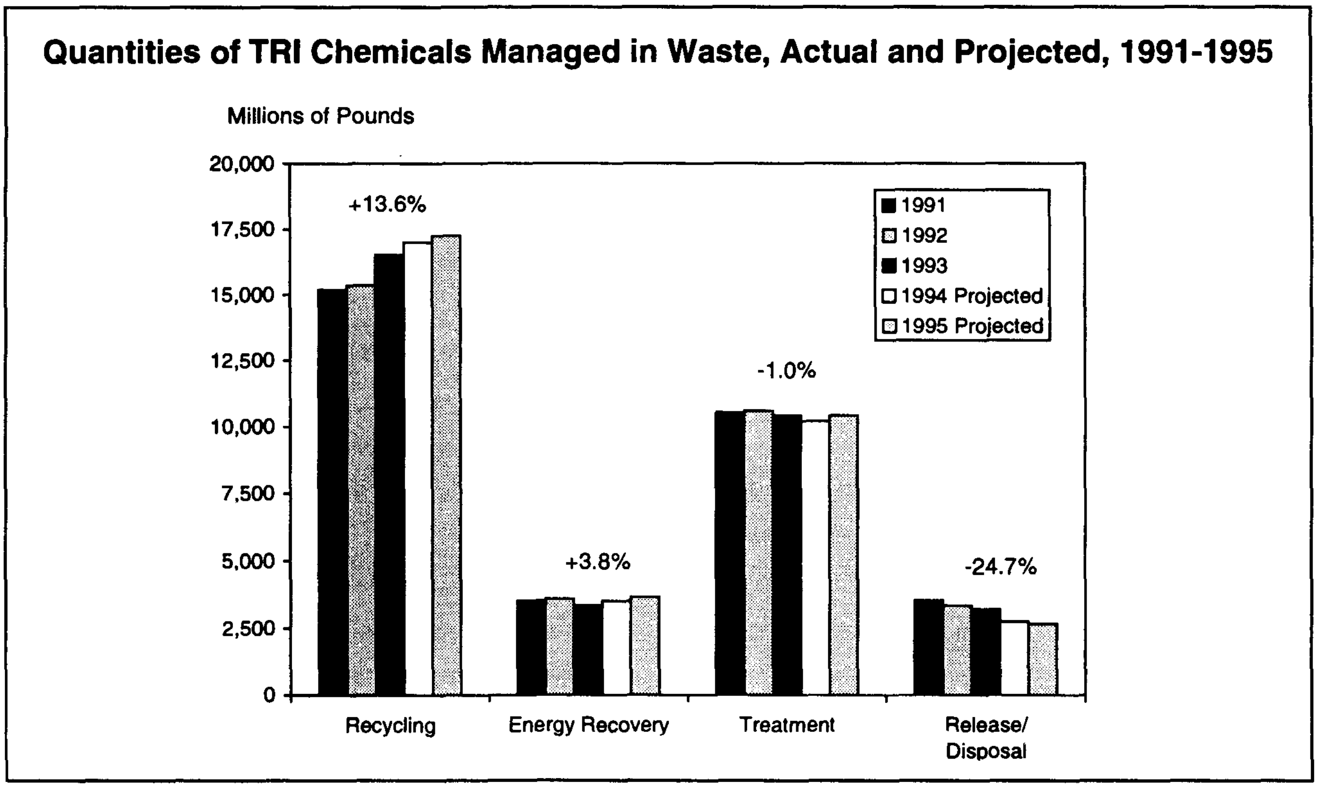


Figure E-18.

❺ Multiple Codes: Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

Top Chemicals by Waste Management Activity, 1993

Top 10 Chemicals Recycling

	Pounds
Sulfuric acid	7,137,133,908
Toluene	1,191,786,855
Copper	747,555,744
Lead compounds	649,807,005
Methanol	502,912,627
Ethylene	433,212,167
Copper compounds	390,397,586
Ethylene glycol	388,463,915
Zinc compounds	344,633,052
Lead	323,560,206
Subtotal	12,109,463,065
Total for All TRI Chemicals	16,515,920,583

Table E-8.

Top 10 Chemicals Energy Recovery

	Pounds
Propylene	491,329,899
Ethylene	419,022,752
Methanol	348,009,065
Toluene	341,738,331
Xylene (mixed isomers)	259,727,488
Acetone	173,643,561
Mixtures and other trade names	171,436,688
Methyl ethyl ketone	146,085,339
Ammonia	86,567,296
tert-Butyl alcohol	67,079,131
Subtotal	2,504,639,550
Total for All TRI Chemicals	3,350,119,881

Table E-9.

Top 10 Chemicals Treatment

	Pounds
Sulfuric acid	3,000,122,562
Hydrochloric acid	1,949,374,303
Methanol	987,336,098
Ammonia	451,633,343
Ethylene	373,572,787
Phosphoric acid	306,416,497
Nitric acid	298,588,152
Chlorine	246,159,502
Freon 113	230,733,955
Propylene	216,423,796
Subtotal	8,060,360,995
Total for All TRI Chemicals	10,426,058,390

Table E-10.

Top 10 Chemicals Release/Disposal

	Pounds
Ammonia	396,799,112
Sulfuric acid	254,999,222
Hydrochloric acid	241,034,754
Methanol	222,161,442
Phosphoric acid	214,596,798
Toluene	181,399,292
Zinc compounds	135,266,664
Acetone	128,689,551
Xylene (mixed isomers)	111,710,327
Carbon disulfide	93,697,475
Subtotal	1,980,354,637
Total for All TRI Chemicals	3,206,362,816

Table E-11.

Source Reduction Activities, 1993

Facilities also must provide information about source reduction activities they implemented during the reporting year. Source reduction activities reduce the amount of a toxic chemical entering a waste stream and therefore prevent pollution before it is generated. Waste management activities such as recycling are not considered source reduction because they manage toxic chemicals after they enter waste streams.

Thirty-five percent of all TRI facilities reported at least one source reduction activity in 1993. Table E-12 lists the categories of source reduction activities in order of reporting frequency. Table E-13 lists the top 10 industries based on the percentage of forms reporting source reduction. Table E-14 lists the 10 chemicals for which source reduction was reported the most often.

Source Reduction Activity Reporting

Category of Activity	Number of TRI Forms Reporting
Good operating practices	9,576
Process modifications	7,074
Spill and leak prevention	5,601
Raw material modifications	3,838
Inventory control	2,449
Cleaning and degreasing	2,395
Surface preparation and finishing	2,317
Product modifications	1,698

Table E-12.

Source Reduction Activity Reporting

Top Industries By Percentage of Forms	TRI Forms Number	Forms Reporting Source Reduction Activities Number	Forms Reporting Source Reduction Activities Percent
Measure./Photo.	991	379	38.2
Furniture	1,848	680	36.8
Printing	631	200	31.7
Leather	367	116	31.6
Miscellaneous	955	297	31.1
Multiple Codes 20-39 ❻	5,914	1,683	28.5
Transportation Equip.	4,908	1,383	28.2
Electrical	4,283	1,183	27.6
Plastics	4,293	1,174	27.3
Lumber	1,931	500	25.9
Subtotal	26,121	7,595	29.1
Total for All Industries	79,987	19,732	24.7

Table E-13.

Source Reduction Activity Reporting

Top Chemicals By Number of Forms	TRI Forms Number	Forms Reporting Source Reduction Activities Number	Forms Reporting Source Reduction Activities Percent
Toluene	3,569	1,376	38.6
Xylene (mixed isomers)	3,371	1,220	36.2
1,1,1-Trichloroethane	2,073	1,154	55.7
Sulfuric acid	5,640	944	16.7
Methyl ethyl ketone	2,418	904	37.4
Acetone	2,511	852	33.9
Methanol	2,424	618	25.5
Ammonia	3,096	618	20.0
Glycol ethers	2,162	591	27.3
Hydrochloric acid	3,279	567	17.3
Subtotal	30,543	8,844	29.0
Total for All TRI Chemicals	79,987	19,732	24.7

Table E-14.

❻ Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

CHAPTER 3: YEAR-TO-YEAR COMPARISON OF RELEASES AND TRANSFERS

Because TRI data are collected annually, they can be used to measure progress in reducing toxic chemical releases and off-site transfers.

Reported toxic chemical releases decreased by 12.6% between 1992 and 1993, more than double the rate of decline between 1991 and 1992. Reported transfers increased by 4.1%, primarily due to increased transfers for recycling. Table E-15 compares the 1992 and 1993 release and transfer quantities. Since 1988, EPA's baseline year for TRI comparisons, toxic chemical releases have declined by 42.7%. Figure E-19 illustrates the change in each release type since 1988.

Releases and Transfers 1992-1993	1992-1993 Change	
	Millions of Pounds	Percent
Total Releases	**-406.5**	**-12.6**
Air	-200.5	-10.7
Surface Water	-5.0	-1.8
Underground Injection	-149.7	-20.6
Land	-51.3	-15.1
Total Transfers	**186.2**	**4.1**
Recycling	317.6	10.8
Energy Recovery	14.8	3.1
Treatment	-69.0	-17.4
POTWs	-122.4	-28.0
Disposal	61.4	23.3
Other[7]	-16.2	-89.9

Table E-15.

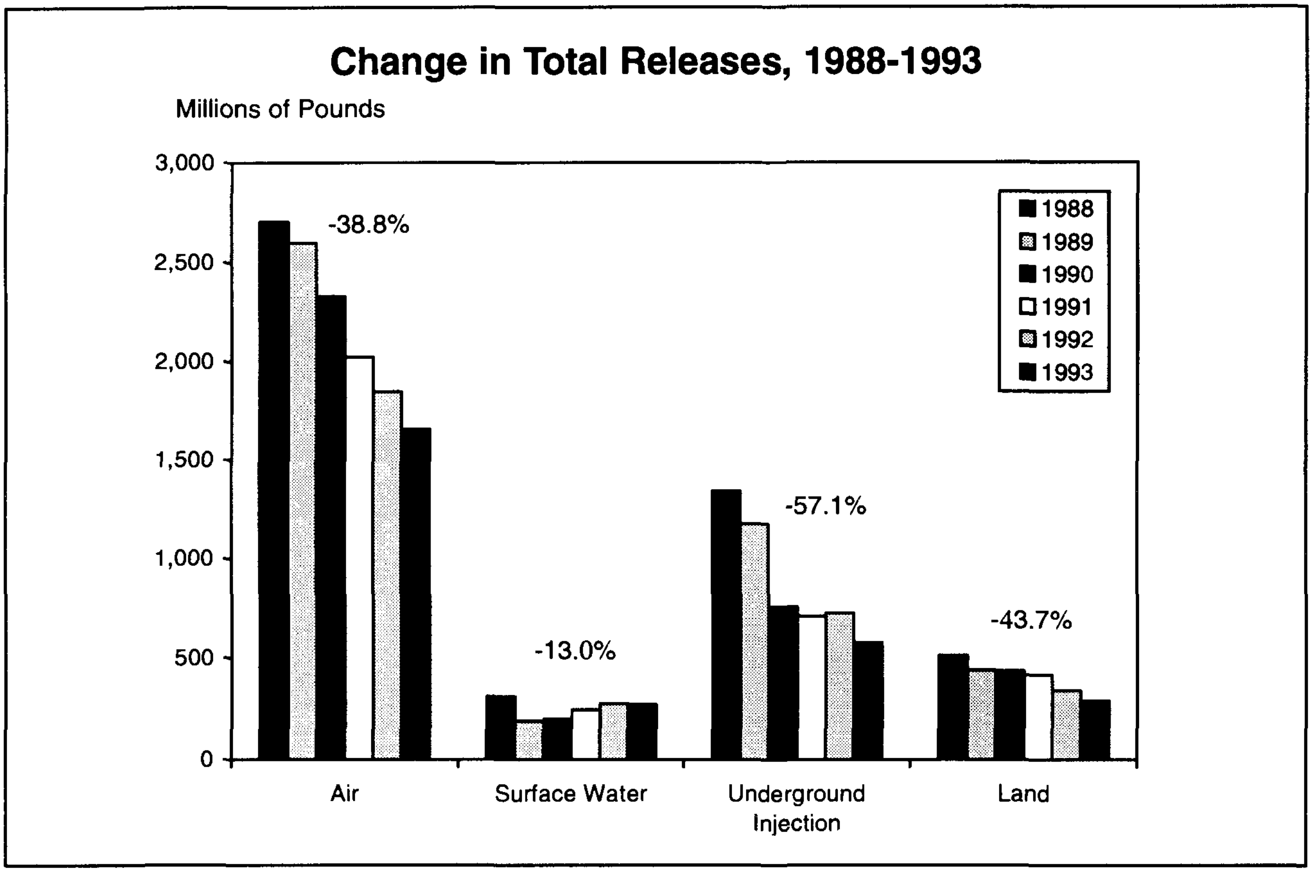


Figure E-19.[8]

[7] Transfers reported with no waste management codes or invalid codes.

[8] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

1992-1993 Change in Total Releases by State

(Includes Underground Injection)

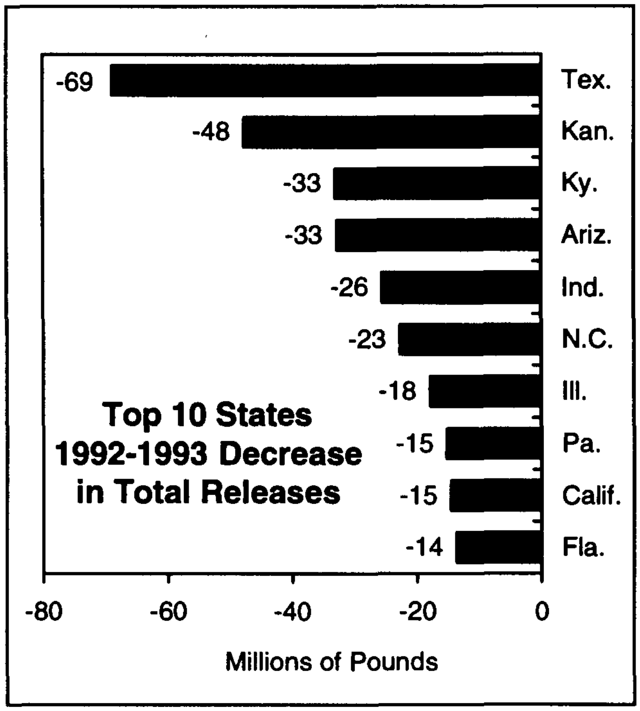


Figure E-20.

Figure E-20 presents the 10 states with the largest poundage decrease in total releases (including underground injection) between 1992 and 1993. Figure E-21 illustrates the percentage change in total releases between 1992 and 1993 for each state.

Fifteen states reported a decrease in total releases of more than 20% since 1992. Six states and two territories reported increased releases between 1992 and 1993.

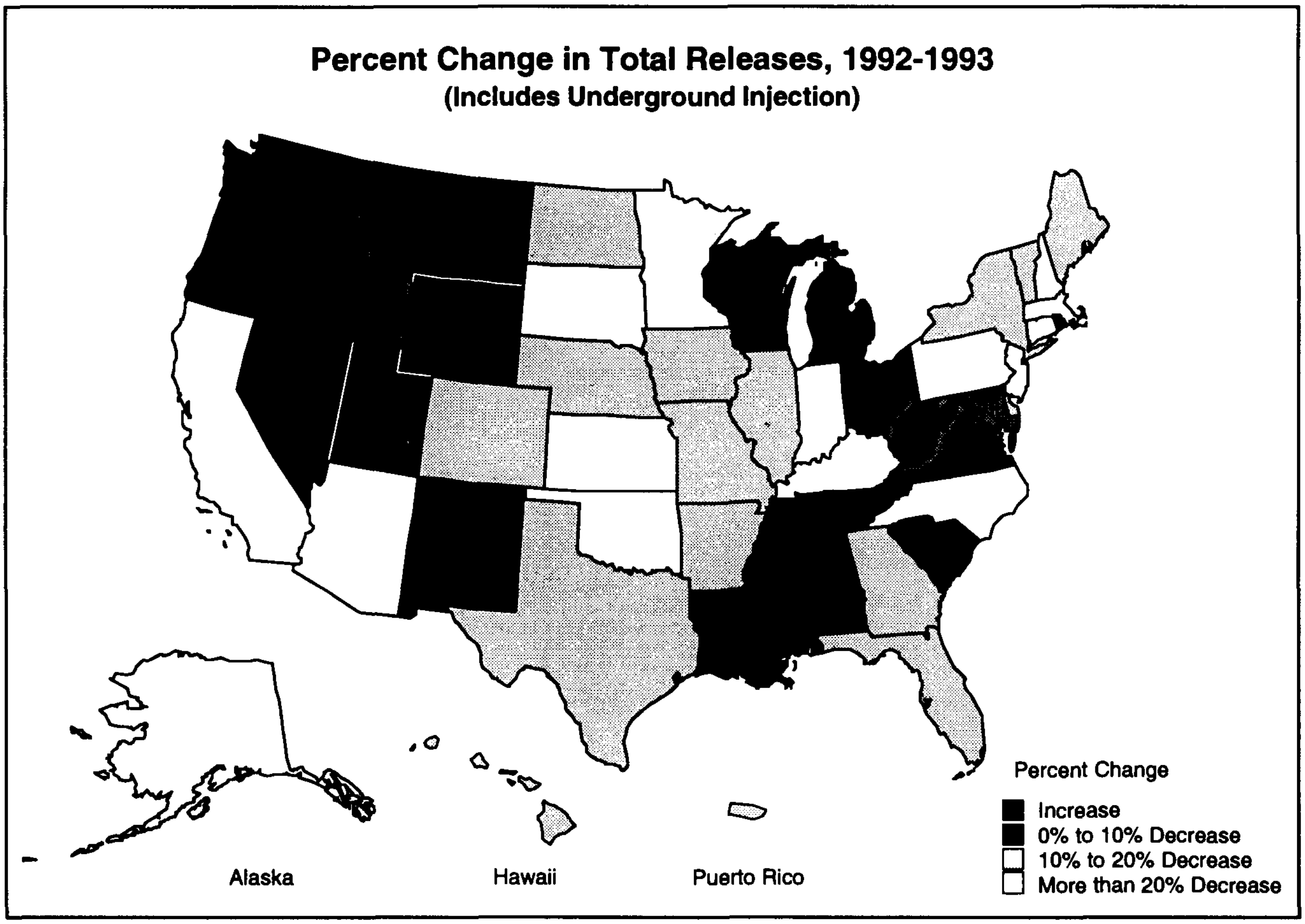


Figure E-21.

1988-1993 Change in Total Releases by State
(Includes Underground Injection)

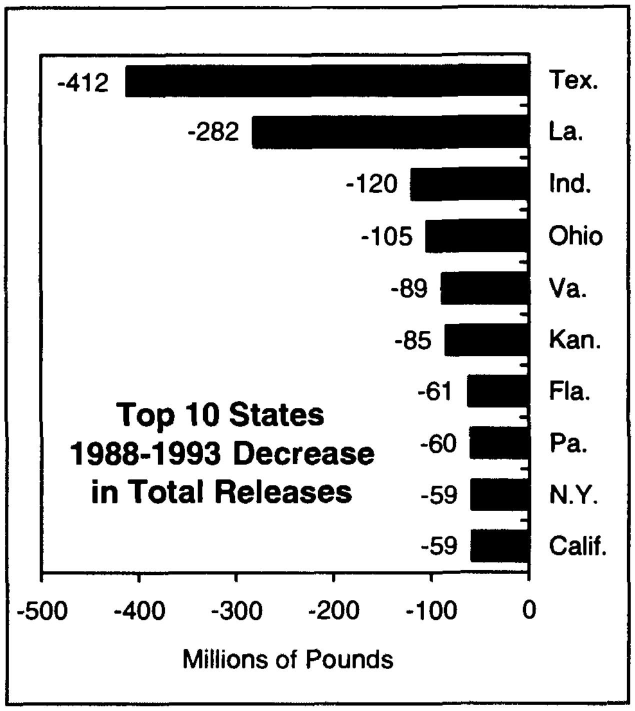


Figure E-22.

Figure E-22 presents the 10 states with the largest quantity decrease in total releases (including underground injection) between 1988 and 1993. Figure E-23 displays the states by percentage change in total releases between 1988 and 1993.

Twenty-two states and the District of Columbia have reduced their total releases by more than 50% since 1988. Eight states have reduced their releases by less than 25% since 1988, compared to the national decrease of nearly 43%. Three states have reported an increase in total releases since 1988.

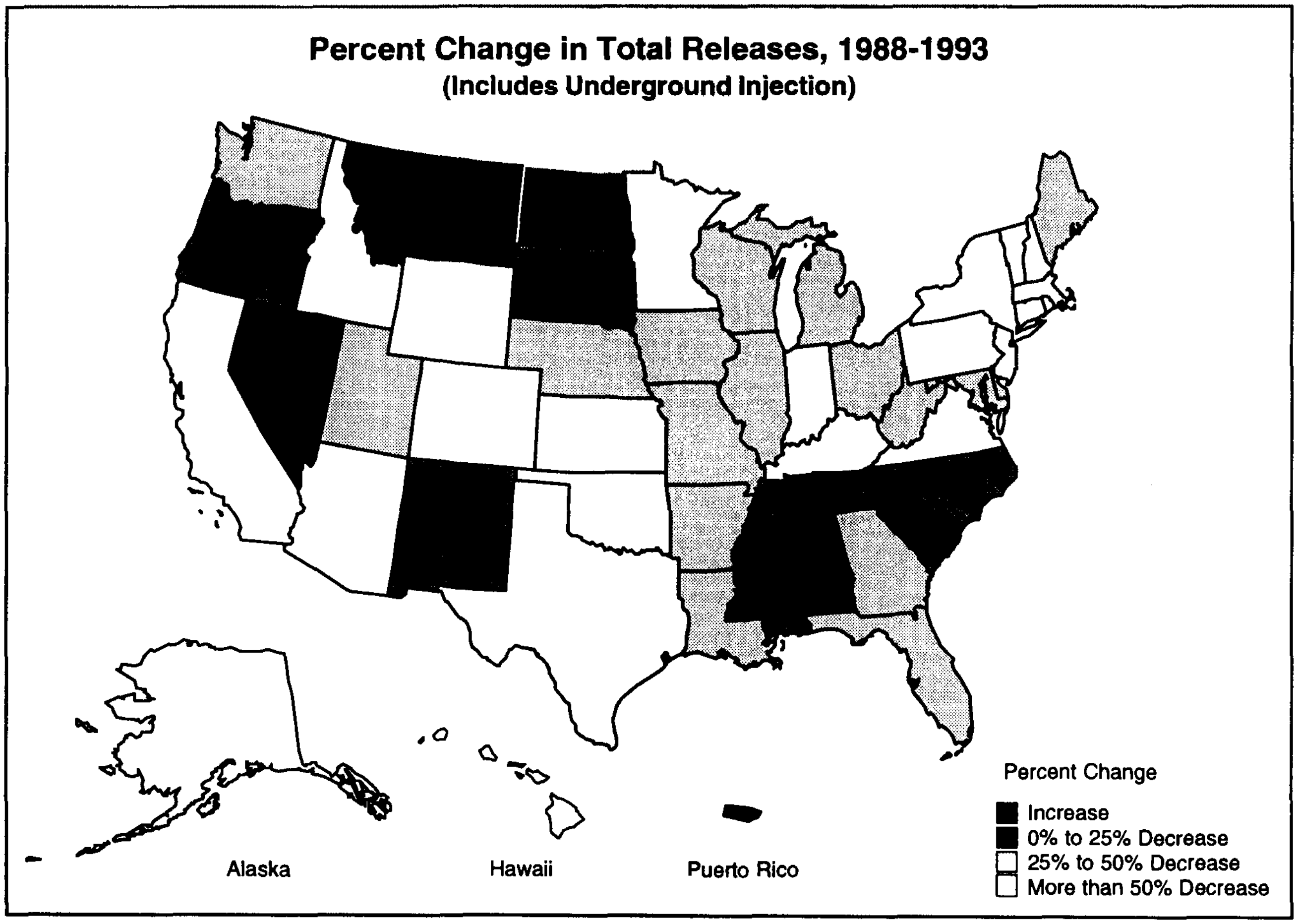


Figure E-23.

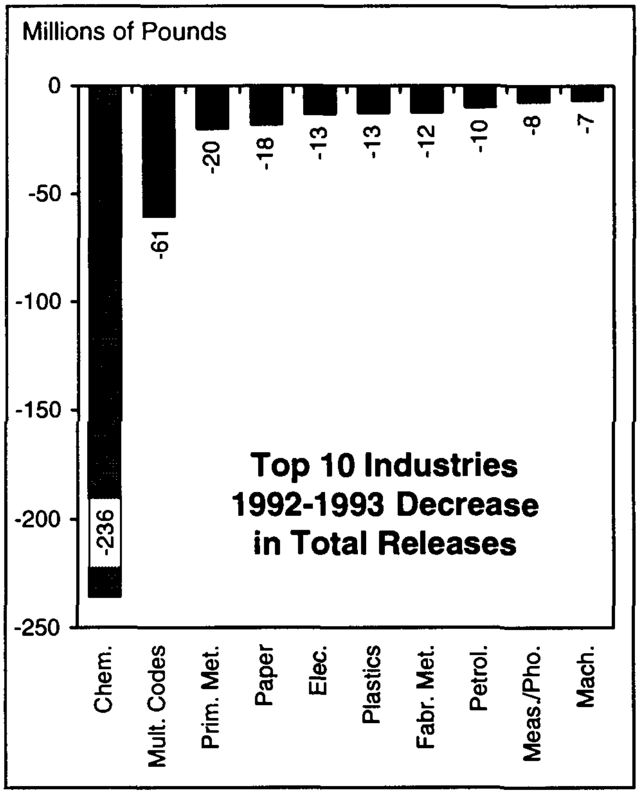


Figure E-24.❾

Change in Total Releases by Industry

Figure E-24 displays the 10 industries with the largest quantity decrease in total releases (including underground injection) between 1992 and 1993. Figure E-25 displays the 10 industries with the largest quantity decrease in total releases between 1988 and 1993.

Although the chemical industry has experienced the largest decrease in terms of pounds since 1988, several industries have experienced larger percentage reductions in total releases. For example, the electrical equipment industry has reduced its releases by 68.5% since 1988, compared to 43.8% for the chemical industry and 42.7% for all industries combined. Table E-16 lists the top 10 industries for percentage decrease in total releases since 1988.

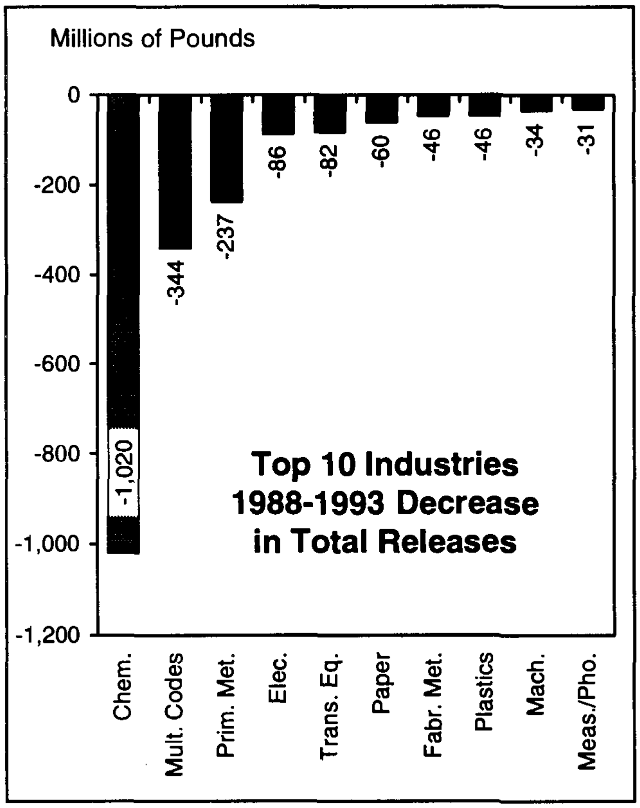


Figure E-25.❾

Top 10 Industries for 1988-1993 Percentage Decrease in Total Releases	1988-1993 Change	
	Pounds	Percent
Electrical	-85,976,191	-68.5
Multiple Codes 20-39❾	-343,517,564	-68.3
Machinery	-33,825,370	-55.2
Measure./Photo.	-30,524,297	-53.4
Leather	-7,555,908	-47.5
Textiles	-17,761,858	-46.5
Miscellaneous	-14,379,030	-45.5
Chemicals	-1,019,874,077	-43.8
Primary Metals	-236,927,540	-41.9
Printing	-24,528,738	-40.2
Total for Top 10 Industries	-1,814,870,573	-47.9

Table E-16.

❾ Multiple Codes: Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

Change in Total Releases by Chemical

Table E-17 lists the 10 chemicals with the largest quantity decrease in total releases (including underground injection) between 1992 and 1993. Two of the chemicals among the top 10 for decrease in total releases (1,1,1-trichloroethane and Freon 113) are ozone-depleting chemicals whose production will be banned as of January 1, 1996. The net decrease (decreases for some chemicals minus increases for others) for all TRI chemicals between 1992 and 1993 was 406 million pounds, or 12.6%.

Table E-18 lists the 10 chemicals with the largest quantity decrease in total releases (including underground injection) between 1988 and 1993. The 98% decline in releases of ammonium sulfate (solution) is largely attributable to a change in reporting method for this chemical rather than to actual reductions in releases. The net decrease for all TRI chemicals between 1988 and 1993 was nearly 2.1 billion pounds, or 42.7%.

Table E-19 lists the 10 chemicals with the largest increases in total releases (including underground injection) between 1988 and 1993.

1992-1993 Decrease in Total Releases

Chemical	1992-1993 Change	
	Pounds	Percent
Ammonia	-113,011,644	-24.3
Hydrochloric acid	-62,028,328	-21.6
1,1,1-Trichloroethane	-53,042,379	-45.3
Methanol	-41,931,828	-16.5
Toluene	-17,837,961	-9.1
Manganese compounds	-16,173,398	-24.3
Freon 113	-15,065,503	-60.5
Copper	-11,592,214	-80.9
Dichloromethane	-10,378,371	-13.7
Acetone	-10,188,311	-7.3
Total for Top 10 Chemicals	-351,249,937	-21.4

Table E-17.

1988-1993 Decrease in Total Releases

Chemical	1988-1993 Change	
	Pounds	Percent
Ammonium sulfate (solution)	-593,862,296	-98.0
Hydrochloric acid	-255,372,525	-53.1
Toluene	-121,071,663	-40.4
1,1,1-Trichloroethane	-115,415,330	-64.3
Acetone	-84,373,471	-39.4
Methanol	-77,945,453	-26.9
Dichloromethane	-65,526,833	-50.0
Chlorine	-65,000,624	-46.0
Freon 113	-60,702,551	-86.1
Methyl ethyl ketone	-55,214,405	-39.2
Total for Top 10 Chemicals	-1,494,485,151	-58.5

Table E-18.[10]

1988-1993 Increase in Total Releases

Chemical	1988-1993 Change	
	Pounds	Percent
Phosphoric acid	35,370,949	20.0
Copper compounds	14,413,640	43.4
Ethylbenzene	2,877,323	36.8
Ammonia	2,841,897	0.8
1,2,4-Trimethylbenzene	2,237,166	50.6
Acrylamide	1,813,597	81.4
Methyl tert-butyl ether	1,327,068	50.6
Acetamide[11]	1,089,016	—
Methylenebis(phenylisocyanate)	1,016,774	304.9
Decabromodiphenyl oxide	658,075	1269.3
Total for Top 10 Chemicals	63,645,505	11.0

Table E-19.[10]

[10] Calculation of top chemicals does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

[11] No releases were reported for this chemical in 1988, although it was included on the TRI list that year.

CHAPTER 4: TRI REPORTING PROFILES FOR 33/50 PROGRAM CHEMICALS

The 33/50 Program is a voluntary pollution prevention initiative that targets 17 high-priority TRI chemicals for reductions in releases and transfers (see Box E-6). The program derives its name from its reduction goals: an interim goal of a 33% reduction in the 1992 reporting year and an ultimate goal of a 50% reduction in the 1995 reporting year, as measured against 1988 TRI data. These goals include all releases, as well as transfers to off-site locations for treatment and disposal. Transfers for recycling and energy recovery are not included because they were not reportable in 1988.

Releases and transfers of these 17 targeted chemicals declined by 100 million pounds, or 11%, between 1992 and 1993. Reductions since 1988 total 46% (see Figure E-26). Facilities owned by companies participating in the 33/50 Program, representing just a third of the total number of facilities reporting Program chemicals to TRI, accounted for 98% of the 100 million pound reduction in the last year, experiencing an average reduction of more than 20% (and 57% since 1988). Non-participating facilities reported virtually no reductions in 33/50 Program emissions in 1993.

In the first two years after the Program's goals were announced (1991 and 1992), the rate of reduction for 33/50 Program chemicals significantly outpaced the rate for non-Program chemicals. However, between 1992 and 1993, releases and transfers of non-Program chemicals declined by 13%, compared to an 11.0% decline for 33/50 Program chemicals. Figure E-27 compares the annual reduction rates of the 33/50 Program chemicals to the rates for all other TRI chemicals.

17 Priority Chemicals Targeted by the 33/50 Program

Benzene
Cadmium and compounds
Carbon tetrachloride
Chloroform
Chromium and compounds
Cyanide compounds
Dichloromethane
Lead and compounds
Mercury and compounds
Methyl ethyl ketone
Methyl isobutyl ketone
Nickel and compounds
Tetrachloroethylene
Toluene
1,1,1-Trichloroethane
Trichloroethylene
Xylenes

Box E-6.

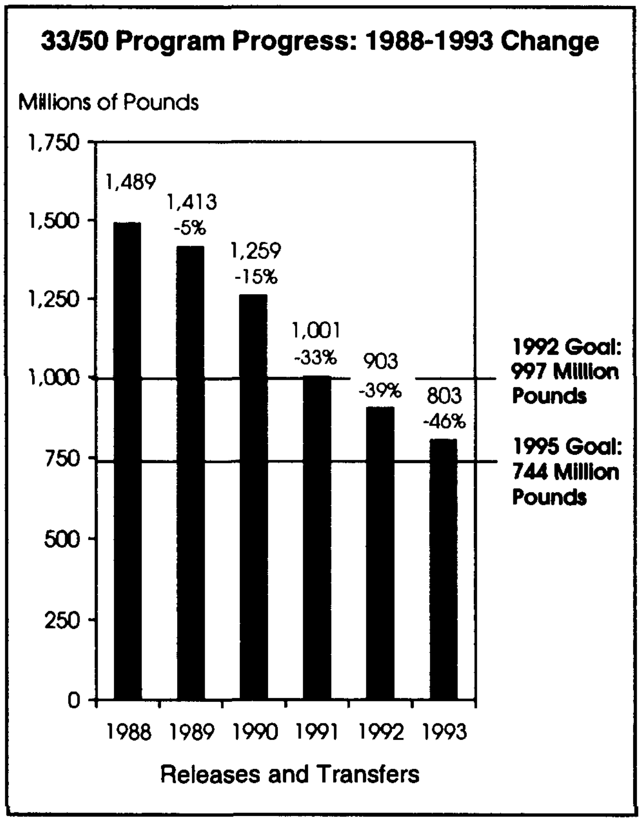


Figure E-26.

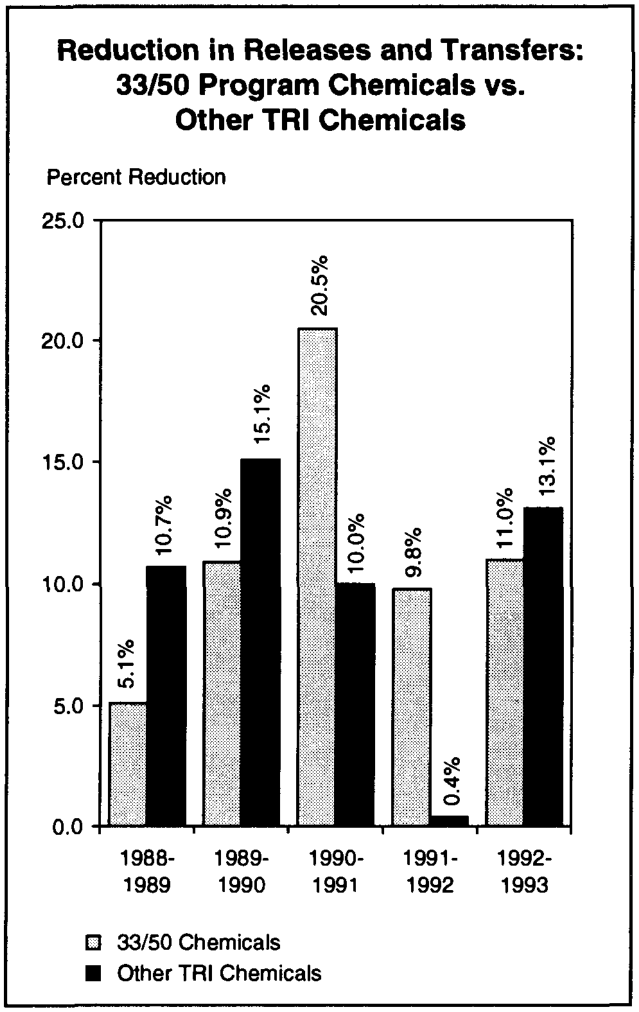


Figure E-27.⓬

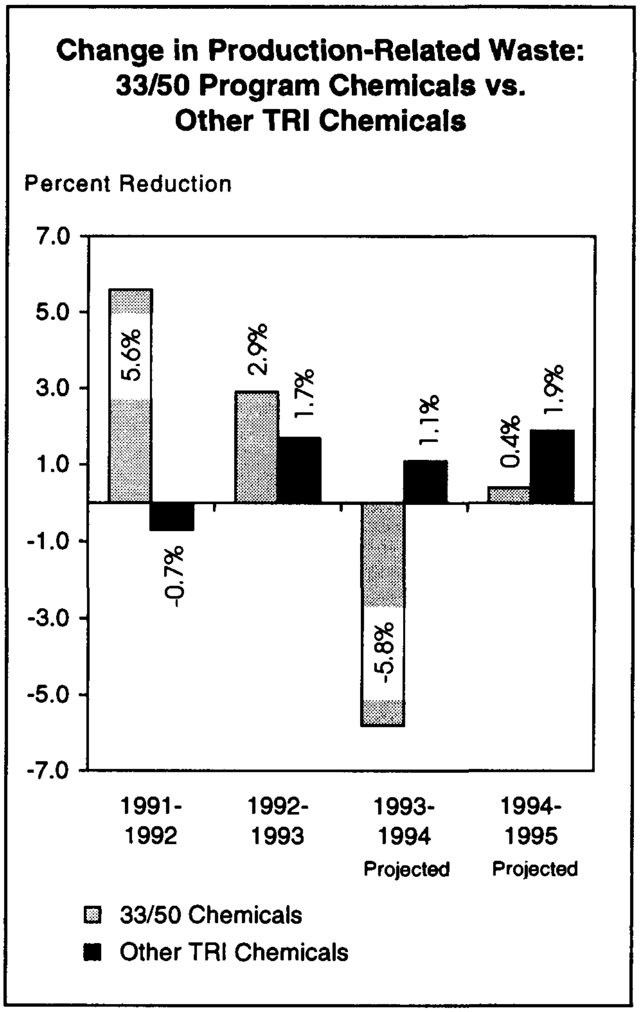


Figure E-28.⓭

Total production-related waste associated with 33/50 Program chemicals increased by 2.9% between 1992 and 1993. However, facilities are projecting that total production-related waste associated with 33/50 Program chemicals will decline by nearly 6% in 1994, while production-related waste associated with non-Program chemicals is projected to rise. Figure E-28 compares the annual changes in total production-related waste for 33/50 Program chemicals and non-Program chemicals.

Facilities owned by companies participating in the 33/50 Program reported a slight reduction in 33/50 Program chemical production-related waste in 1993 (0.5%) and are projecting substantial additional reductions by 1995 (15%). Non-participating facilities reported a nearly 8% rise in 33/50 Program production-related waste in the last year and project an increase of an additional 7% by 1995.

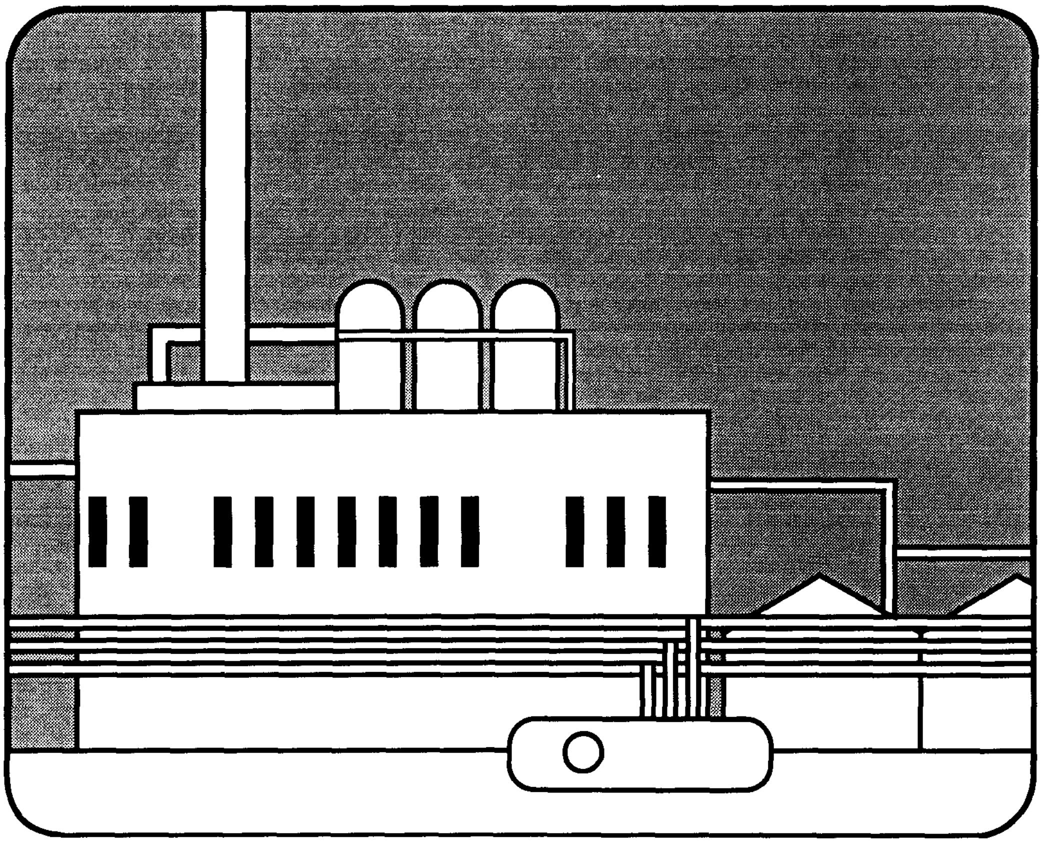
Facilities report a higher rate of source reduction activities for 33/50 Program chemicals than for non-Program chemicals. In 1993, nearly one-third of all forms for 33/50 Program chemicals reported one or more source reduction activities undertaken that year for the chemical. This compares to just over 21% for all other TRI chemicals.

⓬ The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

⓭ 1991 as reported on the 1992 Form R for the previous year.

1993 Toxics Release Inventory Public Data Release

Introduction



1993 TOXICS RELEASE INVENTORY PUBLIC DATA RELEASE

INTRODUCTION

What is the Toxics Release Inventory?

The Toxics Release Inventory, or TRI, is a publicly available database that contains specific toxic chemical release and transfer information from manufacturing facilities throughout the United States. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), which Congress passed to promote planning for chemical emergencies and to provide information to the public about the presence and release of toxic and hazardous chemicals in their communities.

Following passage of the Pollution Prevention Act of 1990, the TRI was expanded to include mandatory reporting of additional waste management and pollution prevention activities. The information collected under these laws can be used by the public to identify facilities and chemical release patterns that warrant further study and analysis. Combined with hazard and exposure information, TRI has proven to be an invaluable tool for risk identification.

Each year, manufacturing facilities meeting certain thresholds must report their estimated releases and transfers of listed toxic chemicals to the U.S. Environmental Protection Agency and to the state or tribal entity in whose jurisdiction the facility is located. The TRI list for 1993 included 316 chemicals and 20 chemical categories. A separate report, called a Form R, is required for each chemical the facility has manufactured, processed, or otherwise used in amounts exceeding the thresholds.

Reports for each calendar year are due by July 1 of the following year. After completion of data entry and data quality assurance activities, EPA makes the data available to the public in printed reports, in a computer database, and through a variety of other information products. States also make available to the public copies of the forms filed by facilities in their jurisdiction.

This document summarizes data collected for calendar year 1993. Industry reporting forms for 1993 were due to EPA and the states by July 1, 1994. This document also provides basic data for the two preceding years (1991 and 1992) and for the baseline year (1988) for comparison purposes. Although the first data were collected for calendar year 1987, 1988 has been selected as the baseline year because of concerns about the data quality of industry's first-year submissions. The on-line computer database and the CD-ROM version of the database contain the data collected for all years, including years not summarized in this report.

Who Must Report?

Manufacturing facilities that have the equivalent of 10 or more full-time employees and meet the established thresholds for manufacturing, processing, or otherwise using listed chemicals must report their releases and transfers. Manufacturing facilities are defined as facilities in Standard Industrial Classification primary codes 20-39, which include, among others: chemicals, petroleum refining, primary metals, fabricated metals, paper, plastics, and transportation equipment. 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. Beginning with the 1994 reporting year, certain facilities will be able to take advantage of an alternate reporting threshold, which is discussed below.

What Must be Reported?

Each year, facilities report to TRI the amounts of toxic chemicals released to the air, water and land and the amounts of chemicals transferred off-site for treatment and disposal. Facilities provide extensive identifying information, such as name, location, type of business, contact names, name of parent company, and environmental permit numbers. They also provide information about the manufacture, process, and use of the listed chemical at the facility and the maximum amount of the chemical on-site during the year. Facilities also provide information about methods used to treat waste at the site and the efficiencies of those treatment methods. In addition to information about the amount of toxic chemicals sent off-site, facilities also must specify the destinations of those transfers.

Beginning with the 1991 reports, facilities were required to provide additional information about source reduction activities and about waste management activities such as recycling. Companies must also provide a production index that can help relate changes in reported quantities of toxic chemicals in waste to changes in production. These additional data elements facilitate tracking of industry progress in reducing waste generation and moving towards safer management alternatives. While not an absolute measure of pollution prevention, the additional data provide new insight into the complete toxics cycle.

What are the Benefits and Uses of the Data?

The TRI program gives the public unprecedented direct access to toxic chemical release and transfer data at the local, state, regional, and national level. Responsible use of this information can allow the public to identify potential concerns, gain a better understanding of potential risks, and work with industry and government to reduce toxic chemical releases and the risks associated with them. When combined with hazard and exposure data, this information can allow informed environmental priority setting at the local level.

Federal, state, and local governments can use the data to compare facilities or geographic areas, to identify hotspots, to evaluate existing environmental programs, to more effectively set regulatory priorities, and to track pollution control and waste reduction progress. TRI data, in conjunction with demographic data, can help governments and the public identify potential environmental justice concerns.

Industry can use the data to obtain an overview of use and release of toxic chemicals, to identify and reduce costs associated with toxic waste, to identify promising areas of pollution prevention, to establish reduction targets, and to measure and document progress toward reduction goals. The public availability of the data has prompted many facilities to work with their communities to develop effective strategies for reducing environmental and human health risks posed by toxic chemical releases.

What are the Limitations of the Data?

While the TRI includes about 80,000 reports from 23,000 facilities each year, it captures only a portion of all toxic chemical releases nationwide. Facilities with fewer than 10 employees and facilities that do not meet chemical thresholds are not required to file TRI reports. Non-manufacturing facilities currently are not required to report, although EPA is examining industry groups for possible addition to the reporting requirements. TRI does not account for toxic emissions from automobiles and many other non-industrial sources. Not all toxic chemicals are listed under TRI, although chemical coverage was greatly expanded for the 1995 reporting year.

TRI requires the reporting of estimated data and does not mandate that facilities monitor their releases. Various estimation techniques are used where monitoring data are not available, and EPA has published estimation guidance for the regulated community. Variations between facilities can result from the use of different estimation methodologies. Some facilities may not be fully complying with the reporting requirements. These factors should be taken into account when considering data accuracy and completeness.

As discussed above, the TRI data summarized in this report reflect chemical releases, transfers, and waste management activities that occurred in the 1993 calendar year. Release and transfer patterns can change dramatically from one year to the next, so it is important to recognize that current facility activities may be different than those reported for 1993. Each year, EPA has been able to reduce the amount of time required to process and make available the forms received. Particularly as more facilities switch from paper to magnetic media submissions, the amount of time required for data processing and quality assurance will continue to decrease, allowing EPA to make the TRI data available more quickly following the submission deadline.

TRI reports reflect releases of chemicals, not exposures of the public to those chemicals. Release estimates alone are not sufficient to determine exposure or to calculate potential adverse effects on human health and the environment. Although additional information is necessary to assess exposure and risk, TRI data can be used to identify areas of potential concern.

Program Accomplishments and Future Directions

On November 30, 1994, EPA finalized the addition of 286 chemicals and chemical categories to the EPCRA section 313 toxic chemical list. These additions include 39 chemicals as part of delimited chemical categories. A majority of the chemicals that were added to the toxic chemical list are pesticide active ingredients. The addition of these chemicals is effective for the 1995 reporting year, with the first reports due by July 1, 1996. Data collected for these additional chemicals will enable the public to develop a more complete picture of toxic chemicals in their communities.

In conjunction with this addition of chemicals, EPA established an alternative reporting threshold for facilities whose annual reportable amount of a listed toxic chemical does not exceed 500 pounds. The annual reportable amount of a chemical means the amount of that chemical released or disposed of, treated, burned for energy recovery, or recycled by the facility on-site or off-site. If a facility's annual reportable amount of a chemical does not exceed 500 pounds, and the facility does not manufacture, process or use that chemical in excess of one million pounds annually, the facility can take advantage of a less burdensome reporting alternative. Instead of filing a complete reporting form, the facility may file a certification statement which provides facility and chemical identity information. EPA estimates that this alternative threshold will save industry more than $17 million annually in reporting costs.

EPA continues to examine industry sectors for possible addition to the TRI reporting requirements, in part by refining the analysis of the use and release of toxic chemicals at facilities in these industries. In 1994, EPA conducted a series of meetings with representatives of these different industries to discuss EPA's analysis and its approach to expanding industry coverage under TRI.

An Executive Order signed by President Clinton in 1993 applied federal right-to-know laws, including TRI reporting, to all federal government facilities. The first reports under this Executive Order are due by July 1, 1995 for the 1994 reporting year. During the summer of 1994, EPA conducted an extensive series of training sessions nationwide to help federal facilities prepare for their upcoming reporting obligation. The Department of Energy voluntarily complied with this Executive Order one year early, with 23 of its facilities filing TRI reports for 1993.

In 1994, EPA completed a public dialog process that was initiated in early 1993 to address issues associated with reporting the new data required by the Pollution Prevention Act. In this process, representatives of environmental groups, industry, states, and academia were convened to discuss issues and provide EPA with advice and recommendations for resolving them. EPA received the final report from this committee and considered its findings in development of guidance for reporting the Pollution Prevention Act data. EPA expects to publish final guidance by the winter of 1995.

How Can I Obtain Additional TRI Information?

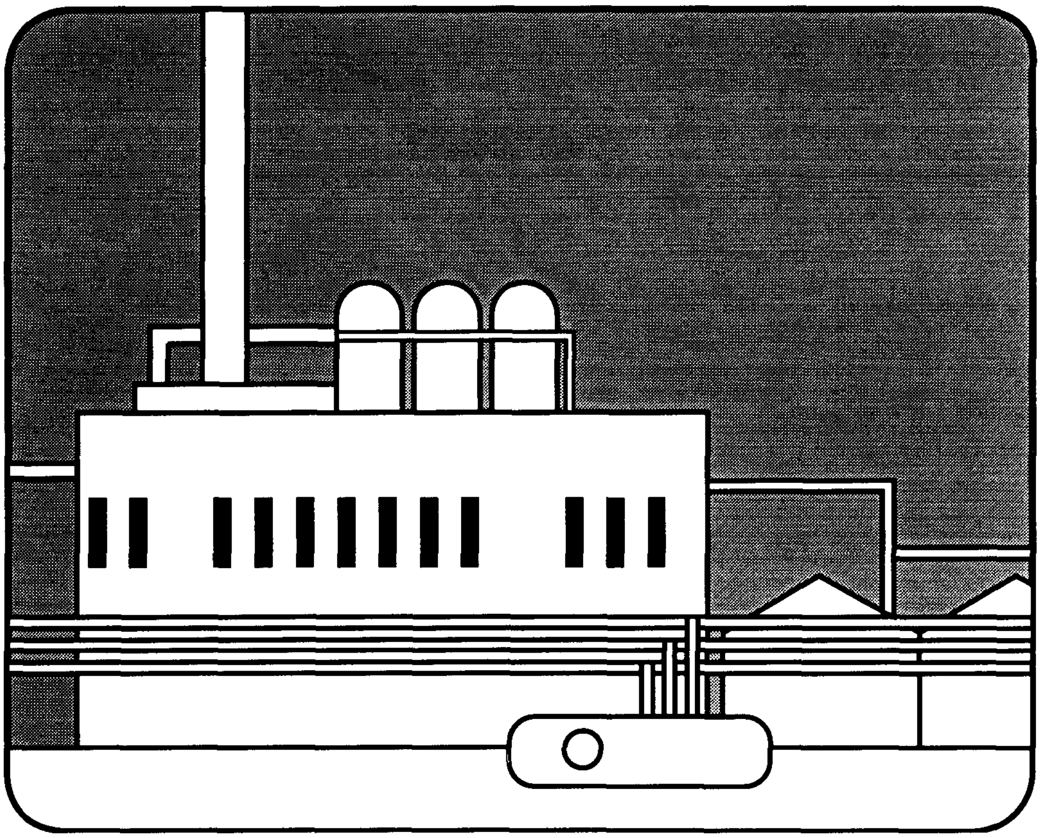
This report contains 1993 TRI data and limited comparison data for 1988, 1991 and 1992. The TRI data are also available in a variety of common computer and hard copy formats, to ensure that everyone can easily use the information. The complete TRI database is accessible to the public via on-line telecommunications through the National Library of Medicine's TOXNET system and through the Right-to-Know Network. Information about accessing the TRI database through these systems is provided in Appendix B. The data are also available on diskette, CD-ROM, and computer bulletin boards. The TRI User Support Service (202-260-1531) can provide assistance in accessing and using the TRI data.

To request copies of TRI and EPCRA documents or to obtain further information about the program, contact the toll-free Emergency Planning and Community Right-to-Know Information Hotline at 1-800-535-0202.

Other potential sources of TRI information include the state EPCRA section 313 contact, the EPA Regional Office, or the facility itself. Information about EPA Regional and state EPCRA section 313 contacts is found in Appendix G.

Chapter 1

1993 TRI Releases and Transfers



1993 TRI RELEASES AND TRANSFERS

INTRODUCTION

This chapter provides information reported by facilities for calendar year 1993 on releases of toxic chemicals at the facility and transfers of chemicals in waste for further processing or disposal. To provide a greater degree of insight as to how data on releases and transfers were reported for 1993 activities, this chapter has been divided into three sections. These sections present the data by state, by industry, and by chemical. Figure 1-1 illustrates the media to which on-site releases can occur and the types of off-site transfers for waste management that are reportable to TRI.

Box 1-1 that follows is a description of the on-site releases reportable to TRI and the types of activities that may contribute releases to various media. Box 1-2 is a listing of those off-site transfers for waste management or further processing that are reportable to TRI and are covered in this chapter.

WHAT TO CONSIDER WHEN USING TRI DATA

Users of TRI information should be aware that the TRI data reflect releases and transfers of chemicals, not exposures of the public to those chemicals. The TRI data, in conjunction with other information, can be used to evaluate exposures that may result from releases and transfers of toxic chemicals. The evaluation of exposures to these chemicals is one factor in determining potential risks. The determination of potential risk depends upon many factors. The following are some of the factors that should be considered when reviewing TRI data:

Toxicity of the Chemical

The TRI list consists of chemicals that vary widely in their ability to produce toxic effects.

- Some high-volume releases of less toxic chemicals may appear to be a more serious problem than lower-volume releases of highly toxic chemicals, when just the opposite may be true.
- For example, phosgene is more toxic in smaller quantities than methanol, and a comparison between these two chemicals for setting hazard priorities or estimating potential health concerns may be misleading on the basis of volume released alone.

Exposure Considerations

- Potential degradation or persistence of the chemical in the environment.

  Exposure to a chemical is dependent upon the chemical being available. The potential for exposure is greater the longer the chemical remains unchanged in the environ-

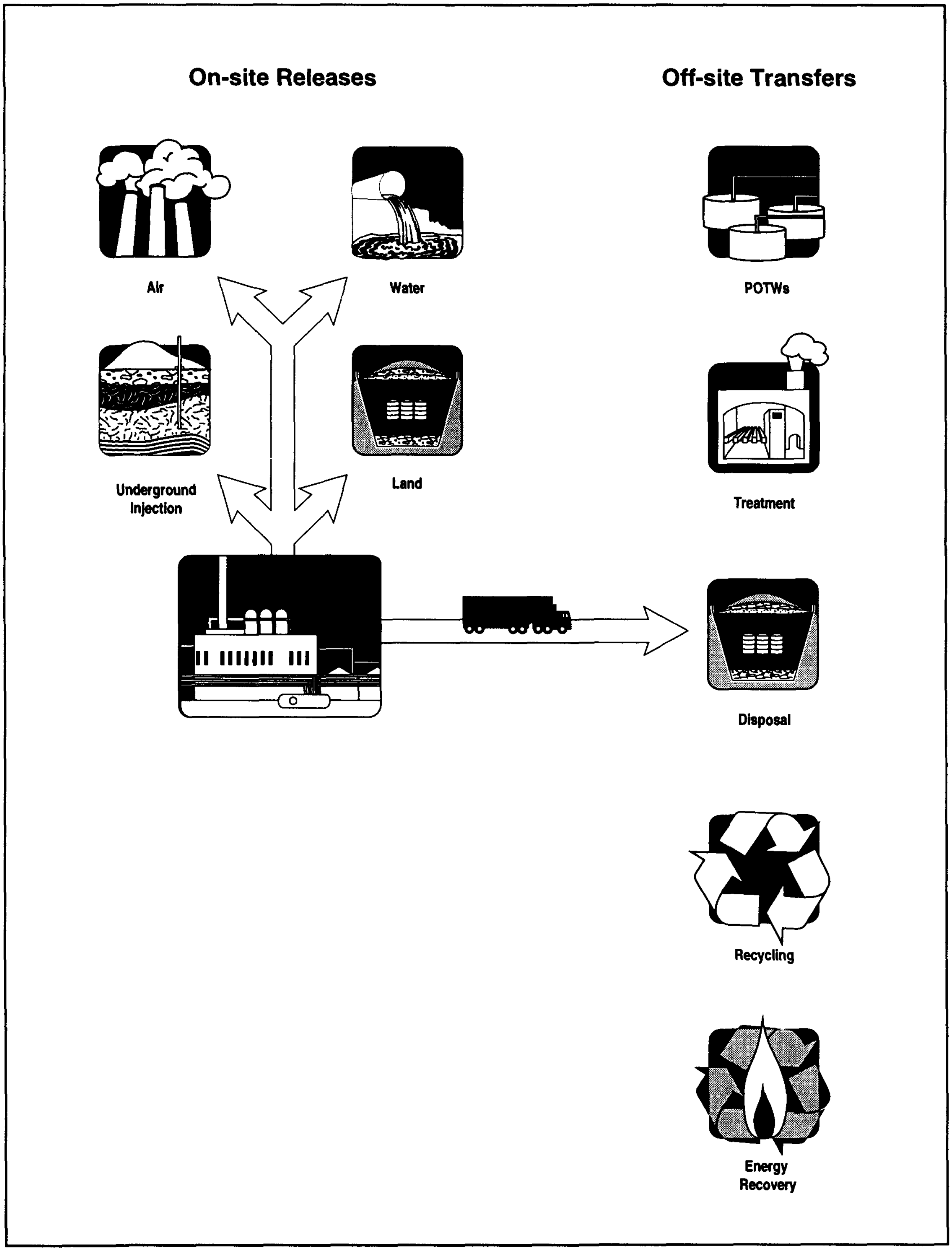


Figure 1-1. On-site Releases and Off-site Transfers Reported to TRI.

An Explanation of Releases

Releases. A release is an on-site discharge of a toxic chemical to the environment. This includes emissions to the air, discharges to bodies of water, releases at the facility to land, as well as contained disposal into underground injection wells. Releases are reported to TRI by media type. The left side of Figure 1-1 illustrates these release types.

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

Releases to Water. Releases to water include discharges to streams, rivers, lakes, oceans, and other 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 a contained release of a fluid into a subsurface well for the purpose of waste disposal. Wastes containing TRI chemicals are injected into either Class I wells or Class V wells. Class I wells are used to inject liquid hazardous wastes or dispose of industrial and municipal wastewaters beneath the lowermost underground source of drinking water. Class V wells are generally used to inject non-hazardous fluid into or above an underground source of drinking water. Currently, TRI reporting does not distinguish between these two types of wells, although there are important differences in environmental impact between these two methods of injection.

Releases to Land. 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 spills, leaks, or waste piles).

Box 1-1. An Explanation of Releases.

ment. Sunlight, heat, or microorganisms may or may not decompose the chemical.

- For example, microorganisms readily degrade some chemicals, such as methanol, into less toxic chemicals; volatile organic chemicals, such as ethylene and propylene, react in the atmosphere, contributing to the formation of smog; metals are persistent and will not degrade upon release to the environment.

- As a result, smaller releases of a persistent highly toxic chemical may create a more serious problem than larger releases of a chemical that is rapidly converted to a less toxic form.

♦ Bioconcentration of the chemical in the food chain.

As a chemical becomes incorporated in the food chain it may concentrate or disperse as it moves up the food chain.

- Some chemicals, such as mercury, will accumulate as they move up the food chain.

- Small releases of a chemical that bioaccumulates may result in significant exposures to consumers.

An Explanation of Transfers

Off-site Transfers. An off-site transfer is a transfer of toxic chemicals in wastes to a facility that is geographically or physically separate from the 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 for disposal, these quantities do not necessarily represent entry of the chemical into the environment. The right side of Figure 1-1 illustrates transfer types reportable to TRI.

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.

Transfers Off-site for Recycling. Toxic chemicals in wastes that are sent off-site for the purposes of recycling are generally recovered or regenerated by a variety of recycling methods, including solvent recovery, metals recovery, and acid regeneration. The choice of the recycling method depends on the toxic chemical being sent for recycling. Once 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 for Energy Recovery. Toxic chemicals in wastes 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 for Treatment. Toxic chemicals in wastes 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 Off-site for Disposal. Toxic chemicals in wastes that are transferred to a facility for disposal generally are either released to land (see Box 1-1 above) at an off-site facility or are injected underground.

Other Off-site Transfers. In this report, toxic chemicals in wastes 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."

Box 1-2. An Explanation of Transfers.

- The environmental medium (air, water, land, or underground injection) to which the toxic chemical has been released.

  Chemical exposure of a population depends on the environmental medium to which a chemical is released. The medium also affects the types of exposures possible, such as inhalation, dermal exposure, or ingestion.

  - Releases of a chemical to the air can result in exposures to organisms living near and downwind from facilities releasing toxic chemicals to the atmosphere. Persistent chemicals may fall or be rained out of air onto land or into water bodies, resulting in exposures via these environmental media.
  - Exposures that may result from releases to water bodies (streams, lakes, etc.) depend in part on the downstream uses of the water, including drinking, cooking, and bathing.
  - Releases to POTWs may result in exposure if chemicals are not removed through treatment processes and are passed through the POTW to water bodies used by downstream communities.
  - Toxic chemicals released to land may be transported to other environmental media as a result of run-off or migration of the chemical through the soil into underlying water sources.
  - Chemicals may enter the food chain through the presence of the toxic chemical in soil or water.
  - Injection of toxic chemicals into properly designed and constructed Class I wells will result in substantially lower exposure potential than direct forms of environmental release. These wells are designed to entomb liquid wastes for at least 10,000 years.

- The type of off-site facility receiving the chemical and the efficiency of its waste management practices.

  The amount of a toxic chemical that ultimately enters the environment depends upon how the chemical was handled during disposal, treatment, energy recovery, or recycling activities. Several factors to keep in mind when considering amounts sent off-site are presented below.

  - The efficiency of recycling operations varies depending upon the method of recycling and the chemical being recycled.
  - Use of a combustible toxic chemical for energy recovery typically results in the destruction of 95% to 99% or more of the toxic chemical. The remaining quantity may either be released to air or disposed of in ash to land.
  - The efficiency of the treatment of toxic chemicals in waste sent to sewage treatment plants varies depending on the chemical and the sewage plant. Some high-volume pollutants such as methanol are readily degraded by most sewage treatment plants. Other high volume chemicals such as ammonia are not readily treated by most sewage treatment plants and will pass through the plant into the aquatic environment. The efficiency of other treatment methods, such as incineration, also depends upon the specifications of the treatment facility and the nature of the chemical.
  - Toxic chemicals in waste sent off-site for disposal are typically released to land or injected underground.

1993 Releases	Pounds
Total Releases	2,808,618,413
Fugitive Air	490,040,607
Point Source Air	1,182,087,128
Surface Water	271,152,864
Underground Injection	576,285,233
On-site Land Releases	289,052,581

Table 1-1. TRI Releases, 1993.

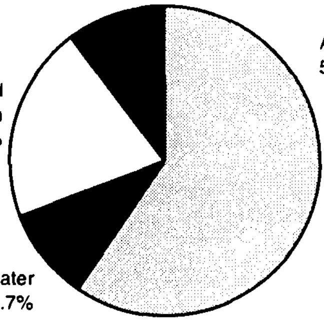


Figure 1-2. Distribution of TRI Releases, 1993.

Further information on the use of TRI data in determining potential risks can be found in "Toxic Chemical Risk Screening Guide" (EPA 560/2-89-002), July 1989.

1993 NATIONAL OVERVIEW

In 1993, 23,321 facilities reported approximately 2.8 billion pounds of total releases of toxic chemicals into the environment. Amounts directly released to the environment included 1.7 billion pounds to air, 271.2 million pounds to surface water, and 289.1 million pounds to land. An additional 576.3 million pounds were injected underground. (See Table 1-1 and Figure 1-2.)

Facilities also sent a total of 4.7 billion pounds of toxic chemicals to off-site locations for treatment, disposal, energy recovery, and recycling. The bulk of these off-site transfers (3.3 billion pounds) was sent off-site to be recycled. In addition, 487.4 million pounds of toxic chemicals were sent off-site for energy recovery, 328.1 million pounds were transferred off-site for treatment, 325.3 million pounds of toxic chemicals were transferred off-site for disposal, and 314.4 million pounds were sent to Publicly Owned Treatment Works (POTWs). An additional 1.8 million pounds of toxic chemicals were reported with no waste management codes or invalid codes and are listed as "Other Off-site Transfers." (See Table 1-2 and Figure 1-3.)

The remainder of this chapter presents information on amounts reported by facilities for 1993 activities summarized by state, industry sector, and chemical. The chemical section provides data on chemicals that may be of special interest to the public, as well as a complete listing of releases and transfers of all TRI chemicals.

1993 TRI DATA BY STATE

The following figures and tables present the 1993 release and transfer data by state.

Figures 1-4 and 1-5 illustrate which states have the highest volumes of TRI total releases and transfers.

Table 1-3 presents TRI releases, by media, alphabetically by state. Table 1-4 presents TRI transfers, by transfer type, and is also arranged alphabetically by state. No reports were received in 1993 for the District of Columbia, Guam, or the Northern Mariana Islands.

Table 1-5 ranks states by the sum of TRI on-site releases to air, water, and land only (excluding underground injection of waste). The top five

1993 Transfers	Pounds
Total Transfers	4,709,043,863
Transfers to recycling	3,252,166,922
Transfers to energy recovery	487,380,037
Transfers to treatment	328,074,174
Transfers to POTWs	314,350,915
Transfers to disposal	325,251,442
Other off-site transfers❶	1,820,373

Table 1-2. TRI Transfers, 1993.

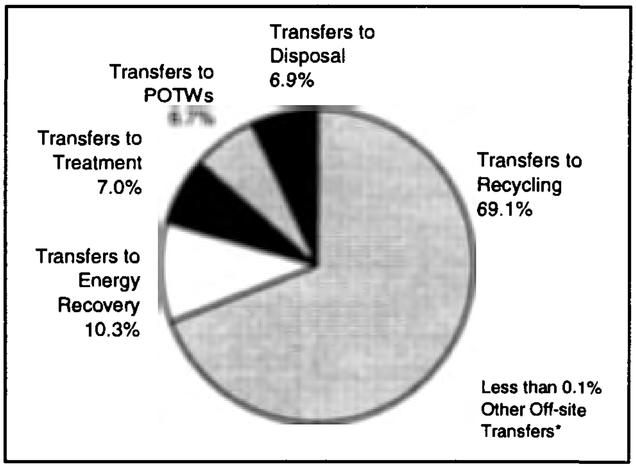


Figure 1-3. Distribution of TRI Transfers, 1993.

states for total air/water/land releases for 1993 reporting were Louisiana, Texas, Tennessee, Ohio, and Alabama. Table 1-6 ranks states by the sum of their TRI total releases, which includes amounts of waste injected underground. In this ranking, the top four states remain the same, but Alabama drops to sixth place. Mississippi, which ranks 14th for air/water/land releases, ranks fifth for total releases because of large quantities of chemicals injected underground.

EPA has offered these alternative state rankings because substantial questions have been raised concerning whether waste disposed of in Class I injection wells should be viewed as a direct environmental release. Properly designed and constructed Class I injection wells have a substantially lower exposure potential than direct forms of release. EPA believes that it is appropriate to include rankings both with and without underground injection in order to help the public to consider potential exposure when focusing on areas of concern.

When reviewing TRI data, it is important to remember that the information reported is not a complete picture of all chemicals being released, treated, or otherwise managed. TRI does not cover all chemicals that may pose health or environmental concerns; TRI does not cover all industries that manage and release chemicals; and TRI reporting thresholds exclude some activities that would otherwise be reported. With this in mind, the following Tables 1-7 through 1-12 illustrate the movement of off-site transfers of waste within and between states. Table 1-7 presents transfers from one location to another within the same state. Table 1-8 presents transfers received at locations in the state from TRI facilities outside that state (imports of waste into the state). Some interesting findings can be seen from comparing general management of TRI waste for a given state. For example, Washington state ranks ninth in total transfers of TRI waste within the state, but appears in the 31st position in terms of total transfers received from sources outside the state. Also of note, the District of Columbia has no TRI reporting facilities but ranks 25th in overall receipt of TRI waste for treatment or further processing.

Table 1-9 adds the quantities in Tables 1-7 and 1-8, to give the total quantity of transfers received at locations within a state, regardless of whether those transfers originated at a TRI facility in that state or in another state.

❶ Transfers reported without valid waste management codes.

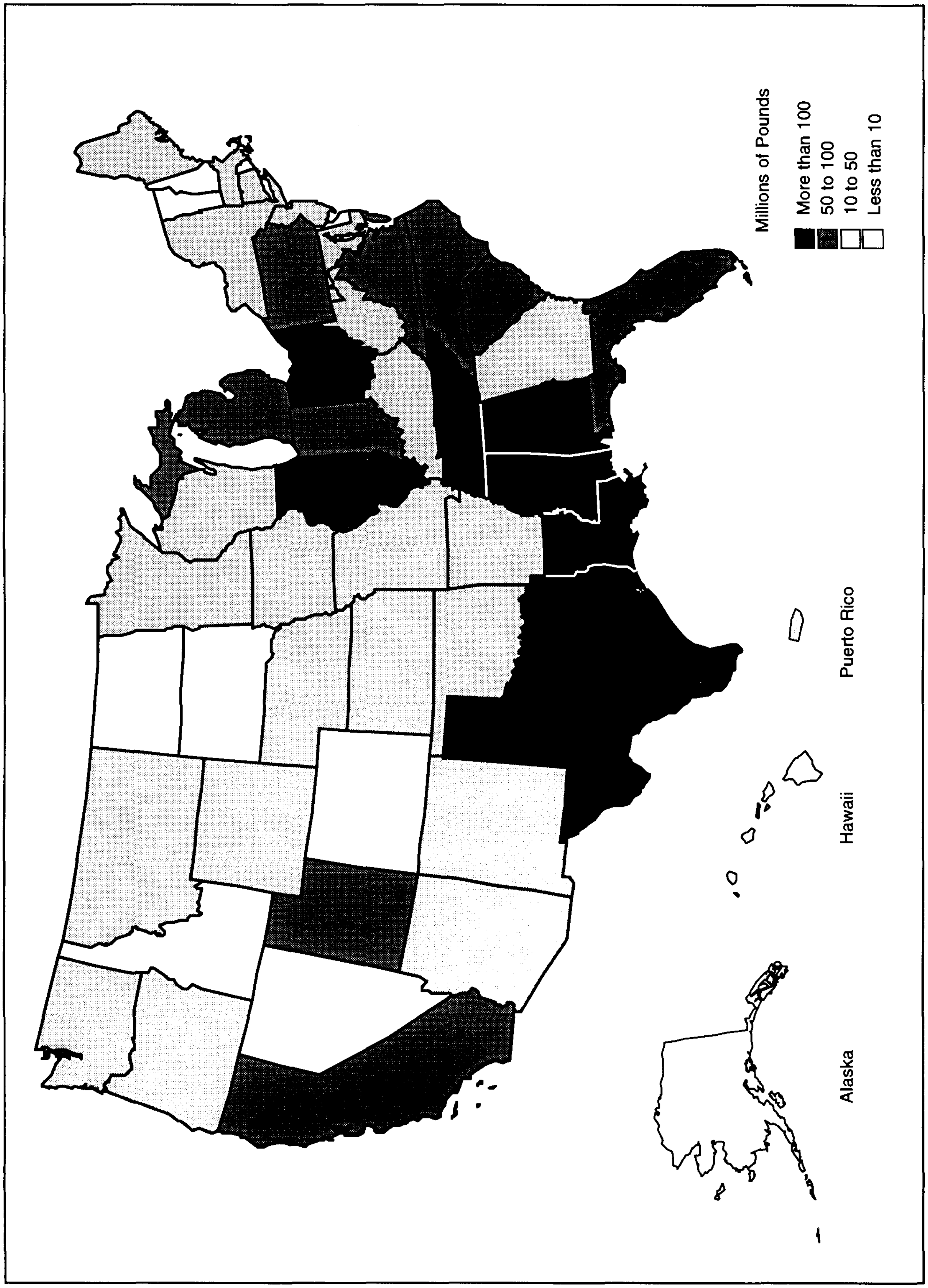


Figure 1-4. TRI Releases by State, 1993.

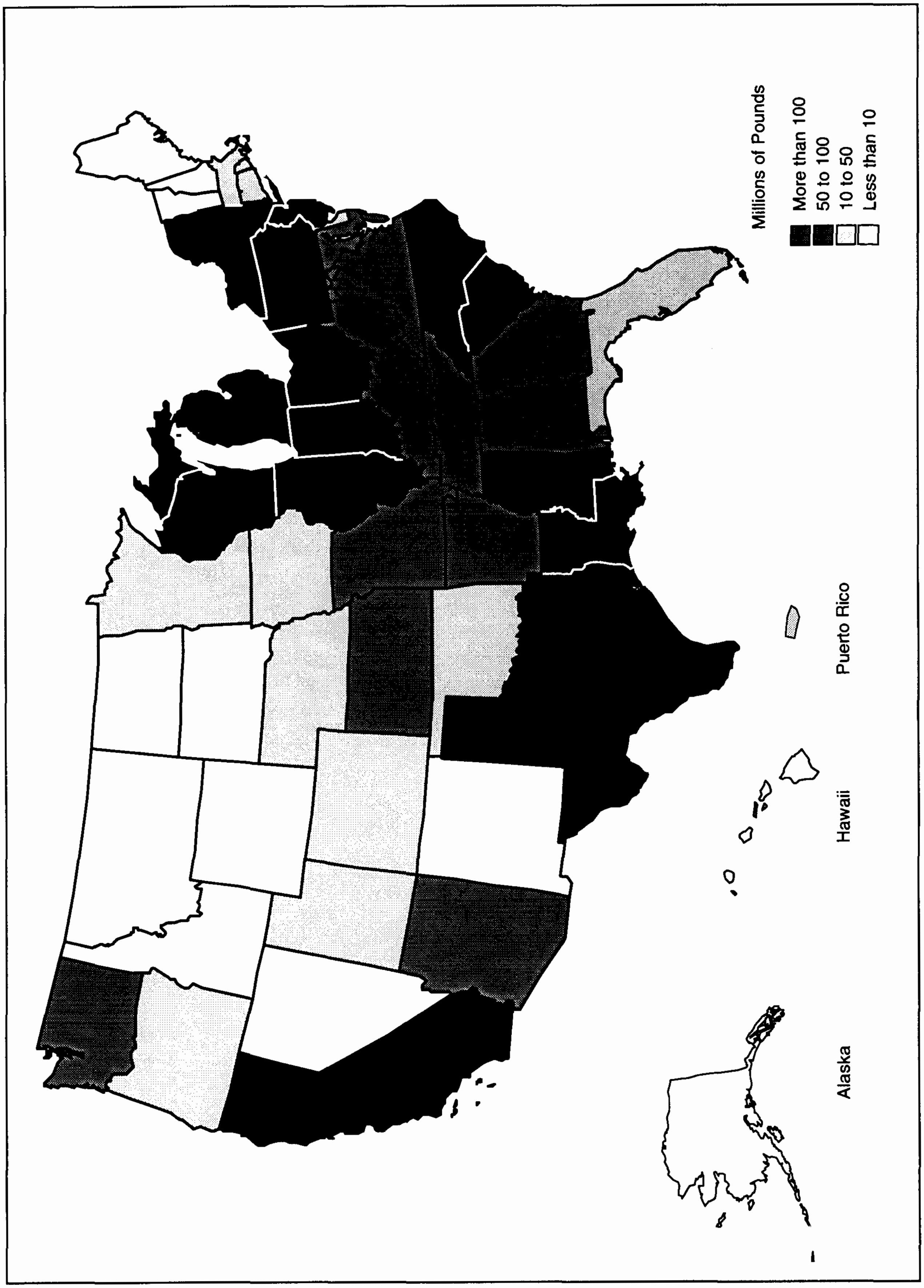


Figure 1-5. TRI Transfers by State, 1993.

Table 1-3. TRI Releases by State, 1993 (Alphabetically Ordered).

State	Facilities Number	Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Alabama	517	1,930	95,160,628	5,628,552	145,613	4,603,618	105,538,411
Alaska	8	50	6,228,306	2,056,183	192	1,933	8,286,614
American Samoa	3	6	18,518	5	0	0	18,523
Arizona	180	508	5,481,037	57	18	7,955,053	13,436,165
Arkansas	398	1,299	29,426,159	1,555,379	3,624,516	2,471,827	37,077,881
California	1,758	5,078	46,538,726	3,085,060	4,152,139	3,494,363	57,270,288
Colorado	189	511	4,435,016	189,656	500	286,900	4,912,072
Connecticut	388	1,115	10,477,018	2,345,213	0	373,108	13,195,339
Delaware	75	286	4,502,835	135,504	0	174,267	4,812,606
Florida	512	1,436	30,588,799	2,149,042	10,940,759	25,466,473	69,145,073
Georgia	731	2,451	45,394,371	3,037,766	0	1,454,833	49,886,970
Hawaii	18	66	528,077	14,300	160,015	1,760	704,152
Idaho	58	162	4,269,802	30,574	0	3,717,828	8,018,204
Illinois	1,387	4,899	63,011,054	5,167,311	12,551,427	20,261,127	100,990,919
Indiana	1,041	3,693	76,875,870	777,645	7,425,421	12,765,463	97,844,399
Iowa	427	1,288	28,159,291	1,055,579	0	2,301,076	31,515,946
Kansas	288	1,017	21,396,521	743,750	17,159,038	532,071	39,831,380
Kentucky	445	1,698	35,016,332	490,193	20,000	1,299,674	36,826,199
Louisiana	322	2,017	77,665,640	210,347,583	158,091,740	4,575,998	450,680,961
Maine	111	354	10,619,968	625,901	0	1,378,229	12,624,098
Maryland	209	648	10,453,788	567,509	0	2,208,581	13,229,878
Massachusetts	588	1,654	11,539,397	46,533	0	51,973	11,637,903
Michigan	970	3,759	67,861,464	331,065	4,674,279	9,131,738	81,998,546
Minnesota	523	1,513	22,339,025	450,851	48	2,190,285	24,980,209
Mississippi	330	1,128	48,213,352	1,776,442	62,573,996	5,455,676	118,019,466
Missouri	590	1,979	32,687,733	1,440,396	0	15,480,689	49,608,818
Montana	23	142	2,395,245	182,387	0	42,634,659	45,212,291
Nebraska	172	526	10,811,341	339,827	0	305,618	11,456,786
Nevada	39	97	1,052,163	0	0	7,661,687	8,713,850
New Hampshire	126	343	3,926,805	66,329	0	11,224	4,004,358
New Jersey	700	2,575	15,438,767	3,296,633	0	637,489	19,372,889
New Mexico	41	140	1,836,130	14,254	0	21,979,730	23,830,114
New York	847	2,592	44,854,984	1,779,140	255	1,124,826	47,759,205
North Carolina	965	2,993	74,182,818	735,905	0	16,095,957	91,014,680
North Dakota	33	91	1,467,998	70,147	0	1,282	1,539,427
Ohio	1,669	5,907	84,597,707	4,798,638	25,865,489	22,772,725	138,034,559
Oklahoma	255	836	17,228,991	418,143	1,228,210	3,185,438	22,060,782
Oregon	256	777	16,903,135	562,627	0	1,969,869	19,435,631
Pennsylvania	1,262	4,252	52,071,577	1,054,565	3,202	952,942	54,082,286
Puerto Rico	177	579	13,387,462	16,531	0	10,407	13,414,400
Rhode Island	158	439	3,525,422	133,763	0	0	3,659,185
South Carolina	493	1,886	56,981,880	963,027	0	1,158,972	59,103,879
South Dakota	64	120	1,799,323	15,018	0	192,610	2,006,951
Tennessee	694	2,297	116,734,579	2,263,941	62,224,840	6,984,283	188,207,643
Texas	1,240	5,970	141,869,302	2,268,176	190,931,446	17,102,799	352,171,723
Utah	143	519	80,150,953	48,077	0	11,651,782	91,850,812
Vermont	44	113	756,788	1,450	0	260	758,498
Virgin Islands	3	30	1,560,702	137,330	0	26,038	1,724,070
Virginia	473	1,567	60,997,378	1,815,362	0	2,280,206	65,092,946
Washington	312	995	20,489,919	3,746,659	0	191,137	24,427,715
West Virginia	154	733	23,099,901	1,657,994	64	329,600	25,087,559
Wisconsin	883	2,781	33,220,087	649,215	0	2,041,591	35,910,893
Wyoming	29	142	1,897,651	69,677	14,512,026	114,907	16,594,261
Total	23,321	79,987	1,672,127,735	271,152,864	576,285,233	289,052,581	2,808,618,413

Table 1-4. TRI Transfers by State, 1993 (Alphabetically Ordered).

State	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers❷ Pounds	Total Transfers Pounds
Alabama	49,419,204	11,889,056	7,797,927	468,846	8,131,155	0	77,706,188
Alaska	450,043	0	2,364	20	20	0	452,447
American Samoa	0	0	7	0	0	0	7
Arizona	47,132,038	716,757	2,388,813	533,642	205,696	0	50,976,946
Arkansas	60,125,214	6,036,168	1,280,819	596,869	1,118,874	255	69,158,199
California	227,379,771	9,592,954	6,746,814	19,418,656	9,370,805	217,552	272,726,552
Colorado	9,794,524	3,925,318	3,654,992	632,061	1,195,107	4,050	19,206,052
Connecticut	24,761,508	4,055,556	6,771,808	1,251,210	915,069	16,682	37,771,833
Delaware	16,316,523	439,333	1,005,826	3,062,509	120,206	0	20,944,397
Florida	21,515,244	3,519,899	3,823,636	9,385,308	1,879,497	224,115	40,347,699
Georgia	52,316,876	7,099,249	2,439,819	4,382,221	3,626,030	504	69,864,699
Hawaii	39,148	0	790	5,000	14,982	0	59,920
Idaho	515,255	247,671	46,510	2,027,567	4,839	250	2,842,092
Illinois	140,936,017	38,003,092	19,720,357	47,878,672	17,036,493	7,986	263,582,617
Indiana	413,167,791	16,627,290	31,239,809	3,572,043	15,131,517	3,574	479,742,024
Iowa	23,148,215	4,621,931	2,530,478	8,833,109	1,305,151	750	40,439,634
Kansas	39,859,752	2,159,574	3,919,211	2,455,067	9,058,591	15,847	57,468,042
Kentucky	62,739,461	10,184,639	9,575,465	2,187,485	3,143,410	60,960	87,891,420
Louisiana	111,187,063	6,881,439	5,617,275	40,857	2,615,845	0	126,342,479
Maine	2,965,478	600,484	296,433	625,989	193,879	0	4,682,263
Maryland	52,005,750	2,566,686	1,690,335	5,353,989	359,170	0	61,975,930
Massachusetts	23,304,629	7,924,901	4,341,388	4,729,882	1,241,351	52,605	41,594,756
Michigan	168,278,116	70,479,924	16,704,543	7,834,646	31,343,649	137,246	294,778,124
Minnesota	17,480,487	5,386,483	2,127,610	5,852,931	580,733	0	31,428,244
Mississippi	258,115,284	3,905,138	1,606,017	927,638	1,424,877	4,200	265,983,154
Missouri	47,477,206	8,295,626	18,062,200	21,901,305	3,326,039	5,155	99,067,531
Montana	1,941,469	73,110	10,785	27,822	58,774	0	2,111,960
Nebraska	21,329,393	787,282	2,595,999	1,248,693	12,687,901	260	38,649,528
Nevada	682,744	4,579	17,379	7,279	67,742	0	779,723
New Hampshire	7,117,233	310,431	415,357	445,404	457,796	0	8,746,221
New Jersey	99,562,436	28,241,990	10,416,001	38,828,620	3,887,380	95,107	181,031,534
New Mexico	390,388	170,931	79,609	334,316	33,604	0	1,008,848
New York	79,057,657	7,460,234	7,296,850	8,468,446	6,036,685	181,623	108,501,495
North Carolina	100,713,583	10,265,190	5,199,707	3,585,272	4,823,420	6,173	124,593,345
North Dakota	219,148	46,830	61,531	194,415	3,913	0	525,837
Ohio	200,292,570	31,009,831	47,164,592	17,734,142	37,752,061	41,700	333,994,896
Oklahoma	21,324,382	2,718,713	912,252	195,438	11,208,920	1,750	36,361,455
Oregon	16,370,061	609,976	699,817	4,827,587	1,313,441	0	23,820,882
Pennsylvania	180,137,012	20,462,927	25,063,156	9,610,012	61,777,620	595,141	297,645,868
Puerto Rico	14,610,091	8,217,141	6,476,251	3,581,800	347,434	250	33,232,967
Rhode Island	11,664,174	457,959	533,093	1,925,027	2,515,076	37	17,095,366
South Carolina	118,435,540	10,029,008	7,650,416	2,484,168	3,711,850	0	142,310,982
South Dakota	290,928	212,101	53,737	192,453	65,328	0	814,547
Tennessee	43,699,761	9,794,572	3,598,948	19,410,913	9,576,246	2,434	86,082,874
Texas	244,947,157	84,893,966	34,765,586	22,456,379	33,339,093	36,008	420,438,189
Utah	35,586,971	325,535	736,280	529,260	6,925,955	7,407	44,111,408
Vermont	3,978,943	177,002	320,564	18,713	26,182	0	4,521,404
Virgin Islands	682,955	125	7,261	0	1	0	690,342
Virginia	26,673,107	7,491,583	3,201,325	15,184,377	1,781,848	0	54,332,240
Washington	67,357,496	641,015	1,019,982	561,887	975,822	750	70,556,952
West Virginia	31,489,347	15,208,982	6,440,144	1,870,901	2,660,269	250	57,669,893
Wisconsin	53,116,195	22,605,827	9,928,293	6,669,786	9,838,100	99,752	102,257,953
Wyoming	65,584	4,029	18,013	283	35,996	0	123,905
Total	3,252,166,922	487,380,037	328,074,174	314,350,915	325,251,442	1,820,373	4,709,043,863

❷ Transfers reported without valid waste management codes.

Table 1-5. TRI Releases to Air, Water, and Land by State, 1993 (Ordered by Total Air/Water/Land Release).

State	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/Water/Land Releases Pounds
Louisiana	77,665,640	210,347,583	4,575,998	292,589,221
Texas	141,869,302	2,268,176	17,102,799	161,240,277
Tennessee	116,734,579	2,263,941	6,984,283	125,982,803
Ohio	84,597,707	4,798,638	22,772,725	112,169,070
Alabama	95,160,628	5,628,552	4,603,618	105,392,798
Utah	80,150,953	48,077	11,651,782	91,850,812
North Carolina	74,182,818	735,905	16,095,957	91,014,680
Indiana	76,875,870	777,645	12,765,463	90,418,978
Illinois	63,011,054	5,167,311	20,261,127	88,439,492
Michigan	67,861,464	331,065	9,131,738	77,324,267
Virginia	60,997,378	1,815,362	2,280,206	65,092,946
South Carolina	56,981,880	963,027	1,158,972	59,103,879
Florida	30,588,799	2,149,042	25,466,473	58,204,314
Mississippi	48,213,352	1,776,442	5,455,676	55,445,470
Pennsylvania	52,071,577	1,054,565	952,942	54,079,084
California	46,538,726	3,085,060	3,494,363	53,118,149
Georgia	45,394,371	3,037,766	1,454,833	49,886,970
Missouri	32,687,733	1,440,396	15,480,689	49,608,818
New York	44,854,984	1,779,140	1,124,826	47,758,950
Montana	2,395,245	182,387	42,634,659	45,212,291
Kentucky	35,016,332	490,193	1,299,674	36,806,199
Wisconsin	33,220,087	649,215	2,041,591	35,910,893
Arkansas	29,426,159	1,555,379	2,471,827	33,453,365
Iowa	28,159,291	1,055,579	2,301,076	31,515,946
West Virginia	23,099,901	1,657,994	329,600	25,087,495
Minnesota	22,339,025	450,851	2,190,285	24,980,161
Washington	20,489,919	3,746,659	191,137	24,427,715
New Mexico	1,836,130	14,254	21,979,730	23,830,114
Kansas	21,396,521	743,750	532,071	22,672,342
Oklahoma	17,228,991	418,143	3,185,438	20,832,572
Oregon	16,903,135	562,627	1,969,869	19,435,631
New Jersey	15,438,767	3,296,633	637,489	19,372,889
Arizona	5,481,037	57	7,955,053	13,436,147
Puerto Rico	13,387,462	16,531	10,407	13,414,400
Maryland	10,453,788	567,509	2,208,581	13,229,878
Connecticut	10,477,018	2,345,213	373,108	13,195,339
Maine	10,619,968	625,901	1,378,229	12,624,098
Massachusetts	11,539,397	46,533	51,973	11,637,903
Nebraska	10,811,341	339,827	305,618	11,456,786
Nevada	1,052,163	0	7,661,687	8,713,850
Alaska	6,228,306	2,056,183	1,933	8,286,422
Idaho	4,269,802	30,574	3,717,828	8,018,204
Colorado	4,435,016	189,656	286,900	4,911,572
Delaware	4,502,835	135,504	174,267	4,812,606
New Hampshire	3,926,805	66,329	11,224	4,004,358
Rhode Island	3,525,422	133,763	0	3,659,185
Wyoming	1,897,651	69,677	114,907	2,082,235
South Dakota	1,799,323	15,018	192,610	2,006,951
Virgin Islands	1,560,702	137,330	26,038	1,724,070
North Dakota	1,467,998	70,147	1,282	1,539,427
Vermont	756,788	1,450	260	758,498
Hawaii	528,077	14,300	1,760	544,137
American Samoa	18,518	5	0	18,523
Total	1,672,127,735	271,152,864	289,052,581	2,232,333,180

Table 1-6. TRI Releases by State, 1993 (Ordered by Total Release).

State	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Louisiana	77,665,640	210,347,583	158,091,740	4,575,998	450,680,961
Texas	141,869,302	2,268,176	190,931,446	17,102,799	352,171,723
Tennessee	116,734,579	2,263,941	62,224,840	6,984,283	188,207,643
Ohio	84,597,707	4,798,638	25,865,489	22,772,725	138,034,559
Mississippi	48,213,352	1,776,442	62,573,996	5,455,676	118,019,466
Alabama	95,160,628	5,628,552	145,613	4,603,618	105,538,411
Illinois	63,011,054	5,167,311	12,551,427	20,261,127	100,990,919
Indiana	76,875,870	777,645	7,425,421	12,765,463	97,844,399
Utah	80,150,953	48,077	0	11,651,782	91,850,812
North Carolina	74,182,818	735,905	0	16,095,957	91,014,680
Michigan	67,861,464	331,065	4,674,279	9,131,738	81,998,546
Florida	30,588,799	2,149,042	10,940,759	25,466,473	69,145,073
Virginia	60,997,378	1,815,362	0	2,280,206	65,092,946
South Carolina	56,981,880	963,027	0	1,158,972	59,103,879
California	46,538,726	3,085,060	4,152,139	3,494,363	57,270,288
Pennsylvania	52,071,577	1,054,565	3,202	952,942	54,082,286
Georgia	45,394,371	3,037,766	0	1,454,833	49,886,970
Missouri	32,687,733	1,440,396	0	15,480,689	49,608,818
New York	44,854,984	1,779,140	255	1,124,826	47,759,205
Montana	2,395,245	182,387	0	42,634,659	45,212,291
Kansas	21,396,521	743,750	17,159,038	532,071	39,831,380
Arkansas	29,426,159	1,555,379	3,624,516	2,471,827	37,077,881
Kentucky	35,016,332	490,193	20,000	1,299,674	36,826,199
Wisconsin	33,220,087	649,215	0	2,041,591	35,910,893
Iowa	28,159,291	1,055,579	0	2,301,076	31,515,946
West Virginia	23,099,901	1,657,994	64	329,600	25,087,559
Minnesota	22,339,025	450,851	48	2,190,285	24,980,209
Washington	20,489,919	3,746,659	0	191,137	24,427,715
New Mexico	1,836,130	14,254	0	21,979,730	23,830,114
Oklahoma	17,228,991	418,143	1,228,210	3,185,438	22,060,782
Oregon	16,903,135	562,627	0	1,969,869	19,435,631
New Jersey	15,438,767	3,296,633	0	637,489	19,372,889
Wyoming	1,897,651	69,677	14,512,026	114,907	16,594,261
Arizona	5,481,037	57	18	7,955,053	13,436,165
Puerto Rico	13,387,462	16,531	0	10,407	13,414,400
Maryland	10,453,788	567,509	0	2,208,581	13,229,878
Connecticut	10,477,018	2,345,213	0	373,108	13,195,339
Maine	10,619,968	625,901	0	1,378,229	12,624,098
Massachusetts	11,539,397	46,533	0	51,973	11,637,903
Nebraska	10,811,341	339,827	0	305,618	11,456,786
Nevada	1,052,163	0	0	7,661,687	8,713,850
Alaska	6,228,306	2,056,183	192	1,933	8,286,614
Idaho	4,269,802	30,574	0	3,717,828	8,018,204
Colorado	4,435,016	189,656	500	286,900	4,912,072
Delaware	4,502,835	135,504	0	174,267	4,812,606
New Hampshire	3,926,805	66,329	0	11,224	4,004,358
Rhode Island	3,525,422	133,763	0	0	3,659,185
South Dakota	1,799,323	15,018	0	192,610	2,006,951
Virgin Islands	1,560,702	137,330	0	26,038	1,724,070
North Dakota	1,467,998	70,147	0	1,282	1,539,427
Vermont	756,788	1,450	0	260	758,498
Hawaii	528,077	14,300	160,015	1,760	704,152
American Samoa	18,518	5	0	0	18,523
Total	1,672,127,735	271,152,864	576,285,233	289,052,581	2,808,618,413

Table 1-7. Transfers of TRI Chemicals in Wastes Within a State, 1993 (Ordered by Total Transferred).

State	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to Disposal Pounds	Other Off-site Transfers❸ Pounds	Total Transfers Within State Pounds
Indiana	334,307,431	8,362,804	29,109,406	11,874,818	2,824	383,657,283
Texas	140,660,571	76,151,202	30,987,295	30,478,988	27,594	278,305,650
California	210,474,162	7,334,987	5,465,866	8,222,567	171,572	231,669,154
Michigan	119,013,618	37,898,106	11,149,270	26,073,374	1,250	194,135,618
Pennsylvania	112,777,949	303,447	13,369,999	50,557,801	1,332	177,010,528
Ohio	73,686,121	23,049,986	39,674,800	33,072,408	41,700	169,525,015
Louisiana	69,834,569	3,773,281	4,312,955	1,478,929	0	79,399,734
Illinois	23,865,261	16,688,415	13,183,508	15,485,134	7,731	69,230,049
Washington	51,421,346	226,101	783,033	404,390	750	52,835,620
South Carolina	32,402,973	5,242,097	3,448,655	3,115,201	0	44,208,926
Wisconsin	25,806,946	1,673,937	7,764,430	8,731,464	2,802	43,979,579
New Jersey	16,071,207	16,906,643	6,590,683	2,741,727	500	42,310,760
New York	25,084,144	1,173,013	2,163,012	3,936,765	89,159	32,446,093
Arizona	29,336,468	336,699	1,501,959	115,543	0	31,290,669
Tennessee	18,064,428	2,105,907	1,582,703	8,745,291	2,387	30,500,716
West Virginia	25,267,346	690,073	89,402	1,784,036	0	27,830,857
Missouri	16,447,836	2,724,892	4,392,183	2,236,927	2,250	25,804,088
Nebraska	9,411,620	4,530	2,417,472	9,551,274	0	21,384,896
Alabama	7,976,413	6,807,613	919,190	5,188,522	0	20,891,738
Georgia	17,129,387	1,114,501	219,296	1,232,983	2	19,696,169
Puerto Rico	12,242,858	3,756,534	2,902,443	309,126	250	19,211,211
Kansas	6,703,876	373,186	1,746,205	8,889,649	200	17,713,116
North Carolina	7,699,172	1,531,766	2,206,616	4,038,516	255	15,476,325
Kentucky	8,272,805	1,488,415	2,439,013	1,796,673	460	13,997,366
Connecticut	11,661,807	120,436	1,129,788	505,252	16,432	13,433,715
Massachusetts	8,017,625	2,878,088	1,423,801	844,536	9,297	13,173,347
Maryland	11,986,049	4,388	36,769	253,036	0	12,280,242
Utah	4,860,280	100	425,251	6,908,794	7,407	12,201,832
Arkansas	9,609,511	1,009,148	572,780	481,435	250	11,673,124
Minnesota	7,351,632	908,795	1,419,568	330,818	0	10,010,813
Oklahoma	6,816,146	569,312	196,565	695,102	1,750	8,278,875
Florida	6,189,998	653,764	387,445	1,009,064	33,800	8,274,071
Virginia	2,671,263	1,900,854	276,285	1,538,779	0	6,387,181
Colorado	2,156,805	252,219	2,092,940	1,033,019	250	5,535,233
Iowa	2,971,198	72,756	1,186,692	751,194	750	4,982,590
Oregon	3,208,212	25,605	356,319	1,262,471	0	4,852,607
Mississippi	3,543,376	4,379	97,058	866,713	0	4,511,526
Delaware	3,518,879	0	18,711	70,931	0	3,608,521
Rhode Island	737,302	390	76,818	2,238,191	32	3,052,733
New Hampshire	1,193,658	0	70,728	91,420	0	1,355,806
Maine	1,056,476	250	5,775	62,564	0	1,125,065
Idaho	203,289	0	43,695	4,619	0	251,603
North Dakota	218,270	6,187	0	2,076	0	226,533
South Dakota	34,975	2,150	3,627	51,407	0	92,159
Nevada	0	0	6,531	67,727	0	74,258
New Mexico	8,662	0	34,000	25,993	0	68,655
Vermont	39,346	0	19,561	1,535	0	60,442
Montana	15,000	0	0	313	0	15,313
Hawaii	25	0	0	1,627	0	1,652
Wyoming	625	0	27	280	0	932
Alaska	0	0	0	0	0	0
American Samoa	0	0	0	0	0	0
Virgin Islands	0	0	0	0	0	0
Total	1,482,028,916	228,126,956	198,300,128	259,161,002	422,986	2,168,039,988

❸ Transfers reported without valid waste management codes.

Table 1-8. Receipt of TRI Chemicals in Wastes from Out of State, 1993 (Ordered by Total Received).

Receiving State	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[4] Pounds	Total Transfers Received Pounds
Louisiana	293,730,398	11,056,999	14,865,575	3,119,264	500	322,772,736
Pennsylvania	209,037,782	1,346,442	7,270,196	2,437,494	122,877	220,214,791
Indiana	156,670,239	30,900,033	7,669,644	3,579,118	9,155	198,828,189
Ohio	100,612,922	42,703,504	20,073,843	14,240,939	16,965	177,648,173
Illinois	119,213,387	14,785,574	7,785,005	3,972,927	88,200	145,845,093
Texas	79,067,786	5,076,247	4,425,504	11,336,738	250	99,906,525
South Carolina	61,800,319	17,733,777	4,809,481	3,834,247	8	88,177,832
Michigan	64,090,569	13,005,528	5,716,420	4,715,998	250	87,528,765
New York	77,919,539	2,254,695	2,658,206	957,690	0	83,790,130
California	65,100,162	677,694	1,033,136	107,555	250	66,918,797
New Jersey	38,778,056	12,108,895	13,480,996	317,884	266,009	64,951,840
Missouri	44,314,880	17,242,412	615,393	98,848	6,805	62,278,338
Tennessee	41,737,180	9,483,338	3,064,616	948,588	42,482	55,276,204
Alabama	29,553,505	15,525,051	3,199,063	1,720,429	10,790	50,008,838
West Virginia	34,820,609	265,214	116,068	420,450	0	35,622,341
Georgia	30,182,858	3,105,766	969,714	215,416	250	34,474,004
Connecticut	31,855,092	135,879	1,552,712	127,281	41,735	33,712,699
Virginia	20,037,424	12,382,050	965,816	48,682	1,823	33,435,795
North Carolina	25,476,300	2,162,803	1,824,994	461,040	0	29,925,137
Kentucky	6,560,780	13,816,791	8,391,945	516,627	255	29,286,398
Wyoming	27,600,000	0	0	0	0	27,600,000
Wisconsin	16,330,275	4,097,408	790,007	575,876	279	21,793,845
Delaware	17,640,703	33,369	91,363	1,817	0	17,767,252
Arkansas	3,736,906	6,834,989	5,751,780	229,119	5,184	16,557,978
District of Columbia	16,367,830	0	99,090	1,490	0	16,468,410
Kansas	456,126	11,241,009	244,799	91,975	0	12,033,909
Massachusetts	7,716,669	729,753	1,018,938	667,092	5	10,132,457
Florida	6,049,042	2,652,655	764,561	58,772	0	9,525,030
Maryland	5,102,914	1,701,236	2,357,218	334,989	250	9,496,607
Minnesota	4,263,771	2,986,215	2,232,741	602	0	9,483,329
Washington	7,884,360	200,979	111,815	48,671	0	8,245,825
Oklahoma	2,964,040	1,530,907	1,037,785	1,241,234	1,182	6,775,148
Montana	3,381,364	0	0	2,144,060	0	5,525,424
Arizona	5,094,749	29,480	128,354	68,258	0	5,320,841
Rhode Island	2,652,676	53,931	185,972	78,359	0	2,970,938
Utah	494,278	481,004	710,559	1,207,726	0	2,893,567
Colorado	461,651	235,626	140,091	2,047,862	0	2,885,230
Iowa	2,526,946	82,001	25,186	14,584	0	2,648,717
Nebraska	2,171,080	29,259	4,055	25,751	0	2,230,145
Nevada	456,410	0	47,947	790,490	0	1,294,847
North Dakota	115,282	0	95,898	980,383	0	1,191,563
Mississippi	529,343	1,718	7,921	522,943	0	1,061,925
Idaho	639,212	4,064	46,676	260,682	0	950,634
Oregon	476,177	18,089	45,690	338,571	0	878,527
Alaska	1,395	204,975	14,938	5	0	221,313
New Hampshire	16,867	0	83	198,655	0	215,605
South Dakota	0	0	0	93,240	0	93,240
New Mexico	35,481	0	0	3,393	0	38,874
Vermont	5,814	0	11,647	680	0	18,141
Maine	0	7,133	1,039	1,553	0	9,725
American Samoa	0	0	0	0	0	0
Hawaii	0	0	0	0	0	0
Puerto Rico	0	0	0	0	0	0
Virgin Islands	0	0	0	0	0	0
Other[5]	104,406,858	328,589	3,319,566	884,393	781,883	109,721,289
Total	1,770,138,006	259,253,081	129,774,046	66,090,440	1,397,387	2,226,652,960

[4] Transfers reported without valid waste management codes.

[5] Includes wastes sent to other countries and to sites not identified by state.

Table 1-9. Total Transfers of TRI Chemicals Received, Including Intrastate Transfers and Transfers into the State, 1993 (Ordered by Transfers Received).

Receiving State	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[6] Pounds	Total Transfers Received Pounds
Indiana	490,977,670	39,262,837	36,779,050	15,453,936	11,979	582,485,472
Louisiana	363,564,967	14,830,280	19,178,530	4,598,193	500	402,172,470
Pennsylvania	321,815,731	1,649,889	20,640,195	52,995,295	124,209	397,225,319
Texas	219,728,357	81,227,449	35,412,799	41,815,726	27,844	378,212,175
Ohio	174,299,043	65,753,490	59,748,643	47,313,347	58,665	347,173,188
California	275,574,324	8,012,681	6,499,002	8,330,122	171,822	298,587,951
Michigan	183,104,187	50,903,634	16,865,690	30,789,372	1,500	281,664,383
Illinois	143,078,648	31,473,989	20,968,513	19,458,061	95,931	215,075,142
South Carolina	94,203,292	22,975,874	8,258,136	6,949,448	8	132,386,758
New York	103,003,683	3,427,708	4,821,218	4,894,455	89,159	116,236,223
New Jersey	54,849,263	29,015,538	20,071,679	3,059,611	266,509	107,262,600
Missouri	60,762,716	19,967,304	5,007,576	2,335,775	9,055	88,082,426
Tennessee	59,801,608	11,589,245	4,647,319	9,693,879	44,869	85,776,920
Alabama	37,529,918	22,332,664	4,118,253	6,908,951	10,790	70,900,576
Wisconsin	42,137,221	5,771,345	8,554,437	9,307,340	3,081	65,773,424
West Virginia	60,087,955	955,287	205,470	2,204,486	0	63,453,198
Washington	59,305,706	427,080	894,848	453,061	750	61,081,445
Georgia	47,312,245	4,220,267	1,189,010	1,448,399	252	54,170,173
Connecticut	43,516,899	256,315	2,682,500	632,533	58,167	47,146,414
North Carolina	33,175,472	3,694,569	4,031,610	4,499,556	255	45,401,462
Kentucky	14,833,585	15,305,206	10,830,958	2,313,300	715	43,283,764
Virginia	22,708,687	14,282,904	1,242,101	1,587,461	1,823	39,822,976
Arizona	34,431,217	366,179	1,630,313	183,801	0	36,611,510
Kansas	7,160,002	11,614,195	1,991,004	8,981,624	200	29,747,025
Arkansas	13,346,417	7,844,137	6,324,560	710,554	5,434	28,231,102
Wyoming	27,600,625	0	27	280	0	27,600,932
Nebraska	11,582,700	33,789	2,421,527	9,577,025	0	23,615,041
Massachusetts	15,734,294	3,607,841	2,442,739	1,511,628	9,302	23,305,804
Maryland	17,088,963	1,705,624	2,393,987	588,025	250	21,776,849
Delaware	21,159,582	33,369	110,074	72,748	0	21,375,773
Minnesota	11,615,403	3,895,010	3,652,309	331,420	0	19,494,142
Puerto Rico	12,242,858	3,756,534	2,902,443	309,126	250	19,211,211
Florida	12,239,040	3,306,419	1,152,006	1,067,836	33,800	17,799,101
District of Columbia	16,367,830	0	99,090	1,490	0	16,468,410
Utah	5,354,558	481,104	1,135,810	8,116,520	7,407	15,095,399
Oklahoma	9,780,186	2,100,219	1,234,350	1,936,336	2,932	15,054,023
Colorado	2,618,456	487,845	2,233,031	3,080,881	250	8,420,463
Iowa	5,498,144	154,757	1,211,878	765,778	750	7,631,307
Rhode Island	3,389,978	54,321	262,790	2,316,550	32	6,023,671
Oregon	3,684,389	43,694	402,009	1,601,042	0	5,731,134
Mississippi	4,072,719	6,097	104,979	1,389,656	0	5,573,451
Montana	3,396,364	0	0	2,144,373	0	5,540,737
New Hampshire	1,210,525	0	70,811	290,075	0	1,571,411
North Dakota	333,552	6,187	95,898	982,459	0	1,418,096
Nevada	456,410	0	54,478	858,217	0	1,369,105
Idaho	842,501	4,064	90,371	265,301	0	1,202,237
Maine	1,056,476	7,383	6,814	64,117	0	1,134,790
Alaska	1,395	204,975	14,938	5	0	221,313
South Dakota	34,975	2,150	3,627	144,647	0	185,399
New Mexico	44,143	0	34,000	29,386	0	107,529
Vermont	45,160	0	31,208	2,215	0	78,583
Hawaii	25	0	0	1,627	0	1,652
American Samoa	0	0	0	0	0	0
Virgin Islands	0	0	0	0	0	0
Other[7]	104,406,858	328,589	3,319,566	884,393	781,883	109,721,289
Total	3,252,166,922	487,380,037	328,074,174	325,251,442	1,820,373	4,394,692,948

[6] Transfers reported without valid waste management codes.

[7] Includes wastes sent to other countries and to sites not identified by state.

Table 1-10. Transfers of TRI Chemicals in Wastes Out of State, 1993 (Ordered by Total Transferred).

Transferring State	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to Disposal Pounds	Other Off-site Transfers❽ Pounds	Total Transfers Out of State Pounds
Mississippi	254,571,908	3,900,759	1,508,959	558,164	4,200	260,543,990
Ohio	126,606,449	7,959,845	7,489,792	4,679,653	0	146,735,739
Illinois	117,070,756	21,314,677	6,536,849	1,551,359	255	146,473,896
Texas	104,286,586	8,742,764	3,778,291	2,860,105	8,414	119,676,160
Pennsylvania	67,359,063	20,159,480	11,693,157	11,219,819	593,809	111,025,328
North Carolina	93,014,411	8,733,424	2,993,091	784,904	5,918	105,531,748
New Jersey	83,491,229	11,335,347	3,825,318	1,145,653	94,607	99,892,154
South Carolina	86,032,567	4,786,911	4,201,761	596,649	0	95,617,888
Michigan	49,264,498	32,581,818	5,555,273	5,270,275	135,996	92,807,860
Indiana	78,860,360	8,264,486	2,130,403	3,256,699	750	92,512,698
Kentucky	54,466,656	8,696,224	7,136,452	1,346,737	60,500	71,706,569
New York	53,973,513	6,287,221	5,133,838	2,099,920	92,464	67,586,956
Arkansas	50,515,703	5,027,020	708,039	637,439	5	56,888,206
Alabama	41,442,791	5,081,443	6,878,737	2,942,633	0	56,345,604
Wisconsin	27,309,249	20,931,890	2,163,863	1,106,636	96,950	51,608,588
Missouri	31,029,370	5,570,734	13,670,017	1,089,112	2,905	51,362,138
Louisiana	41,352,494	3,108,158	1,304,320	1,136,916	0	46,901,888
Georgia	35,187,489	5,984,748	2,220,523	2,393,047	502	45,786,309
Maryland	40,019,701	2,562,298	1,653,566	106,134	0	44,341,699
Kansas	33,155,876	1,786,388	2,173,006	168,942	15,647	37,299,859
Tennessee	25,635,333	7,688,665	2,016,245	830,955	47	36,171,245
Virginia	24,001,844	5,590,729	2,925,040	243,069	0	32,760,682
Utah	30,726,691	325,435	311,029	17,161	0	31,380,316
West Virginia	6,222,001	14,518,909	6,350,742	876,233	250	27,968,135
Oklahoma	14,508,236	2,149,401	715,687	10,513,818	0	27,887,142
Iowa	20,177,017	4,549,175	1,343,786	553,957	0	26,623,935
Massachusetts	15,287,004	5,046,813	2,917,587	396,815	43,308	23,691,527
Connecticut	13,099,701	3,935,120	5,642,020	409,817	250	23,086,908
Florida	15,325,246	2,866,135	3,436,191	870,433	190,315	22,688,320
California	16,905,609	2,257,967	1,280,948	1,148,238	45,980	21,638,742
Arizona	17,795,570	380,058	886,854	90,153	0	19,152,635
Washington	15,936,150	414,914	236,949	571,432	0	17,159,445
Nebraska	11,917,773	782,752	178,527	3,136,627	260	16,015,939
Minnesota	10,128,855	4,477,688	708,042	249,915	0	15,564,500
Delaware	12,797,644	439,333	987,115	49,275	0	14,273,367
Oregon	13,161,849	584,371	343,498	50,970	0	14,140,688
Colorado	7,637,719	3,673,099	1,562,052	162,088	3,800	13,038,758
Rhode Island	10,926,872	457,569	456,275	276,885	5	12,117,606
Puerto Rico	2,367,233	4,460,607	3,573,808	38,308	0	10,439,956
New Hampshire	5,923,575	310,431	344,629	366,376	0	6,945,011
Vermont	3,939,597	177,002	301,003	24,647	0	4,442,249
Maine	1,909,002	600,234	290,658	131,315	0	2,931,209
Montana	1,926,469	73,110	10,785	58,461	0	2,068,825
Nevada	682,744	4,579	10,848	15	0	698,186
Virgin Islands	682,955	125	7,261	1	0	690,342
New Mexico	381,726	170,931	45,609	7,611	0	605,877
Idaho	311,966	247,671	2,815	220	250	562,922
South Dakota	255,953	209,951	50,110	13,921	0	529,935
Alaska	450,043	0	2,364	20	0	452,427
Wyoming	64,959	4,029	17,986	35,716	0	122,690
North Dakota	878	40,643	61,531	1,837	0	104,889
Hawaii	39,123	0	790	13,355	0	53,268
American Samoa	0	0	7	0	0	7
Total	1,770,138,006	259,253,081	129,774,046	66,090,440	1,397,387	2,226,652,960

❽ Transfers reported without valid waste management codes.

Table 1-11. States with Net Imports of TRI Chemicals in Wastes (Transfers Received from Out of State Minus Transfers Sent Out of State), 1993 (Ordered by Net Imports).

State	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[9] Pounds	Net Imports Pounds
Louisiana	252,377,904	7,948,841	13,561,255	1,982,348	500	275,870,848
Pennsylvania	141,678,719	-18,813,038	-4,422,961	-8,782,325	-470,932	109,189,463
Indiana	77,809,879	22,635,547	5,539,241	322,419	8,405	106,315,491
California	48,194,553	-1,580,273	-247,812	-1,040,683	-45,730	45,280,055
Ohio	-25,993,527	34,743,659	12,584,051	9,561,286	16,965	30,912,434
Wyoming	27,535,041	-4,029	-17,986	-35,716	0	27,477,310
Tennessee	16,101,847	1,794,673	1,048,371	117,633	42,435	19,104,959
District of Columbia	16,367,830	0	99,090	1,490	0	16,468,410
New York	23,946,026	-4,032,526	-2,475,632	-1,142,230	-92,464	16,203,174
Missouri	13,285,510	11,671,678	-13,054,624	-990,264	3,900	10,916,200
Connecticut	18,755,391	-3,799,241	-4,089,308	-282,536	41,485	10,625,791
West Virginia	28,598,608	-14,253,695	-6,234,674	-455,783	-250	7,654,206
Delaware	4,843,059	-405,964	-895,752	-47,458	0	3,493,885
Montana	1,454,895	-73,110	-10,785	2,085,599	0	3,456,599
North Dakota	114,404	-40,643	34,367	978,546	0	1,086,674
Virginia	-3,964,420	6,791,321	-1,959,224	-194,387	1,823	675,113
Nevada	-226,334	-4,579	37,099	790,475	0	596,661
Idaho	327,246	-243,607	43,861	260,462	-250	387,712
Total	641,206,631	42,335,014	-461,423	3,128,876	-494,113	685,714,985

Table 1-10 presents TRI transfers from facilities in a state to locations outside that state (exports of waste from that state to other states).

Some states, such as Ohio, Pennsylvania, Illinois, and Texas, rank high both for receipt of chemicals from out of state and for transfers of chemicals to other states.

Table 1-11 presents the states that are net importers of TRI chemicals in waste. These states receive more transfers of TRI chemicals in waste from other states than they send to other states. These states are ranked in descending order by total net quantity imported. In this table, a negative number in a transfer category indicates that the state is a net exporter in that category, although the state is a net importer for the sum of all amounts received.

Table 1-12 presents the states that are net exporters of TRI chemicals in waste. These states transfer more TRI chemicals in waste to locations in other states than they receive from other states. These states are ranked in descending order by total net quantity exported. In this table, a negative number in a transfer category indicates that the state is a net importer in that category, even though it is a net exporter overall.

Figure 1-6 displays a map of the continental U.S. depicting those counties that rank in the top 10% based on total releases to air, land, and water as reported in 1993. These top 10% represent 210 counties out of approximately 2,100 total counties reporting to TRI. These top counties account for 68% of the total releases to air, land, and water for the nation as a whole.

Table 1-13 lists the top 50 counties for total air/water/land releases. These top 50 counties account for nearly 42% of the total releases to air/water/land reported to TRI nationally. Facilities report their city and county location information to EPA on their Form Rs. EPA enters this facility identification information as

[9] Transfers reported without valid waste management codes.

Table 1-12. States with Net Exports of TRI Chemicals in Wastes (Transfers Sent Out of State Minus Transfers Received from Out of State), 1993 (Ordered by Net Exports).

State	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to Disposal Pounds	Other Off-site Transfers⑩ Pounds	Net Exports Pounds
Mississippi	254,042,565	3,899,041	1,501,038	35,221	4,200	259,482,065
North Carolina	67,538,111	6,570,621	1,168,097	323,864	5,918	75,606,611
Kentucky	47,905,876	-5,120,567	-1,255,493	830,110	60,245	42,420,171
Arkansas	46,778,797	-1,807,969	-5,043,741	408,320	-5,179	40,330,228
New Jersey	44,713,173	-773,548	-9,655,678	827,769	-171,402	34,940,314
Maryland	34,916,787	861,062	-703,652	-228,855	-250	34,845,092
Wisconsin	10,978,974	16,834,482	1,373,856	530,760	96,671	29,814,743
Utah	30,232,413	-155,569	-399,530	-1,190,565	0	28,486,749
Kansas	32,699,750	-9,454,621	1,928,207	76,967	15,647	25,265,950
Iowa	17,650,071	4,467,174	1,318,600	539,373	0	23,975,218
Oklahoma	11,544,196	618,494	-322,098	9,272,584	-1,182	21,111,994
Texas	25,218,800	3,666,517	-647,213	-8,476,633	8,164	19,769,635
Arizona	12,700,821	350,578	758,500	21,895	0	13,831,794
Nebraska	9,746,693	753,493	174,472	3,110,876	260	13,785,794
Massachusetts	7,570,335	4,317,060	1,898,649	-270,277	43,303	13,559,070
Oregon	12,685,672	566,282	297,808	-287,601	0	13,262,161
Florida	9,276,204	213,480	2,671,630	811,661	190,315	13,163,290
Georgia	5,004,631	2,878,982	1,250,809	2,177,631	252	11,312,305
Puerto Rico	2,367,233	4,460,607	3,573,808	38,308	0	10,439,956
Colorado	7,176,068	3,437,473	1,421,961	-1,885,774	3,800	10,153,528
Rhode Island	8,274,196	403,638	270,303	198,526	5	9,146,668
Washington	8,051,790	213,935	125,134	522,761	0	8,913,620
South Carolina	24,232,248	-12,946,866	-607,720	-3,237,598	-8	7,440,056
New Hampshire	5,906,708	310,431	344,546	167,721	0	6,729,406
Alabama	11,889,286	-10,443,608	3,679,674	1,222,204	-10,790	6,336,766
Minnesota	5,865,084	1,491,473	-1,524,699	249,313	0	6,081,171
Michigan	-14,826,071	19,576,290	-161,147	554,277	135,746	5,279,095
Vermont	3,933,783	177,002	289,356	23,967	0	4,424,108
Maine	1,909,002	593,101	289,619	129,762	0	2,921,484
Virgin Islands	682,955	125	7,261	1	0	690,342
Illinois	-2,142,631	6,529,103	-1,248,156	-2,421,568	-87,945	628,803
New Mexico	346,245	170,931	45,609	4,218	0	567,003
South Dakota	255,953	209,951	50,110	-79,319	0	436,695
Alaska	448,648	-204,975	-12,574	15	0	231,114
Hawaii	39,123	0	790	13,355	0	53,268
American Samoa	0	0	7	0	0	7
Total	745,613,489	42,663,603	2,858,143	4,013,269	287,770	795,436,274

reported by facilities. This county table includes certain independent cities, which are not part of any county (for example, Hopewell City, Virginia). Some facilities, particularly those located in or near independent cities or on county borders, may misreport their county location. Such misreporting would affect the totals and rankings in this table.

Release information alone from TRI does not provide an adequate basis for assessing potential exposure or risk. While the counties in this map have large releases relative to other counties, these cannot be assumed to be "hot spots." Exposure potential depends on many factors in addition to magnitude of release, such as release medium, environmental and chemical fate characteristics, proximity to population centers, and demographic or human activity characteristics as previously discussed. This map primarily provides a sense of the geographic distribution of TRI total releases, and shows where the largest volumes of such releases occur.

⑩ Transfers reported without valid waste management codes.

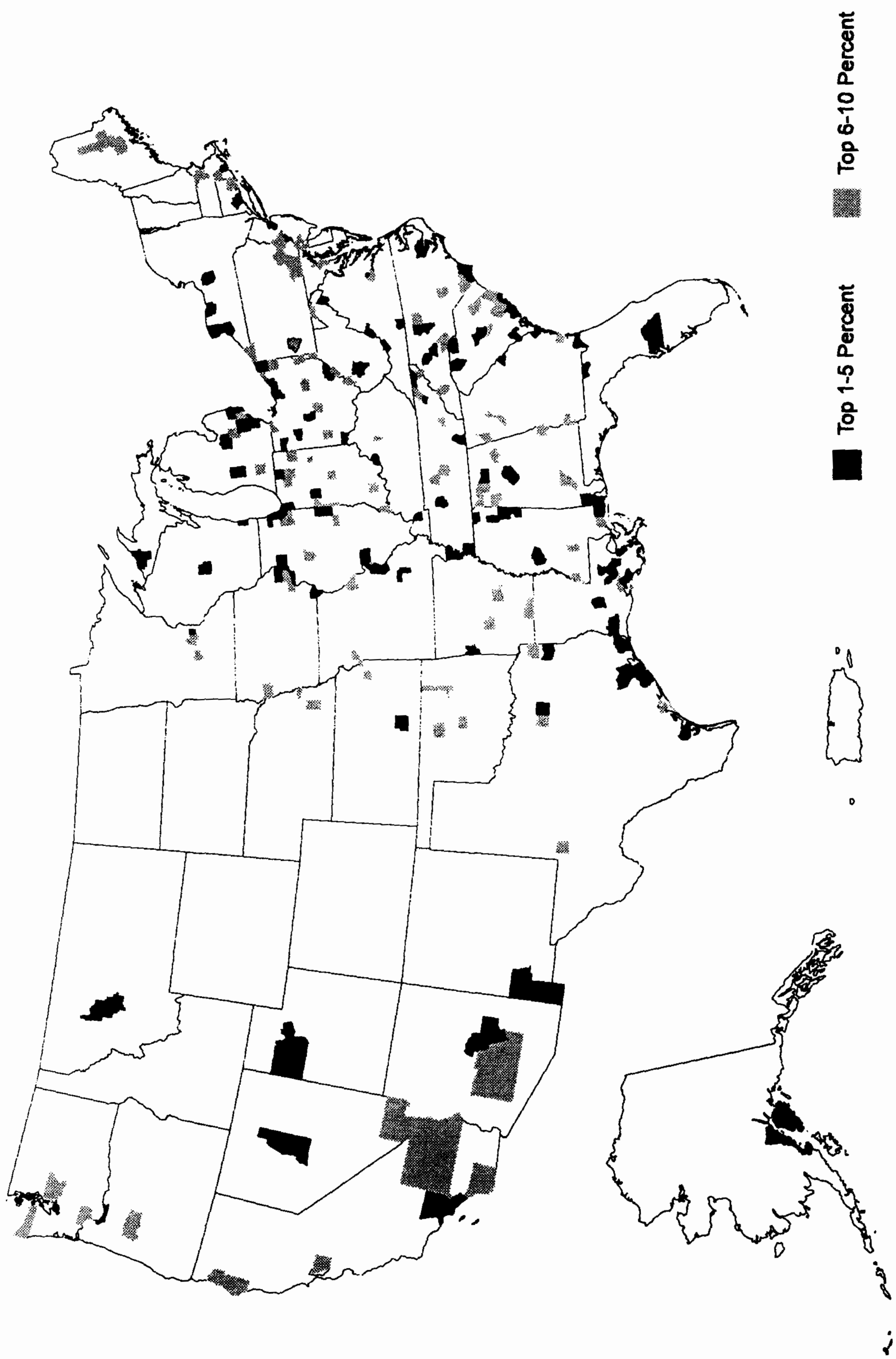


Figure 1-6. Top 10% of U.S. Counties for Total Air/Water/Land Releases, 1993.

Table 1-13. Top 50 U.S. Counties for Air/Water/Land Releases, 1993 (Ordered by Total Air/Land/Water Release).

County	State	Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
St. James	LA	10	5,696,045	184,008,820	725,912	190,430,777
Tooele	UT	3	73,326,750	500	1,700	73,328,950
Mobile	AL	45	48,855,511	735,936	277,142	49,868,589
Harris	TX	271	42,526,385	604,657	1,035,156	44,166,198
Lewis and Clark	MT	3	133,215	0	42,611,283	42,744,498
Ascension	LA	19	16,404,667	21,757,205	777,255	38,939,127
Sullivan	TN	17	30,222,741	240,379	79,469	30,542,589
Hamblen	TN	23	24,251,620	21,970	237,500	24,511,090
Washington	OH	14	6,966,216	3,972,873	10,080,097	21,019,186
Polk	FL	44	2,708,531	456	16,847,565	19,556,552
Cook	IL	594	19,484,511	26,814	4,170	19,515,495
Nueces	TX	13	5,579,511	128,284	12,016,538	17,724,333
Lake	IN	49	4,989,338	433,036	11,372,047	16,794,421
Jefferson	TX	39	15,826,112	353,652	222,256	16,402,020
Los Angeles	CA	657	16,075,860	200,901	72,813	16,349,574
Salt Lake	UT	60	4,038,789	14,205	11,444,025	15,497,019
Hidalgo	NM	1	643,105	0	14,130,654	14,773,759
Whiteside	IL	15	533,927	3,105	13,970,000	14,507,032
Monroe	NY	54	12,491,701	743,555	110	13,235,366
Brazoria	TX	28	12,316,711	454,669	140,711	12,912,091
Beaufort	NC	7	3,278,327	0	8,806,805	12,085,132
Wayne	MI	158	11,085,001	153,201	1,550	11,239,752
Ontonagon	MI	2	6,576,857	164	3,784,000	10,361,021
New Hanover	NC	15	3,365,767	53,808	6,719,045	10,138,620
Shelby	TN	85	9,781,210	12,501	7,142	9,800,853
Jefferson	MO	14	1,606,238	159,093	7,933,240	9,698,571
Humphreys	TN	4	2,559,966	1,530,891	5,469,090	9,559,947
Calcasieu	LA	22	6,365,651	1,160,230	1,453,927	8,979,808
East Baton Rouge	LA	24	7,370,887	1,193,390	161,665	8,725,942
Jefferson	KY	87	8,684,842	3,303	13,000	8,701,145
St. Mary	LA	6	8,265,019	180	0	8,265,199
Grant	NM	1	305,252	0	7,837,287	8,142,539
Giles	VA	1	7,887,916	638	15,200	7,903,754
Morgan	AL	26	6,388,946	1,476,473	30,770	7,896,189
Madison	IL	31	2,644,662	205,113	5,019,761	7,869,536
Elkhart	IN	103	7,657,531	16,610	17,351	7,691,492
Orange	TX	14	7,513,958	35,952	73,395	7,623,305
Galveston	TX	15	7,003,946	269,958	154,962	7,428,866
Catawba	NC	65	7,258,337	1	500	7,258,838
Cuyahoga	OH	233	5,245,701	87,479	1,874,802	7,207,982
Chatham	GA	30	5,316,505	1,458,601	356,505	7,131,611
Iron	MO	3	239,035	91	6,867,046	7,106,172
Gila	AZ	2	851,341	5	6,091,204	6,942,550
Oakland	MI	71	6,725,647	527	62,145	6,788,319
Charleston	SC	17	6,705,245	29,956	6,850	6,742,051
Hamilton	FL	1	261,020	1,390	6,450,000	6,712,410
Kent	MI	98	6,354,886	55	244,980	6,599,921
Hopewell City	VA	7	5,066,581	1,353,132	208	6,419,921
York	SC	18	6,036,835	212,136	63,965	6,312,936
Kanawha	WV	16	5,720,827	481,381	1,581	6,203,789
Subtotal		3,135	507,195,182	223,597,276	205,564,379	936,356,837
Total		23,321	1,672,127,735	271,152,864	289,052,581	2,232,333,180

Releases can vary widely within a given county. Some counties have multiple sources that contribute TRI releases, such as Harris county, Texas, with 271 facilities, while other counties, such as Tooele, Utah, have the vast majority of their TRI reported releases from a single facility. The numbers of reporting facilities in each county are included in Table 1-13. Within a given county, TRI reporting facilities can be located in relatively concentrated urban centers or in sparsely populated rural areas.

1993 TRI DATA BY INDUSTRY

The following section summarizes the TRI data reported by industry. Industry categories are based on the Standard Industrial Classification (SIC) code(s) reported by the facility on its Form R.

Tables 1-14 and 1-15 present TRI releases and transfers, respectively, by industry in SIC code order. The TRI reporting Form R allows facilities to report more than one SIC code as the facility determines to be appropriate in characterizing its operations. Facilities that reported two or more two-digit SIC codes (Major Groups) within the manufacturing range of 20-39 [for example, petroleum (29) and chemicals (28)] are assigned to a "multiple codes" category. Facilities reporting no SIC code or SIC codes outside the 20-39 range are assigned to a "no codes" category.

The top five industry categories having the largest total on-site releases for 1993 were chemical manufacturing (SIC code 28), primary metals (33), paper manufacturing (26), multiple codes (20 - 39), and transportation equipment (37). These same industries comprise the top five industries for releases to air, water, and land, excluding underground injection. Figure 1-7 illustrates the levels of TRI total releases and transfers reported across industry sectors.

Multiple SIC Codes

TRI facilities submitted nearly 6,000 Form Rs that indicated multiple SIC code combinations. These 6,000 Form Rs had nearly 400 unique combinations of two or more two-digit SIC codes or major groups within the manufacturing sector. These forms contained information on over 160 million pounds of total releases which placed this industry group in fourth place among others based on total release amounts. These Form Rs had an additional 468 million pounds of waste that were reported as off-site transfers.

Table 1-16 is a list of the top 25 multiple SIC code combinations falling within the manufacturing sector. These combinations account for nearly 70% of the total releases associated with multiple SIC code combinations of manufacturing activities and have been included to provide a level of insight into some of the industrial activities that are associated with the multiple industry grouping. Many of the same industries that rank high in releases assigned specifically to that industry, such as chemicals, paper, primary metals, and plastics also appear dominant in the multiple list. However, other industries, such as stone/clay/glass, machinery, and textiles can also be found among these combinations.

The sequence of SIC code combinations listed in Table 1-16 is ranked in the order as reported. Within this list, some SIC code combinations repeat in a different order (30 and 28 also appear as 28 and 30). These similar combinations were not presented in aggregate in order to preserve the sequence in which they were reported. TRI reporting guidance directs facilities to report the SIC code that represents their primary economic activity first. While it is unknown whether facilities follow this guidance, the original order may reflect the facilities' primary activity by the leading codes.

Table 1-17 lists the releases and transfers of the individual industry segments making up the chemical manufacturing industry—the largest single industry sector for both releases and transfers.

Top 50 Facilities

Table 1-18 lists the top 50 facilities based on the sum of amounts released to air, water, and land. Figure 1-8 illustrates the approximate location of the top 25 facilities for total air/water/land releases. The size of the triangle designating the facility's location is proportional to the quantity of releases from that facility. While the top 50 facilities contributed approximately 32% of all of the TRI reported releases to air, water, and land, they represent substantially less than 1% of the 23,321 facilities that reported in 1993.

These facilities submitted a total of 868 chemical reports which is an average of 17.4 reports per facility. This is well above the national average of 3.4 reports for all facilities.

Table 1-19 presents the top 50 facilities for total TRI releases, including underground injection of waste. These 50 facilities account for nearly 41% of TRI total releases, including underground injection.

Figure 1-9 displays the top 25 facilities for TRI total releases including underground injection.

Top 10 Parent Companies

This section summarizes TRI data by reporting facilities' parent companies. Each facility is required to report the name of its parent company (if applicable) on the TRI Form R. The parent company is the company that owns or controls the facility. For TRI purposes, the parent company of a facility is defined as the highest-level company located in the United States that directly owns at least 50% of the voting stock of the company of which the facility is a part. In some cases, this information is omitted or the facility indicates a company that is not the highest-level parent. For the purpose of this analysis, in cases where the ultimate parent was not identified, a parent company was assigned through a search of the most recent Dun and Bradstreet data using the facility-level information provided on the Form R.

Table 1-20 presents releases and number of forms and facilities attributable to the top 10 parent companies based on the sum of amounts released to air, water, and land. These parent companies accounted for only 1.4% of all facilities and 3.7% of all forms, yet they accounted for 25.7% of TRI releases to air, water, and land.

Table 1-21 presents releases and numbers of forms and facilities attributable to the top 10 parent companies for total TRI releases, including underground injection. Again, these parent companies accounted for only 1.6% of all facilities and 4.0% of all forms, yet they accounted for 31.5% of total TRI releases, including underground injection.

Reporting by Federal Facilities

Until 1994, facilities owned and operated by the federal government were not required to report to TRI, although some did report voluntarily. Beginning with the 1994 reporting year, all federal facilities must comply with TRI reporting requirements. These requirements were extended to federal facilities in an Executive Order entitled "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements." The federal facilities that meet the TRI thresholds will submit their reports on or before July 1, 1995, and EPA and the states will make the information publicly available.

Table 1-14. TRI Releases by Industry, 1993.

SIC Code	Industry	Facilities Number (11)	Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
20	Food	2,069	3,851	27,428,898	1,353,806	68,405	9,317,812	38,168,921
21	Tobacco	20	43	2,729,408	18,996	0	0	2,748,404
22	Textiles	465	962	20,139,895	262,370	0	47,102	20,449,367
23	Apparel	42	76	1,129,346	965	0	644	1,130,955
24	Lumber	732	1,931	30,403,029	106,019	0	12,881	30,521,929
25	Furniture	557	1,848	57,855,811	621	0	276,502	58,132,934
26	Paper	569	2,487	192,990,912	18,071,971	2	5,066,282	216,129,167
27	Printing	317	631	36,529,750	592	0	9,157	36,539,499
28	Chemicals	4,150	22,363	476,240,352	234,143,888	533,476,390	72,127,072	1,315,987,702
29	Petroleum	404	3,255	57,414,321	3,319,276	13,297,835	770,475	74,801,907
30	Plastics	1,858	4,293	126,122,790	360,401	5	393,773	126,876,969
31	Leather	149	367	7,518,426	61,813	0	773,958	8,354,197
32	Stone/Clay/Glass	638	1,554	18,016,657	190,644	6,566,124	1,906,055	26,679,480
33	Primary Metals	1,898	6,847	136,736,804	6,819,434	18,652,430	166,564,396	328,773,064
34	Fabr. Metals	3,132	8,885	90,593,939	101,928	1,490	660,322	91,357,679
35	Machinery	1,063	2,900	27,350,918	238,911	0	73,180	27,663,009
36	Electrical	1,436	4,283	41,175,533	308,536	19,233	536,111	42,039,413
37	Transportation Equip.	1,273	4,908	134,178,612	130,460	505	1,525,481	135,835,058
38	Measure./Photo.	371	991	27,327,487	846,881	0	45,475	28,219,843
39	Miscellaneous	390	955	17,308,899	1,543	0	7,474	17,317,916
	Multiple codes 20-39 (12)	1,609	5,914	131,074,139	4,499,802	237,334	24,543,291	160,354,566
	No codes 20-39 (13)	179	643	11,861,809	314,007	3,965,480	4,395,138	20,536,434
	Total	23,321	79,987	1,672,127,735	271,152,864	576,285,233	289,052,581	2,808,618,413

In September 1992, the Secretary of Energy directed the Department to initiate TRI reporting at Department of Energy (DOE) sites for 1993, a year ahead of the requirement in the Executive Order. DOE's contractor-operated sites have been reporting since 1987.

For reporting year 1993, 23 DOE facilities submitted 89 TRI Form R reports. Reports were submitted for 28 TRI chemicals. Total DOE releases reported for 1993 were 4,346,424 pounds and transfers were 109,097 pounds. Refer to Tables 1-22 and 1-23 for a list of DOE facilities reporting to TRI and their associated releases and transfers.

DOE is undertaking numerous projects to prevent pollution and reduce releases of toxic chemicals. The following are some examples of these activities.

DOE is funding the development, demonstration, testing, evaluation, and implementation of new environmentally benign technologies under its "Environmentally Conscious Manufacturing" program. Activities include product reformulation, substitution of materials, process modification, equipment design, and recycling.

The pollution prevention program for the Pinellas Plant in Largo, Florida, has targeted three chlorinated hydrocarbons—dichloro-

(11) Facilities have been assigned to the "multiple" category according to all the SIC codes they reported. Forms and amounts in pounds have been assigned to single category SIC codes if only one SIC code was reported for an individual chemical form from the facility.

(12) Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

(13) Facilities/forms that did not report an SIC code or reported SIC codes outside the 20-to-39 range.

Table 1-15. TRI Transfers by Industry, 1993.

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers [14] Pounds	Total Transfers Pounds
20	Food	1,210,750	148,973	2,228,504	37,450,297	10,605,629	2,255	51,646,408
21	Tobacco	196,422	3,800	1,108	53,515	6,320	0	261,165
22	Textiles	1,200,913	1,543,629	617,266	6,538,506	969,247	0	10,869,561
23	Apparel	133,913	429,623	150,586	65,497	56,967	0	836,586
24	Lumber	913,842	3,056,232	1,018,339	101,626	1,960,743	4,300	7,055,082
25	Furniture	5,992,642	6,915,293	1,320,086	107,353	384,205	5,458	14,725,037
26	Paper	1,953,942	8,154,047	8,381,596	38,149,414	2,734,955	0	59,373,954
27	Printing	5,363,834	3,943,469	360,698	344,669	189,079	3,189	10,204,938
28	Chemicals	427,094,852	354,783,477	157,058,327	171,745,641	41,195,779	105,443	1,151,983,519
29	Petroleum	756,334,743	1,132,435	755,086	4,990,242	3,225,689	0	766,438,195
30	Plastics	17,112,155	11,183,173	4,912,901	3,708,610	10,214,990	30,892	47,162,721
31	Leather	273,156	358,513	77,640	6,243,363	2,790,830	0	9,743,502
32	Stone/Clay/Glass	3,422,985	8,680,155	3,257,548	671,389	8,817,672	3,079	24,852,828
33	Primary Metals	899,179,430	11,977,764	51,339,183	11,767,672	155,233,279	394,486	1,129,891,814
34	Fabr. Metals	244,303,696	13,813,645	18,566,017	3,809,715	19,826,720	369,491	300,689,284
35	Machinery	48,045,192	3,214,982	2,431,092	1,632,074	3,347,525	34,750	58,705,615
36	Electrical	300,389,598	11,331,120	14,262,282	7,238,460	9,861,733	7,212	343,090,405
37	Transportation Equip.	146,237,930	20,386,364	9,547,463	3,651,386	11,383,880	685,491	191,892,514
38	Measure./Photo.	15,895,600	4,386,610	3,299,098	1,031,703	1,067,747	0	25,680,758
39	Miscellaneous	20,996,818	3,278,073	1,050,855	682,471	3,265,699	755	29,274,671
	Multiple codes 20-39 [15]	350,579,136	17,999,868	47,169,011	13,831,315	37,961,766	173,273	467,714,369
	No codes 20-39 [16]	5,335,373	658,792	269,488	535,997	150,988	299	6,950,937
	Total	3,252,166,922	487,380,037	328,074,174	314,350,915	325,251,442	1,820,373	4,709,043,863

methane, trichloroethylene, and 1,1,1-trichloroethane. Activities include on-time buying to reduce the quantity of chemicals which were being disposed of due to shelf life expiration; a Seven Point Resale Program to recycle virgin chemicals with expired shelf lives, rather than dispose of the materials as hazardous waste; implementation of nickel teflon-plated molds in resin coatings; and installing water-based degreasers in production areas and laboratories.

The Oak Ridge Y-12 Plant has substituted chlorine with ozone for use as a biocide to control biological growth in its cooling towers.

The Argonne National Laboratory East is decontaminating and reusing 10,000 surface-contaminated lead bricks using a carbon dioxide ice-pellet blast system, instead of the typical wet-acid process, preventing 4,400 cubic feet of mixed waste over the year-long life of the project.

In 1993, the Savannah River Site recycled 941 gallons (7,852 pounds) of paint solvents containing two TRI chemicals—methyl ethyl ketone (MEK) and xylene. Approximately 2,356 pounds of MEK and 982 pounds of xylene were recycled. By recycling the paint solvents, Savannah River was able to reduce both its procurement and its disposal of these chemicals. Additionally, Savannah River is revising its paint specifications to require the use of less volatile chemicals.

[14] Transfers reported without valid waste management codes.
[15] Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper(26) and chemicals (28)].
[16] Facilities/forms that did not report an SIC code or reported SIC codes outside the 20-to-39 range.

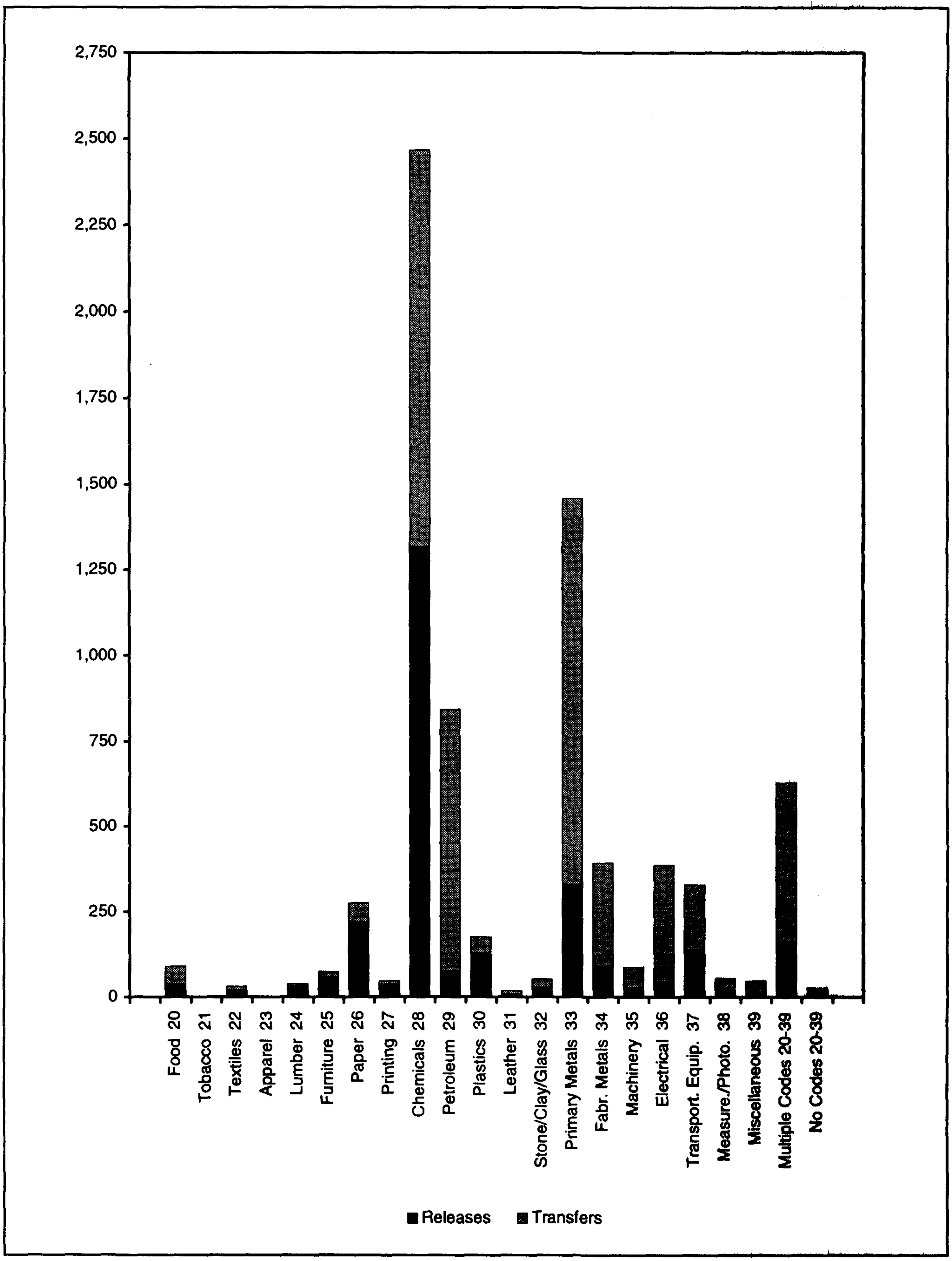


Figure 1-7. TRI Releases and Transfers by Industry, 1993.

Table 1-16. Top 25 Combinations of Multiple Two-Digit SIC Codes 20-39 for TRI Releases, 1993.[17]

Multiple SIC Codes			Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
29	28		354	11,313,808	4,678,369	757,700	14,795	770,975	17,535,647
26	28		85	698,624	9,205,276	1,078,217	0	38,305	11,020,422
33	32		44	341,267	127,198	320,216	0	9,863,650	10,652,331
28	20		70	616,804	1,782,554	2,431	28	6,844,389	9,246,206
28	30		274	1,872,385	4,140,359	112,393	5	17,106	6,142,248
26	24		48	350,933	5,168,938	132,193	0	448,530	6,100,594
28	33		19	98,117	249,383	34,800	0	5,216,700	5,599,000
33	34		433	1,327,961	2,685,461	20,544	0	79,917	4,113,883
30	22		34	1,865,732	2,095,741	0	0	0	3,961,473
33	28		96	1,587,322	2,306,357	34,676	0	1,448	3,929,803
37	34		205	1,642,807	2,155,455	2,787	0	3,541	3,804,590
37	36		66	1,724,008	1,429,137	1,290	0	0	3,154,435
36	26		17	670,093	2,422,372	0	0	0	3,092,465
22	26	28	7	14,540	2,908,088	53	0	234	2,922,915
28	22		47	978,977	1,616,260	15,480	0	256,450	2,867,167
28	38		29	1,188,232	1,179,763	0	0	6,216	2,374,211
32	35		57	12,800	2,142,963	190	0	0	2,155,953
30	34		102	725,238	1,228,528	1	0	0	1,953,767
22	30		21	723,347	1,120,495	85	0	0	1,843,927
37	32		20	341,020	1,380,960	5,420	0	0	1,727,400
30	28		100	697,503	885,383	6,939	0	51,832	1,641,657
34	35		133	596,111	882,009	4,711	0	123,967	1,606,798
38	32	26	7	1,311,800	77,850	0	0	0	1,389,650
37	35		83	595,218	698,840	81,842	0	327	1,376,227
37	30		25	128,561	1,212,106	0	0	22,000	1,362,667
	Subtotal		2,376	31,423,208	53,779,845	2,611,968	14,828	23,745,587	111,575,436
	Total		5,914	46,700,422	84,373,717	4,499,802	237,334	24,543,291	160,354,566

Table 1-17. TRI Releases in Chemical Manufacturing Industry (SIC 28), by Three-Digit SIC Code, 1993.

SIC Code	Industry	Facilities Number	Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
281	Industrial inorganic chemicals	559	1,709	25,328,465	2,728,275	120,745,733	31,064,549	179,867,022
282	Plastics materials and synthetics	376	2,092	64,551,800	1,220,937	238,020	923,007	66,933,764
283	Drugs	222	834	19,436,585	607,622	4,172,498	139,119	24,355,824
284	Soap and cleaners	457	1,471	1,949,332	8,680	18,378	4,545	1,980,935
285	Paints and allied products	575	3,409	11,230,322	10,601	0	26,844	11,267,767
286	Industrial organic chemicals	413	3,300	61,729,456	1,415,674	87,698,609	1,027,734	151,871,473
287	Agricultural chemicals	267	1,185	54,201,815	7,187,123	2,751,109	19,392,979	83,533,026
289	Miscellaneous chemical products	710	2,482	25,197,963	287,458	250	97,081	25,582,752
	Multiple within SIC 28[18]	567	5,869	212,575,927	220,677,518	317,851,793	19,451,214	770,556,452
	Unknown/not valid SIC code	4	12	38,687	0	0	0	38,687
	Total	4,150	22,363	476,240,352	234,143,888	533,476,390	72,127,072	1,315,987,702

[17] These combinations are taken in order reported on the TRI Form R. Facilities are asked to report their primary SIC codes first. Therefore, a combination of "2911 2869" would be different from "2869 2911" in that the primary manufacturing operations at the facility fall under SIC code 2911 (petroleum refining) in the first instance, but under 2869 (industrial organic chemicals manufacture in the second instance).

[18] Facilities have been assigned to the "multiple" category according to all the SIC codes they reported. Forms and amounts in pounds have been assigned to single-category SIC codes if only one SIC code was reported for a particular chemical form from the facility.

Table 1-18. Top 50 TRI Facilities with the Largest Air/Water/Land Releases, 1993.

Facility Name	City	State	SIC[19] Code	Forms[20] Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
IMC-Agrico Co.	Saint James	LA	28	8	5,084,677	122,406,028	422,262	127,912,967
Magnesium Corp. of America	Rowley	UT	33	8	73,300,250	0	0	73,300,250
IMC-Agrico Co.	Uncle Sam	LA	28	4	108,337	61,442,528	256,315	61,807,180
Asarco Inc.	East Helena	MT	33	10	117,215	0	42,611,283	42,728,498
Courtaulds Fibers Inc.	Axis	AL	28	7	42,614,610	44,255	0	42,658,865
Eastman Chemical Co.	Kingsport	TN	28	69	29,027,863	233,428	78,386	29,339,677
Arcadian Fertilizer L.P.	Geismar	LA	28	11	1,925,191	19,985,915	761,855	22,672,961
Lenzing Fibers Corp.	Lowland	TN	28	7	22,250,765	21,750	0	22,272,515
Elkem Metals Co.	Marietta	OH	33	9	4,556,572	3,968,000	10,080,000	18,604,572
Phelps Dodge Mining Co.	Playas	NM	33	4	643,105	0	14,130,654	14,773,759
Northwestern Steel & Wire Co.	Sterling	IL	33	8	301,470	3,100	13,970,000	14,274,570
American Chrome & Chemicals	Corpus Christi	TX	28	8	90,810	22,550	12,000,000	12,113,360
Eastman Kodak Co.	Rochester	NY	38	64	11,280,804	743,510	100	12,024,414
Kennecott Utah Copper	Magna	UT	33	13	395,305	4,750	11,317,260	11,717,315
Texasgulf Inc.	Aurora	NC	28	8	2,679,010	0	8,806,800	11,485,810
Inland Steel Co.	East Chicago	IN	Mult.	34	434,977	320,092	9,863,650	10,618,719
Doe Run Co.	Herculaneum	MO	33	8	258,309	3,063	7,932,956	8,194,328
Chino Mines Co.	Hurley	NM	33	3	305,252	0	7,837,287	8,142,539
Hoechst-Celanese	Narrows	VA	28	11	7,887,916	638	15,200	7,903,754
IMC Fertilizer Inc.	Mulberry	FL	Mult.	7	799,365	0	6,800,750	7,600,115
Asarco Inc.	Annapolis	MO	33	6	218,170	86	6,867,046	7,085,302
CF Industries Inc.	Donaldsonville	LA	28	11	6,085,325	951,965	0	7,037,290
Dow Chemical Co.	Freeport	TX	28	90	6,521,547	277,332	17,698	6,816,577
Occidental Chemical Corp.	White Springs	FL	28	5	261,020	1,390	6,450,000	6,712,410
Occidental Chemical Corp.	Castle Hayne	NC	28	4	4,817	74	6,700,904	6,705,795
Cyprus Miami Mining Corp.	Claypool	AZ	33	6	135,500	5	6,088,000	6,223,505
Chemetals Inc.	New Johnsonville	TN	28	5	220,712	891	5,463,290	5,684,893
Coastal Chem Inc.	Battle Mountain	NV	28	5	341,332	0	5,235,336	5,576,668
Kerr-Mcgee Chemical Corp.	Hamilton	MS	Mult.	8	198,955	34,800	5,212,800	5,446,555
Westinghouse Electric Corp.	Hampton	SC	30	13	5,425,690	31	0	5,425,721
Mississippi Chemical Corp.	Yazoo City	MS	28	5	4,647,652	710,943	0	5,358,595
Westvaco Corp.	North Charleston	SC	26	15	5,280,208	17,691	0	5,297,899
Granite City Steel	Granite City	IL	33	31	380,242	84,312	4,691,594	5,156,148
Unocal Petroleum Prods.	Kenai	AK	28	10	4,781,036	302,675	157	5,083,868
Westvaco Corp.	Covington	VA	26	13	4,649,105	87,800	15,450	4,752,355
Eastman Kodak Co.	Longview	TX	Mult.	41	4,568,463	10,000	8,700	4,587,163
Cabot Corp.	Franklin	LA	28	5	4,545,100	0	0	4,545,100
Shell Oil Co.	Deer Park	TX	Mult.	55	3,821,886	13,142	692,903	4,527,931
General Motors Corp.	Saginaw	MI	33	20	324,173	0	4,172,015	4,496,188
American Tape Co.	Marysville	MI	26	2	4,462,227	0	0	4,462,227
Cabot Corp.	Ville Platte	LA	28	4	4,416,847	0	0	4,416,847
Mobil Oil Beaumont Refinery	Beaumont	TX	29	33	4,286,393	0	25,686	4,312,079
Arcadian Fertilizer L.P.	Millington	TN	28	10	4,029,229	9,937	0	4,039,166
3M Co.	Cordova	IL	28	31	229,313	3,692,596	54,400	3,976,309
Dow Chemical Co.	Plaquemine	LA	28	56	2,058,424	745,836	1,080,931	3,885,191
DuPont	Leland	NC	28	25	3,815,000	15,456	24,854	3,855,310
North American Rayon Corp.	Elizabethton	TN	28	5	3,651,505	120,150	30	3,771,685
Farmland Industries Inc.	Enid	OK	28	10	3,733,060	33,250	505	3,766,815
Hoechst-Celanese Chemical	Pasadena	TX	28	30	3,747,833	0	0	3,747,833
ITT Rayonier Inc.	Port Angeles	WA	26	13	1,456,310	2,204,700	0	3,661,010
Subtotal				868	292,358,877	218,514,669	199,687,057	710,560,603
Total for All TRI Facilities				79,987	1,672,127,735	271,152,864	289,052,581	2,232,333,180

[19] Mult. (multiple) means more than one SIC code reported in the range 20 through 39.

[20] Number of forms is all chemical forms reported by the facility regardless of whether or not air, water, or land releases were reported for a particular chemical.

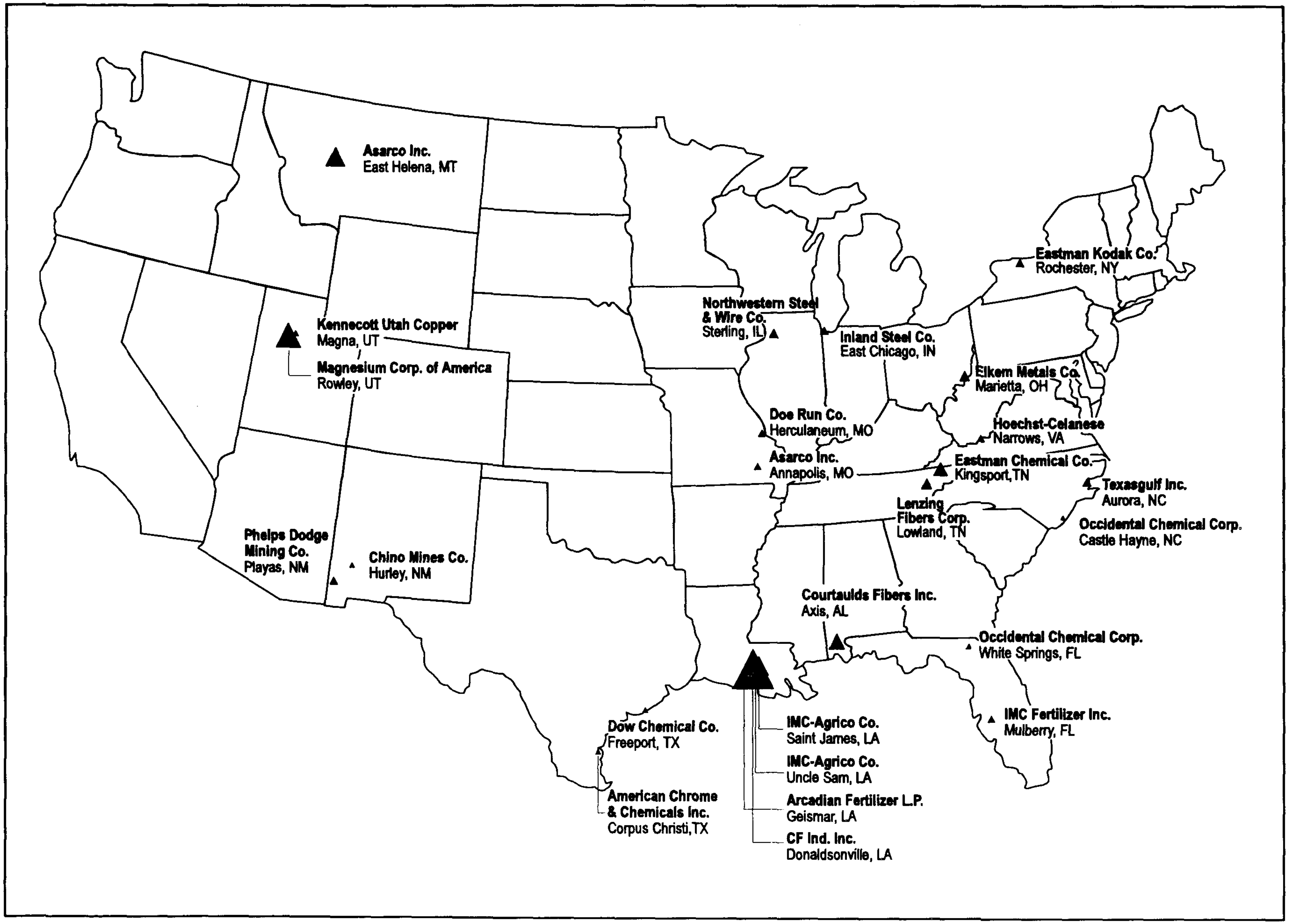


Figure 1-8. Top 25 Facilities with the Largest Air/Water/Land Releases, 1993.

Table 1-19. Top 50 TRI Facilities with the Largest Total Releases, 1993.

Facility Name	City	State	SIC [21] Code	Forms [22] Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
IMC-Agrico Co.	Saint James	LA	28	8	5,084,677	122,406,028	0	422,262	127,912,967
Cytec Industries Inc.	Westwego	LA	28	21	530,923	40,551	119,578,250	0	120,149,724
Magnesium Corp. of America	Rowley	UT	33	8	73,300,250	0	0	0	73,300,250
IMC-Agrico Co.	Uncle Sam	LA	28	4	108,337	61,442,528	0	256,315	61,807,180
DuPont	Pass Christian	MS	28	6	2,875,670	0	56,000,000	64	58,875,734
DuPont	New Johnsonville	TN	28	7	2,215,700	0	49,000,000	0	51,215,700
Asarco Inc.	East Helena	MT	33	10	117,215	0	0	42,611,283	42,728,498
Courtaulds Fibers Inc.	Axis	AL	28	7	42,614,610	44,255	0	0	42,658,865
Monsanto Co.	Alvin	TX	28	24	251,495	0	40,164,600	101,000	40,517,095
DuPont	Beaumont	TX	28	36	1,603,075	28,078	35,186,195	0	36,817,348
Eastman Chemical Co.	Kingsport	TN	28	69	29,027,863	233,428	0	78,386	29,339,677
Sterling Chemicals Inc.	Texas City	TX	28	37	1,063,698	20,005	23,625,432	0	24,709,135
Arcadian Fertilizer L.P.	Geismar	LA	28	11	1,925,191	19,985,915	0	761,855	22,672,961
DuPont	Victoria	TX	28	32	545,379	1,910	21,903,231	21,152	22,471,672
Lenzing Fibers Corp.	Lowland	TN	28	7	22,250,765	21,750	0	0	22,272,515
BP Chemicals Inc.	Port Lavaca	TX	28	20	118,844	870	20,531,246	19	20,650,979
BP Chemicals Inc.	Lima	OH	28	24	214,380	0	20,406,300	0	20,620,680
Elkem Metals Co.	Marietta	OH	33	9	4,556,572	3,968,000	0	10,080,000	18,604,572
Vulcan Chemicals	Wichita	KS	28	25	432,349	0	16,973,869	0	17,406,218
Coastal Chem Inc.	Cheyenne	WY	28	13	822,397	0	14,512,026	0	15,334,423
Phelps Dodge Mining Co.	Playas	NM	33	4	643,105	0	0	14,130,654	14,773,759
Northwestern Steel & Wire Co.	Sterling	IL	33	8	301,470	3,100	0	13,970,000	14,274,570
Cabot Corp.	Tuscola	IL	28	2	3,177,080	0	10,749,360	0	13,926,440
Zeneca Specialties	Mt. Pleasant	TN	28	18	204,674	0	13,224,585	0	13,429,259
Amoco Oil Co.	Texas City	TX	29	32	648,689	227,374	12,166,000	154,671	13,196,734
American Chrome & Chemicals	Corpus Christi	TX	28	8	90,810	22,550	0	12,000,000	12,113,360
Eastman Kodak Co.	Rochester	NY	38	64	11,280,804	743,510	0	100	12,024,414
Kennecott Utah Copper	Magna	UT	33	13	395,305	4,750	0	11,317,260	11,717,315
Texasgulf Inc.	Aurora	NC	28	8	2,679,010	0	0	8,806,800	11,485,810
Inland Steel Co.	East Chicago	IN	Mult.	34	434,977	320,092	0	9,863,650	10,618,719
Hoechst-Celanese Chemical	Pasadena	TX	28	30	3,747,833	0	6,606,610	0	10,354,443
DuPont	Orange	TX	28	38	2,405,205	22,573	7,303,524	0	9,731,302
Uniroyal Chemical Co. Inc.	Geismar	LA	28	27	919,372	16,420	8,088,520	0	9,024,312
Rubicon Inc.	Geismar	LA	28	30	361,457	131	8,260,300	0	8,621,888
Doe Run Co.	Herculaneum	MO	33	8	258,309	3,063	0	7,932,956	8,194,328
Chino Mines Co.	Hurley	NM	33	3	305,252	0	0	7,837,287	8,142,539
Hoechst-Celanese	Narrows	VA	28	11	7,887,916	638	0	15,200	7,903,754
IMC Fertilizer Inc.	Mulberry	FL	Mult.	7	799,365	0	0	6,800,750	7,600,115
Asarco Inc.	Annapolis	MO	33	6	218,170	86	0	6,867,046	7,085,302
CF Industries Inc.	Donaldsonville	LA	28	11	6,085,325	951,965	0	0	7,037,290
Dow Chemical Co.	Freeport	TX	28	90	6,521,547	277,332	0	17,698	6,816,577
Occidental Chemical Corp.	White Springs	FL	28	5	261,020	1,390	0	6,450,000	6,712,410
Occidental Chemical Corp.	Castle Hayne	NC	28	4	4,817	74	0	6,700,904	6,705,795
Engelhard Corp.	Jackson	MS	32	1	6,912	0	6,521,124	0	6,528,036
Cyprus Miami Mining Corp.	Claypool	AZ	33	6	135,500	5	0	6,088,000	6,223,505
Angus Chemical Co.	Sterlington	LA	28	15	421,245	72,560	5,523,000	0	6,016,805
Asarco Inc.	Amarillo	TX	33	14	125,810	0	5,832,635	11,975	5,970,420
Monsanto Co.	Cantonment	FL	28	26	131,683	950	5,779,658	0	5,912,291
Chemetals Inc.	New Johnsonville	TN	28	5	220,712	891	0	5,463,290	5,684,893
Coastal Chem Inc.	Battle Mountain	NV	28	5	341,332	0	0	5,235,336	5,576,668
Subtotal				911	240,674,096	210,862,772	507,936,465	183,995,913	1,143,469,246
Total for All TRI Facilities				79,987	1,672,127,735	271,152,864	576,285,233	289,052,581	2,808,618,413

[21] Mult. (multiple) means more than one SIC code reported in the range 20 through 39.

[22] Number of forms is all chemical forms reported by the facility regardless of whether or not releases were reported for a particular chemical.

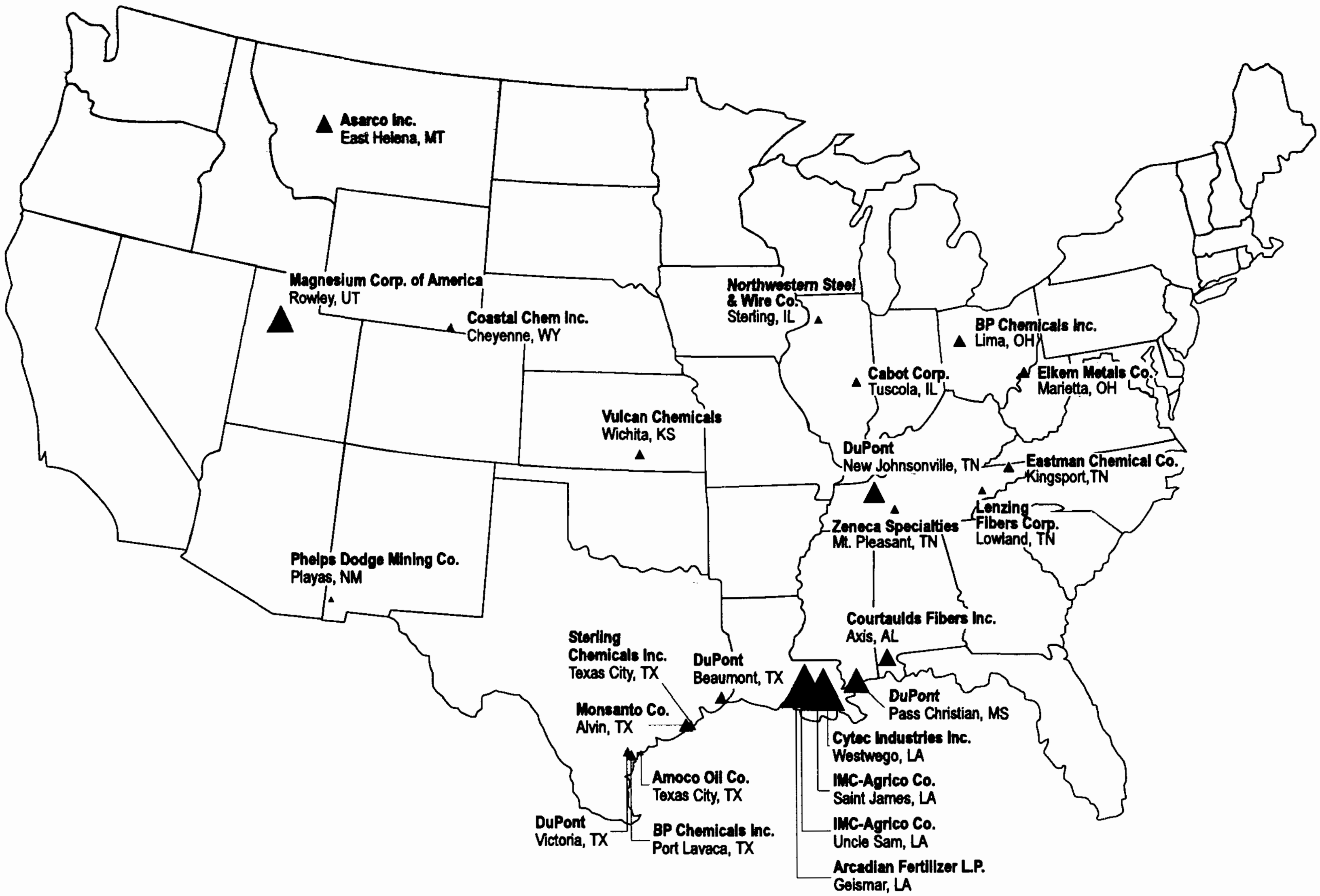


Figure 1-9. Top 25 Facilities with the Largest Total Releases, 1993.

Table 1-20. Top 10 TRI Parent Companies with the Largest Air/Water/Land Releases, 1993.

Company Name	Facilities Number	Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
Freeport-McMoran Inc.	4	18	5,412,474	184,131,306	4,216,827	193,760,607
Renco Holdings Inc.	6	34	73,579,823	5,489	922,180	74,507,492
Asarco Inc.	13	105	1,630,038	17,779	49,576,730	51,224,547
Eastman Kodak Co.	21	313	48,666,641	1,129,867	130,314	49,926,822
Courtaulds United States	11	62	43,683,098	45,443	0	43,728,541
General Motors Corp.	129	1,092	28,537,841	114,070	7,667,899	36,319,810
Arcadian Fertilizer L.P.	8	71	12,450,526	21,937,530	864,402	35,252,458
DuPont	77	811	29,419,556	3,793,670	301,564	33,514,790
3M Co.	50	372	23,162,980	3,969,076	100,826	27,232,882
Phelps Dodge Corp.	18	65	5,158,546	413	21,969,941	27,128,900
Subtotal	337	2,943	271,701,523	215,144,643	85,750,683	572,596,849
Total for All TRI Facilities	23,321	79,987	1,672,127,735	271,152,864	289,052,581	2,232,333,180

Table 1-21. Top 10 TRI Parent Companies with the Largest Total Releases, 1993.

Company Name	Facilities Number	Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
DuPont	77	811	29,419,556	3,793,670	172,510,531	301,564	206,025,321
Freeport-McMoran Inc.	4	18	5,412,474	184,131,306	0	4,216,827	193,760,607
American Cyanamid[23]	32	234	3,734,318	704,655	119,816,270	385,511	124,640,754
Renco Holdings Inc.	6	34	73,579,823	5,489	0	922,180	74,507,492
Asarco Inc.	13	105	1,630,038	17,779	5,832,635	49,576,730	57,057,182
Monsanto Co.	29	283	4,897,603	1,470,802	48,530,658	133,359	55,032,422
Eastman Kodak Co.	21	313	48,666,641	1,129,867	0	130,314	49,926,822
BP America	56	272	3,216,623	369,667	40,937,546	10,534	44,534,370
Courtaulds United States	11	62	43,683,098	45,443	0	0	43,728,541
General Motors Corp.	129	1,092	28,537,841	114,070	0	7,667,899	36,319,810
Subtotal	378	3,224	242,778,015	191,782,748	387,627,640	63,344,918	885,533,321
Total for All TRI Facilities	23,321	79,987	1,672,127,735	271,152,864	576,285,233	289,052,581	2,808,618,413

[23] American Cyanamid no longer exists, but was in existence during 1993. Many of the releases attributed to American Cyanamid in 1993 will be associated with Cytec Industries in future years.

Table 1-22. TRI Releases from U.S. Department of Energy Facilities, 1993.

Facility	City	State	SIC[24] Code	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
U.S. DOE Stanford Linear Acc.	Menlo Park	CA	None	8,300	0	0	0	8,300
U.S. DOE Etec Site	Simi Hills	CA	37	101,200	0	0	0	101,200
U.S. DOE Naval Petroleum Res.	Tupman	CA	None	20,490	0	3,762,430	0	3,782,920
U.S. DOE Rocky Flats Plant	Golden	CO	Mult.	3,877	0	0	750	4,627
U.S. DOE Pinellas Plant	Largo	FL	36	22,755	0	0	0	22,755
U.S. DOE Idaho Natl. Eng. Lab	Scoville	ID	Mult.	69,561	0	0	380	69,941
U.S. DOE Argonne Natl. Lab	Aargonne	IL	None	1,500	5	0	0	1,505
U.S. DOE Fermi Natl. Lab	Batavia	IL	None	1,800	0	0	0	1,800
U.S. DOE Kansas City Plant	Kansas City	MO	None	1,477	0	0	0	1,477
U.S. DOE Weldon Spring Site	Saint Charles	MO	None	255	0	0	0	255
U.S. DOE Sandia Natl. Lab	Albuquerque	NM	36	255	0	0	0	255
U.S. DOE Los Alamos Natl. Lab	Los Alamos	NM	None	755	4,110	0	0	4,865
U.S. DOE Nevada Test Site	Mercury	NV	None	0	0	0	0	0
U.S. DOE Brookhaven Natl. Lab	Upton	NY	None	5,010	5	0	0	5,015
U.S. DOE Fernald	Fernald	OH	None	1,010	900	0	0	1,910
U.S. DOE Mound Plant	Miamisburg	OH	Mult.	250	0	0	0	250
U.S. DOE Portsmouth Gas. Diff.	Piketon	OH	28	171,298	339	0	0	171,637
U.S. DOE Savannah River Site	Aiken	SC	28	68,772	1,001	0	9,847	79,620
U.S. DOE Oak Ridge K-25 Site	Oak Ridge	TN	28	4,536	1,852	0	0	6,388
U.S. DOE Oak Ridge Natl. Lab	Oak Ridge	TN	None	2,860	4,493	0	5	7,358
U.S. DOE Oak Ridge Y-12 Plant	Oak Ridge	TN	Mult.	73,755	0	0	250	74,005
U.S. DOE Hanford Site	Richland	WA	None	14	0	0	0	14
U.S. DOE Naval Petroleum Res.	Casper	WY	None	327	0	0	0	327
Total for U.S. Department of Energy Facilities				560,057	12,705	3,762,430	11,232	4,346,424

Table 1-23. TRI Transfers from U.S. Department of Energy Facilities, 1993.

Facility	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-Site Transfers[25] Pounds	Total Transfers Pounds
U.S. DOE Stanford Linear Acc.	4,400	0	4,005	0	0	0	8,405
U.S. DOE Etec Site	68,111	0	255	0	0	0	68,366
U.S. DOE Naval Petroleum Res.	0	0	0	0	0	0	0
U.S. DOE Rocky Flats Plant	0	0	0	0	0	0	0
U.S. DOE Pinellas Plant	0	0	10,000	15	11,200	0	21,215
U.S. DOE Idaho Natl. Eng. Lab	0	0	344	0	106	0	450
U.S. DOE Argonne Natl. Lab	0	2,650	4,000	0	0	0	6,650
U.S. DOE Fermi Natl. Lab	0	0	1,459	0	250	0	1,709
U.S. DOE Kansas City Plant	0	0	0	0	0	0	0
U.S. DOE Weldon Spring Site	0	0	0	0	0	0	0
U.S. DOE Sandia Natl. Lab	0	0	0	250	0	0	250
U.S. DOE Los Alamos Natl. Lab	0	0	0	0	0	0	0
U.S. DOE Nevada Test Site	0	0	0	0	0	0	0
U.S. DOE Brookhaven Natl. Lab	0	0	1,335	0	0	0	1,335
U.S. DOE Fernald	0	0	0	0	0	0	0
U.S. DOE Mound Plant	0	0	500	0	0	0	500
U.S. DOE Portsmouth Gas. Diff.	0	0	0	0	0	0	0
U.S. DOE Savannah River Site	0	0	67	150	0	0	217
U.S. DOE Oak Ridge K-25 Site	0	0	0	0	0	0	0
U.S. DOE Oak Ridge Natl. Lab	0	0	0	0	0	0	0
U.S. DOE Oak Ridge Y-12 Plant	0	0	0	0	0	0	0
U.S. DOE Hanford Site	0	0	0	0	0	0	0
U.S. DOE Naval Petroleum Res.	0	0	0	0	0	0	0
Total for U.S. Department of Energy Facilities	72,511	2,650	21,965	415	11,556	0	109,097

[24] Mult. (multiple) means more than one SIC code reported in the range 20 through 39. None means no SIC code reported in the range 20 through 39.

[25] Transfers reported without valid waste management codes.

1993 TRI DATA BY CHEMICAL

The following tables provide the 1993 TRI data by chemical. Table 1-24 lists the top 50 TRI chemicals with largest air, water, and land releases. Table 1-25 lists the top 50 TRI chemicals with the largest total releases including underground injection.

Tables 1-26 to 1-34 provide the top 15 chemicals released to each media and transferred off-site for each waste management activity.

Use, Toxicity, and Environmental Fate Information

TRI chemicals exhibit a variety of adverse health and environmental effects. Some of the key effects exhibited by these chemicals are discussed below. Box 1-3 provides a reference to the potential health or environmental effects of the top 25 TRI chemicals for total releases.

Acute Toxicity: Toxicity that results from a single exposure to a chemical.

Carcinogenicity: The ability of a chemical to produce cancer.

Chronic Toxicity: Toxicity that results from a repeated long-term exposure to a chemical. The adverse effects are produced on the thyroid, liver, kidney, spleen, gastrointestinal tract and/ or respiratory system.

Developmental Toxicity: Any detrimental effect produced by exposure to the chemical during embryonic stages of development. These effects include structural abnormalities, functional abnormalities, growth retardation, or death of the fetus.

Reproductive Toxicity: The occurrence of adverse effects on the reproductive system that may result from exposure to a chemical. The manifestation of such toxicity may be noted as alterations in sexual behavior, fertility, pregnancy outcomes, or modifications in hormonal functions that are dependent on the integrity of this system.

Neurotoxicity: Occurrence of adverse effects on the nervous system following exposure to a chemical.

Other Effects: Toxic effects can be caused by the degradation products or metabolites of the parent compound.

Environmental Effects: Adverse effects on the flora and fauna (aquatic and terrestrial organisms) such as reduction in agricultural productivity, fish kills, and death of birds. Some chemicals can cause adverse effects by ozone depletion and eutrophication. (Eutrophication is a result of the overgrowth of algae whose death and decay may lead to depletion of dissolved oxygen in the water. Low levels of dissolved oxygen limit the type of aquatic organisms that can survive in the water, possibly resulting in fish kills.)

The following information on use, toxicity, and environmental fate is provided for the top 10 chemicals with largest air/water/land releases and total releases taken from Tables 1-24 and 1-25.

Ammonia

Uses. Ammonia is used in the manufacture of various nitrogen compounds including nitric acid, ammonium salts, urea, and chemicals that are used as fertilizers or in the manufacture of nylon and plastics. Ammonia is also used in refrigeration, paper and pulp production, explosives, cleaners, and metal-treating operations.

Toxicity. Anhydrous ammonia is a corrosive and severely irritating gas with a pungent odor; it is irritating to the skin, eyes, nose, throat, and upper respiratory system.

CAS Number[26]	Chemical	Health Effects							Environmental Effects		
		Acute	Cancer[27]	Chronic	Developmental	Reproductive	Neurotoxicity	Other[28]	Ecotoxicity	Smog Formation	Ozone Depletion
7664-41-7	Ammonia								✓		
7647-01-3	Hydrochloric acid	✓[29]		✓[30]					✓		
7664-38-2	Phosphoric acid								✓		
67-56-1	Methanol			✓				✓			
108-88-3	Toluene						✓			✓[31]	
7664-93-9	Sulfuric acid			✓[30]					✓		
67-64-1	Acetone									✓[31]	
1330-20-7	Xylene (mixed isomers)									✓[31]	
75-15-0	Carbon disulfide			✓	✓	✓	✓				
78-93-3	Methyl ethyl ketone						✓			✓	
7782-50-5	Chlorine	✓							✓		
—	Zinc compounds	✓		✓	✓				✓		
75-09-2	Dichloromethane		✓	✓			✓				
71-55-6	1,1,1-Trichloroethane										✓
—	Manganese compounds	✓		✓			✓		✓		
6484-52-2	Ammonium nitrate (solution)							✓[32]	✓		
—	Copper compounds	✓		✓					✓		
—	Glycol ethers	✓		✓	✓	✓					
74-85-1	Ethylene							✓		✓	
100-42-5	Styrene		✓				✓				
71-36-3	n-Butyl alcohol			✓							
79-01-6	Trichloroethylene		✓								
108-10-1	Methyl isobutyl ketone			✓				✓		✓	
—	Chromium compounds	✓	✓[33]	✓	✓	✓			✓		
7697-37-2	Nitric acid	✓[29]		✓					✓	✓	

Box 1-3. Potential Adverse Human Health and Environmental Effects of the Top 25 TRI Chemicals for Total Releases, 1993.[34]

[26] Compound categories do not have CAS numbers (—).
[27] Distinctions among cancer classifications are discussed in the OSHA carcinogen section of this chapter.
[28] Toxicity resulting from the metabolite or degradation product of the parent compound.
[29] Concentrated solutions are corrosive.
[30] Aerosol forms.
[31] Contributes to ozone formation in the lower atmosphere; however, the extent of contribution to smog formation is unknown.
[32] Nitrate ion.
[33] Chromium VI is carcinogenic.
[34] Sources: Integrated Risk Management System, Hazardous Substances Data Bank, OPPT's Background Documents for Chemical Fact Sheets, EPCRA Section 313 Responses to Petitions, Agency for Toxic Substances and Disease Registry's *Toxicological Profiles*, and *Environmental Health Perspective*, Vol. 37, 1984.

Table 1-24. Top 50 TRI Chemicals with the Largest Air/Water/Land Releases, 1993.

CAS Number(35)	Chemical	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
7664-38-2	Phosphoric acid	490,193	745,085	175,861,627	35,491,946	212,588,851
7664-41-7	Ammonia	35,439,303	102,617,862	35,938,643	10,144,184	184,139,992
67-56-1	Methanol	29,407,465	142,885,516	10,011,681	1,719,866	184,024,528
108-88-3	Toluene	60,860,617	116,441,054	133,248	234,148	177,669,067
67-64-1	Acetone	69,220,768	55,931,694	990,315	472,427	126,615,204
1330-20-7	Xylene (mixed isomers)	25,653,790	85,535,823	51,944	203,182	111,444,739
75-15-0	Carbon disulfide	3,333,231	89,974,108	34,169	8	93,341,516
78-93-3	Methyl ethyl ketone	29,044,598	55,770,325	197,216	134,162	85,146,301
7647-01-0	Hydrochloric acid	4,310,382	74,763,273	719,541	359,506	80,152,702
7782-50-5	Chlorine	1,284,028	74,126,080	675,121	49,012	76,134,241
—	Zinc compounds	1,501,719	2,814,644	1,046,444	67,413,392	72,776,199
75-09-2	Dichloromethane	24,478,364	39,834,847	62,909	78,267	64,454,387
71-55-6	1,1,1-Trichloroethane	32,866,736	31,199,295	10,912	42,743	64,119,686
7664-93-9	Sulfuric acid	1,866,251	22,763,591	27,542,946	1,552,743	53,725,531
—	Manganese compounds	778,095	1,436,529	565,650	47,671,055	50,451,329
—	Copper compounds	4,000,737	3,200,332	92,540	40,082,409	47,376,018
—	Glycol ethers	10,120,540	35,171,877	353,153	137,656	45,783,226
74-85-1	Ethylene	14,775,632	18,530,394	24,779	0	33,330,805
100-42-5	Styrene	12,559,401	20,011,190	28,274	177,580	32,776,445
79-01-6	Trichloroethylene	14,488,988	15,625,125	5,218	8,212	30,127,543
71-36-3	n-Butyl alcohol	6,792,330	22,002,423	57,472	17,057	28,869,282
108-10-1	Methyl isobutyl ketone	7,777,025	17,317,092	90,214	76,771	25,261,102
—	Chromium compounds	118,238	285,978	228,475	22,675,748	23,308,439
115-07-1	Propylene	13,141,400	5,763,375	175,120	0	19,079,895
6484-52-2	Ammonium nitrate (solution)	178,946	1,099,038	7,386,387	6,457,512	15,121,883
67-66-3	Chloroform	4,488,694	9,319,998	451,362	32,926	14,292,980
463-58-1	Carbonyl sulfide	8,998	12,780,099	0	0	12,789,097
107-21-1	Ethylene glycol	2,466,226	7,670,401	1,170,533	1,283,019	12,590,179
50-00-0	Formaldehyde	2,049,988	9,321,033	418,503	418,220	12,207,744
7440-66-6	Zinc (fume or dust)	830,106	850,500	66,802	10,449,577	12,196,985
—	Lead compounds	216,860	814,284	50,518	10,950,924	12,032,586
127-18-4	Tetrachloroethylene	4,422,676	6,519,343	10,152	618,026	11,570,197
71-43-2	Benzene	6,712,433	4,086,692	18,793	27,515	10,845,433
100-41-4	Ethylbenzene	3,088,395	7,226,146	15,347	27,110	10,356,998
110-82-7	Cyclohexane	4,603,824	5,494,004	26,842	10,218	10,134,888
76-13-1	Freon 113	6,871,554	2,953,806	4,271	1,237	9,830,868
7664-39-3	Hydrogen fluoride	3,076,706	4,645,613	10,340	28,805	7,761,464
7439-96-5	Manganese	362,608	496,504	243,336	6,650,151	7,752,599
75-71-8	Dichlorodifluoromethane (CFC-12)	4,845,914	2,521,594	14,186	100	7,381,794
108-95-2	Phenol	1,929,310	4,804,052	126,951	200,076	7,060,389
95-63-6	1,2,4-Trimethylbenzene	2,345,237	4,276,394	17,549	16,771	6,655,951
75-07-0	Acetaldehyde	1,692,021	4,815,116	35,127	951	6,543,215
7783-20-2	Ammonium sulfate (solution)	12,029	82,386	3,872,980	2,184,322	6,151,717
75-69-4	Trichlorofluoromethane (CFC-11)	2,645,752	3,481,936	1,546	1,000	6,130,234
74-87-3	Chloromethane	1,217,748	4,095,061	59,565	266	5,372,640
106-42-3	p-Xylene	1,268,116	3,170,089	749	631	4,439,585
108-05-4	Vinyl acetate	1,188,547	3,012,385	1,341	1,626	4,203,899
7439-92-1	Lead	236,287	459,607	24,575	3,336,155	4,056,624
1634-04-4	Methyl tert-butyl ether	938,717	2,910,737	92,315	409	3,942,178
7697-37-2	Nitric acid	802,420	2,252,954	180,513	421,294	3,657,181
	Subtotal	462,809,943	1,143,907,284	269,198,194	271,860,915	2,147,776,336
	Total for All TRI Chemicals	490,040,607	1,182,087,128	271,152,864	289,052,581	2,232,333,180

(35) Compound categories do not have CAS numbers (—).

Table 1-25. Top 50 TRI Chemicals with the Largest Total Releases, 1993.

CAS Number(36)	Chemical	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
7664-41-7	Ammonia	35,439,303	102,617,862	35,938,643	168,725,501	10,144,184	352,865,493
7647-01-0	Hydrochloric acid	4,310,382	74,763,273	719,541	145,097,099	359,506	225,249,801
7664-38-2	Phosphoric acid	490,193	745,085	175,861,627	33,784	35,491,946	212,622,635
67-56-1	Methanol	29,407,465	142,885,516	10,011,681	27,899,963	1,719,866	211,924,491
108-88-3	Toluene	60,860,617	116,441,054	133,248	967,496	234,148	178,636,563
7664-93-9	Sulfuric acid	1,866,251	22,763,591	27,542,946	105,872,094	1,552,743	159,597,625
67-64-1	Acetone	69,220,768	55,931,694	990,315	3,250,160	472,427	129,865,364
1330-20-7	Xylene (mixed isomers)	25,653,790	85,535,823	51,944	213,157	203,182	111,657,896
75-15-0	Carbon disulfide	3,333,231	89,974,108	34,169	2,805	8	93,344,321
78-93-3	Methyl ethyl ketone	29,044,598	55,770,325	197,216	360,927	134,162	85,507,228
7782-50-5	Chlorine	1,284,028	74,126,080	675,121	120,758	49,012	76,254,999
—	Zinc compounds	1,501,719	2,814,644	1,046,444	176,143	67,413,392	72,952,342
75-09-2	Dichloromethane	24,478,364	39,834,847	62,909	956,098	78,267	65,410,485
71-55-6	1,1,1-Trichloroethane	32,866,736	31,199,295	10,912	2,528	42,743	64,122,214
—	Manganese compounds	778,095	1,436,529	565,650	8,740	47,671,055	50,460,069
6484-52-2	Ammonium nitrate (solution)	178,946	1,099,038	7,386,387	35,211,208	6,457,512	50,333,091
—	Copper compounds	4,000,737	3,200,332	92,540	228,924	40,082,409	47,604,942
—	Glycol ethers	10,120,540	35,171,877	353,153	114,415	137,656	45,897,641
74-85-1	Ethylene	14,775,632	18,530,394	24,779	0	0	33,330,805
100-42-5	Styrene	12,559,401	20,011,190	28,274	132,607	177,580	32,909,052
71-36-3	n-Butyl alcohol	6,792,330	22,002,423	57,472	1,942,044	17,057	30,811,326
79-01-6	Trichloroethylene	14,488,988	15,625,125	5,218	460	8,212	30,128,003
108-10-1	Methyl isobutyl ketone	7,777,025	17,317,092	90,214	131,600	76,771	25,392,702
—	Chromium compounds	118,238	285,978	228,475	42,493	22,675,748	23,350,932
7697-37-2	Nitric acid	802,420	2,252,954	180,513	19,213,898	421,294	22,871,079
115-07-1	Propylene	13,141,400	5,763,375	175,120	0	0	19,079,895
107-21-1	Ethylene glycol	2,466,226	7,670,401	1,170,533	5,943,528	1,283,019	18,533,707
50-00-0	Formaldehyde	2,049,988	9,321,033	418,503	5,912,425	418,220	18,120,169
75-05-8	Acetonitrile	723,924	336,272	15,283	15,707,895	18	16,783,392
67-66-3	Chloroform	4,488,694	9,319,998	451,362	38,039	32,926	14,331,019
463-58-1	Carbonyl sulfide	8,998	12,780,099	0	0	0	12,789,097
7783-20-2	Ammonium sulfate (solution)	12,029	82,386	3,872,980	6,189,894	2,184,322	12,341,611
7440-66-6	Zinc (fume or dust)	830,106	850,500	66,802	0	10,449,577	12,196,985
—	Lead compounds	216,860	814,284	50,518	1,768	10,950,924	12,034,354
127-18-4	Tetrachloroethylene	4,422,676	6,519,343	10,152	15,041	618,026	11,585,238
71-43-2	Benzene	6,712,433	4,086,692	18,793	363,660	27,515	11,209,093
100-41-4	Ethylbenzene	3,088,395	7,226,146	15,347	333,957	27,110	10,690,955
110-82-7	Cyclohexane	4,603,824	5,494,004	26,842	260,344	10,218	10,395,232
108-95-2	Phenol	1,929,310	4,804,052	126,951	3,070,279	200,076	10,130,668
76-13-1	Freon 113	6,871,554	2,953,806	4,271	4	1,237	9,830,872
75-07-0	Acetaldehyde	1,692,021	4,815,116	35,127	2,623,334	951	9,166,549
7664-39-3	Hydrogen fluoride	3,076,706	4,645,613	10,340	3,520	28,805	7,764,984
7439-96-5	Manganese	362,608	496,504	243,336	504	6,650,151	7,753,103
75-71-8	Dichlorodifluoromethane (CFC-12)	4,845,914	2,521,594	14,186	1	100	7,381,795
95-63-6	1,2,4-Trimethylbenzene	2,345,237	4,276,394	17,549	1,293	16,771	6,657,244
75-69-4	Trichlorofluoromethane (CFC-11)	2,645,752	3,481,936	1,546	11	1,000	6,130,245
108-05-4	Vinyl acetate	1,188,547	3,012,385	1,341	1,408,698	1,626	5,612,597
74-87-3	Chloromethane	1,217,748	4,095,061	59,565	93,947	266	5,466,587
107-13-1	Acrylonitrile	344,718	1,048,900	3,078	3,823,381	6,934	5,227,011
106-42-3	p-Xylene	1,268,116	3,170,089	749	5	631	4,439,590
	Subtotal	462,703,581	1,141,922,112	269,099,665	556,496,430	268,531,303	2,698,753,091
	Total for All TRI Chemicals	490,040,607	1,182,087,128	271,152,864	576,285,233	289,052,581	2,808,618,413

(36) Compound categories do not have CAS numbers (—).

Table 1-26. Top 15 TRI Chemicals with the Largest Emissions to Air, 1993.

CAS Number[37]	Chemical	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Total Air Emissions Pounds
108-88-3	Toluene	60,860,617	116,441,054	177,301,671
67-56-1	Methanol	29,407,465	142,885,516	172,292,981
7664-41-7	Ammonia	35,439,303	102,617,862	138,057,165
67-64-1	Acetone	69,220,768	55,931,694	125,152,462
1330-20-7	Xylene (mixed isomers)	25,653,790	85,535,823	111,189,613
75-15-0	Carbon disulfide	3,333,231	89,974,108	93,307,339
78-93-3	Methyl ethyl ketone	29,044,598	55,770,325	84,814,923
7647-01-0	Hydrochloric acid	4,310,382	74,763,273	79,073,655
7782-50-5	Chlorine	1,284,028	74,126,080	75,410,108
75-09-2	Dichloromethane	24,478,364	39,834,847	64,313,211
71-55-6	1,1,1-Trichloroethane	32,866,736	31,199,295	64,066,031
—	Glycol ethers	10,120,540	35,171,877	45,292,417
74-85-1	Ethylene	14,775,632	18,530,394	33,306,026
100-42-5	Styrene	12,559,401	20,011,190	32,570,591
79-01-6	Trichloroethylene	14,488,988	15,625,125	30,114,113
	Subtotal	367,843,843	958,418,463	1,326,262,306
	Total for All TRI Chemicals	490,040,607	1,182,087,128	1,672,127,735

Table 1-27. Top 15 TRI Chemicals with the Largest Discharges to Surface Water, 1993.

CAS Number[37]	Chemical	Amount Not in Stormwater Pounds	Amount in Stormwater Pounds	Total Surface Water Discharges Pounds
7664-38-2	Phosphoric acid	20,528,720	155,332,907	175,861,627
7664-41-7	Ammonia	35,752,994	185,649	35,938,643
7664-93-9	Sulfuric acid	9,984,591	17,558,355	27,542,946
67-56-1	Methanol	10,006,385	5,296	10,011,681
6484-52-2	Ammonium nitrate (solution)	6,083,778	1,302,609	7,386,387
7783-20-2	Ammonium sulfate (solution)	3,871,938	1,042	3,872,980
107-21-1	Ethylene glycol	1,142,841	27,692	1,170,533
—	Zinc compounds	966,161	80,283	1,046,444
67-64-1	Acetone	988,285	2,030	990,315
7647-01-0	Hydrochloric acid	719,329	212	719,541
7782-50-5	Chlorine	674,741	380	675,121
—	Manganese compounds	552,976	12,674	565,650
123-91-1	1,4-Dioxane	477,896	0	477,896
67-66-3	Chloroform	450,470	892	451,362
50-00-0	Formaldehyde	411,286	7,217	418,503
	Subtotal	92,612,391	174,517,238	267,129,629
	Total for All TRI Chemicals	96,475,769	174,677,095	271,152,864

[37] Compound categories do not have CAS numbers (—).

Table 1-28. Top 15 TRI Chemicals with the Largest Underground Injection, 1993.

CAS Number	Chemical	Underground Injection Pounds
7664-41-7	Ammonia	168,725,501
7647-01-0	Hydrochloric acid	145,097,099
7664-93-9	Sulfuric acid	105,872,094
6484-52-2	Ammonium nitrate (solution)	35,211,208
67-56-1	Methanol	27,899,963
7697-37-2	Nitric acid	19,213,898
75-05-8	Acetonitrile	15,707,895
7783-20-2	Ammonium sulfate (solution)	6,189,894
107-21-1	Ethylene glycol	5,943,528
50-00-0	Formaldehyde	5,912,425
79-06-1	Acrylamide	4,010,509
107-13-1	Acrylonitrile	3,823,381
79-10-7	Acrylic acid	3,507,000
67-64-1	Acetone	3,250,160
108-95-2	Phenol	3,070,279
	Subtotal	553,434,834
	Total for All TRI Chemicals	576,285,233

Table 1-29. Top 15 TRI Chemicals with the Largest Releases to Land, 1993.

CAS Number[38]	Chemical	Releases to On-site Landfills Pounds	Releases to On-site Land Treatment Pounds	Releases to On-site Surface Impoundments Pounds	Other On-site Land Disposal Pounds	Total Releases to Land Pounds
—	Zinc compounds	22,439,739	184,748	5,078,274	39,710,631	67,413,392
—	Manganese compounds	30,358,359	140,037	13,948,488	3,224,171	47,671,055
—	Copper compounds	12,058,309	417,762	5,097,728	22,508,610	40,082,409
7664-38-2	Phosphoric acid	7,057,775	256,575	11,507,345	16,670,251	35,491,946
—	Chromium compounds	2,460,491	131,807	19,983,038	100,412	22,675,748
—	Lead compounds	3,124,561	8,577	1,745,156	6,072,630	10,950,924
7440-66-6	Zinc (fume or dust)	6,244,627	100	98,913	4,105,937	10,449,577
7664-41-7	Ammonia	517,825	5,992,061	3,500,287	134,011	10,144,184
7439-96-5	Manganese	5,680,497	505	203,617	765,532	6,650,151
6484-52-2	Ammonium nitrate (solution)	16,235	644,514	5,507,077	289,686	6,457,512
7439-92-1	Lead	420,452	5,032	557,555	2,353,116	3,336,155
—	Nickel compounds	356,540	25,131	819,961	1,663,069	2,864,701
—	Barium compounds	1,825,227	10,171	299,231	475,933	2,610,562
—	Arsenic compounds	59,135	53	1,600,509	590,897	2,250,594
7783-20-2	Ammonium sulfate (solution)	0	1,895,569	288,253	500	2,184,322
	Subtotal	92,619,772	9,712,642	70,235,432	98,665,386	271,233,232
	Total for All TRI Chemicals	100,270,412	10,670,885	73,703,245	104,408,039	289,052,581

[38] Compound categories do not have CAS numbers (—).

Table 1-30. Top 15 TRI Chemicals with the Largest Off-site Transfers for Recycling, 1993.

CAS Number[39]	Chemical	Solvents/ Organics Recovery Pounds	Metals Recovery Pounds	Other Reuse or Recovery Pounds	Acid Regeneration Pounds	Transfer to Waste Broker- Recycling Pounds	Total Off-site Transfers to Recycling Pounds
7664-93-9	Sulfuric acid	28,074,481	35,372,368	111,780,335	1,004,131,149	3,264,889	1,182,623,222
7440-50-8	Copper	3,974	372,516,164	9,548,712	4,283	82,008,068	464,081,201
—	Lead compounds	1,794	245,876,086	3,128,588	5	1,950,795	250,957,268
—	Zinc compounds	48,686	179,435,128	42,359,463	1,355	4,765,834	226,610,466
—	Copper compounds	219	94,974,695	5,433,931	26,300	20,073,121	120,508,266
107-21-1	Ethylene glycol	79,737,799	0	30,764,746	0	1,261,608	111,764,153
7440-47-3	Chromium	52,973	56,041,607	2,609,436	5	23,504,393	82,208,414
7440-66-6	Zinc (fume or dust)	0	73,826,381	736,619	0	1,353,019	75,916,019
7439-96-5	Manganese	9,157	34,436,310	24,937,424	5	10,410,104	69,793,000
7429-90-5	Aluminum (fume or dust)	0	17,892,883	49,565,532	0	1,107,577	68,565,992
7647-01-0	Hydrochloric acid	15,370	810,847	41,730,253	11,544,401	6,055,099	60,155,970
7440-02-0	Nickel	5,857	39,546,178	2,710,225	5	16,010,141	58,272,406
—	Manganese compounds	102	25,107,099	15,207,114	0	4,346,322	44,660,637
—	Chromium compounds	4,877	27,157,394	11,150,631	3,005	3,550,897	41,866,804
7439-92-1	Lead	7,366	35,169,355	1,638,895	0	3,281,110	40,096,726
	Subtotal	107,962,655	1,238,162,495	353,301,904	1,015,710,513	182,942,977	2,898,080,544
	Total for All TRI Chemicals	341,628,249	1,286,764,008	401,905,126	1,017,894,553	203,974,986	3,252,166,922

Table 1-31. Top 15 TRI Chemicals with the Largest Off-site Transfers for Energy Recovery, 1993.

CAS Number[39]	Chemical	Energy Recovery Pounds	Transfers to Waste Broker- Energy Recovery Pounds	Total Transfers to Energy Recovery Pounds
108-88-3	Toluene	55,608,702	25,148,013	80,756,715
1330-20-7	Xylene (mixed isomers)	50,700,578	19,797,059	70,497,637
67-56-1	Methanol	43,145,512	14,221,664	57,367,176
67-64-1	Acetone	39,992,971	11,437,275	51,430,246
78-93-3	Methyl ethyl ketone	34,125,159	11,573,212	45,698,371
75-65-0	tert-Butyl alcohol	30,586,012	198,501	30,784,513
—	Glycol ethers	10,050,603	3,724,586	13,775,189
108-10-1	Methyl isobutyl ketone	7,300,414	4,869,002	12,169,416
74-85-1	Ethylene	11,316,769	392,031	11,708,800
100-41-4	Ethylbenzene	6,842,679	2,410,957	9,253,636
71-36-3	n-Butyl alcohol	7,103,733	2,062,091	9,165,824
107-21-1	Ethylene glycol	6,775,742	1,993,811	8,769,553
7647-01-0	Hydrochloric acid	3,463	8,503,850	8,507,313
108-05-4	Vinyl acetate	6,816,610	1,646,403	8,463,013
79-10-7	Acrylic acid	7,743,968	178,237	7,922,205
	Subtotal	318,112,915	108,156,692	426,269,607
	Total for All TRI Chemicals	364,804,039	122,575,998	487,380,037

[39] Compound categories do not have CAS numbers (—).

Table 1-32. Top 15 TRI Chemicals with the Largest Off-site Transfers for Treatment, 1993.

CAS Number[40]	Chemical	Solidification/ Stabilization Pounds	Incineration/ Thermal Treatment Pounds	Incineration/ Insignificant Fuel Value Pounds	Wastewater Treatment excluding POTW Pounds	Other Waste Treatment Pounds	Transfers to Waste Broker-Waste Treatment Pounds	Total Transfers to Treatment Pounds
7647-01-0	Hydrochloric acid	1,626,537	122,131	29,461	9,549,108	17,585,233	18,063,307	46,975,777
67-56-1	Methanol	8,580	22,266,583	2,410,475	10,185,644	808,703	1,413,755	37,093,740
7664-93-9	Sulfuric acid	4,139,681	2,318,851	29,987	18,813,873	8,519,664	560,041	34,382,097
108-88-3	Toluene	82,198	20,514,584	816,054	363,326	210,558	181,046	22,167,766
—	Chromium compounds	15,470,181	235,375	292,514	116,102	399,096	45,725	16,558,993
67-64-1	Acetone	176,600	9,641,697	705,962	856,019	230,097	195,193	11,805,568
7697-37-2	Nitric acid	607,624	23,908	20,174	4,861,292	5,084,872	646,411	11,244,281
—	Zinc compounds	7,590,342	246,641	748,654	595,724	1,504,467	330,848	11,016,676
75-09-2	Dichloromethane	4,918	3,891,420	3,721,365	175,627	150,287	1,823,390	9,767,007
107-21-1	Ethylene glycol	428,793	3,653,182	323,137	4,295,856	305,471	110,862	9,117,301
1330-20-7	Xylene (mixed isomers)	179,999	5,335,479	631,828	219,921	295,526	341,386	7,004,139
7664-41-7	Ammonia	24,334	334,897	50,747	5,583,719	438,107	20,392	6,452,196
78-93-3	Methyl ethyl ketone	14,732	4,763,457	237,782	129,399	155,479	190,749	5,491,598
7783-20-2	Ammonium sulfate (solution)	0	92,524	0	4,738,653	0	245,230	5,076,407
75-05-8	Acetonitrile	0	4,240,758	38,601	168,100	250	39,338	4,487,047
	Subtotal	30,354,519	77,681,487	10,056,741	60,652,363	35,687,810	24,207,673	238,640,593
	Total for All TRI Chemicals	41,316,005	127,513,710	19,932,675	69,794,155	42,933,583	26,584,046	328,074,174

Table 1-33. Top 15 TRI Chemicals with the Largest Off-site Transfers to Publicly Owned Treatment Works (POTWs), 1993.

CAS Number[40]	Chemical	Transfers to POTWs Pounds
67-56-1	Methanol	94,712,739
7664-41-7	Ammonia	72,597,087
7783-20-2	Ammonium sulfate (solution)	31,195,284
7647-01-0	Hydrochloric acid	19,913,557
7664-93-9	Sulfuric acid	19,188,364
107-21-1	Ethylene glycol	15,071,067
—	Glycol ethers	12,188,571
67-64-1	Acetone	8,298,215
6484-52-2	Ammonium nitrate (solution)	4,767,098
7664-38-2	Phosphoric acid	4,265,830
108-95-2	Phenol	3,817,033
50-00-0	Formaldehyde	3,464,896
7697-37-2	Nitric acid	2,228,420
71-36-3	n-Butyl alcohol	1,519,267
62-53-3	Aniline	1,483,800
	Subtotal	294,711,228
	Total for All TRI Chemicals	314,350,915

[40] Compound categories do not have CAS numbers (—).

Table 1-34. Top 15 TRI Chemicals with the Largest Off-site Transfers for Disposal, 1993.

CAS Number [41]	Chemical	Storage Only Pounds	Underground Injection Pounds	Landfill/ Surface Impoundment Pounds	Land Treatment Pounds
—	Zinc compounds	120,885	1,143,118	82,685,516	11,138
7664-93-9	Sulfuric acid	325,461	36,180,149	1,244,167	19,697
—	Lead compounds	9,026	5,701	19,035,126	107,440
—	Manganese compounds	47	37,359	19,424,072	33,764
7647-01-0	Hydrochloric acid	5,058	13,185,810	112,606	0
7664-41-7	Ammonia	881	1,605,291	1,305,251	10,045,153
—	Copper compounds	24,154	22,109	11,722,354	650
7439-96-5	Manganese	1,500	20,521	9,623,077	16,454
—	Chromium compounds	165,258	228,707	9,572,394	4,267
—	Barium compounds	41,085	755	10,053,778	6,138
7429-90-5	Aluminum (fume or dust)	1,230	0	3,426,940	0
7440-47-3	Chromium	8,294	157,859	6,161,495	25,820
7440-50-8	Copper	18,576	22,465	5,188,770	3,926
1332-21-4	Asbestos (friable)	0	0	5,293,568	0
—	Nickel compounds	28,036	44,150	4,648,404	14,007
	Subtotal	749,491	52,653,994	189,497,518	10,288,454
	Total for All TRI Chemicals	1,440,004	63,121,430	226,680,492	15,076,806

Aqueous ammonia is moderately toxic to aquatic organisms.

Because it is a source of nitrogen, an essential element for aquatic plant growth, ammonia may contribute to eutrophication of standing or slow-moving surface water, particularly in nitrogen-limited waters, such as the Chesapeake Bay.

Environmental Fate. Ammonia combines with sulfate ions in the atmosphere and is washed out by rainfall, resulting in rapid return of ammonia to the soil and surface waters.

Ammonia is a central compound in the environmental cycling of nitrogen. Ammonia in lakes, rivers, and streams is converted to nitrate.

Hydrochloric Acid

Uses. Hydrochloric acid has various uses, including neutralization of waste streams/pH adjustment of process waters, in the manufacture of chemicals, and in the cleaning and preparation of metals for coatings.

Toxicity. Concentrated hydrochloric acid is corrosive. However, hydrochloric acid is primarily a concern in its aerosol form. Acid aerosols have been implicated in causing and exacerbating a variety of respiratory ailments.

Accidental releases of solution forms of hydrochloric acid may adversely affect aquatic life by inducing a transient lowering of the pH (i.e., increasing the acidity) of a surface water.

[41] Compound categories do not have CAS numbers (—).

Table 1-34.

Chemical	Other Land Disposal Pounds	Other Off-site Management Pounds	Transfers to Waste Broker-Disposal Pounds	Unknown Pounds	Total Transfers for Disposal Pounds
Zinc compounds	1,821,493	216,627	1,697,672	337,136	88,033,585
Sulfuric acid	86,140	34,479	675,002	436,308	39,001,403
Lead compounds	502,885	69,807	163,835	365,405	20,259,225
Manganese compounds	10,402	750	286,611	13,028	19,806,033
Hydrochloric acid	9,123	5,386	244,118	13,350	13,575,451
Ammonia	16,363	35	3,772	1,010	12,977,756
Copper compounds	65,413	1,016	79,519	26,103	11,941,318
Manganese	1,476,721	35,597	42,311	1,326	11,217,507
Chromium compounds	277,705	1,492	92,278	296,387	10,638,488
Barium compounds	153,892	48,756	249,966	15,336	10,569,706
Aluminum (fume or dust)	25,196	0	3,437,070	251	6,890,687
Chromium	230,003	41,658	164,322	13,124	6,802,575
Copper	146,615	86,690	648,348	11,766	6,127,156
Asbestos (friable)	0	0	750	0	5,294,318
Nickel compounds	40,866	1,334	17,597	23,856	4,818,250
Subtotal	4,862,817	543,627	7,803,171	1,554,386	267,953,458
Total for All TRI Chemicals	6,007,608	1,009,785	9,858,014	2,057,303	325,251,442

Environmental Fate. Releases of hydrochloric acid to surface waters and soils will be neutralized to an extent due to the buffering capacities of both systems. The extent of these reactions will depend on the characteristics of the specific environment.

Phosphoric Acid

Uses. Phosphoric acid is a phosphate chemical used to make phosphate fertilizers and agricultural chemicals; it is used in foods, e.g., soft drinks; it is used as a catalyst and in the treatment of metal surfaces.

Toxicity. Because it is a source of phosphorus, an essential element for aquatic plant growth, phosphoric acid may contribute to eutrophication of standing or slow-moving surface water, particularly in phosphorus-limited waters such as the Great Lakes.

Environmental Fate. The acidity of phosphoric acid may be reduced readily by natural water-hardness minerals. The phosphate will persist until used by plants as a nutrient.

Methanol

Uses. Methanol is used as a solvent, as a raw material in the synthesis of organic chemicals, as a fuel, as a de-icing agent, and to denature ethanol.

Toxicity. Methanol is a flammable liquid that is likely to evaporate when exposed to air. Methanol, which is readily absorbed from the gastrointestinal tract and the respiratory tract, is toxic to humans in moderate to high doses. In the body methanol is converted into formaldehyde and formic acid. Methanol is excreted as formic acid. Observed toxic effects at high dose levels generally include central nervous system damage and blindness. EPA has assessed methanol for potential non-cancer, long-term effects when exposure occurs by inhalation and concluded that methanol affects the liver and blood in animals at relatively high doses.

Methanol is expected to have low toxicity to aquatic organisms. Concentrations lethal to half the organisms of a test population are expected to exceed 1 milligram methanol per liter of water. Methanol is not likely to persist in water or to bioaccumulate in aquatic life.

Environmental Fate. Methanol reacts in air to produce formaldehyde which contributes to formation of air pollutants. In the atmosphere it can react with other atmospheric chemicals or be washed out by rain. Methanol is readily degraded by microorganisms in soils and surface waters.

Toluene

Uses. Toluene is a flammable liquid used in the manufacture of organic chemicals, such as benzoic acid and benzaldehyde, as a solvent for paint, gums, and resins, and as an additive for gasoline.

Toxicity. Inhalation or ingestion of toluene can cause headaches, confusion, weakness, and memory loss. Toluene may also affect the way the kidneys and liver function.

Some studies have shown that unborn animals were harmed when high levels of toluene were inhaled by their mothers, although the same effects were not seen when the mothers were fed large quantities of toluene.

Reactions of toluene (see environmental fate) in the atmosphere contribute to the formation of ozone in the lower atmosphere. Ozone can affect the respiratory system, especially in sensitive individuals such as asthma or allergy sufferers.

Environmental Fate. Toluene is a volatile organic chemical. As such, toluene in the lower atmosphere will react with other atmospheric components contributing to the formation of ozone in the lower atmosphere and other air pollutants.

The majority of releases of toluene to land and water will evaporate. Toluene may also be degraded by microorganisms.

Sulfuric Acid

Uses. Sulfuric acid is used as a catalyst, in the manufacture of fertilizers and other chemicals, in iron and steel pickling, in electroplating, and in the production of rayon and film.

Toxicity. Concentrated sulfuric acid is corrosive. In its aerosol form, sulfuric acid has been implicated in causing and exacerbating a variety of respiratory ailments.

Accidental releases of solution forms of sulfuric acid may adversely affect aquatic life by inducing a transient lowering of the pH (i.e., increasing the acidity) of a surface water.

Sulfuric acid in its aerosol form is also a component of acid rain. Acid rain can cause serious damage to crops and forests.

Environmental Fate. Releases of sulfuric acid to surface waters and soils will be neutralized to an extent due to the buffering capacities of both systems. The extent of these reactions will depend on the characteristics of the specific environment.

In the atmosphere, aerosol forms of sulfuric acid contribute to acid rain. These aerosol forms can travel large distances from the point of release before the acid is deposited on land and surface waters in the form of rain.

Acetone

Uses. Acetone has many uses, including as a solvent in the manufacture of organic chemicals and as a solvent in adhesives and printing inks. Acetone is an ingredient in paint, varnish, and nail polish removers.

Toxicity. Acetone is irritating to the eyes, nose, and throat. Symptoms of exposures to large quantities of acetone may include headache, unsteadiness, confusion, lassitude, drowsiness, vomiting, and respiratory depression.

Reactions of acetone (see environmental fate) in the atmosphere contribute to the formation of ozone in the lower atmosphere. Ozone can affect the respiratory system, especially in sensitive individuals such as asthma or allergy sufferers.

Environmental Fate. If released into water, acetone will be degraded by microorganisms or will evaporate into the atmosphere. Degradation by microorganisms will be the primary removal mechanism.

Acetone is a volatile and flammable organic chemical. As such, acetone in the lower atmosphere will react with other atmospheric components, contributing to the formation of ozone in the lower atmosphere and other air pollutants. EPA is reevaluating acetone's reactivity in the lower atmosphere to determine whether this contribution is negligible.

Xylenes

Uses. Xylenes are used in the manufacture of organic chemicals as a raw material and as a solvent. They are also used as a solvent for paints, coatings, adhesives, and rubbers.

Toxicity. Xylenes are rapidly absorbed into the body after inhalation, ingestion, or skin contact. Short-term exposure of humans to high levels of xylenes can cause irritation of the skin, eyes, nose, and throat, difficulty in breathing, impaired lung function, impaired memory, and possible changes in the liver and kidneys. Both short- and long-term exposure to high concentrations can cause effects such as headaches, dizziness, confusion, and lack of muscle coordination. Reactions of xylenes (see environmental fate) in the atmosphere contribute to the formation of ozone in the lower atmosphere. Ozone can affect the respiratory system, especially in sensitive individuals such as asthma or allergy sufferers.

Environmental Fate. The majority of releases to land and water will quickly evaporate, although some degradation by microorganisms will occur.

Xylenes are moderately mobile in soils and may leach into groundwater, where they may persist for several years.

Xylenes are volatile organic chemicals. As such, xylenes in the lower atmosphere will react with other atmospheric components, contributing to the formation of ozone in the lower atmosphere and other air pollutants.

Carbon Disulfide

Uses. Carbon disulfide is used in the manufacture of rayon, in the manufacture of organic chemicals such as carbon tetrachloride, as a fumigant, as a corrosion inhibitor, and in metal treating and plating.

Toxicity. Breathing large amounts of carbon disulfide can irritate the eyes, throat, and respiratory system and cause tremors, convulsions, and coma. Exposure to low levels may increase blood pressure and can cause coronary heart disease. Studies indicate that carbon disulfide can adversely affect the developing fetus.

Environmental Fate. Carbon disulfide is a volatile liquid. The majority of releases to land and water will evaporate into the atmosphere. Releases to land may leach into the ground, where the carbon disulfide may be degraded by microorganisms. In the atmosphere, carbon disulfide will react with oxygen and other atmospheric chemicals to form atmospheric pollutants.

Methyl Ethyl Ketone

Uses. Methyl ethyl ketone (MEK) is used as a solvent in protective coatings, adhesives, printing inks, and paint removers, in the production of magnetic tapes, and for dewaxing lubricating oils. It is also used as a chemical intermediate in numerous chemical reactions.

Toxicity. Breathing moderate amounts of MEK for short periods of time can cause adverse effects on the nervous system ranging from headaches, dizziness, nausea, and numbness in the fingers and toes to unconsciousness. Its vapors are irritating to the skin, eyes, nose, and throat and can damage the eyes. Repeated exposure to moderate to high amounts may cause liver and kidney effects.

Environmental Fate. MEK is a flammable liquid. Most of the MEK released to the environment will end up in air. MEK can contribute to the formation of air pollutants in the lower atmosphere. It can be degraded by microorganisms living in water and soil.

Chlorine

Uses. Chlorine is primarily used in the manufacture of ethylene dichloride, which is used to make polyvinyl chloride (PVC) resins. It is also used to bleach paper and make chlorinated solvents and chlorofluorocarbons (CFCs); these uses are declining due to the environmental concern of these substances. Other uses of chlorine include use as a disinfectant for drinking water and swimming pools and as a laundry bleach.

Toxicity. Chlorine is a highly reactive gas. Breathing small amounts of chlorine for short periods of time can affect the respiratory tract in humans, causing symptoms such as coughing and chest pain. It is irritating to the skin, eyes, and respiratory tract. Repeated long-term exposure to chlorine can cause adverse effects on the blood and respiratory system.

Environmental Fate. Most of the chlorine released to the environment will quickly evaporate. However, chlorine is highly toxic to aquatic organisms and plants at low doses.

Metals and Metal Compounds

Both metals and their metal compounds are listed on TRI. The potential adverse human health and/or environmental effects associated with the metals and metal compounds reportable to TRI are listed in Box 1-4 and are indicated by a check mark. Under EPCRA section 313, facilities that manufacture, process, or otherwise use metal compounds report releases and/or transfers of only the metal portion of the metal compound. For example, a facility that releases a copper compound, such as copper sulfate, would report as a release only the weight of the copper, not the weight of the entire copper compound. This is done to capture information on the targeted portion of each member of the category, so that releases and transfers of a metal can be traced through the environment and can be compared from facility to facility.

Metals (including the metal portion of metal compounds) are different from other TRI chemicals because they do not degrade and are not destroyed. Other TRI-listed chemicals can be destroyed by sunlight, heat, microorganisms, or other chemicals. Although metals cannot be destroyed, they may be converted to a less toxic form. For example, many facilities convert

Chemical	Health Effects	Acute	Cancer	Chronic	Developmental	Reproductive	Neurotoxicity[42]	Environmental Effects	Ecotoxicity
Antimony and antimony compounds		✓	✓	✓	✓	✓			✓
Arsenic and arsenic compounds		✓	inorganic compounds[43]	✓	✓	✓	✓		
Barium and barium compounds		✓		✓					
Beryllium and beryllium compounds		✓	✓	✓					✓
Cadmium and cadmium compounds		✓	✓	✓	✓	✓	✓		✓
Chromium and chromium compounds		✓	hexavalent compounds	✓	✓	✓			✓
Cobalt and cobalt compounds		✓		✓	✓	✓[44]	✓		✓
Copper and copper compounds		✓		✓					✓
Lead and lead compounds		✓	inorganic compounds	✓	✓	✓	✓		✓
Manganese and manganese compounds		✓		✓	✓		✓		✓
Mercury and mercury compounds		✓		✓	✓[45]		✓		✓
Nickel and nickel compounds		✓[46]	✓	✓	✓	✓			✓
Selenium and selenium compounds		✓	✓[47]	✓					✓
Silver and silver compounds		✓		✓					✓
Thallium and thallium compounds		✓		✓	✓	✓			✓
Zinc and zinc compounds		✓		✓	✓				✓

Box 1-4. Potential Adverse Human Health and Environmental Effects of Metals and Metal Compounds.

[42] ATSDR *Toxicological Profiles.*
[43] Organic compounds, however, can also cause this effect if they dissociate to give arsenic ion.
[44] Cobalt chloride and cobalt sulfate; ATSDR *Toxicological Profile,* 1991.
[45] Hazardous Substances Data Bank; Developmental and Reproductive Toxicology Database.
[46] Primarily nickel carbonyl.
[47] Selenium sulfide classified as B2 by EPA.

Table 1-35. Releases of TRI Metals and Metal Compounds, 1993.

Chemical	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Antimony and antimony compounds	36,540	71,104	37,398	3,707	960,740	1,109,489
Arsenic and arsenic compounds	11,337	115,990	7,399	52,000	2,561,857	2,748,583
Barium and barium compounds	310,693	438,008	78,570	2,491	2,901,703	3,731,465
Beryllium and beryllium compounds	5	1,261	28	0	22,681	23,975
Cadmium and cadmium compounds	9,474	52,660	1,064	977	123,364	187,539
Chromium and chromium	406,770	423,644	250,435	42,762	23,832,948	24,956,559
Cobalt and cobalt compounds	24,195	36,129	103,927	2,375	123,629	290,255
Copper and copper compounds	4,281,315	4,118,487	135,929	251,851	41,558,023	50,345,605
Lead and lead compounds	453,147	1,273,891	75,093	1,768	14,287,079	16,090,978
Manganese and manganese compounds	1,140,703	1,933,033	808,986	9,244	54,321,206	58,213,172
Mercury and mercury compounds	11,856	4,267	446	15	1,812	18,396
Nickel and nickel compounds	225,313	275,493	94,194	133,238	3,292,612	4,020,850
Selenium and selenium compounds	3,136	76,134	557	2,300	120,527	202,654
Silver and silver compounds	10,913	17,790	9,387	310	21,376	59,776
Thallium and thallium compounds	5	250	0	0	755	1,010
Zinc and zinc compounds[48]	2,331,825	3,665,144	1,113,246	176,143	77,862,969	85,149,327
Total	9,257,227	12,503,285	2,716,659	679,181	221,993,281	247,149,633

hexavalent chromium (a known carcinogen) to the less toxic trivalent form before releasing or transferring to off-site locations. Other metal waste may be treated before disposal so that the metal will be less likely to be transported through soils. Although such treatment may limit the availability of the metal to the environment, it does not destroy the metal.

Comparing the release and transfer data for metal waste in Tables 1-35 and 1-36 indicates that the vast majority of metal waste is transferred, with recycling accounting for over 85% of transfers and over 75% of total releases and transfers combined. Amounts of metals recaptured from waste by on-site recycling activities can be found in tables presented in Chapter 2.

Several facilities reported transfers of metal waste off-site for treatment by POTWs. Treatment processes employed at POTWs may remove the metal from a waste stream or convert the metal into a less toxic form, but they do not destroy the metal. For example, public

[48] Only fume or dust forms of zinc metal are reportable.

Table 1-36. Transfers of TRI Metals and Metal Compounds, 1993.

Chemical	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (49) Pounds	Total Transfers Pounds
Antimony and antimony compounds	5,993,099	35,375	282,132	98,968	2,972,015	254	9,381,843
Arsenic and arsenic compounds	571,608	33	745,142	1,036	2,863,403	250	4,181,472
Barium and barium compounds	1,595,015	216,358	2,609,949	347,122	10,963,799	250	15,732,493
Beryllium and beryllium compounds	152,759	0	1,422	0	6,978	0	161,159
Cadmium and cadmium compounds	2,181,549	1,142	191,713	4,944	3,180,974	0	5,560,322
Chromium and chromium	124,075,218	31,061	17,416,591	443,461	17,441,063	89,217	159,496,611
Cobalt and cobalt compounds	8,881,755	517	108,663	39,586	632,013	23,014	9,685,548
Copper and copper compounds	584,589,467	86,326	3,699,617	367,261	18,068,474	298,134	607,109,279
Lead and lead compounds	291,053,994	83,202	3,920,304	139,125	22,401,665	1,049	317,599,339
Manganese and manganese compounds	114,453,637	23,935	3,828,069	447,608	31,023,540	593,809	150,370,598
Mercury and mercury compounds	23,639	0	1,751	21	72,955	0	98,366
Nickel and nickel compounds	90,127,604	13,405	2,655,737	219,692	7,177,354	37,268	100,231,060
Selenium and selenium compounds	257,238	0	13,986	472	43,191	5	314,892
Silver and silver compounds	2,093,887	0	10,169	8,385	16,141	0	2,128,582
Thallium and thallium compounds	750	0	0	5	0	0	755
Zinc and zinc compounds (50)	302,526,485	382,969	11,678,559	624,564	90,254,609	32,166	405,499,352
Total	1,528,577,704	874,323	47,163,804	2,742,250	207,118,174	1,075,416	1,787,551,671

sewage treatment plants will remove some fraction of the metals during treatment of the waste stream when removing solid materials. The amounts removed are then generally sent to a landfill for disposal. The metal waste that is not removed remains in the wastewater and will pass through the treatment plant and into the aquatic environment.

Table 1-37 presents releases of metals and metal compounds to air, water, and land by state. These data are illustrated by Figure 1-10. Table 1-38 presents releases of metals and metal compounds to air, water, and land by industry. The top five industries based on releases of metals and metal compounds on-site are primary metals (33), chemicals (28), multiple codes, no codes, and paper (26). As one might expect, primary metals account for the majority of metal releases, accounting for more than 71% of the total releases to air/water/land (see Figure 1-11).

(49) Transfers reported without valid waste management codes.
(50) Only fume or dust forms of zinc metal are reportable.

Table 1-37. Air, Water, and Land Releases of Metals and Metal Compounds, by State, 1993.

State	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
Alabama	601,192	337,286	3,755,014	4,693,492
Alaska	35	0	7	42
American Samoa	0	0	0	0
Arizona	808,334	47	7,133,500	7,941,881
Arkansas	269,152	68,095	1,640,310	1,977,557
California	125,148	27,989	449,178	602,315
Colorado	54,744	9,054	161,406	225,204
Connecticut	78,730	26,411	1,424	106,565
Delaware	43,663	21,443	63,970	129,076
Florida	133,100	2,814	3,285	139,199
Georgia	583,571	216,117	1,132,266	1,931,954
Hawaii	0	0	0	0
Idaho	7,917	2,700	457,428	468,045
Illinois	1,366,952	76,520	19,350,837	20,794,309
Indiana	1,166,995	102,014	12,511,308	13,780,317
Iowa	347,309	12,967	2,129,292	2,489,568
Kansas	146,066	5,127	149,577	300,770
Kentucky	202,879	24,516	528,868	756,263
Louisiana	81,294	125,234	1,660,874	1,867,402
Maine	69,917	108,917	1,000,026	1,178,860
Maryland	105,173	235,699	2,029,074	2,369,946
Massachusetts	115,586	4,529	32,907	153,022
Michigan	5,991,282	95,938	8,031,242	14,118,462
Minnesota	117,346	5,377	1,974,336	2,097,059
Mississippi	123,558	21,259	4,402,060	4,546,877
Missouri	821,723	11,271	15,264,758	16,097,752
Montana	114,883	117	42,604,442	42,719,442
Nebraska	165,874	18,559	247,310	431,743
Nevada	54,621	0	2,418,031	2,472,652
New Hampshire	18,878	598	1,659	21,135
New Jersey	260,685	8,320	591,262	860,267
New Mexico	270,369	1,254	21,968,201	22,239,824
New York	356,681	226,488	1,078,843	1,662,012
North Carolina	140,773	21,490	6,881,177	7,043,440
North Dakota	28,686	514	527	29,727
Ohio	1,622,128	135,743	22,290,926	24,048,797
Oklahoma	99,643	12,661	2,845,790	2,958,094
Oregon	113,649	27,109	1,459,430	1,600,188
Pennsylvania	1,379,560	118,848	778,880	2,277,288
Puerto Rico	3,120	10	352	3,482
Rhode Island	10,255	1,048	0	11,303
South Carolina	342,236	79,544	440,104	861,884
South Dakota	5,862	5	0	5,867
Tennessee	827,881	114,141	5,863,404	6,805,426
Texas	1,452,965	123,562	13,775,292	15,351,819
Utah	231,579	6,543	11,418,789	11,656,911
Vermont	1,645	0	260	1,905
Virgin Islands	0	301	550	851
Virginia	247,802	19,834	2,140,682	2,408,318
Washington	96,999	39,003	10,706	146,708
West Virginia	220,162	171,982	273,641	665,785
Wisconsin	330,379	47,632	1,016,500	1,394,511
Wyoming	1,531	29	23,576	25,136
Total	21,760,512	2,716,659	221,993,281	246,470,452

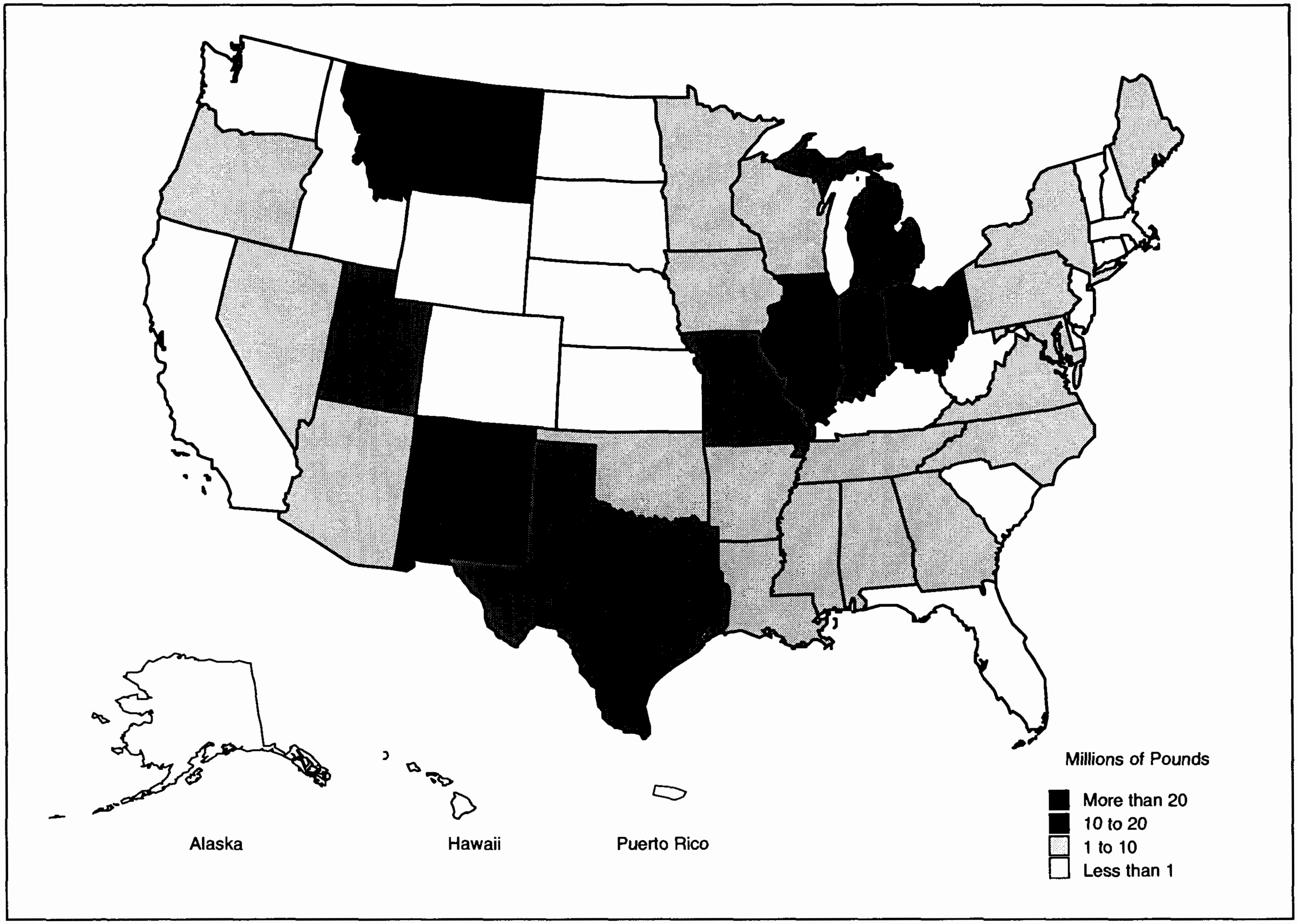


Figure 1-10. Total Air, Water, and Land Releases of Metals and Metal Compounds by State, 1993.

Table 1-38. Air, Water, and Land Releases of Metals and Metal Compounds, by Industry, 1993.

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
20	Food	166,838	2,022	509,962	678,822
21	Tobacco	0	3,885	0	3,885
22	Textiles	25,090	31,283	21,505	77,878
23	Apparel	1,814	965	644	3,423
24	Lumber	12,906	10,484	270	23,660
25	Furniture	79,757	331	19,559	99,647
26	Paper	390,014	495,334	3,530,956	4,416,304
27	Printing	5,872	42	98	6,012
28	Chemicals	1,036,257	716,148	30,813,535	32,565,940
29	Petroleum	119,871	99,954	279,832	499,657
30	Plastics	224,164	19,204	224,638	468,006
31	Leather	2,404	3,587	9,148	15,139
32	Stone/Clay/Glass	445,845	48,755	1,242,602	1,737,202
33	Primary Metals	10,296,162	847,113	164,339,590	175,482,865
34	Fabr Metals	725,696	45,023	490,443	1,261,162
35	Machinery	325,813	9,010	42,735	377,558
36	Electrical	385,214	43,595	133,239	562,048
37	Transportation Equip.	796,304	32,513	1,302,355	2,131,172
38	Measure./Photo.	32,650	138,695	4,084	175,429
39	Miscellaneous	62,071	1,085	1,004	64,160
	Multiple codes 20-39 (51)	1,176,830	167,218	15,237,166	16,581,214
	No codes 20-39 (52)	5,448,940	413	3,789,916	9,239,269
	Total	21,760,512	2,716,659	221,993,281	246,470,452

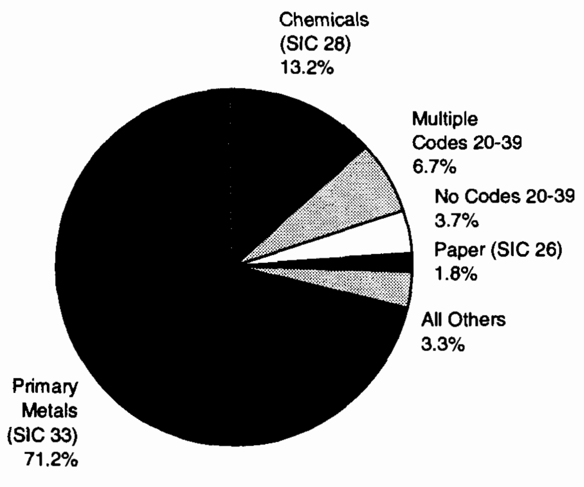


Figure 1-11. Top Industries for Air/Water/Land Releases of Metals and Metal Compounds, 1993.

(51) Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

(52) Facilities/forms that did not report an SIC code or reported SIC codes outside the 20-to-39 range.

Ozone Depleters

Ozone depleters, such as chlorofluorocarbons (CFCs), halons, 1,1,1-trichloroethane (methyl chloroform), carbon tetrachloride, and bromomethane (methyl bromide), are known to release chlorine or bromine in the stratosphere (earth's upper atmosphere). Chlorine and bromine act as catalysts in the conversion of ozone to oxygen, thus reducing the amount of stratospheric ozone. Stratospheric ozone is important because it shields the earth from ultraviolet-B radiation. As the ozone layer diminishes, the amount of this harmful radiation reaching the earth's surface increases. These ozone depleters remain in the stratosphere for many decades; thus, emissions today will influence ozone levels far into the future.

Ultraviolet-B radiation has been shown to cause various adverse human health and environmental effects as described below.

Health Effects

Skin Cancer. Exposure to ultraviolet-B radiation has been implicated in two types of non-melanoma skin cancer: squamous cell cancer and basal cell cancer. In addition, experimental evidence suggests that ultraviolet-B radiation plays an important role in causing malignant melanoma skin cancer. Recent studies predict that for each 1% change in ultraviolet-B radiation intensity, the incidence of melanoma could increase from 0.5 to 1%.

Other Health Effects. Results from some studies have demonstrated that ultraviolet-B radiation can suppress the immune response system in animals and possibly in humans.

The incidence of cataracts and adverse effects on the retina are likely to increase with ultraviolet-B radiation exposure.

Other studies have shown that increased penetration of ultraviolet-B radiation could increase the rate of tropospheric ozone formation. Data suggest that ozone exposure may lead to chronic health effects, including morphological changes to, and impaired functioning of, the lungs.

Environmental Effects

Aquatic organisms, particularly phytoplankton, zooplankton, and the larvae of many fishes, appear to be susceptible to harm from ultraviolet-B radiation because they spend at least part of their time at or near the surface of the waters they inhabit.

Plants have also been shown to be adversely affected by increased ultraviolet-B radiation. Possible effects include yield reductions and altering the balance of competition between plants.

Uses

CFCs and halons have various uses. A summary of the major uses follows:

- CFCs are used as refrigerants, with applications in household refrigerators and freezers, cold storage warehouses, refrigerated transport systems, and air conditioning.
- Some CFCs are used as blowing agents in the manufacture of foam plastics. The CFCs are used to create bubbles, or cells, in the plastic foam structure.
- 1,1,1-Trichloroethane and Freon 113 are used as industrial solvents in cleaning operations. The three major cleaning applications are metal cleaning, electronics cleaning, and precision cleaning.

- Halons, such as halon 1301 and halon 1211, are used in fire extinguishers, including portable systems used by military and commercial "crash/rescue" teams at airports, and in explosion protection devices.
- CFC-12 is widely used in combination with ethylene oxide to sterilize medical equipment and devices, in pharmaceutical production, and in spice fumigation.
- CFC-11 is used to puff leaves of tobacco to increase the volume of the tobacco used in cigarette production.
- 1,1,1-Trichloroethane is used as a solvent in adhesives, inks, and coatings, such as wood coatings, metal coatings, and aerospace coatings.

On September 16, 1987, the United States, along with 23 other nations and the European Economic Community, signed the "Montreal Protocol on Substances that Deplete the Ozone Layer." As a result of this protocol and newer scientific evidence, Congress mandated in the Clean Air Act Amendments that the production of CFCs and halons be phased out by the year 2000. The production of many Class I ozone depleters will be banned as of January 1, 1996, based on findings by the National Aeronautics and Space Administration (NASA) that ozone depletion in the previous decade was more severe than had been predicted.

See Table 1-39 for the TRI releases of Class I ozone depleters. Table 1-40 provides TRI transfer data for these ozone depleters.

Interim substitutes, such as hydrochlorofluorocarbons (HCFCs), have also been found to decrease ozone in the stratosphere, but these chemicals have much lower ozone-depletion potentials than CFCs. The HCFCs will serve as first-generation substitutes, but will themselves be phased out. On November 30, 1993, EPA added 11 HCFCs to the TRI list of reportable chemicals. The first TRI reports for these chemicals, covering activities during the 1994 reporting year, will be submitted by July 1, 1995. (See Chemical List questions in Appendix A).

Table 1-41 lists the amounts of ozone depleters released to air by state. The top five states reporting releases of ozone depleters to air were California, Texas, Ohio, North Carolina, and Indiana. Over 18% of all of the ozone-depleting chemicals reported to TRI as released to air were from California. Figure 1-12 maps this information for all states.

Table 1-42 presents releases of ozone depleters by industry. Nearly 50% of all of the TRI-listed ozone depleters released to air were from the transportation equipment (37), chemicals (28), and plastics (30) industries. Figure 1-13 shows the top 10 industries for releases of ozone depleters.

OSHA Carcinogens

Some chemicals on the TRI are listed 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 chemicals that have been shown to cause cancer in animals. Known and suspect carcinogens are highlighted on the TRI list because reportable *de minimis* concentration values are based on whether the chemical is considered to be an "OSHA Carcinogen" (see below). These known or suspect carcinogens are featured in this public data release package because these chemicals are specifically identified on the EPCRA section 313 toxic chemical list.

Table 1-39. TRI Releases of Ozone Depleters, 1993.

CAS Number	Chemical	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
353-59-3	Bromochlorodifluoromethane (Halon 1211)	6,248	3,025	0	0	0	9,273
74-83-9	Bromomethane	641,088	2,538,074	760	1,100	0	3,181,022
75-63-8	Bromotrifluoromethane (Halon 1301)	39,077	1,808	0	0	0	40,885
56-23-5	Carbon tetrachloride	585,481	1,643,428	1,453	34,332	79	2,264,773
75-71-8	Dichlorodifluoromethane (CFC-12)	4,845,914	2,521,594	14,186	1	100	7,381,795
76-14-2	Dichlorotetrafluoroethane (CFC-114)	989,347	123,820	5,136	0	0	1,118,303
76-13-1	Freon 113	6,871,554	2,953,806	4,271	4	1,237	9,830,872
76-15-3	Monochloropentafluoroethane (CFC-115)	510,058	49,695	1,000	0	0	560,753
71-55-6	1,1,1-Trichloroethane	32,866,736	31,199,295	10,912	2,528	42,743	64,122,214
75-69-4	Trichlorofluoromethane (CFC-11)	2,645,752	3,481,936	1,546	11	1,000	6,130,245
	Total	50,001,255	44,516,481	39,264	37,976	45,159	94,640,135

Table 1-40. TRI Transfers of Ozone Depleters, 1993.

CAS Number	Chemical	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers [53] Pounds	Total Transfers Pounds
353-59-3	Bromochlorodifluoromethane (Halon 1211)	0	0	0	0	0	0	0
74-83-9	Bromomethane	0	3,300	500	0	5	0	3,805
75-63-8	Bromotrifluoromethane (Halon 1301)	0	0	0	0	0	0	0
56-23-5	Carbon tetrachloride	111,626	4,109	920,808	1,675	121,363	0	1,159,581
75-71-8	Dichlorodifluoromethane (CFC-12)	312,686	319	81,000	21,832	1,969	0	417,806
76-14-2	Dichlorotetrafluoroethane (CFC-114)	24,730	0	6,383	0	15	0	31,128
76-13-1	Freon 113	3,043,503	208,109	417,205	37,045	12,278	750	3,718,890
76-15-3	Monochloropentafluoroethane (CFC-115)	0	0	0	0	0	0	0
71-55-6	1,1,1-Trichloroethane	14,370,656	2,322,187	3,568,694	60,457	267,633	177,907	20,767,534
75-69-4	Trichlorofluoromethane (CFC-11)	244,377	227,123	250,238	614	81,821	0	804,173
	Total	18,107,578	2,765,147	5,244,828	121,623	485,084	178,657	26,902,917

[53] Transfers reported without valid waste management codes.

Table 1-41. TRI Releases to Air of Ozone Depleters, by State, 1993.

State	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Total Air Emissions Pounds
Alabama	668,426	1,433,686	2,102,112
Alaska	0	0	0
American Samoa	0	0	0
Arizona	304,531	655,142	959,673
Arkansas	890,659	1,122,658	2,013,317
California	9,566,063	7,899,175	17,465,238
Colorado	549,963	98,299	648,262
Connecticut	1,532,288	1,846,535	3,378,823
Delaware	75,147	76,764	151,911
Florida	867,185	544,418	1,411,603
Georgia	924,274	1,115,744	2,040,018
Hawaii	0	0	0
Idaho	0	15,604	15,604
Illinois	1,706,827	1,848,996	3,555,823
Indiana	2,576,681	2,665,429	5,242,110
Iowa	487,542	388,855	876,397
Kansas	1,061,835	224,998	1,286,833
Kentucky	1,326,447	1,175,389	2,501,836
Louisiana	1,177,891	570,960	1,748,851
Maine	322,672	567,030	889,702
Maryland	356,635	222,253	578,888
Massachusetts	811,954	419,137	1,231,091
Michigan	1,531,191	1,031,217	2,562,408
Minnesota	983,012	874,193	1,857,205
Mississippi	1,002,981	595,828	1,598,809
Missouri	854,087	772,522	1,626,609
Montana	0	0	0
Nebraska	155,628	275,671	431,299
Nevada	35,400	7,194	42,594
New Hampshire	160,704	228,146	388,850
New Jersey	1,105,850	539,302	1,645,152
New Mexico	57,004	107,685	164,689
New York	1,576,395	1,201,303	2,777,698
North Carolina	2,462,719	2,787,676	5,250,395
North Dakota	34,220	38,663	72,883
Ohio	2,980,299	2,479,933	5,460,232
Oklahoma	229,016	207,099	436,115
Oregon	241,458	149,009	390,467
Pennsylvania	1,611,758	1,079,306	2,691,064
Puerto Rico	587,115	506,824	1,093,939
Rhode Island	252,452	37,666	290,118
South Carolina	933,420	1,204,936	2,138,356
South Dakota	40,518	76,293	116,811
Tennessee	1,542,144	1,678,459	3,220,603
Texas	3,068,301	2,573,968	5,642,269
Utah	924,137	1,181,345	2,105,482
Vermont	22,081	45,290	67,371
Virgin Islands	7,771	0	7,771
Virginia	898,918	308,862	1,207,780
Washington	650,004	170,279	820,283
West Virginia	195,418	460,393	655,811
Wisconsin	650,229	1,006,347	1,656,576
Wyoming	5	0	5
Total	50,001,255	44,516,481	94,517,736

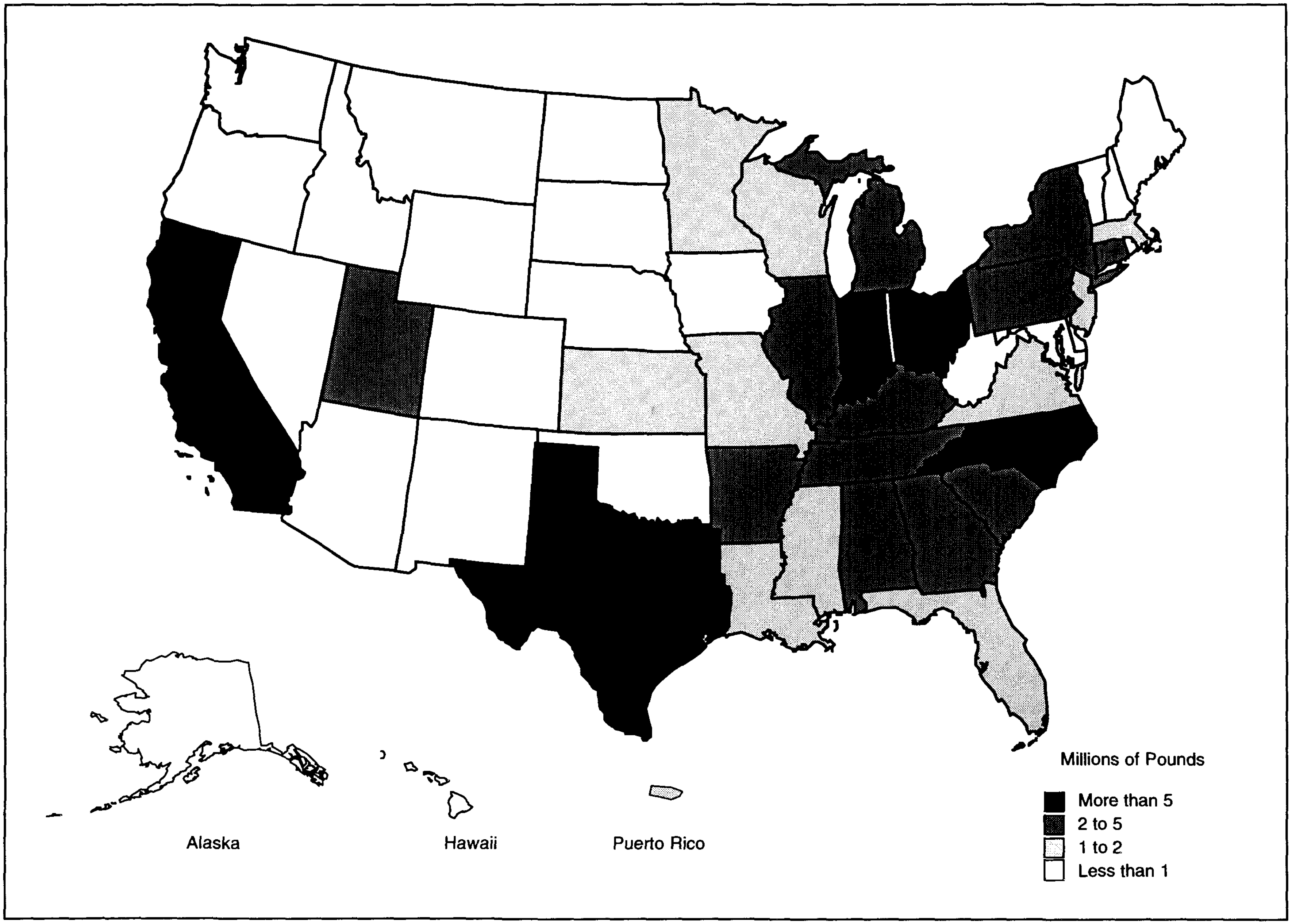


Figure 1-12. TRI Releases to Air of Ozone Depleters, by State, 1993.

Table 1-42. TRI Releases to Air of Ozone Depleters, by Industry, 1993.

SIC Code	Industry	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Total Air Emissions Pounds
20	Food	641,490	52,303	693,793
21	Tobacco	128,286	291,331	419,617
22	Textiles	602,593	178,832	781,425
23	Apparel	59,548	233,739	293,287
24	Lumber	132,843	316,993	449,836
25	Furniture	555,592	1,875,218	2,430,810
26	Paper	187,211	404,713	591,924
27	Printing	1,096,511	340,447	1,436,958
28	Chemicals	7,108,018	6,925,429	14,033,447
29	Petroleum	540,601	13,301	553,902
30	Plastics	6,728,277	6,755,051	13,483,328
31	Leather	83,807	54,596	138,403
32	Stone/Clay/Glass	109,010	310,505	419,515
33	Primary Metals	3,707,496	1,015,054	4,722,550
34	Fabr. Metals	3,676,561	4,246,766	7,923,327
35	Machinery	2,281,429	2,306,388	4,587,817
36	Electrical	2,428,889	4,637,380	7,066,269
37	Transportation Equip.	10,780,231	6,977,881	17,758,112
38	Measure./Photo.	2,711,075	3,012,446	5,723,521
39	Miscellaneous	509,289	566,912	1,076,201
	Multiple codes 20-39 (54)	5,732,574	3,870,903	9,603,477
	No codes 20-39 (55)	199,924	130,293	330,217
	Total	50,001,255	44,516,481	94,517,736

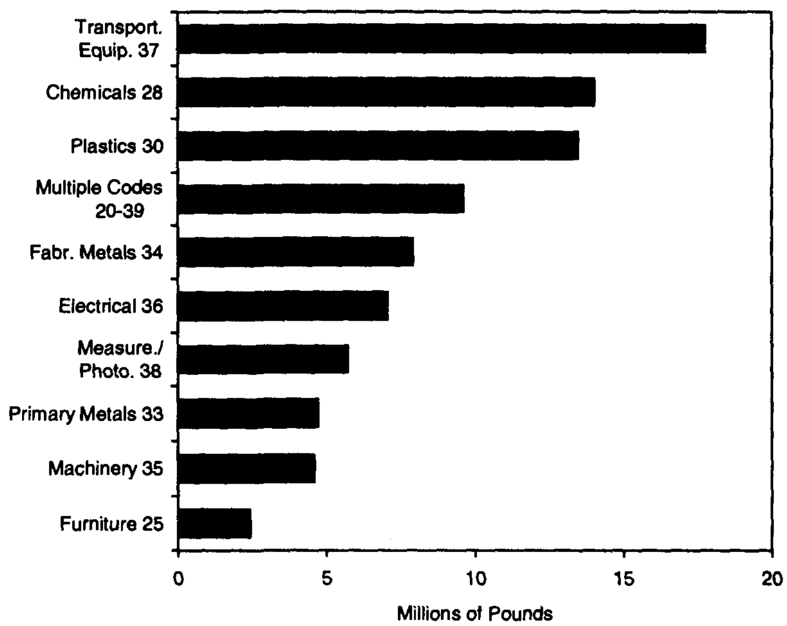


Figure 1-13. Top 10 Industries for Releases to Air of Ozone Depleters, 1993.

(54) Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

(55) Facilities/forms that did not report an SIC code or reported SIC codes outside the 20-to-39 range.

Clarification of the Basis for Carcinogen Listings on the EPCRA Section 313 List of Toxic Chemicals

Under section 313, a chemical does not have to be counted towards threshold and release calculations if it is present in a mixture below a certain concentration. This is known as the section 313 "*de minimis*" concentration in mixture. When the section 313 rule was developed, EPA adopted the *de minimis* percentages from the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standards (29 CFR 1910.1200), because much of the information the industry would have relating to chemicals in mixtures would most likely be from the material safety data sheet (MSDS) on that mixture. The OSHA *de minimis* limitation is 0.1% 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.

The *de minimis* limitation is 1.0% for chemicals that do not meet the above OSHA carcinogen criteria.

The carcinogen designation in the list of chemicals relates to any chemical that the Agency determined met the above OSHA criteria for the 0.1% *de minimis* limitation.

Box 1-5 shows the specific bases for which the individual chemical was designated as a known or suspect carcinogen.

Certain metal compound categories have two *de minimis* limitations. For example, hexavalent chromium compounds and inorganic arsenic compounds meet the OSHA carcinogen criteria, while trivalent chromium compounds and organic arsenic do not meet the OSHA criteria. As release and transfer information on these groups are not reported separately, they were not included in Tables 1-43, 1-44, and 1-45 and Figure 1-14.

Table 1-43 provides the releases to air, water, and land for known or suspect carcinogens reported to TRI. Table 1-44 is a list of total releases of known or suspect carcinogens to air, water, and land by state, and Figure 1-14 is the corresponding map illustrating reporting by state. Texas, Indiana, and North Carolina reported the largest quantities of carcinogen releases to air, water, and land.

Table 1-45 presents total releases to air, water, and land of known or suspect carcinogens by industry. The chemical industry accounts for the largest quantity of carcinogen releases to air, water, and land, about 47 million pounds or 26.1%. The plastics industry ranked second, with 36.7 million pounds. The plastics industry accounted for 20.4% of carcinogen releases to air, water, and land, although it accounted for only 5.7% of releases of all chemicals to air, water, and land. The transportation equipment industry was third with 16.6 million pounds, or 9.2%. Figure 1-15 shows the top 10 industries for releases of known or suspect carcinogens to air, water, and land.

Releases and Transfers of All TRI Chemicals

The last table provided in this chapter (Table 1-46) is an alphabetical listing of all of the TRI chemicals reported in 1993 and their associated releases and transfers.

Chemical	IARC 56	NTP 57	OSHA 58
Acetaldehyde	2B	P	--
Acetamide	2B	--	--
2-Acetylaminofluorene	--	P	Z
Acrylamide	2B	P	--
Acrylonitrile	2A	P	Z
2-Aminoanthraquinone	--	P	--
4-Aminoazobenzene	2B	--	--
4-Aminobiphenyl	1	K	Z
1-Amino-2-methylanthraquinone	--	P	--
o-Anisidine	2B	--	--
o-Anisidine hydrochloride	--	P	--
Arsenic and inorganic arsenic compounds	1	K	Z
Asbestos (friable)	1	K	Z
Benzene	1	K	--
Benzidine	1	K	Z
Benzoic trichloride	2B	P	--
Beryllium	2A	P	--
Bis(chloromethyl)ether	1	K	Z
1,3-Butadiene	2B	P	--
C.I. Direct Black 38	2A	P	--
C.I. Direct Blue 6	2A	P	--
C.I. Direct Brown 95	2A	--	--
C.I. Food Red 5	2B	--	--
C.I. Solvent Yellow 34 (Auramine)	2B	--	--
Cadmium	2A	P	--
Carbon tetrachloride	2B	P	--
Chloroform	2B	P	--
Chloromethyl methyl ether	1	K	Z
Chlorophenols	2B	--	--
Chromium (VI) compounds	1	K	--
Creosote	2A	--	--
p-Cresidine	2B	P	--
Cupferron	--	P	--
2,4-Diaminoanisole	2B	--	--
2,4-Diaminoanisole sulfate	--	P	--
4,4'-Diaminodiphenyl ether	2B	--	--
Diaminotoluene (mixed isomers)	2B	P	--
2,4-Diaminotoluene	2B	P	--
1,2-Dibromo-3-chloropropane	2B	P	Z
1,2-Dibromoethane	2A	P	--
Dichlorobenzene (mixed isomers)	2B	P	--
1,4-Dichlorobenzene	2B	P	--
3,3'-Dichlorobenzidene	2B	P	Z
1,2-Dichloroethane	2B	P	--
Dichloromethane	2B	P	--
1,3-Dichloropropylene	2B	P	--
Diepoxybutane	2B	P	--
Di-(2-ethylhexyl)phthalate	2B	P	--
Diethyl sulfate	2A	P	--
3,3'-Dimethoxybenzidine	2B	P	--
4-Dimethylaminoazobenzene	2B	P	Z
3,3'-Dimethylbenzidine	2B	P	--
Dimethylcarbamyl chloride	2A	P	--
1,1-Dimethylhydrazine	2B	P	--
Dimethyl sulfate	2A	P	--
1,4-Dioxane	2B	P	--
1,2-Diphenylhydrazine	--	P	--
Epichlorohydrin	2A	P	--
Ethyl acrylate	2B	P	--
Ethyleneimine	--	--	Z
Ethylene oxide	2A	P	Z
Ethylene thiourea	2B	P	--
Formaldehyde	2A	P	--

Box 1-5. Basis of OSHA Carcinogen Listing for Individual Chemicals.

Chemical	IARC[56]	NTP[57]	OSHA[58]
Hexachlorobenzene	2B	P	--
Hexamethylphosphoramide	2B	P	--
Hydrazine	2B	P	--
Hydrazine sulfate	--	P	--
Lead and inorganic lead compounds	2B	--	Z
Lindane	2B	P	--
4,4-Methylenebis (2-chloroaniline)	2A	P	--
4,4'-Methylenebis (N,N-dimethyl) benzeneamine	2B	P	--
4,4'-Methylenedianiline	2B	P	--
Michler's ketone	--	P	--
Mustard gas	1	K	--
alpha-Naphthylamine	--	--	Z
beta-Naphthylamine	1	K	Z
Nickel	2B	P	--
Nickel compounds	1	P[59]	--
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-Nitrosomethylvinylamine	2B	P	--
N-Nitrosomorpholine	2B	P	--
N-Nitroso-N-ethylurea	2A	P	--
N-Nitroso-N-methylurea	2A	P	--
N-Nitrosonornicotine	2B	P	--
N-Nitrosopiperidine	2B	P	--
Polybrominated biphenyls (PBBs)	2B	P	--
Polychlorinated biphenyls (PCBs)	2A	P	--
Propane sultone	2B	P	--
beta-Propiolactone	2B	P	Z
Propyleneimine	2B	P	--
Propylene oxide	2A	P	--
Saccharin (manufacturing)	2B	P	--
Safrole	2B	P	--
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	--
2,4,6-Trichlorophenol	2B	P	--
Tris(2,3-dibromopropyl)phosphate	2A	P	--
Urethane	2B	P	--
Vinyl bromide	2A	--	--
Vinyl chloride	1	K	Z

Box 1-5. Basis of OSHA Carcinogen Listing for Individual Chemicals, Continued.

[56] 1: The chemical is carcinogenic to humans; 2A: The chemical is probably carcinogenic to humans; 2B: The chemical is possibly carcinogenic to humans.

[57] K: The chemical is known to be carcinogenic; P: The chemical may reasonably be anticipated to be carcinogenic.

[58] Z: The chemical appears at 29 CFR Part 1910 Subpart Z.

[59] Certain nickel compounds.

Table 1-43. TRI Releases of Known or Suspect Carcinogens to Air, Water, and Land, 1993 (Alphabetically Ordered).

CAS Number(60)	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
75-07-0	Acetaldehyde	6,507,137	35,127	951	6,543,215
60-35-5	Acetamide	15	1	0	16
79-06-1	Acrylamide	28,558	2,261	168	30,987
107-13-1	Acrylonitrile	1,393,618	3,078	6,934	1,403,630
60-09-3	4-Aminoazobenzene	1	0	0	1
92-67-1	4-Aminobiphenyl	0	0	0	0
90-04-0	o-Anisidine	877	81	116	1,074
7440-38-2	Arsenic	33,988	1,643	311,263	346,894
1332-21-4	Asbestos (friable)	8,383	255	537,783	546,421
71-43-2	Benzene	10,799,125	18,793	27,515	10,845,433
92-87-5	Benzidine	16	0	0	16
98-07-7	Benzoic trichloride	6,135	0	0	6,135
7440-41-7	Beryllium	903	24	14,594	15,521
542-88-1	Bis(chloromethyl) ether	255	0	0	255
106-99-0	1,3-Butadiene	3,274,316	7,595	350	3,282,261
7440-43-9	Cadmium	15,290	412	56,665	72,367
56-23-5	Carbon tetrachloride	2,228,909	1,453	79	2,230,441
67-66-3	Chloroform	13,808,692	451,362	32,926	14,292,980
107-30-2	Chloromethyl methyl ether	2,241	5	0	2,246
—	Chlorophenols	9,906	34	0	9,940
7440-47-3	Chromium	426,198	21,960	1,157,200	1,605,358
8001-58-9	Creosote	1,152,129	8,039	1,528	1,161,696
120-71-8	p-Cresidine	410	5	85	500
135-20-6	Cupferron	59	0	0	59
615-05-4	2,4-Diaminoanisole	13	0	0	13
101-80-4	4,4'-Diaminodiphenyl ether	119	2,137	5	2,261
25376-45-8	Diaminotoluene (mixed isomers)	17,364	989	113	18,466
95-80-7	2,4-Diaminotoluene	1,790	0	0	1,790
106-93-4	1,2-Dibromoethane	25,199	80	254	25,533
25321-22-6	Dichlorobenzene (mixed isomers)	6,886	0	30	6,916
106-46-7	1,4-Dichlorobenzene	357,891	1,265	1,112	360,268
91-94-1	3,3'-Dichlorobenzidine	10	0	0	10
107-06-2	1,2-Dichloroethane	2,304,877	6,806	303	2,311,986
75-09-2	Dichloromethane	64,313,211	62,909	78,267	64,454,387
542-75-6	1,3-Dichloropropylene	33,164	2	0	33,166
117-81-7	Di-(2-ethylhexyl) phthalate	578,940	1,118	92,887	672,945
64-67-5	Diethyl sulfate	22,016	5	5	22,026
119-90-4	3,3'-Dimethoxybenzidine	0	4	0	4
57-14-7	1,1-Dimethyl hydrazine	194	0	0	194
77-78-1	Dimethyl sulfate	5,755	0	5	5,760
123-91-1	1,4-Dioxane	434,017	477,896	2,236	914,149
106-89-8	Epichlorohydrin	384,132	3,642	2,356	390,130

Table 1-43. TRI Releases of Known or Suspect Carcinogens to Air, Water, and Land, 1993 (Alphabetically Ordered), Continued.

CAS Number[60]	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air/ Water/Land Releases Pounds
140-88-5	Ethyl acrylate	186,391	1,200	21	187,612
151-56-4	Ethyleneimine	0	0	0	0
75-21-8	Ethylene oxide	1,147,222	2,634	11,222	1,161,078
96-45-7	Ethylene thiourea	270	0	0	270
50-00-0	Formaldehyde	11,371,021	418,503	418,220	12,207,744
118-74-1	Hexachlorobenzene	636	476	0	1,112
302-01-2	Hydrazine	16,452	784	5	17,241
10034-93-2	Hydrazine sulfate	1	0	0	1
7439-92-1	Lead	695,894	24,575	3,336,155	4,056,624
58-89-9	Lindane	575	0	5	580
101-14-4	4,4'-Methylenebis (2-chloroaniline)	15	0	0	15
101-77-9	4,4'-Methylenedianiline	18,274	291	135	18,700
90-94-8	Michler's ketone	1,542	0	0	1,542
134-32-7	alpha-Naphthylamine	10	0	0	10
7440-02-0	Nickel	321,926	38,098	427,911	787,935
—	Nickel compounds	178,880	56,096	2,864,701	3,099,677
139-13-9	Nitrilotriacetic acid	12	6,442	0	6,454
79-46-9	2-Nitropropane	48,328	1,200	0	49,528
—	Polybrominated biphenyls	0	0	0	0
1336-36-3	Polychlorinated biphenyls (PCBs)	0	0	265	265
1120-71-4	Propane sultone	250	0	0	250
75-55-8	Propyleneimine	339	0	0	339
75-56-9	Propylene oxide	1,123,896	6,390	6,197	1,136,483
81-07-2	Saccharin (manufacturing)	301	0	0	301
100-42-5	Styrene	32,570,591	28,274	177,580	32,776,445
96-09-3	Styrene oxide	344	0	0	344
127-18-4	Tetrachloroethylene	10,942,019	10,152	618,026	11,570,197
62-56-6	Thiourea	1,372	2,611	288	4,271
584-84-9	Toluene-2,4-diisocyanate	58,869	0	0	58,869
91-08-7	Toluene-2,6-diisocyanate	6,695	0	0	6,695
26471-62-5	Toluenediisocyanate (mixed isomers)	42,223	0	288	42,511
95-53-4	o-Toluidine	18,401	1,266	7	19,674
88-06-2	2,4,6-Trichlorophenol	69	56	0	125
51-79-6	Urethane	12,200	0	0	12,200
593-60-2	Vinyl bromide	1,657	0	0	1,657
75-01-4	Vinyl chloride	1,013,962	277	6	1,014,245
	Subtotal	167,963,376	1,708,306	10,186,762	179,858,444
	Total for All TRI Chemicals	1,672,127,735	271,152,864	289,052,581	2,232,333,180

[60] Compound categories do not have CAS numbers (—).

Table 1-44. TRI Air, Water, and Land Releases of Carcinogens, by State, 1993.

State	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air Water/Land Releases Pounds
Alabama	5,962,215	66,858	65,795	6,094,868
Alaska	424,500	59,878	257	484,635
American Samoa	0	0	0	0
Arizona	385,525	1	832,150	1,217,676
Arkansas	1,711,750	13,554	906,154	2,631,458
California	6,109,824	9,924	16,312	6,136,060
Colorado	530,481	275	1,993	532,749
Connecticut	2,880,469	264,573	227,395	3,372,437
Delaware	565,400	750	249	566,399
Florida	4,504,298	12,180	4,178	4,520,656
Georgia	5,231,249	26,557	48,977	5,306,783
Hawaii	63,519	0	5	63,524
Idaho	180,469	750	13	181,232
Illinois	5,591,277	13,348	375,787	5,980,412
Indiana	14,452,575	8,346	206,774	14,667,695
Iowa	1,963,754	2,989	62,533	2,029,276
Kansas	2,342,760	1,244	15,537	2,359,541
Kentucky	3,185,247	30,216	55,803	3,271,266
Louisiana	4,611,969	104,817	1,349,396	6,066,182
Maine	1,038,156	10,439	251	1,048,846
Maryland	907,925	5,627	459,354	1,372,906
Massachusetts	1,316,720	2,340	23,771	1,342,831
Michigan	5,042,507	15,139	227,569	5,285,215
Minnesota	2,788,712	8,085	48,394	2,845,191
Mississippi	6,653,767	20,933	44,554	6,719,254
Missouri	2,888,721	5,549	2,413,207	5,307,477
Montana	256,547	782	28,639	285,968
Nebraska	652,458	855	11,623	664,936
Nevada	21,005	0	552	21,557
New Hampshire	420,934	14,615	4,918	440,467
New Jersey	1,369,496	11,549	104,402	1,485,447
New Mexico	88,511	3	1,255	89,769
New York	5,626,225	292,490	25,084	5,943,799
North Carolina	10,199,503	50,919	9,097	10,259,519
North Dakota	117,309	509	1	117,819
Ohio	9,136,467	24,629	446,739	9,607,835
Oklahoma	1,837,895	1,720	8,920	1,848,535
Oregon	1,799,951	8,262	1,195,656	3,003,869
Pennsylvania	6,768,360	27,466	280,811	7,076,637
Puerto Rico	4,381,755	0	2,989	4,384,744
Rhode Island	148,596	6	0	148,602
South Carolina	5,422,134	99,431	25,077	5,546,642
South Dakota	124,806	5	0	124,811
Tennessee	4,660,954	95,055	47,047	4,803,056
Texas	19,700,288	75,225	238,486	20,013,999
Utah	1,279,262	15	20,312	1,299,589
Vermont	17,028	250	255	17,533
Virgin Islands	113,529	978	1,530	116,037
Virginia	4,046,389	17,132	60,955	4,124,476
Washington	2,832,307	263,155	3,747	3,099,209
West Virginia	2,834,130	23,866	72,310	2,930,306
Wisconsin	2,739,695	15,012	188,039	2,942,746
Wyoming	34,053	5	21,910	55,968
Total	167,963,376	1,708,306	10,186,762	179,858,444

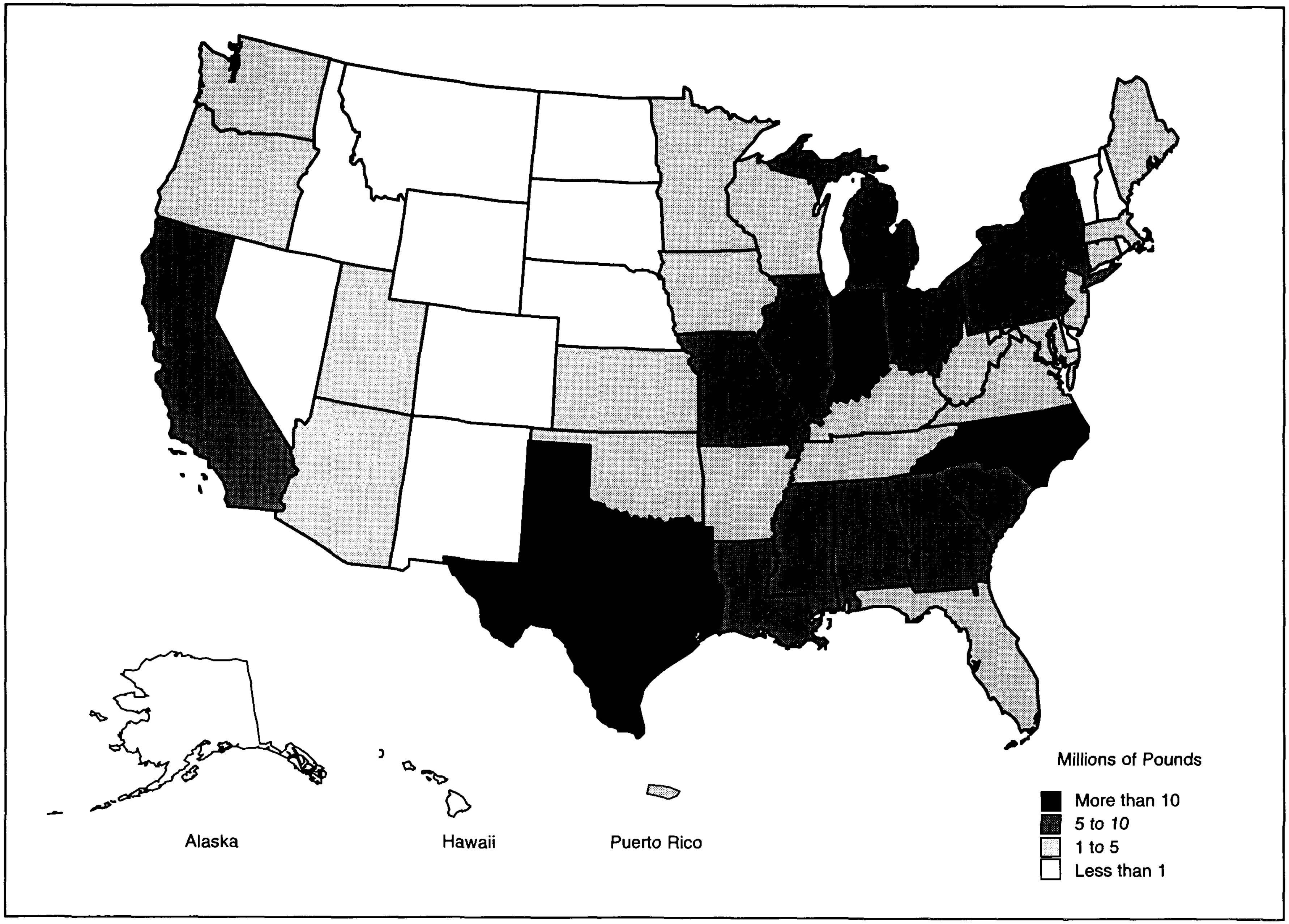


Figure 1-14. TRI Total Air, Water, and Land Releases of Carcinogens by State, 1993.

Table 1-45. TRI Air/Water/Land Releases of Carcinogens, by Industry, 1993.

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds	Total Air Water/Land Releases Pounds
20	Food	765,201	315	24,260	789,776
21	Tobacco	0	0	0	0
22	Textiles	1,140,306	965	294	1,141,565
23	Apparel	97,234	0	0	97,234
24	Lumber	4,757,418	14,848	2,444	4,774,710
25	Furniture	976,561	201	48	976,810
26	Paper	14,921,552	343,562	38,105	15,303,219
27	Printing	289,719	0	98	289,817
28	Chemicals	44,427,860	724,639	1,812,567	46,965,066
29	Petroleum	5,277,971	31,979	77,262	5,387,212
30	Plastics	36,580,479	902	148,377	36,729,758
31	Leather	129,957	250	7,256	137,463
32	Stone/Clay/Glass	3,649,392	5,372	418,842	4,073,606
33	Primary Metals	4,419,248	63,370	7,321,811	11,804,429
34	Fabr. Metals	5,459,257	12,124	69,582	5,540,963
35	Machinery	2,530,510	1,781	30,982	2,563,273
36	Electrical	3,540,007	1,491	24,021	3,565,519
37	Transportation Equip.	16,523,768	11,003	21,583	16,556,354
38	Measure./Photo.	5,704,231	280,906	1,402	5,986,539
39	Miscellaneous	1,711,860	498	3,620	1,715,978
	Multiple codes 20-39 (61)	14,454,478	214,082	184,196	14,852,756
	No codes 20-39 (62)	606,367	18	12	606,397
	Total	167,963,376	1,708,306	10,186,762	179,858,444

(61) Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].
(62) Facilities/forms that did not report an SIC code or reported SIC codes outside the 20-to-39 range.

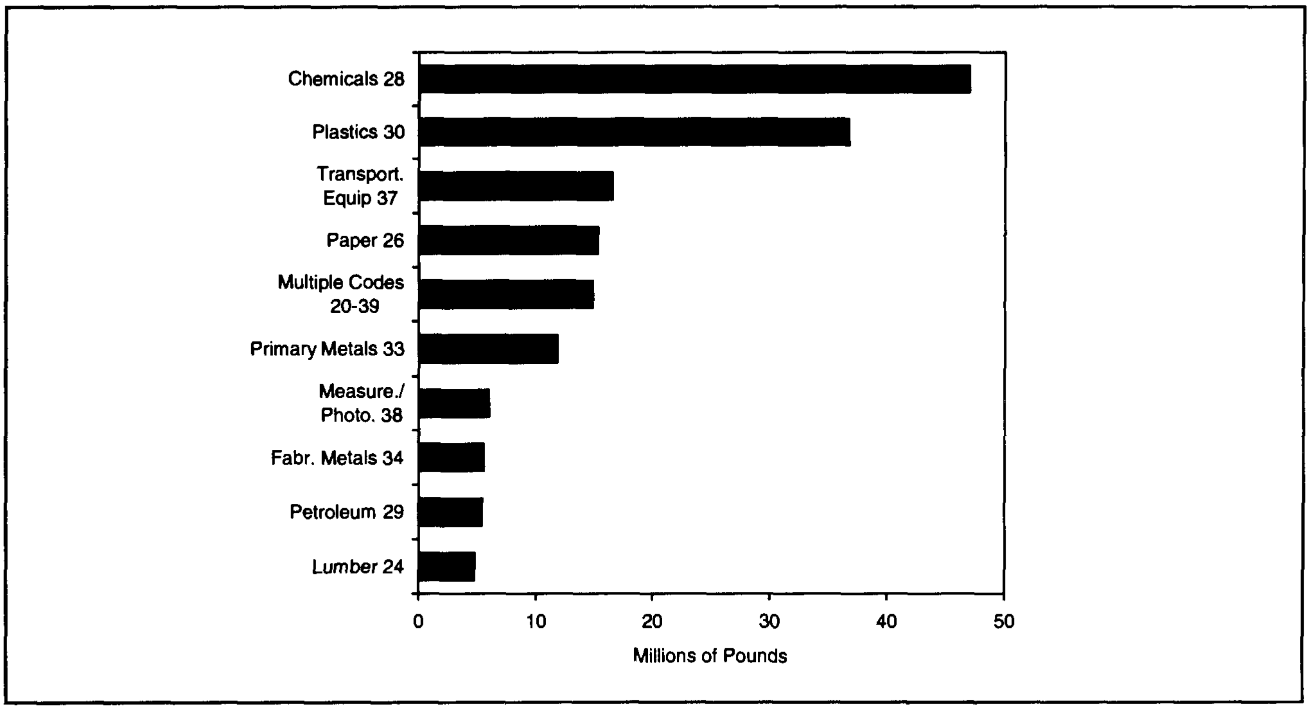


Figure 1-15. Top 10 Industries for Air/Water/Land Releases of Carcinogens, 1993.[63]

[63] Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

Table 1-46. Releases and Transfers of All TRI Chemicals, 1993 (Alphabetically Ordered).

CAS Number[64]	Chemical	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
75-07-0	Acetaldehyde	103	1,692,021	4,815,116	35,127	2,623,334	951	9,166,549
60-35-5	Acetamide	4	7	8	1	1,089,000	0	1,089,016
67-64-1	Acetone	2,511	69,220,768	55,931,694	990,315	3,250,160	472,427	129,865,364
75-05-8	Acetonitrile	78	723,924	336,272	15,283	15,707,895	18	16,783,392
107-02-8	Acrolein	15	10,744	12,022	0	102,335	0	125,101
79-06-1	Acrylamide	77	24,241	4,317	2,261	4,010,509	168	4,041,496
79-10-7	Acrylic acid	184	339,715	257,536	1,528	3,507,000	125	4,105,904
107-13-1	Acrylonitrile	118	344,718	1,048,900	3,078	3,823,381	6,934	5,227,011
107-18-6	Allyl alcohol	24	50,853	16,925	8,690	192,966	0	269,434
107-05-1	Allyl chloride	19	75,867	30,573	0	0	2	106,442
7429-90-5	Aluminum (fume or dust)	285	286,116	2,085,587	36,376	11	919,519	3,327,609
1344-28-1	Aluminum oxide (fibrous forms)	55	84,283	17,477	435	0	75,628	177,823
60-09-3	4-Aminoazobenzene	1	0	1	0	370	0	371
92-67-1	4-Aminobiphenyl	1	0	0	0	3	0	3
7664-41-7	Ammonia	3,096	35,439,303	102,617,862	35,938,643	168,725,501	10,144,184	352,865,493
6484-52-2	Ammonium nitrate (solution)	219	178,946	1,099,038	7,386,387	35,211,208	6,457,512	50,333,091
7783-20-2	Ammonium sulfate (solution)	248	12,029	82,386	3,872,980	6,189,894	2,184,322	12,341,611
62-53-3	Aniline	72	232,358	196,005	4,588	1,365,557	1,381	1,799,889
90-04-0	o-Anisidine	7	865	12	81	0	116	1,074
104-94-9	p-Anisidine	2	5	7	5	0	5	22
120-12-7	Anthracene	81	21,733	48,887	589	0	7,150	78,359
7440-36-0	Antimony	134	3,529	15,732	10,074	0	81,779	111,114
—	Antimony compounds	503	33,011	55,372	27,324	3,707	878,961	998,375
7440-38-2	Arsenic	100	2,492	31,496	1,643	0	311,263	346,894
—	Arsenic compounds	306	8,845	84,494	5,756	52,000	2,250,594	2,401,689
1332-21-4	Asbestos (friable)	94	3,899	4,484	255	0	537,783	546,421
7440-39-3	Barium	65	68,179	31,880	5,259	0	291,141	396,459
—	Barium compounds	990	242,514	406,128	73,311	2,491	2,610,562	3,335,006
98-87-3	Benzal chloride	3	322	11	0	0	0	333
71-43-2	Benzene	469	6,712,433	4,086,692	18,793	363,660	27,515	11,209,093
92-87-5	Benzidine	1	16	0	0	0	0	16
98-07-7	Benzoic trichloride	3	5,907	228	0	0	0	6,135
98-88-4	Benzoyl chloride	19	11,339	2,147	0	0	11	13,497
94-36-0	Benzoyl peroxide	57	744	1,250	5	0	2,070	4,069
100-44-7	Benzyl chloride	48	14,196	6,933	41	35	61	21,266
7440-41-7	Beryllium	9	3	900	24	0	14,594	15,521
—	Beryllium compounds	8	2	361	4	0	8,087	8,454
92-52-4	Biphenyl	146	614,887	137,550	4,673	46,966	6,803	810,879
111-44-4	Bis(2-chloroethyl) ether	12	12,783	408	6	0	0	13,197
542-88-1	Bis(chloromethyl) ether	2	5	250	0	0	0	255
108-60-1	Bis(2-chloro-1-methyl-ethyl)ether	2	2,670	2,886	3,000	0	84	8,640
103-23-1	Bis(2-ethylhexyl) adipate	142	149,425	294,018	887	0	183,541	627,871
353-59-3	Bromochlorodifluoro-methane (Halon 1211)	11	6,248	3,025	0	0	0	9,273
74-83-9	Bromomethane	50	641,088	2,538,074	760	1,100	0	3,181,022
75-63-8	Bromotrifluoromethane (Halon 1301)	13	39,077	1,808	0	0	0	40,885
106-99-0	1,3-Butadiene	175	2,219,657	1,054,659	7,595	1,000	350	3,283,261
141-32-2	Butyl acrylate	167	158,778	160,384	774	0	52	319,988
71-36-3	n-Butyl alcohol	1,152	6,792,330	22,002,423	57,472	1,942,044	17,057	30,811,326
78-92-2	sec-Butyl alcohol	110	209,498	492,870	4,724	0	9	707,101
75-65-0	tert-Butyl alcohol	68	1,207,843	435,984	174,289	305,700	349	2,124,165
85-68-7	Butyl benzyl phthalate	176	89,830	266,510	657	83	2,938	360,018
106-88-7	1,2-Butylene oxide	15	14,297	6,019	26	0	0	20,342
123-72-8	Butyraldehyde	30	170,227	168,053	559	189,447	8,606	536,892
569-64-2	C.I. Basic Green 4	3	0	5	0	0	0	5
989-38-8	C.I. Basic Red 1	2	0	0	0	0	0	0

Table 1-46.

Chemical	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[65] Pounds	Total Transfers Pounds
Acetaldehyde	8,600	226,932	212,800	270,561	1,211	0	720,104
Acetamide	0	0	889	0	0	0	889
Acetone	16,307,782	51,430,246	11,805,568	8,298,215	533,984	27,452	88,403,247
Acetonitrile	1,934,210	5,648,422	4,487,047	471,530	156,291	0	12,697,500
Acrolein	0	8,152	8	0	0	0	8,160
Acrylamide	171	57,337	78,461	85,857	6,623	0	228,449
Acrylic acid	62,354	7,922,205	243,914	37,546	40,274	47	8,306,340
Acrylonitrile	0	784,832	769,225	201,949	15,285	0	1,771,291
Allyl alcohol	0	141,420	114,900	141,402	65,127	0	462,849
Allyl chloride	0	8,121	459,481	14	149	0	467,765
Aluminum (fume or dust)	68,565,992	178,718	96,722	7,123	6,890,687	255	75,739,497
Aluminum oxide (fibrous forms)	2,315,286	1,677	52,367	781	1,532,051	0	3,902,162
4-Aminoazobenzene	0	0	0	0	0	0	0
4-Aminobiphenyl	0	0	0	0	0	0	0
Ammonia	9,822,551	30,349	6,452,196	72,597,087	12,977,756	750	101,880,689
Ammonium nitrate (solution)	603,690	0	33,294	4,767,098	2,867,117	0	8,271,199
Ammonium sulfate (solution)	1,415,800	0	5,076,407	31,195,284	2,901,806	0	40,589,297
Aniline	3,400	931,875	540,052	1,483,800	400,262	0	3,359,389
o-Anisidine	0	0	0	0	0	0	0
p-Anisidine	0	0	0	2	0	0	2
Anthracene	9,151	139,833	20,603	609	66,249	0	236,445
Antimony	4,021,535	1,932	4,962	31,194	209,724	0	4,269,347
Antimony compounds	1,971,564	33,443	277,170	67,774	2,762,291	254	5,112,496
Arsenic	266,124	25	85,479	353	134,851	0	486,832
Arsenic compounds	305,484	8	659,663	683	2,728,552	250	3,694,640
Asbestos (friable)	0	0	94,250	757	5,294,318	0	5,389,325
Barium	45,113	90	3,116	4,528	394,093	0	446,940
Barium compounds	1,549,902	216,268	2,606,833	342,594	10,569,706	250	15,285,553
Benzal chloride	0	44,000	0	0	0	0	44,000
Benzene	1,101,028	1,094,354	1,764,985	308,621	90,863	0	4,359,851
Benzidine	0	0	0	0	0	0	0
Benzoic trichloride	0	0	251	0	0	0	251
Benzoyl chloride	0	4,906	956,298	400	250	0	961,854
Benzoyl peroxide	5,050	2,842	9,141	19,504	11,966	0	48,503
Benzyl chloride	0	310,991	485	11,106	210	0	322,792
Beryllium	121,104	0	539	0	4,619	0	126,262
Beryllium compounds	31,655	0	883	0	2,359	0	34,897
Biphenyl	134,519	354,373	159,788	794,830	31,969	0	1,475,479
Bis(2-chloroethyl) ether	170,971	100	10,381	7,089	180	0	188,721
Bis(chloromethyl) ether	0	0	0	0	2	0	2
Bis(2-chloro-1-methyl-ethyl)ether	0	0	0	0	0	0	0
Bis(2-ethylhexyl) adipate	164,476	164,269	18,125	12,413	528,190	0	887,473
Bromochlorodifluoro-methane (Halon 1211)	0	0	0	0	0	0	0
Bromomethane	0	3,300	500	0	5	0	3,805
Bromotrifluoromethane (Halon 1301)	0	0	0	0	0	0	0
1,3-Butadiene	7,473,983	6,574	102,713	8,439	4,893	0	7,596,602
Butyl acrylate	67,843	77,856	80,493	114,605	69,966	0	410,763
n-Butyl alcohol	2,231,523	9,165,824	1,766,836	1,519,267	314,789	24,501	15,022,740
sec-Butyl alcohol	62,960	5,305,314	37,466	45,684	155,290	0	5,606,714
tert-Butyl alcohol	18,324	30,784,513	649,218	1,075,164	274,832	0	32,802,051
Butyl benzyl phthalate	156,548	114,767	193,712	17,171	1,972,538	0	2,454,736
1,2-Butylene oxide	0	373,210	16	0	0	0	373,226
Butyraldehyde	450	479,072	7,079	132,237	1,716	0	620,554
C.I. Basic Green 4	0	0	499	83	0	0	582
C.I. Basic Red 1	0	230	0	24	670	0	924

Table 1-46. Releases and Transfers of All TRI Chemicals, 1993 (Alphabetically Ordered), Continued.

CAS Number	Chemical	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
2832-40-8	C.I. Disperse Yellow 3	2	399	0	28	0	9,199	9,626
81-88-9	C.I. Food Red 15	2	0	1	0	0	0	1
97-56-3	C.I. Solvent Yellow 3	1	0	0	0	0	0	0
7440-43-9	Cadmium	52	2,031	13,259	412	0	56,665	72,367
—	Cadmium compounds	125	7,443	39,401	652	977	66,699	115,172
156-62-7	Calcium cyanamide	6	0	5	0	0	5	10
133-06-2	Captan	16	1,896	4,775	5	0	5	6,681
63-25-2	Carbaryl	22	3,024	5,947	15	0	265	9,251
75-15-0	Carbon disulfide	81	3,333,231	89,974,108	34,169	2,805	8	93,344,321
56-23-5	Carbon tetrachloride	74	585,481	1,643,428	1,453	34,332	79	2,264,773
463-58-1	Carbonyl sulfide	37	8,998	12,780,099	0	0	0	12,789,097
120-80-9	Catechol	121	578	1,572	52,798	0	4,606	59,554
57-74-9	Chlordane	1	51	0	15	0	0	66
7782-50-5	Chlorine	1,504	1,284,028	74,126,080	675,121	120,758	49,012	76,254,999
10049-04-4	Chlorine dioxide	132	27,090	1,537,027	251	0	0	1,564,368
79-11-8	Chloroacetic acid	29	5,788	767	8,719	0	750	16,024
108-90-7	Chlorobenzene	71	1,032,928	1,015,531	3,511	71,000	678	2,123,648
75-00-3	Chloroethane	53	1,237,605	1,441,896	2,231	110	33	2,681,875
67-66-3	Chloroform	175	4,488,694	9,319,998	451,362	38,039	32,926	14,331,019
74-87-3	Chloromethane	94	1,217,748	4,095,061	59,565	93,947	266	5,466,587
107-30-2	Chloromethyl methyl ether	4	20	2,221	5	0	0	2,246
—	Chlorophenols	6	1,964	7,942	34	106,436	0	116,376
126-99-8	Chloroprene	14	191,316	799,794	47	29,000	3,018	1,023,175
1897-45-6	Chlorothalonil	21	1,295	4,920	9	0	250	6,474
7440-47-3	Chromium	1,693	288,532	137,666	21,960	269	1,157,200	1,605,627
	Chromium compounds	1,414	118,238	285,978	228,475	42,493	22,675,748	23,350,932
7440-48-4	Cobalt	235	18,035	15,788	7,283	0	15,843	56,949
—	Cobalt compounds	204	6,160	20,341	96,644	2,375	107,786	233,306
7440-50-8	Copper	2,458	280,578	918,155	43,389	22,927	1,475,614	2,740,663
—	Copper compounds	1,435	4,000,737	3,200,332	92,540	228,924	40,082,409	47,604,942
8001-58-9	Creosote	93	433,801	718,328	8,039	0	1,528	1,161,696
120-71-8	p-Cresidine	5	285	125	5	0	85	500
1319-77-3	Cresol (mixed isomers)	118	201,711	323,764	2,931	903,402	1,431	1,433,239
108-39-4	m-Cresol	20	30,178	5,958	626	520,000	0	556,762
95-48-7	o-Cresol	22	13,201	153,999	158	560,000	122	727,480
106-44-5	p-Cresol	21	21,473	3,831	293	262,000	24	287,621
98-82-8	Cumene	236	1,238,681	1,300,413	1,148	17,062	950	2,558,254
80-15-9	Cumene hydroperoxide	38	74,360	18,096	196	380,000	4,271	476,923
135-20-6	Cupferron	2	28	31	0	0	0	59
—	Cyanide compounds	252	56,544	842,184	97,666	2,288,870	6,043	3,291,307
110-82-7	Cyclohexane	336	4,603,824	5,494,004	26,842	260,344	10,218	10,395,232
94-75-7	2,4-D (acetic acid)	27	5,589	3,213	184	750	55	9,791
1163-19-5	Decabromodiphenyl oxide	126	23,358	179,502	2,181	39	504,841	709,921
615-05-4	2,4-Diaminoanisole	1	0	13	0	0	0	13
101-80-4	4,4'-Diaminodiphenyl ether	5	8	111	2,137	0	5	2,261
25376-45-8	Diaminotoluene (mixed isomers)	12	12,501	4,863	989	28,000	113	46,466
95-80-7	2,4-Diaminotoluene	4	263	1,527	0	0	0	1,790
132-64-9	Dibenzofuran	44	16,336	11,843	10	0	911	29,100
106-93-4	1,2-Dibromoethane	19	17,439	7,760	80	26	254	25,559
84-74-2	Dibutyl phthalate	128	107,292	80,619	3,593	140,000	1,000	332,504
25321-22-6	Dichlorobenzene (mixed isomers)	8	475	6,411	0	1	30	6,917
95-50-1	1,2-Dichlorobenzene	30	168,572	175,132	2,174	14,000	6,947	366,825
541-73-1	1,3-Dichlorobenzene	7	1,339	8,682	139	0	0	10,160
106-46-7	1,4-Dichlorobenzene	22	95,363	262,528	1,265	2,000	1,112	362,268
91-94-1	3,3'-Dichlorobenzidine	5	5	5	0	0	0	10
75-27-4	Dichlorobromomethane	1	180	0	0	0	0	180
75-71-8	Dichlorodifluoromethane (CFC-12)	282	4,845,914	2,521,594	14,186	1	100	7,381,795
107-06-2	1,2-Dichloroethane	76	614,195	1,690,682	6,806	5,198	303	2,317,184

Table 1-46, Continued.

Chemical	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers(65) Pounds	Total Transfers Pounds
C.I. Disperse Yellow 3	0	0	0	3,150	1,658	0	4,808
C.I. Food Red 15	0	0	0	1,100	0	0	1,100
C.I. Solvent Yellow 3	0	0	0	0	0	0	0
Cadmium	709,561	0	34,162	2,156	42,434	0	788,313
Cadmium compounds	1,471,988	1,142	157,551	2,788	3,138,540	0	4,772,009
Calcium cyanamide	0	0	0	0	0	0	0
Captan	0	0	6,184	29	2,436	0	8,649
Carbaryl	0	0	18,834	1	16,031	0	34,866
Carbon disulfide	5,098	248,766	64,510	226,215	1,329	0	545,918
Carbon tetrachloride	111,626	4,109	920,808	1,675	121,363	0	1,159,581
Carbonyl sulfide	0	0	0	0	0	0	0
Catechol	0	33,825	6,151	64,122	841	0	104,939
Chlordane	0	0	11	51	0	0	62
Chlorine	1,413,177	10,514	318,102	866,133	15,866	0	2,623,792
Chlorine dioxide	0	0	0	880	0	0	880
Chloroacetic acid	0	400	1,026	1,433	793	0	3,652
Chlorobenzene	1,401,667	643,725	2,612,970	8,558	4,965	0	4,671,885
Chloroethane	161,718	21,933	395,391	255	0	0	579,297
Chloroform	435,332	69,463	1,821,397	603,115	73,348	0	3,002,655
Chloromethane	0	57,355	163,661	3,442	1,446	0	225,904
Chloromethyl methyl ether	0	0	0	0	70	0	70
Chlorophenols	0	0	36,088	279	751	0	37,118
Chloroprene	500,444	121,297	200,869	18,506	5,295	0	846,411
Chlorothalonil	625	0	3,632	281	206,386	0	210,924
Chromium	82,208,414	3,582	857,598	86,085	6,802,575	63,774	90,022,028
Chromium compounds	41,866,804	27,479	16,558,993	357,376	10,638,488	25,443	69,474,583
Cobalt	6,859,454	0	33,759	16,801	133,125	23,014	7,066,153
Cobalt compounds	2,022,301	517	74,904	22,785	498,888	0	2,619,395
Copper	464,081,201	27,043	761,168	149,862	6,127,156	124,314	471,270,744
Copper compounds	120,508,266	59,283	2,938,449	217,399	11,941,318	173,820	135,838,535
Creosote	291,667	666,038	449,178	11,507	2,003,819	0	3,422,209
p-Cresidine	0	0	1,400	28,223	0	0	29,623
Cresol (mixed isomers)	155,838	383,627	164,844	46,325	25,072	1,000	776,706
m-Cresol	270,000	9,373	51,380	9,654	15,386	0	355,793
o-Cresol	0	7,205	11,706	40,942	6,632	0	66,485
p-Cresol	160,000	79,736	23,124	868,509	8,086	0	1,139,455
Cumene	90,372	879,065	83,250	69,289	12,089	0	1,134,065
Cumene hydroperoxide	0	706	4,316	592	15,687	0	21,301
Cupferron	0	0	2,300	56	0	0	2,356
Cyanide compounds	24,600	2,008	325,721	99,903	149,034	500	601,766
Cyclohexane	1,385,099	2,841,058	814,171	12,103	20,237	0	5,072,668
2,4-D (acetic acid)	0	0	51,521	574	18,728	0	70,823
Decabromodiphenyl oxide	25,105	8,129	27,720	202,671	836,895	0	1,100,520
2,4-Diaminoanisole	0	0	0	0	0	0	0
4,4'-Diaminodiphenyl ether	0	0	23,548	7	119	0	23,674
Diaminotoluene (mixed isomers)	0	376,100	479,489	58,575	1,646	0	915,810
2,4-Diaminotoluene	0	0	57,902	0	0	0	57,902
Dibenzofuran	3,609	19,988	751	505	30,141	0	54,994
1,2-Dibromoethane	1	255	502,946	0	67	0	503,269
Dibutyl phthalate	12,896	200,186	117,522	8,948	74,055	70	413,677
Dichlorobenzene (mixed isomers)	0	14,828	14,540	0	0	0	29,368
1,2-Dichlorobenzene	3,145,376	404,460	1,528,689	30,791	99,113	0	5,208,429
1,3-Dichlorobenzene	6,764	450	5,048	1,537	0	0	13,799
1,4-Dichlorobenzene	6,278	0	102,521	3,631	213	0	112,643
3,3'-Dichlorobenzidine	0	3,300	11,250	10	5,005	0	19,565
Dichlorobromomethane	0	0	0	0	0	0	0
Dichlorodifluoromethane (CFC-12)	312,686	319	81,000	21,832	1,969	0	417,806
1,2-Dichloroethane	8,147,906	271,519	2,228,128	13,898	61,483	0	10,722,934

Table 1-46. Releases and Transfers of All TRI Chemicals, 1993 (Alphabetically Ordered), Continued.

CAS Number	Chemical	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
540-59-0	1,2-Dichloroethylene	12	19,923	9,555	28	0	0	29,506
75-09-2	Dichloromethane	1,065	24,478,364	39,834,847	62,909	956,098	78,267	65,410,485
120-83-2	2,4-Dichlorophenol	3	270	318	61	7,677	0	8,326
78-87-5	1,2-Dichloropropane	12	262,040	315,399	4,749	0	19	582,207
78-88-6	2,3-Dichloropropene	3	170,000	336	1,900	106	0	172,342
542-75-6	1,3-Dichloropropylene	10	27,514	5,650	2	0	0	33,166
76-14-2	Dichlorotetrafluoro-ethane (CFC-114)	19	989,347	123,820	5,136	0	0	1,118,303
62-73-7	Dichlorvos	5	807	500	5	0	250	1,562
115-32-2	Dicofol	5	255	10	5	0	250	520
111-42-2	Diethanolamine	356	187,854	113,583	282,866	60,284	67,013	711,600
117-81-7	Di-(2-ethylhexyl) phthalate	321	149,731	429,209	1,118	0	92,887	672,945
84-66-2	Diethyl phthalate	62	26,703	131,596	337	0	750	159,386
64-67-5	Diethyl sulfate	35	5,159	16,857	5	0	5	22,026
119-90-4	3,3'-Dimethoxybenzidine	2	0	0	4	0	0	4
57-14-7	1,1-Dimethyl hydrazine	4	99	95	0	0	0	194
105-67-9	2,4-Dimethylphenol	18	16,323	14,990	84	55,000	250	86,647
131-11-3	Dimethyl phthalate	66	21,010	70,350	329	1,300	5	92,994
77-78-1	Dimethyl sulfate	36	4,556	1,199	0	0	5	5,760
99-65-0	m-Dinitrobenzene	2	63	399	18,756	0	300	19,518
528-29-0	o-Dinitrobenzene	3	5	41	237	0	0	283
100-25-4	p-Dinitrobenzene	1	3	7	43	0	0	53
534-52-1	4,6-Dinitro-o-cresol	6	6	65	10	0	0	81
51-28-5	2,4-Dinitrophenol	5	1	2	142	27,408	4	27,557
121-14-2	2,4-Dinitrotoluene	4	1,846	33	319	0	0	2,198
606-20-2	2,6-Dinitrotoluene	1	463	8	212	0	0	683
25321-14-6	Dinitrotoluene (mixed isomers)	7	5,458	10,511	631	98,000	173	114,773
123-91-1	1,4-Dioxane	64	281,921	152,096	477,896	0	2,236	914,149
106-89-8	Epichlorohydrin	71	282,452	101,680	3,642	0	2,356	390,130
110-80-5	2-Ethoxyethanol	48	95,428	208,789	1,952	0	0	306,169
140-88-5	Ethyl acrylate	102	92,497	93,894	1,200	2,400	21	190,012
100-41-4	Ethylbenzene	935	3,088,395	7,226,146	15,347	333,957	27,110	10,690,955
541-41-3	Ethyl chloroformate	5	1,918	485	5	0	5	2,413
74-85-1	Ethylene	273	14,775,632	18,530,394	24,779	0	0	33,330,805
107-21-1	Ethylene glycol	1,312	2,466,226	7,670,401	1,170,533	5,943,528	1,283,019	18,533,707
151-56-4	Ethyleneimine	1	0	0	0	0	0	0
75-21-8	Ethylene oxide	162	561,890	585,332	2,634	28,000	11,222	1,189,078
96-45-7	Ethylene thiourea	7	5	265	0	0	0	270
2164-17-2	Fluometuron	7	296	347	0	0	0	643
50-00-0	Formaldehyde	782	2,049,988	9,321,033	418,503	5,912,425	418,220	18,120,169
76-13-1	Freon 113	466	6,871,554	2,953,806	4,271	4	1,237	9,830,872
—	*Glycol ethers*	2,162	*10,120,540*	*35,171,877*	*353,153*	*114,415*	*137,656*	45,897,641
76-44-8	Heptachlor	1	31	0	2	0	0	33
118-74-1	Hexachlorobenzene	10	304	332	476	548	0	1,660
87-68-3	Hexachloro-1,3-butadiene	8	1,190	557	1,200	520	0	3,467
77-47-4	Hexachlorocyclo-pentadiene	4	2,857	908	1	250	0	4,016
67-72-1	Hexachloroethane	24	1,029	48,677	291	1,081	0	51,078
302-01-2	Hydrazine	46	12,267	4,185	784	0	5	17,241
10034-93-2	Hydrazine sulfate	3	0	1	0	220,000	0	220,001
7647-01-0	Hydrochloric acid	3,279	4,310,382	74,763,273	719,541	145,097,099	359,506	225,249,801
74-90-8	Hydrogen cyanide	40	53,123	2,180,818	396	821,815	12	3,056,164
7664-39-3	Hydrogen fluoride	513	3,076,706	4,645,613	10,340	3,520	28,805	7,764,984
123-31-9	Hydroquinone	60	3,950	16,125	8,994	470,000	117	499,186
78-84-2	Isobutyraldehyde	20	129,996	250,198	650	34,783	0	415,627
67-63-0	Isopropyl alcohol (manufacturing)	123	332,235	1,025,007	0	0	750	1,357,992
80-05-7	4,4'-Isopropylidene-diphenol	109	105,696	96,396	8,366	44,339	695,804	950,601
7439-92-1	Lead	797	236,287	459,607	24,575	0	3,336,155	4,056,624

Table 1-46, Continued.

Chemical	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[65] Pounds	Total Transfers Pounds
1,2-Dichloroethylene	2,101	0	522	0	0	0	2,623
Dichloromethane	20,970,440	3,241,821	9,767,007	843,209	108,451	33,584	34,964,512
2,4-Dichlorophenol	0	0	0	0	250	0	250
1,2-Dichloropropane	11,000	7	54	252	567	0	11,880
2,3-Dichloropropene	0	0	599,208	0	0	0	599,208
1,3-Dichloropropylene	5,432	1	2,257	0	0	0	7,690
Dichlorotetrafluoro-ethane (CFC-114)	24,730	0	6,383	0	15	0	31,128
Dichlorvos	0	250	3,660	0	750	0	4,660
Dicofol	0	0	2,271	0	250	0	2,521
Diethanolamine	364,972	92,961	510,787	1,130,429	104,493	0	2,203,642
Di-(2-ethylhexyl) phthalate	5,433,203	237,312	434,794	26,901	1,161,270	0	7,293,480
Diethyl phthalate	357,899	117,137	60,813	302,115	13,930	0	851,894
Diethyl sulfate	5,370,550	54	1,775	457	0	0	5,372,836
3,3'-Dimethoxybenzidine	0	0	0	0	0	0	0
1,1-Dimethyl hydrazine	5	0	2,914	0	6	0	2,925
2,4-Dimethylphenol	22,356	27,443	16,314	5,700	885	0	72,698
Dimethyl phthalate	250	28,987	25,816	131,086	4,597	0	190,736
Dimethyl sulfate	39,542	0	0	265	0	0	39,807
m-Dinitrobenzene	0	0	0	0	0	0	0
o-Dinitrobenzene	0	0	0	0	0	0	0
p-Dinitrobenzene	0	0	0	0	0	0	0
4,6-Dinitro-o-cresol	0	1,376	6,122	357	6,630	0	14,485
2,4-Dinitrophenol	0	0	9,000	0	20	0	9,020
2,4-Dinitrotoluene	0	300	0	0	10	0	310
2,6-Dinitrotoluene	0	0	0	0	0	0	0
Dinitrotoluene (mixed isomers)	0	500	515,660	6,800	314	0	523,274
1,4-Dioxane	18,262	738,584	200,994	258,084	61,762	0	1,277,686
Epichlorohydrin	0	17,837	947,707	29,201	851	0	995,596
2-Ethoxyethanol	359,015	259,985	35,069	391,233	3	0	1,045,305
Ethyl acrylate	38,620	1,417,133	244,897	21,310	9,493	0	1,731,453
Ethylbenzene	3,945,186	9,253,636	1,330,687	57,017	128,364	250	14,715,140
Ethyl chloroformate	0	0	0	0	0	0	0
Ethylene	0	11,708,800	61,073	19	128	0	11,770,020
Ethylene glycol	111,764,153	8,769,553	9,117,301	15,071,067	1,428,386	0	146,150,460
Ethyleneimine	0	0	0	0	0	0	0
Ethylene oxide	0	1	1,063	95,140	3,589	0	99,793
Ethylene thiourea	2,054	0	5,585	5	1,260	0	8,904
Fluometuron	0	0	3,460	30,030	9,364	0	42,854
Formaldehyde	60,343	146,580	1,091,750	3,464,896	365,516	0	5,129,085
Freon 113	3,043,503	208,109	417,205	37,045	12,278	750	3,718,890
Glycol ethers	4,388,256	13,775,189	3,486,547	12,188,571	791,957	50,368	34,680,888
Heptachlor	0	0	77,287	42	0	0	77,329
Hexachlorobenzene	1	0	88,709	250	648,010	0	736,970
Hexachloro-1,3-butadiene	0	0	21,416	14	12	0	21,442
Hexachlorocyclo-pentadiene	0	910	9,620	656	0	0	11,186
Hexachloroethane	0	41,000	49,801	0	1,954	0	92,755
Hydrazine	8	30,005	72,162	1,408	4,136	0	107,719
Hydrazine sulfate	0	0	0	0	0	0	0
Hydrochloric acid	60,155,970	8,507,313	46,975,777	19,913,557	13,575,451	78,081	149,206,149
Hydrogen cyanide	0	253	492	281	2,065	0	3,091
Hydrogen fluoride	281,413	0	2,254,588	269,976	856,706	250	3,662,933
Hydroquinone	9,700	881	47,558	110,898	34,105	0	203,142
Isobutyraldehyde	200	691,085	43,747	10,402	0	0	745,434
Isopropyl alcohol (manufacturing)	214,276	267,089	116,974	8,964	27,137	0	634,440
4,4'-Isopropylidene-diphenol	0	34,556	40,193	32,719	365,436	0	472,904
Lead	40,096,726	7,815	520,158	28,085	2,142,440	750	42,795,974

Table 1-46. Releases and Transfers of All TRI Chemicals, 1993 (Alphabetically Ordered), Continued.

CAS Number	Chemical	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
—	Lead compounds	858	216,860	814,284	50,518	1,768	10,950,924	12,034,354
58-89-9	Lindane	8	277	298	0	0	5	580
108-31-6	Maleic anhydride	206	61,297	311,018	403	5	4,062	376,785
12427-38-2	Maneb	6	510	520	0	0	0	1,030
7439-96-5	Manganese	1,286	362,608	496,504	243,336	504	6,650,151	7,753,103
—	Manganese compounds	988	778,095	1,436,529	565,650	8,740	47,671,055	50,460,069
7439-97-6	Mercury	22	9,349	3,353	267	0	1,801	14,770
—	Mercury compounds	13	2,507	914	179	15	11	3,626
67-56-1	Methanol	2,424	29,407,465	142,885,516	10,011,681	27,899,963	1,719,866	211,924,491
72-43-5	Methoxychlor	4	91	5	5	0	0	101
109-86-4	2-Methoxyethanol	68	497,989	660,857	85,820	0	2	1,244,668
96-33-3	Methyl acrylate	64	108,933	83,230	442	130	88	192,823
1634-04-4	Methyl tert-butyl ether	141	938,717	2,910,737	92,315	9,406	409	3,951,584
101-14-4	4,4'-Methylenebis (2-chloroaniline)	16	10	5	0	0	0	15
101-68-8	Methylenebis (phenylisocyanate)	834	381,649	167,981	15	0	800,629	1,350,274
74-95-3	Methylene bromide	7	42,558	13,759	0	0	0	56,317
101-77-9	4,4'-Methyenedianiline	27	15,313	2,961	291	9,750	135	28,450
78-93-3	Methyl ethyl ketone	2,418	29,044,598	55,770,325	197,216	360,927	134,162	85,507,228
60-34-4	Methyl hydrazine	2	25	0	0	0	0	25
74-88-4	Methyl iodide	4	33,233	907	14	0	0	34,154
108-10-1	Methyl isobutyl ketone	1,006	7,777,025	17,317,092	90,214	131,600	76,771	25,392,702
624-83-9	Methyl isocyanate	3	4,490	1,273	0	0	0	5,763
80-62-6	Methyl methacrylate	251	600,068	1,728,620	7,992	260,000	2,606	2,599,286
90-94-8	Michler's ketone	1	100	1,442	0	0	0	1,542
1313-27-5	Molybdenum trioxide	139	124,993	51,931	60,169	202,775	11,449	451,317
76-15-3	Monochloropentafluoro-ethane (CFC-115)	13	510,058	49,695	1,000	0	0	560,753
91-20-3	Naphthalene	471	1,483,665	1,186,271	31,123	79,290	48,971	2,829,320
134-32-7	alpha-Naphthylamine	2	5	5	0	0	0	10
7440-02-0	Nickel	1,639	169,431	152,495	38,098	11,078	427,911	799,013
—	Nickel compounds	820	55,882	122,998	56,096	122,160	2,864,701	3,221,837
7697-37-2	Nitric acid	1,824	802,420	2,252,954	180,513	19,213,898	421,294	22,871,079
139-13-9	Nitrilotriacetic acid	7	7	5	6,442	500	0	6,954
99-59-2	5-Nitro-o-anisidine	1	5	5	0	0	0	10
98-95-3	Nitrobenzene	15	64,830	7,807	309	309,441	328	382,715
55-63-0	Nitroglycerin	18	554	12,545	28,012	0	250	41,361
88-75-5	2-Nitrophenol	5	5	24	7	0	0	36
100-02-7	4-Nitrophenol	5	654	91	33	0	0	778
79-46-9	2-Nitropropane	7	39,191	9,137	1,200	0	0	49,528
156-10-5	p-Nitrosodiphenylamine	2	24	0	0	5,400	0	5,424
121-69-7	N,N-Dimethylaniline	23	3,500	17,222	697	0	0	21,419
86-30-6	N-Nitrosodiphenylamine	1	0	0	0	0	0	0
56-38-2	Parathion	3	1,215	5	5	0	0	1,225
87-86-5	Pentachlorophenol	39	5,673	5,220	2,541	0	255	13,689
79-21-0	Peracetic acid	15	661	2,660	53	0	260	3,634
108-95-2	Phenol	676	1,929,310	4,804,052	126,951	3,070,279	200,076	10,130,668
106-50-3	p-Phenylenediamine	8	342	3,177	1,004	0	1,051	5,574
90-43-7	2-Phenylphenol	19	25,409	1,089	57	0	255	26,810
75-44-5	Phosgene	33	3,035	2,660	0	5	0	5,700
7664-38-2	Phosphoric acid	2,678	490,193	745,085	175,861,627	33,784	35,491,946	212,622,635
7723-14-0	Phosphorus (yellow or white)	51	25,089	5,195	4,987	5	327,654	362,930
85-44-9	Phthalic anhydride	178	90,810	389,629	457	0	226	481,122
88-89-1	Picric acid	8	2	2	1	64,294	1	64,300
	Polybrominated biphenyls	1	0	0	0	0	0	0
1336-36-3	Polychlorinated biphenyls (PCBs)	16	0	0	0	0	265	265
1120-71-4	Propane sultone	1	250	0	0	0	0	250
123-38-6	Propionaldehyde	21	328,204	130,008	56	63,995	0	522,263
114-26-1	Propoxur	4	0	5	0	0	0	5

Table 1-46, Continued.

Chemical	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers(65) Pounds	Total Transfers Pounds
Lead compounds	250,957,268	75,387	3,400,146	111,040	20,259,225	299	274,803,365
Lindane	0	0	3,992	6	67	0	4,065
Maleic anhydride	0	112,033	783,929	2,980	25,827	0	924,769
Maneb	0	0	260	0	125,841	0	126,101
Manganese	69,793,000	253	504,457	29,941	11,217,507	593,559	82,138,717
Manganese compounds	44,660,637	23,682	3,323,612	417,667	19,806,033	250	68,231,881
Mercury	11,639	0	1,265	15	17,406	0	30,325
Mercury compounds	12,000	0	486	6	55,549	0	68,041
Methanol	15,803,246	57,367,176	37,093,740	94,712,739	3,332,440	388	208,309,729
Methoxychlor	0	0	15	0	5	0	20
2-Methoxyethanol	320	580,965	327,097	855,415	16,300	0	1,780,097
Methyl acrylate	14,736	255,044	17,229	8,484	1,595	0	297,088
Methyl tert-butyl ether	49,327	657,873	33,893	92,030	134,331	0	967,454
4,4'-Methylenebis (2-chloroaniline)	0	2,148	99	5	750	0	3,002
Methylenebis (phenylisocyanate)	400,158	146,804	649,007	1,881	1,349,736	0	2,547,586
Methylene bromide	0	750	584	2,489	0	0	3,823
4,4'-Methyenedianiline	0	8,530	72,400	2,152	33,676	0	116,758
Methyl ethyl ketone	24,231,204	45,698,371	5,491,598	756,561	433,670	18,755	76,630,159
Methyl hydrazine	0	0	74	0	0	0	74
Methyl iodide	0	350	230	0	27	0	607
Methyl isobutyl ketone	22,879,916	12,169,416	1,391,209	636,214	126,372	1,705	37,204,832
Methyl isocyanate	0	0	0	0	0	0	0
Methyl methacrylate	82,310	1,044,464	663,896	265,342	174,215	0	2,230,227
Michler's ketone	0	216	0	0	0	0	216
Molybdenum trioxide	3,302,529	0	78,094	34,801	446,634	4,957	3,867,015
Monochloropentafluoro-ethane (CFC-115)	0	0	0	0	0	0	0
Naphthalene	248,531	1,377,127	345,047	24,352	332,257	0	2,327,314
alpha-Naphthylamine	0	0	0	0	0	0	0
Nickel	58,272,406	6,812	928,601	99,350	2,359,104	30,333	61,696,606
Nickel compounds	31,855,198	6,593	1,727,136	120,342	4,818,250	6,935	38,534,454
Nitric acid	2,206,554	44	11,244,281	2,228,420	2,608,501	250	18,288,050
Nitrilotriacetic acid	0	0	0	0	0	0	0
5-Nitro-o-anisidine	0	0	0	5	0	0	5
Nitrobenzene	3,370	19,340	288,124	118	790	0	311,742
Nitroglycerin	0	2	39,006	52	6	0	39,066
2-Nitrophenol	0	4,592	42,430	130	0	0	47,152
4-Nitrophenol	0	0	923,001	245	4	0	923,250
2-Nitropropane	3,400	103	12,298	0	0	0	15,801
p-Nitrosodiphenylamine	0	15,000	0	0	0	0	15,000
N,N-Dimethylaniline	0	593,413	37,849	164,986	0	0	796,248
N-Nitrosodiphenylamine	0	0	474,000	0	0	0	474,000
Parathion	0	0	7,847	0	0	0	7,847
Pentachlorophenol	1,010	40,981	69,218	1,133	34,860	0	147,202
Peracetic acid	0	0	110	3,689	0	0	3,799
Phenol	869,280	2,385,392	2,596,690	3,817,033	1,404,159	0	11,072,554
p-Phenylenediamine	0	0	28,693	3,830	7,900	0	40,423
2-Phenylphenol	0	260	0	3,687	1,005	0	4,952
Phosgene	0	0	1,000	0	0	0	1,000
Phosphoric acid	9,106,307	1,015	1,905,763	4,265,830	2,156,222	15,234	17,450,371
Phosphorus (yellow or white)	162,841	0	27,996	2,355	5,467	0	198,659
Phthalic anhydride	0	4,003,843	192,250	5,295	157,425	0	4,358,813
Picric acid	0	0	0	0	0	0	0
Polybrominated biphenyls	0	0	0	0	0	0	0
Polychlorinated biphenyls (PCBs)	0	4	857,363	265	164,205	0	1,021,837
Propane sultone	0	0	0	0	0	0	0
Propionaldehyde	0	13,333	1	1,155	3,167	0	17,656
Propoxur	0	0	750	250	0	0	1,000

Table 1-46. Releases and Transfers of All TRI Chemicals, 1993 (Alphabetically Ordered), Continued.

CAS Number	Chemical	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
115-07-1	Propylene	323	13,141,400	5,763,375	175,120	0	0	19,079,895
75-55-8	Propyleneimine	7	24	315	0	0	0	339
75-56-9	Propylene oxide	121	333,869	790,027	6,390	5,151	6,197	1,141,634
110-86-1	Pyridine	31	49,402	53,474	899	412,200	49	516,024
91-22-5	Quinoline	24	4,344	19,963	50	63,000	196	87,553
106-51-4	Quinone	5	14,000	2,101	1,400	0	0	17,501
82-68-8	Quintozene	8	1,265	528	0	0	0	1,793
81-07-2	Saccharin (manufacturing)	2	50	251	0	0	0	301
7782-49-2	Selenium	15	334	1,200	0	0	256	1,790
—	Selenium compounds	45	2,802	74,934	557	2,300	120,271	200,864
7440-22-4	Silver	64	4,437	2,643	318	210	1,000	8,608
—	Silver compounds	56	6,476	15,147	9,069	100	20,376	51,168
100-42-5	Styrene	1,404	12,559,401	20,011,190	28,274	132,607	177,580	32,909,052
96-09-3	Styrene oxide	5	298	46	0	0	0	344
7664-93-9	Sulfuric acid	5,640	1,866,251	22,763,591	27,542,946	105,872,094	1,552,743	159,597,625
79-34-5	1,1,2,2-Tetra-chloroethane	15	24,640	3,563	2,930	0	1	31,134
127-18-4	Tetrachloroethylene	474	4,422,676	6,519,343	10,152	15,041	618,026	11,585,238
961-11-5	Tetrachlorvinphos	4	260	270	5	0	0	535
7440-28-0	Thallium	1	5	250	0	0	755	1,010
62-56-6	Thiourea	26	857	515	2,611	5,300	288	9,571
1314-20-1	Thorium dioxide	1	0	0	0	0	0	0
7550-45-0	Titanium tetrachloride	38	19,012	5,610	0	0	100	24,722
108-88-3	Toluene	3,569	60,860,617	116,441,054	133,248	967,496	234,148	178,636,563
584-84-9	Toluene-2,4-diiso-cyanate	75	4,858	54,011	0	0	0	58,869
91-08-7	Toluene-2,6-diiso-cyanate	42	2,239	4,456	0	0	0	6,695
26471-62-5	Toluenediisocyanate (mixed isomers)	186	13,803	28,420	0	0	288	42,511
95-53-4	o-Toluidine	20	15,421	2,980	1,266	24,600	7	44,274
52-68-6	Trichlorfon	3	5	1	7	0	0	13
120-82-1	1,2,4-Trichlorobenzene	41	103,567	159,276	1,148	5,118	1,781	270,890
71-55-6	1,1,1-Trichloroethane	2,073	32,866,736	31,199,295	10,912	2,528	42,743	64,122,214
79-00-5	1,1,2-Trichloroethane	24	104,697	210,700	2,030	0	5	317,432
79-01-6	Trichloroethylene	772	14,488,988	15,625,125	5,218	460	8,212	30,128,003
75-69-4	Trichlorofluoromethane (CFC-11)	203	2,645,752	3,481,936	1,546	11	1,000	6,130,245
88-06-2	2,4,6-Trichlorophenol	1	0	69	56	0	0	125
1582-09-8	Trifluralin	17	12,185	5,475	10	0	5	17,675
95-63-6	1,2,4-Trimethylbenzene	699	2,345,237	4,276,394	17,549	1,293	16,771	6,657,244
51-79-6	Urethane	3	12,200	0	0	0	0	12,200
7440-62-2	Vanadium (fume or dust)	12	4,769	6,407	3,200	0	36,000	50,376
108-05-4	Vinyl acetate	154	1,188,547	3,012,385	1,341	1,408,698	1,626	5,612,597
593-60-2	Vinyl bromide	2	257	1,400	0	0	0	1,657
75-01-4	Vinyl chloride	45	306,661	707,301	277	0	6	1,014,245
75-35-4	Vinylidene chloride	24	58,578	136,746	192	0	20	195,536
1330-20-7	Xylene (mixed isomers)	3,371	25,653,790	85,535,823	51,944	213,157	203,182	111,657,896
108-38-3	m-Xylene	61	1,236,772	424,684	2,798	5	3,751	1,668,010
95-47-6	o-Xylene	81	1,310,688	641,424	1,180	5	1,143	1,954,440
106-42-3	p-Xylene	49	1,268,116	3,170,089	749	5	631	4,439,590
87-62-7	2,6-Xylidine	5	83	27	387	0	0	497
7440-66-6	Zinc (fume or dust)	418	830,106	850,500	66,802	0	10,449,577	12,196,985
—	Zinc compounds	2,463	1,501,719	2,814,644	1,046,444	176,143	67,413,392	72,952,342
	Mixtures and other trade names	47	86,411	18,952	5	0	2,412	107,780
	Trade secrets	14	2,850	525	0	0	0	3,375
	Total	79,987	490,040,607	1,182,087,128	271,152,864	576,285,233	289,052,581	2,808,618,413

Table 1-46, Continued.

Chemical	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers [65] Pounds	Total Transfers Pounds
Propylene	0	2,188,040	388,948	5	482	0	2,577,475
Propyleneimine	0	0	0	0	0	0	0
Propylene oxide	0	95,414	15,534	25,877	9,597	0	146,422
Pyridine	3,609	184,027	93,910	309,895	4,977	0	596,418
Quinoline	3,609	16,015	1,953	505	5,997	0	28,079
Quinone	0	0	6,776	0	0	0	6,776
Quintozene	0	0	522,354	505	285	0	523,144
Saccharin (manufacturing)	0	0	25,625	12	840	0	26,477
Selenium	27,911	0	2,984	260	3,776	0	34,931
Selenium compounds	229,327	0	11,002	212	39,415	5	279,961
Silver	643,597	0	7,940	1,934	1,922	0	655,393
Silver compounds	1,450,290	0	2,229	6,451	14,219	0	1,473,189
Styrene	1,074,823	5,186,338	3,106,473	95,736	2,064,768	5	11,528,143
Styrene oxide	0	0	0	0	0	0	0
Sulfuric acid	1,182,623,222	28,498	34,382,097	19,188,364	39,001,403	98,209	1,275,321,793
1,1,2,2-Tetra-chloroethane	1,737,712	0	32,733	155	80	0	1,770,680
Tetrachloroethylene	6,033,800	823,490	2,346,817	111,007	56,340	9,709	9,381,163
Tetrachlorvinphos	0	0	4,310	17	8,825	0	13,152
Thallium	750	0	0	5	0	0	755
Thiourea	0	0	2,645	1,534	2,446	0	6,625
Thorium dioxide	0	0	0	0	42,000	0	42,000
Titanium tetrachloride	0	86	2,958,898	0	16	0	2,959,000
Toluene	31,193,360	80,756,715	22,167,766	968,612	1,151,233	91,442	136,329,128
Toluene-2,4-diiso-cyanate	81,888	16,620	59,063	0	9,938	0	167,509
Toluene-2,6-diiso-cyanate	20,497	4,746	340	0	2,010	0	27,593
Toluenediisocyanate (mixed isomers)	8,186	39,225	342,931	10	14,045	0	404,397
o-Toluidine	0	41,913	29,039	86,591	56	0	157,599
Trichlorfon	0	0	272	0	0	0	272
1,2,4-Trichlorobenzene	520	30,930	623,111	170,659	18,276	0	843,496
1,1,1-Trichloroethane	14,370,656	2,322,187	3,568,694	60,457	267,633	177,907	20,767,534
1,1,2-Trichloroethane	12,136,563	23,308	3,995,573	1,600	592	0	16,157,636
Trichloroethylene	6,911,325	1,196,826	1,806,930	45,777	232,950	60,207	10,254,015
Trichlorofluoromethane (CFC-11)	244,377	227,123	250,238	614	81,821	0	804,173
2,4,6-Trichlorophenol	0	0	0	0	0	0	0
Trifluralin	0	0	17,628	67	18,856	0	36,551
1,2,4-Trimethylbenzene	1,475,226	2,976,915	261,610	219,193	43,284	3,052	4,979,280
Urethane	0	0	0	5,900	46,360	0	52,260
Vanadium (fume or dust)	250	0	1,080	5	6,405	0	7,740
Vinyl acetate	826,472	8,463,013	1,486,726	278,715	28,051	34,000	11,116,977
Vinyl bromide	0	0	0	0	0	0	0
Vinyl chloride	151,324	11,613	25,360	343	18,091	0	206,731
Vinylidene chloride	5	8	162,129	201	1	0	162,344
Xylene (mixed isomers)	36,861,435	70,497,637	7,004,139	657,939	981,743	11,279	116,014,172
m-Xylene	27,264	116,095	23,518	33,378	100,441	0	300,696
o-Xylene	7,223	1,865,351	29,362	22,262	51,219	0	1,975,417
p-Xylene	1,427	71,806	16,138	31,730	5,794	0	126,895
2,6-Xylidine	0	0	625	0	0	0	625
Zinc (fume or dust)	75,916,019	101,807	661,883	102,336	2,221,024	500	79,003,569
Zinc compounds	226,610,466	281,162	11,016,676	522,228	88,033,585	31,666	326,495,783
Mixtures and other trade names	443,745	18,662	490,154	1,151	2,985	0	956,697
Trade secrets	397,675	11,525	221,020	5	0	0	630,225
Total	3,252,166,922	487,380,037	328,074,174	314,350,915	325,251,442	1,820,373	4,709,043,863

[64] Compound categories do not have CAS numbers (—).

[65] Transfers reported without valid waste management codes.

Chapter 2

Prevention and Management of TRI Chemicals in Waste

PREVENTION AND MANAGEMENT OF TRI CHEMICALS IN WASTE

INTRODUCTION

The Pollution Prevention Act of 1990 (PPA) requires facilities to report information about the management of TRI chemicals in waste and efforts made to eliminate or reduce those quantities, beginning with the 1991 reporting year. The PPA also established as national policy that source reduction, the prevention of the generation of waste, is the most preferable approach to managing waste. When it is not feasible to implement source reduction, the PPA established as national policy a hierarchy of waste management. Although pollution prevention is the preferred method of reducing risk, environmentally sound recycling shares many of the advantages of prevention by reducing the need for treatment or disposal and conserving energy and natural resources. Where prevention or recycling are not feasible, treatment followed by disposal as a last resort complete the hierarchy. The hierarchy for making pollution prevention and waste management decisions is illustrated in Figure 2-1. Although the PPA did not specifically address the combustion of waste for energy recovery as a waste management option, EPA made this activity a specific action in the hierarchy, recognizing that energy recovery has aspects of both recycling and treatment.

Throughout this book, data tables present information in this hierarchical order: recycling, energy recovery, treatment, and release/disposal.

The information required by the PPA can help facilities and the public assess progress in the management of TRI chemicals in waste but cannot specifically quantify progress in source reduction. These data can be used to analyze trends in quantities recycled, combusted for energy recovery, treated, and released or disposed of, which can then indicate whether facilities are reducing waste or moving up the waste management hierarchy. Trends in the total quantity of TRI chemicals in waste can also be assessed. Using the information reported on efforts to reduce or eliminate the quantities of TRI chemicals in waste, data users can assess which industries and facilities are implementing source reduction and the types of source reduction activities implemented. Using

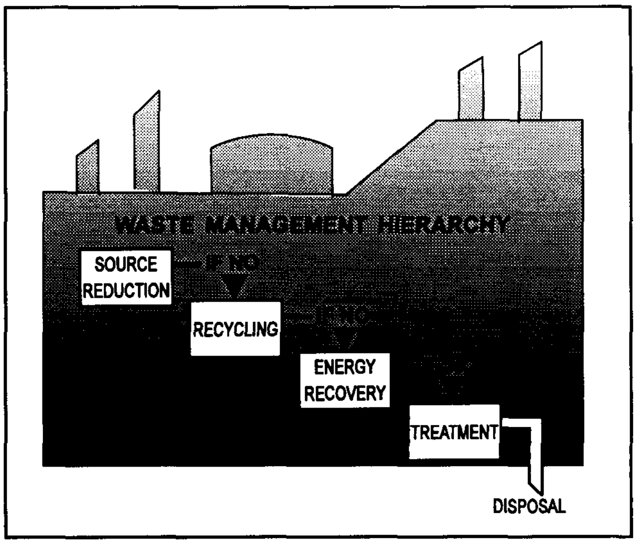


Figure 2-1. Waste Management Hierarchy.

the information on how the source reduction activities were implemented, data users can assess how opportunities for source reduction are identified, which can then aid in determining the more successful routes of delivery for source reduction information, as well as technology transfer. The data reported for 1991 provide a baseline for such assessments.

WHAT WASTE MANAGEMENT INFORMATION IS COLLECTED?

This information is collected in Section 8 of the TRI reporting form (see EPA's Form R in Appendix F) and includes the following quantities:

- quantity released to the environment at the facility and sent off-site for disposal;
- quantity used for energy recovery at the facility;
- quantity sent off-site for energy recovery;
- quantity recycled at the facility;
- quantity sent off-site for recycling;
- quantity treated at the facility; and
- quantity sent off-site for treatment.

These quantities are illustrated in Figure 2-2, and a description of what these quantities should represent is provided in Box 2-1. The individual quantities are mutually exclusive to avoid double-counting of TRI chemicals in waste. This allows the summation of these quantities in order to calculate the total quantity of TRI chemicals in waste from routine production operations that a facility manages during the calendar year. For the reporting year only, facilities are also required to report the quantity released to the environment at the facility or transferred off-site due to catastrophic events or remedial (clean-up) actions occurring at the facility. This quantity is referred to as non-production-related waste because it is not associated with routine production operations at the facility. Such quantities are considered less amenable to source reduction because such quantities cannot be reasonably anticipated by facilities.

The production-related quantities are reported not only for the reporting year (1993), but for the year prior to the reporting year (1992) and the two years following the reporting year (1994 and 1995). While the quantities reported for 1992 and 1993 are estimates of quantities already managed, the quantities reported for 1994 and 1995 are projections only. The PPA requires these projections to encourage facilities to consider future waste generation and source reduction of those quantities as well as movement up the waste management hierarchy. Future-year estimates are not commitments that facilities reporting under TRI are required to meet.

QUANTITIES OF TRI CHEMICALS IN WASTE

For 1993, a total of 33.5 billion pounds of toxic chemicals in production-related waste was reported, compared with 33.3 billion pounds reported for 1992 and 33.0 billion pounds reported for 1991. In addition, just over 45 million pounds of non-production-related waste were reported for 1993, compared to 35 million pounds for 1992 and 33 million pounds for 1991. The quantities of TRI chemicals in waste reported for 1991 through 1993, based on the forms for those years, are compared in Table 2-1.

Figure 2-3 shows the distribution of the total production-related waste as reported by waste management activity. Looking at the quantities aggregated by the hierarchy of waste management, approximately 49% of the toxic chemicals in waste (16.516 billion pounds) was reported as recycled; 10% (3.350 billion pounds) was reported as combusted for energy recovery; 31% (10.426 billion pounds) was

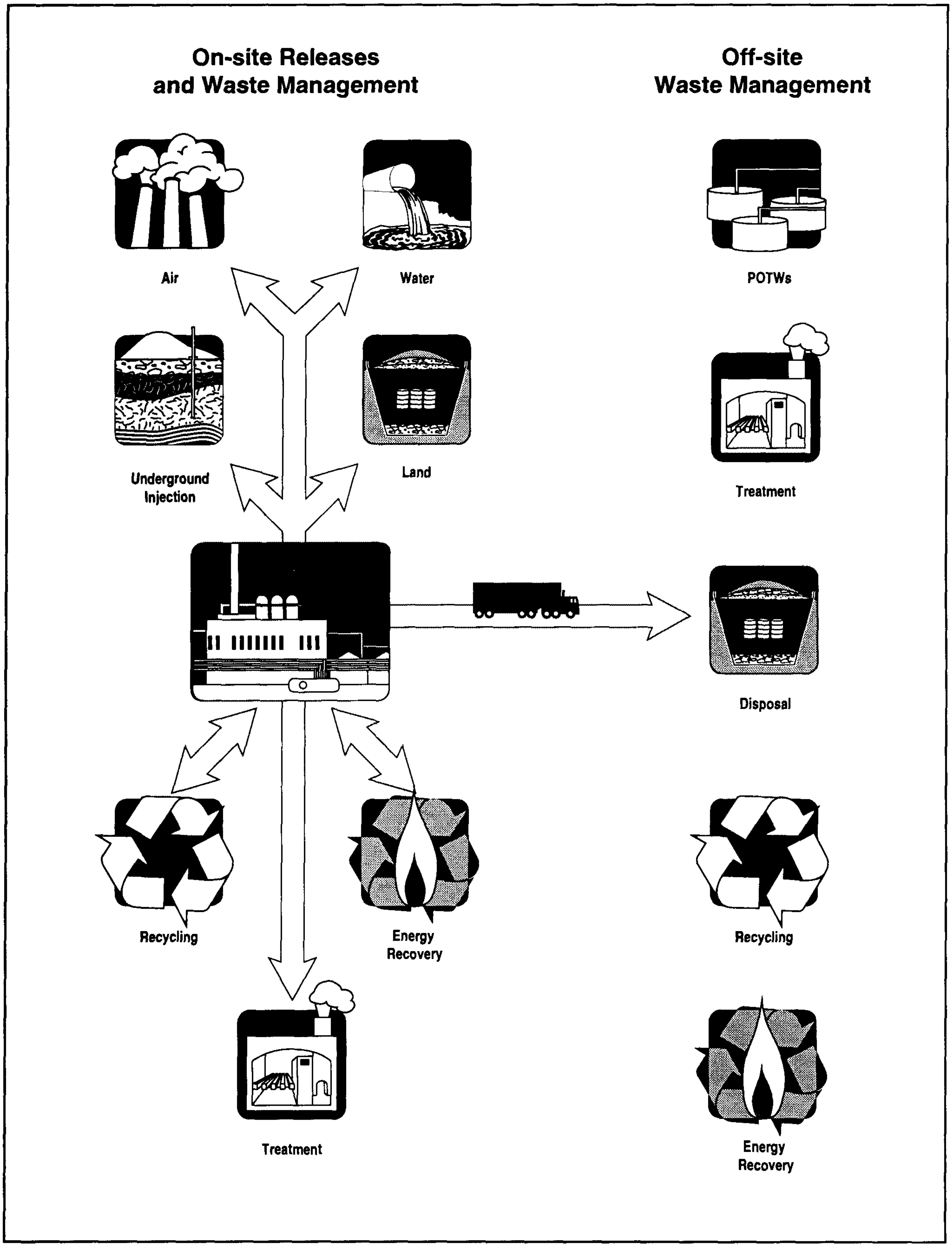


Figure 2-2. Waste Management Information Collected under TRI.

What Does This Waste Management Information Represent?

Quantity released (Section 8.1 of Form R). 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 (transfers for disposal only) less any amount(s) associated with non-routine events.

Quantity used for energy recovery on-site (Section 8.2 of Form R). 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 a 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).

Quantity used for energy recovery off-site (Section 8.3 of Form R). 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.

Quantity recycled on-site (Section 8.4 of Form R). 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.

Quantity recycled off-site (Section 8.5 of Form R). 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.

Quantity treated on-site (Section 8.6 of Form R). 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).

Quantity treated off-site (Section 8.7 of Form R). 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.

Quantity released to the environment due to one-time events (Section 8.8 of Form R). 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 allow for distinctions to be made between those quantities that are routinely associated with production operations and are more amenable to source reduction and those quantities that are not routinely associated with production processes and are not as amenable to source reduction because they are not readily anticipated. This separation of quantities is important in assessing progress in source reduction at facilities.

Box 2-1. What Does This Waste Management Information Represent?

Table 2-1. Quantities of TRI Chemicals in Waste, 1991-1993.❶

Management Activity	1991 Quantity Billions of Pounds	1992 Quantity Billions of Pounds	1993 Quantity Billions of Pounds	1992-93 Percent Change Percent	1991-93 Percent Change Percent
Recycled On-site	12.520	12.196	13.191	8.2	5.4
Recycled Off-site	2.982	3.475	3.325	-4.3	11.5
Energy Recovery On-site	3.143	3.028	2.838	-6.3	-9.7
Energy Recovery Off-site	0.486	0.478	0.512	7.1	5.4
Treated On-site	9.448	10.040	9.768	-2.7	3.4
Treated Off-site	0.714	0.682	0.658	-3.5	-7.9
Released or Disposed of	3.662	3.425	3.206	-6.4	-12.4
Total Production-Related Waste	32.954	33.324	33.498	0.5	1.7

reported as treated; and 10% (3.206 billion pounds) was reported as released or disposed into the environment. This indicates that 59% of the toxic chemicals in waste was reported as recycled or used beneficially, while the remaining 41% was reported as either treated or released to the environment.

Table 2-2 shows the quantities of toxic chemicals in production-related waste reported for 1991 through 1995 aggregated at the national level. The quantities for 1991 are based on 1992 reports while the quantities for 1992 through 1995 are based on 1993 reports. Table 2-2 indicates an increase in production-related waste from 1991 to 1993, with a slight decrease projected for 1994 and an increase projected for 1995. Across those years there is also an indication that there is some movement up the waste management hierarchy in that there are slight decreases in the amounts released and treated while there are slight increases in the quantities recycled and combusted for energy recovery.

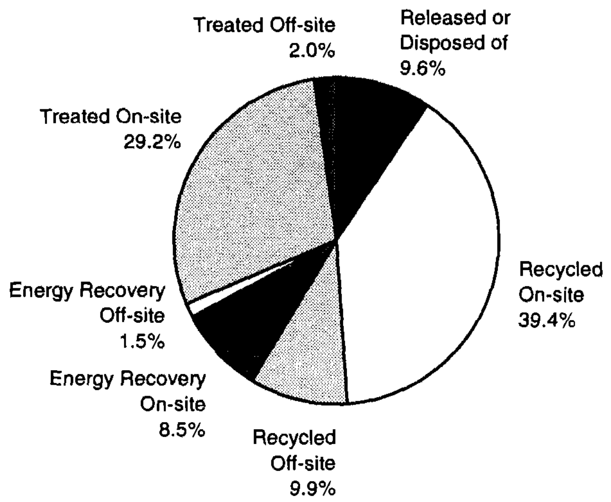


Figure 2-3. Management of TRI Chemicals in Waste, by Activity, 1993.

❶ 1991 amounts are as reported on the 1991 Form R, 1992 amounts are as reported on the 1992 Form R, and 1993 amounts are as reported on the 1993 Form R.

Table 2-3 shows the quantities reported for 1992 through 1995 on the 1993 reports, but only for those forms that provided quantities consistently for all four years. Consistent data means either zeros or nonzero amounts were reported for all four years for each waste management activity. This allows for a consistent comparison to more accurately see trends in the quantities recycled, combusted for energy recovery, treated, and disposed. The quantities of toxic chemicals in waste between 1992 and 1993 are relatively stable and are projected to remain at a similar level in 1994 but are projected to increase slightly in 1995. Some movement up the waste management hierarchy is also indicated by Table 2-3. This is evident through some actual and projected decreases in the quantities released and quantities treated and some actual increases in the quantities recycled on-site.

While movement up the hierarchy is an improvement in how toxic chemicals in waste are managed, there is no decrease in the total amount of waste that must be managed. This suggests that, on a national scale and without consideration of increases or decreases in production, current source reduction efforts are not reducing the absolute quantities of toxic chemicals in waste. Further comparison is necessary, however, to determine if increased production is responsible for the slightly increasing quantities of toxic chemicals in waste rather than a failure in source reduction efforts. To assist in such a comparison, facilities are required to provide an indication of changes in production at the facility. This information can help to assess the effect that production changes may have had on the amount of toxic chemicals generated in waste.

Looking beyond the national aggregates, the distributions of toxic chemicals in waste by state, by industry, and by individual toxic chemical are shown in Tables 2-4 through 2-6. For the state and industry tables, quantities are shown for 1992 through 1995 as reported on the 1993 reports.

Tables 2-7 through 2-10 show the top 25 toxic chemicals (by quantity) in each category of the waste management hierarchy: recycling, energy recovery, treatment, and release (including off-site disposal). Sulfuric acid was reported as recycled in the greatest quantity, both on-site and off-site. The amounts of sulfuric acid recycled on-site and off-site make up 45% and 36%, respectively, of the total amounts of all TRI chemicals recycled on-site and off-site. Propylene was reported as combusted for the purposes of energy recovery in the greatest quantity on-site while toluene was reported as sent off-site for the purposes of energy recovery in the greatest quantity. Sulfuric acid was reported as treated on-site in the greatest quantity, while methanol was reported as treated off-site in the greatest quantity. The top 25 chemicals released (including off-site disposal) are listed in Table 2-10. Comparing this group of chemicals to the top 50 chemicals for total releases on-site (presented in Table 1-24 in Chapter 1) shows that the same chemicals are in the top 25 in both lists although in a different order. The only exception is lead compounds, which are 24th in Table 2-10 and 34th in Table 1-24. The rankings of the chemicals in the tables are sometimes different due to the inclusion of off-site disposal in the quantities released as reported in Section 8 of Form R and presented in this chapter.

Table 2-2. Actual and Projected Quantities of TRI Chemicals in Waste, 1991-1995.②

Management Activity	1991 Pounds	1991 Percent	1992 Pounds	1992 Percent	1993 Pounds	1993 Percent	Projected Data③ 1994 Pounds	1994 Percent	1995 Pounds	1995 Percent
Recycled On-site	12,198,437,150	37.2	12,165,834,089	37.0	13,191,306,508	39.4	13,678,882,442	40.9	13,709,975,050	40.3
Recycled Off-site	2,991,691,233	9.1	3,190,769,161	9.7	3,324,614,075	9.9	3,328,052,754	10.0	3,549,835,273	10.4
Energy Recovery On-site	3,060,364,957	9.3	3,136,788,296	9.5	2,838,344,940	8.5	3,022,790,837	9.0	3,202,534,563	9.4
Energy Recovery Off-site	450,135,521	1.4	454,009,875	1.4	511,774,941	1.5	467,934,508	1.4	442,052,865	1.3
Treated On-site	9,842,152,388	30.0	9,883,578,297	30.1	9,768,273,293	29.2	9,597,823,990	28.7	9,854,704,711	29.0
Treated Off-site	682,497,196	2.1	700,349,754	2.1	657,785,097	2.0	601,207,650	1.8	568,596,402	1.7
Quantity Released/ Disposed of	3,529,762,296	10.8	3,353,178,648	10.2	3,206,362,816	9.6	2,750,842,449	8.2	2,658,806,401	7.8
Total Production-Related Waste	32,755,040,741	100.0	32,884,508,120	100.0	33,498,461,670	100.0	33,447,534,630	100.0	33,986,505,265	100.0

Table 2-3. Actual and Projected Quantities of TRI Chemicals in Waste, 1992-1995, Based on 1993 Forms Reporting Consistent Data.④

Management Activity	1992 Pounds	1992 Percent	1993 Pounds	1993 Percent	Projected Data③ 1994 Pounds	1994 Percent	1995 Pounds	1995 Percent
Recycled On-site	5,552,505,309	27.0	6,315,926,518	30.9	6,421,446,139	31.3	6,516,040,425	30.9
Recycled Off-site	1,927,280,056	9.4	1,733,835,803	8.5	1,793,289,646	8.7	1,994,998,552	9.5
Energy Recovery On-site	2,437,315,722	11.8	2,125,817,393	10.4	2,225,004,600	10.9	2,349,318,460	11.1
Energy Recovery Off-site	248,302,010	1.2	254,882,169	1.2	248,388,131	1.2	241,972,306	1.1
Treated On-site	7,608,138,881	37.0	7,433,885,675	36.3	7,427,654,922	36.2	7,646,190,514	36.3
Treated Off-site	515,719,193	2.5	439,919,932	2.2	453,427,721	2.2	435,654,704	2.1
Quantity Released/ Disposed of	2,285,873,757	11.1	2,155,317,927	10.5	1,930,065,247	9.4	1,887,475,928	9.0
Total Production-Related Waste	20,575,134,928	100.0	20,459,585,417	100.0	20,499,276,406	100.0	21,071,650,889	100.0

② 1991 amounts are as reported for the previous year on 1992 Form R. All other years are as reported on the 1993 Form R.

③ Data for 1994 and 1995 are projections reported by the facilities. As projections, those quantities do not represent estimates of actual quantities for the 1994 or 1995 reporting years.

④ All data as reported on the 1993 Form R. The data in this table represent those forms that consistently reported data either by entering a quantity or a zero for each year and each management activity or by leaving the management activity blank for all four years.

Table 2-4. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1992-1995 (Alphabetically Ordered).

State	Year❺	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
Alabama	92	269,082,290	41,946,647	69,974,467	11,773,889
	93	309,718,033	47,054,489	62,705,886	11,174,282
	94	332,883,271	41,577,691	67,846,804	8,197,369
	95	334,550,366	47,707,931	70,900,497	8,313,037
Alaska	92	8,799	242,373	1,322,000	0
	93	7,846	450,043	1,322,000	0
	94	7,450	172,000	1,322,000	0
	95	7,400	0	1,122,000	0
American Samoa	92	0	0	0	0
	93	0	0	0	0
	94	0	0	0	0
	95	0	0	0	0
Arizona	92	455,229,533	24,601,160	362,390	886,695
	93	462,984,713	47,052,211	302,302	845,633
	94	467,198,543	45,861,877	319,311	941,719
	95	480,675,788	45,852,691	385,714	917,026
Arkansas	92	80,144,155	49,225,624	33,182,107	5,106,666
	93	81,577,547	61,067,846	22,201,299	6,016,661
	94	78,478,549	70,706,345	32,511,692	5,918,287
	95	77,776,959	79,791,879	26,707,322	5,894,828
California	92	100,324,406	135,337,882	207,661,072	9,395,520
	93	191,645,057	233,537,463	293,336,341	9,222,321
	94	183,574,985	228,823,467	297,416,190	8,648,210
	95	182,964,221	230,456,402	303,160,408	8,564,374
Colorado	92	19,602,806	9,395,383	8,477,400	1,946,672
	93	36,897,317	10,569,562	4,480,008	3,910,247
	94	23,733,953	11,169,752	4,580,000	4,830,395
	95	18,350,459	11,777,852	4,580,000	3,510,183
Connecticut	92	203,674,173	24,215,600	5,737,514	4,603,529
	93	133,850,127	25,923,236	6,005,655	4,143,072
	94	130,251,258	25,477,904	5,766,232	2,232,235
	95	55,178,644	26,008,567	4,920,103	1,965,132
Delaware	92	36,374,540	7,756,176	164,768	1,337,705
	93	25,772,082	16,313,872	169,638	461,997
	94	27,510,121	16,964,925	196,765	560,827
	95	31,775,212	17,978,911	201,860	549,862
Florida	92	122,145,397	22,810,915	40,746,163	15,570,536
	93	107,901,931	22,460,351	38,152,869	15,942,126
	94	130,201,429	20,551,348	54,385,290	15,553,331
	95	130,814,700	19,031,691	59,200,596	14,393,895
Georgia	92	371,415,506	57,642,194	50,000,586	6,931,084
	93	365,096,845	60,640,786	43,576,621	7,190,167
	94	373,582,721	62,119,708	45,880,044	6,461,560
	95	376,622,957	55,299,890	47,421,544	7,267,563

Table 2-4.

State	Year❺	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Waste Pounds	Non-Production-Related Waste Pounds
Alabama	92	588,126,030	12,558,462	114,014,652	1,107,476,437	
	93	664,259,530	11,804,744	113,308,911	1,220,025,875	846,137
	94	665,877,448	8,617,508	107,352,163	1,232,352,254	
	95	715,442,977	10,408,589	104,247,523	1,291,570,920	
Alaska	92	3,320,827	3,071	14,878,407	19,775,477	
	93	2,389,267	1,870	8,323,860	12,494,886	231,750
	94	1,118,500	1,764	6,918,811	9,540,525	
	95	1,122,700	1,645	6,047,542	8,301,287	
American Samoa	92	0	0	11,240	11,240	
	93	0	5,250	35,200	40,450	2,000
	94	0	0	13,000	13,000	
	95	0	0	11,500	11,500	
Arizona	92	51,546,102	6,496,204	45,582,649	584,704,733	
	93	48,975,801	2,928,514	13,615,521	576,704,695	9,680
	94	49,371,618	3,011,524	13,811,400	580,515,992	
	95	50,652,068	3,041,471	13,387,452	594,912,210	
Arkansas	92	177,159,771	1,669,108	44,737,129	391,224,560	
	93	175,483,666	2,199,695	39,820,445	388,367,159	97,439
	94	174,789,644	1,839,379	35,992,179	400,236,075	
	95	166,944,633	1,370,013	34,829,031	393,314,665	
California	92	328,998,182	29,134,345	80,056,548	890,907,955	
	93	347,862,404	28,012,413	69,521,203	1,173,137,202	451,865
	94	226,533,119	23,633,279	62,067,047	1,030,696,297	
	95	268,766,097	20,560,843	56,957,513	1,071,429,858	
Colorado	92	20,417,262	3,267,017	6,074,890	69,181,430	
	93	24,111,848	4,223,400	6,254,853	90,447,235	3,215
	94	25,555,504	2,697,104	5,836,699	78,403,407	
	95	25,250,336	2,733,984	5,198,509	71,401,323	
Connecticut	92	59,335,327	6,644,697	17,225,854	321,436,694	
	93	82,750,409	7,930,408	16,252,610	276,855,517	315,812
	94	77,067,253	6,585,106	11,863,119	259,243,107	
	95	75,528,014	6,497,251	8,791,735	178,889,446	
Delaware	92	67,964,896	3,132,203	5,437,078	122,167,366	
	93	93,420,993	4,013,323	5,014,786	145,166,691	19,711
	94	98,530,976	3,552,939	4,759,925	152,076,478	
	95	99,709,529	3,503,765	4,486,997	158,206,136	
Florida	92	190,472,910	17,093,333	86,992,823	495,832,077	
	93	224,523,993	13,627,153	69,749,246	492,357,669	74,202
	94	214,223,097	16,249,840	72,876,047	524,040,382	
	95	233,121,046	16,281,791	77,846,922	550,690,641	
Georgia	92	302,965,668	7,127,026	62,493,607	858,575,671	
	93	308,075,931	6,433,928	54,869,516	845,883,794	567,572
	94	317,118,817	6,562,962	52,789,604	864,515,416	
	95	323,265,971	6,316,653	50,805,593	867,000,171	

Table 2-4. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1992-1995 (Alphabetically Ordered), Continued.

State	Year⑤	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
Hawaii	92	3,249	26,749	1,600,000	0
	93	15,261	39,130	1,800,000	0
	94	17,602	40,000	1,900,000	0
	95	17,140	40,000	2,000,000	0
Idaho	92	179,813	322,476	0	269,299
	93	348,152	515,367	455,000	248,891
	94	1,169,571	568,540	507,000	267,799
	95	1,464,013	551,810	557,000	278,906
Illinois	92	159,188,132	132,551,441	36,325,659	40,901,364
	93	188,046,274	135,561,210	35,991,832	45,679,600
	94	194,750,165	128,549,450	40,295,239	42,979,635
	95	193,003,258	128,279,158	36,303,853	39,112,218
Indiana	92	270,162,801	393,456,314	59,508,798	19,015,553
	93	256,173,412	438,735,733	40,722,982	17,343,701
	94	241,991,805	442,644,490	42,713,520	18,048,672
	95	241,488,421	466,447,253	67,922,360	11,299,657
Iowa	92	44,660,699	20,207,268	1,737,759	3,505,365
	93	40,515,195	24,644,224	1,992,536	4,578,480
	94	56,316,188	29,921,185	2,032,666	4,241,053
	95	52,400,384	32,951,780	1,980,869	4,254,704
Kansas	92	578,126,146	36,281,675	531,673,874	2,607,070
	93	558,339,954	40,527,481	284,883,893	2,342,841
	94	442,793,410	43,826,773	300,534,972	2,392,338
	95	344,517,874	44,307,571	379,059,330	1,937,282
Kentucky	92	149,749,331	69,525,749	45,062,250	6,688,539
	93	187,325,614	66,652,900	56,599,125	9,251,654
	94	193,327,738	73,118,595	46,463,242	7,511,707
	95	195,957,851	78,515,670	44,476,028	7,628,812
Louisiana	92	724,014,369	243,836,277	365,463,694	6,715,193
	93	890,698,079	121,701,588	252,891,322	6,929,669
	94	972,121,792	128,491,794	245,328,372	6,154,363
	95	1,033,350,181	135,290,742	260,035,485	5,270,561
Maine	92	7,601,918	5,169,174	16,427,663	464,561
	93	7,305,310	5,411,587	11,602,689	594,469
	94	7,154,514	5,501,132	12,125,305	481,573
	95	7,570,532	5,324,108	13,011,998	433,957
Maryland	92	66,382,638	93,090,648	8,971,453	1,140,118
	93	41,917,634	54,775,776	9,483,555	2,565,513
	94	24,924,537	54,251,942	10,121,915	1,272,435
	95	24,875,340	50,757,330	10,664,111	1,256,951
Massachusetts	92	26,843,242	21,312,194	9,417,647	8,571,730
	93	26,131,288	24,974,852	10,234,202	8,089,194
	94	19,816,992	22,511,266	10,803,938	7,284,571
	95	19,798,658	21,886,975	10,371,543	6,572,751

Table 2-4, Cont.

State	Year 5	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Waste Pounds	Non-Production-Related Waste Pounds
Hawaii	92	5,653,605	5,222	916,286	8,205,111	
	93	5,664,617	5,076	733,298	8,257,382	10
	94	5,657,045	5,012	698,225	8,317,884	
	95	5,648,720	5,012	700,279	8,411,151	
Idaho	92	26,021,292	2,156,216	7,989,353	36,938,449	
	93	29,372,162	2,193,896	7,264,793	40,398,261	422,605
	94	23,332,731	1,329,241	6,107,533	33,282,415	
	95	23,003,541	1,050,319	6,518,249	33,423,838	
Illinois	92	411,114,015	79,753,205	142,706,598	1,002,540,414	
	93	452,098,889	76,593,706	141,047,586	1,075,019,097	329,964
	94	454,065,155	67,649,701	117,388,471	1,045,677,816	
	95	455,750,666	59,111,459	100,425,530	1,011,986,142	
Indiana	92	278,112,826	44,448,871	145,670,634	1,210,375,797	
	93	308,225,138	35,946,646	112,152,985	1,209,300,597	1,029,984
	94	234,551,843	33,600,818	96,346,122	1,109,897,270	
	95	253,516,518	31,748,688	92,033,809	1,164,456,706	
Iowa	92	79,120,380	10,131,225	35,996,106	195,358,802	
	93	88,536,759	11,067,473	33,097,199	204,431,866	141,992
	94	94,621,964	11,878,621	32,192,495	231,204,172	
	95	93,582,447	13,214,742	28,569,050	226,953,976	
Kansas	92	58,335,447	6,536,929	94,291,381	1,307,852,522	
	93	54,519,636	6,096,508	46,173,740	992,884,053	299,817
	94	58,629,364	5,771,663	35,853,140	889,801,660	
	95	59,331,474	5,578,346	30,100,422	864,832,299	
Kentucky	92	229,115,062	11,491,774	100,132,160	611,764,865	
	93	222,529,438	11,400,625	39,574,736	593,334,092	136,651
	94	228,051,820	9,579,654	36,565,246	594,618,002	
	95	231,186,461	9,305,549	34,234,424	601,304,795	
Louisiana	92	1,023,334,547	8,781,010	468,202,894	2,840,347,984	
	93	945,773,032	5,635,812	452,786,215	2,676,415,717	1,545,084
	94	914,191,655	5,302,649	214,008,886	2,485,599,511	
	95	928,485,645	5,343,318	216,319,184	2,584,095,116	
Maine	92	70,820,819	695,333	15,645,531	116,824,999	
	93	73,028,556	902,354	12,638,376	111,483,341	15,226
	94	74,689,145	911,866	11,425,768	112,289,303	
	95	75,189,553	729,936	10,695,633	112,955,717	
Maryland	92	335,091,823	6,580,783	13,146,664	524,404,127	
	93	290,167,768	7,462,204	13,391,686	419,764,136	13,880
	94	271,694,402	7,452,964	11,880,203	381,598,398	
	95	271,895,192	7,731,213	11,561,553	378,741,690	
Massachusetts	92	44,276,368	9,286,893	13,646,422	133,354,496	
	93	44,613,714	9,358,166	12,701,574	136,102,990	60,880
	94	43,395,752	8,197,244	10,006,826	122,016,589	
	95	44,948,393	7,764,344	8,998,813	120,341,477	

Table 2-4. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1992-1995 (Alphabetically Ordered), Continued.

State	Year❺	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
Michigan	92	151,764,340	191,941,982	65,442,273	49,629,817
	93	180,197,640	165,182,991	53,475,322	70,384,862
	94	249,818,671	167,949,828	57,213,220	61,479,715
	95	236,712,208	184,624,294	63,869,477	60,661,990
Minnesota	92	101,288,551	30,793,871	8,300,830	4,812,172
	93	107,378,603	17,368,872	13,388,944	5,446,555
	94	112,491,593	17,452,651	11,490,378	5,160,721
	95	117,873,156	18,837,780	11,469,390	5,095,783
Mississippi	92	4,236,333,578	66,639,307	17,553,331	3,455,963
	93	4,056,877,520	255,889,851	28,395,095	3,863,667
	94	4,275,046,713	233,345,478	80,073,850	3,517,172
	95	4,280,893,914	224,675,554	80,178,840	3,135,570
Missouri	92	149,298,186	42,994,874	262,156,514	8,873,982
	93	161,724,971	48,441,334	229,861,700	17,679,104
	94	160,428,524	49,541,589	236,647,041	18,008,836
	95	166,840,080	48,097,857	238,773,541	18,042,417
Montana	92	54,651,308	2,459,538	7,733,900	105,079
	93	38,598,872	1,940,916	6,209,700	72,664
	94	38,018,935	1,954,040	6,629,700	46,047
	95	38,018,975	1,962,340	6,682,800	18,697
Nebraska	92	31,170,550	22,091,612	2,834,737	1,086,215
	93	91,742,615	21,494,392	3,086,329	768,066
	94	85,647,639	21,147,098	2,954,867	703,961
	95	85,486,015	20,725,616	2,958,522	681,687
Nevada	92	5,069,513	456,279	0	12,769
	93	5,257,550	450,092	0	4,579
	94	10,296,409	376,392	0	6,085
	95	10,298,233	371,392	0	6,085
New Hampshire	92	22,777,519	6,624,440	2,507,317	403,534
	93	20,824,046	7,332,886	1,168,673	468,663
	94	14,256,017	8,085,002	1,600,254	400,008
	95	13,971,665	7,867,724	1,693,161	291,709
New Jersey	92	127,100,814	99,224,186	17,138,413	27,936,451
	93	80,113,034	95,791,722	18,265,525	28,614,453
	94	79,442,023	86,720,352	18,226,614	26,947,059
	95	82,561,491	87,031,162	18,166,521	26,181,740
New Mexico	92	261,735	245,301	18,896,000	206,970
	93	190,599	384,349	36,632,683	170,460
	94	179,724	158,569	36,656,493	188,904
	95	164,918	130,345	36,681,293	217,289
New York	92	220,155,653	67,411,641	19,339,898	10,101,953
	93	192,461,269	78,486,821	22,002,172	7,568,469
	94	178,679,485	69,771,685	23,910,776	7,454,831
	95	179,941,421	62,821,085	24,482,718	6,540,824

Table 2-4, Cont.

State	Year❺	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Waste Pounds	Non-Production-Related Waste Pounds
Michigan	92	335,591,022	26,395,869	98,940,478	919,705,781	
	93	339,528,010	31,126,087	108,420,893	948,315,805	790,619
	94	339,093,741	20,609,664	104,984,907	1,001,149,746	
	95	382,606,057	20,694,427	100,599,639	1,049,768,092	
Minnesota	92	55,905,728	7,931,737	29,675,691	238,708,580	
	93	60,906,675	8,054,308	25,301,149	237,845,106	62,230
	94	58,022,251	7,799,757	22,516,965	234,934,316	
	95	57,869,250	7,861,525	20,686,616	239,693,500	
Mississippi	92	184,279,817	2,763,262	112,744,908	4,623,770,166	
	93	169,213,374	3,887,220	116,165,073	4,634,291,800	114,068
	94	168,373,794	4,374,104	109,428,378	4,874,159,489	
	95	168,283,011	4,110,205	105,606,203	4,866,883,297	
Missouri	92	102,878,328	28,317,898	56,961,142	651,480,924	
	93	103,074,087	28,703,585	53,663,260	643,148,041	724,503
	94	109,788,427	28,792,439	50,622,364	653,829,220	
	95	110,670,582	29,356,034	49,020,154	660,800,665	
Montana	92	27,938,558	38,304	43,883,304	136,809,991	
	93	31,840,370	37,965	45,225,864	123,926,351	509
	94	33,894,540	30,012	44,458,260	125,031,534	
	95	34,115,940	25,012	44,464,260	125,288,024	
Nebraska	92	15,029,290	2,777,999	24,608,194	99,598,597	
	93	17,981,433	3,866,756	54,572,033	193,511,624	86,934
	94	17,142,729	13,806,331	22,885,635	164,288,260	
	95	16,924,254	3,701,504	23,579,377	154,056,975	
Nevada	92	20,636,540	26,869	3,799,102	30,001,072	
	93	11,581,009	23,788	8,382,310	25,699,328	950
	94	4,883,029	23,438	3,896,684	19,482,037	
	95	3,122,459	22,172	3,851,210	17,671,551	
New Hampshire	92	23,909,679	988,675	5,923,152	63,134,316	
	93	16,389,263	808,091	4,323,117	51,314,739	13,654
	94	17,273,702	614,774	3,304,713	45,534,470	
	95	16,540,355	505,451	2,744,749	43,614,814	
New Jersey	92	259,939,623	48,272,345	29,549,859	609,161,691	
	93	247,110,337	43,043,954	26,912,649	539,851,674	797,548
	94	218,324,235	39,638,687	23,780,591	493,079,561	
	95	209,510,010	35,462,275	22,165,830	481,079,029	
New Mexico	92	2,628,437	210,111	20,359,084	42,807,638	
	93	8,974,271	335,828	23,962,490	70,650,680	1,606
	94	9,805,165	364,463	22,589,541	69,942,859	
	95	10,468,819	417,301	23,603,746	71,683,711	
New York	92	230,637,578	16,279,928	61,357,593	625,284,244	
	93	226,696,817	15,014,935	53,048,112	595,278,595	82,048
	94	217,678,186	14,013,069	45,525,241	557,033,273	
	95	209,403,491	13,793,737	40,217,679	537,200,955	

Table 2-4. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1992-1995 (Alphabetically Ordered), Continued.

State	Year 5	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
North Carolina	92	185,091,281	122,147,483	21,015,277	11,371,403
	93	336,747,571	101,640,107	30,474,428	10,648,681
	94	350,901,654	103,757,485	33,196,847	8,871,276
	95	382,058,286	104,263,817	33,991,939	9,522,127
North Dakota	92	34,364	98,290	0	59,872
	93	12,136	218,670	0	46,780
	94	11,605	240,400	0	14,539
	95	11,149	240,400	0	13,439
Ohio	92	664,951,958	205,648,130	109,469,146	33,606,703
	93	584,105,466	195,565,483	108,816,233	30,474,063
	94	605,330,789	185,978,692	116,491,466	29,503,402
	95	690,079,577	190,338,687	123,026,503	29,328,096
Oklahoma	92	25,171,663	18,573,141	21,099,695	1,114,231
	93	106,293,704	21,667,450	5,490,915	2,694,434
	94	103,726,635	21,605,292	5,465,460	2,307,119
	95	104,035,002	21,818,264	5,465,460	2,046,898
Oregon	92	44,766,833	13,007,724	16,055,485	698,779
	93	41,951,929	15,006,783	9,065,600	594,817
	94	44,320,822	8,757,318	9,299,022	508,030
	95	53,958,672	8,490,367	9,297,812	486,245
Pennsylvania	92	514,973,921	198,090,312	94,674,903	17,836,265
	93	566,369,620	220,706,446	145,315,397	20,647,161
	94	573,137,263	221,369,084	162,133,292	17,980,644
	95	572,398,519	221,123,435	167,778,673	15,182,649
Puerto Rico	92	23,781,352	9,941,923	54,442	7,785,957
	93	25,748,447	14,576,692	840	8,219,197
	94	26,300,159	14,757,086	852	7,385,361
	95	26,057,837	13,911,369	877	7,629,301
Rhode Island	92	12,669,580	11,096,651	282,411	400,643
	93	12,673,871	11,730,820	275,643	477,296
	94	12,613,968	13,802,729	275,668	499,408
	95	12,723,487	14,656,734	268,061	517,732
South Carolina	92	174,631,930	88,568,308	119,249,606	8,890,845
	93	230,873,968	100,271,991	99,260,569	10,000,711
	94	218,230,262	100,167,222	97,827,920	8,089,436
	95	236,804,039	263,576,230	99,915,334	7,475,453
South Dakota	92	103,392	273,294	0	237,029
	93	36,869,073	305,646	766,600	219,835
	94	36,875,544	306,007	1,001,000	229,207
	95	36,883,172	244,760	1,053,300	252,762
Tennessee	92	153,848,222	60,665,522	54,751,320	8,658,706
	93	186,797,678	44,263,690	64,026,756	10,062,543
	94	172,216,008	48,964,554	63,852,277	9,926,119
	95	164,642,770	51,873,098	65,252,657	8,495,426

Table 2-4, Cont.

State	Year⑤	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Waste Pounds	Non-Production-Related Waste Pounds
North Carolina	92	423,638,211	11,048,205	112,315,551	886,627,411	
	93	343,734,953	13,354,676	96,392,855	932,993,271	354,593
	94	361,693,294	13,154,078	90,905,794	962,480,428	
	95	351,098,035	12,751,254	87,880,811	981,566,269	
North Dakota	92	1,967,104	197,412	1,806,473	4,163,515	
	93	1,852,227	248,631	1,551,454	3,929,898	0
	94	1,822,272	229,480	1,539,486	3,857,782	
	95	1,824,037	203,298	1,556,058	3,848,381	
Ohio	92	344,583,226	51,071,815	174,815,469	1,584,146,447	
	93	355,746,794	63,328,542	239,638,870	1,577,675,451	1,128,602
	94	356,119,407	42,071,458	214,204,943	1,549,700,157	
	95	348,363,296	38,648,788	211,470,555	1,631,255,502	
Oklahoma	92	58,062,320	4,279,566	30,103,892	158,404,508	
	93	55,346,032	3,044,430	29,899,122	224,436,087	2,072,186
	94	56,149,639	2,822,094	25,722,144	217,798,383	
	95	53,308,685	2,597,934	23,380,820	212,653,063	
Oregon	92	82,542,229	4,699,646	19,794,018	181,564,714	
	93	84,704,004	5,966,186	20,246,406	177,535,725	12,170
	94	89,062,186	5,615,886	16,367,542	173,930,806	
	95	90,596,270	5,570,359	18,925,354	187,325,079	
Pennsylvania	92	295,069,833	42,357,703	83,629,544	1,246,632,481	
	93	319,930,074	34,715,622	88,619,047	1,396,303,367	24,777,525
	94	345,310,055	34,254,249	83,840,051	1,438,024,638	
	95	346,554,098	34,394,849	77,311,274	1,434,743,497	
Puerto Rico	92	29,639,012	13,231,264	14,953,476	99,387,426	
	93	30,262,873	11,054,325	13,637,276	103,499,650	12,912
	94	25,444,155	11,793,010	12,083,310	97,763,933	
	95	27,233,806	11,254,412	10,779,214	96,866,816	
Rhode Island	92	17,939,264	837,889	5,631,341	48,857,779	
	93	14,036,665	861,538	6,102,675	46,158,508	357
	94	13,530,167	852,256	4,226,306	45,800,502	
	95	14,529,348	787,988	3,447,931	46,931,281	
South Carolina	92	170,426,858	9,013,609	65,540,972	636,322,128	
	93	179,672,997	9,596,143	61,199,857	690,876,236	54,657
	94	171,152,694	8,829,628	55,660,731	659,957,893	
	95	172,673,275	8,151,584	52,949,204	841,545,119	
South Dakota	92	36,834,686	227,008	3,197,858	40,873,267	
	93	28,950,940	244,742	2,120,588	69,477,424	0
	94	37,949,017	130,068	1,843,262	78,334,105	
	95	37,873,301	133,016	1,619,772	78,060,083	
Tennessee	92	314,308,417	22,939,409	206,226,626	821,398,222	
	93	199,627,169	23,303,089	199,190,387	727,271,312	323,422
	94	212,521,327	20,694,988	193,211,331	721,386,604	
	95	215,587,073	20,407,336	191,718,484	717,976,844	

Table 2-4. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1992-1995 (Alphabetically Ordered), Continued.

State	Year❺	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
Texas	92	913,570,960	320,197,333	619,949,646	82,133,313
	93	1,455,264,311	253,635,947	592,792,956	80,638,422
	94	1,540,741,541	278,250,566	639,607,885	74,465,510
	95	1,539,629,848	279,774,552	666,377,165	71,789,509
Utah	92	8,741,741	32,194,765	13,121	334,893
	93	9,327,258	34,067,194	8,843	345,021
	94	41,083,897	35,127,535	46,800	204,000
	95	39,171,443	34,830,300	51,480	215,996
Vermont	92	6,521,259	3,908,295	0	155,041
	93	4,369,696	3,928,848	4,600	190,002
	94	85,694	1,929,280	8,000	110,000
	95	61,400	1,230,046	8,000	86,000
Virgin Islands	92	634,700	765,194	0	0
	93	3,166,678	683,150	969,485	434
	94	131,471,700	672,000	1,070,000	500
	95	131,471,700	686,500	1,090,000	450
Virginia	92	166,547,322	25,068,861	44,192,331	8,653,620
	93	143,775,812	26,876,337	49,642,452	7,569,381
	94	151,030,804	27,265,693	51,755,341	7,040,339
	95	157,211,030	27,988,438	52,196,347	6,285,419
Washington	92	92,995,274	74,484,946	100,456,758	751,767
	93	89,315,039	62,201,182	121,694,471	650,251
	94	86,394,295	74,893,690	122,265,626	593,688
	95	85,663,744	75,359,598	123,059,527	551,459
West Virginia	92	315,417,488	36,968,167	8,069,842	9,718,892
	93	339,013,912	31,879,366	8,873,228	15,221,600
	94	315,940,782	31,464,101	10,363,118	9,561,183
	95	320,489,265	32,995,640	12,859,920	8,951,959
Wisconsin	92	74,798,065	49,164,035	11,497,736	7,545,710
	93	93,062,628	53,948,828	9,247,266	21,498,205
	94	84,702,241	49,323,274	9,456,133	22,749,264
	95	63,040,824	50,959,330	10,682,184	22,922,390
Wyoming	92	1,797,094	69,837	236,100	213
	93	77,933,321	65,512	222,760	4,047
	94	77,654,452	67,878	220,440	4,065
	95	77,660,852	70,348	220,440	4,065
Total	92	12,165,834,089	3,190,769,161	3,136,788,296	454,009,875
	93	13,191,306,508	3,324,614,075	2,838,344,940	511,774,941
	94	13,678,882,442	3,328,052,754	3,022,790,837	467,934,508
	95	13,709,975,050	3,549,835,273	3,202,534,563	442,052,865

Table 2-4, Cont.

State	Year[5]	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Waste Pounds	Non-Production-Related Waste Pounds
Texas	92	1,525,000,783	90,544,039	363,298,424	3,914,694,498	
	93	1,459,996,156	57,750,114	379,417,001	4,279,494,907	3,810,997
	94	1,441,013,751	54,940,462	390,735,462	4,419,755,177	
	95	1,489,704,130	54,434,751	382,308,659	4,484,018,614	
Utah	92	129,374,886	1,325,512	84,437,180	256,422,098	
	93	132,037,344	1,213,026	96,761,862	273,760,548	2,935,016
	94	121,074,444	1,452,848	90,483,916	289,473,440	
	95	70,977,509	1,555,570	91,460,134	238,262,432	
Vermont	92	7,577,669	472,950	773,306	19,408,520	
	93	7,111,033	285,790	796,710	16,686,679	0
	94	7,418,500	234,972	655,884	10,442,330	
	95	7,414,500	169,363	542,159	9,511,468	
Virgin Islands	92	203,170	50	1,590,223	3,193,337	
	93	868,391	6,952	1,730,938	7,426,028	49,557
	94	283,100	9,350	2,179,006	135,685,656	
	95	294,400	9,600	2,282,506	135,835,156	
Virginia	92	318,746,379	20,088,099	69,368,494	652,665,106	
	93	314,038,019	18,229,843	66,269,881	626,401,725	35,016
	94	364,146,396	17,184,999	61,111,318	679,534,890	
	95	443,665,914	17,110,511	58,724,410	763,182,069	
Washington	92	207,880,630	7,357,856	24,789,445	508,716,676	
	93	194,022,800	7,969,867	24,700,112	500,553,722	8,206
	94	195,360,923	8,181,487	23,180,320	510,870,029	
	95	196,571,303	8,716,715	22,407,124	512,329,470	
West Virginia	92	185,736,966	4,201,982	27,809,346	587,922,683	
	93	188,819,968	8,399,663	28,148,692	620,356,429	142,322
	94	201,754,421	8,442,453	26,327,572	603,853,630	
	95	204,142,109	9,610,425	25,939,874	614,989,192	
Wisconsin	92	122,045,933	15,455,489	45,038,600	325,545,568	
	93	135,543,066	15,447,844	45,035,236	373,783,073	208,710
	94	146,429,321	15,813,311	41,916,501	370,390,045	
	95	158,195,143	13,837,078	41,298,570	360,935,519	
Wyoming	92	1,322,962	4,327	14,406,997	17,837,530	
	93	2,292,591	18,393	16,598,558	97,135,182	0
	94	2,242,270	2,997	13,901,382	94,093,484	
	95	2,242,270	2,997	13,496,762	93,697,734	
Total	92	9,883,578,297	700,349,754	3,353,178,648	32,884,508,120	
	93	9,768,273,293	657,785,097	3,206,362,816	33,498,461,670	45,216,393
	94	9,597,823,990	601,207,650	2,750,842,449	33,447,534,630	
	95	9,854,704,711	568,596,402	2,658,806,401	33,986,505,265	

[5] 1992 and 1993 data are actual amounts reported on 1993 Form Rs; 1994 and 1995 data are facilities' projections reported on 1993 Form Rs.

Table 2-5. Actual and Projected Quantities of TRI Chemicals in Waste, by Industry, 1992-1995.

SIC Code	Industry	Year 6	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
20	Food	92	31,902,636	1,203,805	136,817	124,597
		93	34,092,056	1,268,438	170,599	137,791
		94	37,312,803	1,386,077	196,593	163,455
		95	27,583,999	1,202,451	203,776	128,250
21	Tobacco	92	54,925,473	0	0	0
		93	4,064,745	196,422	0	3,800
		94	0	0	0	0
		95	0	0	0	0
22	Textiles	92	11,053,359	1,438,556	4,528,937	1,381,189
		93	10,324,143	1,238,792	4,625,963	1,405,891
		94	10,790,415	1,037,477	4,618,347	1,313,740
		95	11,152,313	1,127,370	4,657,737	1,185,233
23	Apparel	92	175,317	283,727	0	403,824
		93	162,529	127,639	0	429,501
		94	148,474	114,500	0	340,673
		95	122,782	114,500	0	338,293
24	Lumber	92	18,580,857	939,109	1,672,742	2,769,515
		93	54,769,623	923,924	1,717,836	3,132,717
		94	53,141,243	831,793	1,675,189	2,738,414
		95	50,568,414	821,006	1,637,551	2,552,477
25	Furniture	92	2,350,476	3,325,765	181,092	6,854,886
		93	4,027,882	4,301,473	173,833	6,861,685
		94	3,968,241	4,034,504	176,836	6,359,997
		95	3,727,253	3,927,800	174,946	5,442,589
26	Paper	92	214,381,647	3,216,452	244,564,730	7,638,826
		93	226,235,417	3,782,179	211,165,880	8,311,791
		94	206,979,124	3,294,609	222,902,749	7,603,992
		95	201,820,419	3,083,031	228,917,581	7,032,348
27	Printing	92	181,169,539	6,589,494	193,386	4,385,377
		93	187,677,229	5,651,858	112,411	4,034,850
		94	190,110,578	5,260,251	86,570	3,525,949
		95	194,389,362	5,126,031	38,800	3,401,925
28	Chemicals	92	7,582,458,218	489,613,416	1,099,920,746	329,408,076
		93	8,297,900,012	456,724,671	958,828,808	371,219,308
		94	8,704,438,238	457,488,055	1,005,256,333	340,154,926
		95	8,862,289,546	617,884,954	1,043,588,589	328,887,744
29	Petroleum	92	344,419,749	724,908,848	696,707,167	918,717
		93	467,991,921	773,654,105	571,545,039	1,128,478
		94	588,100,675	788,029,123	551,635,374	5,929,426
		95	587,778,728	793,160,510	551,697,297	312,821
30	Plastics	92	299,278,661	16,713,661	12,158,859	10,971,423
		93	299,153,755	17,264,320	15,158,412	11,100,023
		94	183,709,638	21,575,027	16,164,952	9,508,937
		95	84,508,950	18,280,610	18,552,537	8,804,402
31	Leather	92	928,320	416,805	0	457,103
		93	858,199	287,049	0	356,512
		94	913,025	313,584	0	259,567
		95	1,017,357	322,833	0	197,422

Table 2-5.

SIC Code	Industry	Year 6	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Waste Pounds	Non-Production-Related Waste Pounds
20	Food	92	265,079,393	33,714,897	47,497,104	379,659,249	
		93	283,045,352	38,515,365	77,958,242	435,187,843	534,172
		94	279,395,966	37,619,752	43,057,057	399,131,703	
		95	275,265,167	38,254,807	41,634,922	384,273,372	
21	Tobacco	92	1,260,317	3,952	3,657,349	59,847,091	
		93	716,107	55,735	2,681,943	7,718,752	0
		94	538,830	36,600	830,393	1,405,823	
		95	564,630	47,628	744,136	1,356,394	
22	Textiles	92	53,604,350	6,163,746	21,989,107	100,159,244	
		93	58,503,183	6,570,727	22,202,455	104,871,154	14,929
		94	63,887,822	6,215,548	20,906,348	108,769,697	
		95	62,707,690	6,200,667	20,969,768	108,000,778	
23	Apparel	92	308,238	103,198	1,430,156	2,704,460	
		93	435,937	225,974	1,242,528	2,624,108	0
		94	331,732	235,008	962,970	2,133,357	
		95	338,356	236,955	845,862	1,996,748	
24	Lumber	92	4,628,447	1,064,077	31,717,449	61,372,196	
		93	5,538,348	1,256,828	31,448,010	98,787,286	284,843
		94	4,961,522	576,501	29,794,710	93,719,372	
		95	5,032,408	576,908	30,173,077	91,361,841	
25	Furniture	92	2,228,702	1,061,084	53,640,068	69,642,073	
		93	1,939,735	1,108,518	58,269,586	76,682,712	62,050
		94	2,108,200	936,284	52,859,872	70,443,934	
		95	2,158,654	872,352	50,621,746	66,925,340	
26	Paper	92	1,679,966,296	54,685,173	238,405,889	2,442,859,013	
		93	1,581,812,950	46,328,060	218,577,502	2,296,213,779	209,617
		94	1,584,134,540	49,331,585	207,959,281	2,282,205,880	
		95	1,558,751,891	49,351,315	203,261,648	2,252,218,233	
27	Printing	92	34,479,938	745,031	34,358,030	261,920,795	
		93	51,650,855	644,525	33,619,081	283,390,809	4,754
		94	60,880,641	604,992	32,312,923	292,781,904	
		95	72,913,248	593,692	31,539,043	308,002,101	
28	Chemicals	92	4,741,652,942	380,765,385	1,533,539,277	16,157,358,060	
		93	4,741,276,040	310,039,009	1,361,112,549	16,497,100,397	10,300,759
		94	4,728,501,934	283,133,604	1,085,559,818	16,604,532,908	
		95	4,936,677,773	261,499,023	1,034,456,111	17,085,283,740	
29	Petroleum	92	331,435,983	7,637,833	70,170,526	2,176,198,823	
		93	333,319,549	5,670,650	78,009,499	2,231,319,241	276,523
		94	299,706,484	4,864,906	76,099,458	2,314,365,446	
		95	299,246,683	4,799,891	74,252,358	2,311,248,288	
30	Plastics	92	65,324,599	5,845,356	143,566,977	553,859,536	
		93	61,699,513	7,565,866	136,745,291	548,687,180	703,572
		94	65,822,122	7,554,127	124,502,483	428,837,286	
		95	66,067,710	7,491,385	116,035,752	319,741,346	
31	Leather	92	23,633,820	4,297,112	12,704,046	42,437,206	
		93	25,831,947	4,266,142	12,473,829	44,073,678	1,153
		94	26,041,281	4,411,482	11,522,263	43,461,202	
		95	26,251,865	4,412,832	10,992,458	43,194,767	

Table 2-5. Actual and Projected Quantities of TRI Chemicals in Waste, by Industry, 1992-1995, Continued.

SIC Code	Industry	Year❻	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
32	Stone/Clay/Glass	92	94,631,559	2,613,228	839,845,472	2,826,980
		93	101,964,298	3,128,446	816,129,359	8,253,468
		94	103,592,802	2,341,235	953,933,597	6,917,410
		95	106,914,797	2,119,505	1,083,126,364	6,232,360
33	Primary Metals	92	1,675,645,042	813,594,826	35,743,895	11,274,949
		93	1,625,287,881	884,667,257	37,549,417	19,118,549
		94	1,747,451,158	901,664,776	40,735,111	11,988,100
		95	1,788,597,302	918,193,512	37,822,956	10,612,653
34	Fabr. Metals	92	300,657,713	269,223,806	66,586,197	12,979,529
		93	328,530,043	263,581,065	88,912,580	14,307,426
		94	324,498,946	250,932,812	92,668,855	13,717,734
		95	252,481,987	273,427,086	97,296,823	13,061,115
35	Machinery	92	93,949,565	40,180,193	190,642	2,928,454
		93	84,305,403	47,138,458	193,315	3,084,014
		94	70,688,320	46,496,240	180,037	2,547,163
		95	51,099,442	47,105,126	180,032	2,415,492
36	Electrical	92	233,633,062	302,598,564	4,740,670	11,638,334
		93	216,581,819	300,310,129	4,187,071	11,176,033
		94	216,201,660	299,590,996	4,466,863	10,004,826
		95	224,500,004	308,682,742	4,728,832	9,585,366
37	Transport. Equip.	92	81,436,002	170,772,911	2,119,569	22,195,986
		93	73,780,921	161,306,875	1,762,593	21,216,220
		94	53,947,405	155,567,803	1,224,013	20,084,328
		95	59,317,552	168,045,550	1,321,258	19,478,613
38	Measure./Photo.	92	7,021,632	17,545,015	1,067,100	5,071,031
		93	4,886,745	16,555,368	1,022,683	4,478,347
		94	3,145,124	14,007,084	931,000	3,831,542
		95	2,646,542	13,382,437	931,000	3,719,046
39	Miscellaneous	92	23,031,031	17,581,589	1,163,788	2,428,367
		93	24,034,623	21,027,795	1,871,828	3,291,759
		94	26,032,568	17,189,793	2,268,456	2,838,387
		95	27,508,368	17,439,905	2,629,674	2,056,508
	Multiple codes 20-39❼	92	898,653,704	303,750,359	124,711,262	16,438,106
		93	1,108,189,471	356,143,536	122,629,952	18,065,272
		94	1,114,092,959	351,583,516	123,056,451	17,388,894
		95	1,147,190,950	351,125,630	124,415,299	15,914,350
	No codes 20-39❽	92	15,550,527	4,259,032	555,225	914,606
		93	36,487,793	5,334,276	587,361	661,506
		94	39,619,046	5,313,499	613,511	717,048
		95	24,758,983	5,262,684	613,511	693,858
	Total	92	12,165,834,089	3,190,769,161	3,136,788,296	454,009,875
		93	13,191,306,508	3,324,614,075	2,838,344,940	511,774,941
		94	13,678,882,442	3,328,052,754	3,022,790,837	467,934,508
		95	13,709,975,050	3,549,835,273	3,202,534,563	442,052,865

Table 2-5, Cont.

SIC Code	Industry	Year❻	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Waste Pounds	Non-Production-Related Waste Pounds
32	Stone/Clay/Glass	92	197,122,631	4,304,659	26,913,208	1,168,257,737	
		93	246,466,367	5,962,498	26,536,977	1,208,441,413	864,977
		94	247,186,104	2,748,767	25,521,274	1,342,241,189	
		95	248,874,731	1,897,096	24,967,242	1,474,132,095	
33	Primary Metals	92	744,764,054	90,792,456	448,365,438	3,820,180,660	
		93	828,052,521	99,423,339	512,610,943	4,006,709,907	29,760,031
		94	787,635,699	87,967,034	502,818,793	4,080,260,671	
		95	789,554,557	91,515,067	511,304,477	4,147,600,524	
34	Fabr. Metals	92	205,613,223	21,055,571	111,426,758	987,542,797	
		93	227,672,238	20,245,401	129,921,538	1,073,170,291	210,012
		94	225,389,312	20,017,201	100,100,872	1,027,325,732	
		95	225,612,111	19,821,961	95,846,502	977,547,585	
35	Machinery	92	18,973,013	3,955,043	33,974,573	194,151,483	
		93	20,067,174	3,904,756	31,120,875	189,813,995	200,169
		94	20,428,827	3,524,546	27,115,544	170,980,677	
		95	20,421,325	3,401,269	22,870,089	147,492,775	
36	Electrical	92	222,361,630	19,301,606	58,590,632	852,864,498	
		93	229,337,350	19,824,910	52,003,576	833,420,888	934,219
		94	231,226,344	17,919,037	45,762,909	825,172,635	
		95	240,148,324	16,958,183	41,357,846	845,961,297	
37	Transport. Equip.	92	57,314,901	13,202,933	141,606,373	488,648,675	
		93	65,884,919	15,726,390	144,790,088	484,468,006	433,998
		94	67,720,618	14,566,182	133,604,900	446,715,249	
		95	68,074,578	14,257,992	128,544,300	459,039,843	
38	Measure./Photo.	92	55,667,511	5,491,144	46,240,959	138,104,392	
		93	50,633,179	4,376,720	28,867,130	110,820,172	11,506
		94	45,782,734	3,991,665	22,640,692	94,329,841	
		95	50,923,612	3,675,937	18,556,721	93,835,295	
39	Miscellaneous	92	7,669,851	1,362,295	19,600,279	72,837,200	
		93	9,049,698	1,529,275	20,565,011	81,369,989	11,930
		94	6,839,044	1,268,135	18,365,737	74,802,120	
		95	7,299,793	1,061,055	15,150,665	73,145,968	
	Multiple codes 20-39❼	92	1,005,763,801	44,290,415	250,790,552	2,644,398,199	
		93	781,261,084	63,976,337	205,132,926	2,655,398,578	386,847
		94	695,428,440	53,171,215	170,136,044	2,524,857,519	
		95	703,960,392	41,160,117	160,203,586	2,543,970,324	
	No codes 20-39❽	92	164,724,657	506,788	22,993,898	209,504,733	
		93	164,079,247	568,072	20,473,237	228,191,492	10,332
		94	153,875,794	513,479	18,408,108	219,060,485	
		95	193,859,213	510,270	24,478,092	250,176,611	
	Total	92	9,883,578,297	700,349,754	3,353,178,648	32,884,508,120	
		93	9,768,273,293	657,785,097	3,206,362,816	33,498,461,670	45,216,393
		94	9,597,823,990	601,207,650	2,750,842,449	33,447,534,630	
		95	9,854,704,711	568,596,402	2,658,806,401	33,986,505,265	

❻ 1992 and 1993 data are actual amounts reported on 1993 Form Rs; 1994 and 1995 data are facilities' projections reported on 1993 Form Rs.

❼ Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

❽ Facilities/forms that did not report an SIC code and facilities that reported SIC codes outside the 20-to-39 range.

Table 2-6. Quantities of TRI Chemicals in Waste, by Chemical, 1993 (Alphabetically Ordered).

CAS Number❾	Chemical	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
75-07-0	Acetaldehyde	135,000	74,473	7,054,586	180,615
60-35-5	Acetamide	0	0	53,200	0
67-64-1	Acetone	66,398,482	16,148,914	124,227,193	49,416,368
75-05-8	Acetonitrile	9,621,030	1,964,562	21,221,551	5,579,121
107-02-8	Acrolein	9,500	0	4,553,531	7,962
79-06-1	Acrylamide	1,961	171	0	56,776
79-10-7	Acrylic acid	2,659,250	64,054	18,950,799	4,541,976
107-13-1	Acrylonitrile	16,736,777	640	3,050,968	785,077
107-18-6	Allyl alcohol	250,485	0	573,554	141,466
107-05-1	Allyl chloride	393,630	0	2,970,000	112,329
7429-90-5	Aluminum (fume or dust)	20,658,278	73,576,512	300	25,218
1344-28-1	Aluminum oxide (fibrous forms)	409,105	2,316,308	400	1,676
60-09-3	4-Aminoazobenzene	0	0	0	0
92-67-1	4-Aminobiphenyl	0	0	0	0
7664-41-7	Ammonia	202,843,614	12,410,577	74,039,248	12,528,048
6484-52-2	Ammonium nitrate (solution)	76,792,475	775,075	0	0
7783-20-2	Ammonium sulfate (solution)	1,402,814	2,286,800	0	0
62-53-3	Aniline	47,731,590	3,400	7,169,424	932,396
90-04-0	o-Anisidine	0	0	560	0
104-94-9	p-Anisidine	0	0	0	0
120-12-7	Anthracene	538,054	9,154	152,827	139,880
7440-36-0	Antimony	2,016,131	3,949,872	0	2,558
—	Antimony compounds	12,522,123	1,457,345	0	31,885
7440-38-2	Arsenic	2,032,942	266,206	0	9
—	Arsenic compounds	4,625,730	309,691	0	5
1332-21-4	Asbestos (friable)	703,290	0	0	0
7440-39-3	Barium	42,452	48,240	0	90
—	Barium compounds	21,452,956	1,564,348	0	203,552
98-87-3	Benzal chloride	0	0	0	44,000
71-43-2	Benzene	64,592,187	1,079,229	26,250,860	1,996,334
92-87-5	Benzidine	0	0	0	0
98-07-7	Benzoic trichloride	0	0	0	0
98-88-4	Benzoyl chloride	0	0	0	4,906
94-36-0	Benzoyl peroxide	4,720	5,050	0	2,515
100-44-7	Benzyl chloride	1,640	0	0	310,991
7440-41-7	Beryllium	22,939	10,196	0	0
—	Beryllium compounds	6	31,840	0	0
92-52-4	Biphenyl	792,945	127,728	1,687,732	308,846
111-44-4	Bis(2-chloroethyl) ether	0	170,971	150,000	100
542-88-1	Bis(chloromethyl) ether	0	0	0	0
108-60-1	Bis(2-chloro-1-methylethyl)ether	900,000	0	8,600,000	0
103-23-1	Bis(2-ethylhexyl) adipate	1,697,753	165,181	103,200	135,787
353-59-3	Bromochlorodifluoromethane (Halon 1211)	5,450	0	0	0
74-83-9	Bromomethane	654,760	0	52,000	3,300
75-63-8	Bromotrifluoromethane (Halon 1301)	79,225	0	0	0
106-99-0	1,3-Butadiene	4,510,604	16,995,983	38,514,042	6,574
141-32-2	Butyl acrylate	156,554	67,843	2,471,725	54,268
71-36-3	n-Butyl alcohol	40,352,521	2,295,555	16,105,857	8,787,825
78-92-2	sec-Butyl alcohol	897,099	62,856	10,560,012	5,319,957
75-65-0	tert-Butyl alcohol	217,195	18,324	36,536,100	30,543,031
85-68-7	Butyl benzyl phthalate	2,378,907	157,534	0	123,598
106-88-7	1,2-Butylene oxide	0	0	1,015,000	370,015

Table 2-6.

Chemical	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Wastes Pounds	Non-Production-Related Wastes Pounds
Acetaldehyde	8,111,180	543,976	9,219,773	25,319,603	720
Acetamide	1	779	1,089,001	1,142,981	0
Acetone	104,039,141	20,485,217	128,689,551	509,404,866	312,531
Acetonitrile	13,213,913	3,879,709	16,952,717	72,432,603	4,533
Acrolein	867,333	8	125,129	5,563,463	70
Acrylamide	178,591	161,720	4,045,595	4,444,814	2,100
Acrylic acid	31,189,404	284,564	4,117,729	61,807,776	16,718
Acrylonitrile	17,582,897	975,519	5,304,610	44,436,488	1,819
Allyl alcohol	639,600	258,154	333,433	2,196,692	0
Allyl chloride	989,193	465,557	106,507	5,037,216	372
Aluminum (fume or dust)	110,206,399	3,571,325	6,748,279	214,786,311	150
Aluminum oxide (fibrous forms)	6,650	52,571	1,618,147	4,404,857	1
4-Aminoazobenzene	0	0	370	370	0
4-Aminobiphenyl	91,000	0	3	91,003	0
Ammonia	376,888,157	74,745,186	396,799,112	1,150,253,942	1,503,191
Ammonium nitrate (solution)	17,682,485	4,951,420	50,204,276	150,405,731	116,450
Ammonium sulfate (solution)	10,467,831	34,290,535	16,998,901	65,446,881	21,878
Aniline	2,963,373	2,019,463	2,194,851	63,014,497	970
o-Anisidine	3,155	0	1,088	4,803	0
p-Anisidine	1,049	2	12	1,063	0
Anthracene	83,423	20,409	135,058	1,078,805	19,847
Antimony	1,207,908	24,140	325,185	7,525,794	160
Antimony compounds	95,710	480,752	3,526,707	18,114,522	16,533
Arsenic	9,660	88,753	414,815	2,812,385	42
Arsenic compounds	123,263	715,548	4,175,145	9,949,382	893,055
Asbestos (friable)	507,266	98,958	5,658,165	6,967,679	81,086
Barium	38,410	7,042	794,321	930,555	9
Barium compounds	4,710,834	4,220,122	11,476,988	43,628,800	207,380
Benzal chloride	1,200	0	333	45,533	0
Benzene	33,534,801	2,085,219	11,218,310	140,756,940	119,249
Benzidine	0	0	16	16	0
Benzoic trichloride	210,000	250	6,345	216,595	0
Benzoyl chloride	466,047	956,698	14,028	1,441,679	0
Benzoyl peroxide	42,085	27,132	14,163	95,665	1,290
Benzyl chloride	161,063	11,674	19,680	505,048	120
Beryllium	998	307	20,678	55,118	0
Beryllium compounds	78	880	10,219	43,023	0
Biphenyl	1,592,756	707,137	1,128,544	6,345,688	16,512
Bis(2-chloroethyl) ether	237,776	17,470	13,370	589,687	0
Bis(chloromethyl) ether	13,100	0	291	13,391	0
Bis(2-chloro-1-methylethyl)ether	3,002,100	0	8,600	12,510,700	0
Bis(2-ethylhexyl) adipate	213,883	64,184	1,090,757	3,470,745	145
Bromochlorodifluoromethane (Halon 1211)	0	0	8,473	13,923	350
Bromomethane	48,770	650	3,174,526	3,934,006	30
Bromotrifluoromethane (Halon 1301)	0	0	40,835	120,060	510
1,3-Butadiene	38,354,572	104,951	3,130,210	101,616,936	91,015
Butyl acrylate	3,331,396	192,943	372,032	6,646,761	23,439
n-Butyl alcohol	27,774,811	3,264,793	30,861,821	129,443,183	33,928
sec-Butyl alcohol	2,056,949	76,364	885,716	19,858,953	42
tert-Butyl alcohol	2,202,275	1,702,604	2,467,988	73,687,517	1,401
Butyl benzyl phthalate	1,922,509	585,506	2,235,504	7,403,558	1,082
1,2-Butylene oxide	740,051	14	20,012	2,145,092	160

Table 2-6. Quantities of TRI Chemicals in Waste, by Chemical, 1993 (Alphabetically Ordered), Continued.

CAS Number⑨	Chemical	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
123-72-8	Butyraldehyde	0	560	265,948	245,206
569-64-2	C.I. Basic Green 4	0	0	0	0
989-38-8	C.I. Basic Red 1	0	0	0	230
2832-40-8	C.I. Disperse Yellow 3	0	0	0	0
81-88-9	C.I. Food Red 15	0	0	0	0
97-56-3	C.I. Solvent Yellow 3	0	0	0	0
7440-43-9	Cadmium	1,527,122	647,116	0	0
—	Cadmium compounds	2,558,846	1,439,094	0	1,142
156-62-7	Calcium cyanamide	0	0	0	0
133-06-2	Captan	1,833	0	0	0
63-25-2	Carbaryl	44,985	0	0	0
75-15-0	Carbon disulfide	19,240,256	4,574	3,044,802	248,258
56-23-5	Carbon tetrachloride	2,550,095	111,606	5,139,747	4,116
463-58-1	Carbonyl sulfide	0	0	886,727	0
120-80-9	Catechol	566	0	8,654,376	35,498
57-74-9	Chlordane	0	0	0	0
7782-50-5	Chlorine	104,216,068	1,411,775	1,741,504	7,827
10049-04-4	Chlorine dioxide	2,423,500	0	0	0
79-11-8	Chloroacetic acid	26,314	0	0	150
108-90-7	Chlorobenzene	14,449,380	1,401,430	795,258	635,348
75-00-3	Chloroethane	2,455,101	159,718	17,682,284	21,932
67-66-3	Chloroform	4,968,367	435,102	16,980,876	60,631
74-87-3	Chloromethane	468,103	0	5,474,874	57,369
107-30-2	Chloromethyl methyl ether	0	0	0	0
—	Chlorophenols	2,945,764	0	0	0
126-99-8	Chloroprene	81,469	499,144	187	121,297
1897-45-6	Chlorothalonil	3,779	625	0	0
7440-47-3	Chromium	32,653,695	85,563,352	29,518	4,712
—	Chromium compounds	39,469,001	42,236,520	39,516	88,674
7440-48-4	Cobalt	3,416,650	10,154,319	0	0
—	Cobalt compounds	482,380	1,963,188	0	116
7440-50-8	Copper	287,819,064	459,736,680	0	26,178
—	Copper compounds	255,742,333	134,655,253	0	65,868
8001-58-9	Creosote	49,622,563	291,749	5,700	635,338
120-71-8	p-Cresidine	0	0	0	0
1319-77-3	Cresol (mixed isomers)	1,299,784	155,407	3,767,745	385,881
108-39-4	m-Cresol	1,648,177	270,000	608,002	9,408
95-48-7	o-Cresol	56,330	0	484,000	7,250
106-44-5	p-Cresol	67,596	160,000	340,810	80,105
98-82-8	Cumene	296,607,339	93,673	5,547,498	873,887
80-15-9	Cumene hydroperoxide	25,000	0	0	706
135-20-6	Cupferron	0	0	0	0
—	Cyanide compounds	525,897	15,533	193,000	1,758
110-82-7	Cyclohexane	50,613,957	1,493,888	14,735,115	2,844,363
94-75-7	2,4-D (acetic acid)	162,238	0	0	0
1163-19-5	Decabromodiphenyl oxide	1,204,771	18,142	0	8,079
615-05-4	2,4-Diaminoanisole	0	0	0	0
101-80-4	4,4'-Diaminodiphenyl ether	0	0	0	0
25376-45-8	Diaminotoluene (mixed isomers)	0	0	4,169,087	376,100
95-80-7	2,4-Diaminotoluene	0	0	0	0
132-64-9	Dibenzofuran	88,351	3,609	10,300	19,988
106-93-4	1,2-Dibromoethane	6	1	2,000	661
84-74-2	Dibutyl phthalate	58,805	12,356	280,757	205,745
25321-22-6	Dichlorobenzene (mixed isomers)	0	0	68,221	15,128

Table 2-6, Cont.

Chemical	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Wastes Pounds	Non-Production-Related Wastes Pounds
Butyraldehyde	1,577,599	132,948	771,971	2,994,232	67
C.I. Basic Green 4	2	577	13	592	0
C.I. Basic Red 1	0	0	694	924	0
C.I. Disperse Yellow 3	10,857	3,150	11,284	25,291	0
C.I. Food Red 15	0	1,100	1	1,101	0
C.I. Solvent Yellow 3	0	0	0	0	0
Cadmium	85,488	8,302	146,911	2,414,939	51
Cadmium compounds	77,718	224,577	3,159,629	7,461,006	34,509
Calcium cyanamide	0	0	5	5	0
Captan	9,900	14,802	7,678	34,213	0
Carbaryl	274,991	19,314	21,189	360,479	0
Carbon disulfide	9,500,300	288,388	93,697,475	126,024,053	11,942
Carbon tetrachloride	14,828,380	906,664	2,352,503	25,893,111	53,137
Carbonyl sulfide	10,733,677	0	12,813,998	24,434,402	52
Catechol	2,330,404	36,021	80,595	11,137,460	1
Chlordane	2,550	62	51	2,663	0
Chlorine	245,067,216	1,092,286	76,351,231	429,887,907	16,186
Chlorine dioxide	68,087,901	130	1,625,142	72,136,673	1,329
Chloroacetic acid	1,359,783	1,208	16,228	1,403,683	50
Chlorobenzene	5,574,204	2,626,996	2,174,893	27,657,509	3,408
Chloroethane	22,903,408	395,637	2,675,942	46,294,022	3,357
Chloroform	14,082,436	2,405,711	14,413,609	53,346,732	83,399
Chloromethane	18,125,013	166,666	5,469,045	29,761,070	16,192
Chloromethyl methyl ether	18,000	0	2,316	20,316	0
Chlorophenols	238,136	36,613	116,490	3,337,003	576
Chloroprene	5,248,855	218,884	1,025,496	7,195,332	1,091
Chlorothalonil	16,627	12,265	203,656	236,952	20
Chromium	1,216,709	3,210,509	5,933,445	128,611,940	37,984
Chromium compounds	90,265,144	16,783,289	47,567,578	236,449,722	1,238,758
Cobalt	159,371	53,616	180,282	13,964,238	0
Cobalt compounds	649,372	88,109	551,945	3,735,110	646
Copper	52,355,544	1,367,076	17,996,283	819,300,825	173,939
Copper compounds	142,266,907	2,297,055	55,263,710	590,291,126	4,978,812
Creosote	448,122	530,209	1,722,234	53,255,915	954,588
p-Cresidine	769	29,223	493	30,485	0
Cresol (mixed isomers)	6,662,763	197,243	1,375,381	13,844,204	21,003
m-Cresol	29,130	60,794	571,792	3,197,303	432
o-Cresol	12,889	51,898	734,263	1,346,630	93
p-Cresol	22,653	891,405	295,116	1,857,685	242
Cumene	3,985,087	93,593	2,600,700	309,801,777	17,217
Cumene hydroperoxide	763,890	4,992	490,589	1,285,177	0
Cupferron	0	2,356	59	2,415	0
Cyanide compounds	10,816,903	454,805	3,343,675	15,351,571	3,965
Cyclohexane	25,589,789	1,660,143	10,420,987	107,358,242	252,037
2,4-D (acetic acid)	51,279	35,055	24,972	273,544	17,413
Decabromodiphenyl oxide	41,173	107,822	1,507,173	2,887,160	0
2,4-Diaminoanisole	0	0	13	13	0
4,4'-Diaminodiphenyl ether	17,942	23,550	2,380	43,872	0
Diaminotoluene (mixed isomers)	1,198,952	535,774	44,403	6,324,316	188
2,4-Diaminotoluene	0	57,902	1,811	59,713	0
Dibenzofuran	838	81	53,741	176,908	1,953
1,2-Dibromoethane	56,699	502,957	20,046	582,370	5,115
Dibutyl phthalate	117,219	119,196	419,197	1,213,275	4,509
Dichlorobenzene (mixed isomers)	275,037	14,540	6,716	379,642	0

Table 2-6. Quantities of TRI Chemicals in Waste, by Chemical, 1993 (Alphabetically Ordered), Continued.

CAS Number⑨	Chemical	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
95-50-1	1,2-Dichlorobenzene	2,479,359	3,148,368	184,552	381,124
541-73-1	1,3-Dichlorobenzene	1,678	6,750	65,000	450
106-46-7	1,4-Dichlorobenzene	560,790	6,090	0	0
91-94-1	3,3'-Dichlorobenzidine	0	0	0	3,100
75-27-4	Dichlorobromomethane	0	0	0	0
75-71-8	Dichlorodifluoromethane (CFC-12)	689,072	330,859	15,271	15,378
107-06-2	1,2-Dichloroethane	88,627,715	8,167,906	30,603,809	271,023
540-59-0	1,2-Dichloroethylene	841,687	2,001	2,230,155	0
75-09-2	Dichloromethane	86,323,177	21,079,024	10,502,937	3,252,921
120-83-2	2,4-Dichlorophenol	1,473	0	0	0
78-87-5	1,2-Dichloropropane	37,653,107	2,711,000	21,900,000	7
78-88-6	2,3-Dichloropropene	4,500,000	0	990,000	0
542-75-6	1,3-Dichloropropylene	3,943,000	5,432	13,450,000	1
76-14-2	Dichlorotetrafluoroethane (CFC-114)	822,600	24,730	0	0
62-73-7	Dichlorvos	220	0	0	190
115-32-2	Dicofol	120	0	0	0
111-42-2	Diethanolamine	45,801	332,781	8,463	99,622
117-81-7	Di-(2-ethylhexyl) phthalate	2,802,591	5,901,124	263,159	237,925
84-66-2	Diethyl phthalate	225,348	357,899	213,586	116,983
64-67-5	Diethyl sulfate	0	5,400,550	0	52
119-90-4	3,3'-Dimethoxybenzidine	0	0	0	0
57-14-7	1,1-Dimethyl hydrazine	0	8	0	0
105-67-9	2,4-Dimethylphenol	23,503	22,359	1,161,940	25,884
131-11-3	Dimethyl phthalate	1,482	200	427,546	29,241
77-78-1	Dimethyl sulfate	0	39,542	0	0
99-65-0	m-Dinitrobenzene	0	0	1,600	0
528-29-0	o-Dinitrobenzene	0	0	0	0
100-25-4	p-Dinitrobenzene	0	0	0	0
534-52-1	4,6-Dinitro-o-cresol	2,000	0	898,031	1,376
51-28-5	2,4-Dinitrophenol	0	0	500,002	0
121-14-2	2,4-Dinitrotoluene	0	0	1,676	300
606-20-2	2,6-Dinitrotoluene	0	0	419	0
25321-14-6	Dinitrotoluene (mixed isomers)	0	0	0	200
123-91-1	1,4-Dioxane	816,106	17,598	197,453	738,170
106-89-8	Epichlorohydrin	6,844,483	0	6,060,000	18,447
110-80-5	2-Ethoxyethanol	6,407	328,890	853,464	149,360
140-88-5	Ethyl acrylate	1,060	38,620	6,217,917	1,376,902
100-41-4	Ethylbenzene	20,784,788	3,674,895	45,773,744	9,094,385
541-41-3	Ethyl chloroformate	0	0	0	0
74-85-1	Ethylene	433,212,167	0	401,227,039	17,795,713
107-21-1	Ethylene glycol	276,503,268	111,960,647	9,257,637	8,818,394
151-56-4	Ethyleneimine	0	0	0	0
75-21-8	Ethylene oxide	2,589,952	0	34,920	1
96-45-7	Ethylene thiourea	0	1,347	0	0
2164-17-2	Fluometuron	0	8,300	0	0
50-00-0	Formaldehyde	163,422,324	59,582	5,177,394	236,678
76-13-1	Freon 113	13,899,484	2,989,101	0	190,821
—	Glycol ethers	186,211,860	4,478,185	17,713,358	13,173,610
76-44-8	Heptachlor	0	0	0	0
118-74-1	Hexachlorobenzene	3,500	1	46,000	0
87-68-3	Hexachloro-1,3-butadiene	427,000	0	98,597	0
77-47-4	Hexachlorocyclopentadiene	0	0	0	600
67-72-1	Hexachloroethane	753,300	0	463,012	41,000

Table 2-6, Cont.

Chemical	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Wastes Pounds	Non-Production-Related Wastes Pounds
1,2-Dichlorobenzene	133,342	1,601,383	422,003	8,350,131	28,154
1,3-Dichlorobenzene	9	6,359	10,144	90,390	8
1,4-Dichlorobenzene	1,965	104,611	366,332	1,039,788	4,511
3,3'-Dichlorobenzidine	1,296	11,025	5,001	20,422	0
Dichlorobromomethane	0	0	180	180	0
Dichlorodifluoromethane (CFC-12)	318,334	118,794	7,348,962	8,836,670	132,143
1,2-Dichloroethane	50,109,912	1,808,104	2,335,592	181,924,061	209,528
1,2-Dichloroethylene	5,217,436	142	28,798	8,320,219	663
Dichloromethane	27,362,316	10,509,299	66,718,011	225,747,685	177,848
2,4-Dichlorophenol	119,111	83	8,321	128,988	0
1,2-Dichloropropane	16,711,801	54	585,091	79,561,060	1,030
2,3-Dichloropropene	2,458,000	600,000	170,116	8,718,116	0
1,3-Dichloropropylene	1,068,052	2,252	32,567	18,501,304	0
Dichlorotetrafluoroethane (CFC-114)	181,910	6,382	1,114,154	2,149,776	3,150
Dichlorvos	51	2,980	1,142	4,583	1
Dicofol	0	2,154	13	2,287	0
Diethanolamine	2,528,824	1,658,354	1,015,086	5,688,931	4,947
Di-(2-ethylhexyl) phthalate	345,890	477,604	1,900,495	11,928,788	8,516
Diethyl phthalate	226,257	347,657	175,993	1,663,723	2,171
Diethyl sulfate	2,672	1,529	21,977	5,426,780	0
3,3'-Dimethoxybenzidine	34	0	4	38	0
1,1-Dimethyl hydrazine	2,647	2,940	190	5,785	0
2,4-Dimethylphenol	113,506	21,496	86,832	1,455,520	342
Dimethyl phthalate	267,121	152,823	90,580	968,993	2
Dimethyl sulfate	1,078,615	504	5,762	1,124,423	0
m-Dinitrobenzene	200,992	0	19,517	222,109	1
o-Dinitrobenzene	305,780	0	283	306,063	0
p-Dinitrobenzene	5,009	0	53	5,062	0
4,6-Dinitro-o-cresol	70,000	6,524	11,070	989,001	0
2,4-Dinitrophenol	590,000	9,000	27,541	1,126,543	32
2,4-Dinitrotoluene	309	0	2,198	4,483	0
2,6-Dinitrotoluene	10,946	0	683	12,048	0
Dinitrotoluene (mixed isomers)	501,959	524,110	113,885	1,140,154	3,890
1,4-Dioxane	836,212	466,283	969,623	4,041,445	56
Epichlorohydrin	7,657,108	973,035	386,717	21,939,790	7,007
2-Ethoxyethanol	1,301,002	412,418	302,292	3,353,833	151,727
Ethyl acrylate	1,229,337	246,936	193,764	9,304,536	970
Ethylbenzene	12,758,440	1,294,870	11,481,389	104,862,511	31,610
Ethyl chloroformate	113,584	0	2,224	115,808	55
Ethylene	373,484,832	87,955	32,082,205	1,257,889,911	1,456,298
Ethylene glycol	58,288,557	26,791,740	19,942,550	511,562,793	355,081
Ethyleneimine	0	0	0	0	0
Ethylene oxide	7,224,009	43,321	1,244,035	11,136,238	20,234
Ethylene thiourea	7	5,883	681	7,918	0
Fluometuron	0	33,831	1,054	43,185	0
Formaldehyde	57,588,167	4,452,189	18,330,838	249,267,172	190,061
Freon 113	230,213,438	520,517	9,552,835	257,366,196	45,408
Glycol ethers	27,921,395	14,735,428	47,436,469	311,670,305	74,420
Heptachlor	2,190	77,329	31	79,550	0
Hexachlorobenzene	4,090,230	18,957	718,958	4,877,646	2,150
Hexachloro-1,3-butadiene	5,394,265	20,990	3,364	5,944,216	2,589
Hexachlorocyclopentadiene	298,534	9,846	3,960	312,940	590
Hexachloroethane	2,588,383	49,283	26,373	3,921,351	2,374

Table 2-6. Quantities of TRI Chemicals in Waste, by Chemical, 1993 (Alphabetically Ordered), Continued.

CAS Number⑨	Chemical	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
302-01-2	Hydrazine	0	8	0	30,000
10034-93-2	Hydrazine sulfate	0	0	0	0
7647-01-0	Hydrochloric acid	125,060,092	64,030,063	10,630	8,497,952
74-90-8	Hydrogen cyanide	49,885	0	12,036,599	54
7664-39-3	Hydrogen fluoride	67,197,306	307,196	39,579	0
123-31-9	Hydroquinone	1,218	9,700	511,406	881
78-84-2	Isobutyraldehyde	0	200	4,323,331	668,931
67-63-0	Isopropyl alcohol (manufacturing)	214,224	191,250	13,382,540	275,201
80-05-7	4,4'-Isopropylidenediphenol	171,345	0	6,533,585	24,181
7439-92-1	Lead	282,954,083	40,606,123	34,925	7,232
—	Lead compounds	399,305,981	250,501,024	4,400	73,190
58-89-9	Lindane	681	0	0	0
108-31-6	Maleic anhydride	3,177	0	2,421,560	105,858
12427-38-2	Maneb	888	0	0	0
7439-96-5	Manganese	24,493,022	71,987,672	0	1,718
—	Manganese compounds	87,050,545	44,574,365	0	22,832
7439-97-6	Mercury	13,868,594	11,448	0	0
—	Mercury compounds	100,469	12,840	0	0
67-56-1	Methanol	485,824,704	17,087,923	286,383,015	61,626,050
72-43-5	Methoxychlor	0	0	0	0
109-86-4	2-Methoxyethanol	2,510,644	420	1,205,208	580,319
96-33-3	Methyl acrylate	960,000	14,726	432,131	254,571
1634-04-4	Methyl tert-butyl ether	502,295	49,427	83,200	654,158
101-14-4	4,4'-Methylenebis(2-chloroaniline)	0	0	0	983
101-68-8	Methylenebis(phenylisocyanate)	24,250	465,511	227,308	164,349
74-95-3	Methylene bromide	1,288,700	0	0	300
101-77-9	4,4'-Methylenedianiline	1,700	0	70,698	8,455
78-93-3	Methyl ethyl ketone	170,138,600	21,612,758	99,289,155	46,796,184
60-34-4	Methyl hydrazine	0	0	0	0
74-88-4	Methyl iodide	0	0	1,200	350
108-10-1	Methyl isobutyl ketone	50,396,415	23,026,951	39,090,875	12,145,798
624-83-9	Methyl isocyanate	0	0	0	0
80-62-6	Methyl methacrylate	3,252,855	340,634	2,056,133	1,075,334
90-94-8	Michler's ketone	0	0	0	216
1313-27-5	Molybdenum trioxide	3,876,667	3,328,971	0	0
76-15-3	Monochloropentafluoroethane (CFC-115)	25,000	0	0	0
91-20-3	Naphthalene	12,097,439	251,393	6,780,604	1,373,870
134-32-7	alpha-Naphthylamine	0	0	0	0
7440-02-0	Nickel	25,539,984	60,537,307	0	3,336
—	Nickel compounds	23,112,383	33,399,518	0	4,695
7697-37-2	Nitric acid	28,955,894	2,888,577	24,100	44
139-13-9	Nitrilotriacetic acid	0	0	0	0
99-59-2	5-Nitro-o-anisidine	0	0	0	0
98-95-3	Nitrobenzene	5,317,000	3,370	1,873,320	19,500
55-63-0	Nitroglycerin	15,375	0	0	2
88-75-5	2-Nitrophenol	100	0	25,210	4,592
100-02-7	4-Nitrophenol	0	0	860	0
79-46-9	2-Nitropropane	0	3,400	67,701	103
156-10-5	p-Nitrosodiphenylamine	0	0	8,500	15,000
121-69-7	N,N-Dimethylaniline	40,000	0	280	609,313
86-30-6	N-Nitrosodiphenylamine	0	0	0	0
56-38-2	Parathion	0	0	0	0
87-86-5	Pentachlorophenol	1,908,339	1,555	0	41,004

Table 2-6, Cont.

Chemical	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Wastes Pounds	Non-Production-Related Wastes Pounds
Hydrazine	116,604	74,087	20,385	241,084	491
Hydrazine sulfate	0	0	220,001	220,001	0
Hydrochloric acid	1,874,940,919	74,433,384	241,034,754	2,388,007,794	257,987
Hydrogen cyanide	22,841,234	575	3,056,727	37,985,074	874
Hydrogen fluoride	115,796,794	2,212,698	8,435,119	193,988,692	3,249
Hydroquinone	409,576	178,405	509,628	1,620,814	127
Isobutyraldehyde	481,755	47,972	438,603	5,960,792	72
Isopropyl alcohol (manufacturing)	195,876	158,196	1,359,223	15,776,510	10
4,4'-Isopropylidenediphenol	1,191,050	92,225	1,294,707	9,307,093	10,473
Lead	8,044,440	868,209	5,973,268	338,488,280	16,972
Lead compounds	33,266,050	5,537,317	28,070,134	716,758,096	4,459,565
Lindane	0	78	402	1,161	0
Maleic anhydride	28,552,581	722,046	383,273	32,188,495	79,077
Maneb	0	104	160,721	161,713	0
Manganese	155,872	432,374	20,100,390	117,171,048	5,979
Manganese compounds	312,616	4,550,448	65,340,486	201,851,292	4,259,866
Mercury	44,176	1,099	32,489	13,957,806	1
Mercury compounds	0	230	24,648	138,187	33,702
Methanol	865,266,811	122,069,287	222,161,442	2,060,419,232	231,942
Methoxychlor	114	1	96	211	0
2-Methoxyethanol	5,742,205	1,234,166	1,235,762	12,508,724	168
Methyl acrylate	1,281,313	124,646	252,500	3,319,887	11
Methyl tert-butyl ether	2,759,792	196,750	3,900,842	8,146,464	871
4,4'-Methylenebis(2-chloroaniline)	70	729	15	1,797	0
Methylenebis(phenylisocyanate)	989,202	690,852	1,922,865	4,484,337	28,421
Methylene bromide	143,299	3,073	55,942	1,491,314	0
4,4'-Methylenedianiline	136,270	74,473	58,536	350,132	138
Methyl ethyl ketone	54,609,698	6,533,657	85,805,403	484,785,455	119,432
Methyl hydrazine	116	74	25	215	0
Methyl iodide	49	230	33,033	34,862	1,080
Methyl isobutyl ketone	12,760,735	1,919,172	25,426,035	164,765,981	40,412
Methyl isocyanate	33,132	0	5,762	38,894	1
Methyl methacrylate	3,201,113	988,487	2,690,299	13,604,855	7,873
Michler's ketone	0	0	1,442	1,658	0
Molybdenum trioxide	11,852	117,521	872,759	8,207,770	298
Monochloropentafluoroethane (CFC-115)	66,181	0	512,758	603,939	43,384
Naphthalene	9,092,389	370,250	3,075,634	33,041,579	24,742
alpha-Naphthylamine	0	0	2	2	0
Nickel	2,171,664	1,045,702	12,939,803	102,237,796	7,787
Nickel compounds	443,339	1,390,715	7,210,740	65,561,390	1,586,831
Nitric acid	284,783,246	13,804,906	24,934,305	355,391,072	76,008
Nitrilotriacetic acid	821,894	0	6,954	828,848	0
5-Nitro-o-anisidine	0	0	5	5	0
Nitrobenzene	665,211	287,524	381,740	8,547,665	851
Nitroglycerin	310,505	37,655	41,146	404,683	0
2-Nitrophenol	355,713	42,430	28	428,073	0
4-Nitrophenol	73,600	923,001	787	998,248	0
2-Nitropropane	41,804	12,223	48,792	174,023	0
p-Nitrosodiphenylamine	0	0	5,424	28,924	0
N,N-Dimethylaniline	19,595	202,889	20,787	892,864	0
N-Nitrosodiphenylamine	0	430,000	0	430,000	0
Parathion	0	7,846	1,226	9,072	0
Pentachlorophenol	46,953	69,532	47,877	2,115,260	1,208

Table 2-6. Quantities of TRI Chemicals in Waste, by Chemical, 1993 (Alphabetically Ordered), Continued.

CAS Number❾	Chemical	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
79-21-0	Peracetic acid	21,060	0	0	0
108-95-2	Phenol	32,197,109	873,381	17,450,718	2,372,306
106-50-3	p-Phenylenediamine	0	0	49,000	0
90-43-7	2-Phenylphenol	330	0	7,300	339
75-44-5	Phosgene	0	0	380	0
7664-38-2	Phosphoric acid	172,057,033	11,693,742	21,980	21
7723-14-0	Phosphorus (yellow or white)	4,060	183,305	0	0
85-44-9	Phthalic anhydride	726,907	0	1,655,643	4,040,383
88-89-1	Picric acid	0	0	368,002	0
—	Polybrominated biphenyls	0	0	0	0
1336-36-3	Polychlorinated biphenyls (PCBs)	0	0	0	17,587
1120-71-4	Propane sultone	0	0	0	0
123-38-6	Propionaldehyde	0	0	3,453,799	6,503
114-26-1	Propoxur	0	0	0	0
115-07-1	Propylene	67,896,366	0	489,142,299	2,187,600
75-55-8	Propyleneimine	0	0	0	0
75-56-9	Propylene oxide	10,499	0	5,095,200	95,664
110-86-1	Pyridine	1,789,102	3,609	388,559	172,416
91-22-5	Quinoline	5,929	3,609	250,553	21,328
106-51-4	Quinone	0	0	11,782	0
82-68-8	Quintozene	641	0	0	0
81-07-2	Saccharin (manufacturing)	0	0	0	0
7782-49-2	Selenium	30	27,911	0	0
—	Selenium compounds	148,085	229,000	0	0
7440-22-4	Silver	231,324	644,465	0	0
—	Silver compounds	669,123	1,396,291	0	0
100-42-5	Styrene	59,850,775	1,975,880	28,344,927	5,524,776
96-09-3	Styrene oxide	2,210	0	69,993	0
7664-93-9	Sulfuric acid	5,929,042,911	1,208,090,997	85,143	48,630
79-34-5	1,1,2,2-Tetrachloroethane	7,400,000	1,737,712	1,460,234	0
127-18-4	Tetrachloroethylene	75,066,459	7,712,315	11,124,256	887,593
961-11-5	Tetrachlorvinphos	89,000	0	76	0
7440-28-0	Thallium	50,000	400	0	0
62-56-6	Thiourea	0	0	0	0
1314-20-1	Thorium dioxide	0	0	0	0
7550-45-0	Titanium tetrachloride	5,400,000	0	0	86
108-88-3	Toluene	1,159,918,428	31,868,427	254,771,684	86,966,647
584-84-9	Toluene-2,4-diisocyanate	30,727	32,000	19,632	16,620
91-08-7	Toluene-2,6-diisocyanate	7,461	8,100	3,960	4,746
26471-62-5	Toluenediisocyanate (mixed isomers)	46,440	3,247	5,600,001	42,783
95-53-4	o-Toluidine	1	0	413,000	41,913
52-68-6	Trichlorfon	125	0	0	0
120-82-1	1,2,4-Trichlorobenzene	89,245	510	12,000	30,930
71-55-6	1,1,1-Trichloroethane	111,402,660	14,606,493	4,534,328	2,408,852
79-00-5	1,1,2-Trichloroethane	21,793,731	12,136,563	17,314,745	23,308
79-01-6	Trichloroethylene	293,306,078	7,091,492	1,216,631	1,485,511
75-69-4	Trichlorofluoromethane (CFC-11)	4,171,014	294,088	0	227,402
88-06-2	2,4,6-Trichlorophenol	0	0	0	0
1582-09-8	Trifluralin	1,725	0	0	0
95-63-6	1,2,4-Trimethylbenzene	15,072,194	1,497,441	5,875,688	2,958,793
51-79-6	Urethane	0	0	0	0
7440-62-2	Vanadium (fume or dust)	207,569	43	0	0
108-05-4	Vinyl acetate	5,648,415	821,973	7,951,177	8,458,014

Table 2-6, Cont.

Chemical	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Wastes Pounds	Non-Production-Related Wastes Pounds
Peracetic acid	7,601	3,609	3,143	35,413	36
Phenol	29,475,652	6,320,068	11,238,508	99,927,742	32,887
p-Phenylenediamine	1,230,807	32,273	13,594	1,325,674	2
2-Phenylphenol	278,387	2,157	27,370	315,883	0
Phosgene	13,315,880	1,000	5,051	13,322,311	65
Phosphoric acid	301,206,759	5,209,738	214,596,798	704,786,071	119,488
Phosphorus (yellow or white)	38,012	2,114	79,456	306,947	36,733
Phthalic anhydride	18,848,215	243,853	579,473	26,094,474	2,108
Picric acid	1,307,368	0	64,296	1,739,666	0
Polybrominated biphenyls	0	0	380	380	0
Polychlorinated biphenyls (PCBs)	0	188,076	10,415	216,078	28,404
Propane sultone	0	0	140	140	0
Propionaldehyde	426,955	1,156	533,425	4,421,838	1
Propoxur	1	1,943	3	1,947	0
Propylene	216,034,848	388,948	18,147,650	793,797,711	289,550
Propyleneimine	750	0	336	1,086	32
Propylene oxide	9,070,075	40,106	1,044,927	15,356,471	8,248
Pyridine	814,684	404,285	516,913	4,089,568	51
Quinoline	140,505	1,886	91,685	515,495	534
Quinone	110,000	6,776	17,001	145,559	0
Quintozene	0	522,414	1,780	524,835	0
Saccharin (manufacturing)	6,900	10,007	890	17,797	0
Selenium	400	2,556	5,733	36,630	0
Selenium compounds	49,000	11,769	216,566	654,420	14,185
Silver	74,995	1,425	9,102	961,311	11
Silver compounds	4,011,471	14,073	53,605	6,144,563	1,968
Styrene	26,376,107	3,724,211	35,192,263	160,988,939	119,450
Styrene oxide	11,011	0	301	83,515	0
Sulfuric acid	2,946,897,184	53,225,378	254,999,222	10,392,389,465	1,450,864
1,1,2,2-Tetrachloroethane	8,927,402	32,737	30,783	19,588,868	24
Tetrachloroethylene	16,700,355	2,488,782	11,651,832	125,631,592	651,550
Tetrachlorvinphos	0	4,277	8,870	102,223	0
Thallium	0	5	1,000	51,405	0
Thiourea	10,550	2,744	10,307	23,601	0
Thorium dioxide	0	0	42,000	42,000	0
Titanium tetrachloride	28,431,377	2,976,745	23,391	36,831,599	1,574
Toluene	155,856,226	16,997,430	181,399,292	1,887,778,134	373,182
Toluene-2,4-diisocyanate	15,585	63,288	60,239	238,091	1
Toluene-2,6-diisocyanate	3,877	14,747	3,583	46,474	0
Toluenediisocyanate (mixed isomers)	3,138,992	327,908	53,972	9,213,343	14,568
o-Toluidine	300,999	115,816	43,497	915,226	0
Trichlorfon	160	255	35	575	0
1,2,4-Trichlorobenzene	5,243,161	743,119	334,434	6,453,399	13,073
1,1,1-Trichloroethane	1,914,565	3,423,144	64,594,783	202,884,825	334,530
1,1,2-Trichloroethane	21,049,494	3,976,151	317,342	76,611,334	210
Trichloroethylene	6,515,991	1,818,275	29,884,219	341,318,197	107,936
Trichlorofluoromethane (CFC-11)	86,882	262,351	5,897,558	10,939,295	51,052
2,4,6-Trichlorophenol	952,949	0	125	953,074	0
Trifluralin	350	17,855	33,590	53,520	550
1,2,4-Trimethylbenzene	16,134,000	441,785	6,597,531	48,577,432	21,302
Urethane	0	3,600	58,596	62,196	0
Vanadium (fume or dust)	0	1,102	55,812	264,526	0
Vinyl acetate	18,566,483	1,777,568	5,755,360	48,978,990	8,499

Table 2-6. Quantities of TRI Chemicals in Waste, by Chemical, 1993 (Alphabetically Ordered), Continued.

CAS Number⑨	Chemical	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds
593-60-2	Vinyl bromide	0	0	0	0
75-01-4	Vinyl chloride	5,034,694	108,924	13,462,887	11,817
75-35-4	Vinylidene chloride	430,000	0	86,560	3
1330-20-7	Xylene (mixed isomers)	121,969,074	36,031,238	189,370,157	70,357,331
108-38-3	m-Xylene	1,119,496	102,970	8,845,212	117,592
95-47-6	o-Xylene	642,037	7,667	38,285,879	1,870,088
106-42-3	p-Xylene	1,225,629	939	9,199,646	71,658
87-62-7	2,6-Xylidine	0	0	47,000	0
7440-66-6	Zinc (fume or dust)	32,717,520	76,121,513	0	114,863
—	Zinc compounds	123,853,057	220,779,995	39,372	216,515
—	Mixtures and other trade names	12,300	442,995	171,418,282	18,406
—	Trade secrets	1,900,000	397,675	428,000	11,500
	Total	13,191,306,508	3,324,614,075	2,838,344,940	511,774,941

Table 2-6, Cont.

Chemical	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released/ Disposed of Pounds	Total Production-Related Wastes Pounds	Non-Production-Related Wastes Pounds
Vinyl bromide	86,000	0	1,617	87,617	0
Vinyl chloride	29,099,488	24,367	1,019,548	48,761,725	15,024
Vinylidene chloride	5;624,940	162,331	195,313	6,499,147	600
Xylene (mixed isomers)	61,640;809	7,941,438	111,710,327	599,020,374	460,397
m-Xylene	1,244,660	55,989	1,714,007	13,199,926	2,192
o-Xylene	1,160,594	48,223	1,990,809	44,005,297	924
p-Xylene	200,798	37,705	4,384,140	15,120,515	81,532
2,6-Xylidine	10,623	625	488	58,736	0
Zinc (fume or dust)	2,100,554	652,962	14,085,572	125,792,984	29,251
Zinc compounds	4,859,222	32,254,805	135,266,664	517,269,630	15,185,689
Mixtures and other trade names	353,718	490,237	214,714	172,950,652	117,497
Trade secrets	245,056	257,000	2,830	3,242,061	0
Total	9,768,273,293	657,785,097	3,206,362,816	33,498,461,670	45,216,393

9 Compound categories do not have CAS numbers (—).

Table 2-7. Top 25 Chemicals Reported as Recycled, 1993.

CAS Number⑩	**Chemical**	**Recycled On-site** Pounds	**Recycled Off-site** Pounds	**Total Recycled** Pounds
7664-93-9	Sulfuric acid	5,929,042,911	1,208,090,997	7,137,133,908
108-88-3	Toluene	1,159,918,428	31,868,427	1,191,786,855
7440-50-8	Copper	287,819,064	459,736,680	747,555,744
—	Lead compounds	399,305,981	250,501,024	649,807,005
67-56-1	Methanol	485,824,704	17,087,923	502,912,627
74-85-1	Ethylene	433,212,167	0	433,212,167
—	Copper compounds	255,742,333	134,655,253	390,397,586
107-21-1	Ethylene glycol	276,503,268	111,960,647	388,463,915
—	Zinc compounds	123,853,057	220,779,995	344,633,052
7439-92-1	Lead	282,954,083	40,606,123	323,560,206
79-01-6	Trichloroethylene	293,306,078	7,091,492	300,397,570
98-82-8	Cumene	296,607,339	93,673	296,701,012
7664-41-7	Ammonia	202,843,614	12,410,577	215,254,191
78-93-3	Methyl ethyl ketone	170,138,600	21,612,758	191,751,358
—	Glycol ethers	186,211,860	4,478,185	190,690,045
7647-01-0	Hydrochloric acid	125,060,092	64,030,063	189,090,155
7664-38-2	Phosphoric acid	172,057,033	11,693,742	183,750,775
50-00-0	Formaldehyde	163,422,324	59,582	163,481,906
1330-20-7	Xylene (mixed isomers)	121,969,074	36,031,238	158,000,312
—	Manganese compounds	87,050,545	44,574,365	131,624,910
71-55-6	1,1,1-Trichloroethane	111,402,660	14,606,493	126,009,153
7440-47-3	Chromium	32,653,695	85,563,352	118,217,047
7440-66-6	Zinc (fume or dust)	32,717,520	76,121,513	108,839,033
75-09-2	Dichloromethane	86,323,177	21,079,024	107,402,201
7782-50-5	Chlorine	104,216,068	1,411,775	105,627,843
	Subtotal	11,820,155,675	2,876,144,901	14,696,300,576
	Total for All TRI Chemicals	13,191,306,508	3,324,614,075	16,515,920,583

⑩ Compound categories do not have CAS numbers (—).

Table 2-8. Top 25 Chemicals Reported as Used for Energy Recovery, 1993.

CAS Number ⓫	Chemical	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds	Total Energy Recovery Pounds
115-07-1	Propylene	489,142,299	2,187,600	491,329,899
74-85-1	Ethylene	401,227,039	17,795,713	419,022,752
67-56-1	Methanol	286,383,015	61,626,050	348,009,065
108-88-3	Toluene	254,771,684	86,966,647	341,738,331
1330-20-7	Xylene (mixed isomers)	189,370,157	70,357,331	259,727,488
67-64-1	Acetone	124,227,193	49,416,368	173,643,561
	Mixtures and other trade names	171,418,282	18,406	171,436,688
78-93-3	Methyl ethyl ketone	99,289,155	46,796,184	146,085,339
7664-41-7	Ammonia	74,039,248	12,528,048	86,567,296
75-65-0	tert-Butyl alcohol	36,536,100	30,543,031	67,079,131
100-41-4	Ethylbenzene	45,773,744	9,094,385	54,868,129
108-10-1	Methyl isobutyl ketone	39,090,875	12,145,798	51,236,673
95-47-6	o-Xylene	38,285,879	1,870,088	40,155,967
106-99-0	1,3-Butadiene	38,514,042	6,574	38,520,616
100-42-5	Styrene	28,344,927	5,524,776	33,869,703
—	Glycol ethers	17,713,358	13,173,610	30,886,968
107-06-2	1,2-Dichloroethane	30,603,809	271,023	30,874,832
71-43-2	Benzene	26,250,860	1,996,334	28,247,194
75-05-8	Acetonitrile	21,221,551	5,579,121	26,800,672
71-36-3	n-Butyl alcohol	16,105,857	8,787,825	24,893,682
79-10-7	Acrylic acid	18,950,799	4,541,976	23,492,775
78-87-5	1,2-Dichloropropane	21,900,000	7	21,900,007
108-95-2	Phenol	17,450,718	2,372,306	19,823,024
107-21-1	Ethylene glycol	9,257,637	8,818,394	18,076,031
75-00-3	Chloroethane	17,682,284	21,932	17,704,216
	Subtotal	2,513,550,512	452,439,527	2,965,990,039
	Total for All TRI Chemicals	2,838,344,940	511,774,941	3,350,119,881

⓫ Compound categories do not have CAS numbers (—).

Table 2-9. Top 25 Chemicals Reported as Treated, 1993.

CAS Number⓬	Chemical	Treated On-site Pounds	Treated Off-site Pounds	Total Treated Pounds
7664-93-9	Sulfuric acid	2,946,897,184	53,225,378	3,000,122,562
7647-01-0	Hydrochloric acid	1,874,940,919	74,433,384	1,949,374,303
67-56-1	Methanol	865,266,811	122,069,287	987,336,098
7664-41-7	Ammonia	376,888,157	74,745,186	451,633,343
74-85-1	Ethylene	373,484,832	87,955	373,572,787
7664-38-2	Phosphoric acid	301,206,759	5,209,738	306,416,497
7697-37-2	Nitric acid	284,783,246	13,804,906	298,588,152
7782-50-5	Chlorine	245,067,216	1,092,286	246,159,502
76-13-1	Freon 113	230,213,438	520,517	230,733,955
115-07-1	Propylene	216,034,848	388,948	216,423,796
108-88-3	Toluene	155,856,226	16,997,430	172,853,656
—	Copper compounds	142,266,907	2,297,055	144,563,962
67-64-1	Acetone	104,039,141	20,485,217	124,524,358
7664-39-3	Hydrogen fluoride	115,796,794	2,212,698	118,009,492
7429-90-5	Aluminum (fume or dust)	110,206,399	3,571,325	113,777,724
—	Chromium compounds	90,265,144	16,783,289	107,048,433
107-21-1	Ethylene glycol	58,288,557	26,791,740	85,080,297
1330-20-7	Xylene (mixed isomers)	61,640,809	7,941,438	69,582,247
10049-04-4	Chlorine dioxide	68,087,901	130	68,088,031
50-00-0	Formaldehyde	57,588,167	4,452,189	62,040,356
78-93-3	Methyl ethyl ketone	54,609,698	6,533,657	61,143,355
7440-50-8	Copper	52,355,544	1,367,076	53,722,620
107-06-2	1,2-Dichloroethane	50,109,912	1,808,104	51,918,016
7783-20-2	Ammonium sulfate (solution)	10,467,831	34,290,535	44,758,366
—	Glycol ethers	27,921,395	14,735,428	42,656,823
	Subtotal	8,874,283,835	505,844,896	9,380,128,731
	Total for All TRI Chemicals	9,768,273,293	657,785,097	10,426,058,390

⓬ Compound categories do not have CAS numbers (—).

Table 2-10. Top 25 Chemicals Reported as Released (Includes Off-site Disposal), 1993.

CAS Number[13]	Chemical	Quantity Released/Disposed of Pounds
7664-41-7	Ammonia	396,799,112
7664-93-9	Sulfuric acid	254,999,222
7647-01-0	Hydrochloric acid	241,034,754
67-56-1	Methanol	222,161,442
7664-38-2	Phosphoric acid	214,596,798
108-88-3	Toluene	181,399,292
—	Zinc compounds	135,266,664
67-64-1	Acetone	128,689,551
1330-20-7	Xylene (mixed isomers)	111,710,327
75-15-0	Carbon disulfide	93,697,475
78-93-3	Methyl ethyl ketone	85,805,403
7782-50-5	Chlorine	76,351,231
75-09-2	Dichloromethane	66,718,011
—	Manganese compounds	65,340,486
71-55-6	1,1,1-Trichloroethane	64,594,783
—	Copper compounds	55,263,710
6484-52-2	Ammonium nitrate (solution)	50,204,276
—	Chromium compounds	47,567,578
—	Glycol ethers	47,436,469
100-42-5	Styrene	35,192,263
74-85-1	Ethylene	32,082,205
71-36-3	n-Butyl alcohol	30,861,821
79-01-6	Trichloroethylene	29,884,219
—	Lead compounds	28,070,134
108-10-1	Methyl isobutyl ketone	25,426,035
	Subtotal	2,721,153,261
	Total for All TRI Chemicals	3,206,362,816

[13] Compound categories do not have CAS numbers (—).

RELATIONSHIP OF THIS WASTE MANAGEMENT INFORMATION TO THE RELEASE AND TRANSFER DATA

Some of the information collected on waste management is an aggregation of information that is collected on releases to the environment and transfers off-site in other sections of Form R. It may be helpful to look at the TRI reporting form (Form R) in Appendix F to better understand how the release and transfer data relate to the waste management information. Releases of toxic chemicals to the environment on-site are reported in Section 5 of the form and off-site transfers of toxic chemicals are reported in Section 6. Both on- and off-site management of toxic chemicals in waste is reported in Section 8.

Facilities estimate total releases of the toxic chemical to air, land, and water, as well as underground injection, in Section 5 of Form R. The estimates include releases that are routine to production operations as well as those that are non-routine, such as releases due to catastrophic events like the collapse of a tank due to a tornado or remedial actions like the clean-up of contaminated soil. In Section 6, facilities estimate the total amounts of the toxic chemical transferred to POTWs or to other off-site locations for the purposes of recycling, energy recovery, treatment, or disposal. Again, the estimates would include quantities from routine production operations as well as non-routine events. The information reported in Sections 5 and 6 forms the basis for much of the information in Section 8, but is aggregated in different ways.

Quantities of the toxic chemical released to the environment or transferred off-site in waste for management "as a result of remedial actions, catastrophic events, or one-time events not associated with production processes" are aggregated and reported in Section 8 (8.8). If a facility reports a quantity in this section, then the release and transfer data in Sections 5 and 6 will not directly match the release and transfer data in Section 8. However, if a facility does not report a quantity in this section, the release and transfer data in Sections 5 and 6 should match the release and transfer data in Section 8.

Issues Associated with the Waste Management Information Reported for 1993

Examination of the data reported for 1993 indicates that many facilities are continuing to report inconsistent data in the separate sections of Form R. EPA provided some guidelines for reducing discrepancies in data reported in separate sections of Form R during the 1993 reporting year and anticipates promulgation of final guidance for the data required by the PPA during 1995. The promulgation of this final guidance will involve a public comment period so that the public will have an opportunity to comment on the instructions EPA has developed. These instructions have incorporated some of the results of a dialog process involving representatives of environmental groups, industry, states, and academia. Along with the instructions, EPA will also propose a redesign of the Form R to better integrate the information collected in Section 8 with the other sections of Form R. This redesign will involve Sections 5, 6, 7, and 8 of the Form. A notice in the *Federal Register* for both the guidance and Form R redesign will appear in the summer. With the promulgation of final guidance and a redesigned Form R by EPA, the information reported in different sections of the TRI will be more consistent and will allow for more accurate analyses and comparable data across states, industries, and facilities.

Correlating Information in Different Sections of Form R

Through comparisons of the information presented in this chapter and the information provided in Chapter 1, it is evident that similar information reported in different sections of Form R is not always consistent. In some cases, information on quantities of the toxic chemicals transferred off-site (reported in Section 6) does not match with the information on waste management (reported in Section 8). Some facilities reported quantities sent off-site, but did not provide a code indicating the waste management activity to which the quantity was subject (recycling, energy recovery, treatment, or disposal). Some facilities reported quantities sent off-site, but provided codes that are not in the instructions for completing Form R; those codes cannot be assigned to any particular off-site activity and, along with the quantities that have no codes, are considered as "other" off-site activities.

Even with the use of valid codes, however, some discrepancies still exist. These are shown in Table 2-11. EPA believes that these discrepancies are primarily a problem in relating the data reported in different sections of Form R and that this problem will diminish over time. Comparing data for 1991 through 1993, facilities appear to be improving the quality of the data reported as the gap between the quantities reported in different sections of Form R is narrowing. For example, the discrepancy in the quantities reported as sent off-site for recycling has decreased from nearly a billion pounds for 1991 data, to 634 million pounds for 1992 data, and now to 72 million pounds for 1993 data. It must be realized, however, that quantities reported in Section 8 and those reported in Sections 5 and 6 cannot always correlate if non-production related waste is reported in Section 8. When reported, non-production related waste quantities are included in the amounts reported in Sections 5 and 6, but as discussed previously, those quantities are reported separately in Section 8.

UNDERSTANDING WHAT SPECIFIC ELEMENTS MEAN

Quantities recycled. The largest discrepancy in the information provided in Form R is the difference between what is reported as recycled off-site in Section 8 and what is reported as sent off-site for recycling in Section 6. This discrepancy, about 72 million pounds, may be due to factors beyond just relating the data reported in different sections of Form R. Facilities may have interpreted what was to be reported as recycled off-site in Section 8 differently from what was to be reported as sent off-site as a transfer in waste (Section 6). When reporting off-site transfers for the purposes of

Table 2-11. Difference in Release and Transfer Data and Waste Management Data, 1993.

Management Activity	Quantity Reported in Sections 5 and 6 Pounds	Quantity Reported in Section 8 Pounds	Difference Pounds	Difference as Percent of Section 8 Quantity Percent
Off-site recycling	3,252,166,922	3,324,614,075	72,447,153	2.2
Off-site energy recovery	487,380,037	511,774,941	24,394,904	4.8
Off-site treatment	642,425,089	657,785,097	15,360,008	2.3
Releases and off-site disposal	3,135,690,228	3,206,362,816	70,672,588	2.2

recycling, some facilities believe that what is to be reported in Section 8 is inherently different from what is to be reported in Section 6. They view off-site recycling reported in Section 6 as the recycling of the toxic chemical in waste, while off-site recycling reported in Section 8 is viewed more broadly so as to include recycling of toxic chemicals in materials that are not considered waste by the facility. For example, a facility ships silver residuals off-site to a jewelry manufacturer and reports the transfer in Section 8 but not in Section 6. The facility considers the silver recycled off-site, but does not consider the silver to be "in waste." EPA is considering these issues as it develops final guidance for reporting quantities recycled both on- and off-site.

Quantities reported as recycled on-site may be greater than the actual amount of the toxic chemical used at the facility, depending on how the facility reported. For example, a facility used a total of 15,000 pounds of 1,1,1-trichloroethane for cleaning and other purposes during the reporting year. The toxic chemical was recycled in batches for a total of 15 batches, resulting in the recovery of 225,000 pounds of 1,1,1-trichloroethane during that year. This quantity is much greater than the amount of the toxic chemical that was used at the facility, but reflects the amounts of 1,1,1-trichloroethane in waste managed at the facility during the reporting year. However, not all facilities have reported in this manner.

Quantities combusted for energy recovery. Facilities are instructed not to report metals or metal compounds, as well as other chemicals that have no significant fuel value, as combusted for energy recovery. Some facilities do not follow these instructions, as is evident in Table 2-6. In the case of metal compounds, the parent metals do not contribute heating value to the combusted waste and are either ultimately discharged to air or remain in the ash, which is usually disposed of.

Quantities treated on-site. While facilities were instructed to include only those quantities destroyed through treatment in this data element, some facilities have misinterpreted how to report these quantities. This is evident through examination of Table 2-9, the top 25 chemicals reported as treated, which reveals that two of the top chemicals reported as treated are metal compounds (copper compounds and chromium compounds) and two others are metals (aluminum fume or dust and copper). The metals or parent metals in any of the compounds may be removed from waste, but are not destroyed through on-site treatment and so these metals and metal compounds should not be reported as treated on-site. Such misinterpretations can cause facilities to inflate the amount of TRI chemical in waste or to incorrectly characterize the ultimate disposition of the chemical in waste. For example, the parent metals in metal compounds are ultimately released or disposed of and that final disposition should be reported.

Quantities treated off-site. In reporting transfers off-site, facilities are instructed to provide the ultimate known disposition of the toxic chemical. For example, in a situation where a metal is sent off-site and stabilized prior to disposal in a landfill, the quantity of the metal sent off-site should be reported as disposed of, not treated, off-site in both Sections 6 and 8 of Form R. There may be situations, however, where the facility does not know whether the TRI chemical is destroyed through treatment or what the final disposition of the chemical is. Therefore, quantities reported as treated off-site can sometimes represent amounts that are ultimately released or disposed of. This is the case whenever metal compounds are reported as treated off-site because the parent metals will not be destroyed and will ultimately be released or disposed of.

Similar occurrences can be found with transfers to POTWs. Facilities are instructed to consider all quantities transferred to POTWs as transferred off-site for treatment for the purpose of reporting in Section 8 of Form R. However, POTWs can have varying levels of treatment capabilities, which means that a TRI chemical sent to a POTW may or may not have been destroyed. Metal compounds and certain organic chemicals can be passed through a POTW, meaning that they were discharged directly from the POTW, or contained in the sludges from the POTW, which are ultimately disposed of on land. When such reporting occurs, quantities reported as treated off-site represent amounts that are ultimately released or disposed of.

WHAT IS BEING DONE TO REDUCE THIS WASTE?

Facilities are required to provide information on any source reduction activity implemented during the reporting (calendar) year. (Source reduction is defined in Box 2-2.) Source reduction activities are those that reduce or prevent the need for a quantity of the reported toxic chemical to be recycled, used for energy recovery, treated, or released (including disposal). Of the 23,321 facilities that submitted Form Rs for 1993, 8,135 indicated that they implemented source reduction for at least one chemical. Of the 79,987 Form Rs submitted, 19,732 indicated that source reduction had been implemented. Comparing this to data submitted for the 1992 and 1991 reporting years, there has been a slight decline in the number of facilities and forms indicating the implementation of source reduction: facilities from 36.5% in 1991 to 34.9% in 1993 and forms from 25.7% to 24.7%.

The categories or types of source reduction activities that can be reported, as well as the more specific activities reported under each category, are shown in Box 2-3. The most frequently reported categories of source reduction activities were good operating practices, process modifications, and spill and leak prevention activities. These categories were also most frequently reported for 1992 and 1991.

A reported source reduction activity could have been implemented at any time during the reporting year. This is important to consider when analyzing the source reduction activities reported and the impact that those activities might have had on the total quantity of waste that had to be managed. The implementation of a source reduction activity late in the reporting year would have had a smaller impact on the amount of waste that was managed than the implementation of the same activity earlier in the reporting year.

Facilities are also required to report the method(s) used to identify the reported source reduction activity. The methods are:

- Internal pollution prevention opportunity audit(s)
- External pollution prevention opportunity audit(s)
- Materials balance audits
- Participative team management
- Employee recommendation (independent of a formal company program)
- Employee recommendation (under a formal company program)
- State government technical assistance program

- Federal government technical assistance program
- Trade association/industry technical assistance program
- Vendor assistance
- Other

The most frequently reported methods of identifying opportunities for source reduction measures were participative team management and internal pollution prevention opportunity audits. The frequency for these methods and the association between reported source reduction activities and the methods used to identify the opportunities for them are shown in Table 2-12.

The states of Texas, Ohio, California, Illinois, and Pennsylvania had the greatest number of forms reporting source reduction activities. Good operating practices and process modifications continue to be reported most frequently as the types of source reduction activities implemented (see Table 2-13). Consistent with the national picture, the most frequent methods of identifying opportunities for source reduction for facilities in these states were participative team management and internal pollution prevention opportunity audits (see Table 2-14).

Among industries, the greatest number of forms submitted indicating source reduction were from the chemical industry and the fabricated metals sector. However, the measurements/photographic equipment, furniture, printing, and leather sectors had the greatest percentages of forms indicating source reduction (see Table 2-15). The measurements/photographic equipment sector also had the greatest percentage of facilities reporting source reduction activities (see Table 2-16). Methods used to identify source reduction activities by industry are listed in Table 2-17.

The top 50 chemicals for which source reduction was reported and the methods used to identify those activities are listed in Tables 2-18 and 2-19. The chemical for which source reduction was reported most frequently was toluene. The activities most frequently reported to reduce the amount of toluene entering waste included good operating practices, surface preparation and finishing, and process

What is Source Reduction?

Through pollution prevention, risks to people and the environment can be reduced, financial and natural resources can be saved that would otherwise have to be expended on environmental clean-up or pollution control, and industrial processes can become more efficient. Pollution prevention is source reduction, which is defined in the PPA as any practice that:

- reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions); and
- reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

Pollution prevention practices can include equipment, process, procedure, or technology modifications, reformulation or redesign of products, substitution of raw materials, and improvements in maintenance and inventory controls. Under this definition, waste management activities, including recycling, treatment, and disposal, are not considered forms of pollution prevention.

Box 2-2. What is Source Reduction?

Source Reduction Activity Codes

Good Operating Practices
- W13 Improved maintenance scheduling, recordkeeping, or procedures
- W14 Changed production schedule to minimize equipment and feedstock changeovers
- W19 Other changes in operating practices

Inventory Control
- W21 Instituted procedures to ensure that materials do not stay in inventory beyond shelf-life
- W22 Began to test outdated material -- continue to use if still effective
- W23 Eliminated shelf-life requirements for stable materials
- W24 Instituted better labelling procedures
- W25 Instituted clearinghouse to exchange materials that would otherwise be discarded
- W29 Other changes in inventory control

Spill and Leak Prevention
- W31 Improved storage or stacking procedures
- W32 Improved procedures for loading, unloading, and transfer operations
- W33 Installed overflow alarms or automatic shut-off valves
- W35 Installed vapor recovery systems
- W36 Implemented inspection or monitoring program of potential spill or leak sources
- W39 Other spill and leak prevention

Raw Material Modifications
- W41 Increased purity of raw materials
- W42 Substituted raw materials
- W49 Other raw material modifications

Process Modifications
- W51 Instituted recirculation within a process
- W52 Modified equipment, layout, or piping
- W53 Use of a different process catalyst
- W54 Instituted better controls on operating bulk containers to minimize discarding of empty containers
- W55 Changed from small volume containers to bulk containers to minimize discarding of empty containers
- W58 Other process modifications

Cleaning and Degreasing
- W59 Modified stripping/cleaning equipment
- W60 Changed to mechanical stripping/cleaning devices (from solvents or other materials)
- W61 Changed to aqueous cleaners (from solvents or other materials)
- W63 Modified containment procedures for cleaning units
- W64 Improved draining procedures
- W65 Redesigned parts racks to reduce dragout
- W66 Modified or installed rinse systems
- W67 Improved rinse equipment design
- W68 Improved rinse equipment operation
- W71 Other cleaning and degreasing modifications

Surface Preparation and Finishing
- W72 Modified spray systems or equipment
- W73 Substituted coating materials used
- W74 Improved application techniques
- W75 Changed from spray to other system
- W78 Other surface preparation and finishing modifications

Product Modifications
- W81 Changed product specifications
- W82 Modified design or composition
- W83 Modified packaging
- W89 Other product modifications

Box 2-3. Source Reduction Activity Codes.

Table 2-12. Methods Used to Identify Source Reduction Activity for Each Source Reduction Activity (Number of Times Each Method was Reported), 1993.

Source Reduction Activity	Pollution Prevention Opportunity Audit		Materials Balance Audit	Participative Team Management	Employee Recommendation	
	Internal	External			Informal	Formal Program
Good Operating Practices	**3,542**	**337**	**1,416**	**5,230**	**1,811**	**1,033**
W13	1,774	233	769	2,268	849	420
W14	521	22	222	1,091	383	204
W19	1,247	82	425	1,871	579	409
Inventory Control	**822**	**111**	**554**	**1,288**	**371**	**252**
W21	245	20	191	385	128	98
W22	90	10	57	211	85	50
W23	11	5	7	8	4	1
W24	76	20	14	149	23	22
W25	52	14	20	99	23	14
W29	348	42	265	436	108	67
Spill and Leak Prevention	**2,856**	**391**	**539**	**2,322**	**930**	**631**
W31	260	53	66	252	142	48
W32	674	84	106	582	287	161
W33	161	26	44	205	44	39
W35	224	62	61	156	39	40
W36	856	95	130	659	225	189
W39	681	71	132	468	193	154
Raw Material Modifications	**1,188**	**136**	**345**	**1,395**	**428**	**309**
W41	69	2	23	105	54	15
W42	957	111	256	1,107	321	249
W49	162	23	66	183	53	45
Process Modifications	**2,605**	**335**	**852**	**3,254**	**1,212**	**775**
W51	500	35	240	594	200	122
W52	959	165	259	1,158	447	276
W53	58	5	9	69	24	8
W54	124	10	52	135	49	57
W55	183	50	41	214	100	83
W58	781	70	251	1,084	392	229
Cleaning and Degreasing	**678**	**72**	**136**	**798**	**289**	**191**
W59	87	6	24	102	45	23
W60	35	0	4	37	8	1
W61	353	40	39	377	98	69
W63	40	4	10	48	30	23
W64	50	13	15	83	40	23
W65	16	1	12	30	23	11
W66	24	1	2	25	12	2
W67	25	2	3	18	12	11
W68	48	5	27	78	21	28
Surface Preparation/Finishing	**857**	**116**	**357**	**1,135**	**328**	**200**
W71	211	32	53	288	69	88
W72	202	31	94	186	95	32
W73	229	34	98	312	66	30
W74	117	15	98	213	73	23
W75	38	0	6	57	9	11
W78	60	4	8	79	16	16
Product Modifications	**391**	**46**	**81**	**751**	**189**	**219**
W81	130	8	28	204	61	65
W82	190	29	36	405	104	106
W83	1	1	3	19	1	5
W89	70	8	14	123	23	43
Total	12,939	1,544	4,280	16,173	5,558	3,610
Percent of Total	21.8	2.6	7.2	27.2	9.4	6.1

Table 2-12.

Source Reduction Activity	State Program	Federal Program	Trade/ Industry Program	Vendor Assistance	Other	Total Number of Times Reported	Percent of Total Reported
Good Operating Practices	**87**	**10**	**438**	**1,015**	**1,322**	**16,241**	**27.32**
W13	39	3	157	458	494	7,464	12.56
W14	13	0	53	127	171	2,807	4.72
W19	35	7	228	430	657	5,970	10.04
Inventory Control	**41**	**3**	**142**	**410**	**315**	**4,309**	**7.25**
W21	3	0	14	168	71	1,323	2.23
W22	5	1	3	38	51	601	1.01
W23	0	0	1	0	2	39	0.07
W24	6	1	2	19	44	376	0.63
W25	8	0	13	34	29	306	0.51
W29	19	1	109	151	118	1,664	2.80
Spill and Leak Prevention	**77**	**22**	**270**	**580**	**955**	**9,573**	**16.11**
W31	14	0	22	55	101	1,013	1.70
W32	5	5	65	156	118	2,243	3.77
W33	0	2	9	38	29	597	1.00
W35	10	0	26	80	77	775	1.30
W36	30	10	97	153	351	2,795	4.70
W39	18	5	51	98	279	2,150	3.62
Raw Material Modifications	**19**	**19**	**246**	**1,616**	**665**	**6,366**	**10.71**
W41	0	0	11	79	47	405	0.68
W42	16	19	182	1,197	458	4,873	8.20
W49	3	0	53	340	160	1,088	1.83
Process Modifications	**59**	**16**	**338**	**1,219**	**1,242**	**11,907**	**20.03**
W51	9	5	31	179	118	2,033	3.42
W52	25	2	83	411	348	4,133	6.95
W53	5	1	8	76	21	284	0.48
W54	2	1	24	77	74	605	1.02
W55	5	0	12	139	48	875	1.47
W58	13	7	180	337	633	3,977	6.69
Cleaning and Degreasing	**34**	**9**	**128**	**546**	**191**	**3,072**	**5.17**
W59	6	0	7	78	24	402	0.68
W60	0	0	6	26	9	126	0.21
W61	19	6	76	323	119	1,519	2.56
W63	0	0	6	19	7	187	0.31
W64	2	0	14	25	12	277	0.47
W65	2	2	2	12	4	115	0.19
W66	0	1	7	20	6	100	0.17
W67	3	0	7	18	2	101	0.17
W68	2	0	3	25	8	245	0.41
Surface Preparation/Finishing	**38**	**9**	**309**	**1,419**	**465**	**5,233**	**8.80**
W71	9	2	25	143	93	1,013	1.70
W72	14	2	115	402	67	1,240	2.09
W73	5	1	73	514	134	1,496	2.52
W74	6	4	81	251	120	1,001	1.68
W75	0	0	8	34	26	189	0.32
W78	4	0	7	75	25	294	0.49
Product Modifications	**12**	**4**	**173**	**454**	**417**	**2,737**	**4.60**
W81	1	4	31	167	122	821	1.38
W82	9	0	118	228	178	1,403	2.36
W83	0	0	0	10	6	46	0.08
W89	2	0	24	49	111	467	0.79
Total	367	92	2,044	7,259	5,572	59,438	100.00
Percent of Total	0.6	0.2	3.4	12.2	9.4	100.0	

Table 2-13. Number of TRI Facilities and Forms Reporting Source Reduction, by Source Reduction Category, by State, 1993.

State	Number of TRI Facilities	Facilities Reporting Source Reduction Activities: Number	Facilities Reporting Source Reduction Activities: Percent of All Facilities in the State	Number of TRI Forms	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms in the State
Alabama	517	150	29.0	1,930	426	22.1
Alaska	8	3	37.5	50	11	22.0
American Samoa	3	2	66.7	6	2	33.3
Arizona	180	86	47.8	508	177	34.8
Arkansas	398	125	31.4	1,299	273	21.0
California	1,758	741	42.2	5,078	1,691	33.3
Colorado	189	74	39.2	511	158	30.9
Connecticut	388	154	39.7	1,115	283	25.4
Delaware	75	25	33.3	286	46	16.1
Florida	512	177	34.6	1,436	336	23.4
Georgia	731	231	31.6	2,451	551	22.5
Hawaii	18	6	33.3	66	30	45.5
Idaho	58	14	24.1	162	25	15.4
Illinois	1,387	424	30.6	4,899	1,125	23.0
Indiana	1,041	387	37.2	3,693	1,069	28.9
Iowa	427	138	32.3	1,288	287	22.3
Kansas	288	100	34.7	1,017	284	27.9
Kentucky	445	130	29.2	1,698	300	17.7
Louisiana	322	113	35.1	2,017	405	20.1
Maine	111	51	45.9	354	105	29.7
Maryland	209	64	30.6	648	135	20.8
Massachusetts	588	244	41.5	1,654	527	31.9
Michigan	970	338	34.8	3,759	947	25.2
Minnesota	523	255	48.8	1,513	582	38.5
Mississippi	330	108	32.7	1,128	271	24.0
Missouri	590	201	34.1	1,979	462	23.3
Montana	23	2	8.7	142	17	12.0
Nebraska	172	49	28.5	526	110	20.9
Nevada	39	17	43.6	97	29	29.9
New Hampshire	126	50	39.7	343	94	27.4
New Jersey	700	199	28.4	2,575	399	15.5
New Mexico	41	15	36.6	140	46	32.9
New York	847	307	36.2	2,592	724	27.9
North Carolina	965	352	36.5	2,993	817	27.3
North Dakota	33	11	33.3	91	19	20.9
Ohio	1,669	525	31.5	5,907	1,289	21.8
Oklahoma	255	75	29.4	836	169	20.2
Oregon	256	106	41.4	777	234	30.1
Pennsylvania	1,262	435	34.5	4,252	1,049	24.7
Puerto Rico	177	51	28.8	579	95	16.4
Rhode Island	158	57	36.1	439	123	28.0
South Carolina	493	172	34.9	1,886	417	22.1
South Dakota	64	17	26.6	120	23	19.2
Tennessee	694	240	34.6	2,297	549	23.9
Texas	1,240	442	35.6	5,970	1,451	24.3
Utah	143	52	36.4	519	123	23.7
Vermont	44	17	38.6	113	35	31.0
Virgin Islands	3	1	33.3	30	1	3.3
Virginia	473	147	31.1	1,567	332	21.2
Washington	312	122	39.1	995	274	27.5
West Virginia	154	63	40.9	733	171	23.3
Wisconsin	883	264	29.9	2,781	611	22.0
Wyoming	29	6	20.7	142	23	16.2
Total	23,321	8,135	34.9	79,987	19,732	24.7

Table 2-13.

State	Good Operating Practices	Inventory Control	Spill and Leak Prevention	Raw Material Modifications	Process Modifications	Cleaning and Degreasing	Surface Preparation and Finishing	Product Modifications
	Category of Source Reduction Activity (number of forms reporting)							
Alabama	258	55	110	60	125	26	48	35
Alaska	0	0	5	0	6	0	0	0
American Samoa	0	0	2	0	1	0	0	0
Arizona	76	19	63	63	80	39	4	11
Arkansas	110	38	67	46	115	35	55	36
California	1,020	275	640	224	551	294	108	144
Colorado	81	18	33	23	67	22	19	9
Connecticut	157	45	39	33	108	82	10	23
Delaware	16	1	9	14	13	4	3	5
Florida	173	28	112	69	112	68	40	26
Georgia	241	55	194	120	218	47	47	38
Hawaii	16	6	23	0	0	7	0	0
Idaho	11	2	2	5	20	0	1	0
Illinois	567	143	324	258	419	156	61	128
Indiana	472	162	223	253	414	151	215	87
Iowa	131	11	62	79	91	26	42	22
Kansas	133	59	78	52	95	28	39	34
Kentucky	133	20	60	46	134	30	41	23
Louisiana	162	30	186	49	204	24	50	15
Maine	53	9	8	29	32	13	23	5
Maryland	57	37	44	17	64	13	6	11
Massachusetts	298	91	87	119	183	95	33	55
Michigan	523	136	205	218	347	118	136	102
Minnesota	309	73	130	125	207	77	92	39
Mississippi	111	12	101	40	77	15	70	7
Missouri	206	45	177	111	141	40	60	42
Montana	12	2	13	0	2	1	0	0
Nebraska	52	10	23	41	33	25	19	10
Nevada	15	0	12	5	14	3	1	2
New Hampshire	17	5	18	26	27	18	9	5
New Jersey	186	33	106	87	103	44	21	37
New Mexico	37	0	2	2	21	3	3	6
New York	403	94	173	160	239	105	81	65
North Carolina	307	160	238	197	243	49	209	67
North Dakota	3	1	0	3	11	2	3	2
Ohio	627	110	258	251	473	139	129	133
Oklahoma	80	29	51	32	46	21	34	28
Oregon	94	36	59	58	101	24	33	27
Pennsylvania	514	167	265	197	402	108	135	95
Puerto Rico	36	22	28	15	47	21	6	1
Rhode Island	61	20	37	28	43	30	8	9
South Carolina	181	27	137	73	170	30	23	43
South Dakota	12	7	7	9	6	6	5	1
Tennessee	289	69	126	121	149	32	81	58
Texas	571	131	667	157	573	157	105	79
Utah	59	12	19	17	41	11	25	17
Vermont	14	0	3	5	17	3	5	1
Virgin Islands	1	0	0	0	0	0	0	0
Virginia	166	39	119	80	91	41	42	27
Washington	128	45	89	49	115	50	36	26
West Virginia	79	14	40	17	81	2	9	11
Wisconsin	307	46	113	154	178	58	92	50
Wyoming	11	0	14	1	24	2	0	1
Total	9,576	2,449	5,601	3,838	7,074	2,395	2,317	1,698

Table 2-14. Methods Used to Identify Reported Source Reduction Activities, by State, 1993.

State	Pollution Prevention Opportunity Audit: Internal	Pollution Prevention Opportunity Audit: External	Materials Balance Audit	Participative Team Management	Employee Recommendation: Informal	Employee Recommendation: Formal Program
Alabama	160	28	70	229	87	88
Alaska	0	0	4	2	0	0
American Samoa	0	0	0	0	1	0
Arizona	95	13	44	98	34	13
Arkansas	113	11	28	133	51	28
California	777	119	239	796	276	218
Colorado	53	4	21	73	32	17
Connecticut	117	9	28	165	47	29
Delaware	16	2	10	22	9	6
Florida	125	16	61	156	63	12
Georgia	193	24	63	234	90	64
Hawaii	27	3	0	7	0	0
Idaho	9	1	2	15	3	12
Illinois	394	54	123	535	196	195
Indiana	367	53	100	532	170	122
Iowa	96	21	51	121	46	29
Kansas	98	19	61	135	54	28
Kentucky	89	4	33	155	51	28
Louisiana	164	4	53	211	77	60
Maine	45	3	7	62	19	8
Maryland	65	7	7	62	16	12
Massachusetts	207	30	80	267	86	53
Michigan	358	51	101	509	154	97
Minnesota	256	10	41	314	158	57
Mississippi	92	5	38	109	47	43
Missouri	167	20	58	205	74	46
Montana	12	0	0	3	2	12
Nebraska	44	13	7	41	32	34
Nevada	10	1	5	17	8	0
New Hampshire	28	3	15	47	20	7
New Jersey	154	12	69	178	41	28
New Mexico	18	0	4	16	14	2
New York	316	28	110	334	149	89
North Carolina	300	11	108	290	98	44
North Dakota	6	0	0	12	1	0
Ohio	436	77	136	604	289	125
Oklahoma	69	3	25	80	33	23
Oregon	63	5	32	130	66	33
Pennsylvania	398	55	153	515	186	100
Puerto Rico	44	11	16	37	6	16
Rhode Island	44	12	19	59	45	27
South Carolina	185	15	82	230	69	27
South Dakota	5	2	1	16	4	0
Tennessee	175	29	87	239	109	36
Texas	717	67	181	650	224	133
Utah	55	8	12	44	11	22
Vermont	18	0	5	15	6	5
Virgin Islands	0	0	0	0	0	0
Virginia	122	14	67	130	40	9
Washington	148	17	26	130	44	28
West Virginia	46	7	23	84	30	10
Wisconsin	203	18	65	292	115	69
Wyoming	14	0	1	14	12	1
Total	7,713	919	2,572	9,354	3,495	2,145
Percent of Total	21.0	2.5	7.0	25.5	9.5	5.9

Table 2-14.

State	State Program	Federal Program	Trade/ Industry Program	Vendor Assistance	Other
Alabama	0	7	35	96	79
Alaska	0	0	2	2	5
American Samoa	0	0	0	0	0
Arizona	2	3	5	34	17
Arkansas	0	0	17	53	44
California	13	5	149	311	415
Colorado	0	0	6	43	36
Connecticut	5	2	19	55	38
Delaware	2	1	2	12	4
Florida	3	5	27	89	72
Georgia	3	8	30	135	146
Hawaii	0	0	0	0	4
Idaho	0	0	2	6	4
Illinois	4	0	75	302	277
Indiana	6	3	78	398	192
Iowa	5	0	11	95	42
Kansas	1	1	13	76	87
Kentucky	2	1	16	76	63
Louisiana	1	2	38	54	81
Maine	4	2	3	38	16
Maryland	8	0	15	26	26
Massachusetts	25	6	16	102	95
Michigan	8	1	52	225	176
Minnesota	33	1	27	128	74
Mississippi	3	0	4	81	43
Missouri	1	0	21	132	106
Montana	0	0	0	1	0
Nebraska	0	0	14	52	13
Nevada	0	0	1	5	8
New Hampshire	0	0	3	19	14
New Jersey	9	2	12	63	79
New Mexico	0	0	0	5	5
New York	3	1	28	174	134
North Carolina	14	1	85	324	160
North Dakota	0	0	0	11	4
Ohio	9	2	64	371	256
Oklahoma	1	0	1	45	30
Oregon	4	0	27	78	38
Pennsylvania	5	3	41	250	199
Puerto Rico	2	0	4	17	28
Rhode Island	1	0	5	31	27
South Carolina	10	1	25	86	58
South Dakota	0	0	3	11	3
Tennessee	22	3	53	186	96
Texas	14	9	71	260	280
Utah	0	1	5	27	37
Vermont	2	0	4	11	1
Virgin Islands	0	0	0	0	1
Virginia	0	0	17	78	73
Washington	19	0	27	75	61
West Virginia	0	0	3	50	34
Wisconsin	15	1	29	207	131
Wyoming	0	0	4	10	4
Total	259	72	1,189	5,016	3,916
Percent of Total	0.7	0.2	3.2	13.7	10.7

Table 2-15. Number of TRI Facilities and Forms Reporting Source Reduction, by Industry, 1991-1993.

SIC Code	Industry	1991 TRI Facilities Number	Facilities Reporting Source Reduction Activities: 1991 Number	Facilities Reporting Source Reduction Activities: Percent of All Facilities in Industry Percent	1992 TRI Facilities Number	Facilities Reporting Source Reduction Activities: 1992 Number	Facilities Reporting Source Reduction Activities: Percent of All Facilities in Industry Percent	1993 TRI Facilities Number	Facilities Reporting Source Reduction Activities: 1993 Number	Facilities Reporting Source Reduction Activities: Percent of All Facilities in Industry Percent
20	Food	2,087	432	20.7	2,052	416	20.3	2,069	416	20.1
21	Tobacco	23	7	30.4	21	4	19.0	20	9	45.0
22	Textiles	462	148	32.0	479	167	34.9	465	134	28.8
23	Apparel	43	13	30.2	49	10	20.4	42	15	35.7
24	Lumber	758	242	31.9	735	197	26.8	732	201	27.5
25	Furniture	577	236	40.9	570	252	44.2	557	245	44.0
26	Paper	633	279	44.1	591	255	43.1	569	227	39.9
27	Printing	421	191	45.4	393	185	47.1	317	128	40.4
28	Chemicals	4,315	1,760	40.8	4,228	1,682	39.8	4,150	1,622	39.1
29	Petroleum	431	157	36.4	429	168	39.2	404	169	41.8
30	Plastics	1,883	733	38.9	1,896	730	38.5	1,858	657	35.4
31	Leather	161	67	41.6	160	59	36.9	149	59	39.6
32	Stone/Clay/Glass	687	198	28.8	650	191	29.4	638	190	29.8
33	Primary Metals	1,962	515	26.2	1,937	466	24.1	1,898	465	24.5
34	Fabr. Metals	3,310	1,118	33.8	3,221	1,064	33.0	3,132	988	31.5
35	Machinery	1,147	404	35.2	1,129	391	34.6	1,063	349	32.8
36	Electrical	1,699	784	46.1	1,588	691	43.5	1,436	620	43.2
37	Transportation Equip.	1,316	561	42.6	1,274	567	44.5	1,273	569	44.7
38	Measure./Photo.	453	231	51.0	422	214	50.7	371	201	54.2
39	Miscellaneous	417	160	38.4	388	136	35.1	390	143	36.7
	Multiple codes 20-39[14]	1,626	704	43.3	1,674	704	42.1	1,609	682	42.4
	No codes 20-39[15]	221	47	21.3	205	35	17.1	179	46	25.7
	Total	24,632	8,987	36.5	24,091	8,584	35.6	23,321	8,135	34.9

Table 2-15.

Industry	1991 TRI Forms	Forms Reporting Source Reduction Activities: 1991	Forms Reporting Source Reduction Activities: Percent of All Forms from Industry	1992 TRI Forms	Forms Reporting Source Reduction Activities: 1992	Forms Reporting Source Reduction Activities: Percent of All Forms from Industry	1993 TRI Forms	Forms Reporting Source Reduction Activities: 1993	Forms Reporting Source Reduction Activities: Percent of All Forms from Industry
	Number	Number	Percent	Number	Number	Percent	Number	Number	Percent
Food	3,876	620	16.0	3,815	594	15.6	3,851	609	15.8
Tobacco	47	9	19.1	42	7	16.7	43	10	23.3
Textiles	1,030	263	25.5	996	269	27.0	962	210	21.8
Apparel	80	22	27.5	91	13	14.3	76	17	22.4
Lumber	2,037	564	27.7	1,975	471	23.8	1,931	500	25.9
Furniture	1,811	698	38.5	1,827	729	39.9	1,848	680	36.8
Paper	2,552	582	22.8	2,493	552	22.1	2,487	503	20.2
Printing	843	294	34.9	747	272	36.4	631	200	31.7
Chemicals	23,383	6203	26.5	22,728	5827	25.6	22,363	5,668	25.3
Petroleum	3,447	801	23.2	3,390	792	23.4	3,255	785	24.1
Plastics	4,542	1295	28.5	4,458	1294	29.0	4,293	1,174	27.3
Leather	405	131	32.3	406	125	30.8	367	116	31.6
Stone/Clay/Glass	1,707	455	26.7	1,570	387	24.6	1,554	398	25.6
Primary Metals	7,075	1323	18.7	6,888	1256	18.2	6,847	1,189	17.4
Fabr. Metals	9,384	2121	22.6	9,157	2003	21.9	8,885	1,972	22.2
Machinery	3,145	718	22.8	3,048	726	23.8	2,900	660	22.8
Electrical	5,113	1597	31.2	4,716	1362	28.9	4,283	1,183	27.6
Transportation Equip.	5,124	1469	28.7	4,947	1378	27.9	4,908	1,383	28.2
Measure./Photo.	1,171	435	37.1	1,098	400	36.4	991	379	38.2
Miscellaneous	1,035	316	30.5	947	279	29.5	955	297	31.1
Multiple codes 20-39 [14]	6,193	1725	27.9	6,252	1809	28.9	5,914	1,683	28.5
No codes 20-39 [15]	791	109	13.8	682	107	15.7	643	116	18.0
Total	84,791	21,750	25.7	82,273	20,652	25.1	79,987	19,732	24.7

[14] Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

[15] Facilities/forms that did not report an SIC code or reported SIC codes outside the 20-to-39 range.

Table 2-16. Number of TRI Facilities and Forms Reporting Source Reduction, by Source Reduction Category, by Industry, 1993.

SIC Code	Industry	Number of TRI Facilities	Facilities Reporting Source Reduction Activities: Number	Facilities Reporting Source Reduction Activities: Percent of All Facilities in the Industry	Number of TRI Forms	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms from the Industry
20	Food	2,069	416	20.1	3,851	609	15.8
21	Tobacco	20	9	45.0	43	10	23.3
22	Textiles	465	134	28.8	962	210	21.8
23	Apparel	42	15	35.7	76	17	22.4
24	Lumber	732	201	27.5	1,931	500	25.9
25	Furniture	557	245	44.0	1,848	680	36.8
26	Paper	569	227	39.9	2,487	503	20.2
27	Printing	317	128	40.4	631	200	31.7
28	Chemicals	4,150	1,622	39.1	22,363	5,668	25.3
29	Petroleum	404	169	41.8	3,255	785	24.1
30	Plastics	1,858	657	35.4	4,293	1,174	27.3
31	Leather	149	59	39.6	367	116	31.6
32	Stone/Clay/Glass	638	190	29.8	1,554	398	25.6
33	Primary Metals	1,898	465	24.5	6,847	1,189	17.4
34	Fabr. Metals	3,132	988	31.5	8,885	1,972	22.2
35	Machinery	1,063	349	32.8	2,900	660	22.8
36	Electrical	1,436	620	43.2	4,283	1,183	27.6
37	Transportation Equip.	1,273	569	44.7	4,908	1,383	28.2
38	Measure./Photo.	371	201	54.2	991	379	38.2
39	Miscellaneous	390	143	36.7	955	297	31.1
	Multiple codes 20-39 [16]	1,609	682	42.4	5,914	1,683	28.5
	No codes 20-39 [17]	179	46	25.7	643	116	18.0
	Total	23,321	8,135	34.9	79,987	19,732	24.7

Table 2-16.

Industry	Good Operating Practices	Inventory Control	Spill and Leak Prevention	Raw Material Modifications	Process Modifications	Cleaning and Degreasing	Surface Preparation and Finishing	Product Modifications
	Category of Source Reduction Activity (number of forms reporting)							
Food	403	43	297	39	210	37	8	27
Tobacco	0	0	0	3	9	1	0	2
Textiles	70	12	16	80	69	8	13	33
Apparel	10	0	6	7	7	0	2	3
Lumber	290	38	125	102	127	40	154	47
Furniture	212	182	103	180	114	17	567	67
Paper	207	37	54	188	179	28	12	48
Printing	95	17	12	104	51	23	6	16
Chemicals	3,100	945	2,326	895	2,505	364	31	669
Petroleum	358	38	532	65	320	38	0	31
Plastics	482	130	289	395	355	170	139	103
Leather	38	13	3	52	22	17	73	13
Stone/Clay/Glass	136	42	188	91	138	10	21	45
Primary Metals	640	85	287	233	557	74	55	53
Fabr. Metals	968	246	290	316	595	422	377	88
Machinery	288	53	71	136	156	153	122	63
Electrical	560	127	283	227	471	223	79	62
Transportation Equip.	599	158	191	273	328	305	366	133
Measure./Photo.	187	25	68	90	108	120	16	46
Miscellaneous	158	48	22	48	98	54	61	16
Multiple codes 20-39 ⑯	723	196	370	302	612	282	199	133
No codes 20-39 ⑰	52	14	68	12	43	9	16	0
Total	9,576	2,449	5,601	3,838	7,074	2,395	2,317	1,698

⑯ Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g. paper (26) and chemicals(28)].
⑰ Facilities/forms that did not report an SIC code and facilities that reported SIC codes outside the 20-to-39 range.

Table 2-17. Methods Used to Identify Reported Source Reduction Activities, by Industry, 1993.

SIC Code	Industry	Pollution Prevention Opportunity Audit: Internal	Pollution Prevention Opportunity Audit: External	Materials Balance Audit	Participative Team Management	Employee Recommendation: Informal	Employee Recommendation: Formal Program
20	Food	233	21	81	285	91	51
21	Tobacco	6	0	0	1	0	0
22	Textiles	59	9	30	98	23	7
23	Apparel	9	1	3	10	3	0
24	Lumber	166	20	21	230	86	10
25	Furniture	235	27	114	197	106	47
26	Paper	147	14	42	201	91	56
27	Printing	71	5	31	83	25	19
28	Chemicals	2,306	312	717	2,941	1,147	770
29	Petroleum	376	26	36	239	173	76
30	Plastics	421	54	185	568	216	80
31	Leather	43	7	18	50	17	20
32	Stone/Clay/Glass	141	12	36	168	59	40
33	Primary Metals	504	58	185	535	190	110
34	Fabr. Metals	697	108	243	919	324	176
35	Machinery	233	30	58	309	144	60
36	Electrical	509	52	182	620	210	165
37	Transportation Equip.	568	54	183	699	185	169
38	Measure./Photo.	148	15	46	208	50	39
39	Miscellaneous	92	13	58	144	40	22
	Multiple codes 20-39 [18]	696	77	290	808	285	208
	No codes 20-39 [19]	53	4	13	41	30	20
	Total	7,713	919	2,572	9,354	3,495	2,145
	Percent of Total	21.0	2.5	7.0	25.5	9.5	5.9

Table 2-17.

Industry	State Program	Federal Program	Trade/ Industry Program	Vendor Assistance	Other
Food	4	1	43	163	86
Tobacco	0	0	0	0	3
Textiles	0	2	10	94	41
Apparel	2	0	3	8	1
Lumber	6	0	39	210	54
Furniture	12	0	101	416	139
Paper	4	2	26	142	111
Printing	3	0	20	76	40
Chemicals	61	14	240	621	1,197
Petroleum	7	4	79	84	281
Plastics	9	3	92	422	177
Leather	0	0	15	80	5
Stone/Clay/Glass	2	0	9	76	119
Primary Metals	12	2	99	300	302
Fabr. Metals	57	9	141	687	352
Machinery	17	1	30	228	112
Electrical	13	7	61	321	191
Transportation Equip.	18	16	81	501	221
Measure./Photo.	6	5	16	89	99
Miscellaneous	3	1	14	120	42
Multiple codes 20-39 [18]	21	5	67	349	294
No codes 20-39 [19]	2	0	3	29	49
Total	259	72	1,189	5,016	3,916
Percent of Total	1	0	3	14	11

[18] Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g. paper (26) and chemicals(28)].
[19] Facilities/forms that did not report an SIC code and facilities that reported SIC codes outside the 20-to-39 range.

Table 2-18. Number of Forms Reporting Source Reduction, by Source Reduction Category, for the Top 50 TRI Chemicals by Number of Forms Reporting Source Reduction Activities, 1993.

CAS Number[20]	Chemical	Number of TRI Forms	Forms Reporting Source Reduction Activities: Number	Forms Reporting Source Reduction Activities: Percent of All Forms for the Chemical
108-88-3	Toluene	3,569	1,376	38.6
1330-20-7	Xylene (mixed isomers)	3,371	1,220	36.2
71-55-6	1,1,1-Trichloroethane	2,073	1,154	55.7
7664-93-9	Sulfuric acid	5,640	944	16.7
78-93-3	Methyl ethyl ketone	2,418	904	37.4
67-64-1	Acetone	2,511	852	33.9
67-56-1	Methanol	2,424	618	25.5
7664-41-7	Ammonia	3,096	618	20.0
—	Glycol ethers	2,162	591	27.3
7647-01-0	Hydrochloric acid	3,279	567	17.3
—	Zinc compounds	2,463	484	19.7
7664-38-2	Phosphoric acid	2,678	397	14.8
75-09-2	Dichloromethane	1,065	380	35.7
71-36-3	n-Butyl alcohol	1,152	359	31.2
—	Chromium compounds	1,414	357	25.2
100-42-5	Styrene	1,404	351	25.0
7697-37-2	Nitric acid	1,824	344	18.9
108-10-1	Methyl isobutyl ketone	1,006	338	33.6
100-41-4	Ethylbenzene	935	323	34.5
7440-50-8	Copper	2,458	322	13.1
76-13-1	Freon 113	466	307	65.9
79-01-6	Trichloroethylene	772	285	36.9
—	Lead compounds	858	275	32.1
107-21-1	Ethylene glycol	1,312	272	20.7
—	Copper compounds	1,435	269	18.7
7782-50-5	Chlorine	1,504	240	16.0
7440-02-0	Nickel	1,639	233	14.2
—	Barium compounds	990	231	23.3
7440-47-3	Chromium	1,693	210	12.4
95-63-6	1,2,4-Trimethylbenzene	699	209	29.9
50-00-0	Formaldehyde	782	182	23.3
127-18-4	Tetrachloroethylene	474	175	36.9
—	Manganese compounds	988	167	16.9
—	Nickel compounds	820	153	18.7
7439-92-1	Lead	797	152	19.1
71-43-2	Benzene	469	143	30.5
108-95-2	Phenol	676	141	20.9
7439-96-5	Manganese	1,286	132	10.3
75-71-8	Dichlorodifluoromethane (CFC-12)	282	130	46.1
—	Antimony compounds	503	123	24.5
101-68-8	Methylenebis(phenylisocyanate)	834	122	14.6
91-20-3	Naphthalene	471	120	25.5
75-69-4	Trichlorofluoromethane (CFC-11)	203	117	57.6
110-82-7	Cyclohexane	336	103	30.7
7664-39-3	Hydrogen fluoride	513	99	19.3
111-42-2	Diethanolamine	356	76	21.3
117-81-7	Di-(2-ethylhexyl) phthalate	321	72	22.4
7440-66-6	Zinc (fume or dust)	418	71	17.0
98-82-8	Cumene	236	70	29.7
—	Arsenic compounds	306	70	22.9
	Subtotal	69,381	17,448	25.1
	Total for All TRI Chemicals	79,987	19,732	24.7

Table 2-18.

Chemical	Category of Source Reduction Activity (number of forms reporting)							
	Good Operating Practices	Inventory Control	Spill and Leak Prevention	Raw Material Modifications	Process Modifications	Cleaning and Degreasing	Surface Preparation and Finishing	Product Modifications
Toluene	648	198	304	364	404	132	426	168
Xylene (mixed isomers)	559	179	249	284	356	100	464	139
1,1,1-Trichloroethane	350	66	106	361	183	579	104	116
Sulfuric acid	486	99	331	89	422	77	27	24
Methyl ethyl ketone	448	161	160	239	262	111	268	108
Acetone	418	130	184	171	249	183	137	69
Methanol	282	83	174	137	224	48	100	63
Ammonia	317	32	258	57	289	10	5	22
Glycol ethers	276	115	124	169	184	42	101	73
Hydrochloric acid	282	58	178	59	256	55	15	13
Zinc compounds	258	78	145	76	214	29	20	50
Phosphoric acid	202	73	138	55	126	46	10	23
Dichloromethane	164	34	96	113	117	89	21	43
n-Butyl alcohol	166	83	71	83	105	27	145	28
Chromium compounds	170	36	103	75	149	22	18	32
Styrene	156	64	112	80	145	13	62	34
Nitric acid	195	49	114	24	130	36	9	8
Methyl isobutyl ketone	181	57	69	73	124	35	100	46
Ethylbenzene	167	45	143	49	146	29	41	30
Copper	254	38	44	36	127	28	11	23
Freon 113	109	23	38	70	63	208	5	30
Trichloroethylene	128	16	50	18	56	178	6	16
Lead compounds	142	42	76	93	116	3	6	39
Ethylene glycol	133	52	99	58	96	6	3	26
Copper compounds	176	31	112	20	113	18	12	15
Chlorine	106	8	71	54	97	4	2	5
Nickel	141	41	35	39	95	22	10	17
Barium compounds	126	44	65	65	89	10	21	26
Chromium	132	40	34	40	70	17	6	21
1,2,4-Trimethylbenzene	104	35	91	28	84	17	27	17
Formaldehyde	82	8	67	52	65	4	4	22
Tetrachloroethylene	94	10	44	23	43	59	5	14
Manganese compounds	101	12	56	20	69	5	6	20
Nickel compounds	80	22	40	16	71	12	4	14
Lead	74	13	17	39	59	5	3	26
Benzene	64	7	106	9	84	7	2	3
Phenol	77	14	53	28	69	3	4	17
Manganese	92	23	21	37	32	2	10	13
Dichlorodifluoromethane (CFC-12)	27	2	47	40	33	0	1	28
Antimony compounds	65	16	40	25	57	2	3	13
Methylenebis(phenylisocyanate)	66	16	24	10	49	3	3	12
Naphthalene	56	16	72	17	48	8	6	6
Trichlorofluoromethane (CFC-11)	19	1	20	76	23	1	2	23
Cyclohexane	46	7	66	9	52	1	3	6
Hydrogen fluoride	59	15	27	11	46	11	7	2
Diethanolamine	39	8	20	18	29	6	0	3
Di-(2-ethylhexyl) phthalate	26	6	19	37	16	3	3	9
Zinc (fume or dust)	42	11	24	7	26	3	12	1
Cumene	38	11	31	5	33	2	4	3
Arsenic compounds	55	4	34	3	26	3	1	1
Subtotal	8,478	2,232	4,602	3,561	6,021	2,314	2,265	1,560
Total for All TRI Chemicals	9,576	2,449	5,601	3,838	7,074	2,395	2,317	1,698

20 Compound categories do not have CAS numbers (—).

Table 2-19. Methods Used to Identify Source Reduction Activities for the Top 50 TRI Chemicals by Number of Forms Reporting Source Reduction Activities, 1993.

CAS Number [21]	Chemical	Number of Forms Reporting Source Reduction Activities	Pollution Prevention Opportunity Audit: Internal	Pollution Prevention Opportunity Audit: External	Materials Balance Audit	Participative Team Management	Employee Recommendation: Informal	Employee Recommendation: Formal Program
108-88-3	Toluene	1,376	515	65	180	621	234	149
1330-20-7	Xylene (mixed isomers)	1,220	449	53	146	538	225	141
71-55-6	1,1,1-Trichloroethane	1,154	444	58	108	515	149	105
7664-93-9	Sulfuric acid	944	381	43	98	462	184	96
78-93-3	Methyl ethyl ketone	904	326	49	147	440	171	100
67-64-1	Acetone	852	321	37	142	421	143	91
67-56-1	Methanol	618	244	18	102	292	107	65
7664-41-7	Ammonia	618	259	31	81	260	121	62
—	Glycol ethers	591	215	21	63	274	100	77
7647-01-0	Hydrochloric acid	567	233	23	77	251	117	52
—	Zinc compounds	484	196	29	55	262	102	49
7664-38-2	Phosphoric acid	397	137	13	51	203	74	34
75-09-2	Dichloromethane	380	146	17	46	171	73	36
71-36-3	n-Butyl alcohol	359	131	21	54	165	62	46
—	Chromium compounds	357	156	20	44	183	67	32
100-42-5	Styrene	351	116	13	41	155	65	22
7697-37-2	Nitric acid	344	154	12	40	177	66	32
108-10-1	Methyl isobutyl ketone	338	134	21	48	174	64	47
100-41-4	Ethylbenzene	323	149	16	31	149	63	52
7440-50-8	Copper	322	122	29	66	177	64	44
76-13-1	Freon 113	307	141	17	34	175	38	40
79-01-6	Trichloroethylene	285	118	21	36	125	49	22
—	Lead compounds	275	115	18	32	149	60	32
107-21-1	Ethylene glycol	272	98	9	36	146	53	25
—	Copper compounds	269	120	10	41	127	58	18
7782-50-5	Chlorine	240	94	4	25	100	34	25
7440-02-0	Nickel	233	71	9	48	130	48	27
—	Barium compounds	231	89	15	30	121	53	37
7440-47-3	Chromium	210	59	8	53	112	33	33
95-63-6	1,2,4-Trimethylbenzene	209	91	11	20	82	29	28
50-00-0	Formaldehyde	182	79	13	21	92	22	28
127-18-4	Tetrachloroethylene	175	82	9	26	77	30	15
—	Manganese compounds	167	64	6	15	81	29	14
—	Nickel compounds	153	59	5	24	88	31	7
7439-92-1	Lead	152	53	11	21	74	25	12
71-43-2	Benzene	143	79	9	12	44	23	24
108-95-2	Phenol	141	51	6	18	66	25	19
7439-96-5	Manganese	132	32	7	32	63	25	10
75-71-8	Dichlorodifluoromethane (CFC-12)	130	37	4	17	39	14	9
—	Antimony compounds	123	36	3	25	65	31	16
101-68-8	Methylenebis(phenylisocyanate)	122	37	3	15	61	25	11
91-20-3	Naphthalene	120	50	5	6	47	26	19
75-69-4	Trichlorofluoromethane (CFC-11)	117	20	6	8	39	18	9
110-82-7	Cyclohexane	103	50	2	5	34	21	13
7664-39-3	Hydrogen fluoride	99	45	4	11	49	23	13
111-42-2	Diethanolamine	76	16	1	3	41	15	4
117-81-7	Di-(2-ethylhexyl) phthalate	72	23	2	8	37	14	3
7440-66-6	Zinc (fume or dust)	71	25	6	14	36	11	3
98-82-8	Cumene	70	35	6	7	28	8	12
—	Arsenic compounds	70	32	1	3	31	16	3
	Subtotal	17,448	6,729	820	2,266	8,249	3,138	1,863
	Total for All TRI Chemicals	19,732	7,713	919	2,572	9,354	3,495	2,145

Table 2-19.

Chemical	State Program	Federal Program	Trade/ Industry Program	Vendor Assistance	Other
Toluene	23	5	101	501	273
Xylene (mixed isomers)	26	4	90	462	236
1,1,1-Trichloroethane	19	17	85	417	241
Sulfuric acid	10	3	41	190	173
Methyl ethyl ketone	17	1	63	311	159
Acetone	18	3	70	273	132
Methanol	9	1	34	139	118
Ammonia	4	3	36	114	113
Glycol ethers	5	0	36	187	106
Hydrochloric acid	10	1	32	91	102
Zinc compounds	5	1	22	82	104
Phosphoric acid	3	2	13	102	62
Dichloromethane	2	1	16	90	84
n-Butyl alcohol	8	2	35	124	68
Chromium compounds	4	1	21	84	54
Styrene	6	1	45	135	60
Nitric acid	5	0	6	64	44
Methyl isobutyl ketone	7	0	20	102	60
Ethylbenzene	5	1	15	69	83
Copper	4	0	23	65	52
Freon 113	6	3	19	85	63
Trichloroethylene	9	0	13	77	51
Lead compounds	1	1	15	59	74
Ethylene glycol	1	0	10	40	49
Copper compounds	3	3	14	49	37
Chlorine	3	2	17	43	53
Nickel	2	0	13	47	37
Barium compounds	5	1	6	56	47
Chromium	1	0	8	50	42
1,2,4-Trimethylbenzene	2	0	18	44	53
Formaldehyde	2	0	3	51	38
Tetrachloroethylene	4	0	13	50	29
Manganese compounds	1	0	2	17	34
Nickel compounds	1	1	7	18	36
Lead	2	0	15	32	33
Benzene	2	1	9	17	56
Phenol	1	0	7	35	34
Manganese	1	0	7	39	31
Dichlorodifluoromethane (CFC-12)	0	1	9	27	58
Antimony compounds	0	0	3	24	23
Methylenebis(phenyl-isocyanate)	0	0	7	39	15
Naphthalene	0	0	17	32	35
Trichlorofluoromethane (CFC-11)	0	1	20	53	32
Cyclohexane	1	1	6	14	39
Hydrogen fluoride	1	0	3	22	25
Diethanolamine	1	0	2	12	15
Di-(2-ethylhexyl) phthalate	1	0	2	19	13
Zinc (fume or dust)	1	0	8	16	14
Cumene	0	0	3	10	19
Arsenic compounds	0	0	8	19	6
Subtotal	242	62	1,088	4,698	3,415
Total for All TRI Chemicals	259	72	1,189	5,016	3,916

(21) Compound categories do not have CAS numbers (—).

modifications. The most frequent methods of identifying opportunities for source reduction for toluene were participative team management and internal pollution prevention opportunity audits.

ASSESSMENT OF PROGRESS IN SOURCE REDUCTION

The reporting of source reduction activities and the methods used to identify those activities yield an indication of what is being done to prevent the generation of pollution at the source. Quantifying progress in reducing waste is a complex question that cannot be answered by simply comparing quantities over time. Many factors affect the quantity of toxic chemicals in waste. One such factor is changes in production at a facility. For this reason, the PPA requires facilities to provide on Form R a production ratio or activity index as an indicator of whether production or activity involving the reported toxic chemical has increased, decreased, or remained steady since the previous year. For the 1993 reporting year, the ratio is calculated by dividing the production or activity involving the reported toxic chemical in 1993 by the production or activity involving the reported toxic chemical in 1992. A ratio that is less than 1.0 indicates that production or activity is down in 1993 as compared to 1992. A ratio of 1.0 indicates that production or activity has remained steady. A ratio greater than 1.0 indicates that production or activity has increased. Table 2-20 shows the distribution of the ratios reported for 1993 and the total production-related waste associated with the ratios.

Calculating an Indicator of Changes in Quantities of Toxic Chemicals in Waste

Because of the complexity of quantifying progress in reducing toxic chemicals in waste at the source, there is no one method for measuring progress. Comparing changes in quantities of toxic chemicals in waste when source reduction has been implemented is one method, but this does not take production into account. There is also a method for using the information reported under TRI to assess changes in the quantities of toxic chemicals in waste relative to changes in production or activity at a facility. This method assumes a direct relationship between the level of production or activity at a facility and the amount of toxic chemicals in waste, including releases, generated by that production or activity. Thus, if production increases, waste is assumed to increase by a direct proportion. Similarly, if production decreases, waste is assumed to decrease proportionally. This assumption may hold for some, but not all, processes or facilities. There may be many instances where processes do not have a directly proportional relationship between the level of activity and waste generated.

A thorough and accurate assessment of source reduction progress requires more detailed information than is included in Form R. Nonetheless, the data collected under TRI can indicate whether toxic chemicals in waste are increasing or decreasing relative to production. To perform the following analysis, those forms that have complete data for both 1992 and 1993 must be selected. Data for those years must be comparable, meaning that a facility has to have reported quantities for the same waste management activity, for example, on-site recycling, for both years. The calculations shown in Box 2-4 illustrate how the information reported on Form R can be used to assess changes in the quantities of toxic chemicals in waste relative to changes in production or activity.

Because production may not be directly and linearly related to the quantity of chemical in waste, analysis of progress should also include simple comparison of reporting-year and prior-

Table 2-20. Distribution of Production Index.

Index	Number of Forms Reporting Number	Percent of Forms Reporting Percent	Cumulative Percent of Forms Reporting Percent	Production Related Waste 1993 Pounds	Percent of 1993 Waste Percent	Cumulative Percent of 1993 Waste Percent
0.1	439	0.6	0.6	21,105,964	0.1	0.1
0.2	377	0.5	1.1	31,057,774	0.1	0.2
0.3	479	0.6	1.7	57,255,837	0.2	0.3
0.4	609	0.8	2.5	90,030,389	0.3	0.6
0.5	1,059	1.4	3.9	197,451,654	0.6	1.2
0.6	1,287	1.7	5.7	383,907,111	1.2	2.4
0.7	2,317	3.1	8.7	524,871,021	1.6	3.9
0.8	4,102	5.5	14.2	852,390,321	2.6	6.5
0.9	8,384	11.2	25.3	4,217,109,571	12.7	19.2
1.0	20,220	26.9	52.2	14,788,729,766	44.5	63.7
1.1	14,745	19.6	71.9	6,157,236,363	18.5	82.3
1.2	7,624	10.1	82.0	2,451,498,808	7.4	89.6
1.3	4,231	5.6	87.6	1,075,398,938	3.2	92.9
1.4	2,030	2.7	90.3	793,702,271	2.4	95.3
1.5	1,572	2.1	92.4	235,875,023	0.7	96.0
1.6	946	1.3	93.7	293,437,893	0.9	96.9
1.7	577	0.8	94.4	202,000,869	0.6	97.5
1.8	467	0.6	95.1	61,400,172	0.2	97.6
1.9	348	0.5	95.5	51,108,970	0.2	97.8
2.0 - 2.9	1,517	2.0	97.5	252,368,698	0.8	98.6
3.0 - 3.9	397	0.5	98.1	97,449,397	0.3	98.9
4.0 - 4.9	210	0.3	98.4	22,772,472	0.1	98.9
5.0 - 9.9	347	0.5	98.8	39,371,980	0.1	99.0
10.0-24.9	186	0.2	99.1	26,148,030	0.1	99.1
25.0-49.9	48	0.1	99.1	9,588,354	0.0	99.2
50.0-99.9	334	0.4	99.6	73,628,305	0.2	99.4
>=100	320	0.4	100.0	208,485,434	0.6	100.0
Total	75,172	100.0		33,215,381,385	100.0	
Zero or blank or NA for Index						
Zero	793			48,611,671		
Blank	1,103			50,818,488		
NA	2,917			183,649,841		
Total	4,813			283,080,000		
Negative Number for Index						
Total	2			285		

year data. A decrease could indicate progress while an increase could indicate that progress is not happening. In some instances, however, source reduction could be implemented at a facility, but quantities reported for one chemical could increase if that chemical is substituted for another chemical as a source reduction measure for the latter chemical.

Changes in Quantities of Toxic Chemicals in Waste at the National Level

EPA performed an analysis of the data received for 1993 using the technique discussed in Box 2-4. Of the 79,987 Form Rs submitted for 1993, 57,852 forms had sufficient information for both 1992 and 1993 to perform an analysis of the changes of the quantity of toxic chemicals in waste for those two years. Of those 57,852 forms, 13,976 (approximately 24%, or 17% of the total 79,987 forms submitted) indicated the implementation of a source reduction activity. For this subset of forms that reported source reduction and provided sufficient information for both 1992 and 1993, the quantity of toxic chemicals in waste reported decreased by 5.1% between 1992 and 1993 in absolute terms (see Table 2-21). Adjusting for production changes indicates a significantly greater decrease of 8.9%. Movement up the waste management hierarchy is indicated on these forms as well. This is evident as the quantities recycled on-site and used for energy recovery on-site and off-site increased while the quantity released and the quantities treated (both on- and off-site) decreased.

As shown in Table 2-22, forms from facilities that did not indicate the implementation of source reduction showed a small decrease (0.6%) in the total quantity of toxic chemicals

Calculating Changes in Quantities of TRI Chemicals in Waste Relative to Production

1) Sum Sections 8.1 through 8.7 for the prior year (1992).
2) Sum Sections 8.1 through 8.7 for the reporting year (1993).
3) Multiply the sum for the prior year as calculated in step 1 by the production ratio or activity index (which is reported in Section 8.9 of Form R). This yields a quantity that would have been generated in the reporting year (call it the expected quantity).
4) Take the sum for the current year as calculated in step 2 and subtract from it the result of step 3 (the expected quantity).

If the result of step 4 is a negative number, this suggests that the total quantity of the toxic chemical in waste for the reporting year (1993) was less than that expected, given the reported level of production or activity. This could be an indication that reduction of the toxic chemical in waste is occurring. If the result of step 4 is a positive number, this means that the amount of toxic chemical in waste for the reporting year (1993) was greater than that expected, given the reported level of production or activity. This could be an indication that reduction of the toxic chemical in waste is not occurring.

Box 2-4. Calculating Changes in Quantities of TRI Chemicals in Waste Relative to Production.

Table 2-21. Change in Quantities of TRI Chemicals in Waste from 1992 to 1993 for Facilities Reporting Source Reduction Activities.㉒

Category of Waste Generated	1992 Reported Quantity Pounds	1992 Reported Percent of Total	1993 Reported Quantity Pounds	1993 Reported Percent of Total	Amount Expected for 1993 Quantity Pounds	Amount Expected for 1993 Percent of Total
Recycled On-site	2,183,656,146	31.5	2,205,086,710	33.5	2,357,846,316	32.9
Recycled Off-site	492,287,420	7.1	454,828,093	6.9	542,588,809	7.6
Energy Recovery On-site	825,186,502	11.9	826,114,929	12.6	771,110,553	10.8
Energy Recovery Off-site	139,231,132	2.0	140,526,318	2.1	155,517,940	2.2
Treated On-site	2,256,971,676	32.5	2,066,627,046	31.4	2,295,616,453	32.0
Treated Off-site	181,396,897	2.6	137,412,802	2.1	185,627,215	2.6
Quantity Released	859,327,300	12.4	750,191,769	11.4	855,716,628	11.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Category of Waste Generated	Absolute Change 1993-1992 Quantity Pounds	Absolute Change 1993-1992 Percent Change	Relative Change 1993 Reported - 1993 Expected Quantity Pounds	Relative Change 1993 Reported - 1993 Expected Percent Change
Recycled On-site	21,430,564	1.0	-152,759,606	-6.9
Recycled Off-site	-37,459,327	-7.6	-87,760,716	-19.3
Energy Recovery On-site	928,427	0.1	55,004,376	6.7
Energy Recovery Off-site	1,295,186	0.9	-14,991,622	-10.7
Treated On-site	-190,344,630	-8.4	-228,989,407	-11.1
Treated Off-site	-43,984,095	-24.2	-48,214,413	-35.1
Quantity Released	-109,135,531	-12.7	-105,524,859	-14.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 2-22. Change in Quantities of TRI Chemicals in Waste from 1992 to 1993 for Facilities Not Reporting Source Reduction Activities.㉓

Category of Waste Generated	1992 Reported Quantity Pounds	1992 Reported Percent of Total	1993 Reported Quantity Pounds	1993 Reported Percent of Total	Amount Expected for 1993 Quantity Pounds	Amount Expected for 1993 Percent of Total
Recycled On-site	3,879,578,132	25.3	4,442,432,897	29.2	4,245,866,455	26.5
Recycled Off-site	1,552,784,500	10.1	1,383,786,746	9.1	1,612,930,728	10.1
Energy Recovery On-site	1,668,032,316	10.9	1,350,513,948	8.9	1,669,665,013	10.4
Energy Recovery Off-site	144,487,719	0.9	151,991,143	1.0	161,959,488	1.0
Treated On-site	6,014,683,720	39.3	5,991,444,437	39.4	6,286,986,121	39.3
Treated Off-site	382,101,607	2.5	346,402,214	2.3	370,530,729	2.3
Quantity Released	1,667,323,060	10.9	1,554,090,052	10.2	1,668,175,652	10.4
Total	15,308,991,054	100.0	15,220,661,437	100.0	16,016,114,186	100.0

Category of Waste Generated	Absolute Change 1993-1992 Quantity Pounds	Absolute Change 1993-1992 Percent Change	Relative Change 1993 Reported - 1993 Expected Quantity Pounds	Relative Change 1993 Reported - 1993 Expected Percent Change
Recycled On-site	562,854,765	14.5	196,566,442	4.4
Recycled Off-site	-168,997,754	-10.9	-229,143,982	-16.6
Energy Recovery On-site	-317,518,368	-19.0	-319,151,065	-23.6
Energy Recovery Off-site	7,503,424	5.2	-9,968,345	-6.6
Treated On-site	-23,239,283	-0.4	-295,541,684	-4.9
Treated Off-site	-35,699,393	-9.3	-24,128,515	-7.0
Quantity Released	-113,233,008	-6.8	-114,085,600	-7.3
Total	-88,329,617	-0.6	-795,452,749	-5.2

㉒ 13,976 of the 57,852 Form Rs met these criteria.

㉓ 43,876 of the 57,852 Form Rs met these criteria.

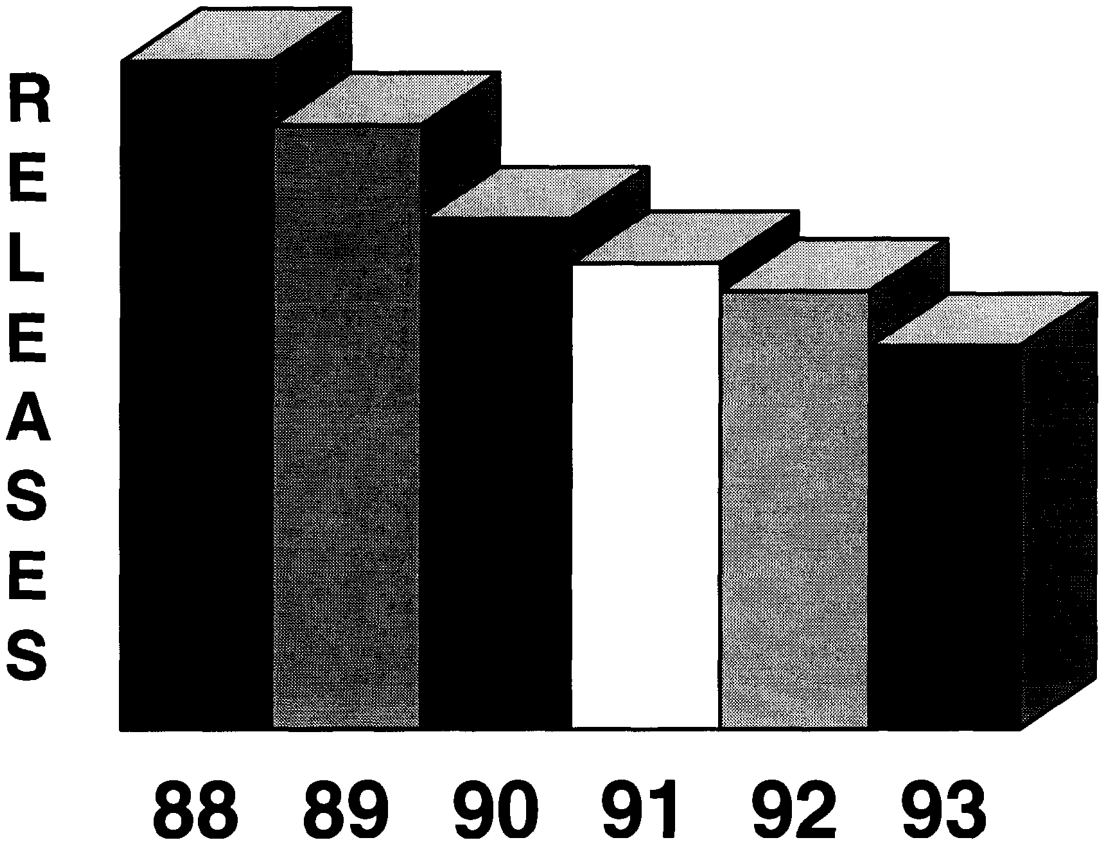
entering waste in absolute terms. With an adjustment for production, this decrease becomes more significant, just over 5.2%. Movement up the waste management hierarchy is also indicated by this subset of forms.

EPA has further analyzed this subset of the 1993 data and has found that not all facilities reporting a source reduction activity have indicated a decrease in the total quantity of toxic chemicals in waste. Similar to what was revealed with analysis of the 1992 and 1991 data, some facilities that have reported the implementation of a source reduction activity have also indicated an increase in the total quantity of toxic chemicals in waste. In addition, many facilities that did not indicate the implementation of a source reduction activity on Form R have indicated decreases in the total quantity of toxic chemicals in waste.

EPA has also performed some preliminary comparisons of source reduction reporting for 1991 through 1993. After matching a total of 58,910 forms across 1991 and 1993, 9,115 forms (15%) indicated the implementation of source reduction in all three years. A total of 2,770 matched forms (5%) indicated the implementation of source reduction in both 1992 and 1993. Of the remaining matched forms, 36,357 (62%) did not indicate the implementation of source reduction in any year.

Chapter 3

Year-to-Year Comparison of TRI Data



YEAR-TO-YEAR COMPARISON OF TRI DATA

INTRODUCTION

Because TRI data are collected annually, they can be used to measure the nation's progress in reducing toxic chemical releases and off-site transfers from manufacturing facilities. This chapter attempts to measure such progress on a national, state, industry, and chemical-specific basis.

This chapter compares the 1993 data to the 1992 data to measure annual progress, and to the 1988 data to measure progress since the beginning of the TRI program. Although 1987 was the first year for TRI reporting, 1988 has been chosen as the baseline year for comparisons because of concerns about the data quality of industry's submissions in the first year. Most comparisons to 1988 data include data for 1988 and 1991-1993 only; 1989 and 1990 have been omitted for practical reasons.

Certain TRI reporting requirements have changed since the inception of the program. It is important to understand these changes and consider their implications when comparing TRI data across years.

Chemical List Changes

EPA has the authority to add chemicals to the reporting list, if they meet the statutory criteria for toxicity, and to delete chemicals from the list if they are determined not to 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. These chemical list changes are discussed in detail in Appendix A: Questions and Answers.

In order to control for changes to the chemical list over time, year-to-year comparisons presented in this chapter are based on a consistent set of chemicals that have been reportable for all years being compared. This use of a consistent set of chemicals ensures that any year-to-year changes in release or transfer totals seen here cannot be attributed to changes in the list of reportable chemicals.

Because of this normalization process, release and transfer totals presented in 1988-1993 comparison tables will differ slightly from totals seen in 1992-1993 comparison tables and from the totals presented in Chapter 1 of this report. The 1988 through 1993 comparisons do not include aluminum oxide or any chemicals that have been added to or deleted from the chemical list since 1988. The 1992-1993 comparisons do not include any delisted chemicals, but they do include aluminum oxide (fibrous forms), as well as chemicals added to the list beginning with the 1990 and 1991 reporting years.

There were two changes to the chemical list between 1992 and 1993. Barium sulfate was removed from the barium compounds category, and the definition of the glycol ethers category was modified. Although these changes may cause some reduction in amounts reported for those categories, both of the categories have been included in the data comparisons in this chapter.

Methods used by facilities to report their releases and transfers of ammonia and ammonium sulfate (solution) have changed since the TRI program began. These changes have contributed substantially to changes seen in release and transfer amounts for these two chemicals over the years. Changes in reporting of ammonia and ammonium sulfate (solution) are discussed in Box 3-1.

Threshold Changes

Facilities are required to report for a particular chemical only if they meet the manufacture, process, or otherwise use thresholds for that chemical. The otherwise use threshold has remained 10,000 pounds since the inception of the program. However, the manufacture and process thresholds began at 75,000 pounds for 1987, dropped to 50,000 pounds for 1988, and dropped again to 25,000 pounds for 1989 and later. Due in part to these declining thresholds, the number of facilities reporting to TRI and the number of forms filed increased from 1987 to 1988 and again from 1988 to 1989. Thresholds have not changed since 1989. Therefore, threshold changes may have impacted the TRI data between 1988 and 1989, but would not affect data after 1989.

New Transfer Types

Beginning with the 1991 reporting year, facilities were required to report transfers off-site for the purposes of recycling and energy recovery to TRI. Prior to 1991, facilities were only required to report transfers to POTWs and other off-site locations for the purposes of treatment and disposal. Because of this change in the reporting requirements, total transfers for 1988 are not comparable to total transfers for 1993. Comparisons between 1988 and 1993 transfers in this chapter include only those transfer types which were reportable in 1988. Comparisons between 1992 and 1993 transfers include all transfer types reportable for 1991 and beyond.

NATIONAL OVERVIEW

Total Releases

Reported releases of toxic chemicals to the environment decreased by more than 406 million pounds between 1992 and 1993, from 3.2 billion pounds to 2.8 billion pounds. This decline of 12.6% is more than double the 6% decline between 1991 and 1992. Decreased air emissions accounted for more than half of the decline, while the greatest decreases in percentage terms were in underground injection of toxic chemicals and in releases to land. Table 3-1 compares the 1993 TRI data to the 1992 data.

Part of the decrease in releases between 1992 and 1993 is attributable to changes in facility reporting methods for ammonium sulfate (solution) and ammonia. This is explained in Box 3-1. If these two chemicals are excluded from the comparison, total releases to all media declined by 10.7% between 1992 and 1993, compared to the 12.6% decrease seen if these chemicals are included.

Between 1988 and 1993, total releases decreased by nearly 2.1 billion pounds, a decline of 42.7%. Air emissions decreased by more than 1 billion pounds, and underground injection of TRI chemicals decreased by 766 million pounds. Table 3-2 compares the 1993 TRI data to the 1988 data. If ammonia and ammonium sulfate (solution) are excluded from the comparison, total releases have declined 38.1% since 1988, compared to the 42.7% decline if these chemicals are included.

An Explanation of Changes in Reporting Methods for Aqueous Ammonia and Ammonium Sulfate (Solution)

Many facilities have changed the way they report releases and transfers of aqueous ammonia and ammonium sulfate (solution) as they became aware of EPA guidance for reporting aqueous ammonia and of an optional reporting method for ammonium sulfate (solution). These changes in reporting methods for these high-volume chemicals have resulted in large changes in the quantities of these chemicals reported as released or transferred. Reported changes in quantity which result from changes in reporting method do not represent actual changes in the quantity of the chemicals released or transferred.

Aqueous Ammonia. Many facilities recently became aware of existing EPA guidance allowing them to report only the quantity of un-ionized ammonia instead of total ammonia when filing a report for aqueous ammonia. Aqueous ammonia is an equilibrium mixture of un-ionized ammonia and ionized ammonia. Although its concentration varies with changing conditions such as temperature and pH, un-ionized ammonia generally represents only a very small fraction of total ammonia, typically no more than a few percent, at environmental pHs. Facilities that change their reporting of aqueous ammonia from total ammonia to un-ionized ammonia could reduce their reported quantity of releases or transfers by 90% or more. Although this guidance has existed since the 1990 reporting year, it seems to have had a more significant impact on the 1993 reports as more facilities have learned about it. Reported releases of ammonia declined by 113 million pounds, or 24%, between 1992 and 1993.

Ammonium Sulfate (Solution). Beginning with the 1990 reporting year, facilities were given the option of reporting their releases and transfers of ammonium sulfate (solution) as ammonium sulfate (solution) or as total ammonia. If a facility chose to report its ammonium sulfate (solution) releases and transfers as total ammonia, it would make its threshold determinations based on the quantity of ammonium sulfate (solution) manufactured, processed or used at the facility, but it would file a reporting form for ammonia and report only the weight of the ammonia portion of the ammonium sulfate (solution).

Because ammonia accounts for only about 27%, by weight, of ammonium sulfate (solution), changing to this optional reporting method would allow facilities to reduce the quantity of chemical reported by 73% without actually reducing the quantity released or transferred. For example, a facility which reported one million pounds of ammonium sulfate (solution) one year could report only about 270,000 pounds of ammonia the following year under the optional reporting method.

Because many facilities began to use this optional reporting method, reported releases and transfers of ammonium sulfate (solution) dropped sharply between 1989 and 1990 and continued to decline in subsequent years. In fact, reported releases of ammonium sulfate (solution) have declined by 98% since 1988. As part of the response to a petition to delete ammonium sulfate (solution) from EPCRA Section 313, EPA is redefining the requirements for reporting aqueous releases of ammonia. An amended proposed rule addressing this issue will be published by late March or early April and a final rule is expected by June 30, 1995.

Box 3-1. An Explanation of Changes in Reporting Methods for Aqueous Ammonia and Ammonium Sulfate (Solution).

Table 3-1. Comparison of TRI Releases and Transfers, 1992-1993.

	1992 Number	1993 Number	1992-1993 Change Number	1992-1993 Change Percent
Total Facilities	24,091	23,321	-770	-3.20
Total Forms	82,273	79,987	-2,286	-2.78
	Pounds	Pounds	Pounds	Percent
Total Air Emissions	1,872,601,046	1,672,127,735	-200,473,311	-10.71
Fugitive Air	553,889,339	490,040,607	-63,848,732	-11.53
Point Source Air	1,318,711,707	1,182,087,128	-136,624,579	-10.36
Surface Water Discharges	276,139,144	271,152,864	-4,986,280	-1.81
Underground Injection	725,946,644	576,285,233	-149,661,411	-20.62
Releases to Land	340,397,729	289,052,581	-51,345,148	-15.08
Total Releases	3,215,084,563	2,808,618,413	-406,466,150	-12.64
Transfers to Recycling	2,934,563,494	3,252,166,922	317,603,428	10.82
Transfers to Energy Recovery	472,584,712	487,380,037	14,795,325	3.13
Transfers to Treatment	397,052,262	328,074,174	-68,978,088	-17.37
Transfers to POTWs	436,788,261	314,350,915	-122,437,346	-28.03
Transfers to Disposal	263,891,628	325,251,442	61,359,814	23.25
Other Off-site Transfers[1]	17,988,132	1,820,373	-16,167,759	-89.88
Total Transfers	4,522,868,489	4,709,043,863	186,175,374	4.12
Total Releases and Transfers	7,737,953,052	7,517,662,276	-220,290,776	-2.85

Total Transfers

Reported transfers of TRI chemicals to off-site locations increased by 186 million pounds between 1992 and 1993, from 4.5 billion pounds to 4.7 billion pounds (see Table 3-1). This represents an increase of 4.1% between 1992 and 1993, compared to an increase of 20.4% between 1991 and 1992. Transfers to recycling, energy recovery, and disposal all increased, while other types of transfers decreased.

Because transfers to recycling and energy recovery were not reportable in 1988, total transfers for 1993 cannot be compared to total transfers for 1988. However, transfers to POTWs and other off-site locations for the purposes of treatment and disposal have declined 38.6% since 1988.

Facilities and Forms

The number of facilities reporting to TRI dropped 3.2% between 1992 and 1993, from 24,091 to 23,322. The number of individual chemical reports dropped 2.8%, from 82,273 in 1992 to 79,987 in 1993. However, it is likely that the number of facilities and forms for 1993 will rise somewhat over time due to late reporting and to resolution of outstanding data quality problems which may have prevented data entry of some submissions prior to the preparation of this report.

The decrease in the number of facilities reporting to TRI does not appear to have contributed significantly to the decrease in releases between 1992 and 1993. An analysis of

[1] Transfers reported with no waste management codes or invalid codes.

Table 3-2. Comparison of TRI Releases and Transfers, 1988, 1991-1993.[2]

	1988 Number	1991 Number	1992 Number	1993 Number	1988-1993 Change Number	1988-1993 Change Percent
Total Facilities	22,538	24,521	23,993	23,227	689	3.06
Total Forms	78,208	83,625	81,228	79,072	864	1.10
	Pounds	Pounds	Pounds	Pounds	Pounds	Percent
Total Air Emissions	2,706,997,365	2,022,328,114	1,848,302,336	1,655,358,748	-1,051,638,617	-38.85
Fugitive Air	840,042,600	618,630,741	541,139,839	480,245,942	-359,796,658	-42.83
Point Source Air	1,866,954,765	1,403,697,373	1,307,162,497	1,175,112,806	-691,841,959	-37.06
Surface Water Discharges	311,587,802	245,301,508	276,111,371	271,092,265	-40,495,537	-13.00
Underground Injection	1,342,357,672	709,185,109	725,821,103	575,994,149	-766,363,523	-57.09
Releases to Land	513,296,671	416,714,015	340,179,498	288,973,564	-224,323,107	-43.70
Total Releases	4,874,239,510	3,393,528,746	3,190,414,308	2,791,418,726	-2,082,820,784	-42.73
Transfers to Recycling[3]	NA	2,288,542,499	2,933,685,469	3,248,969,990	—	—
Transfers to Energy Recovery[3]	NA	443,312,792	472,252,568	486,303,735	—	—
Transfers to Treatment	492,576,600	351,711,653	393,260,049	325,662,309	-166,914,291	-33.89
Transfers to POTWs	581,979,953	393,878,122	436,399,701	314,167,969	-267,811,984	-46.02
Transfers to Disposal	491,867,067	261,687,384	261,242,552	321,552,281	-170,314,786	-34.63
Other Off-site Transfers[4]	48,299,434	10,672,939	17,931,132	1,820,373	—	—
Total Transfers	1,614,723,054	3,749,805,389	4,514,771,471	4,698,476,657	—	—
Total Releases and Transfers	6,488,962,564	7,143,334,135	7,705,185,779	7,489,895,383	—	—

releases reported by the 21,578 facilities that reported for both 1992 and 1993 shows that total releases for these facilities declined 12.5%, compared to 12.6% for all facilities reporting in 1993.

Figure 3-1 shows the change in the number of reporting facilities and the number of reports submitted to TRI since 1988. The increase in the number of reporting facilities and TRI reports between 1988 and 1989 is probably due primarily to the decrease in the reporting threshold for the manufacture and processing of chemicals, from 50,000 pounds in 1988 to 25,000 pounds in 1989. Since 1989, the number of facilities and forms has declined steadily.

Releases by Media

Air Emissions

Total air emissions declined by more than 200 million pounds between 1992 and 1993, from nearly 1.9 billion pounds to nearly 1.7 billion pounds. This represents a decrease of 10.7% for total air emissions between 1992 and 1993. Fugitive air emissions declined by 11.5%, while stack or point source air emissions declined by 10.4%.

Decreased emissions of 1,1,1-trichloroethane, an ozone-depleting solvent, accounted for about one-quarter of the decline in total air emissions, or about 53 million pounds. Air emissions of 1,1,1-trichloroethane dropped by 45.2% since

[2] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.
[3] NA: Transfers for recyling or energy recovery were not required to be reported for 1988.
[4] For 1991, 1992, and 1993, transfers reported with no waste management codes or invalid codes. For 1988, transfers reported with no waste management codes, invalid codes, or codes not required to be reported in 1988.

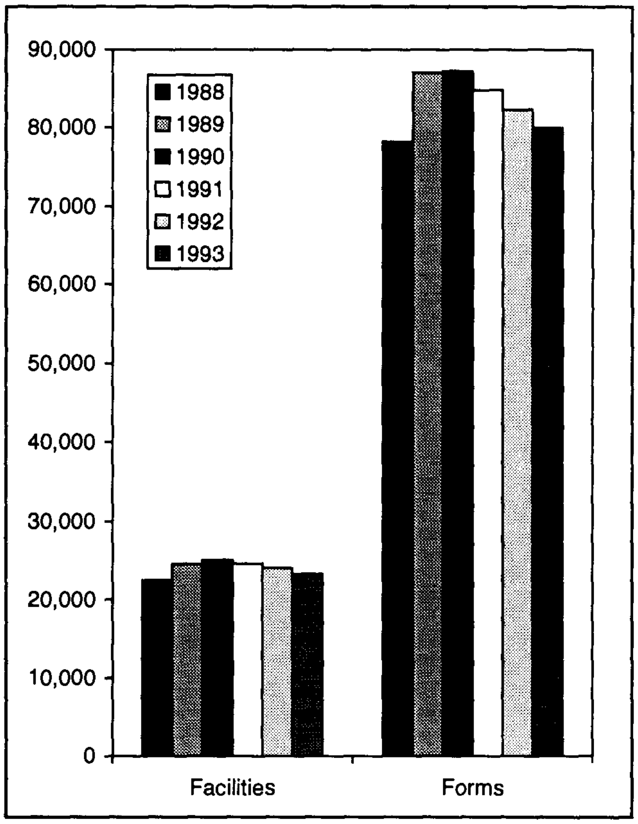


Figure 3-1. Facilities Reporting and Forms Submitted, 1988-1993.❺

1992. Air emissions of Freon 113, another ozone-depleting chemical, declined by more than 15 million pounds, or 60.5%, since 1992. Other chemicals with large decreases in air emissions since 1992 include methanol (33 million pounds), ammonia (24 million pounds), toluene (17 million pounds), acetone (10 million pounds), and dichloromethane, a suspect carcinogen (10 million pounds). With the exception of ammonia, all of these chemicals with the largest decreases in air emissions are industrial solvents.

Although air emissions decreased significantly overall between 1992 and 1993, emissions of certain chemicals increased. For example, air releases of chlorine increased by more than 5 million pounds between 1992 and 1993, and air releases of hydrochloric acid increased by nearly 2 million pounds. Increases for both of these chemicals are largely attributable to increased releases from one facility, Magnesium Corporation of America in Rowley, Utah. (Individual facilities are discussed in greater detail in the industry section of this chapter.) Other chemicals with increases in air releases greater than a million pounds were styrene (1.6 million pounds) and 1,2,4-trimethylbenzene (1.3 million pounds).

Figure 3-2 shows the trend in TRI total air emissions from 1988 to 1993. Since 1988, air emissions have declined by more than 1 billion pounds, or 38.9%. Fugitive air emissions have declined by 42.8%, while stack emissions have declined by 37.1%.

Surface Water Discharges

Discharges to surface water decreased by about 5 million pounds between 1992 and 1993, from 276 million pounds to 271 million pounds. This represents a 1.8% decrease since 1992.

The chemicals with the greatest decreases in water releases since 1992 include methanol (8.1 million pounds), ammonia (6.8 million pounds), sulfuric acid (4.2 million pounds), ammonium sulfate (solution) (1.3 million pounds), and hydrochloric acid (1.2 million pounds).

These and other decreases were nearly offset by a 17 million pound increase in the amount of phosphoric acid released to surface water. This net increase in phosphoric acid discharges resulted from a large increase in phosphoric acid releases from one fertilizer facility (IMC-Agrico Company in Saint James, Louisiana) and decreases from various other facilities.

❺ Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

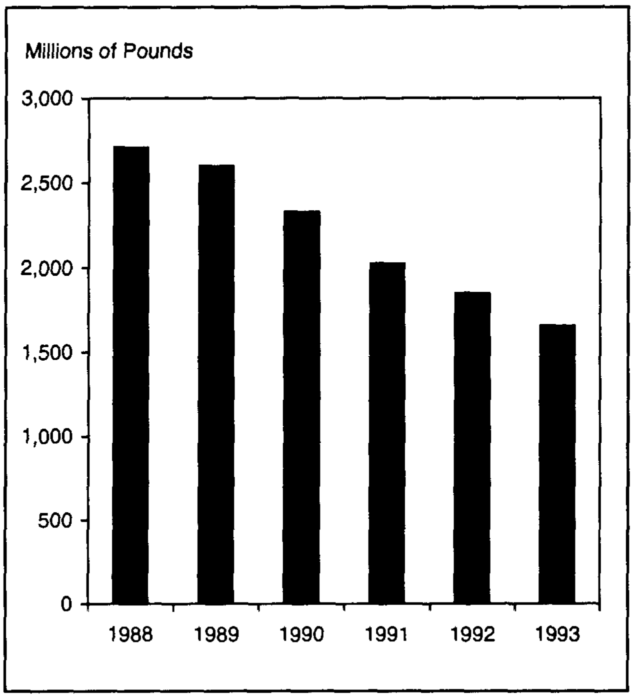


Figure 3-2. TRI Total Air Emissions, 1988-1993.❻

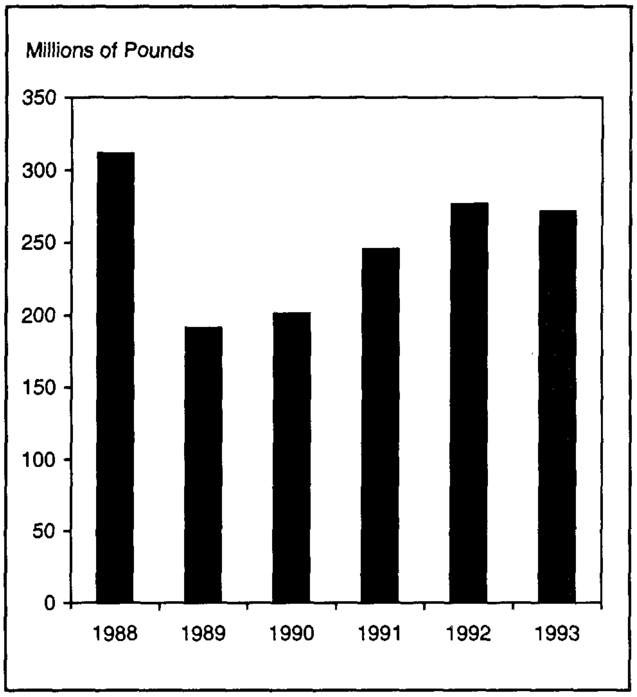


Figure 3-3. TRI Surface Water Discharges, 1988-1993.❻

Figure 3-3 illustrates the changes in surface water releases since 1988. Reported surface water discharges have declined by 13.0% since 1988. However, changes in facility reporting methods for ammonia and ammonium sulfate (solution) may have had a significant impact on this release category (see Box 3-1 above). If these chemicals are excluded from the 1988-1993 comparison, surface water discharges have increased by 8.0% instead of decreasing by 13.0% since 1988.

Underground Injection

Reported underground injection of TRI chemicals decreased by 150 million pounds between 1992 and 1993, from 726 million pounds to 576 million pounds. This represents a decrease of 20.6% since 1992.

Reported underground injection of ammonia decreased by 83 million pounds, or 33.0%, since 1992. This represents more than one-half of the total decrease in underground injection since 1992. Other chemicals with significant decreases in underground injection since 1992 include hydrochloric acid (62.7 million pounds), acetonitrile (4.4 million pounds), nitric acid (2.9 million pounds), phenol (2.5 million pounds), ammonium nitrate (solution) (2.3 million pounds), and picric acid (1.0 million pounds).

A significant portion of the large decrease in reported underground injection of ammonia is attributable to facility changes in reporting methods for this chemical, as explained above in Box 3-1. If ammonia and ammonium sulfate (solution) are excluded from the 1992-1993 comparison, underground injection has declined by 14.3% since 1992, instead of the 20.6% decrease seen when these chemicals are included in the comparison.

❻ Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

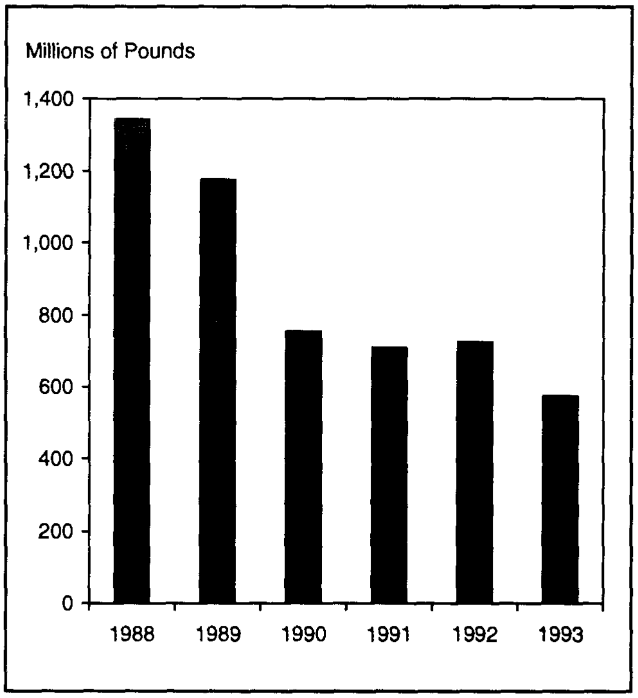


Figure 3-4. TRI Underground Injection, 1988-1993.❼

Since 1988, reported underground injection of TRI chemicals has decreased by 766 million pounds, or 57.1%. Underground injection totals for 1988 through 1993 are displayed in Figure 3-4. Reported underground injection of ammonium sulfate (solution) alone has decreased by 514 million pounds since 1988, from 520 million pounds to 6 million pounds. Again, this change in underground injection of ammonium sulfate was due largely to changes in facility reporting methods for this chemical, as explained in Box 3-1. If ammonia and ammonium sulfate (solution) are excluded from the comparison, underground injection has declined by 47.7% since 1988.

Land Releases

Releases to land decreased by 51 million pounds since 1992, from 340 million pounds to 289 million pounds. This represents a decrease of 15.1% since 1992.

Many of the chemicals with the largest decreases in land releases were metals and metal compounds, including manganese compounds (16.2 million pounds), copper (11.3 million pounds), zinc compounds (9.1 million pounds), zinc (fume or dust) (4.9 million pounds), barium compounds (2.3 million pounds), and nickel (2.0 million pounds). Phosphoric acid releases to land decreased by 11.2 million pounds.

One facility, Magma Copper Company in San Manuel, Arizona, accounted for 11.6 million pounds of decreased land releases of copper, an amount larger than the total net decrease for this chemical. This facility also accounted for much of the decrease in land releases of zinc compounds. The Inland Steel Company in East Chicago, Indiana, accounted for 19 million pounds of decrease in land releases of manganese compounds, more than the net decrease for this chemical category. Decreased phosphoric acid releases to land were largely attributable to IMC Fertilizer, Inc. in Mulberry, Florida, and to Texasgulf Inc. in Aurora, North Carolina.

Land releases have decreased by 224 million pounds, or 43.7%, since 1988. Figure 3-5 illustrates the changes in land releases between 1988 and 1993.

Transfers by Type

Recycling

Transfers to off-site locations for recycling increased by nearly 318 million pounds since 1992, from more than 2.9 billion pounds to more than 3.2 billion pounds. This represents an increase of 10.8% since 1992.

Transfers of sulfuric acid to recycling increased by 188 million pounds since 1992, while transfers of copper to recycling increased by 108

❼ Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

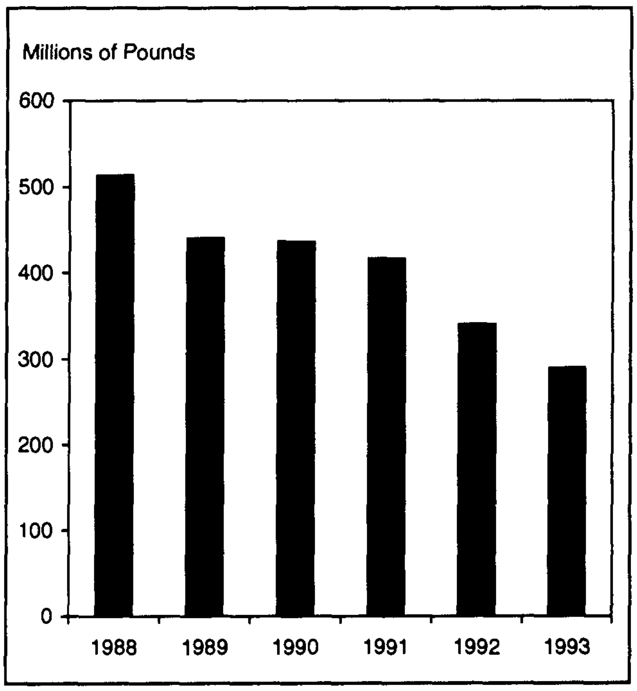


Figure 3-5. TRI Releases to Land, 1988-1993.❽

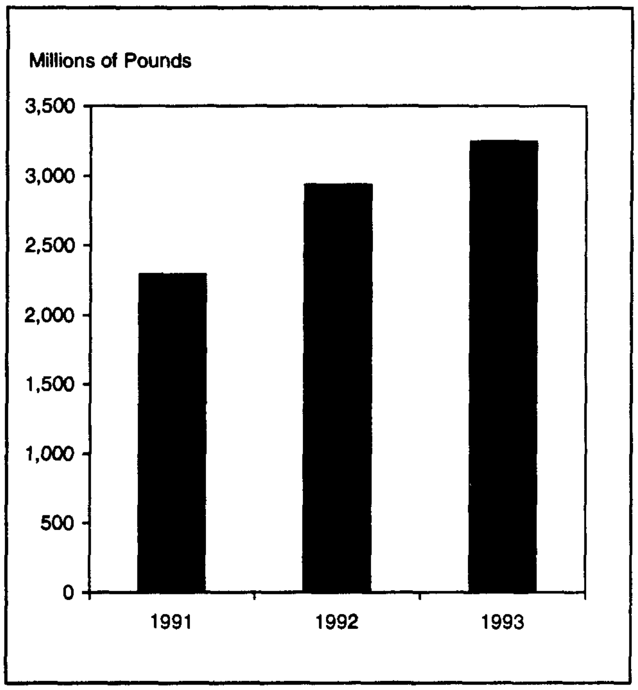


Figure 3-6. TRI Transfers to Recycling, 1991-1993.

million pounds. Other chemicals with large increases in transfers to recycling include aluminum (fume or dust) (48.8 million pounds), manganese (38.4 million pounds), chromium compounds (13.5 million pounds), copper compounds (12.6 million pounds), ethylene glycol (11.8 million pounds), and chromium (11.4 million pounds). Transfers of zinc to recycling increased by 13.1 million pounds, while transfers of zinc compounds to recycling decreased by 5.9 million pounds.

Lead compounds showed by far the largest decrease in transfers to recycling between 1992 and 1993, a decrease of 122 million pounds. In contrast, transfers of lead to recycling increased by 8.6 million pounds during the same period. Other chemicals with large decreases in transfers to recycling between 1992 and 1993 include: 1,3-butadiene (10.9 million pounds); 1,2-dichloroethane (10.3 million pounds); 1,1,1-trichloroethane (8.9 million pounds); and dichloromethane (7.9 million pounds).

Transfers for recycling have increased by 42.0% since 1991, the first year for which such reporting was required. Transfers for recycling for 1991 through 1993 are displayed in Figure 3-6.

Energy Recovery

Transfers to off-site locations for energy recovery increased from about 473 million pounds in 1992 to 487 million pounds in 1993, an increase of nearly 15 million pounds, or 3.1%.

Chemicals with the largest increases in off-site transfers for energy recovery include: acetone (9.1 million pounds); methyl ethyl ketone (6.4 million pounds); xylene (mixed isomers) (5.9 million pounds); acrylic acid (3.7 million pounds); hydrochloric acid (3.4 million pounds); tert-butyl alcohol (2.9 million pounds); and vinyl acetate (2.6 million pounds).

❽ Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

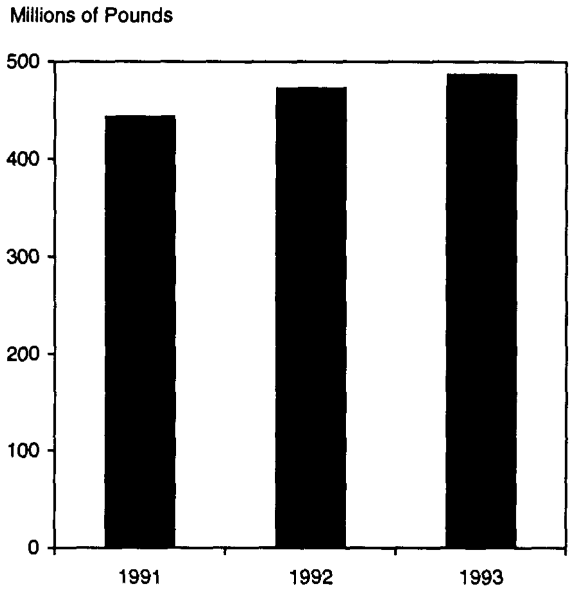


Figure 3-7. TRI Transfers to Energy Recovery, 1991-1993.

Chemicals with the largest decreases in off-site transfers for energy recovery include: methanol (12.0 million pounds); methyl isobutyl ketone (5.2 million pounds); styrene (3.4 million pounds); 1,1,1-trichloroethane (1.3 million pounds); and benzene (1.2 million pounds).

Transfers for energy recovery have increased by 9.7% since 1991, the first year for which such reporting was required. Figure 3-7 illustrates transfers for energy recovery for 1991 through 1993.

Treatment

Transfers to off-site locations for the purposes of treatment decreased from 397 million pounds in 1992 to 328 million pounds in 1993, a decline of 69 million pounds, or 17.4%.

Chemicals with the greatest decreases in transfers for treatment include: zinc compounds (25.5 million pounds); antimony compounds (20.3 million pounds); and lead compounds (16.6 million pounds). These decreases are largely attributable to one lead smelter facility, Doe Run Company in Boss, Missouri. In 1992, the facility reported transferring about 64 million pounds of these compounds to off-site locations for solidification/stabilization, a treatment method which does not result in the destruction of the chemical. The decline in 1993 occurred because the facility did not repeat these transfers in 1993. Other chemicals with large decreases in transfers to treatment include: acetone (7.9 million pounds); sulfuric acid (7.7 million pounds); arsenic compounds (3.3 million pounds); methanol (2.8 million pounds); and dichloromethane (2.8 million pounds).

Chemicals with large increases in transfers to treatment include: chromium compounds (14.1 million pounds); hydrochloric acid (3.9 million pounds); toluene (2.3 million pounds); and ethylene glycol (2.1 million pounds).

Figure 3-8 displays transfers to off-site locations for treatment for 1988 through 1993. These transfers have declined by 167 million pounds, or 33.9%, since 1988.

POTWs

Reported transfers to POTWs decreased by more than 122 million pounds since 1992, from 437 million pounds to 314 million pounds. This represents a decline of 28.0%. However, if ammonia and ammonium sulfate (solution) are excluded from the 1992-1993 comparison, transfers to POTWs declined by 22.3%.

Chemicals with large decreases in transfers to POTWs between 1992 and 1993 include: ammonium sulfate (solution) (61.2 million pounds); methanol (19.2 million pounds);

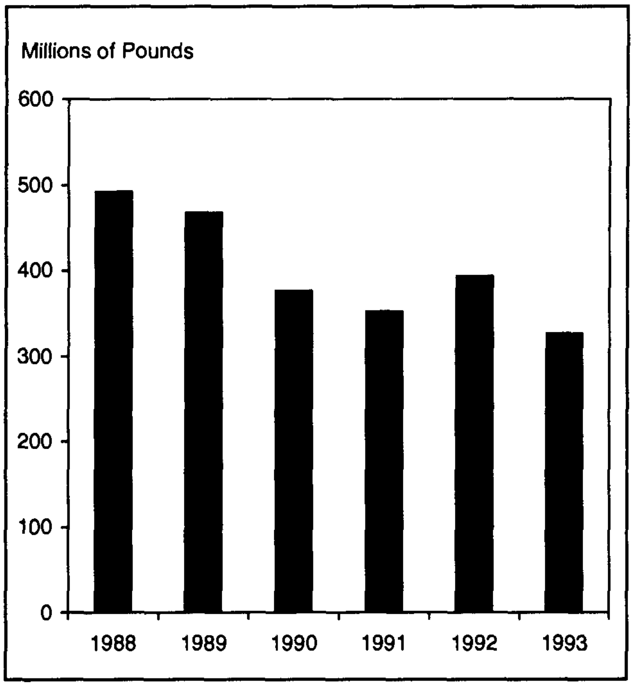


Figure 3-8. TRI Transfers to Treatment, 1988-1993.[9]

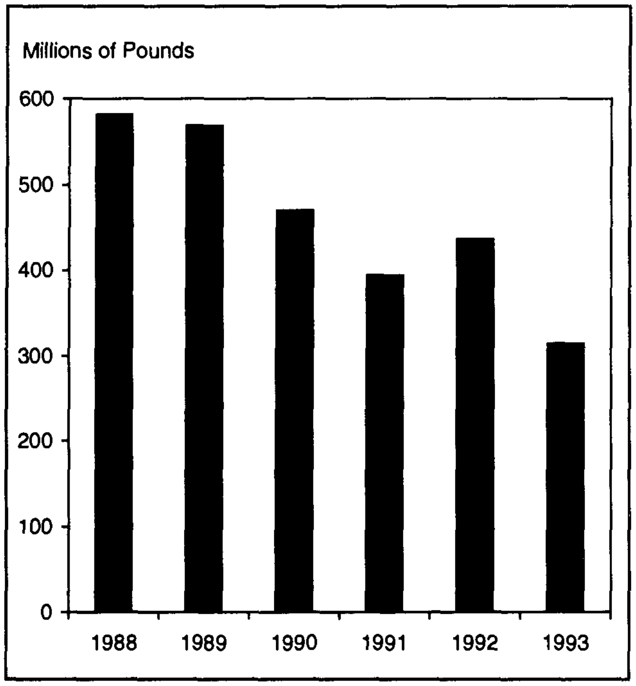


Figure 3-9. TRI Transfers to POTWs, 1988-1993.[9]

sulfuric acid (15.7 million pounds); hydrochloric acid (9.4 million pounds); and ethylene glycol (4.8 million pounds).

Transfers of glycol ethers to POTWs increased by 1.6 million pounds between 1992 and 1993. No other chemical increased by more than a million pounds in this transfer category.

Reported transfers to POTWs have decreased by 268 million pounds since 1988, a decline of 46.0%. These transfers are displayed in Figure 3-9. If ammonia and ammonium sulfate (solution) are excluded from the comparison, transfers to POTWs have declined by 42.6% since 1988.

Disposal

Transfers to off-site locations for disposal increased by 61 million pounds since 1992, from 264 million pounds to 325 million pounds. This represents an increase of 23.3%.

This increase is largely due to increased transfers of several types of metal compounds, including: zinc compounds (42 million pounds); lead compounds (6.9 million pounds); manganese compounds (6.2 million pounds); and copper compounds (5.5 million pounds). Other chemicals with large increases in transfers for disposal included ammonia (9.0 million pounds) and sulfuric acid (4.4 million pounds).

Chemicals with large decreases in transfers to disposal include: copper (6.8 million pounds); barium compounds (5.4 million pounds); ammonium sulfate (solution) (4.7 million pounds); and zinc (fume or dust) (3.4 million pounds).

Transfers off-site for disposal have decreased by 170 million pounds, or 34.6%, since 1988 (see Figure 3-10).

[9] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991

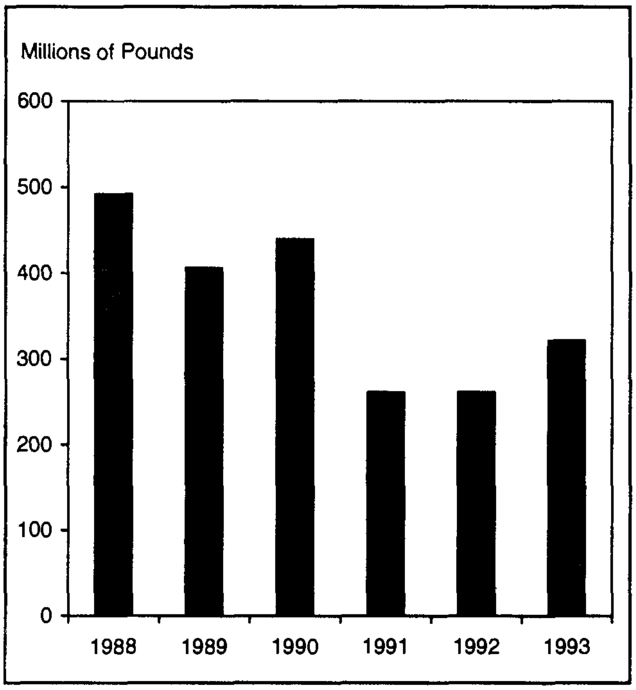


Figure 3-10. TRI Transfers to Disposal, 1988-1993.[10]

Other Off-site Transfers

This category includes transfers that are reported without valid waste management codes and that therefore cannot be assigned to one of the reporting categories. These transfers decreased from 17.9 million pounds in 1992 to 1.8 million pounds in 1993, a decline of 89.9%.

CHANGES IN RELEASES AND TRANSFERS BY STATE

1992 - 1993 Comparisons

Table 3-3 compares the total TRI releases reported by each state for 1992 and 1993. The five states with the largest reported decreases in total TRI releases were Texas (69 million pounds), Kansas (48 million pounds), Kentucky (33 million pounds), Arizona (33 million pounds), and Indiana (26 million pounds).

These five states together account for more than one-half of the total reductions reported nationally between 1992 and 1993. For four of these five states, the majority of the decrease is attributable to just one or two facilities. Many of these decreases are explained in greater detail in the industry section of this chapter.

In Kansas, 41 million pounds of the state's 48 million pound decrease resulted from decreased underground injection at a Vulcan Chemicals facility in Wichita. Twenty-nine million pounds of Kentucky's 33 million pound decrease resulted from the elimination of underground injection at a DuPont facility in Louisville. Arizona's 33 million pound decrease was due primarily to decreased land releases at a Magma Copper Co. facility in San Manuel and an Asarco, Inc. facility in Hayden. Twenty million pounds of Indiana's 26 million pound decrease was attributable to decreased land releases at an Inland Steel facility in East Chicago.

Texas' 69 million pound decrease was due to decreases in underground injection (37 million pounds), surface water discharges (14 million pounds), and air emissions (17 million pounds). The largest underground injection decreases were attributable to a Monsanto facility in Alvin and a Sterling Chemical facility in Texas City, although numerous other facilities also reported decreased underground injection. The decrease in surface water releases was attributable to a Mobil Mining and Minerals facility in Pasadena. Many facilities in Texas reported decreased air emissions.

Figure 3-11 displays the states by percentage change in TRI total releases from 1992 to 1993. Fifteen states reported decreases in total releases of more than 20% between 1992 and 1993. The three states with the largest percentage

[10] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

decreases, Arizona (71%), Kansas (54.5%), and Kentucky (47.4%), were also among the states with the largest decreases in terms of pounds. Decreases in Alaska (44.2%), New Hampshire (35.1%), and South Dakota (33.4%) were significant on a percentage basis but represent much smaller decreases in poundage terms because of the comparatively low release volumes reported by these states.

Four of the five states with the largest total releases in 1993 had rates of decrease well below the 12.6% national average decrease between 1992 and 1993. Louisiana, the state with the largest quantity of TRI total releases, reported only a 2.9% decrease from 1992 to 1993. Tennessee, ranked third in the nation for total TRI releases, reported a decrease of only 4.9% from 1992 to 1993. Fourth-ranked Ohio reported a 6.0% decrease between 1992 and 1993, while fifth-ranked Mississippi reported only a 1.5% decrease. Among the top five states for total releases in 1993, only Texas reduced its releases at a rate greater than the nation as a whole, reporting a 16.4% reduction from 1992 to 1993.

In contrast to states reporting declining releases between 1992 and 1993, eight states and territories reported increases in total TRI releases (see Table 3-3 and Figure 3-11). Utah's 13 million pound increase was largely due to increased air releases from a Magnesium Corporation of America facility in Rowley. Nevada's increase of 5 million pounds was due largely to increased land releases at a Coastal Chemical facility in Battle Mountain. Much of New Mexico's increase resulted from increased land releases at a Phelps Dodge Mining facility in Playas, while Montana's increase was largely attributable to increased land releases at an Asarco, Inc. facility in East Helena.

1988-1993 Comparisons

Table 3-4 compares TRI total release data by state for 1988 through 1993. Figure 3-12 displays the states by 1988 through 1993 percent change in total releases. Twenty-two states and the District of Columbia have reduced their releases by more than 50% since 1988; ten of these have reduced their total TRI releases by more than 60%. Only three states (Montana, Nevada, and North Dakota) reported increased TRI releases between 1988 and 1993.

Figure 3-13 displays the 1988 through 1993 total TRI releases for the five states with the greatest quantity of TRI releases in 1993. Louisiana, currently ranked first in the nation for total releases, has reduced its releases by 282 million pounds since 1988, a decrease of 38.5%. This is the second-largest decrease of any state in terms of pounds. Louisiana's underground injection has decreased by 266 million pounds and air releases have decreased by 63 million pounds. However, surface water discharges in Louisiana have increased by 50 million pounds since 1988, due to increased discharges of phosphoric acid from a few fertilizer facilities.

Texas, currently ranked second in the nation for total TRI releases, has reduced its releases by 412 million pounds since 1988, the largest decrease for any state. Underground injection in Texas has decreased by 318 million pounds; air emissions have decreased by 72 million pounds; and land releases have decreased by 18 million pounds. Total releases in Texas have declined by 54.0% since 1988.

Tennessee, ranked third in the nation for total releases in 1993, has reduced its releases by less than 30 million pounds since 1988, a decrease of only 13.7%. Air releases have decreased by

Table 3-3. Change in Total TRI Releases by State, 1992-1993.

State	Total Releases 1992 Pounds	Total Releases 1993 Pounds	1992-1993 Change Pounds	1992-1993 Change Percent
Alabama	114,617,447	105,538,411	-9,079,036	-7.9
Alaska	14,854,171	8,286,614	-6,567,557	-44.2
American Samoa	11,240	18,523	7,283	64.8
Arizona	46,310,667	13,436,165	-32,874,502	-71.0
Arkansas	43,843,499	37,077,881	-6,765,618	-15.4
California	71,888,755	57,270,288	-14,618,467	-20.3
Colorado	5,587,686	4,912,072	-675,614	-12.1
Connecticut	16,758,191	13,195,339	-3,562,852	-21.3
Delaware	5,383,871	4,812,606	-571,265	-10.6
Florida	82,792,447	69,145,073	-13,647,374	-16.5
Georgia	55,656,354	49,886,970	-5,769,384	-10.4
Hawaii	872,362	704,152	-168,210	-19.3
Idaho	8,345,017	8,018,204	-326,813	-3.9
Illinois	118,934,178	100,990,919	-17,943,259	-15.1
Indiana	123,420,724	97,844,399	-25,576,325	-20.7
Iowa	35,707,425	31,515,946	-4,191,479	-11.7
Kansas	87,561,109	39,831,380	-47,729,729	-54.5
Kentucky	69,956,007	36,826,199	-33,129,808	-47.4
Louisiana	464,191,301	450,680,961	-13,510,340	-2.9
Maine	15,001,398	12,624,098	-2,377,300	-15.8
Maryland	13,240,293	13,229,878	-10,415	-0.1
Massachusetts	14,842,257	11,637,903	-3,204,354	-21.6
Michigan	84,688,899	81,998,546	-2,690,353	-3.2
Minnesota	31,770,959	24,980,209	-6,790,750	-21.4
Mississippi	119,826,678	118,019,466	-1,807,212	-1.5
Missouri	55,389,613	49,608,818	-5,780,795	-10.4
Montana	43,905,756	45,212,291	1,306,535	3.0
Nebraska	13,151,782	11,456,786	-1,694,996	-12.9
Nevada	3,646,206	8,713,850	5,067,644	139.0
New Hampshire	6,166,214	4,004,358	-2,161,856	-35.1
New Jersey	24,534,557	19,372,889	-5,161,668	-21.0
New Mexico	20,369,870	23,830,114	3,460,244	17.0
New York	58,889,942	47,759,205	-11,130,737	-18.9
North Carolina	113,817,577	91,014,680	-22,802,897	-20.0
North Dakota	1,904,146	1,539,427	-364,719	-19.2
Ohio	146,904,910	138,034,559	-8,870,351	-6.0
Oklahoma	28,547,489	22,060,782	-6,486,707	-22.7
Oregon	20,215,496	19,435,631	-779,865	-3.9
Pennsylvania	69,374,012	54,082,286	-15,291,726	-22.0
Puerto Rico	15,174,180	13,414,400	-1,759,780	-11.6
Rhode Island	3,769,611	3,659,185	-110,426	-2.9
South Carolina	65,332,437	59,103,879	-6,228,558	-9.5
South Dakota	3,013,700	2,006,951	-1,006,749	-33.4
Tennessee	197,995,455	188,207,643	-9,787,812	-4.9
Texas	421,081,842	352,171,723	-68,910,119	-16.4
Utah	79,186,366	91,850,812	12,664,446	16.0
Vermont	870,090	758,498	-111,592	-12.8
Virgin Islands	1,539,233	1,724,070	184,837	12.0
Virginia	68,714,342	65,092,946	-3,621,396	-5.3
Washington	26,391,876	24,427,715	-1,964,161	-7.4
West Virginia	24,938,418	25,087,559	149,141	0.6
Wisconsin	39,232,604	35,910,893	-3,321,711	-8.5
Wyoming	14,963,904	16,594,261	1,630,357	10.9
Total	3,215,084,563	2,808,618,413	-406,466,150	-12.6

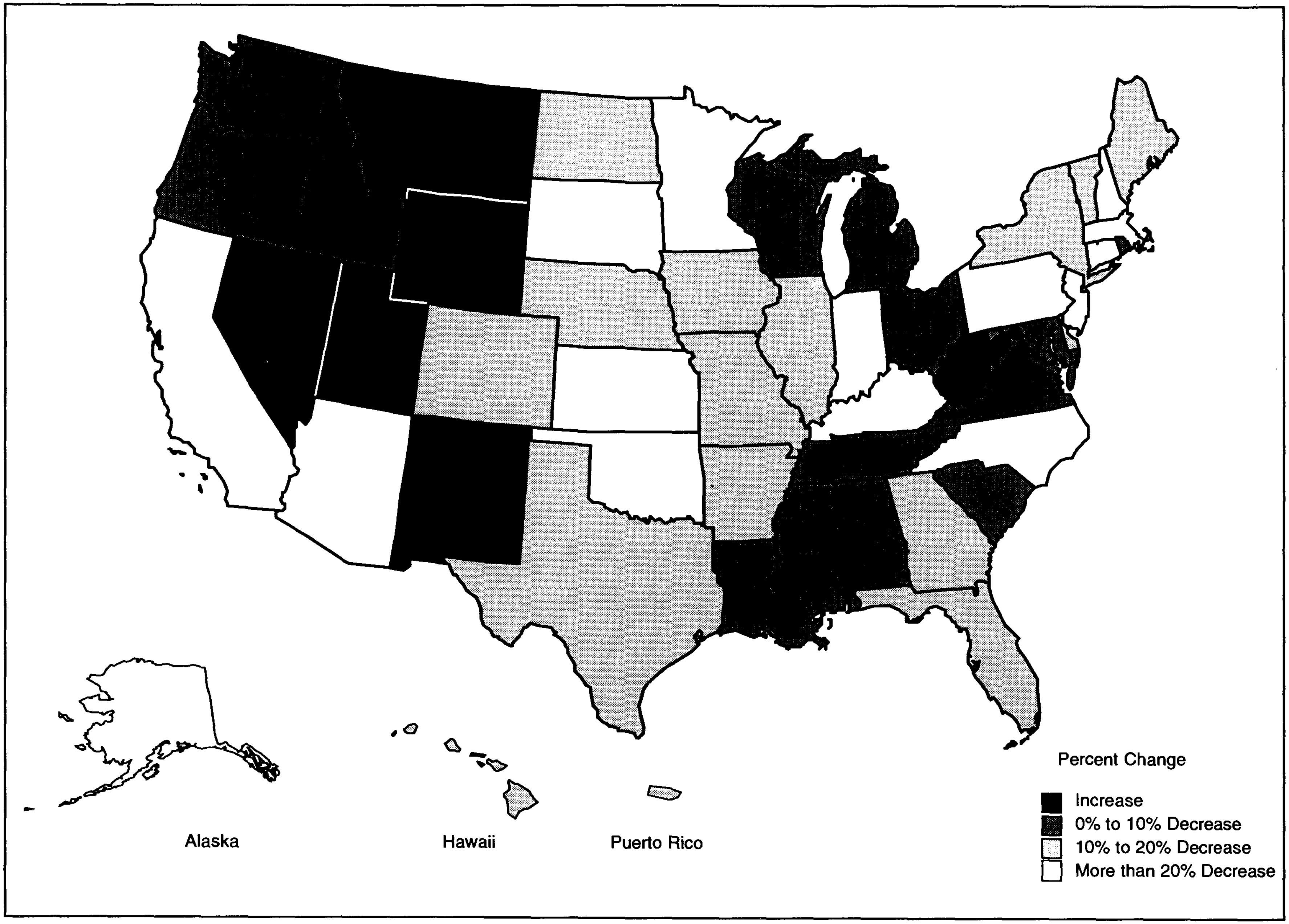


Figure 3-11. Percent Change in Total TRI Releases by State, 1992-1993.

Table 3-4. Change in Total TRI Releases by State, 1988-1993.⑪

State	Total Releases 1988 Pounds	Total Releases 1991 Pounds	Total Releases 1992 Pounds	Total Releases 1993 Pounds	1988-1993 Change Pounds	1988-1993 Change Percent
Alabama	124,203,261	118,798,099	113,887,655	104,830,451	-19,372,810	-15.6
Alaska	27,515,117	18,027,698	14,854,171	8,286,614	-19,228,503	-69.9
American Samoa	29,500	22,000	11,240	18,523	-10,977	-37.2
Arizona	70,086,623	63,181,618	46,237,355	13,430,765	-56,655,858	-80.8
Arkansas	68,851,644	50,609,822	43,425,036	36,796,479	-32,055,165	-46.6
California	114,736,965	89,813,911	70,106,107	56,101,758	-58,635,207	-51.1
Colorado	14,942,547	6,501,665	5,409,892	4,835,662	-10,106,885	-67.6
Connecticut	34,093,507	19,903,213	16,484,279	13,076,270	-21,017,237	-61.6
Delaware	8,379,313	6,344,397	5,342,403	4,773,721	-3,605,592	-43.0
District of Columbia	500	0	0	0	-500	-100.0
Florida	130,329,460	88,112,155	82,488,754	68,934,941	-61,394,519	-47.1
Georgia	97,255,939	64,244,522	55,262,095	49,758,950	-47,496,989	-48.8
Hawaii	2,141,399	913,086	872,362	704,152	-1,437,247	-67.1
Idaho	17,513,277	10,481,654	8,345,017	8,018,204	-9,495,073	-54.2
Illinois	144,184,257	122,817,096	117,794,669	100,346,166	-43,838,091	-30.4
Indiana	216,604,627	132,207,039	122,162,425	96,737,534	-119,867,093	-55.3
Iowa	46,940,359	38,353,008	35,561,866	31,408,837	-15,531,522	-33.1
Kansas	124,285,922	76,199,483	86,848,192	39,052,085	-85,233,837	-68.6
Kentucky	86,835,818	62,182,112	68,421,913	35,294,093	-51,541,725	-59.4
Louisiana	731,026,374	458,797,429	462,660,129	449,468,130	-281,558,244	-38.5
Maine	18,834,914	16,283,191	14,727,071	12,359,348	-6,475,566	-34.4
Maryland	25,507,507	14,732,636	13,216,238	13,210,159	-12,297,348	-48.2
Massachusetts	29,657,098	17,409,936	14,670,988	11,477,109	-18,179,989	-61.3
Michigan	112,481,872	93,306,122	84,128,770	81,559,013	-30,922,859	-27.5
Minnesota	60,795,508	41,229,990	31,341,990	24,813,026	-35,982,482	-59.2
Mississippi	120,644,040	113,342,472	118,740,807	117,243,675	-3,400,365	-2.8
Missouri	92,523,686	61,551,791	55,198,037	49,528,970	-42,994,716	-46.5
Montana	36,053,149	41,450,732	43,905,756	45,212,291	9,159,142	25.4
Nebraska	19,055,948	15,542,516	13,136,101	11,453,221	-7,602,727	-39.9
Nevada	2,545,717	3,246,791	3,600,306	8,687,450	6,141,733	241.3
New Hampshire	13,253,686	6,049,562	6,130,477	3,974,535	-9,279,151	-70.0
New Jersey	43,993,112	24,353,840	24,017,067	18,828,700	-25,164,412	-57.2
New Mexico	30,964,260	39,835,660	20,260,719	23,764,203	-7,200,057	-23.3
New York	106,534,276	63,841,210	58,341,698	47,486,382	-59,047,894	-55.4
North Carolina	115,593,111	107,924,974	111,766,143	90,217,816	-25,375,295	-22.0
North Dakota	1,313,104	1,908,934	1,904,146	1,539,427	226,323	17.2
Ohio	241,818,005	174,911,222	145,623,537	137,173,667	-104,644,338	-43.3
Oklahoma	47,163,228	31,087,702	28,505,815	22,018,988	-25,144,240	-53.3
Oregon	22,931,048	19,824,880	20,138,292	19,404,218	-3,526,830	-15.4
Pennsylvania	113,733,843	76,201,071	68,527,656	53,775,127	-59,958,716	-52.7
Puerto Rico	15,215,281	16,786,517	14,341,867	12,979,835	-2,235,446	-14.7
Rhode Island	8,481,738	4,479,935	3,768,856	3,658,435	-4,823,303	-56.9
South Carolina	73,875,226	64,103,389	65,106,402	58,982,852	-14,892,374	-20.2
South Dakota	2,575,033	2,787,792	2,998,608	1,995,711	-579,322	-22.5
Tennessee	217,595,873	222,052,167	197,623,355	187,884,897	-29,710,976	-13.7
Texas	761,669,219	407,845,368	418,519,973	350,135,400	-411,533,819	-54.0
Utah	135,748,733	98,331,223	79,085,797	91,778,892	-43,969,841	-32.4
Vermont	1,704,770	1,000,824	865,617	742,248	-962,522	-56.5
Virgin Islands	1,850,198	1,520,016	1,539,233	1,724,070	-126,128	-6.8
Virginia	153,283,259	71,649,472	68,025,493	64,564,077	-88,719,182	-57.9
Washington	44,134,195	30,305,430	26,255,287	24,337,292	-19,796,903	-44.9
West Virginia	42,828,515	29,061,302	24,355,747	24,729,909	-18,098,606	-42.3
Wisconsin	54,602,909	40,197,401	38,906,995	35,710,187	-18,892,722	-34.6
Wyoming	45,321,040	11,862,671	14,963,904	16,594,261	-28,726,779	-63.4
Total	4,874,239,510	3,393,528,746	3,190,414,308	2,791,418,726	-2,082,820,784	-42.7

⑪ Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

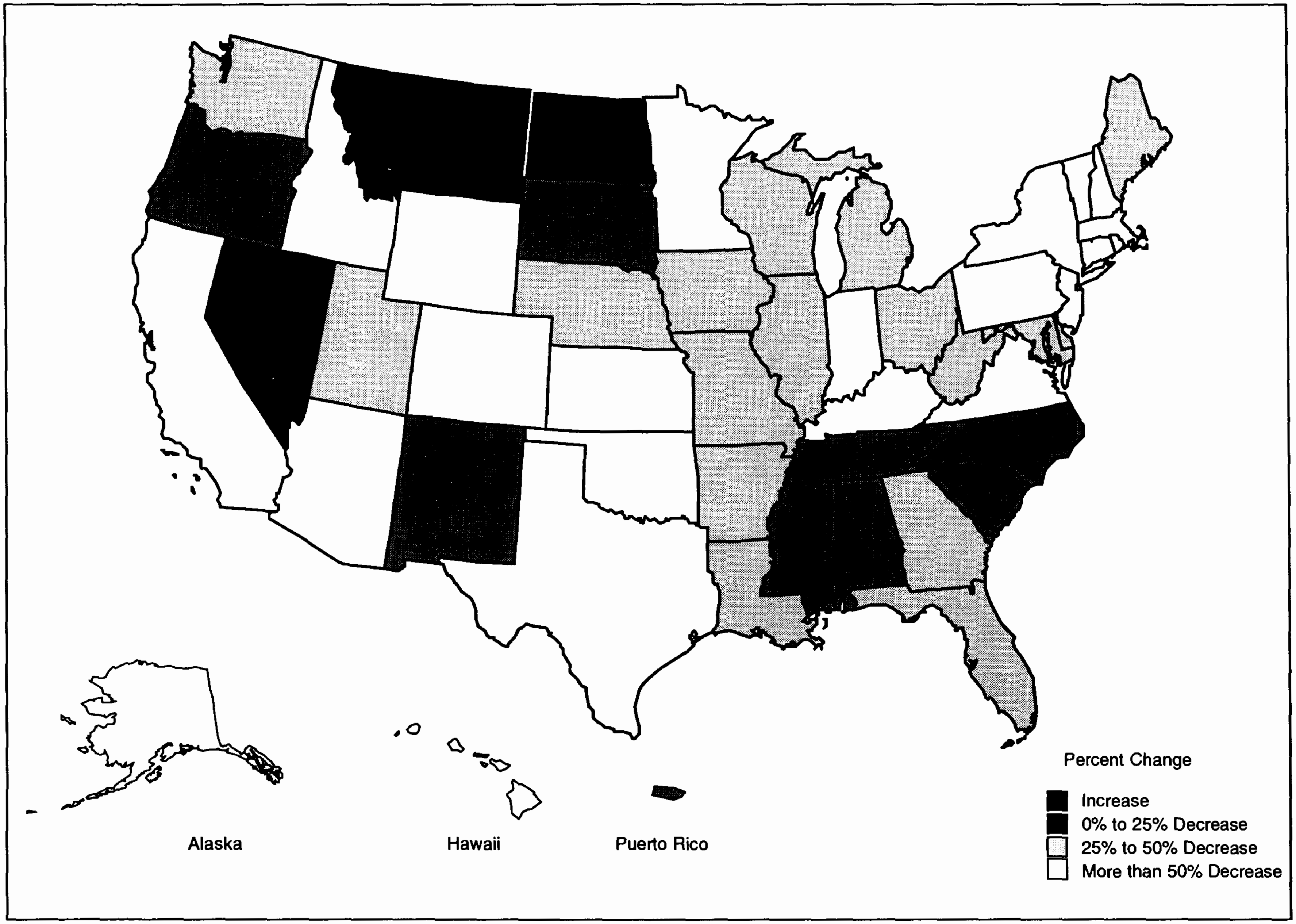


Figure 3-12. Percent Change in Total TRI Releases by State, 1988-1993.

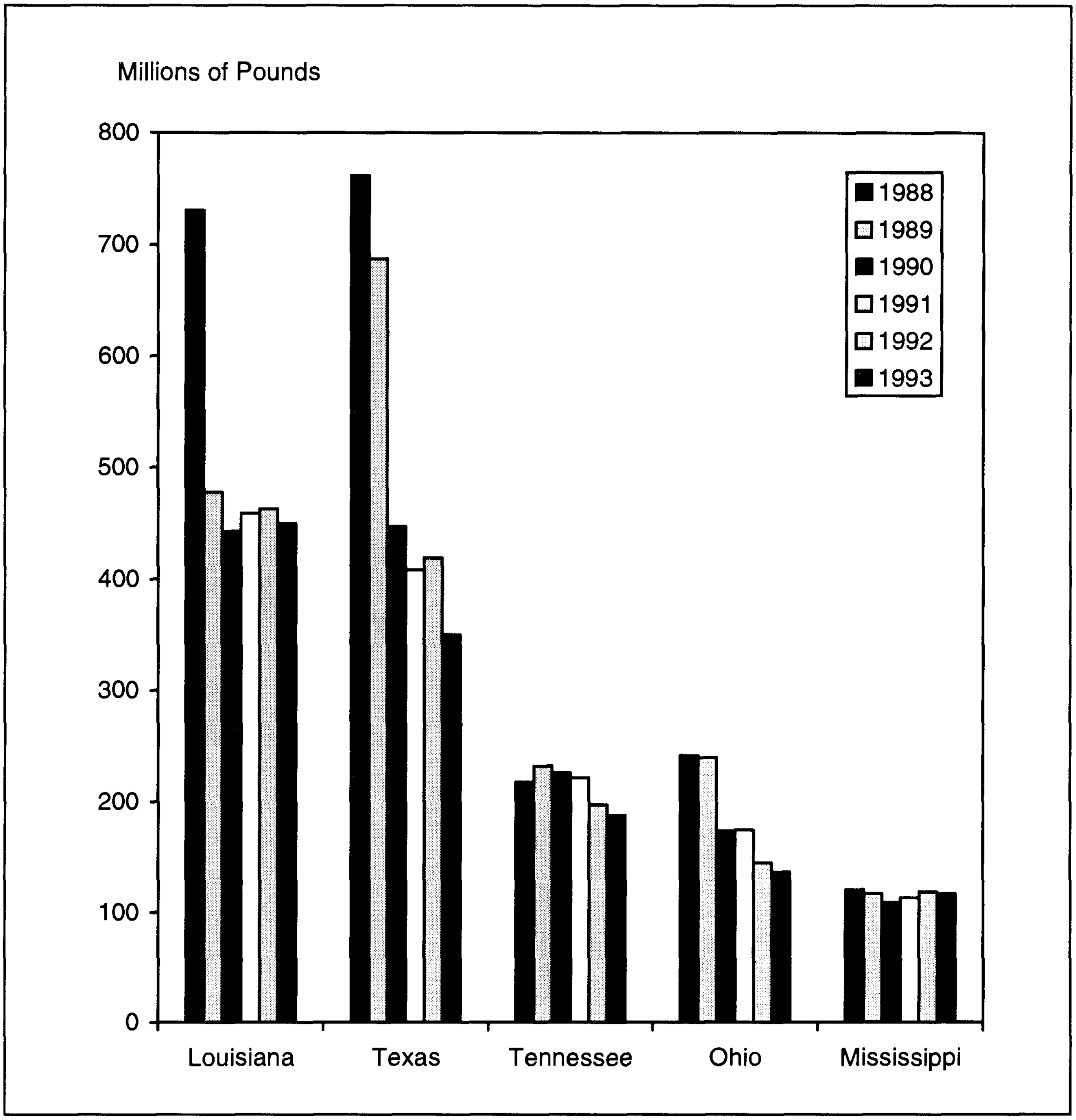


Figure 3-13. Total TRI Releases, 1988-1993, of Top Five States for Total Releases in 1993.⓬

⓬ Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

31 million pounds, water releases by 4 million pounds, and releases to land by 6.6 million pounds, but underground injection has increased.

Fourth-ranked Ohio has reduced its releases by 105 million pounds since 1988, a decrease of 43.3%. Air releases have decreased by 65 million pounds, and underground injection has decreased by 31 million pounds. Releases to surface water and to land also decreased.

Mississippi has reduced its total TRI releases by only 3 million pounds since 1988, a decrease of just 2.8%. Because of this, Mississippi has moved from 12th in the nation for total TRI releases in 1988 to fifth in the nation in 1993. Mississippi's air releases have decreased by 15 million pounds since 1988. Land and water releases have also decreased. However, an increase of 16 million pounds in underground injection nearly offset these decreases to other media.

Table 3-5 presents the complete release and transfer information for each state for 1988 and 1991-1993. No reports were received from Guam or the Northern Mariana Islands for any year 1988-1993. No reports were received from the District of Columbia for any year 1990-1993.

CHANGE IN RELEASES AND TRANSFERS BY INDUSTRY

1992-1993 Comparisons

Between 1992 and 1993, 18 of the 20 industry groups covered by TRI reported decreased releases. Only two industry groups (furniture and stone/clay/glass) reported increases, and these increases were small in both percentage and poundage terms. Facilities that did not fall within the covered industrial sectors also reported increased releases, largely due to this year's voluntary reporting by Department of Energy facilities, many of which did not report an SIC code within the covered range. Table 3-6 presents the 1992 to 1993 change in TRI total releases by industry group.

The chemical industry accounted for the largest decrease in total releases between 1992 and 1993, about 236 million pounds. This represents 58.0% of the total reduction across all industry groups. Facilities reporting activities within more than one industry group (identified as "multiple codes 20-39" in the tables) reported the next largest quantity of TRI release reductions, at 61 million pounds. The primary metals and paper industries followed, with 20 million pounds and 18 million pounds of reductions respectively.

The largest decreases in percentage terms between 1992 and 1993 were reported by the following industry groups: apparel (29.1%), multiple codes 20-39 (27.5%), electrical (23.9%), tobacco (23.2%), and leather (22.1%). Three of these five groups (leather, tobacco and apparel) report comparatively small quantities of TRI releases each year, so their large percentage decreases represent comparatively small decreases in terms of pounds.

1988-1993 Comparisons

Between 1988 and 1993, the chemical industry accounted for more than one billion pounds of total TRI release reductions, or about 49% of the total reduction of 2.1 billion pounds across all industry groups. Facilities reporting "multiple codes" accounted for 344 million pounds of release reductions, or about 16.5% of total reductions across all industry groups. Primary metals followed, with 237 million pounds of

Table 3-5. TRI Releases and Transfers by State, 1988, 1991-1993 (Alphabetically Ordered).

State	Year	Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Alabama	93	515	94,452,970	5,628,250	145,613	4,603,618	104,830,451
	92	512	94,776,223	6,708,092	6,269,403	6,133,937	113,887,655
	91	491	99,893,685	4,261,623	7,988,920	6,653,871	118,798,099
	88	411	106,370,320	7,078,632	6,139,021	4,615,288	124,203,261
Alaska	93	8	6,228,306	2,056,183	192	1,933	8,286,614
	92	6	10,945,946	3,907,576	192	457	14,854,171
	91	7	13,226,443	4,795,973	150	5,132	18,027,698
	88	6	23,045,564	4,466,815	1,018	1,720	27,515,117
American Samoa	93	3	18,518	5	0	0	18,523
	92	2	11,240	0	0	0	11,240
	91	2	22,000	0	0	0	22,000
	88	2	29,500	0	0	0	29,500
Arizona	93	180	5,475,637	57	18	7,955,053	13,430,765
	92	187	8,516,122	5	0	37,721,228	46,237,355
	91	200	9,847,377	32,960	0	53,301,281	63,181,618
	88	197	16,408,538	9,855	505	53,667,725	70,086,623
Arkansas	93	397	29,150,507	1,549,879	3,624,516	2,471,577	36,796,479
	92	393	27,753,385	1,429,109	11,995,448	2,247,094	43,425,036
	91	399	32,465,316	2,419,047	14,031,499	1,693,960	50,609,822
	88	346	48,942,279	7,448,161	10,521,284	1,939,920	68,851,644
California	93	1,752	45,390,644	3,084,987	4,152,139	3,473,988	56,101,758
	92	1,880	55,605,927	10,212,998	884,806	3,402,376	70,106,107
	91	1,991	69,150,379	10,141,472	1,934,745	8,587,315	89,813,911
	88	1,952	94,170,937	10,862,037	1,586,653	8,117,338	114,736,965
Colorado	93	189	4,358,606	189,656	500	286,900	4,835,662
	92	200	4,991,231	139,971	500	278,190	5,409,892
	91	216	5,817,935	195,424	500	487,806	6,501,665
	88	189	12,032,488	114,864	1,000	2,794,195	14,942,547
Connecticut	93	385	10,357,954	2,345,208	0	373,108	13,076,270
	92	419	13,379,545	3,100,833	0	3,901	16,484,279
	91	449	16,005,265	3,894,543	50	3,355	19,903,213
	88	458	26,323,702	6,081,914	250	1,687,641	34,093,507
Delaware	93	73	4,463,950	135,504	0	174,267	4,773,721
	92	68	4,966,998	236,887	0	138,518	5,342,403
	91	72	5,840,399	349,040	0	154,958	6,344,397
	88	63	7,564,595	574,601	0	240,117	8,379,313
District of Columbia	88	1	250	250	0	0	500
Florida	93	511	30,378,667	2,149,042	10,940,759	25,466,473	68,934,941
	92	533	33,541,044	3,294,027	11,772,909	33,880,774	82,488,754
	91	530	38,424,604	3,145,245	13,728,636	32,813,670	88,112,155
	88	521	51,839,109	6,955,162	34,651,616	36,883,573	130,329,460
Georgia	93	730	45,266,851	3,037,516	0	1,454,583	49,758,950
	92	750	50,315,452	3,681,542	10	1,265,091	55,262,095
	91	756	58,346,255	4,728,830	0	1,169,437	64,244,522
	88	659	84,870,994	3,021,415	59,467	9,304,063	97,255,939

Table 3-5.

State	Year	Transfers to Recycling[14] Pounds	Transfers to Energy Recovery[14] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[15] Pounds	Total Transfers[16] Pounds
Alabama	93	49,411,919	11,889,056	7,762,906	468,526	7,389,355	0	76,921,762
	92	36,061,428	11,407,672	9,890,289	1,100,003	6,172,978	3,957,959	68,590,329
	91	38,937,858	45,420,800	9,368,874	980,312	5,963,786	583,808	101,255,438
	88	NA	NA	8,849,328	1,155,334	6,725,990	153,791	NA
Alaska	93	450,043	0	2,364	20	20	0	452,447
	92	242,373	0	3,088	20	40	0	245,521
	91	0	0	1,036	0	20	0	1,056
	88	NA	NA	0	1,000	1,750	0	NA
American Samoa	93	0	0	7	0	0	0	7
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Arizona	93	47,131,738	716,757	2,388,813	533,642	204,721	0	50,975,671
	92	25,426,742	958,400	2,178,744	471,720	87,829	14,362	29,137,797
	91	23,896,144	878,222	1,034,599	475,457	85,176	42,941	26,412,539
	88	NA	NA	1,196,919	4,536,846	722,213	27,417	6,483,395
Arkansas	93	60,124,314	6,023,768	1,280,106	596,866	1,021,874	255	69,047,183
	92	49,565,897	5,082,000	1,411,690	507,668	5,028,546	57,677	61,653,478
	91	31,237,807	3,517,892	2,253,292	576,646	2,180,477	4,124	39,770,238
	88	NA	NA	2,475,995	1,274,333	5,181,969	293,784	NA
California	93	227,117,419	9,592,954	6,719,496	19,418,656	9,342,538	217,552	272,408,615
	92	126,133,070	12,467,037	6,752,821	21,274,971	5,712,458	114,136	172,454,493
	91	134,303,309	13,636,557	6,325,074	26,033,306	8,891,714	310,177	189,500,137
	88	NA	NA	18,029,751	49,394,439	19,645,183	4,109,781	NA
Colorado	93	9,794,524	3,925,318	3,654,992	631,964	1,193,767	4,050	19,204,615
	92	9,446,111	2,014,368	3,021,533	516,212	222,682	250	15,221,156
	91	6,963,112	1,330,388	1,805,923	465,991	1,065,552	170,450	11,801,416
	88	NA	NA	2,454,676	631,606	2,589,861	169,898	NA
Connecticut	93	24,714,593	4,055,556	6,771,558	1,251,210	888,324	16,682	37,697,923
	92	21,520,050	4,397,696	6,334,341	1,831,145	940,856	239,993	35,264,081
	91	22,684,433	3,586,484	6,561,696	1,568,527	1,013,982	191,209	35,606,331
	88	NA	NA	11,035,879	3,318,028	5,611,188	334,573	NA
Delaware	93	16,303,324	439,333	1,005,196	3,062,509	120,206	0	20,930,568
	92	7,746,970	1,388,720	767,827	2,455,462	42,934	0	12,401,913
	91	7,053,510	1,186,088	742,594	2,369,900	28,746	0	11,380,838
	88	NA	NA	2,429,914	3,276,713	1,722,689	19,894	NA
District of Columbia	88	NA	NA	250	250	0	0	NA
Florida	93	21,515,244	3,519,899	3,823,517	9,363,494	1,879,497	224,115	40,325,766
	92	19,726,248	4,960,554	5,961,173	12,482,174	2,061,201	1,500	45,192,850
	91	15,251,216	5,041,258	7,231,046	13,653,053	2,636,278	18,154	43,831,005
	88	NA	NA	8,812,359	16,229,362	2,791,703	1,652,325	NA
Georgia	93	52,316,876	7,034,249	2,433,374	4,382,211	3,462,302	504	69,629,516
	92	54,296,489	6,742,916	3,031,027	4,984,085	7,847,850	668,510	77,570,877
	91	55,360,824	6,971,745	3,338,137	8,369,069	8,854,383	260,938	83,155,096
	88	NA	NA	8,822,435	8,302,726	20,358,710	777,801	NA

Table 3-5. TRI Releases and Transfers by State, 1988, 1991-1993 (Alphabetically Ordered), Continued.

State	Year	Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Hawaii	93	18	528,077	14,300	160,015	1,760	704,152
	92	21	594,381	7,210	269,261	1,510	872,362
	91	28	579,658	17,029	235,199	81,200	913,086
	88	27	874,145	10,000	1,051,509	205,745	2,141,399
Idaho	93	58	4,269,802	30,574	0	3,717,828	8,018,204
	92	55	5,314,084	160,405	0	2,870,528	8,345,017
	91	57	6,412,663	187,956	0	3,881,035	10,481,654
	88	51	5,366,683	296,220	0	11,850,374	17,513,277
Illinois	93	1,383	62,366,460	5,167,267	12,551,415	20,261,024	100,346,166
	92	1,416	72,817,721	5,760,454	20,942,170	18,274,324	117,794,669
	91	1,451	81,784,558	6,443,167	16,199,440	18,389,931	122,817,096
	88	1,359	111,131,104	14,185,427	7,340,184	11,527,542	144,184,257
Indiana	93	1,038	75,769,047	777,603	7,425,421	12,765,463	96,737,534
	92	1,051	83,784,172	1,063,460	3,777,831	33,536,962	122,162,425
	91	1,041	92,219,158	1,658,364	2,361,080	35,968,437	132,207,039
	88	875	113,768,665	4,913,927	34,845,400	63,076,635	216,604,627
Iowa	93	426	28,052,182	1,055,579	0	2,301,076	31,408,837
	92	430	32,752,650	1,276,714	0	1,532,502	35,561,866
	91	451	34,562,280	2,001,525	0	1,789,203	38,353,008
	88	391	44,920,242	1,383,577	5	636,535	46,940,359
Kansas	93	287	20,617,226	743,750	17,159,038	532,071	39,052,085
	92	290	25,173,697	733,266	59,640,479	1,300,750	86,848,192
	91	290	29,110,801	935,630	44,921,511	1,231,541	76,199,483
	88	230	32,793,376	802,762	90,207,210	482,574	124,285,922
Kentucky	93	442	33,486,528	488,334	20,000	1,299,231	35,294,093
	92	449	37,238,722	574,974	29,040,503	1,567,714	68,421,913
	91	445	37,857,785	694,592	22,000,001	1,629,734	62,182,112
	88	350	49,374,375	1,698,577	30,000,250	5,762,616	86,835,818
Louisiana	93	317	76,565,401	210,332,991	157,993,740	4,575,998	449,468,130
	92	327	88,214,090	185,324,008	186,623,578	2,498,453	462,660,129
	91	328	99,112,878	161,288,380	196,547,237	1,848,934	458,797,429
	88	302	139,659,494	159,858,867	423,893,540	7,614,473	731,026,374
Maine	93	111	10,355,218	625,901	0	1,378,229	12,359,348
	92	113	12,695,425	568,953	405	1,462,288	14,727,071
	91	112	13,865,946	799,298	0	1,617,947	16,283,191
	88	105	17,436,476	437,488	0	960,950	18,834,914
Maryland	93	207	10,434,069	567,509	0	2,208,581	13,210,159
	92	229	10,785,257	838,672	0	1,592,309	13,216,238
	91	235	12,756,332	682,953	0	1,293,351	14,732,636
	88	215	19,665,296	3,955,551	2	1,886,658	25,507,507
Massachusetts	93	587	11,378,603	46,533	0	51,973	11,477,109
	92	636	14,500,877	74,809	0	95,302	14,670,988
	91	670	16,845,565	396,842	0	167,529	17,409,936
	88	684	28,070,951	674,240	4,000	907,907	29,657,098
Michigan	93	967	67,422,197	331,049	4,674,279	9,131,488	81,559,013
	92	985	66,971,065	748,252	6,083,782	10,325,671	84,128,770
	91	1,011	71,716,215	943,412	6,699,997	13,946,498	93,306,122
	88	935	99,333,991	1,151,606	6,326,978	5,669,297	112,481,872

Table 3-5, Cont.

State	Year	Transfers to Recycling⓮ Pounds	Transfers to Energy Recovery⓮ Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers⓯ Pounds	Total Transfers⓰ Pounds
Hawaii	93	39,148	0	790	5,000	14,982	0	59,920
	92	26,749	0	15	30,000	163,500	0	220,264
	91	42,781	185	20	31,250	12,388	0	86,624
	88	NA	NA	0	835,250	13,682	0	NA
Idaho	93	515,255	247,671	46,510	2,027,567	4,839	250	2,842,092
	92	346,467	302,663	70,395	2,063,990	35,465	0	2,818,980
	91	475,287	283,187	61,501	1,561,850	5,065	0	2,386,890
	88	NA	NA	56,281	437,263	65,184	750	NA
Illinois	93	140,933,777	38,002,055	19,406,495	47,877,307	16,962,343	7,986	263,189,963
	92	162,023,332	32,658,005	18,076,676	72,223,793	14,473,571	778,146	300,233,523
	91	76,693,694	26,725,749	15,698,998	59,525,094	20,054,598	336,241	199,034,374
	88	NA	NA	27,340,153	60,061,317	26,679,427	4,105,252	NA
Indiana	93	412,481,486	16,590,901	31,238,081	3,570,817	14,476,483	3,574	478,361,342
	92	341,662,006	17,897,302	41,176,480	4,405,495	14,117,655	820,996	420,079,934
	91	304,793,519	19,831,047	35,478,495	4,516,660	10,477,614	1,372,819	376,470,154
	88	NA	NA	26,390,456	14,013,565	24,760,847	1,188,381	NA
Iowa	93	23,113,606	4,621,931	2,529,978	8,833,109	1,290,730	750	40,390,104
	92	17,748,714	3,651,816	2,282,581	8,783,059	1,853,670	68,865	34,388,705
	91	16,973,972	4,219,002	2,529,662	8,997,207	1,844,626	41,510	34,605,979
	88	NA	NA	2,690,853	6,569,558	4,489,599	204,866	NA
Kansas	93	39,859,752	2,159,540	3,918,371	2,455,067	9,058,591	15,847	57,467,168
	92	44,734,201	2,316,274	4,030,350	3,574,626	9,142,363	104,452	63,902,266
	91	35,653,762	1,862,329	3,659,227	1,968,205	7,419,501	1,660	50,564,684
	88	NA	NA	2,336,629	3,114,461	1,831,455	186,506	NA
Kentucky	93	62,739,431	10,182,787	9,535,349	2,187,480	2,938,000	60,960	87,644,007
	92	62,869,765	6,823,493	9,983,387	2,414,326	3,156,946	676,902	85,924,819
	91	60,500,736	5,335,688	7,112,220	1,955,063	7,125,063	794,053	82,822,823
	88	NA	NA	15,905,816	2,802,252	16,772,244	1,482,747	NA
Louisiana	93	111,171,967	6,371,403	5,551,227	36,894	2,562,366	0	125,693,857
	92	231,886,447	6,897,947	4,962,239	60,497	3,573,063	250	247,380,443
	91	60,750,398	5,125,335	9,159,551	109,452	4,463,258	9,627	79,617,621
	88	NA	NA	3,307,053	3,533,503	10,214,530	195,152	NA
Maine	93	2,965,478	600,484	296,433	625,989	193,879	0	4,682,263
	92	2,539,404	430,462	265,267	675,939	890,885	4,320	4,806,277
	91	2,509,350	298,665	503,070	808,832	1,034,786	9,600	5,164,303
	88	NA	NA	381,242	2,755,230	910,261	30,883	NA
Maryland	93	51,991,750	2,566,686	1,688,835	5,353,989	359,170	0	61,960,430
	92	24,123,689	1,139,762	1,765,294	4,603,336	413,981	1,830	32,047,892
	91	24,938,305	1,625,128	2,096,159	4,482,589	741,339	5,653	33,889,173
	88	NA	NA	3,231,802	3,992,911	2,093,734	130,866	NA
Massachusetts	93	23,304,629	7,924,901	4,340,818	4,729,882	1,241,351	52,605	41,594,186
	92	18,321,707	8,917,378	5,595,333	5,099,751	1,783,880	151,309	39,869,358
	91	17,543,542	6,716,558	5,458,416	6,334,749	2,265,246	261,357	38,579,868
	88	NA	NA	14,421,000	15,994,771	6,969,590	990,256	NA
Michigan	93	168,262,972	70,457,204	16,687,498	7,834,396	31,335,674	137,246	294,714,990
	92	121,963,653	73,481,357	21,514,397	14,604,369	22,519,154	596,888	254,679,818
	91	111,493,430	60,194,873	23,130,810	14,725,032	22,908,607	214,589	232,667,341
	88	NA	NA	33,449,455	15,975,843	47,795,441	7,619,474	NA

Table 3-5. TRI Releases and Transfers by State, 1988, 1991-1993 (Alphabetically Ordered), Continued.

State	Year	Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Minnesota	93	522	22,171,842	450,851	48	2,190,285	24,813,026
	92	550	29,333,827	502,929	0	1,505,234	31,341,990
	91	577	39,094,060	688,369	0	1,447,561	41,229,990
	88	450	54,921,421	2,735,819	0	3,138,268	60,795,508
Mississippi	93	321	47,439,061	1,774,942	62,573,996	5,455,676	117,243,675
	92	320	53,411,403	1,544,709	57,994,938	5,789,757	118,740,807
	91	318	57,331,902	2,071,882	48,370,606	5,568,082	113,342,472
	88	274	62,496,064	2,339,398	46,806,563	9,002,015	120,644,040
Missouri	93	588	32,608,487	1,439,832	0	15,480,651	49,528,970
	92	602	36,826,859	1,119,082	250	17,251,846	55,198,037
	91	620	36,556,231	1,230,431	0	23,765,129	61,551,791
	88	568	51,092,258	1,941,032	500	39,489,896	92,523,686
Montana	93	23	2,395,245	182,387	0	42,634,659	45,212,291
	92	23	2,805,798	140,144	0	40,959,814	43,905,756
	91	25	2,749,442	167,267	0	38,534,023	41,450,732
	88	25	2,931,679	206,524	0	32,914,946	36,053,149
Nebraska	93	172	10,807,776	339,827	0	305,618	11,453,221
	92	183	12,583,369	446,199	0	106,533	13,136,101
	91	186	14,761,859	385,629	0	395,028	15,542,516
	88	155	18,689,493	309,718	0	56,737	19,055,948
Nevada	93	39	1,025,763	0	0	7,661,687	8,687,450
	92	44	831,295	370	0	2,768,641	3,600,306
	91	41	850,891	250	0	2,395,650	3,246,791
	88	38	704,246	250	0	1,841,221	2,545,717
New Hampshire	93	126	3,896,982	66,329	0	11,224	3,974,535
	92	131	6,047,679	74,689	0	8,109	6,130,477
	91	130	5,977,605	61,608	0	10,349	6,049,562
	88	156	12,299,335	523,733	0	430,618	13,253,686
New Jersey	93	697	14,920,268	3,271,416	0	637,016	18,828,700
	92	761	20,056,780	3,310,512	750	649,025	24,017,067
	91	807	21,352,227	2,492,721	1	508,891	24,353,840
	88	901	39,685,456	1,417,766	2,950	2,886,940	43,993,112
New Mexico	93	41	1,770,219	14,254	0	21,979,730	23,764,203
	92	44	1,865,039	6	0	18,395,674	20,260,719
	91	45	2,153,933	9,992	750	37,670,985	39,835,660
	88	35	2,133,348	505	5	28,830,402	30,964,260
New York	93	846	44,582,161	1,779,140	255	1,124,826	47,486,382
	92	911	54,953,215	1,812,867	250	1,575,366	58,341,698
	91	927	60,470,081	1,644,196	37	1,726,896	63,841,210
	88	965	101,440,567	2,072,538	251	3,020,920	106,534,276
North Carolina	93	960	73,385,954	735,905	0	16,095,957	90,217,816
	92	983	90,255,230	750,668	0	20,760,245	111,766,143
	91	987	83,543,874	776,032	0	23,605,068	107,924,974
	88	908	98,054,983	699,061	0	16,839,067	115,593,111
North Dakota	93	33	1,467,998	70,147	0	1,282	1,539,427
	92	37	1,755,365	118,022	0	30,759	1,904,146
	91	39	1,806,627	79,557	0	22,750	1,908,934
	88	30	1,272,889	4,903	0	35,312	1,313,104

Table 3-5, Cont.

State	Year	Transfers to Recycling⓮ Pounds	Transfers to Energy Recovery⓮ Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers⓯ Pounds	Total Transfers⓰ Pounds
Minnesota	93	17,457,987	5,386,483	2,127,110	5,852,931	580,733	0	31,405,244
	92	18,738,921	4,999,692	2,847,052	4,960,017	637,747	22,495	32,205,924
	91	19,815,262	3,613,037	2,110,138	4,793,498	975,644	24,730	31,332,309
	88	NA	NA	4,547,703	6,067,584	1,677,060	13,183	NA
Mississippi	93	258,103,275	3,895,438	1,599,078	926,549	1,349,877	4,200	265,878,417
	92	63,693,450	3,343,015	1,437,413	834,083	1,380,783	16,035	70,704,779
	91	44,677,116	3,847,169	1,756,694	1,070,325	972,664	12,955	52,336,923
	88	NA	NA	3,760,218	1,500,235	3,937,564	456,806	NA
Missouri	93	47,477,206	8,290,592	18,057,576	21,898,241	3,315,331	5,155	99,044,101
	92	183,268,798	9,255,122	74,352,525	22,846,331	2,851,944	67,077	292,641,797
	91	38,827,718	9,739,096	6,342,080	25,883,697	2,343,143	133,959	83,269,693
	88	NA	NA	5,810,955	67,045,716	6,559,057	2,115,379	NA
Montana	93	1,941,469	73,110	10,785	27,822	58,774	0	2,111,960
	92	2,480,412	117,059	10,962	27,803	154,510	0	2,790,746
	91	2,924,659	184,409	156,506	10,650	78,854	0	3,355,078
	88	NA	NA	4,456	1,312	42,914	0	NA
Nebraska	93	21,329,393	787,282	2,595,999	1,248,693	12,687,901	260	38,649,528
	92	21,761,301	1,133,219	1,909,913	1,458,203	3,937,567	1,264,675	31,464,878
	91	14,038,853	1,004,157	3,875,356	1,295,347	4,117,766	6,866	24,338,345
	88	NA	NA	647,509	901,304	3,783,694	25,850	NA
Nevada	93	682,744	4,579	17,379	7,279	67,742	0	779,723
	92	419,922	12,816	25,647	9,832	103,948	0	572,165
	91	387,776	8,274	24,787	8,612	62,693	800	492,942
	88	NA	NA	608,807	20,611	63,885	0	NA
New Hampshire	93	7,117,233	310,431	415,357	445,404	457,796	0	8,746,221
	92	7,062,135	428,063	579,287	499,125	350,363	1,000	8,919,973
	91	8,265,258	329,441	1,668,725	450,869	386,509	38,650	11,139,452
	88	NA	NA	1,536,083	494,944	5,765,770	480,251	NA
New Jersey	93	98,048,283	28,065,982	10,163,190	38,827,858	3,863,365	95,107	179,063,785
	92	102,973,608	29,253,898	17,231,121	92,796,372	2,689,031	262,619	245,206,649
	91	92,888,301	22,989,084	17,593,895	43,936,304	2,327,380	176,797	179,911,761
	88	NA	NA	29,468,328	55,314,239	37,270,410	2,852,516	NA
New Mexico	93	390,388	170,856	79,609	334,316	33,604	0	1,008,773
	92	313,771	227,060	75,712	213,548	23,729	350	854,170
	91	188,434	147,996	61,401	150,891	31,920	25,444	606,086
	88	NA	NA	117,340	35,871	144,690	15	NA
New York	93	79,057,657	7,458,646	7,290,079	8,468,186	6,028,558	181,623	108,484,749
	92	57,266,078	10,292,702	8,704,470	10,043,826	5,164,829	254,438	91,726,343
	91	49,164,949	9,957,928	8,630,886	10,741,004	5,679,924	524,430	84,699,121
	88	NA	NA	36,211,314	23,071,991	12,177,760	765,028	NA
North Carolina	93	100,504,475	10,263,962	5,146,961	3,585,267	4,740,070	6,173	124,246,908
	92	110,627,532	10,431,734	6,210,567	4,267,427	4,569,438	745,242	136,851,940
	91	116,315,755	7,814,206	7,531,785	5,697,808	4,085,200	170,876	141,615,630
	88	NA	NA	8,482,626	6,815,189	10,727,098	503,180	NA
North Dakota	93	219,148	46,830	61,531	194,415	3,913	0	525,837
	92	114,470	60,934	101,296	191,497	40,768	0	508,965
	91	337,150	36,120	38,860	108,820	5,070	399	526,419
	88	NA	NA	79,047	52,832	65,740	12,500	NA

Table 3-5. TRI Releases and Transfers by State, 1988, 1991-1993 (Alphabetically Ordered), Continued.

State	Year	Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Ohio	93	1,665	83,792,400	4,798,638	25,865,489	22,717,140	137,173,667
	92	1,721	92,520,737	4,792,155	25,090,615	23,220,030	145,623,537
	91	1,732	104,036,388	5,915,122	29,417,995	35,541,717	174,911,222
	88	1,573	148,603,290	5,824,367	56,920,303	30,470,045	241,818,005
Oklahoma	93	254	17,187,197	418,143	1,228,210	3,185,438	22,018,988
	92	263	24,536,942	1,075,541	2,029,508	863,824	28,505,815
	91	273	26,532,093	508,705	2,597,370	1,449,534	31,087,702
	88	214	38,653,645	365,705	6,353,464	1,790,414	47,163,228
Oregon	93	255	16,871,972	562,627	0	1,969,619	19,404,218
	92	259	16,895,870	507,790	0	2,734,632	20,138,292
	91	263	18,151,626	386,860	0	1,286,394	19,824,880
	88	226	21,219,964	349,951	1	1,361,132	22,931,048
Pennsylvania	93	1,252	51,764,466	1,054,517	3,202	952,942	53,775,127
	92	1,311	62,379,347	1,351,024	250	4,797,035	68,527,656
	91	1,305	67,130,116	1,235,814	0	7,835,141	76,201,071
	88	1,169	92,648,629	4,201,887	750	16,882,577	113,733,843
Puerto Rico	93	177	12,952,897	16,531	0	10,407	12,979,835
	92	179	14,257,393	45,961	250	38,263	14,341,867
	91	190	16,536,450	119,417	0	130,650	16,786,517
	88	188	14,981,368	123,088	0	110,825	15,215,281
Rhode Island	93	158	3,524,672	133,763	0	0	3,658,435
	92	170	3,640,627	115,849	0	12,380	3,768,856
	91	184	4,356,211	121,277	0	2,447	4,479,935
	88	203	7,780,445	586,245	0	115,048	8,481,738
South Carolina	93	493	56,860,890	962,990	0	1,158,972	58,982,852
	92	506	61,656,538	1,062,493	0	2,387,371	65,106,402
	91	487	61,817,652	1,210,519	0	1,075,218	64,103,389
	88	396	71,377,086	1,198,713	5	1,299,422	73,875,226
South Dakota	93	64	1,788,083	15,018	0	192,610	1,995,711
	92	59	2,941,598	57,005	0	5	2,998,608
	91	60	2,751,314	9,038	0	27,440	2,787,792
	88	50	2,572,382	2,400	0	251	2,575,033
Tennessee	93	692	116,411,833	2,263,941	62,224,840	6,984,283	187,884,897
	92	677	127,889,032	2,663,915	63,508,375	3,562,033	197,623,355
	91	695	144,301,700	3,645,608	69,568,902	4,535,957	222,052,167
	88	570	147,771,874	6,324,864	49,906,115	13,593,020	217,595,873
Texas	93	1,231	140,034,096	2,260,881	190,738,374	17,102,049	350,135,400
	92	1,260	156,852,497	16,366,461	227,379,989	17,921,026	418,519,973
	91	1,278	167,236,824	2,918,475	223,928,366	13,761,703	407,845,368
	88	1,203	212,035,815	5,583,447	508,621,691	35,428,266	761,669,219
Utah	93	143	80,079,033	48,077	0	11,651,782	91,778,892
	92	133	68,894,045	103,845	0	10,087,907	79,085,797
	91	139	74,487,866	120,656	0	23,722,701	98,331,223
	88	128	121,616,755	330,471	0	13,801,507	135,748,733
Vermont	93	44	740,538	1,450	0	260	742,248
	92	50	825,501	32,363	0	7,753	865,617
	91	53	899,385	44,250	0	57,189	1,000,824
	88	58	1,567,121	113,308	0	24,341	1,704,770

Table 3-5, Cont.

State	Year	Transfers to Recycling[14] Pounds	Transfers to Energy Recovery[14] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[15] Pounds	Total Transfers[16] Pounds
Ohio	93	200,014,535	30,980,601	46,886,014	17,640,137	37,470,966	41,700	333,033,953
	92	189,370,223	37,290,683	30,410,545	21,833,878	28,239,194	1,693,763	308,838,286
	91	225,549,969	26,644,569	42,484,191	25,309,980	21,184,948	262,539	341,436,196
	88	NA	NA	48,441,104	26,977,385	61,024,584	8,191,643	NA
Oklahoma	93	21,292,450	2,718,713	860,135	195,438	11,208,915	1,750	36,277,401
	92	13,810,720	1,241,820	1,348,901	183,937	7,162,655	6,825	23,754,858
	91	15,939,841	1,296,393	1,876,150	155,798	13,845,471	250	33,113,903
	88	NA	NA	2,824,462	503,489	8,969,718	80,865	NA
Oregon	93	16,370,061	609,476	697,633	4,827,452	1,173,531	0	23,678,153
	92	12,685,698	588,961	849,150	4,251,480	3,100,996	4,800	21,481,085
	91	11,918,637	463,675	929,737	4,140,800	4,028,403	58,943	21,540,195
	88	NA	NA	1,718,149	7,113,907	3,738,694	12,879	NA
Pennsylvania	93	180,134,262	20,459,223	25,057,192	9,609,688	61,662,971	595,141	297,518,477
	92	120,038,282	18,197,882	29,364,407	13,343,914	23,854,425	3,168,886	207,967,796
	91	108,705,325	16,548,187	33,609,522	15,606,466	17,074,276	238,169	191,781,945
	88	NA	NA	44,433,916	15,789,446	43,897,788	693,734	NA
Puerto Rico	93	14,610,091	8,217,141	6,476,251	3,581,800	347,434	250	33,232,967
	92	12,167,702	9,461,194	4,983,259	4,364,070	425,286	45,188	31,446,699
	91	13,339,730	7,465,598	8,233,804	5,898,885	473,411	250	35,411,678
	88	NA	NA	5,064,641	7,697,098	168,717	26,200	NA
Rhode Island	93	11,664,174	457,959	532,343	1,925,027	2,515,076	37	17,094,616
	92	10,687,202	427,324	610,681	446,844	1,977,373	11,628	14,161,052
	91	8,177,750	462,785	735,021	678,968	413,262	16,602	10,484,388
	88	NA	NA	2,536,696	1,938,667	2,021,287	24,858	NA
South Carolina	93	118,430,840	10,029,008	7,621,370	2,483,753	3,711,850	0	142,276,821
	92	74,134,351	8,339,637	6,866,521	4,377,464	5,692,675	421,713	99,832,361
	91	82,846,935	6,645,558	8,341,762	3,573,695	3,804,399	529,632	105,741,981
	88	NA	NA	7,467,787	2,705,063	5,449,641	5,973,334	NA
South Dakota	93	290,928	212,101	53,737	192,453	65,328	0	814,547
	92	245,985	277,083	92,139	147,562	50,126	44,644	857,539
	91	229,236	207,533	33,264	200,299	47,621	39,550	757,503
	88	NA	NA	193,764	156,889	217,770	250	NA
Tennessee	93	43,698,661	9,794,572	3,596,168	19,410,913	9,573,576	2,434	86,076,324
	92	52,128,039	11,916,908	2,972,678	21,153,381	16,873,049	53,018	105,097,073
	91	33,219,923	8,700,356	3,486,325	22,769,118	18,217,541	1,753,189	88,146,452
	88	NA	NA	7,231,167	25,934,481	12,190,378	234,048	NA
Texas	93	244,946,407	84,712,999	33,595,608	22,429,456	32,587,370	36,008	418,307,848
	92	287,732,341	83,542,166	35,692,564	30,965,605	31,928,558	1,039,435	470,900,669
	91	165,613,437	72,711,099	41,656,840	30,372,244	34,977,531	1,296,160	346,627,311
	88	NA	NA	52,820,131	48,877,176	28,145,897	1,093,893	NA
Utah	93	35,586,971	325,535	735,980	529,260	6,925,955	7,407	44,111,108
	92	32,355,524	329,018	397,231	618,530	4,248,643	0	37,948,946
	91	28,835,045	398,810	932,712	672,513	2,305,445	12,000	33,156,525
	88	NA	NA	1,551,509	994,393	535,365	52,937	NA
Vermont	93	3,978,943	177,002	320,564	18,713	26,182	0	4,521,404
	92	4,317,515	531,800	155,838	53,662	37,273	0	5,096,088
	91	2,249,092	73,460	673,933	35,707	29,388	4,400	3,065,980
	88	NA	NA	646,556	72,761	146,768	15,340	NA

Table 3-5. TRI Releases and Transfers by State, 1988, 1991-1993 (Alphabetically Ordered),⑬ Continued.

State	Year	Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
Virgin Islands	93	3	1,560,702	137,330	0	26,038	1,724,070
	92	3	1,427,345	111,274	0	614	1,539,233
	91	3	1,110,088	394,318	0	15,610	1,520,016
	88	2	1,705,156	4,700	0	140,342	1,850,198
Virginia	93	471	60,471,504	1,812,367	0	2,280,206	64,564,077
	92	471	63,695,985	1,887,114	0	2,442,394	68,025,493
	91	489	67,195,041	2,432,270	0	2,022,161	71,649,472
	88	443	126,862,469	20,139,004	1,373	6,280,413	153,283,259
Washington	93	311	20,399,996	3,746,409	0	190,887	24,337,292
	92	336	21,886,680	3,954,933	0	413,674	26,255,287
	91	361	25,902,314	4,246,080	0	157,036	30,305,430
	88	341	29,614,301	13,605,620	0	914,274	44,134,195
West Virginia	93	152	22,742,261	1,657,984	64	329,600	24,729,909
	92	149	22,571,056	1,523,228	0	261,463	24,355,747
	91	151	27,183,422	1,554,714	0	323,166	29,061,302
	88	125	37,887,388	4,045,736	0	895,391	42,828,515
Wisconsin	93	881	33,019,381	649,215	0	2,041,591	35,710,187
	92	879	36,767,131	677,477	300	1,462,087	38,906,995
	91	897	37,249,756	710,941	25	2,236,679	40,197,401
	88	788	47,493,800	513,051	250	6,595,808	54,602,909
Wyoming	93	29	1,897,651	69,677	14,512,026	114,907	16,594,261
	92	26	2,292,899	120,529	12,514,351	36,125	14,963,904
	91	27	2,937,639	106,205	8,652,092	166,735	11,862,671
	88	27	2,891,064	42,050	27,113,559	15,274,367	45,321,040
Total	93	23,227	1,655,358,748	271,092,265	575,994,149	288,973,564	2,791,418,726
	92	23,993	1,848,302,336	276,111,371	725,821,103	340,179,498	3,190,414,308
	91	24,521	2,022,328,114	245,301,508	709,185,109	416,714,015	3,393,528,746
	88	22,538	2,706,997,365	311,587,802	1,342,357,672	513,296,671	4,874,239,510

Table 3-5, Cont.

State	Year	Transfers to Recycling⓮ Pounds	Transfers to Energy Recovery⓮ Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers⓯ Pounds	Total Transfers⓰ Pounds
Virgin Islands	93	682,955	125	7,261	0	1	0	690,342
	92	703	0	176	0	57,180	0	58,059
	91	376,888	0	173	0	0	0	377,061
	88	NA	NA	0	0	0	0	NA
Virginia	93	26,672,787	7,480,083	3,173,825	15,184,377	1,759,346	0	54,270,418
	92	24,454,858	8,179,999	3,089,349	18,984,275	1,589,591	16,074	56,314,146
	91	25,508,794	10,367,556	3,306,623	20,844,943	1,713,457	45,941	61,787,314
	88	NA	NA	6,305,317	37,856,487	7,372,234	69,161	NA
Washington	93	67,336,896	641,015	1,019,232	561,882	973,457	750	70,533,232
	92	74,140,314	875,638	1,103,032	481,130	1,172,266	16,173	77,788,553
	91	68,987,800	818,631	1,664,353	367,577	881,461	4,311	72,724,133
	88	NA	NA	4,720,822	978,070	2,519,403	264,952	NA
West Virginia	93	31,489,347	15,208,982	6,438,359	1,844,000	2,550,816	250	57,531,754
	92	36,371,803	9,950,309	2,421,060	1,911,753	2,401,427	21,812	53,078,164
	91	25,575,858	7,612,344	2,435,276	1,805,621	2,959,009	3,684	40,391,792
	88	NA	NA	11,368,908	3,536,369	8,503,842	1,000	NA
Wisconsin	93	53,115,595	22,598,527	9,925,256	6,669,781	9,834,835	99,752	102,243,746
	92	41,842,282	7,610,872	10,336,444	10,943,349	10,218,690	494,897	81,446,534
	91	35,514,864	9,433,844	7,969,386	7,616,322	9,590,275	662,503	70,787,194
	88	NA	NA	10,231,937	21,309,533	16,800,608	665,235	NA
Wyoming	93	65,584	4,029	18,013	283	35,996	0	123,905
	92	70,017	138	5,162	28,162	66,981	0	170,460
	91	65,155	4,297	1,068	173,117	2,514	0	246,151
	88	NA	NA	127,102	10,350	1,481	0	NA
Total	93	3,248,969,990	486,303,735	325,662,309	314,167,969	321,552,281	1,820,373	4,698,476,657
	92	2,933,685,469	472,252,568	393,260,049	436,399,701	261,242,552	17,931,132	4,514,771,471
	91	2,288,542,499	443,312,792	351,711,653	393,878,122	261,687,384	10,672,939	3,749,805,389
	88	NA	NA	492,576,600	581,979,953	491,867,067	48,299,434	NA

⓭ Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

⓮ NA: Transfers for recycling or energy recovery were not required to be reported for 1988.

⓯ For 1991, 1992, and 1993, transfers reported with no waste management code or invalid codes.
For 1988, transfers reported with no waste management codes, invalid codes, or codes not required to be reported in 1988.

⓰ Because transfers for recycling or energy recovery were not required to be reported in 1988, total transfers in 1988 are not comparable to total transfers reported for 1991, 1992, or 1993.

Table 3-6. Change in Total TRI Releases by Industry, 1992-1993.

SIC Code	Industry	Total Releases 1992 Pounds	Total Releases 1993 Pounds	1992-1993 Change Pounds	1992-1993 Change Percent
20	Food	39,229,720	38,168,921	-1,060,799	-2.7
21	Tobacco	3,580,372	2,748,404	-831,968	-23.2
22	Textiles	21,856,445	20,449,367	-1,407,078	-6.4
23	Apparel	1,596,092	1,130,955	-465,137	-29.1
24	Lumber	32,249,705	30,521,929	-1,727,776	-5.4
25	Furniture	56,694,897	58,132,934	1,438,037	2.5
26	Paper	234,080,908	216,129,167	-17,951,741	-7.7
27	Printing	41,095,746	36,539,499	-4,556,247	-11.1
28	Chemicals	1,551,640,545	1,315,987,702	-235,652,843	-15.2
29	Petroleum	84,785,649	74,801,907	-9,983,742	-11.8
30	Plastics	139,400,177	126,876,969	-12,523,208	-9.0
31	Leather	10,723,115	8,354,197	-2,368,918	-22.1
32	Stone/Clay/Glass	26,114,661	26,679,480	564,819	2.2
33	Primary Metals	348,676,475	328,773,064	-19,903,411	-5.7
34	Fabr. Metals	103,794,561	91,357,679	-12,436,882	-12.0
35	Machinery	34,500,972	27,663,009	-6,837,963	-19.8
36	Electrical	55,276,969	42,039,413	-13,237,556	-23.9
37	Transportation Equip.	138,338,165	135,835,058	-2,503,107	-1.8
38	Measure./Photo.	35,775,718	28,219,843	-7,555,875	-21.1
39	Miscellaneous	19,039,525	17,317,916	-1,721,609	-9.0
	Multiple Codes 20-39 [17]	221,183,899	160,354,566	-60,829,333	-27.5
	No Codes 20-39 [18]	15,450,247	20,536,434	5,086,187	32.9
	Total	3,215,084,563	2,808,618,413	-406,466,150	-12.6

reductions between 1988 and 1993. Table 3-7 presents the 1988 through 1993 changes in total TRI releases by industry group.

The largest decreases in percentage terms between 1988 and 1993 were reported by the electrical (68.5%), machinery (55.2%), and measurement/photography (53.4%) industries, as well as by facilities reporting "multiple codes" (68.3%). The chemical industry has reduced its releases by 43.8% since 1988, the eighth largest decrease in percentage terms and slightly larger than the 42.7% decrease across all industry groups. The primary metals industry, which accounted for the second largest quantity of TRI releases in 1993, has reported decreases of 41.9% since 1988, just slightly below the average. In contrast, the paper industry, which accounted for the third largest quantity of TRI releases in 1993, has reduced its releases just 21.8% since 1988, about one-half the average decrease.

Table 3-8 presents the complete release and transfer data by industry group for 1988 through 1993.

Facilities with Greatest Changes in Releases

This section examines the facilities which account for the greatest increases and decreases in air/water/land releases and in underground injection between 1992 and 1993. Facilities that reported voluntarily or reported for one year but not the other are not included in this section. EPA has contacted a number of the top facilities

[17] Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g. paper (26) and chemicals (28)].

[18] Facilities/forms that did not report an SIC code and facilities that reported SIC codes outside the 20-to-39 range.

Table 3-7. Change in Total TRI Releases by Industry, 1988-1993.[19]

SIC Code	Industry	Total Releases 1988 Pounds	1991 Pounds	1992 Pounds	1993 Pounds	1988-1993 Change Pounds	Percent
20	Food	28,388,015	39,807,293	38,709,615	37,970,884	9,582,869	33.8
21	Tobacco	1,831,154	2,289,357	1,991,033	2,360,735	529,581	28.9
22	Textiles	38,211,225	25,160,107	21,856,350	20,449,367	-17,761,858	-46.5
23	Apparel	1,063,597	1,435,379	1,596,092	1,130,955	67,358	6.3
24	Lumber	32,963,505	32,639,786	31,001,301	29,456,887	-3,506,618	-10.6
25	Furniture	66,821,609	56,562,767	56,694,289	58,131,946	-8,689,663	-13.0
26	Paper	276,494,119	246,409,297	234,080,658	216,117,607	-60,376,512	-21.8
27	Printing	61,068,237	47,209,703	41,082,746	36,539,499	-24,528,738	-40.2
28	Chemicals	2,328,304,381	1,546,901,850	1,542,986,763	1,308,430,304	-1,019,874,077	-43.8
29	Petroleum	97,993,428	79,925,710	84,247,566	74,540,751	-23,452,677	-23.9
30	Plastics	170,873,579	151,475,746	135,635,037	125,144,894	-45,728,685	-26.8
31	Leather	15,910,105	10,209,512	10,708,815	8,354,197	-7,555,908	-47.5
32	Stone/Clay/Glass	39,345,270	29,759,936	26,081,006	26,673,191	-12,672,079	-32.2
33	Primary Metals	565,542,199	424,702,875	348,594,310	328,614,659	-236,927,540	-41.9
34	Fabr. Metals	137,402,771	111,562,843	103,029,674	91,144,157	-46,258,614	-33.7
35	Machinery	61,305,787	39,251,073	34,066,734	27,480,417	-33,825,370	-55.2
36	Electrical	125,548,496	67,653,932	53,232,050	39,572,305	-85,976,191	-68.5
37	Transportation Equip.	217,026,125	150,811,322	137,237,591	135,495,312	-81,530,813	-37.6
38	Measure./Photo.	57,111,563	39,747,221	33,308,345	26,587,266	-30,524,297	-53.4
39	Miscellaneous	31,594,708	20,817,094	18,851,450	17,215,678	-14,379,030	-45.5
	Multiple Codes 20-39[20]	503,154,877	242,143,432	220,280,870	159,637,313	-343,517,564	-68.3
	No Codes 20-39[21]	16,284,760	27,052,511	15,142,013	20,370,402	4,085,642	25.1
	Total	4,874,239,510	3,393,528,746	3,190,414,308	2,791,418,726	-2,082,820,784	-42.7

in each category to better understand the source of the increases and decreases. Information provided by the top facilities in each category is presented below. Box 3-2 provides a general discussion of reasons that facility release and transfer estimates may change from one year to another.

1993 TRI Top Decreasers in Air/Water/Land Releases

Table 3-9 lists the 50 TRI facilities with the greatest reported decreases in combined releases to air, water, and land from 1992 to 1993, ranked by the magnitude of their decrease. Together, these 50 facilities accounted for reported reductions totaling 193.9 million pounds.

Magma Copper Company; San Manuel, AZ: Reported releases to land decreased for copper from 11.6 million to 39 thousand pounds, for zinc compounds from 7.2 million to 120 thousand pounds, for lead from 1.7 million to 450 thousand pounds, and for arsenic from 1.8 million to 300 thousand pounds. These releases come from the copper smelting and refining process. Magma Copper was identified as a top increaser in the 1991 Toxics Release Inventory Public Data Release with the reported increases partly attributed to changes in estimating methods. In 1993, based on further analysis of *de minimis* levels, mass balance data, and amounts of material recycled, Magma Copper release estimates were significantly reduced. In

[19] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.
[20] Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g. paper (26) and chemicals (28)].
[21] Facilities/forms that did not report an SIC code and facilities that reported SIC codes outside the 20-to-39 range.

Table 3-8. TRI Releases and Transfers by Industry, 1988, 1991-1993.[22]

SIC Code	Industry	Year	Facilities[23] Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
20	Food	93	2,068	27,230,861	1,353,806	68,405	9,317,812	37,970,884
		92	2,050	28,407,392	1,994,038	228,402	8,079,783	38,709,615
		91	2,084	28,169,580	2,536,865	209,844	8,891,004	39,807,293
		88	1,687	18,350,981	3,602,196	1,018,719	5,416,119	28,388,015
21	Tobacco	93	17	2,341,739	18,996	0	0	2,360,735
		92	19	1,969,769	21,259	0	5	1,991,033
		91	21	2,274,774	14,583	0	0	2,289,357
		88	21	1,817,354	13,050	0	750	1,831,154
22	Textiles	93	465	20,139,895	262,370	0	47,102	20,449,367
		92	479	21,503,957	262,440	0	89,953	21,856,350
		91	462	24,831,709	261,005	0	67,393	25,160,107
		88	432	37,056,158	1,004,717	0	150,350	38,211,225
23	Apparel	93	42	1,129,346	965	0	644	1,130,955
		92	49	1,595,030	1,057	0	5	1,596,092
		91	43	1,420,487	182	0	14,710	1,435,379
		88	34	1,022,498	250	0	40,849	1,063,597
24	Lumber	93	692	29,346,964	97,985	0	11,938	29,456,887
		92	698	30,816,188	83,966	11	101,136	31,001,301
		91	712	32,446,699	111,629	0	81,458	32,639,786
		88	690	32,677,297	230,978	0	55,230	32,963,505
25	Furniture	93	557	57,854,861	621	0	276,464	58,131,946
		92	570	56,284,750	332	0	409,207	56,694,289
		91	577	56,299,106	625	0	263,036	56,562,767
		88	510	66,743,622	3,051	0	74,936	66,821,609
26	Paper	93	569	192,979,352	18,071,971	2	5,066,282	216,117,607
		92	590	199,231,598	29,287,385	3,507	5,558,168	234,080,658
		91	632	211,962,444	29,629,079	0	4,817,774	246,409,297
		88	639	227,824,973	38,123,294	0	10,545,852	276,494,119
27	Printing	93	317	36,529,750	592	0	9,157	36,539,499
		92	392	41,072,391	678	645	9,032	41,082,746
		91	420	47,186,310	406	1	22,986	47,209,703
		88	376	60,954,580	32,091	40,000	41,566	61,068,237
28	Chemicals	93	4,138	469,028,226	234,091,752	533,185,412	72,124,914	1,308,430,304
		92	4,217	562,756,102	225,895,632	684,519,410	69,815,619	1,542,986,763
		91	4,306	609,774,351	190,169,880	654,984,897	91,972,722	1,546,901,850
		88	4,093	861,060,071	232,068,558	1,099,308,698	135,867,054	2,328,304,381
29	Petroleum	93	404	57,153,165	3,319,276	13,297,835	770,475	74,540,751
		92	426	62,603,204	3,433,172	13,072,139	5,139,051	84,247,566
		91	431	61,394,406	3,285,683	14,261,706	983,915	79,925,710
		88	386	71,195,934	3,634,275	20,486,919	2,676,300	97,993,428
30	Plastics	93	1,843	124,390,874	360,242	5	393,773	125,144,894
		92	1,876	134,660,814	487,404	255	486,564	135,635,037
		91	1,859	150,381,309	583,698	15,795	494,944	151,475,746
		88	1,529	170,067,396	630,380	2,754	173,049	170,873,579
31	Leather	93	149	7,518,426	61,813	0	773,958	8,354,197
		92	160	10,386,683	272,210	0	49,922	10,708,815
		91	161	10,007,468	118,645	0	83,399	10,209,512
		88	157	14,876,135	680,755	0	353,215	15,910,105
32	Stone/Clay/Glass	93	632	18,010,868	190,394	6,566,124	1,905,805	26,673,191
		92	644	18,421,061	79,903	6,077,194	1,502,848	26,081,006
		91	678	19,774,787	155,490	7,464,305	2,365,354	29,759,936
		88	615	27,484,908	1,178,292	6,580,250	4,101,820	39,345,270

Table 3-8.

SIC Code	Industry	Year	Transfers to Recycling㉔ Pounds	Transfers to Energy Recovery㉔ Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers㉕ Pounds	Total Transfers㉖ Pounds
20	Food	93	1,210,750	148,973	2,228,504	37,450,297	10,605,629	2,255	51,646,408
		92	1,376,075	82,506	2,091,723	39,855,073	1,679,655	551	45,085,583
		91	1,159,588	126,600	3,589,460	42,044,603	1,391,265	210,633	48,522,149
		88	NA	NA	846,173	38,365,135	2,104,875	182,603	NA
21	Tobacco	93	139,622	3,800	1,108	53,515	6,320	0	204,365
		92	1,914	7,116	3,161	8,814	17,774	0	38,779
		91	1,932	7,681	0	9,744	20,295	0	39,652
		88	NA	NA	121,958	791,940	191,024	0	NA
22	Textiles	93	1,200,913	1,543,629	617,266	6,538,506	969,247	0	10,869,561
		92	1,354,579	1,316,811	721,016	8,557,602	546,763	467,721	12,964,492
		91	1,208,693	2,372,567	873,115	7,043,645	1,913,455	12,255	13,423,730
		88	NA	NA	2,049,724	14,623,226	1,653,534	109,478	NA
23	Apparel	93	133,913	429,623	150,586	65,497	56,967	0	836,586
		92	287,836	404,653	77,431	97,192	47,112	0	914,224
		91	3,013	58,278	198,598	105,139	58,271	11,635	434,934
		88	NA	NA	68,940	471,546	103,568	5,351	NA
24	Lumber	93	895,175	2,419,414	571,781	90,124	663,837	4,300	4,644,631
		92	1,050,146	2,440,269	554,991	89,242	458,280	10,399	4,603,327
		91	1,303,493	2,921,677	523,691	131,331	656,802	18,169	5,555,163
		88	NA	NA	2,507,824	213,016	1,959,855	397,450	NA
25	Furniture	93	5,987,798	6,915,293	1,319,711	107,353	384,205	5,458	14,719,818
		92	3,628,268	6,707,765	1,646,671	130,425	3,556,828	4,405	15,674,362
		91	3,596,061	5,960,677	1,978,847	161,074	805,799	97,292	12,599,750
		88	NA	NA	4,134,132	460,231	1,095,214	1,215,512	NA
26	Paper	93	1,953,942	8,154,047	8,381,596	38,149,414	2,734,955	0	59,373,954
		92	1,504,253	7,163,480	10,291,475	46,677,833	3,597,465	1,044	69,235,550
		91	2,929,176	6,641,849	6,943,603	44,608,015	4,024,384	83,361	65,230,388
		88	NA	NA	14,944,047	55,494,309	6,292,582	133,384	NA
27	Printing	93	5,363,834	3,943,469	360,698	344,669	189,079	3,189	10,204,938
		92	5,672,369	4,785,969	810,019	310,570	166,844	48,542	11,794,313
		91	5,235,017	4,355,618	1,763,414	335,725	266,516	9,517	11,965,807
		88	NA	NA	4,577,310	3,512,991	506,324	402,387	NA
28	Chemicals	93	426,502,605	354,415,975	156,185,344	171,691,034	40,407,742	105,443	1,149,308,143
		92	454,703,563	350,175,612	167,254,238	260,011,308	46,815,573	1,645,652	1,280,605,946
		91	418,622,730	323,952,626	187,144,272	219,026,407	51,201,934	3,209,406	1,203,157,375
		88	NA	NA	224,564,818	335,102,481	115,647,078	18,087,167	NA
29	Petroleum	93	755,559,355	1,132,435	755,086	4,990,242	2,885,515	0	765,322,633
		92	634,757,147	2,262,965	697,280	5,334,883	2,567,879	897	645,621,051
		91	450,878,794	1,618,460	623,758	7,357,446	2,967,067	56,387	463,501,912
		88	NA	NA	2,949,850	10,935,162	4,794,436	906,249	NA
30	Plastics	93	17,106,322	11,163,836	4,616,356	3,708,355	10,174,823	30,892	46,800,584
		92	17,602,026	11,088,396	5,348,687	4,247,007	9,636,768	195,924	48,118,808
		91	14,681,304	10,418,567	4,955,557	5,076,235	9,037,029	73,282	44,241,974
		88	NA	NA	11,258,546	4,830,498	12,481,493	788,871	NA
31	Leather	93	273,156	358,513	77,640	6,243,363	2,790,830	0	9,743,502
		92	928,559	890,195	115,417	6,530,287	1,804,053	41,766	10,310,277
		91	1,018,279	1,134,727	627,853	5,667,658	1,456,937	87,043	9,992,497
		88	NA	NA	1,238,373	10,025,028	1,198,522	6,912	NA
32	Stone/Clay/Glass	93	3,422,985	8,680,155	3,256,798	670,889	8,706,745	3,079	24,740,651
		92	3,718,885	3,434,743	3,276,739	2,044,296	6,749,091	691,446	19,915,200
		91	4,423,081	4,724,425	6,326,522	1,666,997	6,427,312	20,966	23,589,303
		88	NA	NA	2,835,719	1,346,738	17,158,912	87,198	NA

Table 3-8. TRI Releases and Transfers by Industry, 1988, 1991-1993 (Continued).㉒

SIC Code	Industry	Year	Facilities㉓ Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
33	Primary Metals	93	1,896	136,633,399	6,819,434	18,652,430	166,509,396	328,614,659
		92	1,934	136,564,990	6,487,874	14,349,889	191,191,557	348,594,310
		91	1,961	154,573,690	8,495,624	13,536,541	248,097,020	424,702,875
		88	1,677	240,622,100	17,681,939	41,632,936	265,605,224	565,542,199
34	Fabr. Metals	93	3,131	90,380,667	101,928	1,490	660,072	91,144,157
		92	3,218	101,947,697	178,930	3,691	899,356	103,029,674
		91	3,308	110,110,552	107,079	574	1,344,638	111,562,843
		88	3,064	131,296,827	1,516,905	386,120	4,202,919	137,402,771
35	Machinery	93	1,061	27,168,334	238,906	0	73,177	27,480,417
		92	1,127	33,778,125	57,106	250	231,253	34,066,734
		91	1,145	39,050,208	51,289	35	149,541	39,251,073
		88	1,072	60,713,968	375,432	0	216,387	61,305,787
36	Electrical	93	1,436	38,708,435	308,526	19,233	536,111	39,572,305
		92	1,588	52,422,656	236,328	1,077	571,989	53,232,050
		91	1,699	65,928,666	258,243	2,224	1,464,799	67,653,932
		88	1,777	123,374,730	686,663	43,720	1,443,383	125,548,496
37	Transport. Equip.	93	1,272	133,838,866	130,460	505	1,525,481	135,495,312
		92	1,273	135,340,763	142,891	1,250	1,752,687	137,237,591
		91	1,314	148,768,253	140,299	1,250	1,901,520	150,811,322
		88	1,196	214,118,799	369,958	81,855	2,455,513	217,026,125
38	Measure./Photo.	93	368	25,694,910	846,881	0	45,475	26,587,266
		92	420	32,471,580	816,224	0	20,541	33,308,345
		91	448	38,970,353	735,088	0	41,780	39,747,221
		88	382	56,048,191	688,569	250	374,553	57,111,563
39	Miscellaneous	93	389	17,206,661	1,543	0	7,474	17,215,678
		92	385	18,846,053	1,446	250	3,701	18,851,450
		91	416	20,760,606	5,358	0	51,130	20,817,094
		88	428	31,278,951	54,024	1	261,732	31,594,708
Multiple codes 20-39㉗		93	1,604	130,377,372	4,499,797	237,228	24,522,916	159,637,313
		92	1,673	156,333,555	5,967,352	7,319,095	50,660,868	220,280,870
		91	1,624	174,810,582	8,243,808	9,607,187	49,481,855	242,143,432
		88	1,490	244,974,524	8,718,522	172,774,638	76,687,193	503,154,877
No codes 20-39㉘		93	177	11,695,777	314,007	3,965,480	4,395,138	20,370,402
		92	205	10,887,978	403,744	244,038	3,606,253	15,142,013
		91	220	13,431,774	396,950	9,100,750	4,123,037	27,052,511
		88	283	13,437,368	293,903	812	2,552,677	16,284,760
Total		93	23,227	1,655,358,748	271,092,265	575,994,149	288,973,564	2,791,418,726
		92	23,993	1,848,302,336	276,111,371	725,821,103	340,179,498	3,190,414,308
		91	24,521	2,022,328,114	245,301,508	709,185,109	416,714,015	3,393,528,746
		88	22,538	2,706,997,365	311,587,802	1,342,357,672	513,296,671	4,874,239,510

Table 3-8, Cont.

SIC Code	Industry	Year	Transfers to Recycling[24] Pounds	Transfers to Energy Recovery[24] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[25] Pounds	Total Transfers[26] Pounds
33	Primary Metals	93	899,179,430	11,977,764	51,287,066	11,767,672	154,618,602	394,486	1,129,225,020
		92	768,218,260	8,292,570	120,918,862	22,487,764	96,532,963	7,686,759	1,024,137,178
		91	616,847,569	7,737,919	53,171,338	21,627,555	85,653,219	2,380,149	787,417,749
		88	NA	NA	69,227,732	22,922,553	186,491,508	9,095,471	NA
34	Fabr. Metals	93	244,278,696	13,812,271	18,561,504	3,809,715	19,736,496	369,491	300,568,173
		92	223,683,460	12,790,642	20,025,966	5,005,878	23,162,079	2,358,912	287,026,937
		91	213,214,641	12,331,653	20,318,113	4,894,518	22,207,171	1,631,061	274,597,157
		88	NA	NA	34,313,199	17,149,495	43,529,628	8,303,148	NA
35	Machinery	93	48,044,865	3,211,853	2,430,342	1,631,821	3,186,994	34,750	58,540,625
		92	44,777,807	3,449,051	2,302,868	2,139,855	3,697,731	215,330	56,582,642
		91	37,203,298	3,062,918	3,322,072	2,376,692	4,641,435	375,637	50,982,052
		88	NA	NA	9,634,638	2,705,204	10,098,741	987,598	NA
36	Electrical	93	300,323,984	11,294,478	14,242,448	7,238,450	9,754,446	7,212	342,861,018
		92	302,010,177	12,231,223	14,364,870	7,282,948	11,086,026	1,494,111	348,469,355
		91	244,733,100	11,369,453	17,644,389	7,021,166	14,861,218	942,758	296,572,084
		88	NA	NA	21,173,120	18,262,423	19,865,769	1,658,705	NA
37	Transport. Equip.	93	146,191,998	20,386,364	9,545,014	3,651,386	11,262,178	685,491	191,722,431
		92	146,385,085	20,973,718	10,234,803	3,820,213	11,204,149	191,679	192,809,647
		91	115,417,634	22,651,023	13,088,056	6,100,605	12,341,856	285,508	169,884,682
		88	NA	NA	31,067,216	7,424,202	20,924,301	3,799,908	NA
38	Measure./Photo.	93	15,830,685	4,386,610	3,299,092	1,026,698	1,067,728	0	25,610,813
		92	17,178,446	4,985,784	4,292,502	1,172,843	1,054,689	21,065	28,705,329
		91	18,078,456	3,908,857	4,620,564	1,521,551	1,142,640	23,591	29,295,659
		88	NA	NA	7,813,020	3,732,729	11,499,586	247,898	NA
39	Miscellaneous	93	20,996,818	3,278,073	1,050,015	665,657	3,265,449	755	29,256,767
		92	9,480,534	1,966,929	1,299,947	495,804	1,855,922	124,820	15,223,956
		91	10,361,021	2,588,171	1,340,092	789,300	1,889,065	205,554	17,173,203
		88	NA	NA	6,840,171	462,839	2,268,341	382,012	NA
Multiple codes 20-39[27]		93	350,551,924	17,988,368	46,454,866	13,737,315	37,933,506	173,273	466,839,252
		92	289,906,370	16,146,521	25,010,514	17,494,227	34,341,523	2,457,311	385,356,466
		91	120,779,767	14,633,713	21,062,571	15,274,555	34,387,115	688,401	206,826,122
		88	NA	NA	36,809,895	31,023,892	31,057,254	1,462,037	NA
No codes 20-39[28]		93	3,821,220	658,792	269,488	535,997	150,988	299	5,436,784
		92	5,459,710	655,650	1,920,869	2,605,637	663,385	272,798	11,578,049
		91	6,845,852	735,333	1,595,768	1,038,161	4,336,599	250,334	14,802,047
		88	NA	NA	3,600,195	2,124,315	944,522	40,095	NA
Total		93	3,248,969,990	486,303,735	325,662,309	314,167,969	321,552,281	1,820,373	4,698,476,657
		92	2,933,685,469	472,252,568	393,260,049	436,399,701	261,242,552	17,931,132	4,514,771,471
		91	2,288,542,499	443,312,792	351,711,653	393,878,122	261,687,384	10,672,939	3,749,805,389
		88	NA	NA	492,576,600	581,979,953	491,867,067	48,299,434	NA

[22] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

[23] Facilities have been assigned to the "multiple codes" category according to all the SIC codes they reported. Forms and amounts in pounds have been assigned to single-category SIC codes if only one SIC code was reported for an individual chemical form from the facility.

[24] NA: Transfers for recycling or energy recovery were not required to be reported for 1988.

[25] For 1991, 1992, and 1993, transfers reported with no waste management code or invalid codes. For 1988, transfers reported with no waste management codes, invalid codes, or codes not required to be reported in 1988.

[26] Because transfers for recycling or energy recovery were not required to be reported in 1988, total transfers in 1988 are not comparable to total transfers reported for 1991, 1992, or 1993.

[27] Facilities/forms that reported more than one 2-digit SIC code within the range of 20 to 39 [e.g., paper (26) and chemicals (28)].

[28] Facilities/forms that did not report an SIC code or reported only SIC codes outside the 20-to-39 range.

Reasons Facility Release and Transfer Estimates Change

Some reported increases and decreases are real—that is, they reflect changes in the amounts of TRI chemicals actually released or transferred. Other reported increases and decreases are accounting or "paper" changes that do not reflect any actual change in releases and transfers. Some examples follow.

Real Changes

Source reduction activities, such as process changes, elimination of spills and leaks, inventory control, improved maintenance, chemical substitution, and alternative methods of cleaning and degreasing can cause real reductions in TRI releases and transfers.

Installation of ***pollution control equipment*** may lead to real reductions in TRI releases/transfers. However, if the pollution control does not destroy the reported chemical, it may merely shift waste from one type of release or disposal to another.

Increased ***recycling and reuse*** of waste or sale of waste as raw materials or products will result in real decreases in TRI releases and/or transfers for treatment and disposal.

Production changes can cause real changes in the quantities of TRI chemicals released or transferred by facilities. Releases/transfers are likely to increase when production increases and decrease when production decreases, although the relationship is not necessarily linear.

One-time events unrelated to normal production processes, such as accidental releases or clean-up operations, can cause a real but anomalous increase in the reporting year in which they occur and then a decrease from that abnormally high level the following year.

"Paper" Changes

Changes in estimation or calculation techniques can cause a change in the amount reported without a corresponding change in actual releases or transfers.

Clarifications of reporting instructions or changes in the way a facility interprets those instructions may cause a change in reported amounts without an actual change in releases or transfers. For example, revised guidance concerning the *de minimis* exemption and beneficiation activities which was issued by EPA for 1991 may have resulted in lower reported releases for some facilities.

Similarly, a facility's reported releases may go down without an actual reduction in releases if the facility begins to take advantage of a ***reporting exemption or optional reporting method*** for the first time. One large source of this type of paper change is the optional reporting method for ammonium sulfate (solution), which is discussed in detail in Box 3-1.

Apparent increases or decreases can occur if a facility makes a ***reporting error*** one year and does not submit a revision for that year, but does not repeat the error the following year.

Box 3-2. Reasons Facility Release and Transfer Estimates Change.

addition, all of the slag from the smelting process was recycled off-site, which represents a real reduction in releases to land.

Inland Steel Company; East Chicago, IN: Reported releases to land decreased for manganese compounds from 26.8 million to 7.5 million pounds and for chromium compounds from 1 million to 244 thousand pounds. These metal compounds were found in waste slag and dust sent to an on-site landfill. Inland Steel has been reducing the amount of slag sent to landfill each year and is no longer discharging any of this waste material to land. Some of the slag is recycled to recover metal compounds, but the majority of slag is sold as product.

Arcadian Fertilizer L.P.; Geismar, LA: Reported releases to water decreased for phosphoric acid from 22 million to 12 million pounds and for sulfuric acid from 13 million to 6.9 million pounds. A large source of Arcadian's acid waste is rainfall run-off from large piles of gypsum contaminated with phosphoric and sulfuric acid. The run-off is stored in a pond and released to the Mississippi River. More favorable rainfall in 1993 produced less run-off. Arcadian is now recycling some of the pond water as process water, reducing the amount released to the river. The facility is also covering the gypsum piles with grass to reduce run-off.

Mobil Mining and Minerals Co.; Pasadena, TX: Reported releases to water decreased for phosphoric acid from 12 million to zero pounds, for sulfuric acid from 1.2 million to zero pounds, and for ammonia from 770 thousand to 140 thousand pounds. In 1992, abnormally high releases of wastewater were reported because of a major spill requiring remediation as well as discharge to surface waters from a phosphogypsum pond. The decrease in 1993 represented a return to normal levels with no pond discharges.

Asarco Inc.; Hayden, AZ: Reported releases of zinc, copper, and lead compounds to land decreased from 11.6 million pounds to zero pounds. These compounds are contained in the smelter slag which is stored on site. Recycling of older slag from on-site stockpiles containing higher metal content began in early 1992. Slag produced from current operations with lower concentrations of metals is returned to the stockpile. As a result, the amount of these compounds in the stockpile is decreasing; therefore, no releases to land were reported for 1993.

DuPont; Leland, NC: Reported releases to air of methanol decreased from 11.4 million pounds to 1.2 million pounds. The decrease was attributed to the conversion of DuPont's continuous polymerization line for the manufacture of Dacron to a process which essentially eliminates the use of methanol.

IMC Fertilizer Inc.; Mulberry, FL: Reported releases of phosphoric acid to land decreased from 12.7 million to 6.8 million pounds. Land releases of phosphoric acid increased in 1992 during the construction of a slurry wall around an unlined pond containing process cooling water from the manufacture of phosphate fertilizer. Completion of this project eliminated lateral seepage from this pond, leaving only vertical seepage.

Mississippi Chemical Corp.; Yazoo City, MS: Reported air releases of ammonia decreased from 10.4 million to 4.6 million pounds. Ammonia is released during the production of ammonium nitrate. The decrease was due to the addition of an ammonia vapor recovery system, a $5 million environmental improvement project.

Amoco Oil Company; Texas City, TX: Reported releases to land decreased from 4.2 million to 118 thousand pounds for naphthalene,

Table 3-9. Top 50 TRI Facilities with the Largest Decrease in Air, Water, and Land Releases, 1992-1993.

Facility	City	State	Net Change from 1992 to 1993: Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds
Magma Copper Co.	San Manuel	AZ	-3,419	-4,299	0	-21,285,300
Inland Steel Co.	East Chicago	IN	12,960	-180,667	-256,599	-20,140,532
Arcadian Fertilizer L.P.	Geismar	LA	-103,440	33,000	-16,685,100	-59,660
Mobil Mining & Minerals Co.	Pasadena	TX	-167,040	-122,700	-13,830,810	-18,552
Asarco Inc.	Hayden	AZ	-44,199	44,718	0	-12,266,661
DuPont	Leland	NC	-208,071	-10,414,381	-4,404	-15,787
IMC Fertilizer Inc.	Mulberry	FL	-146,740	-90,900	0	-5,932,250
Mississippi Chemical Corp.	Yazoo City	MS	9,924	-5,780,574	82,215	0
Amoco Oil Co.	Texas City	TX	-14,711	10,261	-68,656	-4,527,296
Simpson Paper Co.	Eureka	CA	-1,250	-800,700	-3,431,430	0
Unocal Petroleum Products	Kenai	AK	-251,452	-3,599,469	23,619	-228
Arcadian Fertilizer L.P.	Millington	TN	5,955	-3,580,807	-226,528	0
Louisiana-Pacific Corp.	Samoa	CA	-16,806	-164,531	-3,611,900	0
Asarco Inc.	Annapolis	MO	-35	-63	52	-3,538,424
Eastman Chemical Co.	Kingsport	TN	6,045,280	-9,016,287	-68,126	-118,057
Texasgulf Inc.	Aurora	NC	-3,100	328,600	-46,900	-3,233,450
DuPont	New Johnsonville	TN	-42,600	-2,777,300	0	0
BP Chemicals Inc.	Lima	OH	-286,930	-2,364,995	-62,860	0
American Synthetic Rubber	Louisville	KY	568	-2,620,041	0	0
3M Co.	Hutchinson	MN	464,553	-3,053,150	0	0
Westvaco Corp.	Covington	VA	-1,077	-2,067,952	0	0
Ketchikan Pulp Co.	Ketchikan	AK	-64,110	-304,346	-1,656,673	0
IMC-Agrico Co.	Mulberry	FL	-92,300	-9,600	0	-1,790,000
DuPont	Memphis	TN	-31,663	-1,811,027	-17,307	0
Eastman Kodak Co.	Rochester	NY	-407,333	-1,422,826	3,728	-1,488
Terra International Inc.	Woodward	OK	6,000	-1,800,695	-11,000	0
Boeing Co.	Wichita	KS	-1,382,509	-382,872	-13,470	0
Eli Lilly & Co.	Clinton	IN	362,995	-2,152,893	20,490	11,070
AK Steel Corp.	Middletown	OH	-33,240	-305,290	-66,811	-1,325,730
Holliston Mills Inc.	Church Hill	TN	-8,672	-1,710,982	-1,194	0
Occidental Chemical Corp.	Castle Hayne	NC	-166	-6,146	37	-1,699,858
Garden State Tanning	Fleetwood	PA	-126,917	-1,514,166	0	0
Eli Lilly & Co.	Shadeland	IN	-454,852	-1,142,682	-26,092	0
Cabot Corp.	Tuscola	IL	0	-1,520,326	0	0
Bowater Inc.	Catawba	SC	-198,400	-272,442	-2,895	-1,044,785
Zinc Corp. of America	Monaca	PA	-80,437	13,060	-941	-1,438,000
Champion International Corp.	Canton	NC	-647,104	-828,101	34,980	0
Monsanto Co.	Muscatine	IA	-27,099	-1,291,175	-119,167	0
Federal Paper Board Co. Inc.	Riegelwood	NC	60	-1,414,669	1,578	0
General Motors Corp.	Saginaw	MI	43,689	-117,823	0	-1,292,070
Dow Chemical Co.	Freeport	TX	-563,286	-882,964	206,982	-94,279
Georgia-Pacific Corp.	Brunswick	GA	-115,170	-1,136,314	-56,140	-6,764
R. R. Donnelley & Sons Co.	Chicago	IL	-1,242,012	-58,979	0	0
Cape Industries	Wilmington	NC	67,345	-1,285,342	-19,456	-10,677
Gilman Paper Co.	Saint Marys	GA	-94,840	-1,110,930	-16,694	0
DuPont	Beaumont	TX	253,221	-1,431,800	-15,860	-86
Procter & Gamble Mfg. Co.	Kansas City	KS	-7,000	-1,185,539	0	0
Bethlehem Steel Corp.	Burns Harbor	IN	-424,205	-242,000	-12,100	-436,050
3M Co.	Saint Paul	MN	-9,664	-1,072,330	0	0
3M Co.	Brookings	SD	-80	-1,074,876	0	0
Total			-29,379	-73,698,312	-39,955,432	-80,264,914

Table 3-9.

Facility	City	State	1992 Total Air/ Water/Land Releases Pounds	1993 Total Air/ Water/Land Releases Pounds	1992-1993 Change in Total Air/Water/Land Releases Pounds
Magma Copper Co.	San Manuel	AZ	22,562,500	1,269,482	-21,293,018
Inland Steel Co.	East Chicago	IN	31,183,557	10,618,719	-20,564,838
Arcadian Fertilizer L.P.	Geismar	LA	39,488,161	22,672,961	-16,815,200
Mobil Mining & Minerals Co.	Pasadena	TX	14,522,576	383,474	-14,139,102
Asarco Inc.	Hayden	AZ	12,985,187	719,045	-12,266,142
DuPont	Leland	NC	14,497,953	3,855,310	-10,642,643
IMC Fertilizer Inc.	Mulberry	FL	13,770,005	7,600,115	-6,169,890
Mississippi Chemical Corp.	Yazoo City	MS	11,047,030	5,358,595	-5,688,435
Amoco Oil Co.	Texas City	TX	5,631,136	1,030,734	-4,600,402
Simpson Paper Co.	Eureka	CA	4,921,370	687,990	-4,233,380
Unocal Petroleum Products	Kenai	AK	8,911,398	5,083,868	-3,827,530
Arcadian Fertilizer L.P.	Millington	TN	7,840,546	4,039,166	-3,801,380
Louisiana-Pacific Corp.	Samoa	CA	5,768,058	1,974,821	-3,793,237
Asarco Inc.	Annapolis	MO	10,623,772	7,085,302	-3,538,470
Eastman Chemical Co.	Kingsport	TN	32,496,867	29,339,677	-3,157,190
Texasgulf Inc.	Aurora	NC	14,440,660	11,485,810	-2,954,850
DuPont	New Johnsonville	TN	5,035,600	2,215,700	-2,819,900
BP Chemicals Inc.	Lima	OH	2,929,165	214,380	-2,714,785
American Synthetic Rubber	Louisville	KY	4,620,595	2,001,122	-2,619,473
3M Co.	Hutchinson	MN	5,652,839	3,064,242	-2,588,597
Westvaco Corp.	Covington	VA	2,479,006	409,977	-2,069,029
Ketchikan Pulp Co.	Ketchikan	AK	3,924,242	1,899,113	-2,025,129
IMC-Agrico Co.	Mulberry	FL	5,454,100	3,562,200	-1,891,900
DuPont	Memphis	TN	2,101,705	241,708	-1,859,997
Eastman Kodak Co.	Rochester	NY	13,852,333	12,024,414	-1,827,919
Terra International Inc.	Woodward	OK	2,487,315	681,620	-1,805,695
Boeing Co.	Wichita	KS	4,482,066	2,703,215	-1,778,851
Eli Lilly & Co.	Clinton	IN	4,005,448	2,247,110	-1,758,338
AK Steel Corp.	Middletown	OH	2,400,121	669,050	-1,731,071
Holliston Mills Inc.	Church Hill	TN	4,643,763	2,922,915	-1,720,848
Occidental Chemical Corp.	Castle Hayne	NC	8,411,928	6,705,795	-1,706,133
Garden State Tanning	Fleetwood	PA	1,752,923	111,840	-1,641,083
Eli Lilly & Co.	Shadeland	IN	4,044,340	2,420,714	-1,623,626
Cabot Corp.	Tuscola	IL	4,697,406	3,177,080	-1,520,326
Bowater Inc.	Catawba	SC	3,948,992	2,430,470	-1,518,522
Zinc Corp. of America	Monaca	PA	2,169,358	663,040	-1,506,318
Champion International Corp.	Canton	NC	3,794,906	2,354,681	-1,440,225
Monsanto Co.	Muscatine	IA	1,992,506	555,065	-1,437,441
Federal Paper Board Co. Inc.	Riegelwood	NC	3,373,192	1,960,161	-1,413,031
General Motors Corp.	Saginaw	MI	5,862,392	4,496,188	-1,366,204
Dow Chemical Co.	Freeport	TX	8,150,124	6,816,577	-1,333,547
Georgia-Pacific Corp.	Brunswick	GA	2,949,443	1,635,055	-1,314,388
R. R. Donnelley & Sons Co.	Chicago	IL	1,378,451	77,460	-1,300,991
Cape Industries	Wilmington	NC	3,900,398	2,652,268	-1,248,130
Gilman Paper Co.	Saint Marys	GA	2,246,035	1,023,571	-1,222,464
DuPont	Beaumont	TX	2,825,678	1,631,153	-1,194,525
Procter & Gamble Mfg. Co.	Kansas City	KS	1,359,197	166,658	-1,192,539
Bethlehem Steel Corp.	Burns Harbor	IN	2,195,325	1,080,970	-1,114,355
3M Co.	Saint Paul	MN	1,694,790	612,796	-1,081,994
3M Co.	Brookings	SD	1,438,906	363,950	-1,074,956
Total			382,945,364	188,997,327	-193,948,037

1,2,4-trimethylbenzene, ethylbenzene, toluene, xylene (mixed isomers), chromium compounds, and zinc compounds combined. In 1992, releases were reported from a site remediation project which collected contaminated soil containing these compounds from around storage basins and storage tanks for disposal on-site.

Simpson Paper Company; Eureka, CA: Reported releases of methanol decreased from 4.6 million to 550 thousand pounds because of reduced production. The paper mill operated for only two months in 1993.

Unocal Petroleum Products; Kenai, AK: Reported stack air releases of ammonia from the production of urea decreased from 7.9 million to 4.4 million pounds and reported fugitive air releases decreased from 506 thousand pounds to 255 thousand pounds. The decrease in stack emissions was due to improvements in operation of ammonia scrubbers installed in late 1991 and the optimizing of start-up and operating procedures to minimize the release of ammonia. The decrease in fugitive air releases was due to a revised estimation technique.

Arcadian Fertilizer L.P.; Millington, TN: Reported air releases of ammonia from the production of urea decreased from 7.3 million to 3.9 million pounds. The decrease was due to process modifications to improve the conversion and reduce the venting of ammonia.

Louisiana-Pacific Corp.; Samoa, CA: Reported releases of methanol, a byproduct of the pulping process, decreased from 5.5 million to 1.9 million pounds due to decreased production.

Asarco Inc.; Annapolis, MO: Reported release of zinc (fume or dust) to land decreased from 8 million to 4 million pounds as a result of changes in the grade of ore used in the smelting process. About 98% of Asarco's releases to land consists of slag generated during lead smelting.

Eastman Chemical Co.; Kingsport, TN: Reported total air releases of acetone decreased from 25.4 million to 22.2 million pounds due to improved capture and recovery of fugitive acetone vapors. Reported stack air releases decreased from 9.4 million to 1.2 million pounds while reported fugitive air releases increased from 16 million to 21 million pounds. Acetone is a process solvent in a fiber-spinning operation. The reported data showed a significant decrease in stack emissions. Reported fugitive emissions increased because of an error in reporting; in 1992, a portion of the fugitive emissions were reported as a stack release. However, the total reported air releases in 1992 was not in error.

1993 TRI Top Increasers in Air/Water/Land Releases

Table 3-10 lists the 50 TRI facilities with the largest reported increases in air/water/land releases from 1992 to 1993, ranked by the magnitude of their increase. Together, these 50 facilities accounted for reported increases totaling 116.5 million pounds.

IMC-Agrico Co.; Saint James, LA: Reported releases to the Mississippi River of phosphoric acid increased from 72.3 million to 113.7 million pounds, while sulfuric acid releases decreased from 11.3 million to 8.7 million pounds. Phosphoric acid and sulfuric acid are manufactured for use in the production of phosphate fertilizers. Gypsum waste from the fertilizer production process is stored in stacks on-site and contains residual phosphoric acid and sulfuric acid. The increase in the release of phosphoric acid was the result of a project to cover inactive phosphogypsum stacks with clay, soil, and grass and thereby reduce releases draining from the stacks. The project, completed in 1994, required standing water to be pumped from the stacks and discharged to facilitate the covering process and allow for installation of drainage systems and liners to evaporation ponds on top of the stacks. Water collected in the stacks' drainage systems will be reused in the fertilizer production process. Future decreases in phosphoric acid and sulfuric acid releases can be anticipated since all inactive phosphogypsum stacks are now covered.

Magnesium Corp. of America; Rowley, UT: Reported stack air releases of chlorine increased from 57 million to 67 million pounds. The chlorine is released during the manufacture of magnesium and chlorine gas. The increase in chlorine releases was due to breakdowns in process control equipment (chlorine reduction burners). Reported stack air releases of hydrochloric acid increased from 3.7 million to 6.1 million pounds. The increase was due to an estimate based on elevated readings from an emission test. Further testing did not reproduce the same elevated readings, but the higher measured values were nevertheless used to estimate total releases.

Coastal Chem. Inc.; Battle Mountain, NV: Reported releases to land increased for ammonium nitrate (solution) from 291 thousand to 4.7 million pounds and for ammonia from less than one thousand to 549 thousand pounds. The plant produces inorganic chemicals including ammonia, urea, and ammonium nitrate. The increase in releases reflects the transition from initial start-up in July, 1992, to full production in 1993.

Arcadian Ohio L.P.; Lima, OH: Total releases increased from zero to almost 3.4 million pounds. The releases from this facility are from part of a facility that was sold by BP Chemicals Inc. to Arcadian Ohio L.P. in March 1993. In 1993, Arcadian Ohio L.P. reported as a separate facility. Although ownership of the operation was split in 1993, Arcadian Ohio L.P. reported the releases for all of 1993.

IMC-Agrico Co.; Uncle Sam, LA: Reported releases to the Mississippi River of sulfuric acid increased from 5.8 million to 11.6 million pounds while releases of phosphoric acid decreased from 52.0 million to 49.8 million pounds. IMC-Agrico produces phosphoric acid and sulfuric acid at the Uncle Sam Plant, generating gypsum waste containing residual phosphoric and sulfuric acids. As with the Faustina Plant in St. James, Louisiana, a project to cover inactive gypsum storage stacks and reduce future discharges was completed. The necessary pumping and discharge of standing water from the stacks to facilitate the covering process increased the release of sulfuric acid. The inactive gypsum stacks have now been covered, and water collected by the drainage system is being reused in the process. Future decreases in sulfuric acid and phosphoric acid releases can be anticipated.

Cyprus Miami Mining Corp.; Claypool, AZ: Reported releases to land of copper compounds increased from 2.8 million to 5.6 million pounds and of lead compounds increased from 248 thousand to 488 thousand pounds due to an increase in production. The slag from the smelting process contains residual levels of copper and lead compounds and is landfilled on-site. A major modernization of the smelter has expanded copper smelting capacity and increased the quantity of furnace slag produced.

Phelps Dodge Mining Co.; Playas, NM: Reported land releases of copper compounds increased from 10.4 million to 13.7 million pounds due to an increase in production. The 1993 estimate was based on a full 12 months of production, compared to 10 months of

Table 3-10. Top 50 TRI Facilities with the Largest Increase in Air, Water, and Land Releases, 1992-1993.

Facility	City	State	Net Change from 1992 to 1993: Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Releases to Land Pounds
IMC-Agrico Co.	Saint James	LA	-234,802	-1,503,991	38,790,628	61,012
Magnesium Corp. of America	Rowley	UT	-7,813	12,400,000	0	0
Coastal Chem Inc.	Battle Mountain	NV	5	272,797	0	4,942,936
Arcadian Ohio L.P.	Lima	OH	267,800	3,075,800	45,360	0
IMC-Agrico Co.	Uncle Sam	LA	-30,638	-225,510	3,617,005	3,492
Cyprus Miami Mining Corp.	Claypool	AZ	3,800	5,700	5	3,040,000
Phelps Dodge Mining Co.	Playas	NM	0	9,029	0	2,972,375
Zinc Corp. of America	Bartlesville	OK	-2,789	-11,320	0	2,690,214
Chemetals Inc.	New Johnsonville	TN	17,236	-3,286	543	2,597,307
Elkem Metals Co.	Marietta	OH	730,963	-204,023	934,300	631,000
Stone Container Corp.	Coshocton	OH	186	2,052,320	-432	0
American Chrome & Chemicals	Corpus Christi	TX	0	-47,500	1,000	2,000,000
Inland Container Corp.	Rome	GA	-35,495	1,935,000	-1,190	0
Lenzing Fibers Corp.	Lowland	TN	400,000	1,450,000	-5,750	0
Doe Run Co.	Herculaneum	MO	-1,561	-14,341	2,285	1,730,258
Asarco Inc.	East Helena	MT	-5,676	1,852	0	1,657,761
Alabama River Pulp Co. Inc.	Claiborne	AL	30,200	1,572,600	1,150	-4,500
Autoalliance Intl. Inc.	Flat Rock	MI	81,397	1,470,219	-1,962	0
Kennecott Utah Copper	Magna	UT	-1,650	20,100	1,250	1,474,540
Louisiana Pigment Co. L.P.	Westlake	LA	708	6,068	-1,717	1,447,111
American Maize Products	Dimmitt	TX	0	0	0	1,404,185
Northwestern Steel & Wire Co.	Sterling	IL	-3,150	-51,870	-500	1,390,000
Coastal Refining & Marketing	Corpus Christi	TX	126,985	997,712	51,132	0
Purolator Products Inc.	Fayetteville	NC	331,249	842,477	0	0
Brown Printing Co.	Franklin	KY	24,302	1,040,240	0	0
American Woodmark Corp.	Moorefield	WV	2,161	1,021,519	0	0
Chevron Chemical Co.	Baytown	TX	63,482	949,861	0	0
Eastern Stainless Corp.	Baltimore	MD	0	0	245	1,010,739
Union Camp Corp.	Eastover	SC	31,850	897,400	305	2,795
Georgia-Pacific Corp.	Monticello	MS	-73,950	738,000	170,045	29,000
International Paper	Domino	TX	-15,635	884,730	-6,095	0
Ford Motor Co.	Wayne	MI	12,309	766,871	0	0
North Star Recycling	Wiltonjunction	IA	0	0	0	777,500
Knauf Fiber Glass	Shelbyville	IN	-89,248	862,159	0	0
Cabot Corp.	Ville Platte	LA	0	740,747	0	0
Westinghouse Electric Corp.	Hampton	SC	16,208	680,670	-7	0
Allied-Signal Laminate Sys.	Franklin	IN	-179,785	870,118	0	0
Great Southern Paper	Cedar Springs	GA	-15,530	482,100	990	199,951
Chino Mines Co.	Hurley	NM	0	51,920	0	611,787
North Star Recycling	Saint Paul	MN	0	0	0	661,900
Harman Automotive Inc.	Bolivar	TN	122,742	528,972	-39	0
Granite City Steel	Granite City	IL	-29,460	-209,829	24,459	865,582
U.S. Vanadium Corp.	Hot Springs	AR	10,000	177,000	364,000	95,900
Georgia-Pacific Corp.	Palatka	FL	-4,571	627,859	-2,309	4
Burnham Foundry	Zanesville	OH	3,215	-38,374	0	646,784
General Motors Corp.	Flint	MI	80,230	527,350	2,357	0
Hoechst-Celanese Chemical	Pasadena	TX	-39,775	643,748	0	0
Murray Ohio Mfg. Co.	Lawrenceburg	TN	57,950	539,900	643	0
Wheeling-Pittsburgh Steel Corp.	Follansbee	WV	54,764	499,010	9,546	0
USS/Kobe Steel Co.	Lorain	OH	-9,680	1,200	-187,300	754,995
Total			1,688,534	37,333,004	43,809,947	33,694,628

Table 3-10.

Facility	City	State	1992 Total Air/ Water/Land Releases Pounds	1993 Total Air/ Water/Land Releases Pounds	1992-1993 Change in Total Air/Water/Land Releases Pounds
IMC-Agrico Co.	Saint James	LA	90,800,120	127,912,967	37,112,847
Magnesium Corp. of America	Rowley	UT	60,908,063	73,300,250	12,392,187
Coastal Chem Inc.	Battle Mountain	NV	360,930	5,576,668	5,215,738
Arcadian Ohio L.P.	Lima	OH	0	3,388,960	3,388,960
IMC-Agrico Co.	Uncle Sam	LA	58,442,831	61,807,180	3,364,349
Cyprus Miami Mining Corp.	Claypool	AZ	3,174,000	6,223,505	3,049,505
Phelps Dodge Mining Co.	Playas	NM	11,792,355	14,773,759	2,981,404
Zinc Corp. of America	Bartlesville	OK	57,536	2,733,641	2,676,105
Chemetals Inc.	New Johnsonville	TN	3,073,093	5,684,893	2,611,800
Elkem Metals Co.	Marietta	OH	16,512,332	18,604,572	2,092,240
Stone Container Corp.	Coshocton	OH	1,984	2,054,058	2,052,074
American Chrome & Chemicals	Corpus Christi	TX	10,159,860	12,113,360	1,953,500
Inland Container Corp.	Rome	GA	1,347,500	3,245,815	1,898,315
Lenzing Fibers Corp.	Lowland	TN	20,428,265	22,272,515	1,844,250
Doe Run Co.	Herculaneum	MO	6,477,687	8,194,328	1,716,641
Asarco Inc.	East Helena	MT	41,074,561	42,728,498	1,653,937
Alabama River Pulp Co. Inc.	Claiborne	AL	834,155	2,433,605	1,599,450
Autoalliance Intl. Inc.	Flat Rock	MI	1,459,462	3,009,116	1,549,654
Kennecott Utah Copper	Magna	UT	10,223,075	11,717,315	1,494,240
Louisiana Pigment Co. L.P.	Westlake	LA	13,583	1,465,753	1,452,170
American Maize Products	Dimmitt	TX	1,000	1,405,185	1,404,185
Northwestern Steel & Wire Co.	Sterling	IL	12,940,090	14,274,570	1,334,480
Coastal Refining & Marketing	Corpus Christi	TX	651,853	1,827,682	1,175,829
Purolator Products Inc.	Fayetteville	NC	316,349	1,490,075	1,173,726
Brown Printing Co.	Franklin	KY	579,339	1,643,881	1,064,542
American Woodmark Corp.	Moorefield	WV	217,983	1,241,663	1,023,680
Chevron Chemical Co.	Baytown	TX	987,579	2,000,922	1,013,343
Eastern Stainless Corp.	Baltimore	MD	5,520	1,016,504	1,010,984
Union Camp Corp.	Eastover	SC	1,332,730	2,265,080	932,350
Georgia-Pacific Corp.	Monticello	MS	1,789,715	2,652,810	863,095
International Paper	Domino	TX	1,476,075	2,339,075	863,000
Ford Motor Co.	Wayne	MI	954,457	1,733,637	779,180
North Star Recycling	Wiltonjunction	IA	0	777,500	777,500
Knauf Fiber Glass	Shelbyville	IN	471,114	1,244,025	772,911
Cabot Corp.	Ville Platte	LA	3,676,100	4,416,847	740,747
Westinghouse Electric Corp.	Hampton	SC	4,728,850	5,425,721	696,871
Allied-Signal Laminate Sys.	Franklin	IN	286,000	976,333	690,333
Great Southern Paper	Cedar Springs	GA	1,855,009	2,522,520	667,511
Chino Mines Co.	Hurley	NM	7,478,832	8,142,539	663,707
North Star Recycling	Saint Paul	MN	1,293,100	1,955,000	661,900
Harman Automotive Inc.	Bolivar	TN	1,075,725	1,727,400	651,675
Granite City Steel	Granite City	IL	4,505,396	5,156,148	650,752
U.S. Vanadium Corp.	Hot Sprngs	AR	1,449,750	2,096,650	646,900
Georgia-Pacific Corp.	Palatka	FL	785,731	1,406,714	620,983
Burnham Foundry	Zanesville	OH	55,331	666,956	611,625
General Motors Corp.	Flint	MI	296,603	906,540	609,937
Hoechst-Celanese Chemical	Pasadena	TX	3,143,860	3,747,833	603,973
Murray Ohio Mfg. Co.	Lawrenceburg	TN	827,724	1,426,217	598,493
Wheeling-Pittsburgh Steel Corp.	Follansbee	WV	1,239,099	1,802,419	563,320
USS/Kobe Steel Co.	Lorain	OH	856,945	1,416,160	559,215
Total			392,419,251	508,945,364	116,526,113

production in 1992. The copper compounds are contained in smelter slag from the production of anode copper for commercial sale.

Zinc Corp. of America; Bartlesville, OK: Reported releases of copper compounds, lead compounds, and zinc compounds increased from zero to 2.6 million pounds. These compounds are contained in residual slag produced in the smelting process. The slag material is stockpiled on-site for potential future use as a source of these metals. In past years, these stockpiles were not reported as releases to land. They have now been designated as landfills and reported as such.

Chemetals Inc.; New Johnsonville, TN: Reported release of manganese compounds to landfill increased from 2.7 million to 5.3 million pounds. Ores containing manganese dioxide are processed in reduction furnaces and then dissolved in acid. Undissolved materials containing manganese compounds are sent to landfill. The increased quantity to landfill resulted from reduced recovery efficiencies as a result of processing lower-grade manganese ores and an increase in the quantity of ore in process. Chemetals converts manganese ores into purified manganese dioxide for the battery industry.

Elkem Metals Co.; Marietta, OH: Reported fugitive air emissions of ammonia increased from 3.4 million to 4.0 million pounds and reported discharges of ammonia to the Ohio River increased from 2.9 million to 3.9 million pounds. Process modifications increased the use of ammonia. The facility is subject to reporting for ammonium sulfate (solution) and submitted reports for ammonia, reporting its releases based on total ammonia (ionized and un-ionized).

Stone Container Corp.; Coshocton, OH: Reported stack air releases increased from zero to 2.0 million pounds for formaldehyde, methanol, acetone, benzene, and acetaldehyde. The increase was due to the first-time reporting of emissions for these chemicals, which are byproducts from pulp mill operations. Recent emission testing by the pulp and paper industry to identify potential sources of hazardous air pollutants under the Clean Air Act established emission factors for these chemicals. Stone Container intends to file Form Rs for previous years addressing the generation of these byproducts using these new factors.

American Chrome & Chemicals; Corpus Christi, TX: Reported releases of chromium compounds to land increased from 10 million to 12 million pounds due to a lower overall efficiency in the recovery of chrome from chromite ores. Chromite ores are reacted with soda ash in a furnace followed by extraction of chrome as sodium chromate. The non-extractable material includes residual chromium compounds which are further processed and sent to landfill. The reduced recovery efficiency was attributed to the operation of the furnaces. The furnaces have since been upgraded, improving the recovery efficiency and reducing chrome losses to landfill.

Inland Container Corp.; Rome, GA: Reported stack air releases of methanol from the wood pulping process increased from 980 thousand to 2.1 million pounds. The increase was the result of a failure in an air emission control system. Reported stack air releases of hydrochloric acid increased from 72 thousand to 870 thousand pounds due to a revised emission estimating technique. Methanol and hydrochloric acid are byproducts generated in the pulping process.

Lenzing Fibers Corp.; Lowland, TN: Reported air releases of carbon disulfide increased from 20.4 million to 22.3 million pounds due to production increases. Carbon disulfide is a reactant in the production of rayon fibers.

Doe Run Co.; Herculaneum, MO: Reported releases of lead compounds and zinc compounds to land increased from 6.1 million to 7.8 million pounds due to increased production. Furnace slag from the smelting process containing these compounds is stored on land for potential future recovery of these metals. Increased production of lead resulted in increased slag production.

1993 TRI Top Decreasers in Underground Injection

Table 3-11 lists the 50 TRI facilities with the largest reported decreases in underground injection from 1992 to 1993, ranked by the magnitude of their decrease. Together, these 50 facilities accounted for reported reductions totaling 181 million pounds. Several of the facilities reported large decreases in underground injection for ammonia and ammonium sulfate (solution) because they have become aware of EPA's reporting guidance for these chemicals. A discussion of this guidance appears in Box 3-1 of this chapter.

Vulcan Chemicals; Wichita, KS: Reported underground injection of hydrochloric acid decreased from 44 million to 10 million pounds because of an increase in the reprocessing of the hydrochloric acid waste stream to produce calcium chloride, a road de-icing salt. Sulfuric acid sent to the deepwell decreased from 13 million to 6 million pounds because of an increase in off-site transfers to a recycling facility.

DuPont; Louisville, KY: Reported underground injection of hydrochloric acid decreased from 29 million to zero pounds because of the sale, rather than disposal, of the hydrochloric acid. DuPont shut down its deepwell in September, 1992. Hydrochloric acid is a byproduct from the production of Freon 22. The plant added tanks to increase the storage capacity so the hydrochloric acid can be sold as the market demands.

Cytec Industries Inc.; Westwego, LA: Reported underground injection decreased for acetonitrile from 13 million to 6.3 million pounds and for ammonia from 50 million to 18 million pounds. Both are byproducts of acrylonitrile and methyl methacrylate production processes. The decrease in acetonitrile can be attributed to the installation of an additional stripper. Acetonitrile is now recovered and sold as product. The decrease in ammonia is due to calculation errors in previous years that were corrected in 1993. Cytec put in a new sulfuric acid regeneration plant which converts ammonia and is expecting a large decrease in ammonia injection for 1994.

Monsanto Company; Alvin, TX: Reported underground injection of ammonia decreased from 52 million to 36 million pounds, primarily because the facility became aware of EPA's previous reporting guidance concerning reporting of ammonia contained in aqueous solutions. Releases from the ammonium sulfate stream are being reported as total ammonia and are basically unchanged. Ammonia released in Monsanto's petrochemical process to deepwells from sources other than ammonium sulfate is now being reported as un-ionized ammonia, instead of total ammonia, based on pH measurements of the waste stream.

Sterling Chemicals Inc.; Texas City, TX: Reported underground injection of ammonia decreased from 31.9 million to 19.3 million pounds due to a 30% reduction in the production of acrylonitrile. Ammonia is a byproduct from this process. Although the primary factor was

Table 3-11. Top 50 TRI Facilities with the Largest Decrease in Underground Injection, 1992-1993.

Facility	City	State	1992 Underground Injection Pounds	1993 Underground Injection Pounds	1992-1993 Change in Underground Injection Pounds
Vulcan Chemicals	Wichita	KS	59,536,672	16,973,869	-42,562,803
DuPont	Louisville	KY	29,039,810	0	-29,039,810
Cytec Industries Inc.	Westwego	LA	146,355,805	119,578,250	-26,777,555
Monsanto Co.	Alvin	TX	55,343,664	40,164,600	-15,179,064
Sterling Chemicals Inc.	Texas City	TX	35,929,070	23,625,432	-12,303,638
Cabot Corp.	Tuscola	IL	18,915,780	10,749,360	-8,166,420
BP Chemicals Inc.	Port Lavaca	TX	26,767,584	20,531,246	-6,236,338
Zeneca Inc.	Bucks	AL	6,269,383	145,600	-6,123,783
Albemarle Corp.	Magnolia	AR	6,468,971	430,810	-6,038,161
Citgo Petroleum Corp.	Lake Charles	LA	3,930,990	0	-3,930,990
Shell Oil Co.	Deer Park	TX	3,320,646	14,795	-3,305,851
Zeneca Specialties	Mt. Pleasant	TN	16,508,125	13,224,585	-3,283,540
DuPont	Beaumont	TX	37,368,768	35,186,195	-2,182,573
Monsanto Co.	Luling	LA	4,734,960	2,586,400	-2,148,560
Upjohn Co.	Portage	MI	2,465,990	776,455	-1,689,535
Jetco Chemicals Inc.	Corsicana	TX	3,017,733	1,339,825	-1,677,908
Uniroyal Chemical Co. Inc.	Geismar	LA	9,617,920	8,088,520	-1,529,400
Albemarle Corp.	Magnolia	AR	1,500,000	0	-1,500,000
DuPont	La Porte	TX	3,710,700	2,338,980	-1,371,720
Arkansas Chemicals Inc.	El Dorado	AR	1,079,062	0	-1,079,062
Agricultural Minerals Ltd.	Verdigris	OK	1,138,000	128,300	-1,009,700
Kaiser Aluminum & Chemical	Mulberry	FL	5,483,168	4,876,348	-606,820
Angus Chemical Co.	Sterlington	LA	6,023,000	5,523,000	-500,000
Texaco Refining & Marketing	Bakersfield	CA	738,005	311,837	-426,168
Diamond Shamrock Inc.	Sunray	TX	606,448	275,212	-331,236
Great Lakes Chemical Corp.	Magnolia	AR	380,000	120,000	-260,000
Monsanto Co.	Cantonment	FL	6,028,556	5,779,658	-248,898
W. R. Grace & Co.	Deer Park	TX	238,771	0	-238,771
LTV Steel Co.	Hennepin	IL	2,000,250	1,800,250	-200,000
Maui Pineapple Co. Ltd.	Kahului	HI	223,927	63,485	-160,442
DuPont	Victoria	TX	22,060,820	21,903,231	-157,589
ISP Tech.	Texas City	TX	2,843,330	2,722,200	-121,130
Hoechst-Celanese Chemical	Bay City	TX	2,346,305	2,231,677	-114,628
Texaco Refining & Marketing	Bakersfield	CA	143,276	77,102	-66,174
Great Lakes Chemical Corp.	El Dorado	AR	1,935,400	1,878,740	-56,660
Mobil Oil Corp.	Chalmette	LA	55,885	0	-55,885
Aristech Chemical Corp.	Haverhill	OH	1,984,103	1,931,482	-52,621
UOP	Blanchard	LA	4,550,163	4,500,927	-49,236
Martin Marietta Magnesia	Manistee	MI	85,000	45,000	-40,000
Rexene Corp.	Odessa	TX	156,245	118,928	-37,317
Arco Chemical Co.	Channelview	TX	928,895	893,342	-35,553
Zeneca Inc.	Perry	OH	43,004	7,707	-35,297
DuPont	La Place	LA	810,188	778,597	-31,591
Chevron Chemical Co.	Belle Chasse	LA	299,810	282,655	-17,155
Qo Chemicals Inc.	Belle Glade	FL	40,000	28,000	-12,000
Air Products Mfg. Corp.	Wichita	KS	68,273	59,595	-8,678
Calumet Lubricants Co.	Princeton	LA	7,526	284	-7,242
Imco Recycling Inc.	Sapulpa	OK	43,900	37,000	-6,900
Zinc Corp. of America	Bartlesville	OK	20,526	13,848	-6,678
Witco Oleo/Surfactants	Houston	TX	21,962	18,378	-3,584
Total			533,186,369	352,161,705	-181,024,664

reduced production, approximately 1 million pounds of this decrease in ammonia can be attributed to emission reduction projects.

Cabot Corp.; Tuscola, IL: Reported underground injection of hydrochloric acid decreased from 18.9 million to 10.7 million pounds. Hydrochloric acid is a byproduct from the manufacture of fumed silica. A more favorable market allowed for an increase in the sale of byproduct hydrochloric acid rather than disposal.

B.P. Chemicals Inc.; Port Lavaca, TX: Reported underground injection of ammonia decreased from 21.7 million to 14 million pounds due to utilizing EPA's previous guidance concerning the reporting of ammonia contained in aqueous solutions. Ammonium sulfate is being reported as total ammonia and other ammonia solutions are being reported as un-ionized ammonia. There were no changes in waste generation.

Zeneca Inc.; Bucks, AL: Reported underground injection of methanol decreased from 2.3 million to 145 thousand pounds and ammonia decreased from 4 million to zero pounds as a result of shutting down their trimethyl phosphate process.

Albemarle Corp.; Magnolia, AR: Reported underground injection of ammonia decreased from 5.7 million to zero pounds. The primary source of ammonia was from ammonium bromide, whose releases were not included in Albemarle's 1993 report for ammonia because it was determined that the solution containing the ammonia was not a waste stream and therefore the 1% *de minimis* exemption applied. In addition, the facility became aware of EPA's previous reporting guidance concerning reporting of ammonia contained in aqueous solutions. Reported underground injection of hydrochloric acid decreased from 760 thousand to 388 thousand pounds. Hydrochloric acid is used to acidize the deepwells. Fewer wells were treated in 1993.

Citgo Petroleum Corp.; Lake Charles, LA: Reported underground injection of ammonia decreased from 3.8 million pounds to zero pounds. The addition of on-site treatment of ammonia allowed for termination of the use of deepwells in the spring of 1992. Ammonia is in the cooling water used in the refining process. Ammonia is stripped from the water and then burned in a furnace. The process water from the stripper containing residual ammonia is returned to the process or sent to wastewater treatment for denitrification.

1993 TRI Top Increasers in Underground Injection

Table 3-12 lists the 50 TRI facilities with the largest reported increases in underground injection from 1992 to 1993, ranked by the magnitude of their increase. Together, these 50 facilities accounted for reported increases totaling 27.6 million pounds.

DuPont; Pass Christian, MS: Reported underground injection of hydrochloric acid increased from 52 million to 56 million pounds due to an increase in production. Hydrochloric acid is used in the production of inorganic pigments.

DuPont; Orange, TX: Reported underground injection of sulfuric acid increased from 2.5 million to 5.6 million pounds due to an increase in the number of process upsets and shut downs during the manufacture of hydrogen cyanide. Sulfuric acid is used to maintain pH levels and control process reactions. Sulfuric acid is also used to control pH in wastewater from tank cleaning operations prior to deepwell injection.

Table 3-12. Top 50 TRI Facilities with the Largest Increase in Underground Injection, 1992-1993.

Facility	City	State	1992 Underground Injection Pounds	1993 Underground Injection Pounds	1992-1993 Change in Underground Injection Pounds
DuPont	Pass Christian	MS	52,000,000	56,000,000	4,000,000
DuPont	Orange	TX	4,347,083	7,303,524	2,956,441
Occidental Chemical Corp.	Luling	LA	0	2,733,233	2,733,233
National Steel Corp.	Portage	IN	1,918,535	4,606,300	2,687,765
DuPont	New Johnsonville	TN	47,000,000	49,000,000	2,000,000
Coastal Chem Inc.	Cheyenne	WY	12,514,351	14,512,026	1,997,675
Rubicon Inc.	Geismar	LA	6,881,500	8,260,300	1,378,800
Witco Corp.	Harvey	LA	290,000	1,600,000	1,310,000
Hoechst-Celanese Chemical	Pasadena	TX	5,363,400	6,606,610	1,243,210
Amoco Oil Co.	Texas City	TX	11,203,000	12,166,000	963,000
Bethlehem Steel Corp.	Burns Harbor	IN	1,857,100	2,819,000	961,900
AK Steel Corp.	Middletown	OH	2,700,000	3,520,000	820,000
Great Lakes Chemical Corp.	El Dorado	AR	632,015	1,194,966	562,951
Witco Corp.	Taft	LA	2,142,937	2,703,050	560,113
Engelhard Corp.	Jackson	MS	5,992,194	6,521,124	528,930
Borden Chemicals & Plastics	Geismar	LA	949,028	1,426,171	477,143
Merichem Co.	Houston	TX	3,327,300	3,772,600	445,300
Cominco Fertilizers U.S. Inc.	Borger	TX	372,217	772,248	400,031
Celanese Engineering Resins	Bishop	TX	1,134,480	1,513,750	379,270
Wil-Gro Fertilizer	Pryor	OK	823,270	1,042,120	218,850
Warner-Lambert Co.	Holland	MI	3,259,405	3,396,043	136,638
Witco Corp.	Marshall	TX	31,790	152,183	120,393
Sandoz Agro Inc.	Beaumont	TX	653,440	770,189	116,749
Total Petroleum Inc.	Alma	MI	271,994	365,363	93,369
Great Lakes Chemical Corp.	Adrian	MI	0	88,771	88,771
IBP Inc.	Holcomb	KS	33,250	120,250	87,000
IBP Inc.	Amarillo	TX	33,120	102,250	69,130
BHP Petroleum Americas	Kapolei	HI	45,030	96,030	51,000
Morton International Inc.	Moss Point	MS	2,737	52,872	50,135
BP Chemicals Inc.	Lima	OH	20,363,250	20,406,300	43,050
Phillips 66 Co.	Borger	TX	17,840	51,795	33,955
Asarco Inc.	Amarillo	TX	5,808,239	5,832,635	24,396
Imco Recycling Inc.	Morgantown	KY	693	20,000	19,307
Elf Atochem N.A. Inc.	Crosby	TX	497,644	516,023	18,379
Cytec Industries Inc.	Milton	FL	220,038	238,020	17,982
Harris Corp.	Palm Bay	FL	1,077	18,733	17,656
Zeneca Inc.	Saint Gabriel	LA	23,866	30,353	6,487
Petrolite	Barnsdall	OK	750	6,000	5,250
Teledyne Allvac	Latrobe	PA	0	3,200	3,200
Sherwin-Williams Co.	Coffeyville	KS	0	1,424	1,424
BASF Corp.	Holland	MI	1,101	2,350	1,249
Thrifty Corp.	El Monte	CA	0	750	750
Crouse-Hinds Cooper Industries	Amarillo	TX	0	250	250
Standard Microsystems Corp.	Hauppauge	NY	0	250	250
Heinz USA	Holland	MI	0	250	250
Reynolds Metals Co.	Ewa Beach	HI	54	250	196
Quantum Chemical Co.	Tuscola	IL	59	200	141
Plasma Processing Corp.	Millwood	WV	0	64	64
Arrow Tank & Eng.	Cambridge	MN	0	48	48
Pimalco	Chandler	AZ	0	18	18
Total			192,713,787	220,345,886	27,632,099

Occidental Chemical Corp.; Luling, LA: Reported underground injection of ammonia increased from zero to 2.7 million pounds because for 1993, Occidental Chemical reported as a separate establishment which is part of a facility owned by Monsanto Co. In 1992, all quantities of TRI chemicals injected underground (including ammonia) at the facility were reported by Monsanto Co. The amount of ammonia injected by the facility as a whole actually increased by only 133 thousand pounds.

National Steel Corp.; Portage, IN: Reported underground injection of hydrochloric acid increased from 1.9 million to 4.6 million pounds. The waste hydrochloric acid, an aid in the manufacture of cold-rolled steel, was previously sent off-site for recovery but is now injected underground. The off-site recovery operation no longer accepts this waste hydrochloric acid stream.

DuPont; New Johnsonville, TN: Reported underground injection of hydrochloric acid increased from 47 million to 49 million pounds due to the natural variability of raw materials used in the production of titanium dioxide. Waste hydrochloric acid is generated during the manufacturing process and sent to deepwell for disposal.

Coastal Chemical Inc.; Cheyenne, WY: Reported underground injection of ammonium nitrate (solution) increased from 10.3 to 10.9 million pounds due to production increases. Ammonium nitrate waste is generated during the production of inorganic chemicals. Reported underground injection of ammonia increased from 2.2 million to 3.6 million pounds due to an increase in waste generation from the start-up of a urea plant expansion. Unanticipated start-up problems limited the urea plant's ability to efficiently remove and recycle ammonia. The urea plant was thoroughly revamped in 1994, which should result in substantially lower ammonia discharges.

Rubicon Inc.; Geismar, LA: Reported underground injection of ammonia increased from 3.1 million to 5.7 million pounds due to a process change. Ammonia has replaced sodium hydroxide for neutralization in the manufacture of dinitrotoluene. Some is recovered, with the remaining ammonia waste injected. Ammonia is generated as a byproduct from several different processes on-site. The ammonia is used on site, sold, or disposed of through injection.

Witco Corp.; Harvey, LA: Reported underground injection of methanol increased from 290 thousand to 1.6 million pounds due to a one-time experimental test run for a new product. A repeat of this product run is not expected.

Hoechst-Celanese Chemical; Pasadena, TX: Reported underground injection of ethylene glycol increased from 4.6 million to 5.6 million pounds due to fluctuations in process operation increasing the glycol concentration in the waste stream to the deepwell. Hoechst-Celanese is a producer of ethylene glycol.

Amoco Oil Company; Texas City, TX: Reported underground injection of ammonia increased from 10.7 million to 11.7 million pounds. No specific reasons were identified to account for this increase.

TRI and Economic Data

Clearly, environmental releases and off-site transfers for treatment and disposal of toxic chemicals covered by TRI have declined significantly since 1988. How do these decreases compare to the economic performance of the manufacturing sector during this same period?

One way to examine this relationship is to compare the value of goods shipped from manufacturing facilities to the quantity of TRI chemicals released and transferred off-site by those facilities. This ratio, tracked over time, will indicate whether more or less value of economic activity is being obtained for each unit of TRI chemicals released or transferred.

Increases over time in the ratio would indicate that, for a given value of goods produced and shipped, manufacturers are releasing or transferring a lower quantity of TRI chemicals. This might indicate that manufacturers are becoming more efficient in managing the use and disposal of TRI chemicals. Conversely, a declining ratio would mean that a lower value of goods was being produced and shipped for each unit of TRI releases and transfers. This might be indicative of less effective management of the use and disposal of TRI chemicals in the manufacturing process.

Value-of-shipments data are not a perfect measure of production. For example, value-of-shipments data do not cover all elements of production, such as unsold production or production of intermediates which are not sold. Also, the value-of-shipments data are adjusted for the general rate of inflation in the economy and are expressed in constant 1987 dollars. However, prices of certain products shipped from manufacturers may change at rates different from the general rate of inflation, or manufacturers may shift production to a product mix with higher or lower prices. Such price changes which differ from the general rate of inflation would cause the value-of-shipments data to reflect not just changes in production, but also changes in prices. However, value-of-shipments data constitute the best data readily available to represent production for this type of analysis.

At this time, the most recent value-of-shipments data available were for the 1992 calendar year. Therefore, this analysis examines the relationship between value of shipments and TRI data for 1988 through 1992.

The results of this analysis show that there has been an overall increase in the dollar value of shipments per ton of TRI releases and transfers from 1988 to 1992. The ratio of value of shipments to TRI releases and transfers has increased from 0.86 to 1.28 since 1988. This represents an increase in value of shipments of almost $420,000 per ton of TRI releases and transfers. In other words, reported TRI releases and transfers have declined with respect to production as measured by value of shipments.

For the period 1988 through 1992, the ratio improved for 17 of the 20 two-digit SIC code major groups covered by TRI. Only the food, apparel, and petroleum industries had a lower ratio of value of shipments to TRI releases and transfers in 1992 than in 1988. The chemical industry, which accounts for the largest share of TRI releases and transfers of any industry, showed an improvement of 69%.

From 1991 to 1992, the ratio of value of shipments to TRI releases and transfers increased from 1.20 to 1.28, an increase of 7%. The ratio improved for 18 of the 20 SIC code groupings. Only petroleum and primary metals experienced declining ratios between 1991 and 1992. The chemical industry showed a 9.8% improvement from 1991 to 1992.

Table 3-13 shows, for each year and for each industry, the value of shipments, tons of TRI releases and transfers, and the ratio of value of shipments to TRI releases and transfers. Table

3-14 shows growth rates for value of shipments, TRI releases and transfers, and their ratios. Rounding of numbers in the tables may cause apparently inconsistent results in some cases.

CHANGES IN RELEASES AND TRANSFERS BY CHEMICAL

1992-1993 Comparisons

Table 3-15 presents TRI total release data for the 20 chemicals with the largest decreases in total releases from 1992 to 1993. Ammonia releases decreased by 113 million pounds since 1992, a decline of 24.3%. Ammonia decreases accounted for nearly 28% of total release reductions for all TRI chemicals since 1992. A significant portion of this ammonia decrease may be due to changes in facility reporting methods for the aqueous forms of this chemical, as discussed above in Box 3-1. Total TRI releases of hydrochloric acid decreased by 62 million pounds since 1992, a decline of 21.6%.

Total TRI releases of 1,1,1-trichloroethane, an ozone-depleting chemical, decreased by 53 million pounds since 1992, a decline of 45.3%. The number of TRI reporting forms submitted for this chemical dropped by 34.8% between 1992 and 1993, from 3,178 to 2,073. This indicates that one-third fewer facilities manufactured, processed, or used this chemical above reporting thresholds in 1993. Many facilities are phasing out their use of this common industrial solvent.

Releases of Freon 113, another ozone-depleting chemical, decreased by 15 million pounds since 1992, a decline of 60.5% in just one year. The number of forms submitted for this chemical declined by 46.3%, from 867 in 1992 to 466 in 1993. This chemical has also been the target of intensive pollution prevention efforts by facilities.

Table 3-16 presents TRI total release data for the 20 chemicals with the largest increase in releases between 1992 and 1993. Total TRI releases of copper compounds increased by nearly 7 million pounds since 1992, an increase of 15.9%. Much of this increase is attributable to increased land disposal of slag containing these compounds by a few facilities. Phosphoric acid releases increased by 6 million pounds since 1992 due to a large increase in water releases by a fertilizer facility in Louisiana. Chlorine releases increased by nearly 5 million pounds, due largely to increased air emissions by a single facility in Utah. These increases are discussed in greater detail in the preceding section of this chapter.

1988-1993 Changes

Table 3-17 presents the TRI total release data for the 20 chemicals with the largest decreases between 1988 and 1993. Table 3-18 presents the decrease in number of forms submitted for the 20 chemicals with the greatest decrease in number of forms between 1988 and 1993.

Ammonium sulfate (solution) releases have decreased more than any other TRI chemical since 1988, accounting for 28.5% of total reductions of all TRI chemicals since 1988. Total releases of ammonium sulfate (solution) have decreased by 594 million pounds, from 606 million pounds in 1988 to only 12 million pounds in 1993. This represents a decrease of 98.0% since 1988. Much of this decrease can be attributed to facility use of an optional reporting method for ammonium sulfate (solution) which became available for the 1990 reporting year (see Box 3-1 above). It's interesting to note that, while releases of this chemical have declined by 98% since 1988, the number of forms submitted for it has declined by only 37.4%, from 396 to 248.

Table 3-13. Ratio of Shipments to TRI Releases and Transfers for Manufacturing Industries, 1988-1992.[29]

SIC Code	Industry	Value of Shipments $ Millions, 1987					Total Releases and Transfers Tons				
		1988	1989	1990	1991	1992	1988	1989	1990	1991	1992
20	Food	328,212	324,780	330,472	332,705	342,815	34,943	39,290	42,230	43,522	41,168
21	Tobacco	16,807	15,987	16,333	15,437	29,827	1,468	917	1,277	1,160	1,010
22	Textiles	60,644	61,593	59,096	58,405	60,012	28,324	23,672	19,643	17,501	16,075
23	Apparel	60,664	57,530	56,852	56,332	60,795	857	1,050	836	905	909
24	Lumber	65,994	64,465	63,493	59,103	69,438	19,021	20,677	19,316	16,985	16,057
25	Furniture	35,212	35,599	34,997	32,917	37,087	36,863	35,541	33,772	29,803	31,016
26	Paper	107,789	108,747	107,830	106,378	112,865	176,679	172,213	161,603	151,034	147,324
27	Printing	121,749	120,218	120,352	114,871	142,007	35,034	32,066	30,312	24,792	21,209
28	Chemicals	229,822	232,512	238,168	234,989	259,559	1,510,853	1,370,769	1,083,220	1,003,742	1,009,357
29	Petroleum	194,113	189,831	188,828	190,224	127,301	58,790	58,238	49,672	45,465	46,424
30	Rubber/Plastics	88,285	89,307	91,104	88,538	96,387	100,116	106,413	101,914	85,309	77,532
31	Leather	8,522	8,349	8,065	7,325	8,214	14,189	13,097	11,882	9,025	9,600
32	Stone/Clay/Glass	59,602	58,903	57,698	53,082	53,038	30,387	26,455	20,977	22,101	19,421
33	Primary Metals	131,929	128,761	125,367	117,451	117,431	426,640	385,036	391,449	293,768	298,110
34	Fabr. Metals	147,890	144,033	141,662	134,715	141,778	120,349	113,593	102,607	80,307	76,791
35	Machinery	228,720	229,126	225,061	209,175	219,247	42,366	40,168	32,715	24,983	21,211
36	Electrical	178,729	179,545	178,924	179,727	184,979	93,254	75,960	64,787	54,062	43,730
37	Transport. Equip.	328,430	326,477	318,276	303,867	340,589	140,121	127,906	110,867	91,314	81,344
38	Measure./Photo.	107,036	106,937	108,008	108,870	115,008	40,202	33,622	27,744	23,528	19,925
39	Miscellaneous	32,437	32,059	32,381	31,601	33,638	20,774	21,963	16,758	12,521	11,314
	Total	2,532,586	2,514,760	2,502,966	2,435,711	2,552,016	2,931,230	2,698,645	2,323,581	2,031,825	1,989,529

Table 3-14. Growth Rates in Ratio of Shipments to TRI Releases and Transfers for Manufacturing Industries, 1988-1992.[29]

SIC Code	Industry	Percent Change in Real Value of Shipments					Percent Change in TRI Releases and Transfers				
		1988-1989 Percent	1989-1990 Percent	1990-1991 Percent	1991-1992 Percent	1988-1992 Percent	1988-1989 Percent	1989-1990 Percent	1990-1991 Percent	1991-1992 Percent	1988-1992 Percent
20	Food	-1.05	1.75	0.68	3.04	4.45	12.44	7.48	3.06	-5.41	17.81
21	Tobacco	-4.88	2.17	-5.49	93.22	77.47	-37.55	39.25	-9.15	-12.87	-31.17
22	Textiles	1.57	-4.05	-1.17	2.75	-1.04	-16.42	-17.02	-10.90	-8.15	-43.25
23	Apparel	-5.17	-1.18	-0.92	7.92	0.22	22.54	-20.39	8.25	0.49	6.12
24	Lumber	-2.32	-1.51	-6.91	17.49	5.22	8.71	-6.58	-12.07	-5.46	-15.58
25	Furniture	1.10	-1.69	-5.94	12.67	5.32	-3.59	-4.98	-11.75	4.07	-15.86
26	Paper	0.89	-0.84	-1.35	6.10	4.71	-2.53	-6.16	-6.54	-2.46	-16.61
27	Printing	-1.26	0.11	-4.55	23.62	16.64	-8.47	-5.47	-18.21	-14.45	-39.46
28	Chemicals	1.17	2.43	-1.34	10.46	12.94	-9.27	-20.98	-7.34	0.56	-33.19
29	Petroleum	-2.21	-0.53	0.74	-33.08	-34.42	-0.94	-14.71	-8.47	2.11	-21.03
30	Rubber/Plastics	1.16	2.01	-2.82	8.86	9.18	6.29	-4.23	-16.29	-9.12	-22.56
31	Leather	-2.02	-3.41	-9.17	12.13	-3.61	-7.70	-9.28	-24.05	6.38	-32.34
32	Stone/Clay/Glass	-1.17	-2.04	-8.00	-0.08	-11.01	-12.94	-20.71	5.36	-12.12	-36.09
33	Primary Metals	-2.40	-2.64	-6.31	-0.02	-10.99	-9.75	1.67	-24.95	1.48	-30.13
34	Fabr. Metals	-2.61	-1.65	-4.90	5.24	-4.13	-5.61	-9.67	-21.73	-4.38	-36.19
35	Machinery	0.18	-1.77	-7.06	4.82	-4.14	-5.19	-18.55	-23.63	-15.10	-49.93
36	Electrical	0.46	-0.35	0.45	2.92	3.50	-18.54	-14.71	-16.55	-19.11	-53.11
37	Transport. Equip.	-0.59	-2.51	-4.53	12.09	3.70	-8.72	-13.32	-17.64	-10.92	-41.95
38	Measure./Photo.	-0.09	1.00	0.80	5.64	7.45	-16.37	-17.48	-15.20	-15.31	-50.44
39	Miscellaneous	-1.16	1.00	-2.41	6.45	3.70	5.72	-23.70	-25.28	-9.64	-45.54
	Total	-0.70	-0.47	-2.69	4.78	0.77	-7.93	-13.90	-12.56	-2.08	-32.13

[29] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

SIC Code	Industry	Ratio of Shipments to Releases and Transfers $ Millions/Ton 1988	1989	1990	1991	1992
20	Food	9.39	8.27	7.83	7.64	8.33
21	Tobacco	11.45	17.44	12.80	13.31	29.52
22	Textiles	2.14	2.60	3.01	3.34	3.73
23	Apparel	70.83	54.81	68.04	62.28	66.89
24	Lumber	3.47	3.12	3.29	3.48	4.32
25	Furniture	0.96	1.00	1.04	1.10	1.20
26	Paper	0.61	0.63	0.67	0.70	0.77
27	Printing	3.48	3.75	3.97	4.63	6.70
28	Chemicals	0.15	0.17	0.22	0.23	0.26
29	Petroleum	3.30	3.26	3.80	4.18	2.74
30	Rubber/Plastics	0.88	0.84	0.89	1.04	1.24
31	Leather	0.60	0.64	0.68	0.81	0.86
32	Stone/Clay/Glass	1.96	2.23	2.75	2.40	2.73
33	Primary Metals	0.31	0.33	0.32	0.40	0.39
34	Fabr. Metals	1.23	1.27	1.38	1.68	1.85
35	Machinery	5.40	5.70	6.88	8.37	10.34
36	Electrical	1.92	2.36	2.76	3.32	4.23
37	Transport. Equip.	2.34	2.55	2.87	3.33	4.19
38	Measure./Photo.	2.66	3.18	3.89	4.63	5.77
39	Miscellaneous	1.56	1.46	1.93	2.52	2.97
	All Industries	0.86	0.93	1.08	1.20	1.28

SIC Code	Industry	Percent Change in Ratio of Shipments to Releases and Transfers 1988-1989 Percent	1989-1990 Percent	1990-1991 Percent	1991-1992 Percent	1988-1992 Percent
20	Food	-11.99	-5.33	-2.31	8.93	-11.34
21	Tobacco	52.33	-26.63	4.03	121.77	157.86
22	Textiles	21.52	15.63	10.92	11.87	74.36
23	Apparel	-22.61	24.13	-8.47	7.40	-5.56
24	Lumber	-10.14	5.43	5.86	24.27	24.64
25	Furniture	4.86	3.46	6.58	8.26	25.18
26	Paper	3.50	5.67	5.56	8.77	25.57
27	Printing	7.88	5.90	16.70	44.51	92.67
28	Chemicals	11.51	29.62	6.48	9.84	69.05
29	Petroleum	-1.28	16.63	10.06	-34.46	-16.95
30	Rubber/Plastics	-4.83	6.52	16.10	19.79	40.98
31	Leather	6.15	6.47	19.59	5.41	42.47
32	Stone/Clay/Glass	13.51	23.53	-12.68	13.70	39.23
33	Primary Metals	8.14	-4.23	24.84	-1.47	27.39
34	Fabr. Metals	3.18	8.88	21.50	10.06	50.25
35	Machinery	5.66	20.60	21.70	23.46	91.46
36	Electrical	23.33	16.84	20.38	27.24	120.71
37	Transport. Equip	8.90	12.47	15.92	25.82	78.63
38	Measure./Photo.	19.46	22.40	18.86	24.74	116.80
39	Miscellaneous	-6.51	32.38	30.62	17.80	90.41
	Total	7.85	15.60	11.29	7.00	48.46

Table 3-15. Top 20 Chemicals for Decreases in Total Releases, 1992-1993.

CAS Number[30]	Chemical	Total Releases 1992 Pounds	Total Releases 1993 Pounds	1992-1993 Change Pounds	1992-1993 Change Percent
7664-41-7	Ammonia	465,877,137	352,865,493	-113,011,644	-24.3
7647-01-0	Hydrochloric acid	287,278,129	225,249,801	-62,028,328	-21.6
71-55-6	1,1,1-Trichloroethane	117,164,593	64,122,214	-53,042,379	-45.3
67-56-1	Methanol	253,856,319	211,924,491	-41,931,828	-16.5
108-88-3	Toluene	196,474,524	178,636,563	-17,837,961	-9.1
—	Manganese compounds	66,633,467	50,460,069	-16,173,398	-24.3
76-13-1	Freon 113	24,896,375	9,830,872	-15,065,503	-60.5
7440-50-8	Copper	14,332,877	2,740,663	-11,592,214	-80.9
75-09-2	Dichloromethane	75,788,856	65,410,485	-10,378,371	-13.7
67-64-1	Acetone	140,053,675	129,865,364	-10,188,311	-7.3
—	Zinc compounds	81,832,633	72,952,342	-8,880,291	-10.9
78-93-3	Methyl ethyl ketone	92,688,075	85,507,228	-7,180,847	-7.7
463-58-1	Carbonyl sulfide	18,037,066	12,789,097	-5,247,969	-29.1
7440-66-6	Zinc (fume or dust)	17,057,430	12,196,985	-4,860,445	-28.5
75-05-8	Acetonitrile	21,287,920	16,783,392	-4,504,528	-21.2
75-71-8	Dichlorodifluoromethane (CFC-12)	11,508,287	7,381,795	-4,126,492	-35.9
110-82-7	Cyclohexane	13,962,847	10,395,232	-3,567,615	-25.6
108-95-2	Phenol	13,666,426	10,130,668	-3,535,758	-25.9
67-66-3	Chloroform	17,755,538	14,331,019	-3,424,519	-19.3
74-85-1	Ethylene	36,698,833	33,330,805	-3,368,028	-9.2

Table 3-16. Top 20 Chemicals for Increases in Total Releases, 1992-1993.

CAS Number[30]	Chemical	Total Releases 1992 Pounds	Total Releases 1993 Pounds	1992-1993 Change Pounds	1992-1993 Change Percent
—	Copper compounds	41,087,660	47,604,942	6,517,282	15.9
7664-38-2	Phosphoric acid	206,621,281	212,622,635	6,001,354	2.9
7782-50-5	Chlorine	71,364,152	76,254,999	4,890,847	6.9
7664-93-9	Sulfuric acid	156,083,437	159,597,625	3,514,188	2.3
6484-52-2	Ammonium nitrate (solution)	48,271,423	50,333,091	2,061,668	4.3
7439-92-1	Lead	2,545,365	4,056,624	1,511,259	59.4
100-42-5	Styrene	31,405,163	32,909,052	1,503,889	4.8
50-00-0	Formaldehyde	16,673,116	18,120,169	1,447,053	8.7
—	Nickel compounds	1,816,127	3,221,837	1,405,710	77.4
107-21-1	Ethylene glycol	17,240,115	18,533,707	1,293,592	7.5
60-35-5	Acetamide	100,821	1,089,016	988,195	980.1
56-23-5	Carbon tetrachloride	1,440,839	2,264,773	823,934	57.2
101-68-8	Methylenebis(phenylisocyanate)	530,963	1,350,274	819,311	154.3
95-63-6	1,2,4-Trimethylbenzene	5,897,987	6,657,244	759,257	12.9
75-07-0	Acetaldehyde	8,422,287	9,166,549	744,262	8.8
1634-04-4	Methyl tert-butyl ether	3,214,663	3,951,584	736,921	22.9
80-05-7	4,4'-Isopropylidenediphenol	521,330	950,601	429,271	82.3
108-38-3	m-Xylene	1,269,578	1,668,010	398,432	31.4
75-15-0	Carbon disulfide	92,957,574	93,344,321	386,747	0.4
1319-77-3	Cresol (mixed isomers)	1,117,490	1,433,239	315,749	28.3

[30] Compound categories do not have CAS numbers (—).

Table 3-17. Top 20 Chemicals for Decreases in Total Releases, 1988-1993.[31]

CAS Number[32]	Chemical	Total Releases 1988 Pounds	1991 Pounds	1992 Pounds	1993 Pounds	1988-1993 Change Pounds	Percent
7783-20-2	Ammonium sulfate (solution)	606,203,907	18,286,041	12,908,135	12,341,611	-593,862,296	-98.0
7647-01-0	Hydrochloric acid	480,622,326	289,278,294	287,278,129	225,249,801	-255,372,525	-53.1
108-88-3	Toluene	299,708,226	209,935,425	196,474,524	178,636,563	-121,071,663	-40.4
71-55-6	1,1,1-Trichloroethane	179,537,544	143,107,328	117,164,593	64,122,214	-115,415,330	-64.3
67-64-1	Acetone	214,238,835	161,394,204	140,053,675	129,865,364	-84,373,471	-39.4
67-56-1	Methanol	289,869,944	259,393,405	253,856,319	211,924,491	-77,945,453	-26.9
75-09-2	Dichloromethane	130,937,318	82,210,080	75,788,856	65,410,485	-65,526,833	-50.0
7782-50-5	Chlorine	141,255,623	77,502,722	71,364,152	76,254,999	-65,000,624	-46.0
76-13-1	Freon 113	70,533,423	36,704,002	24,896,375	9,830,872	-60,702,551	-86.1
78-93-3	Methyl ethyl ketone	140,721,633	107,469,325	92,688,075	85,507,228	-55,214,405	-39.2
—	Zinc compounds	121,830,327	114,593,513	81,832,633	72,952,342	-48,877,985	-40.1
1330-20-7	Xylene (mixed isomers)	158,826,169	122,184,099	113,700,234	111,657,896	-47,168,273	-29.7
6484-52-2	Ammonium nitrate (solution)	95,220,959	50,787,210	48,271,423	50,333,091	-44,887,868	-47.1
—	Manganese compounds	93,517,514	72,152,078	66,633,467	50,460,069	-43,057,445	-46.0
7664-93-9	Sulfuric acid	199,355,609	161,588,579	156,083,437	159,597,625	-39,757,984	-19.9
75-15-0	Carbon disulfide	124,210,041	89,583,464	92,957,574	93,344,321	-30,865,720	-24.8
79-01-6	Trichloroethylene	55,829,024	35,769,277	30,208,038	30,128,003	-25,701,021	-46.0
127-18-4	Tetrachloroethylene	36,260,554	16,930,003	12,522,825	11,585,238	-24,675,316	-68.1
71-43-2	Benzene	32,915,312	18,723,952	13,547,553	11,209,093	-21,706,219	-65.9
79-10-7	Acrylic acid	23,094,652	19,296,926	5,051,793	4,105,904	-18,988,748	-82.2

Table 3-18. Top 20 Chemicals for Decreases in Number of Forms Submitted, 1988-1993.[31]

CAS Number[32]	Chemical	Forms 1988 Number	1991 Number	1992 Number	1993 Number	1988-1993 Change Number	Percent
71-55-6	1,1,1-Trichloroethane	3,891	3,699	3,178	2,073	-1,818	-46.7
76-13-1	Freon 113	1,439	1,093	867	466	-973	-67.6
75-09-2	Dichloromethane	1,668	1,293	1,131	1,065	-603	-36.2
108-88-3	Toluene	3,979	3,928	3,770	3,569	-410	-10.3
7782-50-5	Chlorine	1,797	1,635	1,540	1,504	-293	-16.3
127-18-4	Tetrachloroethylene	743	573	512	474	-269	-36.2
67-64-1	Acetone	2,768	2,708	2,578	2,511	-257	-9.3
7440-66-6	Zinc (fume or dust)	645	473	454	418	-227	-35.2
584-84-9	Toluene-2,4-diisocyanate	256	105	83	75	-181	-70.7
79-01-6	Trichloroethylene	946	723	675	772	-174	-18.4
7783-20-2	Ammonium sulfate (solution)	396	299	274	248	-148	-37.4
91-08-7	Toluene-2,6-diisocyanate	189	63	51	42	-147	-77.8
—	Cyanide compounds	391	276	257	252	-139	-35.5
107-21-1	Ethylene glycol	1,447	1,378	1,346	1,312	-135	-9.3
—	Mixtures and other trade names	175	157	60	47	-128	-73.1
1336-36-3	Polychlorinated biphenyls (PCBs)	122	26	20	16	-106	-86.9
78-93-3	Methyl ethyl ketone	2,518	2,570	2,481	2,418	-100	-4.0
7697-37-2	Nitric acid	1,916	1,885	1,826	1,824	-92	-4.8
7440-39-3	Barium	143	87	66	65	-78	-54.5

[31] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

[32] Compound categories do not have CAS numbers (—).

Releases of hydrochloric acid have decreased by 255 million pounds since 1988, a decline of 53.1%. Releases of toluene have decreased by 121 million pounds, a decline of 40.4% since 1988. The number of forms submitted for toluene decreased by 10.3% during this time, from 3,979 to 3,569.

Releases of 1,1,1-trichloroethane decreased by 115 million pounds since 1988, a decline of 64.3%. The number of forms submitted for this chemical dropped by 1,818, from 3,891 to 2,073, a decline of 46.7%. Freon 113 experienced the second largest decrease in number of forms submitted, a decline of 973 forms, or 67.6%. Releases of Freon 113 declined by 61 million pounds, or 86.1%, since 1988.

Table 3-19 presents the TRI total release data for the 20 chemicals with the largest increase in total releases between 1988 and 1993. Table 3-20 presents the 20 chemicals with the largest increase in number of forms submitted since 1988.

Table 3-21 presents the change in total TRI releases to air, water, and land for ozone-depleting chemicals between 1988 and 1993. Production of ozone-depleting chemicals will be phased out under the Clean Air Act Amendments of 1990. Freon 113 and 1,1,1-trichloroethane, both of which can no longer be produced as of January 1, 1996, have experienced very high rates of decline in releases in recent years.

Table 3-22 presents the change in combined TRI releases to air, water, and land for the 25 carcinogens with the largest releases to air, water, and land in 1993. Releases of some of these chemicals, such as dichloromethane, tetrachloroethane, and benzene, have declined steadily since 1988. Release of others, such as styrene, formaldehyde, and acetaldehyde, have remained fairly constant. Releases of nickel compounds, 1,4-dioxane, and arsenic have increased since 1988. Although releases of 22 of these 25 carcinogens have declined since 1988, releases of nine of them increased between 1992 and 1993.

Table 3-23 presents the complete release and transfer information for all TRI chemicals for which reports have been received in at least one year between 1988 and 1993.

Table 3-19. Top 20 Chemicals for Increases in Total Releases, 1988-1993.[33]

CAS Number[34]	Chemical	Total Releases 1988 Pounds	1991 Pounds	1992 Pounds	1993 Pounds	1988-1993 Change Pounds	Percent
7664-38-2	Phosphoric acid	177,251,686	162,986,066	206,621,281	212,622,635	35,370,949	20.0
—	Copper compounds	33,191,302	46,495,295	41,087,660	47,604,942	14,413,640	43.4
100-41-4	Ethylbenzene	7,813,632	9,183,917	10,553,068	10,690,955	2,877,323	36.8
7664-41-7	Ammonia	350,023,596	487,637,260	465,877,137	352,865,493	2,841,897	0.8
95-63-6	1,2,4-Trimethylbenzene	4,420,078	5,639,759	5,897,987	6,657,244	2,237,166	50.6
79-06-1	Acrylamide	2,227,899	4,625,338	4,228,493	4,041,496	1,813,597	81.4
1634-04-4	Methyl tert-butyl ether	2,624,516	3,281,826	3,214,663	3,951,584	1,327,068	50.6
60-35-5	Acetamide	0	40	100,821	1,089,016	1,089,016	NA
101-68-8	Methylenebis(phenyl-isocyanate)	333,500	660,262	530,963	1,350,274	1,016,774	304.9
1163-19-5	Decabromodiphenyl oxide	51,846	271,920	570,720	709,921	658,075	1269.3
95-48-7	o-Cresol	91,915	615,646	513,504	727,480	635,565	691.5
108-39-4	m-Cresol	19,170	638,289	506,999	556,762	537,592	2804.3
103-23-1	Bis(2-ethylhexyl) adipate	104,217	238,671	370,187	627,871	523,654	502.5
74-83-9	Bromomethane	2,774,341	3,052,065	3,015,382	3,181,022	406,681	14.7
74-90-8	Hydrogen cyanide	2,854,188	2,224,575	3,146,900	3,056,164	201,976	7.1
—	Nickel compounds	3,038,931	1,972,377	1,816,127	3,221,837	182,906	6.0
80-05-7	4,4'-Isopropylidenediphenol	777,428	853,197	521,330	950,601	173,173	22.3
7440-38-2	Arsenic	190,236	1,743,023	1,806,693	346,894	156,658	82.3
—	Selenium compounds	64,156	122,171	141,683	200,864	136,708	213.1
123-31-9	Hydroquinone	393,475	270,900	268,235	499,186	105,711	26.9

Table 3-20. Top 20 Chemicals for Increases in Number of Forms Submitted, 1988-1993.[33]

CAS Number[34]	Chemical	Forms 1988 Number	1991 Number	1992 Number	1993 Number	1988-1993 Change Number	Percent
—	Zinc compounds	1,644	2,350	2,417	2,463	819	49.8
—	Glycol ethers	1,612	2,121	2,177	2,162	550	34.1
7440-50-8	Copper	1,930	2,413	2,377	2,458	528	27.4
7440-02-0	Nickel	1,149	1,581	1,600	1,639	490	42.6
7440-47-3	Chromium	1,217	1,554	1,575	1,693	476	39.1
—	Manganese compounds	540	901	948	988	448	83.0
95-63-6	1,2,4-Trimethylbenzene	287	557	645	699	412	143.6
101-68-8	Methylenebis(phenyl-isocyanate)	425	754	779	834	409	96.2
—	Copper compounds	1,032	1,446	1,465	1,435	403	39.1
100-41-4	Ethylbenzene	558	856	895	935	377	67.6
7439-96-5	Manganese	917	1,193	1,218	1,286	369	40.2
—	Barium compounds	624	1,018	1,021	990	366	58.7
—	Nickel compounds	567	788	780	820	253	44.6
—	Antimony compounds	267	487	516	503	236	88.4
—	Chromium compounds	1,198	1,500	1,470	1,414	216	18.0
100-42-5	Styrene	1,235	1,425	1,417	1,404	169	13.7
7664-41-7	Ammonia	2,937	3,284	3,187	3,096	159	5.4
7664-38-2	Phosphoric acid	2,523	2,704	2,685	2,678	155	6.1
—	Lead compounds	727	937	887	858	131	18.0
98-82-8	Cumene	117	218	219	236	119	101.7

[33] Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.

[34] Compounds categories do not have CAS numbers (—).

Table 3-21. Change in TRI Releases to Air, Water, and Land for Ozone Depleters, 1988-1993.

CAS Number[35]	Chemical	Total Air/Water/Land Releases				1988-1993 Change	
		1988[36] Pounds	1991 Pounds	1992 Pounds	1993 Pounds	Pounds	Percent
353-59-3	Bromochlorodifluoromethane (Halon 1211)	NA	11,958	16,747	9,273	—	—
74-83-9	Bromomethane	2,772,795	3,051,065	3,014,382	3,179,922	407,127	14.7
75-63-8	Bromotrifluoromethane (Halon 1301)	NA	180,107	110,151	40,885	—	—
56-23-5	Carbon tetrachloride	3,809,039	1,552,870	1,394,855	2,230,441	-1,578,598	-41.4
124-73-2	Dibromotetrafluoroethane (Halon 2402)	NA	6,550	768	0	—	—
75-71-8	Dichlorodifluoromethane (CFC-12)	NA	15,238,366	11,506,565	7,381,794	—	—
76-14-2	Dichlorotetrafluoroethane (CFC-114)	NA	1,900,333	1,080,479	1,118,303	—	—
76-13-1	Freon 113	70,527,458	36,703,444	24,896,161	9,830,868	-60,696,590	-86.1
76-15-3	Monochloropentafluoroethane (CFC-115)	NA	375,168	421,692	560,753	—	—
71-55-6	1,1,1-Trichloroethane	179,536,544	143,104,523	117,164,032	64,119,686	-115,416,858	-64.3
75-69-4	Trichlorofluoromethane (CFC-11)	NA	11,895,720	9,483,481	6,130,234	—	—

[35] Compounds categories do not have CAS numbers (—).

[36] NA: Halons and CFCs were not reportable until 1991.

Table 3-22. Change in TRI Releases to Air/Water/Land for Carcinogens with Largest 1993 Air, Water, and Land Releases, 1988-1993.

CAS Number[37]	Chemical	Total Air/Water/Land Releases 1988 Pounds	1991 Pounds	1992 Pounds	1993 Pounds	1988-1993 Change Pounds	Percent
75-09-2	Dichloromethane	129,458,485	80,892,374	74,604,989	64,454,387	-65,004,098	-50.2
100-42-5	Styrene	33,818,239	29,525,016	31,321,993	32,776,445	-1,041,794	-3.1
67-66-3	Chloroform	27,133,694	20,050,248	17,705,298	14,292,980	-12,840,714	-47.3
50-00-0	Formaldehyde	13,589,244	11,491,735	11,756,868	12,207,744	-1,381,500	-10.2
127-18-4	Tetrachloroethylene	36,188,304	16,916,003	12,510,045	11,570,197	-24,618,107	-68.0
71-43-2	Benzene	32,090,277	17,899,610	13,191,870	10,845,433	-21,244,844	-66.2
75-07-0	Acetaldehyde	7,064,535	7,370,545	6,516,428	6,543,215	-521,320	-7.4
7439-92-1	Lead	7,839,393	3,788,617	2,545,365	4,056,624	-3,782,769	-48.3
106-99-0	1,3-Butadiene	7,532,529	3,966,489	3,865,500	3,282,261	-4,250,268	-56.4
—	Nickel compounds	2,813,963	1,605,847	1,523,674	3,099,677	285,714	10.2
107-06-2	1,2-Dichloroethane	4,653,872	4,117,838	3,227,325	2,311,986	-2,341,886	-50.3
56-23-5	Carbon tetrachloride	3,809,039	1,552,870	1,394,855	2,230,441	-1,578,598	-41.4
7440-47-3	Chromium	9,918,565	1,622,765	1,444,109	1,605,358	-8,313,207	-83.8
107-13-1	Acrylonitrile	4,217,126	2,206,718	1,612,525	1,403,630	-2,813,496	-66.7
8001-58-9	Creosote[38]	NA	1,768,713	1,373,497	1,161,696	1,161,696	—
75-21-8	Ethylene oxide	4,731,285	1,863,548	1,311,611	1,161,078	-3,570,207	-75.5
75-56-9	Propylene oxide	3,750,316	1,495,796	1,350,853	1,136,483	-2,613,833	-69.7
75-01-4	Vinyl chloride	1,445,229	1,052,560	1,117,164	1,014,245	-430,984	-29.8
123-91-1	1,4-Dioxane	827,655	1,065,348	1,135,109	914,149	86,494	10.5
7440-02-0	Nickel	1,765,536	955,775	3,189,293	787,935	-977,601	-55.4
117-81-7	Di-(2-ethylhexyl) phthalate	1,240,314	1,325,602	999,825	672,945	-567,369	-45.7
1332-21-4	Asbestos (friable)	2,171,075	559,470	247,291	546,421	-1,624,654	-74.8
106-89-8	Epichlorohydrin	714,548	468,281	527,473	390,130	-324,418	-45.4
106-46-7	1,4-Dichlorobenzene	1,898,872	346,820	340,589	360,268	-1,538,604	-81.0
7440-38-2	Arsenic	190,236	1,743,023	1,806,693	346,894	156,658	82.3

[37] Compounds categories do not have CAS numbers (—).

[38] NA: Creosote was not reportable until 1990.

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39]

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
75-07-0	Acetaldehyde	93	103	1,692,021	4,815,116	35,127	2,623,334	951	9,166,549
		92	87	1,961,616	4,494,285	60,238	1,905,859	289	8,422,287
		91	92	2,368,247	4,901,330	63,064	2,328,187	37,904	9,698,732
		88	64	2,576,338	4,209,010	84,236	2,219,105	194,951	9,283,640
60-35-5	Acetamide	93	4	7	8	1	1,089,000	0	1,089,016
		92	4	3	17	1	100,800	0	100,821
		91	4	10	25	5	0	0	40
		88	1	0	0	0	0	0	0
67-64-1	Acetone	93	2,511	69,220,768	55,931,694	990,315	3,250,160	472,427	129,865,364
		92	2,578	63,380,693	71,943,961	991,494	3,180,700	556,827	140,053,675
		91	2,708	78,749,489	77,603,417	1,164,834	3,463,348	413,116	161,394,204
		88	2,768	98,874,916	110,743,291	1,125,469	3,117,741	377,418	214,238,835
75-05-8	Acetonitrile	93	78	723,924	336,272	15,283	15,707,895	18	16,783,392
		92	73	732,913	394,362	48,976	20,111,640	29	21,287,920
		91	81	744,754	624,183	21,991	19,090,831	5,620	20,487,379
		88	67	1,408,588	786,151	42,223	16,739,010	1,790	18,977,762
107-02-8	Acrolein	93	15	10,744	12,022	0	102,335	0	125,101
		92	17	12,775	12,830	0	113,680	0	139,285
		91	17	8,179	20,321	7	205,898	0	234,405
		88	12	17,352	16,300	0	68,950	500	103,102
79-06-1	Acrylamide	93	77	24,241	4,317	2,261	4,010,509	168	4,041,496
		92	72	24,347	4,179	10,324	4,188,680	963	4,228,493
		91	76	20,806	3,497	4,635	4,594,900	1,500	4,625,338
		88	59	17,298	8,721	3,124	2,198,000	756	2,227,899
79-10-7	Acrylic acid	93	184	339,715	257,536	1,528	3,507,000	125	4,105,904
		92	178	284,227	264,012	19,147	4,484,000	407	5,051,793
		91	183	195,007	178,113	712	18,923,000	94	19,296,926
		88	158	585,041	215,005	16,646	22,262,010	15,950	23,094,652
107-13-1	Acrylonitrile	93	118	344,718	1,048,900	3,078	3,823,381	6,934	5,227,011
		92	115	335,086	1,267,885	1,483	3,861,550	8,071	5,474,075
		91	117	520,825	1,670,640	1,960	4,732,983	13,293	6,939,701
		88	113	1,006,698	3,201,787	6,491	4,562,713	2,150	8,779,839
107-05-1	Allyl chloride	93	19	75,867	30,573	0	0	2	106,442
		92	19	96,328	25,306	5	833	0	122,472
		91	20	155,176	24,977	5	145	0	180,303
		88	20	93,811	55,558	430	250	200	150,249
7429-90-5	Aluminum (fume or dust)	93	285	286,116	2,085,587	36,376	11	919,519	3,327,609
		92	316	495,573	2,010,080	82,140	250	1,167,093	3,755,136
		91	314	533,708	1,691,933	56,841	0	1,420,310	3,702,792
		88	357	1,226,731	2,457,917	91,518	250	3,177,625	6,954,041
60-09-3	4-Aminoazobenzene	93	1	0	1	0	370	0	371
		92	1	0	1	0	250	0	251
		91	1	0	1	0	440	0	441
		88	1	0	0	0	537	0	537
92-67-1	4-Aminobiphenyl	93	1	0	0	0	3	0	3
		92	1	0	0	0	3	0	3
		91	1	0	0	0	4	0	4
		88	1	0	10	0	4	0	14
7664-41-7	Ammonia	93	3,096	35,439,303	102,617,862	35,938,643	168,725,501	10,144,184	352,865,493
		92	3,187	38,931,120	123,326,800	42,774,032	251,783,103	9,062,082	465,877,137
		91	3,284	47,569,026	142,101,338	42,567,854	240,682,878	14,716,164	487,637,260
		88	2,937	54,919,991	199,759,274	25,498,527	55,720,094	14,125,710	350,023,596

Table 3-23.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Acetaldehyde	93	8,600	226,932	212,800	270,561	1,211	0	720,104
	92	9,750	170,728	270,925	157,031	549	0	608,983
	91	12,300	128,185	250,717	164,583	1,043	0	556,828
	88	NA	NA	161,761	160,438	25,162	0	NA
Acetamide	93	0	0	889	0	0	0	889
	92	0	0	421	0	0	0	421
	91	0	0	2,638	29,000	0	0	31,638
	88	NA	NA	0	0	250	0	NA
Acetone	93	16,307,782	51,430,246	11,805,568	8,298,215	533,984	27,452	88,403,247
	92	17,112,575	42,352,662	19,741,373	9,437,522	610,784	159,385	89,414,301
	91	18,326,442	40,167,783	13,445,485	14,008,590	531,827	106,480	86,586,607
	88	NA	NA	25,643,428	14,104,727	5,555,518	3,080,973	NA
Acetonitrile	93	1,934,210	5,648,422	4,487,047	471,530	156,291	0	12,697,500
	92	3,010,317	4,496,042	2,933,360	477,782	37,041	0	10,954,542
	91	5,224,305	2,507,956	2,540,160	581,095	150,672	0	11,004,188
	88	NA	NA	3,772,221	600,450	416,333	214,260	NA
Acrolein	93	0	8,152	8	0	0	0	8,160
	92	0	4,316	255	0	0	0	4,571
	91	0	10,681	13	0	3	0	10,697
	88	NA	NA	250	250	0	0	NA
Acrylamide	93	171	57,337	78,461	85,857	6,623	0	228,449
	92	171	123,891	48,955	88,139	37,288	0	298,444
	91	138	1,019	35,253	95,578	9,175	0	141,163
	88	NA	NA	14,458	13,540	97,582	0	NA
Acrylic acid	93	62,354	7,922,205	243,914	37,546	40,274	47	8,306,340
	92	5,899	4,198,882	200,466	37,927	29,659	0	4,472,833
	91	6,690	5,010,030	349,226	47,444	63,956	0	5,477,346
	88	NA	NA	108,914	23,262	134,139	0	NA
Acrylonitrile	93	0	784,832	769,225	201,949	15,285	0	1,771,291
	92	0	1,508,156	822,778	224,271	26,153	140	2,581,498
	91	16,540	81,902	2,034,833	297,197	21,244	0	2,451,716
	88	NA	NA	935,641	955,739	162,349	0	NA
Allyl chloride	93	0	8,121	459,481	14	149	0	467,765
	92	0	31,300	380,035	9	166	0	411,510
	91	0	33,000	302,388	11,754	240	0	347,382
	88	NA	NA	208,328	14,900	747	0	NA
Aluminum (fume or dust)	93	68,565,992	178,718	96,722	7,123	6,890,687	255	75,739,497
	92	19,778,717	174,247	1,742,539	13,691	3,519,425	27,678	25,256,297
	91	9,701,563	310	423,776	13,271	5,974,554	3,963	16,117,437
	88	NA	NA	2,457,125	15,217	14,368,041	12,756	NA
4-Aminoazobenzene	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
4-Aminobiphenyl	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Ammonia	93	9,822,551	30,349	6,452,196	72,597,087	12,977,756	750	101,880,689
	92	8,483,962	106,891	6,587,273	73,255,908	4,008,517	1,040,011	93,482,562
	91	7,295,351	100,788	6,879,332	75,768,562	5,215,250	102,730	95,362,013
	88	NA	NA	2,970,509	27,217,244	3,427,503	273,436	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).39 Continued.

CAS Number40	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
6484-52-2	Ammonium nitrate (solution)	93	219	178,946	1,099,038	7,386,387	35,211,208	6,457,512	50,333,091
		92	223	60,599	1,273,889	6,779,287	37,531,805	2,625,843	48,271,423
		91	230	57,715	1,707,759	7,831,036	32,736,428	8,454,272	50,787,210
		88	217	419,038	2,527,869	8,436,598	67,941,000	15,896,454	95,220,959
7783-20-2	Ammonium sulfate (solution)	93	248	12,029	82,386	3,872,980	6,189,894	2,184,322	12,341,611
		92	274	123,880	111,020	5,132,828	5,705,957	1,834,450	12,908,135
		91	299	19,639	265,457	8,296,454	7,523,816	2,180,675	18,286,041
		88	396	313,237	482,350	71,840,865	520,144,631	13,422,824	606,203,907
62-53-3	Aniline	93	72	232,358	196,005	4,588	1,365,557	1,381	1,799,889
		92	74	181,632	227,372	16,261	1,195,676	1,173	1,622,114
		91	72	130,517	496,659	26,801	1,603,259	1,068	2,258,304
		88	68	323,900	388,869	16,105	3,582,975	12,822	4,324,671
90-04-0	o-Anisidine	93	7	865	12	81	0	116	1,074
		92	8	405	16	107	0	2,167	2,695
		91	7	765	260	187	0	3,800	5,012
		88	6	501	1,792	285	0	250	2,828
104-94-9	p-Anisidine	93	2	5	7	5	0	5	22
		92	3	5	6	5	0	0	16
		91	3	5	8	5	0	0	18
		88	2	0	10	250	0	250	510
120-12-7	Anthracene	93	81	21,733	48,887	589	0	7,150	78,359
		92	85	20,096	46,871	1,034	0	3,070	71,071
		91	90	25,278	44,716	1,158	0	2,374	73,526
		88	138	146,192	55,952	4,382	0	10,856	217,382
7440-36-0	Antimony	93	134	3,529	15,732	10,074	0	81,779	111,114
		92	119	4,994	16,779	7,879	0	10,246	39,898
		91	124	3,964	17,302	1,223	120	5,745	28,354
		88	152	10,789	59,127	11,114	2,100	903,916	987,046
—	Antimony compounds	93	503	33,011	55,372	27,324	3,707	878,961	998,375
		92	516	91,207	123,766	45,488	3,773	1,201,003	1,465,237
		91	487	33,061	57,449	45,679	6,509	1,520,871	1,663,569
		88	267	58,941	106,587	31,178	9,200	1,935,018	2,140,924
7440-38-2	Arsenic	93	100	2,492	31,496	1,643	0	311,263	346,894
		92	41	1,217	4,439	1,236	0	1,799,801	1,806,693
		91	55	3,836	3,734	940	0	1,734,513	1,743,023
		88	78	2,608	5,079	1,282	0	181,267	190,236
—	Arsenic compounds	93	306	8,845	84,494	5,756	52,000	2,250,594	2,401,689
		92	361	10,688	127,132	6,602	33,000	2,452,141	2,629,563
		91	365	25,099	165,363	4,611	23,000	2,690,486	2,908,559
		88	271	43,461	223,791	6,243	27,400	4,946,434	5,247,329
1332-21-4	Asbestos (friable)	93	94	3,899	4,484	255	0	537,783	546,421
		92	100	5,279	5,862	250	0	235,900	247,291
		91	100	5,610	7,202	252	0	546,406	559,470
		88	144	11,043	37,453	10,699	0	2,111,880	2,171,075
7440-39-3	Barium	93	65	68,179	31,880	5,259	0	291,141	396,459
		92	66	61,958	32,286	5,514	0	232,547	332,305
		91	87	94,600	21,801	5,093	0	261,028	382,522
		88	143	174,401	92,410	18,650	0	6,721,686	7,007,147
—	Barium compounds	93	990	242,514	406,128	73,311	2,491	2,610,562	3,335,006
		92	1,021	237,249	405,105	121,687	1,251	4,938,922	5,704,214
		91	1,018	256,825	636,863	101,843	408	4,430,206	5,426,145
		88	624	152,891	872,529	99,428	2,773	5,651,655	6,779,276

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Ammonium nitrate (solution)	93	603,690	0	33,294	4,767,098	2,867,117	0	8,271,199
	92	250	0	70,170	6,856,667	2,394,025	0	9,321,112
	91	740,250	0	557,468	5,984,649	2,457,767	0	9,740,134
	88	NA	NA	671,001	7,678,062	1,539,188	1,670	NA
Ammonium sulfate (solution)	93	1,415,800	0	5,076,407	31,195,284	2,901,806	0	40,589,297
	92	383,870	0	3,311,004	92,436,755	7,577,232	991	103,709,852
	91	400,000	0	6,590,092	47,422,158	498,422	33,971	54,944,643
	88	NA	NA	3,130,312	187,983,379	1,534,654	2,300	NA
Aniline	93	3,400	931,875	540,052	1,483,800	400,262	0	3,359,389
	92	5	942,577	501,482	1,130,509	671,195	0	3,245,768
	91	0	1,632,669	383,469	1,306,755	71,241	2,442	3,396,576
	88	NA	NA	468,311	2,106,510	346,206	16,050	NA
o-Anisidine	93	0	0	0	0	0	0	0
	92	0	0	0	6,811	7	0	6,818
	91	0	0	10	3,395	71	0	3,476
	88	NA	NA	0	768	3	0	NA
p-Anisidine	93	0	0	0	2	0	0	2
	92	0	0	0	15	0	0	15
	91	0	0	0	8	0	0	8
	88	NA	NA	0	0	0	0	NA
Anthracene	93	9,151	139,833	20,603	609	66,249	0	236,445
	92	0	394,934	150,337	598	504,548	250	1,050,667
	91	100	398,793	25,292	597	96,353	0	521,135
	88	NA	NA	73,023	20,419	204,665	1,250	NA
Antimony	93	4,021,535	1,932	4,962	31,194	209,724	0	4,269,347
	92	2,055,778	1,325	53,993	11,617	201,035	2,021	2,325,769
	91	926,915	1,997	11,997	3,228	516,166	12,350	1,472,653
	88	NA	NA	22,979	40,228	568,925	500	NA
Antimony compounds	93	1,971,564	33,443	277,170	67,774	2,762,291	254	5,112,496
	92	5,698,739	11,509	20,576,518	85,094	2,362,725	664	28,735,249
	91	1,963,745	75,810	174,438	88,527	1,752,733	1,621	4,056,874
	88	NA	NA	138,456	67,108	2,181,668	1,450	NA
Arsenic	93	266,124	25	85,479	353	134,851	0	486,832
	92	17,175	5	133,828	457	43,298	0	194,763
	91	152,623	18	160,462	566	464,151	0	777,820
	88	NA	NA	1,020	1,928	62,664	35	NA
Arsenic compounds	93	305,484	8	659,663	683	2,728,552	250	3,694,640
	92	2,610,435	0	3,996,470	899	1,640,990	28,376	8,277,170
	91	951,202	250	391,956	1,389	1,175,945	157	2,520,899
	88	NA	NA	11,887	3,126	1,403,040	9,323	NA
Asbestos (friable)	93	0	0	94,250	757	5,294,318	0	5,389,325
	92	0	0	250	783	6,999,482	0	7,000,515
	91	0	0	33,790	1,707	5,024,698	0	5,060,195
	88	NA	NA	170,934	68,148	11,855,457	1,010,000	NA
Barium	93	45,113	90	3,116	4,528	394,093	0	446,940
	92	31,316	4,516	15,634	4,247	669,993	0	725,706
	91	42,491	4,603	70,296	85,776	557,966	2,400	763,532
	88	NA	NA	89,045	205,209	1,663,835	10,412	NA
Barium compounds	93	1,549,902	216,268	2,606,833	342,594	10,569,706	250	15,285,553
	92	846,379	163,365	1,659,258	498,952	16,017,935	1,014,069	20,199,958
	91	927,689	218,909	2,427,195	2,042,058	16,525,459	30,134	22,171,444
	88	NA	NA	820,370	823,073	16,301,390	290,982	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).39 Continued.

CAS Number40	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
98-87-3	Benzal chloride	93	3	322	11	0	0	0	333
		92	3	956	17	0	0	0	973
		91	3	1,550	11	0	0	0	1,561
		88	3	5,252	6	0	0	0	5,258
55-21-0	Benzamide	93	No Reports Received						
		92	No Reports Received						
		91	No Reports Received						
		88	1	250	250	250	250	0	1,000
71-43-2	Benzene	93	469	6,712,433	4,086,692	18,793	363,660	27,515	11,209,093
		92	474	7,790,380	5,036,035	24,819	355,683	340,636	13,547,553
		91	486	9,764,018	7,996,689	26,970	824,342	111,933	18,723,952
		88	481	20,468,541	11,446,838	46,983	825,035	127,915	32,915,312
92-87-5	Benzidine	93	1	16	0	0	0	0	16
		92	No Reports Received						
		91	No Reports Received						
		88	No Reports Received						
98-07-7	Benzoic trichloride	93	3	5,907	228	0	0	0	6,135
		92	4	5,851	228	0	0	0	6,079
		91	5	7,686	261	0	0	0	7,947
		88	4	24,542	421	0	0	0	24,963
98-88-4	Benzoyl chloride	93	19	11,339	2,147	0	0	11	13,497
		92	19	11,738	1,900	5	0	0	13,643
		91	23	23,446	3,420	5	0	250	27,121
		88	22	28,295	4,719	0	130,000	250	163,264
94-36-0	Benzoyl peroxide	93	57	744	1,250	5	0	2,070	4,069
		92	61	837	1,827	5	0	6,200	8,869
		91	61	648	1,656	5	0	13,205	15,514
		88	50	4,063	2,231	0	5,350	36,050	47,694
100-44-7	Benzyl chloride	93	48	14,196	6,933	41	35	61	21,266
		92	50	25,008	10,099	15	50	43	35,215
		91	50	18,189	8,934	15	20	0	27,158
		88	51	30,689	12,640	640	0	500	44,469
7440-41-7	Beryllium	93	9	3	900	24	0	14,594	15,521
		92	8	1	1,867	39	0	21,358	23,265
		91	8	6	1,372	101	0	29,023	30,502
		88	12	550	2,213	74	0	37,000	39,837
—	Beryllium compounds	93	8	2	361	4	0	8,087	8,454
		92	6	0	511	5	0	48,000	48,516
		91	4	1	241	9	0	30,000	30,251
		88	6	1	861	17	0	12,000	12,879
92-52-4	Biphenyl	93	146	614,887	137,550	4,673	46,966	6,803	810,879
		92	156	667,765	145,877	9,703	49,127	4,622	877,094
		91	164	682,014	189,929	18,704	47,318	29,912	967,877
		88	180	630,991	579,701	88,197	82,760	222,297	1,603,946
111-44-4	Bis(2-chloroethyl) ether	93	12	12,783	408	6	0	0	13,197
		92	12	2,673	514	5	0	0	3,192
		91	12	2,950	594	0	0	0	3,544
		88	8	4,322	600	1,351	0	0	6,273
542-88-1	Bis(chloromethyl) ether	93	2	5	250	0	0	0	255
		92	3	3	306	0	0	0	309
		91	3	2	572	0	0	0	574
		88	2	1	0	0	0	0	1

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Benzal chloride	93	0	44,000	0	0	0	0	44,000
	92	0	34,000	4,343	0	0	0	38,343
	91	0	35,000	0	0	0	0	35,000
	88	NA	NA	95,878	0	7,308	0	NA
Benzamide	93	No Reports Received						
	92	No Reports Received						
	91	No Reports Received						
	88	NA	NA	0	0	750	0	NA
Benzene	93	1,101,028	1,094,354	1,764,985	308,621	90,863	0	4,359,851
	92	421,221	2,323,983	2,233,359	418,050	93,583	931,612	6,421,808
	91	353,207	3,675,285	1,654,752	615,849	141,169	385	6,440,647
	88	NA	NA	1,891,649	1,166,722	396,880	7,430	3,462,681
Benzidine	93	0	0	0	0	0	0	0
	92	No Reports Received						
	91	No Reports Received						
	88	No Reports Received		0				
Benzoic trichloride	93	0	0	251	0	0	0	251
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	12,795	0	9,777	0	NA
Benzoyl chloride	93	0	4,906	956,298	400	250	0	961,854
	92	0	0	385,832	175	0	0	386,007
	91	0	18,421	493,270	230	0	0	511,921
	88	NA	NA	358,570	180	2,399	0	NA
Benzoyl peroxide	93	5,050	2,842	9,141	19,504	11,966	0	48,503
	92	6,400	2,422	16,834	38,327	9,337	0	73,320
	91	11,000	911	62,192	17,192	5,860	0	97,155
	88	NA	NA	38,600	69,946	23,954	0	NA
Benzyl chloride	93	0	310,991	485	11,106	210	0	322,792
	92	0	260,011	38,381	25,331	220	0	323,943
	91	0	200,005	73,051	28,749	205	0	302,010
	88	NA	NA	89,160	41,553	9,687	0	NA
Beryllium	93	121,104	0	539	0	4,619	0	126,262
	92	7,282	0	743	0	14,094	0	22,119
	91	77,731	10	245	0	117,582	0	195,568
	88	NA	NA	3	4	3,155	0	NA
Beryllium compounds	93	31,655	0	883	0	2,359	0	34,897
	92	18,485	0	438	250	4,050	0	23,223
	91	7,135	0	1,081	0	1,800	0	10,016
	88	NA	NA	1,391	3	7,150	0	NA
Biphenyl	93	134,519	354,373	159,788	794,830	31,969	0	1,475,479
	92	421,966	412,944	226,022	1,006,751	32,822	0	2,100,505
	91	179,826	321,354	184,796	866,278	43,714	300	1,596,268
	88	NA	NA	252,521	1,446,614	227,492	0	NA
Bis(2-chloroethyl) ether	93	170,971	100	10,381	7,089	180	0	188,721
	92	0	140	57,031	10,949	3	0	68,123
	91	0	350	447,600	15,841	0	0	463,791
	88	NA	NA	27,265	9,621	0	0	NA
Bis(chloromethyl) ether	93	0	0	0	0	2	0	2
	92	0	0	0	0	1	0	1
	91	0	0	0	0	2	0	2
	88	NA	NA	0	0	0	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).(39) Continued.

CAS Number(40)	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
108-60-1	Bis(2-chloro-1-methyl-ethyl)ether	93	2	2,670	2,886	3,000	0	84	8,640
		92	2	8,000	1,430	1,900	0	0	11,330
		91	2	9,700	1,520	1,800	0	0	13,020
		88	2	7,944	15	30,000	0	0	37,959
103-23-1	Bis(2-ethylhexyl) adipate	93	142	149,425	294,018	887	0	183,541	627,871
		92	122	80,321	180,947	1,628	0	107,291	370,187
		91	117	76,445	80,421	90	0	81,715	238,671
		88	73	25,789	66,788	10,440	0	1,200	104,217
75-25-2	Bromoform	93	No Reports Received						
		92	1	11,120	5	0	4,500	0	15,625
		91	3	150	0	0	1,900	0	2,050
		88	2	0	0	8,600	0	0	8,600
74-83-9	Bromomethane	93	50	641,088	2,538,074	760	1,100	0	3,181,022
		92	49	528,321	2,485,671	390	1,000	0	3,015,382
		91	50	448,440	2,602,625	0	1,000	0	3,052,065
		88	35	416,777	2,356,018	0	1,546	0	2,774,341
106-99-0	1,3-Butadiene	93	175	2,219,657	1,054,659	7,595	1,000	350	3,283,261
		92	182	2,229,782	1,633,982	1,364	1,000	372	3,866,500
		91	182	2,055,887	1,896,672	5,049	0	8,881	3,966,489
		88	157	4,056,939	2,945,269	522,504	1,500	7,817	7,534,029
141-32-2	Butyl acrylate	93	167	158,778	160,384	774	0	52	319,988
		92	164	184,349	158,966	2,261	0	834	346,410
		91	162	152,313	141,433	1,273	0	55	295,074
		88	167	165,197	246,676	3,528	10	602	416,013
71-36-3	n-Butyl alcohol	93	1,152	6,792,330	22,002,423	57,472	1,942,044	17,057	30,811,326
		92	1,182	7,272,639	22,742,111	35,429	2,324,731	57,220	32,432,130
		91	1,173	7,365,365	23,204,477	257,717	4,382,276	83,111	35,292,946
		88	1,104	8,912,292	28,644,291	127,860	1,706,660	175,459	39,566,562
78-92-2	sec-Butyl alcohol	93	110	209,498	492,870	4,724	0	9	707,101
		92	120	211,057	461,573	15,705	25,450	762	714,547
		91	122	233,537	409,813	4,486	170,000	14	817,850
		88	92	400,126	697,037	122,291	0	2,600	1,222,054
75-65-0	tert-Butyl alcohol	93	68	1,207,843	435,984	174,289	305,700	349	2,124,165
		92	75	1,246,893	427,449	147,629	640,123	14	2,462,108
		91	73	763,404	424,303	130,806	827,562	497	2,146,572
		88	54	1,207,440	366,697	14,989	674,798	818	2,264,742
85-68-7	Butyl benzyl phthalate	93	176	89,830	266,510	657	83	2,938	360,018
		92	181	151,970	188,807	961	0	6,109	347,847
		91	179	109,589	195,276	1,177	0	75,866	381,908
		88	141	45,407	245,853	802	480	16,682	309,224
106-88-7	1,2-Butylene oxide	93	15	14,297	6,019	26	0	0	20,342
		92	18	59,828	15,024	5,773	0	0	80,625
		91	23	48,928	10,836	3,490	0	5	63,259
		88	18	34,973	64,958	3,500	0	250	103,681
123-72-8	Butyraldehyde	93	30	170,227	168,053	559	189,447	8,606	536,892
		92	26	214,563	283,946	470	128,051	256	627,286
		91	20	145,671	251,829	575	144,427	28	542,530
		88	25	681,504	1,506,288	3,812	1,997	31	2,193,632
569-64-2	C.I. Basic Green 4	93	3	0	5	0	0	0	5
		92	6	5	5	40	0	0	50
		91	5	6	6	14	0	0	26
		88	6	500	250	0	0	0	750

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
Bis(2-chloro-1-methyl-ethyl)ether	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Bis(2-ethylhexyl) adipate	93	164,476	164,269	18,125	12,413	528,190	0	887,473
	92	135,434	274,379	23,538	20,456	290,126	0	743,933
	91	16,709	107,088	97,926	22,465	211,468	0	455,656
	88	NA	NA	97,289	49,659	79,800	29,617	NA
Bromoform	93	No Reports Received						
	92	0	0	6,400	0	195,005	0	201,405
	91	0	0	250	0	99,300	0	99,550
	88	NA	NA	0	0	0	0	NA
Bromomethane	93	0	3,300	500	0	5	0	3,805
	92	0	3,500	255	0	250	0	4,005
	91	121,000	420	320	0	15	0	121,755
	88	NA	NA	0	0	0	0	NA
1,3-Butadiene	93	7,473,983	6,574	102,713	8,439	4,893	0	7,596,602
	92	18,386,640	177,839	194,778	20,583	7,666	0	18,787,506
	91	877,090	377,354	124,385	11,650	4,602	0	1,395,081
	88	NA	NA	178,855	44,874	185,398	1,934	NA
Butyl acrylate	93	67,843	77,856	80,493	114,605	69,966	0	410,763
	92	12,572	34,905	59,628	190,144	23,350	0	320,599
	91	114,618	125,830	38,736	138,351	15,098	0	432,633
	88	NA	NA	585,394	34,604	18,766	525	NA
n-Butyl alcohol	93	2,231,523	9,165,824	1,766,836	1,519,267	314,789	24,501	15,022,740
	92	2,555,470	8,118,436	2,961,183	2,070,978	501,385	48,427	16,255,879
	91	2,929,991	6,741,623	3,350,347	2,086,131	296,197	30,083	15,434,372
	88	NA	NA	6,840,899	4,524,613	924,519	424,570	NA
sec-Butyl alcohol	93	62,960	5,305,314	37,466	45,684	155,290	0	5,606,714
	92	3,025	4,844,222	100,138	11,880	6,662	0	4,965,927
	91	25,317	3,904,139	27,216	14,464	1,723	0	3,972,859
	88	NA	NA	74,574	41,108	21,351	134,802	NA
tert-Butyl alcohol	93	18,324	30,784,513	649,218	1,075,164	274,832	0	32,802,051
	92	3,058	27,916,993	353,220	2,040,472	63,908	0	30,377,651
	91	0	26,207,749	326,204	1,340,027	788,849	0	28,662,829
	88	NA	NA	328,523	1,539,726	56,502	110,250	NA
Butyl benzyl phthalate	93	156,548	114,767	193,712	17,171	1,972,538	0	2,454,736
	92	58,054	133,724	245,537	27,237	409,326	0	873,878
	91	99,372	126,638	151,125	40,829	320,803	0	738,767
	88	NA	NA	337,119	44,235	726,946	6,230	NA
1,2-Butylene oxide	93	0	373,210	16	0	0	0	373,226
	92	0	354,320	0	6,059	0	0	360,379
	91	10	326,019	907	5	0	0	326,941
	88	NA	NA	250	0	898	0	NA
Butyraldehyde	93	450	479,072	7,079	132,237	1,716	0	620,554
	92	5,850	3,839	3,804	250,480	11	0	263,984
	91	0	911	2,083	260,475	388	0	263,857
	88	NA	NA	6,197	371,633	117,741	0	NA
C.I. Basic Green 4	93	0	0	499	83	0	0	582
	92	0	0	499	3,006	3,025	0	6,530
	91	0	0	0	18,132	1,995	499	20,626
	88	NA	NA	0	1,320	250	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39] Continued.

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
989-38-8	C.I. Basic Red 1	93	2	0	0	0	0	0	0
		92	1	0	0	0	0	0	0
		91	1	0	0	0	0	375	375
		88	No Reports Received						
2832-40-8	C.I. Disperse Yellow 3	93	2	399	0	28	0	9,199	9,626
		92	3	428	0	23	0	780	1,231
		91	2	336	0	26	0	782	1,144
		88	1	398	0	302	0	0	700
81-88-9	C.I. Food Red 15	93	2	0	1	0	0	0	1
		92	3	0	2	0	0	0	2
		91	4	0	1	0	0	0	1
		88	2	250	0	0	0	0	250
97-56-3	C.I. Solvent Yellow 3	93	1	0	0	0	0	0	0
		92	No Reports Received						
		91	2	0	5	0	0	0	5
		88	1	250	0	0	0	0	250
842-07-9	C.I. Solvent Yellow 14	93	No Reports Received						
		92	1	0	0	0	0	0	0
		91	No Reports Received						
		88	2	0	0	0	0	0	0
7440-43-9	Cadmium	93	52	2,031	13,259	412	0	56,665	72,367
		92	55	2,295	6,461	638	0	11,739	21,133
		91	62	1,612	2,841	661	0	2,753	7,867
		88	90	9,300	13,130	2,598	0	94,602	119,630
—	Cadmium compounds	93	125	7,443	39,401	652	977	66,699	115,172
		92	131	11,344	48,971	780	1,211	65,407	127,713
		91	155	16,067	51,479	3,581	1,540	248,354	321,021
		88	116	23,099	77,163	1,799	2,409	295,127	399,597
156-62-7	Calcium cyanamide	93	6	0	5	0	0	5	10
		92	6	8,000	405	0	0	30,005	38,410
		91	6	12,000	625	0	0	40,005	52,630
		88	2	12,000	600	0	0	66,000	78,600
133-06-2	Captan	93	16	1,896	4,775	5	0	5	6,681
		92	20	1,647	5,189	10	5,000	10	11,856
		91	22	1,883	5,233	260	4,500	260	12,136
		88	18	4,066	10,803	750	5,100	1,000	21,719
63-25-2	Carbaryl	93	22	3,024	5,947	15	0	265	9,251
		92	22	2,525	7,172	15	0	265	9,977
		91	26	2,022	4,825	260	0	1,170	8,277
		88	23	2,515	5,408	877	0	500	9,300
75-15-0	Carbon disulfide	93	81	3,333,231	89,974,108	34,169	2,805	8	93,344,321
		92	87	2,668,187	90,241,575	45,087	2,704	21	92,957,574
		91	91	2,659,520	86,862,215	58,634	2,835	260	89,583,464
		88	89	3,139,255	120,974,449	39,501	13,400	43,436	124,210,041
56-23-5	Carbon tetrachloride	93	74	585,481	1,643,428	1,453	34,332	79	2,264,773
		92	90	418,493	973,585	2,444	45,984	333	1,440,839
		91	102	528,622	1,019,252	2,844	42,470	2,152	1,595,340
		88	96	1,084,552	2,694,101	15,627	98,054	14,759	3,907,093
463-58-1	Carbonyl sulfide	93	37	8,998	12,780,099	0	0	0	12,789,097
		92	38	4,460	18,032,606	0	0	0	18,037,066
		91	36	5,627	21,445,281	0	0	0	21,450,908
		88	36	7,643	24,981,879	750	0	0	24,990,272

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
C.I. Basic Red 1	93	0	230	0	24	670	0	924
	92	0	309	0	0	382	0	691
	91	0	271	0	0	375	0	646
	88	No Reports Received						
C.I. Disperse Yellow 3	93	0	0	0	3,150	1,658	0	4,808
	92	0	0	0	755	286	0	1,041
	91	0	0	0	0	125	0	125
	88	NA	NA	0	0	899	0	NA
C.I. Food Red 15	93	0	0	0	1,100	0	0	1,100
	92	0	0	0	1,700	0	0	1,700
	91	0	5	0	1,400	0	0	1,405
	88	NA	NA	0	0	0	0	NA
C.I. Solvent Yellow 3	93	0	0	0	0	0	0	0
	92	No Reports Received						
	91	0	0	10	0	0	0	10
	88	NA	NA	0	0	0	0	NA
C.I. Solvent Yellow 14	93	No Reports Received						
	92	0	0	0	0	0	0	0
	91	No Reports Received						
	88	NA	NA	0	0	0	0	NA
Cadmium	93	709,561	0	34,162	2,156	42,434	0	788,313
	92	227,783	0	76,146	2,502	101,049	107	407,587
	91	126,608	813	68,398	3,099	560,518	4,804	764,240
	88	NA	NA	83,296	7,894	131,879	2,441	NA
Cadmium compounds	93	1,471,988	1,142	157,551	2,788	3,138,540	0	4,772,009
	92	1,819,291	3,302	433,362	43,292	279,798	11,527	2,590,572
	91	2,136,760	6,667	293,424	5,460	355,591	36,801	2,834,703
	88	NA	NA	86,534	13,719	982,418	500	NA
Calcium cyanamide	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Captan	93	0	0	6,184	29	2,436	0	8,649
	92	0	0	4,095	255	5,087	0	9,437
	91	0	0	3,755	255	12,748	0	16,758
	88	NA	NA	511	250	12,434	750	NA
Carbaryl	93	0	0	18,834	1	16,031	0	34,866
	92	0	0	10,777	0	30,268	0	41,045
	91	0	0	9,937	0	6,032	0	15,969
	88	NA	NA	27,582	171	6,198	0	NA
Carbon disulfide	93	5,098	248,766	64,510	226,215	1,329	0	545,918
	92	0	209,574	16,535	193,442	1,718	0	421,269
	91	33,804	436,590	69,728	193,658	3,746	0	737,526
	88	NA	NA	154,315	159,369	58,473	0	NA
Carbon tetrachloride	93	111,626	4,109	920,808	1,675	121,363	0	1,159,581
	92	345,452	24,455	839,388	1,054	11,955	0	1,222,304
	91	390,625	11,061	939,479	621	39,111	1,684	1,382,581
	88	NA	NA	1,300,058	5,014	49,703	250	NA
Carbonyl sulfide	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).(39) Continued.

CAS Number(40)	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
120-80-9	Catechol	93	121	578	1,572	52,798	0	4,606	59,554
		92	133	9,925	917	219,164	3,507	49,656	283,169
		91	134	4,328	1,841	238,390	0	44,654	289,213
		88	112	2,388	1,341	399,638	0	84,265	487,632
133-90-4	Chloramben	93	No Reports Received						
		92	No Reports Received						
		91	No Reports Received						
		88	1	250	1,168	250	0	0	1,668
57-74-9	Chlordane	93	1	51	0	15	0	0	66
		92	2	1,713	0	1	0	0	1,714
		91	3	1,248	179	1	0	0	1,428
		88	2	2,695	3	4	4,262	0	6,964
7782-50-5	Chlorine	93	1,504	1,284,028	74,126,080	675,121	120,758	49,012	76,254,999
		92	1,540	1,642,302	68,660,181	967,241	48,252	46,176	71,364,152
		91	1,635	1,728,400	74,859,972	763,535	72,551	78,264	77,502,722
		88	1,797	4,701,596	129,402,766	6,615,540	107,624	428,097	141,255,623
10049-04-4	Chlorine dioxide	93	132	27,090	1,537,027	251	0	0	1,564,368
		92	129	60,495	3,013,566	761	0	6	3,074,828
		91	129	146,158	3,792,614	13,760	0	120	3,952,652
		88	122	1,277,546	12,076,241	2,350	0	41,000	13,397,137
79-11-8	Chloroacetic acid	93	29	5,788	767	8,719	0	750	16,024
		92	31	10,778	1,024	3,199	0	0	15,001
		91	36	60,745	446,920	1,696	0	123,675	633,036
		88	37	21,660	5,159	850	10	0	27,679
532-27-4	2-Chloroacetophenone	93	No Reports Received						
		92	No Reports Received						
		91	1	1	1	0	0	0	2
		88	No Reports Received						
108-90-7	Chlorobenzene	93	71	1,032,928	1,015,531	3,511	71,000	678	2,123,648
		92	64	1,124,324	1,188,651	20,799	72,000	817	2,406,591
		91	65	1,225,868	1,281,273	5,165	177,032	1,534	2,690,872
		88	66	2,032,791	2,343,096	98,354	84,457	4,127	4,562,825
75-00-3	Chloroethane	93	53	1,237,605	1,441,896	2,231	110	33	2,681,875
		92	50	1,533,378	1,224,260	1,957	210	0	2,759,805
		91	49	1,397,212	1,466,057	16,078	300	10	2,879,657
		88	49	2,148,225	2,555,010	27,448	1,510	0	4,732,193
67-66-3	Chloroform	93	175	4,488,694	9,319,998	451,362	38,039	32,926	14,331,019
		92	180	6,023,765	10,998,651	654,314	50,240	28,568	17,755,538
		91	183	7,729,012	11,534,369	764,712	65,089	22,155	20,115,337
		88	170	7,618,276	18,315,290	1,131,584	36,002	68,544	27,169,696
74-87-3	Chloromethane	93	94	1,217,748	4,095,061	59,565	93,947	266	5,466,587
		92	94	1,337,712	4,334,805	41,750	86,709	0	5,800,976
		91	94	1,443,508	4,283,723	115,318	192,600	0	6,035,149
		88	80	3,431,108	8,315,962	115,985	165,250	0	12,028,305
107-30-2	Chloromethyl methyl ether	93	4	20	2,221	5	0	0	2,246
		92	3	35	1,186	10	0	0	1,231
		91	3	30	3,305	0	0	0	3,335
		88	4	33	3,000	0	0	0	3,033
—	Chlorophenols	93	6	1,964	7,942	34	106,436	0	116,376
		92	9	3,226	6,057	290	133,204	0	142,777
		91	10	3,368	968	782	229,798	56	234,972
		88	9	2,154	419	272	71,554	0	74,399

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Catechol	93	0	33,825	6,151	64,122	841	0	104,939
	92	31	1,526	76,354	154,358	29,092	0	261,361
	91	50	35,305	39,630	237,081	37,401	0	349,467
	88	NA	NA	14,744	245,399	89,474	250	NA
Chloramben	93	No Reports Received						
	92	No Reports Received						
	91	No Reports Received						
	88	NA	NA	0	0	1,159	0	NA
Chlordane	93	0	0	11	51	0	0	62
	92	0	0	638	86	0	0	724
	91	0	0	292	69	0	0	361
	88	NA	NA	74,170	23	0	6,639	NA
Chlorine	93	1,413,177	10,514	318,102	866,133	15,866	0	2,623,792
	92	714,632	23	228,440	864,198	30,705	0	1,837,998
	91	621,626	5	402,410	940,797	57,594	39,020	2,061,452
	88	NA	NA	2,995,507	3,141,077	1,003,531	0	NA
Chlorine dioxide	93	0	0	0	880	0	0	880
	92	0	0	0	1,083	0	0	1,083
	91	0	0	0	14,783	0	0	14,783
	88	NA	NA	0	2,650	41,750	0	NA
Chloroacetic acid	93	0	400	1,026	1,433	793	0	3,652
	92	0	0	502	1,792	1,080	1,565	4,939
	91	0	0	4,490	3,279	1,954	0	9,723
	88	NA	NA	6,900	10,727	2,506	0	NA
2-Chloroacetophenone	93	No Reports Received						
	92	No Reports Received						
	91	0	0	0	0	0	0	0
	88	No Reports Received						
Chlorobenzene	93	1,401,667	643,725	2,612,970	8,558	4,965	0	4,671,885
	92	845,468	849,084	3,733,223	22,055	51,985	0	5,501,815
	91	854,720	869,603	3,769,914	15,346	105,184	0	5,614,767
	88	NA	NA	4,925,431	578,774	117,624	0	NA
Chloroethane	93	161,718	21,933	395,391	255	0	0	579,297
	92	221,447	15,655	172,176	10	1	0	409,289
	91	140,250	24,440	310,731	5	0	0	475,426
	88	NA	NA	430,600	0	32,260	0	NA
Chloroform	93	435,332	69,463	1,821,397	603,115	73,348	0	3,002,655
	92	1,417,848	765,445	918,504	553,650	41,510	3	3,696,960
	91	2,077,870	255,288	1,755,827	803,997	134,212	3	5,027,197
	88	NA	NA	1,204,786	1,226,573	144,771	20,365	NA
Chloromethane	93	0	57,355	163,661	3,442	1,446	0	225,904
	92	7,000	31,308	225,152	84,895	1,323	0	349,678
	91	52,663	14,910	2,807,970	73,961	3,061	0	2,952,565
	88	NA	NA	45,292	54,223	59,140	0	NA
Chloromethyl methyl ether	93	0	0	0	0	70	0	70
	92	0	0	0	0	70	0	70
	91	0	0	0	0	35	0	35
	88	NA	NA	0	0	0	0	NA
Chlorophenols	93	0	0	36,088	279	751	0	37,118
	92	0	0	3,988	580	250	0	4,818
	91	0	4,493	104,388	1,330	0	0	110,211
	88	NA	NA	1,970,910	2,650	2	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39] Continued.

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
126-99-8	Chloroprene	93	14	191,316	799,794	47	29,000	3,018	1,023,175
		92	11	152,543	1,344,852	47	54,000	1,811	1,553,253
		91	12	103,489	1,367,033	124	71,000	137,011	1,678,657
		88	13	234,228	1,713,780	287	68,792	0	2,017,087
1897-45-6	Chlorothalonil	93	21	1,295	4,920	9	0	250	6,474
		92	16	3,185	2,695	6	0	12,250	18,136
		91	20	1,921	1,330	13	0	0	3,264
		88	10	19,455	9,021	250	0	0	28,726
7440-47-3	Chromium	93	1,693	288,532	137,666	21,960	269	1,157,200	1,605,627
		92	1,575	344,435	114,575	22,569	333	962,530	1,444,442
		91	1,554	292,819	109,720	17,315	531	1,202,911	1,623,296
		88	1,217	367,788	194,979	74,941	2,249	9,280,857	9,920,814
—	Chromium compounds	93	1,414	118,238	285,978	228,475	42,493	22,675,748	23,350,932
		92	1,470	130,483	334,025	263,134	32,137	23,194,379	23,954,158
		91	1,500	144,426	434,227	335,808	34,603	24,757,811	25,706,875
		88	1,198	259,937	507,512	323,027	52,653	30,934,406	32,077,535
7440-48-4	Cobalt	93	235	18,035	15,788	7,283	0	15,843	56,949
		92	210	16,503	13,848	2,242	500	6,500	39,593
		91	229	29,093	42,855	4,294	0	13,706	89,948
		88	173	22,434	21,316	16,743	0	213,204	273,697
—	Cobalt compounds	93	204	6,160	20,341	96,644	2,375	107,786	233,306
		92	207	7,832	23,304	99,288	18,420	166,724	315,568
		91	212	8,001	26,453	78,643	19,949	126,301	259,347
		88	150	11,081	45,329	63,662	18,500	39,210	177,782
7440-50-8	Copper	93	2,458	280,578	918,155	43,389	22,927	1,475,614	2,740,663
		92	2,377	489,005	1,038,187	40,993	16,736	12,747,956	14,332,877
		91	2,413	366,213	877,413	56,180	14,011	15,443,500	16,757,317
		88	1,930	319,886	1,202,419	115,631	15,651	10,466,175	12,119,762
—	Copper compounds	93	1,435	4,000,737	3,200,332	92,540	228,924	40,082,409	47,604,942
		92	1,465	3,579,244	2,736,995	79,704	201,431	34,490,286	41,087,660
		91	1,446	2,389,217	1,891,835	160,018	224,560	41,829,665	46,495,295
		88	1,032	2,335,430	821,016	185,292	165,957	29,683,607	33,191,302
120-71-8	p-Cresidine	93	5	285	125	5	0	85	500
		92	5	240	100	5	0	255	600
		91	5	160	68	5	0	250	483
		88	6	5,400	1,680	250	0	750	8,080
1319-77-3	Cresol (mixed isomers)	93	118	201,711	323,764	2,931	903,402	1,431	1,433,239
		92	117	200,443	298,625	2,747	614,578	1,097	1,117,490
		91	122	349,495	391,768	3,661	749,531	2,528	1,496,983
		88	111	400,427	378,678	6,764	1,804,060	4,762	2,594,691
108-39-4	m-Cresol	93	20	30,178	5,958	626	520,000	0	556,762
		92	19	51,679	5,100	220	450,000	0	506,999
		91	24	66,736	11,098	445	560,000	10	638,289
		88	15	5,860	12,572	283	0	455	19,170
95-48-7	o-Cresol	93	22	13,201	153,999	158	560,000	122	727,480
		92	22	20,426	3,061	14	490,000	3	513,504
		91	28	29,218	31,557	11	550,000	4,860	615,646
		88	29	45,563	44,236	448	1	1,667	91,915
106-44-5	p-Cresol	93	21	21,473	3,831	293	262,000	24	287,621
		92	22	36,611	3,777	943	232,900	1,513	275,744
		91	24	45,103	90,084	2,046	252,200	3,259	392,692
		88	18	6,286	634,417	1,143	152,000	62,291	856,137

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Chloroprene	93	500,444	121,297	200,869	18,506	5,295	0	846,411
	92	1,384,119	19,200	193,907	22,912	2,709	0	1,622,847
	91	1,707,168	3,700	168,345	35,000	3,241	0	1,917,454
	88	NA	NA	18,749	62,000	0	0	NA
Chlorothalonil	93	625	0	3,632	281	206,386	0	210,924
	92	1,100	0	4,119	269	175,978	0	181,466
	91	0	653	6,412	293	204,538	0	211,896
	88	NA	NA	3,660	541	396,274	0	NA
Chromium	93	82,208,414	3,582	857,598	86,085	6,802,575	63,774	90,022,028
	92	70,840,181	2,065	1,332,626	135,173	4,481,177	525,595	77,316,817
	91	45,490,724	6,956	986,807	140,183	5,335,184	183,893	52,143,747
	88	NA	NA	1,207,535	414,167	10,381,558	593,142	NA
Chromium compounds	93	41,866,804	27,479	16,558,993	357,376	10,638,488	25,443	69,474,583
	92	28,334,099	87,900	2,433,113	811,948	10,177,647	68,353	41,913,060
	91	23,301,531	116,978	2,788,333	800,597	10,673,751	410,547	38,091,737
	88	NA	NA	2,660,428	1,666,701	11,571,388	386,049	NA
Cobalt	93	6,859,454	0	33,759	16,801	133,125	23,014	7,066,153
	92	4,895,818	4,111	24,129	11,919	115,318	250	5,051,545
	91	5,442,946	4	29,292	9,883	533,093	12	6,015,230
	88	NA	NA	27,673	8,843	223,636	0	NA
Cobalt compounds	93	2,022,301	517	74,904	22,785	498,888	0	2,619,395
	92	1,446,723	11,289	73,869	14,389	350,730	76	1,897,076
	91	1,591,861	2,812	120,116	15,724	235,658	25	1,966,196
	88	NA	NA	88,079	28,369	253,828	263	NA
Copper	93	464,081,201	27,043	761,168	149,862	6,127,156	124,314	471,270,744
	92	356,108,282	2,350	1,756,003	146,087	12,969,755	2,248,166	373,230,643
	91	314,468,620	3,818	2,597,833	164,173	12,810,036	1,867,184	331,911,664
	88	NA	NA	4,065,644	312,088	15,105,980	1,270,988	NA
Copper compounds	93	120,508,266	59,283	2,938,449	217,399	11,941,318	173,820	135,838,535
	92	107,892,612	119,463	3,794,404	246,059	6,444,292	325,897	118,822,727
	91	98,501,639	42,455	1,968,820	213,796	6,653,901	194,512	107,575,123
	88	NA	NA	5,931,394	433,514	11,856,762	1,523,862	NA
p-Cresidine	93	0	0	1,400	28,223	0	0	29,623
	92	0	0	0	23,780	4,500	0	28,280
	91	0	0	1	18,368	2,680	0	21,049
	88	NA	NA	0	37,750	4,700	0	NA
Cresol (mixed isomers)	93	155,838	383,627	164,844	46,325	25,072	1,000	776,706
	92	38,462	329,156	207,196	40,759	22,891	0	638,464
	91	107,081	256,262	252,876	25,056	6,563	0	647,838
	88	NA	NA	847,303	358,242	483,738	8,738	NA
m-Cresol	93	270,000	9,373	51,380	9,654	15,386	0	355,793
	92	888	45,117	20,963	7,496	23,021	0	97,485
	91	490	9,622	39,458	11,918	23,451	0	84,939
	88	NA	NA	125,737	7,165	13,503	0	NA
o-Cresol	93	0	7,205	11,706	40,942	6,632	0	66,485
	92	0	28,607	4,529	33,565	13,382	0	80,083
	91	258	4,342	18,922	55,341	12,004	0	90,867
	88	NA	NA	75,565	40,703	12,458	2,500	NA
p-Cresol	93	160,000	79,736	23,124	868,509	8,086	0	1,139,455
	92	0	163,747	21,716	672,069	12,310	0	869,842
	91	0	28,829	24,251	1,062,305	16,349	0	1,131,734
	88	NA	NA	26,377	744,568	643	250	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39] Continued.

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
98-82-8	Cumene	93	236	1,238,681	1,300,413	1,148	17,062	950	2,558,254
		92	219	1,409,604	2,480,809	2,250	15,100	783	3,908,546
		91	218	1,274,680	2,419,094	2,027	9,189	21,757	3,726,747
		88	117	2,156,139	2,910,301	3,201	30,165	8,591	5,108,397
80-15-9	Cumene hydroperoxide	93	38	74,360	18,096	196	380,000	4,271	476,923
		92	38	66,077	13,221	217	259,000	1,839	340,354
		91	42	111,935	17,922	242	422,600	240	552,939
		88	40	178,787	13,736	1,784	371,000	250	565,557
135-20-6	Cupferron	93	2	28	31	0	0	0	59
		92	1	0	10	0	0	0	10
		91	2	0	1,200	0	0	0	1,200
		88	4	140	780	0	0	0	920
—	Cyanide compounds	93	252	56,544	842,184	97,666	2,288,870	6,043	3,291,307
		92	257	80,916	974,494	83,354	2,963,579	12,936	4,115,279
		91	276	61,844	808,287	111,665	3,781,837	22,163	4,785,796
		88	391	525,618	721,775	194,662	3,707,326	107,208	5,256,589
110-82-7	Cyclohexane	93	336	4,603,824	5,494,004	26,842	260,344	10,218	10,395,232
		92	354	5,087,803	8,509,578	26,734	230,984	107,748	13,962,847
		91	355	6,742,992	9,885,827	12,851	591,703	27,762	17,261,135
		88	302	4,933,531	8,722,441	20,258	334,471	38,190	14,048,891
94-75-7	2,4-D (acetic acid)	93	27	5,589	3,213	184	750	55	9,791
		92	27	3,292	3,493	262	1,200	15,302	23,549
		91	30	10,049	6,161	262	1,291	13,260	31,023
		88	28	3,289	3,731	549	3,789	38,000	49,358
1163-19-5	Decabromodiphenyl oxide	93	126	23,358	179,502	2,181	39	504,841	709,921
		92	128	12,190	25,027	3,878	285	529,340	570,720
		91	119	21,947	26,043	3,817	38	220,075	271,920
		88	58	7,500	22,104	500	292	21,450	51,846
615-05-4	2,4-Diaminoanisole	93	1	0	13	0	0	0	13
		92	No Reports Received						
		91	1	0	0	0	0	0	0
		88	1	0	0	0	0	0	0
39156-41-7	2,4-Diaminoanisole sulfate	93	No Reports Received						
		92	No Reports Received						
		91	1	0	0	0	0	0	0
		88	1	0	0	0	0	0	0
101-80-4	4,4'-Diaminodiphenyl ether	93	5	8	111	2,137	0	5	2,261
		92	5	5	264	312	0	0	581
		91	5	7	697	337	0	0	1,041
		88	5	0	216	585	0	0	801
25376-45-8	Diaminotoluene (mixed isomers)	93	12	12,501	4,863	989	28,000	113	46,466
		92	11	13,913	4,570	695	10,000	85	29,263
		91	12	17,963	2,620	1,110	24,000	10	45,703
		88	13	15,202	5,895	3,288	174,000	295	198,680
95-80-7	2,4-Diaminotoluene	93	4	263	1,527	0	0	0	1,790
		92	4	1,150	755	5	0	0	1,910
		91	4	3,800	10	250	0	0	4,060
		88	2	2,900	88	250	0	0	3,238
132-64-9	Dibenzofuran	93	44	16,336	11,843	10	0	911	29,100
		92	44	16,648	13,456	260	0	211	30,575
		91	52	18,434	21,608	505	0	1,720	42,267
		88	110	46,687	24,406	1,510	0	9,929	82,532

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
Cumene	93	90,372	879,065	83,250	69,289	12,089	0	1,134,065
	92	49,393	661,008	60,702	42,645	18,072	0	831,820
	91	80,857	716,963	56,032	163,552	16,392	0	1,033,796
	88	NA	NA	126,382	203,279	80,075	0	NA
Cumene hydroperoxide	93	0	706	4,316	592	15,687	0	21,301
	92	0	255	1,790	260	42,686	0	44,991
	91	0	2,101	7,423	265	25,465	0	35,254
	88	NA	NA	2,572	5,250	22,944	0	NA
Cupferron	93	0	0	2,300	56	0	0	2,356
	92	0	0	0	69	0	0	69
	91	0	0	0	1,200	0	0	1,200
	88	NA	NA	4,275	780	0	0	NA
Cyanide compounds	93	24,600	2,008	325,721	99,903	149,034	500	601,766
	92	94,518	250	376,909	87,697	254,652	2,200	816,226
	91	82,410	250	443,986	121,205	257,769	12,390	918,010
	88	NA	NA	1,964,458	1,152,491	581,430	150,909	NA
Cyclohexane	93	1,385,099	2,841,058	814,171	12,103	20,237	0	5,072,668
	92	437,349	2,985,894	1,025,482	17,458	31,525	0	4,497,708
	91	579,083	3,700,415	956,730	26,599	24,532	119,416	5,406,775
	88	NA	NA	2,691,889	146,667	211,572	37,400	NA
2,4-D (acetic acid)	93	0	0	51,521	574	18,728	0	70,823
	92	0	0	28,201	300	51,900	5	80,406
	91	0	0	105,891	350	13,326	0	119,567
	88	NA	NA	23,335	27,952	68,422	0	NA
Decabromodiphenyl oxide	93	25,105	8,129	27,720	202,671	836,895	0	1,100,520
	92	21,032	7,406	53,759	126,872	721,583	0	930,652
	91	58,313	8,551	43,567	43,788	752,249	0	906,468
	88	NA	NA	76,150	19,090	555,181	1,284	NA
2,4-Diaminoanisole	93	0	0	0	0	0	0	0
	92	No Reports Received						
	91	0	0	0	85	0	0	85
	88	NA	NA	0	250	0	0	NA
2,4-Diaminoanisole sulfate	93	No Reports Received						
	92	No Reports Received						
	91	0	0	0	250	0	0	250
	88	NA	NA	0	250	0	0	NA
4,4'-Diaminodiphenyl ether	93	0	0	23,548	7	119	0	23,674
	92	0	0	4,226	5	1,193	0	5,424
	91	0	0	3,962	5	120	0	4,087
	88	NA	NA	0	179	142	0	NA
Diaminotoluene (mixed isomers)	93	0	376,100	479,489	58,575	1,646	0	915,810
	92	0	367,800	428,171	33,575	2,793	0	832,339
	91	0	578,455	544,862	54,369	21,702	0	1,199,388
	88	NA	NA	456,114	2,951	289,591	250	NA
2,4-Diaminotoluene	93	0	0	57,902	0	0	0	57,902
	92	0	0	10,388	0	0	0	10,388
	91	0	8,396	5,710	620	6,060	0	20,786
	88	NA	NA	0	1,200	0	0	NA
Dibenzofuran	93	3,609	19,988	751	505	30,141	0	54,994
	92	0	800	3,701	255	68,640	250	73,646
	91	0	3,246	16,943	500	81,602	0	102,291
	88	NA	NA	51,985	47,726	181,799	250	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).39 Continued.

CAS Number40	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
96-12-8	1,2-Dibromo-3-chloropropane	93	No Reports Received						
		92	2	294	0	0	0	0	294
		91	2	290	0	0	0	0	290
		88	No Reports Received						
106-93-4	1,2-Dibromoethane	93	19	17,439	7,760	80	26	254	25,559
		92	16	10,921	21,941	106	1,823	6	34,797
		91	20	8,642	29,575	73	240	2	38,532
		88	34	34,119	29,223	1,011	6,882	259	71,494
84-74-2	Dibutyl phthalate	93	128	107,292	80,619	3,593	140,000	1,000	332,504
		92	132	104,628	72,994	5,991	110,000	764	294,377
		91	143	58,461	95,626	8,907	160,000	5,069	328,063
		88	126	169,836	33,972	14,339	350,000	6,395	574,542
25321-22-6	Dichlorobenzene (mixed isomers)	93	8	475	6,411	0	1	30	6,917
		92	9	725	3,796	0	4	0	4,525
		91	13	4,441	73,649	2	0	9	78,101
		88	15	20,169	143,515	40	0	0	163,724
95-50-1	1,2-Dichlorobenzene	93	30	168,572	175,132	2,174	14,000	6,947	366,825
		92	38	182,216	169,843	2,436	3,700	6,469	364,664
		91	43	175,806	246,506	3,962	19,000	21,153	466,427
		88	46	206,238	324,463	11,624	20,115	13,354	575,794
541-73-1	1,3-Dichlorobenzene	93	7	1,339	8,682	139	0	0	10,160
		92	8	1,102	3,033	877	0	0	5,012
		91	8	878	3,941	779	0	0	5,598
		88	6	5,782	9,500	1,281	0	0	16,563
106-46-7	1,4-Dichlorobenzene	93	22	95,363	262,528	1,265	2,000	1,112	362,268
		92	23	74,313	263,633	2,021	2,000	622	342,589
		91	21	47,159	297,095	2,146	2,000	420	348,820
		88	24	103,870	1,787,549	6,153	4,000	1,300	1,902,872
91-94-1	3,3'-Dichlorobenzidine	93	5	5	5	0	0	0	10
		92	6	5	5	0	0	0	10
		91	6	5	5	0	0	0	10
		88	14	250	5	752	0	0	1,007
75-27-4	Dichlorobromomethane	93	1	180	0	0	0	0	180
		92	1	194	0	0	0	0	194
		91	1	200	0	0	0	0	200
		88	1	13,440	0	0	0	0	13,440
107-06-2	1,2-Dichloroethane	93	76	614,195	1,690,682	6,806	5,198	303	2,317,184
		92	89	672,901	2,539,806	12,760	6,927	1,858	3,234,252
		91	93	816,464	3,268,059	26,264	6,334	7,051	4,124,172
		88	110	1,574,325	3,036,854	40,527	1,452,084	2,166	6,105,956
540-59-0	1,2-Dichloroethylene	93	12	19,923	9,555	28	0	0	29,506
		92	11	15,623	7,604	7	24	1	23,259
		91	12	14,925	29,857	12	0	0	44,794
		88	10	16,552	108,896	95	0	1	125,544
75-09-2	Dichloromethane	93	1,065	24,478,364	39,834,847	62,909	956,098	78,267	65,410,485
		92	1,131	27,620,595	46,671,300	233,786	1,183,867	79,308	75,788,856
		91	1,293	32,183,219	48,491,600	98,995	1,317,706	118,560	82,210,080
		88	1,668	49,531,437	79,419,932	349,960	1,478,833	157,156	130,937,318
120-83-2	2,4-Dichlorophenol	93	3	270	318	61	7,677	0	8,326
		92	3	274	303	0	9,735	0	10,312
		91	5	885	547	1	42,800	1	44,234
		88	8	535	868	107	17,700	2	19,212

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
1,2-Dibromo-3-chloropropane	93	No Reports Received						
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	No Reports Received		0				
1,2-Dibromoethane	93	1	255	502,946	0	67	0	503,269
	92	0	2,353	66,160	0	1,005	0	69,518
	91	0	842	838	2	750	0	2,432
	88	NA	NA	5,937	253	27,924	0	NA
Dibutyl phthalate	93	12,896	200,186	117,522	8,948	74,055	70	413,677
	92	1,345	117,926	140,581	8,829	77,181	8	345,870
	91	4,660	166,958	110,547	14,535	72,951	10,063	379,714
	88	NA	NA	157,156	36,523	112,818	1,618	NA
Dichlorobenzene (mixed isomers)	93	0	14,828	14,540	0	0	0	29,368
	92	0	92	212	250	11	0	565
	91	0	325,693	111,339	7,410	9	0	444,451
	88	NA	NA	104,706	182,663	19,672	0	NA
1,2-Dichlorobenzene	93	3,145,376	404,460	1,528,689	30,791	99,113	0	5,208,429
	92	1,904,907	787,666	1,897,592	29,799	64,587	0	4,684,551
	91	1,490,896	1,079,191	2,413,025	84,218	427,032	0	5,494,362
	88	NA	NA	1,947,856	64,118	38,266	53,683	NA
1,3-Dichlorobenzene	93	6,764	450	5,048	1,537	0	0	13,799
	92	950	0	4,626	480	18	0	6,074
	91	800	0	3,966	160	22	0	4,948
	88	NA	NA	250	40	290	0	NA
1,4-Dichlorobenzene	93	6,278	0	102,521	3,631	213	0	112,643
	92	3	0	132,587	1,603	751	77	135,021
	91	4	36,530	111,019	11,068	770	0	159,391
	88	NA	NA	138,132	37,997	750	0	NA
3,3'-Dichlorobenzidine	93	0	3,300	11,250	10	5,005	0	19,565
	92	0	250	16,600	260	5,850	0	22,960
	91	0	0	19,116	15	4,650	0	23,781
	88	NA	NA	14,420	617	209,785	0	NA
Dichlorobromomethane	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
1,2-Dichloroethane	93	8,147,906	271,519	2,228,128	13,898	61,483	0	10,722,934
	92	18,429,536	82,186	2,146,043	20,044	20,530	0	20,698,339
	91	19,363,730	51,917	5,729,404	26,294	6,789	0	25,178,134
	88	NA	NA	1,617,555	1,477,242	166,131	228,000	NA
1,2-Dichloroethylene	93	2,101	0	522	0	0	0	2,623
	92	2,330	0	312	0	3	0	2,645
	91	2,000	0	359	0	0	0	2,359
	88	NA	NA	125,744	0	87,614	0	NA
Dichloromethane	93	20,970,440	3,241,821	9,767,007	843,209	108,451	33,584	34,964,512
	92	28,919,951	4,074,526	12,535,079	1,300,148	190,299	80,549	47,100,552
	91	28,472,665	3,771,339	12,227,733	1,302,744	496,784	164,918	46,436,183
	88	NA	NA	11,190,222	1,830,904	10,154,983	1,089,604	NA
2,4-Dichlorophenol	93	0	0	0	0	250	0	250
	92	0	0	0	0	0	0	0
	91	0	750	0	0	0	0	750
	88	NA	NA	12,559	6	350	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).(39) Continued.

CAS Number(40)	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
78-87-5	1,2-Dichloropropane	93	12	262,040	315,399	4,749	0	19	582,207
		92	11	205,467	414,450	6,755	0	1,206	627,878
		91	11	226,947	545,596	6,570	0	0	779,113
		88	12	315,478	1,079,826	23,785	0	3,400	1,422,489
542-75-6	1,3-Dichloropropylene	93	10	27,514	5,650	2	0	0	33,166
		92	9	31,315	6,212	69	0	0	37,596
		91	7	11,895	8,510	0	0	0	20,405
		88	8	39,790	14,800	250	0	0	54,840
62-73-7	Dichlorvos	93	5	807	500	5	0	250	1,562
		92	8	546	558	5	0	0	1,109
		91	9	326	318	0	0	0	644
		88	7	1,050	0	0	0	0	1,050
115-32-2	Dicofol	93	5	255	10	5	0	250	520
		92	6	255	256	0	0	0	511
		91	6	5	1	0	0	0	6
		88	8	593	750	0	0	0	1,343
1464-53-5	Diepoxybutane	93	No Reports Received						
		92	No Reports Received						
		91	1	0	0	0	0	0	0
		88	No Reports Received						
111-42-2	Diethanolamine	93	356	187,854	113,583	282,866	60,284	67,013	711,600
		92	349	170,574	86,584	403,697	55,526	179,011	895,392
		91	366	193,079	83,582	434,261	60,000	132,835	903,757
		88	332	439,907	198,081	438,213	238,317	133,456	1,447,974
117-81-7	Di-(2-ethylhexyl) phthalate	93	321	149,731	429,209	1,118	0	92,887	672,945
		92	329	149,541	750,180	947	35	99,157	999,860
		91	352	106,082	1,054,053	3,842	370	161,625	1,325,972
		88	298	181,492	1,035,298	2,776	3,091	20,748	1,243,405
84-66-2	Diethyl phthalate	93	62	26,703	131,596	337	0	750	159,386
		92	57	10,827	83,144	260	0	505	94,736
		91	58	11,042	100,399	678	0	2,977	115,096
		88	32	6,239	82,378	11,272	0	0	99,889
64-67-5	Diethyl sulfate	93	35	5,159	16,857	5	0	5	22,026
		92	37	3,284	9,952	5	0	5	13,246
		91	34	3,610	408	5	0	10	4,033
		88	24	8,436	2,191	0	0	250	10,877
119-90-4	3,3'-Dimethoxybenzidine	93	2	0	0	4	0	0	4
		92	3	0	0	8	0	0	8
		91	2	0	0	4	0	0	4
		88	No Reports Received						
57-14-7	1,1-Dimethyl hydrazine	93	4	99	95	0	0	0	194
		92	4	83	286	0	0	5	374
		91	5	111	378	0	0	0	489
		88	4	2,206	2,117	10	0	0	4,333
105-67-9	2,4-Dimethylphenol	93	18	16,323	14,990	84	55,000	250	86,647
		92	20	19,952	8,390	4	66,000	10	94,356
		91	20	18,008	15,686	8	101,000	26	134,728
		88	14	1,661	9,927	484	24,703	649	37,424
131-11-3	Dimethyl phthalate	93	66	21,010	70,350	329	1,300	5	92,994
		92	57	11,600	67,135	419	855	5	80,014
		91	55	14,152	63,014	1,198	865	811	80,040
		88	56	113,841	420,965	4,335	390	504	540,035

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
1,2-Dichloropropane	93	11,000	7	54	252	567	0	11,880
	92	0	0	53	1,389	1,952	0	3,394
	91	0	0	252	7,100	2,073	0	9,425
	88	NA	NA	3,782	136,775	1,131	0	NA
1,3-Dichloropropylene	93	5,432	1	2,257	0	0	0	7,690
	92	0	0	2,818	0	0	0	2,818
	91	0	0	920	0	0	0	920
	88	NA	NA	2,738	0	0	0	NA
Dichlorvos	93	0	250	3,660	0	750	0	4,660
	92	0	250	2,350	1	1,251	0	3,852
	91	0	500	2,000	0	1,610	0	4,110
	88	NA	NA	1,011	0	505	0	NA
Dicofol	93	0	0	2,271	0	250	0	2,521
	92	0	0	1,750	0	500	0	2,250
	91	0	0	7,899	0	10	0	7,909
	88	NA	NA	9,380	0	15,786	0	NA
Diepoxybutane	93	No Reports Received						
	92	No Reports Received						
	91	0	0	0	0	0	0	0
	88	No Reports Received		0				
Diethanolamine	93	364,972	92,961	510,787	1,130,429	104,493	0	2,203,642
	92	271,869	114,264	331,933	1,020,511	164,626	0	1,903,203
	91	191,987	171,508	367,573	1,337,623	221,811	434	2,290,936
	88	NA	NA	733,874	2,002,497	372,707	221,811	NA
Di-(2-ethylhexyl) phthalate	93	5,433,203	237,312	434,794	26,901	1,161,270	0	7,293,480
	92	3,318,190	387,694	194,931	26,340	1,213,664	0	5,140,819
	91	3,308,284	303,085	179,531	50,482	1,192,589	440	5,034,411
	88	NA	NA	825,367	169,891	1,664,643	44,250	NA
Diethyl phthalate	93	357,899	117,137	60,813	302,115	13,930	0	851,894
	92	297,764	57,808	54,135	474,284	45,251	250	929,492
	91	183,064	12,927	77,732	315,218	48,747	281	637,969
	88	NA	NA	97,952	37,600	6,572	1,40	NA
Diethyl sulfate	93	5,370,550	54	1,775	457	0	0	5,372,836
	92	4,942,698	33	815	547	172	0	4,944,265
	91	7,137,400	50	805	633	0	0	7,138,888
	88	NA	NA	0	890	0	0	NA
3,3'-Dimethoxybenzidine	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	No Reports Received		0				
1,1-Dimethyl hydrazine	93	5	0	2,914	0	6	0	2,925
	92	22	0	7,005	0	0	0	7,027
	91	3	0	6,360	0	26	0	6,389
	88	NA	NA	0	0	8,855	0	NA
2,4-Dimethylphenol	93	22,356	27,443	16,314	5,700	885	0	72,698
	92	304	72,669	10,351	5,445	1,503	0	90,272
	91	12,000	22,069	3,369	3,975	1,595	0	43,008
	88	NA	NA	1,250	7,964	1,750	0	NA
Dimethyl phthalate	93	250	28,987	25,816	131,086	4,597	0	190,736
	92	500	47,843	38,402	108,641	3,497	0	198,883
	91	250	16,102	57,123	82,565	17,434	0	173,474
	88	NA	NA	44,454	508,821	93,358	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39] Continued.

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
77-78-1	Dimethyl sulfate	93	36	4,556	1,199	0	0	5	5,760
		92	34	6,050	973	161	0	0	7,184
		91	31	9,675	432	293	0	0	10,400
		88	33	9,176	1,630	610	0	50	11,466
534-52-1	4,6-Dinitro-o-cresol	93	6	6	65	10	0	0	81
		92	6	2	31	20	0	0	53
		91	7	7	43	33	0	0	83
		88	10	259	15	266	0	2	542
51-28-5	2,4-Dinitrophenol	93	5	1	2	142	27,408	4	27,557
		92	8	14,680	5,632	128	18,925	6	39,371
		91	10	16,585	7,557	3,888	35,532	10	63,572
		88	11	12,386	8,439	98,692	86,200	257	205,974
121-14-2	2,4-Dinitrotoluene	93	4	1,846	33	319	0	0	2,198
		92	8	1,707	57	105	0	0	1,869
		91	9	5,104	313	2,682	0	1,424	9,523
		88	13	15,533	77,724	12,055	106,400	14,961	226,673
606-20-2	2,6-Dinitrotoluene	93	1	463	8	212	0	0	683
		92	1	422	3	126	0	0	551
		91	2	1,197	751	702	0	0	2,650
		88	7	6,074	81,523	957	27,000	0	115,554
123-91-1	1,4-Dioxane	93	64	281,921	152,096	477,896	0	2,236	914,149
		92	85	410,548	274,198	447,066	0	3,297	1,135,109
		91	83	365,544	365,719	318,133	0	15,952	1,065,348
		88	73	361,259	251,374	203,320	0	11,702	827,655
106-89-8	Epichlorohydrin	93	71	282,452	101,680	3,642	0	2,356	390,130
		92	73	402,097	120,556	3,165	0	1,655	527,473
		91	80	277,040	182,110	5,456	0	3,675	468,281
		88	78	506,142	200,965	4,917	68,750	2,524	783,298
110-80-5	2-Ethoxyethanol	93	48	95,428	208,789	1,952	0	0	306,169
		92	55	117,490	279,496	18	0	35	397,039
		91	69	207,045	466,777	5,022	0	5	678,849
		88	110	281,053	2,150,257	120,164	0	52	2,551,526
140-88-5	Ethyl acrylate	93	102	92,497	93,894	1,200	2,400	21	190,012
		92	99	107,913	97,399	734	3,200	1,114	210,360
		91	98	107,886	120,195	423	947	939	230,390
		88	105	126,521	119,461	1,211	0	265	247,458
100-41-4	Ethylbenzene	93	935	3,088,395	7,226,146	15,347	333,957	27,110	10,690,955
		92	895	3,214,161	6,840,136	15,783	193,880	289,108	10,553,068
		91	856	2,936,533	6,083,031	16,851	94,637	52,865	9,183,917
		88	558	3,100,759	4,421,877	15,970	72,914	202,112	7,813,632
541-41-3	Ethyl chloroformate	93	5	1,918	485	5	0	5	2,413
		92	6	2,231	1,138	26	0	5	3,400
		91	5	1,254	576	0	0	0	1,830
		88	5	11,880	2,023	0	0	0	13,903
74-85-1	Ethylene	93	273	14,775,632	18,530,394	24,779	0	0	33,330,805
		92	282	16,599,783	20,085,637	13,413	0	0	36,698,833
		91	281	16,316,939	21,966,320	17,015	0	0	38,300,274
		88	272	22,818,075	26,817,970	15,214	17,203	13,250	49,681,712
107-21-1	Ethylene glycol	93	1,312	2,466,226	7,670,401	1,170,533	5,943,528	1,283,019	18,533,707
		92	1,346	3,226,246	7,066,474	1,339,228	4,923,321	684,846	17,240,115
		91	1,378	4,622,234	6,212,532	2,313,490	3,654,273	908,417	17,710,946
		88	1,447	4,060,712	9,127,042	3,727,220	7,927,570	736,344	25,578,888

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Dimethyl sulfate	93	39,542	0	0	265	0	0	39,807
	92	48,266	0	0	10	0	0	48,276
	91	0	0	0	260	0	0	260
	88	NA	NA	0	1,000	0	0	NA
4,6-Dinitro-o-cresol	93	0	1,376	6,122	357	6,630	0	14,485
	92	0	210	2,166	4,910	5,550	0	12,836
	91	0	100	5,915	26,255	11,455	0	43,725
	88	NA	NA	259,448	19	46,648	0	NA
2,4-Dinitrophenol	93	0	0	9,000	0	20	0	9,020
	92	0	1	6,410	5	0	0	6,416
	91	0	2,600	5	255	1,200	0	4,060
	88	NA	NA	567,365	1,000	110,285	0	NA
2,4-Dinitrotoluene	93	0	300	0	0	10	0	310
	92	0	0	0	0	0	0	0
	91	0	110,750	53,250	0	57	0	164,057
	88	NA	NA	2,055	700,000	124,281	0	NA
2,6-Dinitrotoluene	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	250	250	0	0	0	500
	88	NA	NA	703	170,000	30,882	0	NA
1,4-Dioxane	93	18,262	738,584	200,994	258,084	61,762	0	1,277,686
	92	37,925	589,673	388,376	269,319	47,275	0	1,332,568
	91	44,222	254,549	526,359	255,305	76,539	1	1,156,975
	88	NA	NA	199,402	203,103	10,954	925	NA
Epichlorohydrin	93	0	17,837	947,707	29,201	851	0	995,596
	92	0	41,275	880,794	4,709	276	0	927,054
	91	4,669	7,800	919,235	12,703	594	0	945,001
	88	NA	NA	690,257	73,385	307	0	NA
2-Ethoxyethanol	93	359,015	259,985	35,069	391,233	3	0	1,045,305
	92	13,335	206,073	73,093	404,046	250	2	696,799
	91	36,186	201,811	139,537	218,923	20,456	2	616,915
	88	NA	NA	366,979	196,286	71,142	250	NA
Ethyl acrylate	93	38,620	1,417,133	244,897	21,310	9,493	0	1,731,453
	92	0	1,275,919	123,262	15,836	19,268	0	1,434,285
	91	200	783,299	167,145	19,855	24,621	440	995,560
	88	NA	NA	101,345	27,656	7,110	250	NA
Ethylbenzene	93	3,945,186	9,253,636	1,330,687	57,017	128,364	250	14,715,140
	92	3,271,166	8,866,394	1,336,854	100,169	144,008	12,476	13,731,067
	91	2,873,682	8,880,997	1,343,284	103,264	198,586	11,677	13,411,490
	88	NA	NA	2,317,452	511,285	415,533	269,164	NA
Ethyl chloroformate	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	1,200	390	0	0	0	1,590
	88	NA	NA	69,600	0	0	0	NA
Ethylene	93	0	11,708,800	61,073	19	128	0	11,770,020
	92	0	10,774,417	92,714	5	329	0	10,867,465
	91	0	40,096	897,754	17	504	0	938,371
	88	NA	NA	29,887	250	11,432	0	NA
Ethylene glycol	93	111,764,153	8,769,553	9,117,301	15,071,067	1,428,386	0	146,150,460
	92	99,926,705	7,372,520	6,989,657	19,842,107	1,000,079	33,744	135,164,812
	91	91,447,942	4,128,221	5,933,095	19,361,741	1,357,889	4,800	122,233,688
	88	NA	NA	14,517,439	17,360,752	2,601,889	465,625	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39] Continued.

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
151-56-4	Ethyleneimine	93	1	0	0	0	0	0	0
		92	1	0	0	0	0	0	0
		91	No Reports Received						
		88	1	250	250	0	0	0	500
75-21-8	Ethylene oxide	93	162	561,890	585,332	2,634	28,000	11,222	1,189,078
		92	174	662,788	645,995	1,991	120,000	837	1,431,611
		91	184	816,194	994,758	2,260	25,416	50,336	1,888,964
		88	202	923,731	3,708,003	44,851	11,125	54,700	4,742,410
96-45-7	Ethylene thiourea	93	7	5	265	0	0	0	270
		92	10	5	280	0	0	0	285
		91	11	24	553	0	0	0	577
		88	6	0	500	0	0	0	500
2164-17-2	Fluometuron	93	7	296	347	0	0	0	643
		92	5	301	303	5	0	0	609
		91	6	104	113	10	0	5	232
		88	2	250	250	0	0	0	500
50-00-0	Formaldehyde	93	782	2,049,988	9,321,033	418,503	5,912,425	418,220	18,120,169
		92	775	1,841,136	9,300,069	441,239	4,916,248	174,424	16,673,116
		91	818	1,777,229	8,838,639	627,001	5,217,827	248,866	16,709,562
		88	821	3,092,147	9,098,198	904,788	9,608,524	494,111	23,197,768
76-13-1	Freon 113	93	466	6,871,554	2,953,806	4,271	4	1,237	9,830,872
		92	867	17,861,150	7,024,067	1,916	214	9,028	24,896,375
		91	1,093	24,669,580	11,949,022	3,259	558	81,583	36,704,002
		88	1,439	47,155,972	23,310,793	32,894	5,965	27,799	70,533,423
—	Glycol ethers	93	2,162	10,120,540	35,171,877	353,153	114,415	137,656	45,897,641
		92	2,177	10,797,177	35,497,716	350,571	194,386	161,635	47,001,485
		91	2,121	10,383,015	34,389,854	505,041	176,033	696,202	46,150,145
		88	1,612	10,414,678	38,373,119	293,936	362,198	105,185	49,549,116
76-44-8	Heptachlor	93	1	31	0	2	0	0	33
		92	2	460	250	1	0	0	711
		91	1	5	0	0	0	0	5
		88	2	54,292	3	2	0	0	54,297
118-74-1	Hexachlorobenzene	93	10	304	332	476	548	0	1,660
		92	9	4,138	333	227	794	0	5,492
		91	10	549	292	111	60	1	1,013
		88	9	3,602	443	4	410	0	4,459
87-68-3	Hexachloro-1,3-butadiene	93	8	1,190	557	1,200	520	0	3,467
		92	7	1,916	2,218	1,911	738	0	6,783
		91	9	2,420	990	681	200	2	4,293
		88	9	2,043	465	153	220	0	2,881
77-47-4	Hexachlorocyclo-pentadiene	93	4	2,857	908	1	250	0	4,016
		92	4	7,112	1,268	0	5	0	8,385
		91	4	24,744	717	23	5	0	25,489
		88	5	77,902	415	6	2,131	0	80,454
67-72-1	Hexachloroethane	93	24	1,029	48,677	291	1,081	0	51,078
		92	20	1,738	19,284	3	1,670	0	22,695
		91	21	1,783	20,926	0	160	2	22,871
		88	22	2,949	16,128	11	520	1	19,609
302-01-2	Hydrazine	93	46	12,267	4,185	784	0	5	17,241
		92	43	13,033	6,238	842	0	10	20,123
		91	49	22,354	6,079	1,520	0	5	29,958
		88	55	24,368	7,689	2,149	0	29	34,235

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Ethyleneimine	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	No Reports Received						
	88	NA	NA	0	0	0	0	NA
Ethylene oxide	93	0	1	1,063	95,140	3,589	0	99,793
	92	21,866	0	14,288	94,860	1,650	0	132,664
	91	28,631	0	15,039	113,994	1,604	0	159,268
	88	NA	NA	1,250	362,521	20,663	0	NA
Ethylene thiourea	93	2,054	0	5,585	5	1,260	0	8,904
	92	0	1,682	6,042	12	7,060	0	14,796
	91	0	0	11,117	10	7,500	0	18,627
	88	NA	NA	250	500	2,250	0	NA
Fluometuron	93	0	0	3,460	30,030	9,364	0	42,854
	92	0	0	7,205	11,851	3,037	0	22,093
	91	0	0	11,625	1,012	17,010	0	29,647
	88	NA	NA	19,100	2,300	3,700	0	NA
Formaldehyde	93	60,343	146,580	1,091,750	3,464,896	365,516	0	5,129,085
	92	173,167	178,066	905,062	5,639,816	322,888	29,766	7,248,765
	91	206,290	102,312	953,413	5,486,228	488,176	8,433	7,244,852
	88	NA	NA	1,326,663	4,382,254	1,410,749	3,580	NA
Freon 113	93	3,043,503	208,109	417,205	37,045	12,278	750	3,718,890
	92	5,659,747	393,733	786,556	23,211	100,665	5,116	6,969,028
	91	8,426,528	479,281	1,252,258	38,402	131,777	103,417	10,431,663
	88	NA	NA	4,056,028	104,441	1,929,497	298,985	NA
Glycol ethers	93	4,388,256	13,775,189	3,486,547	12,188,571	791,957	50,368	34,680,888
	92	3,554,109	11,721,626	3,013,970	10,583,134	675,919	73,225	29,621,983
	91	4,042,545	11,963,176	3,376,886	9,260,675	680,186	48,752	29,372,220
	88	NA	NA	5,836,838	9,039,072	1,545,590	539,894	NA
Heptachlor	93	0	0	77,287	42	0	0	77,329
	92	0	0	93,737	69	0	0	93,806
	91	0	0	5	0	0	0	5
	88	NA	NA	51,935	37	0	0	NA
Hexachlorobenzene	93	1	0	88,709	250	648,010	0	736,970
	92	1	0	62,543	8	28,380	0	90,932
	91	1	0	127,143	5	1,064,793	0	1,191,942
	88	NA	NA	521,558	160	443,541	0	NA
Hexachloro-1,3-butadiene	93	0	0	21,416	14	12	0	21,442
	92	0	0	14,441	7	5	0	14,453
	91	0	0	1,710,359	4	4,263	0	1,714,626
	88	NA	NA	3,513,001	300	19,640	0	NA
Hexachlorocyclopentadiene	93	0	910	9,620	656	0	0	11,186
	92	0	1,000	33,818	653	2,740	0	38,211
	91	0	4,000	27,803	624	3,000	0	35,427
	88	NA	NA	590,845	852	28,470	0	NA
Hexachloroethane	93	0	41,000	49,801	0	1,954	0	92,755
	92	0	21,000	10,187	0	206	0	31,393
	91	0	39,000	167,313	0	5,011	0	211,324
	88	NA	NA	532,352	260	128,504	0	NA
Hydrazine	93	8	30,005	72,162	1,408	4,136	0	107,719
	92	22	455	131,085	1,308	2,559	0	135,429
	91	3	38,000	13,515	6,368	4,021	29	61,936
	88	NA	NA	36,582	1,468	6,541	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).㊴ Continued.

CAS Number㊵	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
10034-93-2	Hydrazine sulfate	93	3	0	1	0	220,000	0	220,001
		92	3	0	2	0	120,000	0	120,002
		91	4	0	2	0	150,000	0	150,002
		88	4	290	882	0	355,000	0	356,172
7647-01-0	Hydrochloric acid	93	3,279	4,310,382	74,763,273	719,541	145,097,099	359,506	225,249,801
		92	3,299	4,402,452	72,697,965	1,927,193	207,817,749	432,770	287,278,129
		91	3,358	4,564,012	79,974,512	2,144,739	190,422,615	12,172,416	289,278,294
		88	3,257	6,232,531	68,929,394	3,861,789	396,089,339	5,509,273	480,622,326
74-90-8	Hydrogen cyanide	93	40	53,123	2,180,818	396	821,815	12	3,056,164
		92	36	65,822	2,275,468	3,947	801,646	17	3,146,900
		91	37	64,031	1,205,762	8,839	945,926	17	2,224,575
		88	36	131,604	980,673	2,300	1,737,850	1,761	2,854,188
7664-39-3	Hydrogen fluoride	93	513	3,076,706	4,645,613	10,340	3,520	28,805	7,764,984
		92	526	4,388,611	5,834,629	4,210	1	27,887	10,255,338
		91	527	3,612,771	6,238,415	5,469	1	25,259	9,881,915
		88	527	3,783,842	9,642,646	189,928	250	13,002	13,629,668
123-31-9	Hydroquinone	93	60	3,950	16,125	8,994	470,000	117	499,186
		92	56	4,533	8,985	3,967	250,750	0	268,235
		91	60	6,434	4,367	4,388	255,705	6	270,900
		88	61	3,601	6,733	7,211	375,400	530	393,475
78-84-2	Isobutyraldehyde	93	20	129,996	250,198	650	34,783	0	415,627
		92	22	114,601	289,205	351	3,840	1	407,998
		91	18	118,100	272,124	91	6,810	262	397,387
		88	14	176,240	497,578	773	60	1	674,652
67-63-0	Isopropyl alcohol (manufacturing)	93	123	332,235	1,025,007	0	0	750	1,357,992
		92	113	382,054	989,591	15	0	330	1,371,990
		91	137	435,389	909,573	35	0	77	1,345,074
		88	89	790,232	1,199,178	1,900	0	14	1,991,324
80-05-7	4,4'-Isopropylidene-diphenol	93	109	105,696	96,396	8,366	44,339	695,804	950,601
		92	109	109,292	76,437	7,463	41,000	287,138	521,330
		91	106	117,175	313,604	4,492	43,000	374,926	853,197
		88	79	119,870	107,056	126,385	0	424,117	777,428
7439-92-1	Lead	93	797	236,287	459,607	24,575	0	3,336,155	4,056,624
		92	802	167,534	303,163	11,834	0	2,062,834	2,545,365
		91	866	208,026	228,864	20,556	0	3,331,171	3,788,617
		88	859	484,031	644,625	61,791	5	6,648,946	7,839,398
—	Lead compounds	93	858	216,860	814,284	50,518	1,768	10,950,924	12,034,354
		92	887	477,148	992,951	62,431	2,888	11,924,326	13,459,744
		91	937	444,012	1,061,043	118,692	928	13,701,984	15,326,659
		88	727	355,202	1,177,534	180,368	2,755	20,035,359	21,751,218
58-89-9	Lindane	93	8	277	298	0	0	5	580
		92	11	507	531	0	0	0	1,038
		91	15	271	291	0	0	5	567
		88	3	251	7	0	0	0	258
108-31-6	Maleic anhydride	93	206	61,297	311,018	403	5	4,062	376,785
		92	200	101,129	355,296	405	5	2,327	459,162
		91	215	77,432	382,057	465	255	1,405	461,614
		88	199	111,640	550,604	12,580	240,000	250	915,074
12427-38-2	Maneb	93	6	510	520	0	0	0	1,030
		92	7	510	535	0	0	250	1,295
		91	4	10	19	0	0	0	29
		88	6	1,000	1,265	250	0	0	2,515

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Hydrazine sulfate	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Hydrochloric acid	93	60,155,970	8,507,313	46,975,777	19,913,557	13,575,451	78,081	149,206,149
	92	59,509,690	5,109,001	43,092,487	29,306,548	12,816,139	255,991	150,089,856
	91	43,700,490	4,415,525	36,469,260	16,604,683	14,117,213	567,652	115,874,823
	88	NA	NA	25,633,047	35,167,433	48,941,973	213,017	NA
Hydrogen cyanide	93	0	253	492	281	2,065	0	3,091
	92	0	250	470	330	874	0	1,924
	91	0	250	315	271	120	0	956
	88	NA	NA	21,200	337	1,001	250	NA
Hydrogen fluoride	93	281,413	0	2,254,588	269,976	856,706	250	3,662,933
	92	289,178	0	2,539,160	276,044	1,269,429	10,030	4,383,841
	91	46,814	750	2,516,449	326,065	1,080,205	250	3,970,533
	88	NA	NA	2,841,628	696,139	3,467,471	64,252	NA
Hydroquinone	93	9,700	881	47,558	110,898	34,105	0	203,142
	92	8,316	5,139	28,737	162,175	8,646	250	213,263
	91	10	4,132	22,736	168,069	214,630	440	410,017
	88	NA	NA	303,106	512,180	6,835	0	NA
Isobutyraldehyde	93	200	691,085	43,747	10,402	0	0	745,434
	92	400	1,096,087	35,010	3,265	250	0	1,135,012
	91	0	553,000	47,587	37,444	0	0	638,031
	88	NA	NA	30,260	713	0	0	NA
Isopropyl alcohol (manufacturing)	93	214,276	267,089	116,974	8,964	27,137	0	634,440
	92	225,917	238,756	99,184	68,302	1,318	8,099	641,576
	91	38,983	412,315	108,447	69,576	29,555	536	659,412
	88	NA	NA	319,961	161,751	247,039	129,407	NA
4,4'-Isopropylidene-diphenol	93	0	34,556	40,193	32,719	365,436	0	472,904
	92	18,865	34,510	29,037	34,485	370,428	4	487,329
	91	18,407	67,980	21,524	32,781	251,523	754	392,969
	88	NA	NA	995,810	31,135	444,560	1,000	NA
Lead	93	40,096,726	7,815	520,158	28,085	2,142,440	750	42,795,974
	92	31,493,700	19,880	774,860	31,382	3,015,890	109,071	35,444,783
	91	38,299,231	9,611	1,995,622	49,533	5,508,668	39,308	45,901,973
	88	NA	NA	2,901,988	122,466	10,728,210	252,910	NA
Lead compounds	93	250,957,268	75,387	3,400,146	111,040	20,259,225	299	274,803,365
	92	372,495,789	39,188	19,954,819	326,744	13,344,529	412,721	406,573,790
	91	185,666,753	59,871	2,210,582	286,119	11,108,012	63,910	199,395,247
	88	NA	NA	2,254,778	90,957	14,389,633	667,986	NA
Lindane	93	0	0	3,992	6	67	0	4,065
	92	0	0	51,355	5	73	0	51,433
	91	0	0	7,258	5	66	0	7,329
	88	NA	NA	130	0	56	0	NA
Maleic anhydride	93	0	112,033	783,929	2,980	25,827	0	924,769
	92	0	62,503	688,345	1,770	34,669	577	787,864
	91	47	36,484	735,361	254,846	18,370	1	1,045,109
	88	NA	NA	1,725,648	556,373	132,148	1,150	NA
Maneb	93	0	0	260	0	125,841	0	126,101
	92	0	0	3,070	5	14,092	0	17,167
	91	0	0	255	0	2,370	0	2,625
	88	NA	NA	2,077	1,470	5,285	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).39 Continued.

CAS Number40	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
7439-96-5	Manganese	93	1,286	362,608	496,504	243,336	504	6,650,151	7,753,103
		92	1,218	392,179	306,123	235,291	304	6,528,590	7,462,487
		91	1,193	691,175	326,359	143,101	272	9,906,751	11,067,658
		88	917	1,043,950	538,371	321,992	255	20,229,826	22,134,394
—	Manganese compounds	93	988	778,095	1,436,529	565,650	8,740	47,671,055	50,460,069
		92	948	614,043	1,372,601	733,723	22,569	63,890,531	66,633,467
		91	901	598,418	804,284	700,193	15,327	70,033,856	72,152,078
		88	540	582,202	1,215,299	681,469	6,816,070	84,222,474	93,517,514
7439-97-6	Mercury	93	22	9,349	3,353	267	0	1,801	14,770
		92	23	9,462	4,650	273	0	3,122	17,507
		91	30	11,603	6,605	629	0	5,292	24,129
		88	37	15,791	7,114	1,397	0	13,279	37,581
—	Mercury compounds	93	13	2,507	914	179	15	11	3,626
		92	16	2,493	766	302	9	17	3,587
		91	26	1,355	1,725	47	9	2	3,138
		88	16	1,006	1,370	259	27	250	2,912
67-56-1	Methanol	93	2,424	29,407,465	142,885,516	10,011,681	27,899,963	1,719,866	211,924,491
		92	2,466	34,356,720	170,949,227	18,155,749	27,084,182	3,310,441	253,856,319
		91	2,547	37,591,035	170,374,294	20,011,681	27,826,928	3,589,467	259,393,405
		88	2,492	48,234,861	186,585,067	16,800,444	26,555,436	11,694,136	289,869,944
72-43-5	Methoxychlor	93	4	91	5	5	0	0	101
		92	7	261	557	5	0	5	828
		91	6	251	314	10	0	5	580
		88	12	47,721	83,310	252	0	258	131,541
109-86-4	2-Methoxyethanol	93	68	497,989	660,857	85,820	0	2	1,244,668
		92	85	891,829	527,586	165,535	0	4	1,584,954
		91	89	1,100,988	711,956	364,059	0	20	2,177,023
		88	95	1,148,256	4,751,413	40,520	750	7	5,940,946
96-33-3	Methyl acrylate	93	64	108,933	83,230	442	130	88	192,823
		92	63	129,009	136,816	1,279	77	705	267,886
		91	63	63,806	169,936	919	161	0	234,822
		88	61	332,710	110,786	1,687	200	30,260	475,643
1634-04-4	Methyl tert-butyl ether	93	141	938,717	2,910,737	92,315	9,406	409	3,951,584
		92	132	834,804	2,208,275	102,851	68,445	288	3,214,663
		91	120	781,472	2,384,860	30,901	81,690	2,903	3,281,826
		88	90	617,340	1,970,907	21,499	14,400	370	2,624,516
101-14-4	4,4'-Methylenebis (2-chloroaniline)	93	16	10	5	0	0	0	15
		92	17	12	5	0	0	2	19
		91	19	1,010	255	0	0	0	1,265
		88	8	250	0	0	0	0	250
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzeneamine	93	No Reports Received						
		92	No Reports Received						
		91	No Reports Received						
		88	1	250	0	0	0	7,000	7,250
101-68-8	Methylenebis (phenylisocyanate)	93	834	381,649	167,981	15	0	800,629	1,350,274
		92	779	307,897	145,835	30	0	77,201	530,963
		91	754	311,617	236,248	10	0	112,387	660,262
		88	425	154,916	90,147	1,022	0	87,415	333,500
74-95-3	Methylene bromide	93	7	42,558	13,759	0	0	0	56,317
		92	6	23,361	14,790	0	250	0	38,401
		91	5	38,277	13,010	0	0	0	51,287
		88	9	34,468	23,255	0	0	0	57,723

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
Manganese	93	69,793,000	253	504,457	29,941	11,217,507	593,559	82,138,717
	92	31,433,191	323	497,731	41,151	10,766,313	522,006	43,260,715
	91	37,992,407	24,538	1,328,918	161,859	12,794,779	179,409	52,481,910
	88	NA	NA	4,208,789	132,408	17,867,485	2,931,591	NA
Manganese compounds	93	44,660,637	23,682	3,323,612	417,667	19,806,033	250	68,231,881
	92	37,242,936	29,446	3,364,111	1,038,063	13,580,016	145,350	55,399,922
	91	28,336,775	3,644	3,458,716	3,342,995	20,754,827	195,061	56,092,018
	88	NA	NA	1,376,268	1,843,019	18,013,946	423,308	NA
Mercury	93	11,639	0	1,265	15	17,406	0	30,325
	92	14,455	0	13,910	15	29,809	22	58,211
	91	21,674	0	43,412	42	70,517	0	135,645
	88	NA	NA	38,548	1,364	218,830	0	NA
Mercury compounds	93	12,000	0	486	6	55,549	0	68,041
	92	37,000	1	60,394	7	135,646	0	233,048
	91	443,815	5	22,146	272	17,741	0	483,979
	88	NA	NA	256	528	17,383	0	NA
Methanol	93	15,803,246	57,367,176	37,093,740	94,712,739	3,332,440	388	208,309,729
	92	15,651,868	69,352,815	39,956,560	113,928,001	3,281,731	15,551	242,186,526
	91	12,205,824	64,433,495	38,247,147	114,720,303	4,715,372	1,458,672	235,780,813
	88	NA	NA	40,024,338	121,316,794	15,226,449	3,505,607	NA
Methoxychlor	93	0	0	15	0	5	0	20
	92	0	0	251	0	255	0	506
	91	0	0	159	0	5	0	164
	88	NA	NA	6,551	0	8	0	NA
2-Methoxyethanol	93	320	580,965	327,097	855,415	16,300	0	1,780,097
	92	6,174	727,772	329,204	1,054,043	750	17,845	2,135,788
	91	26,025	542,690	592,598	403,041	702	0	1,565,056
	88	NA	NA	826,153	622,102	57,362	715	NA
Methyl acrylate	93	14,736	255,044	17,229	8,484	1,595	0	297,088
	92	0	409,635	41,241	8,293	1,433	0	460,602
	91	5,000	221,846	38,476	5,311	1,275	0	271,908
	88	NA	NA	14,040	14,886	4,765	0	NA
Methyl tert-butyl ether	93	49,327	657,873	33,893	92,030	134,331	0	967,454
	92	17,250	346,392	32,688	80,414	14,469	0	491,213
	91	6,618	522,457	20,321	129,131	6,060	0	684,587
	88	NA	NA	93,575	7,713	4,602	0	NA
4,4'-Methylenebis (2-chloroaniline)	93	0	2,148	99	5	750	0	3,002
	92	0	2,559	2,390	5	0	0	4,954
	91	0	1,000	4,228	5	0	0	5,233
	88	NA	NA	6,250	0	0	0	NA
4,4'-Methylenebis(N,N-dimethyl) benzeneamine	93	No Reports Received						
	92	No Reports Received						
	91	No Reports Received						
	88	NA	NA	0	0	1,150	0	NA
Methylenebis (phenylisocyanate)	93	400,158	146,804	649,007	1,881	1,349,736	0	2,547,586
	92	328,874	88,328	552,045	2,305	985,099	47,000	2,003,651
	91	393,894	47,220	544,115	911	1,104,797	83,036	2,173,973
	88	NA	NA	932,648	1,500	1,769,721	7,325	NA
Methylene bromide	93	0	750	584	2,489	0	0	3,823
	92	33	0	2,284	1,493	0	0	3,810
	91	0	0	0	5,417	0	0	5,417
	88	NA	NA	0	6,097	0	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39] Continued.

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
101-77-9	4,4'-Methyenedianiline	93	27	15,313	2,961	291	9,750	135	28,450
		92	24	6,496	3,890	420	8,865	55	19,726
		91	27	9,013	4,155	1,486	22,062	3	36,719
		88	30	36,804	93,347	2,599	460,250	1,140	594,140
78-93-3	Methyl ethyl ketone	93	2,418	29,044,598	55,770,325	197,216	360,927	134,162	85,507,228
		92	2,481	31,662,901	60,262,154	154,676	365,395	242,949	92,688,075
		91	2,570	35,753,846	71,050,033	143,003	355,736	166,707	107,469,325
		88	2,518	41,644,628	98,564,080	90,426	255,962	166,537	140,721,633
60-34-4	Methyl hydrazine	93	2	25	0	0	0	0	25
		92	1	0	0	0	0	0	0
		91	2	0	0	0	0	0	0
		88	3	2,774	153	1	0	0	2,928
74-88-4	Methyl iodide	93	4	33,233	907	14	0	0	34,154
		92	6	21,980	3,405	11	9,500	0	34,896
		91	5	22,544	2,870	13	740	0	26,167
		88	3	5,691	3,253	5	250	0	9,199
108-10-1	Methyl isobutyl ketone	93	1,006	7,777,025	17,317,092	90,214	131,600	76,771	25,392,702
		92	1,027	7,899,705	18,237,055	96,387	129,100	194,986	26,557,233
		91	1,041	7,285,523	19,092,111	166,952	161,600	130,415	26,836,601
		88	1,009	13,057,504	18,951,682	762,108	116,650	31,770	32,919,714
624-83-9	Methyl isocyanate	93	3	4,490	1,273	0	0	0	5,763
		92	2	6,851	803	0	0	0	7,654
		91	5	6,742	798	0	0	0	7,540
		88	12	9,649	586	0	0	64	10,299
80-62-6	Methyl methacrylate	93	251	600,068	1,728,620	7,992	260,000	2,606	2,599,286
		92	246	735,044	1,820,951	34,595	220,000	4,003	2,814,593
		91	244	692,638	1,968,813	20,998	270,000	4,305	2,956,754
		88	219	1,346,196	2,284,375	28,437	327,221	8,119	3,994,348
90-94-8	Michler's ketone	93	1	100	1,442	0	0	0	1,542
		92	No Reports Received						
		91	1	0	0	0	0	0	0
		88	4	450	650	0	0	0	1,100
1313-27-5	Molybdenum trioxide	93	139	124,993	51,931	60,169	202,775	11,449	451,317
		92	131	50,069	59,606	59,441	162,705	14,651	346,472
		91	128	46,031	48,526	78,785	134,965	23,165	331,472
		88	99	37,272	73,323	139,021	197,115	97,238	543,969
91-20-3	Naphthalene	93	471	1,483,665	1,186,271	31,123	79,290	48,971	2,829,320
		92	475	1,375,880	1,250,445	28,983	78,227	1,667,145	4,400,680
		91	461	1,413,281	1,372,419	31,486	39,112	54,348	2,910,646
		88	419	3,400,774	1,739,530	22,768	50,946	123,956	5,337,974
134-32-7	alpha-Naphthylamine	93	2	5	5	0	0	0	10
		92	2	5	5	0	0	0	10
		91	2	5	5	0	0	0	10
		88	3	336	254	101	0	0	691
7440-02-0	Nickel	93	1,639	169,431	152,495	38,098	11,078	427,911	799,013
		92	1,600	519,672	199,654	44,930	5,309	2,425,037	3,194,602
		91	1,581	338,718	144,216	54,838	4,418	418,003	960,193
		88	1,149	268,932	181,220	90,133	14,295	1,225,251	1,779,831
—	Nickel compounds	93	820	55,882	122,998	56,096	122,160	2,864,701	3,221,837
		92	780	59,348	90,732	66,194	292,453	1,307,400	1,816,127
		91	788	61,418	183,857	76,841	366,530	1,283,731	1,972,377
		88	567	154,787	112,356	134,294	224,968	2,412,526	3,038,931

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
4,4'-Methyenedianiline	93	0	8,530	72,400	2,152	33,676	0	116,758
	92	0	26,949	84,836	1,629	9,710	0	123,124
	91	0	28,000	44,218	1,759	16,913	0	90,890
	88	NA	NA	139,349	7,399	141,538	0	NA
Methyl ethyl ketone	93	24,231,204	45,698,371	5,491,598	756,561	433,670	18,755	76,630,159
	92	25,371,163	39,263,334	6,257,373	653,417	623,436	291,155	72,459,878
	91	27,570,244	35,471,173	9,933,858	777,361	543,575	294,801	74,591,012
	88	NA	NA	22,152,118	963,868	5,014,693	2,039,145	NA
Methyl hydrazine	93	0	0	74	0	0	0	74
	92	0	0	0	0	0	0	0
	91	0	0	0	1	0	2	3
	88	NA	NA	1,250	0	1,450	0	NA
Methyl iodide	93	0	350	230	0	27	0	607
	92	0	0	250	0	0	0	250
	91	0	0	5	0	0	0	5
	88	NA	NA	0	0	250	0	NA
Methyl isobutyl ketone	93	22,879,916	12,169,416	1,391,209	636,214	126,372	1,705	37,204,832
	92	20,221,693	17,380,409	1,500,419	776,557	107,600	205,272	40,191,950
	91	17,836,398	19,033,586	1,998,478	525,571	158,886	4,745	39,557,664
	88	NA	NA	6,075,272	1,509,030	1,966,217	2,467,760	NA
Methyl isocyanate	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	15,067	0	15,067
	88	NA	NA	314	0	8,400	0	NA
Methyl methacrylate	93	82,310	1,044,464	663,896	265,342	174,215	0	2,230,227
	92	83,571	1,047,331	659,516	252,180	96,628	40,862	2,180,088
	91	405,587	1,255,989	525,679	130,045	187,596	9	2,504,905
	88	NA	NA	2,787,477	191,071	276,567	37,511	NA
Michler's ketone	93	0	216	0	0	0	0	216
	92		No Reports Received					
	91	0	703	0	3	0	0	706
	88	NA	NA	33,519	0	0	0	NA
Molybdenum trioxide	93	3,302,529	0	78,094	34,801	446,634	4,957	3,867,015
	92	3,101,814	0	61,237	72,096	349,143	250	3,584,540
	91	2,671,352	0	48,998	80,682	534,959	736	3,336,727
	88	NA	NA	7,336	34,044	573,624	20,000	NA
Naphthalene	93	248,531	1,377,127	345,047	24,352	332,257	0	2,327,314
	92	136,187	2,321,464	525,688	88,516	666,947	2,850	3,741,652
	91	212,555	1,357,827	491,058	63,592	979,551	16,406	3,120,989
	88	NA	NA	536,139	800,227	1,359,184	31,000	NA
alpha-Naphthylamine	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Nickel	93	58,272,406	6,812	928,601	99,350	2,359,104	30,333	61,696,606
	92	53,549,186	13,073	1,152,195	130,234	3,548,062	408,069	58,800,819
	91	41,843,870	7,832	608,597	254,470	3,508,762	352,985	46,576,516
	88	NA	NA	1,145,848	252,031	6,400,843	72,353	NA
Nickel compounds	93	31,855,198	6,593	1,727,136	120,342	4,818,250	6,935	38,534,454
	92	26,825,435	21,555	1,784,214	121,959	5,040,009	43,483	33,836,655
	91	24,467,102	12,151	1,734,806	133,885	2,988,958	38,354	29,375,256
	88	NA	NA	1,886,744	650,732	3,946,285	194,385	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).(39) Continued.

CAS Number(40)	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
7697-37-2	Nitric acid	93	1,824	802,420	2,252,954	180,513	19,213,898	421,294	22,871,079
		92	1,826	719,734	2,317,172	53,975	22,081,766	662,049	25,834,696
		91	1,885	673,431	2,696,632	88,774	21,128,099	563,133	25,150,069
		88	1,916	1,151,193	7,144,675	1,380,565	25,485,680	1,330,695	36,492,808
139-13-9	Nitrilotriacetic acid	93	7	7	5	6,442	500	0	6,954
		92	7	4	0	4,069	2,700	0	6,773
		91	7	5	0	4,100	7,800	0	11,905
		88	14	1,000	1,500	5,100	0	5,100	12,700
99-59-2	5-Nitro-o-anisidine	93	1	5	5	0	0	0	10
		92	2	5	10	0	0	0	15
		91	2	5	10	0	0	0	15
		88	No Reports Received						
98-95-3	Nitrobenzene	93	15	64,830	7,807	309	309,441	328	382,715
		92	19	38,769	13,798	524	864,949	427	918,467
		91	24	34,511	19,035	2,032	468,404	935	524,917
		88	19	22,614	17,759	5,907	819,024	2,875	868,179
55-63-0	Nitroglycerin	93	18	554	12,545	28,012	0	250	41,361
		92	22	2,059	27,073	12,906	0	16,150	58,188
		91	22	1,790	26,657	12,399	0	9,550	50,396
		88	21	2,280	50,103	2,746	0	11,640	66,769
88-75-5	2-Nitrophenol	93	5	5	24	7	0	0	36
		92	3	5	7	48	0	0	60
		91	2	0	2	40	0	0	42
		88	4	32,152	1,537	1	0	2	33,692
100-02-7	4-Nitrophenol	93	5	654	91	33	0	0	778
		92	6	715	105	1,700	0	0	2,520
		91	5	9,406	127	600	0	0	10,133
		88	7	7,642	213	0	6,300	7	14,162
79-46-9	2-Nitropropane	93	7	39,191	9,137	1,200	0	0	49,528
		92	10	36,262	9,380	900	65,581	0	112,123
		91	9	31,052	74,695	380	139,342	0	245,469
		88	15	208,303	181,082	4,300	257,000	0	650,685
156-10-5	p-Nitrosodiphenylamine	93	2	24	0	0	5,400	0	5,424
		92	2	24	0	0	4,900	0	4,924
		91	2	24	0	0	4,700	0	4,724
		88	2	15	0	0	2,000	0	2,015
121-69-7	N,N-Dimethylaniline	93	23	3,500	17,222	697	0	0	21,419
		92	19	19,616	24,262	2,039	0	0	45,917
		91	20	25,001	26,855	30,430	0	0	82,286
		88	20	18,448	80,457	19,967	0	250	119,122
62-75-9	N-Nitrosodimethylamine	93	No Reports Received						
		92	No Reports Received						
		91	No Reports Received						
		88	1	0	0	0	0	0	0
86-30-6	N-Nitrosodiphenylamine	93	1	0	0	0	0	0	0
		92	2	0	0	0	0	0	0
		91	1	0	0	0	0	0	0
		88	2	0	0	27	34,000	0	34,027
56-38-2	Parathion	93	3	1,215	5	5	0	0	1,225
		92	5	10	255	5	0	0	270
		91	9	267	280	255	0	255	1,057
		88	13	2,258	1,007	750	0	250	4,265

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
Nitric acid	93	2,206,554	44	11,244,281	2,228,420	2,608,501	250	18,288,050
	92	3,240,136	539	10,629,195	3,792,013	4,004,687	33,614	21,700,184
	91	2,289,356	0	14,116,684	8,608,911	3,934,347	9,314	28,958,612
	88	NA	NA	18,442,846	22,781,030	7,929,318	48,202	NA
Nitrilotriacetic acid	93	0	0	0	0	0	0	0
	92	0	0	8,556	0	0	0	8,556
	91	0	0	0	0	0	0	0
	88	NA	NA	190,753	254,859	250	0	NA
5-Nitro-o-anisidine	93	0	0	0	5	0	0	5
	92	0	0	0	10	250	0	260
	91	0	0	0	255	250	0	505
	88	No Reports Received		0				
Nitrobenzene	93	3,370	19,340	288,124	118	790	0	311,742
	92	2,881	27,210	435,854	23	14,297	0	480,265
	91	35,606	243,550	326,969	100	8,403	4,048	618,676
	88	NA	NA	1,301,075	5,671	69,570	750	NA
Nitroglycerin	93	0	2	39,006	52	6	0	39,066
	92	3,088	250	68,952	40	0	0	72,330
	91	2,683	8	87,122	86	0	0	89,899
	88	NA	NA	3,581	53	2	0	NA
2-Nitrophenol	93	0	4,592	42,430	130	0	0	47,152
	92	0	0	429	0	0	0	429
	91	0	0	11,441	140	221	0	11,802
	88	NA	NA	1,600	149,000	13,100	0	NA
4-Nitrophenol	93	0	0	923,001	245	4	0	923,250
	92	0	0	820,002	411	27	0	820,440
	91	0	0	561,290	21,067	0	0	582,357
	88	NA	NA	0	560,428	70	0	NA
2-Nitropropane	93	3,400	103	12,298	0	0	0	15,801
	92	2,230	0	4,100	0	63,962	4,120	74,412
	91	39,204	0	2,837	0	33,650	0	75,691
	88	NA	NA	8,910	3,000	4,785	0	NA
p-Nitrosodiphenylamine	93	0	15,000	0	0	0	0	15,000
	92	0	15,000	0	0	0	0	15,000
	91	0	2,200	0	0	0	0	2,200
	88	NA	NA	0	0	180	0	NA
N,N-Dimethylaniline	93	0	593,413	37,849	164,986	0	0	796,248
	92	0	1,090,379	132,993	161,693	0	0	1,385,065
	91	0	670,869	84,654	206,399	0	0	961,922
	88	NA	NA	465,397	287,483	772	0	NA
N-Nitrosodimethylamine	93	No Reports Received						
	92	No Reports Received						
	91	No Reports Received						
	88	NA	NA	0	0	0	0	NA
N-Nitrosodiphenylamine	93	0	0	474,000	0	0	0	474,000
	92	0	0	498,400	0	0	0	498,400
	91	0	0	470,000	0	0	0	470,000
	88	NA	NA	300	0	0	0	NA
Parathion	93	0	0	7,847	0	0	0	7,847
	92	0	0	6,502	0	0	0	6,502
	91	0	0	361	0	505	2,307	3,173
	88	NA	NA	1,321	0	3,959	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).[39] Continued.

CAS Number[40]	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
87-86-5	Pentachlorophenol	93	39	5,673	5,220	2,541	0	255	13,689
		92	42	7,470	6,224	3,127	0	270	17,091
		91	44	6,991	5,517	2,278	0	1,510	16,296
		88	55	8,133	5,896	2,465	20,000	3,717	40,211
79-21-0	Peracetic acid	93	15	661	2,660	53	0	260	3,634
		92	19	2,589	3,379	14	5	520	6,507
		91	14	1,110	3,982	10	5	3,220	8,327
		88	8	766	4,687	55	0	0	5,508
108-95-2	Phenol	93	676	1,929,310	4,804,052	126,951	3,070,279	200,076	10,130,668
		92	687	2,998,717	4,758,150	167,007	5,552,077	190,475	13,666,426
		91	670	2,537,565	4,173,288	169,856	3,192,210	312,215	10,385,134
		88	632	4,526,592	6,027,710	258,950	4,661,319	1,882,365	17,356,936
106-50-3	p-Phenylenediamine	93	8	342	3,177	1,004	0	1,051	5,574
		92	9	2,737	2,710	0	0	3	5,450
		91	10	1,054	2,497	0	0	2	3,553
		88	13	2,210	111,680	826	4,716	0	119,432
90-43-7	2-Phenylphenol	93	19	25,409	1,089	57	0	255	26,810
		92	18	6,957	17,865	97	0	5	24,924
		91	15	8,403	1,054	224	0	5	9,686
		88	15	9,010	1,620	480	0	0	11,110
75-44-5	Phosgene	93	33	3,035	2,660	0	5	0	5,700
		92	32	3,596	1,684	5	5	0	5,290
		91	36	2,279	2,109	5	5	0	4,398
		88	37	3,839	17,764	500	250	0	22,353
7664-38-2	Phosphoric acid	93	2,678	490,193	745,085	175,861,627	33,784	35,491,946	212,622,635
		92	2,685	317,185	868,395	158,674,836	35,230	46,725,635	206,621,281
		91	2,704	327,403	1,002,483	114,333,359	26,545	47,296,276	162,986,066
		88	2,523	727,537	1,235,303	122,647,164	53,711	52,587,971	177,251,686
7723-14-0	Phosphorus (yellow or white)	93	51	25,089	5,195	4,987	5	327,654	362,930
		92	50	27,894	2,397	4,808	5	327,970	363,074
		91	58	21,801	3,847	2,273	0	339,229	367,150
		88	73	9,049	11,559	11,322	0	3,893,674	3,925,604
85-44-9	Phthalic anhydride	93	178	90,810	389,629	457	0	226	481,122
		92	178	116,402	633,330	5,240	0	1,079	756,051
		91	190	112,654	520,170	13,169	0	1,194	647,187
		88	179	126,906	422,823	1,040	0	1,265	552,034
88-89-1	Picric acid	93	8	2	2	1	64,294	1	64,300
		92	8	2	1	2	1,068,674	2	1,068,681
		91	7	2	1	2	1,634,494	19	1,634,518
		88	5	251	1	251	1,362,180	250	1,362,933
—	Polybrominated biphenyls	93	1	0	0	0	0	0	0
		92	1	0	250	0	0	5	255
		91	No Reports Received						
		88	1	250	0	0	0	0	250
1336-36-3	Polychlorinated biphenyls (PCBs)	93	16	0	0	0	0	265	265
		92	20	0	0	0	0	1	1
		91	26	0	0	0	0	0	0
		88	122	6	0	10	0	752	768
1120-71-4	Propane sultone	93	1	250	0	0	0	0	250
		92	2	250	0	0	0	0	250
		91	No Reports Received						
		88	3	0	0	0	0	0	0

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Pentachlorophenol	93	1,010	40,981	69,218	1,133	34,860	0	147,202
	92	1,250	54,457	23,221	900	99,899	0	179,727
	91	1,755	10,670	65,491	834	186,845	90	265,685
	88	NA	NA	27,568	4,728	518,105	0	NA
Peracetic acid	93	0	0	110	3,689	0	0	3,799
	92	0	0	4,553	2,474	0	2,312	9,339
	91	0	0	0	1,672	0	0	1,672
	88	NA	NA	0	0	0	0	NA
Phenol	93	869,280	2,385,392	2,596,690	3,817,033	1,404,159	0	11,072,554
	92	808,210	2,699,514	1,681,322	4,548,089	1,175,394	25,087	10,937,616
	91	919,296	1,996,347	2,376,455	5,370,885	940,182	25,892	11,629,057
	88	NA	NA	3,668,466	6,046,640	2,518,461	107,900	NA
p-Phenylenediamine	93	0	0	28,693	3,830	7,900	0	40,423
	92	0	0	409	4,298	4,800	0	9,507
	91	0	0	1,200	3,239	13,000	0	17,439
	88	NA	NA	53,471	6,277	64,452	0	NA
2-Phenylphenol	93	0	260	0	3,687	1,005	0	4,952
	92	0	505	1,500	2,667	515	0	5,187
	91	0	260	5	4,858	510	0	5,633
	88	NA	NA	0	6,400	250	0	NA
Phosgene	93	0	0	1,000	0	0	0	1,000
	92	0	0	1,538	0	10	0	1,548
	91	0	0	2,425	0	5	0	2,430
	88	NA	NA	1,040	0	480	0	NA
Phosphoric acid	93	9,106,307	1,015	1,905,763	4,265,830	2,156,222	15,234	17,450,371
	92	7,631,321	913	1,802,151	4,905,132	1,198,684	737,831	16,276,032
	91	9,777,137	16,603	3,041,997	5,337,052	1,680,753	615,565	20,469,107
	88	NA	NA	3,270,219	13,996,695	5,303,543	743,381	NA
Phosphorus (yellow or white)	93	162,841	0	27,996	2,355	5,467	0	198,659
	92	166,372	0	36,229	255	259	0	203,115
	91	146,785	0	3,652	266	506	0	151,209
	88	NA	NA	14,074	646	195,013	946	NA
Phthalic anhydride	93	0	4,003,843	192,250	5,295	157,425	0	4,358,813
	92	4,148	3,659,358	315,500	4,800	251,349	660	4,235,815
	91	0	4,684,778	512,644	252,054	279,776	1	5,729,253
	88	NA	NA	2,877,574	53,441	3,976,682	21,803	NA
Picric acid	93	0	0	0	0	0	0	0
	92	0	0	34	0	0	0	34
	91	0	25,000	12,465	0	0	0	37,465
	88	NA	NA	14,000	0	0	0	NA
Polybrominated biphenyls	93	0	0	0	0	0	0	0
	92	0	0	0	0	500	0	500
	91	No Reports Received						
	88	NA	NA	0	0	0	0	NA
Polychlorinated biphenyls (PCBs)	93	0	4	857,363	265	164,205	0	1,021,837
	92	18,920	0	1,243,879	0	427,320	0	1,690,119
	91	14	0	774,559	0	112,850	0	887,423
	88	NA	NA	5,154,943	250	488,732	23,550	NA
Propane sultone	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	No Reports Received						
	88	NA	NA	0	0	0	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).39 Continued.

CAS Number40	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
123-38-6	Propionaldehyde	93	21	328,204	130,008	56	63,995	0	522,263
		92	22	396,321	287,069	9	63,940	0	747,339
		91	20	598,008	790,001	63	66,741	0	1,454,813
		88	15	399,253	868,586	1,156	930	0	1,269,925
114-26-1	Propoxur	93	4	0	5	0	0	0	5
		92	6	39	386	0	0	0	425
		91	6	10	5	0	0	0	15
		88	5	250	0	0	0	0	250
115-07-1	Propylene	93	323	13,141,400	5,763,375	175,120	0	0	19,079,895
		92	331	13,015,156	8,234,649	989	5	0	21,250,799
		91	345	13,613,265	9,397,905	4,685	0	0	23,015,855
		88	333	18,240,108	11,882,225	10,003	0	0	30,132,336
75-55-8	Propyleneimine	93	7	24	315	0	0	0	339
		92	7	17	386	0	0	0	403
		91	6	50	350	0	0	0	400
		88	1	250	250	0	0	0	500
75-56-9	Propylene oxide	93	121	333,869	790,027	6,390	5,151	6,197	1,141,634
		92	125	603,914	737,428	7,260	200	2,251	1,351,053
		91	124	812,409	670,756	10,181	20,710	2,450	1,516,506
		88	128	892,841	2,733,342	112,503	1,113,780	11,630	4,864,096
110-86-1	Pyridine	93	31	49,402	53,474	899	412,200	49	516,024
		92	36	55,986	78,253	10,218	508,615	9	653,081
		91	37	59,155	86,587	4,930	370,750	13	521,435
		88	31	143,881	107,918	2,158	491,775	1,125	746,857
91-22-5	Quinoline	93	24	4,344	19,963	50	63,000	196	87,553
		92	28	20,702	17,471	75	59,000	46	97,294
		91	27	20,133	24,958	2,660	23,000	286	71,037
		88	34	31,633	17,717	502	0	896	50,748
106-51-4	Quinone	93	5	14,000	2,101	1,400	0	0	17,501
		92	4	6,100	18,002	4	27	0	24,133
		91	4	2,205	1,807	0	5	0	4,017
		88	5	4,600	6,700	140	0	0	11,440
82-68-8	Quintozene	93	8	1,265	528	0	0	0	1,793
		92	11	766	774	0	0	0	1,540
		91	8	20	286	0	0	0	306
		88	6	750	314	0	0	0	1,064
81-07-2	Saccharin (manufacturing)	93	2	50	251	0	0	0	301
		92	4	63	260	0	0	0	323
		91	3	63	251	0	0	0	314
		88	4	250	500	0	0	0	750
94-59-7	Safrole	93	No Reports Received						
		92	No Reports Received						
		91	No Reports Received						
		88	2	250	250	0	0	0	500
7782-49-2	Selenium	93	15	334	1,200	0	0	256	1,790
		92	12	30	1,033	0	0	5	1,068
		91	15	525	835	188	0	260	1,808
		88	24	2,251	14,031	1,168	0	127,508	144,958
—	Selenium compounds	93	45	2,802	74,934	557	2,300	120,271	200,864
		92	41	4,503	28,401	5,963	3,700	99,116	141,683
		91	41	2,380	34,674	722	4,100	80,295	122,171
		88	18	2,251	12,255	250	3,400	46,000	64,156

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Propionaldehyde	93	0	13,333	1	1,155	3,167	0	17,656
	92	0	14,339	0	12,906	4,961	0	32,206
	91	0	5,100	250	12,922	4,975	0	23,247
	88	NA	NA	1,600	761	0	0	NA
Propoxur	93	0	0	750	250	0	0	1,000
	92	0	0	1,000	250	5	0	1,255
	91	0	0	455	255	5	0	715
	88	NA	NA	0	0	250	0	NA
Propylene	93	0	2,188,040	388,948	5	482	0	2,577,475
	92	0	2,891,581	580,777	255	34	0	3,472,647
	91	0	2,640,000	724,173	5	6,039	0	3,370,217
	88	NA	NA	1,521,069	500	3,320	0	NA
Propyleneimine	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	250	0	0	NA
Propylene oxide	93	0	95,414	15,534	25,877	9,597	0	146,422
	92	0	572,206	4,134	33,600	76,669	0	686,609
	91	5	1,361,220	12,437	52,154	40,392	0	1,466,208
	88	NA	NA	1,091	386,355	16,626	35	NA
Pyridine	93	3,609	184,027	93,910	309,895	4,977	0	596,418
	92	0	506,275	331,554	199,015	4,541	0	1,041,385
	91	33,804	177,321	202,765	264,235	4,560	0	682,685
	88	NA	NA	56,729	275,083	40,699	0	NA
Quinoline	93	3,609	16,015	1,953	505	5,997	0	28,079
	92	0	210	5,001	260	2,160	250	7,881
	91	0	0	4,248	255	3,702	0	8,205
	88	NA	NA	4,945	6,406	6,242	0	NA
Quinone	93	0	0	6,776	0	0	0	6,776
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	280	250	0	0	NA
Quintozene	93	0	0	522,354	505	285	0	523,144
	92	170,000	373	452,527	26	50	0	622,976
	91	0	105	61,470	11	1,480	0	63,066
	88	NA	NA	0	250	12,625	0	NA
Saccharin (manufacturing)	93	0	0	25,625	12	840	0	26,477
	92	0	0	9,550	279	1,300	0	11,129
	91	0	0	350	260	1,400	0	2,010
	88	NA	NA	0	7,900	750	0	NA
Safrole	93	No Reports Received						
	92	No Reports Received						
	91	No Reports Received						
	88	NA	NA	0	250	0	0	NA
Selenium	93	27,911	0	2,984	260	3,776	0	34,931
	92	38,463	0	462	57	3,440	5	42,427
	91	43,378	5	6,975	270	22,407	0	73,035
	88	NA	NA	3,145	1,250	2,617	500	NA
Selenium compounds	93	229,327	0	11,002	212	39,415	5	279,961
	92	271,351	1,270	26,982	210	41,894	0	341,707
	91	22,485	0	10,456	160	37,774	0	70,875
	88	NA	NA	1,631	1,860	61,366	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).(39) Continued.

CAS Number(40)	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
7440-22-4	Silver	93	64	4,437	2,643	318	210	1,000	8,608
		92	64	3,262	3,517	140	0	500	7,419
		91	64	5,555	7,599	119	28	250	13,551
		88	72	11,480	36,508	1,654	0	39,510	89,152
—	Silver compounds	93	56	6,476	15,147	9,069	100	20,376	51,168
		92	55	6,977	22,673	9,639	24	20,318	59,631
		91	55	6,637	18,244	8,309	25	17,541	50,756
		88	47	5,991	9,415	8,934	250	11,550	36,140
100-42-5	Styrene	93	1,404	12,559,401	20,011,190	28,274	132,607	177,580	32,909,052
		92	1,417	11,662,203	19,332,109	23,502	83,170	304,179	31,405,163
		91	1,425	10,350,832	18,758,225	25,980	22,080	389,979	29,547,096
		88	1,235	12,769,278	20,746,951	59,069	165	242,941	33,818,404
96-09-3	Styrene oxide	93	5	298	46	0	0	0	344
		92	5	304	64	0	0	0	368
		91	5	1,628	47	0	0	0	1,675
		88	6	511	1,803	0	0	0	2,314
7664-93-9	Sulfuric acid	93	5,640	1,866,251	22,763,591	27,542,946	105,872,094	1,552,743	159,597,625
		92	5,697	1,781,204	22,213,886	31,719,776	98,631,395	1,737,176	156,083,437
		91	5,717	1,703,072	20,492,741	36,993,223	94,720,218	7,679,325	161,588,579
		88	5,635	3,060,238	16,173,442	36,485,235	138,707,333	4,929,361	199,355,609
79-34-5	1,1,2,2-Tetra-chloroethane	93	15	24,640	3,563	2,930	0	1	31,134
		92	17	28,117	20,782	5,164	0	0	54,063
		91	21	40,927	23,324	2,113	0	0	66,364
		88	13	25,904	17,961	1,903	0	29	45,797
127-18-4	Tetrachloroethylene	93	474	4,422,676	6,519,343	10,152	15,041	618,026	11,585,238
		92	512	5,235,244	7,255,130	10,317	12,780	9,354	12,522,825
		91	573	6,619,885	10,265,361	7,448	14,000	23,309	16,930,003
		88	743	16,339,200	19,733,646	33,314	72,250	82,144	36,260,554
961-11-5	Tetrachlorvinphos	93	4	260	270	5	0	0	535
		92	5	260	2,575	5	0	0	2,840
		91	5	251	379	2	0	0	632
		88	6	250	1	0	0	0	251
7440-28-0	Thallium	93	1	5	250	0	0	755	1,010
		92	No Reports Received						
		91	1	1	29	1	0	0	31
		88	No Reports Received						
—	Thallium compounds	93	No Reports Received						
		92	2	255	500	0	0	505	1,260
		91	1	5	250	0	0	255	510
		88	5	1	252	750	0	250	1,253
62-55-5	Thioacetamide	93	No Reports Received						
		92	No Reports Received						
		91	1	0	0	0	0	0	0
		88	1	250	250	0	0	0	500
62-56-6	Thiourea	93	26	857	515	2,611	5,300	288	9,571
		92	29	660	557	727	5,300	256	7,500
		91	33	878	805	717	5,400	505	8,305
		88	26	1,504	500	16,951	5,940	750	25,645
1314-20-1	Thorium dioxide	93	1	0	0	0	0	0	0
		92	1	0	5	0	0	0	5
		91	1	0	250	0	0	0	250
		88	3	230	1,350	0	0	0	1,580

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling[41] Pounds	Transfers to Energy Recovery[41] Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers[42] Pounds	Total Transfers[43] Pounds
Silver	93	643,597	0	7,940	1,934	1,922	0	655,393
	92	979,856	0	4,797	1,858	9,802	3,900	1,000,213
	91	985,166	0	9,105	2,134	116,254	337	1,112,996
	88	NA	NA	23,875	3,624	3,263	0	NA
Silver compounds	93	1,450,290	0	2,229	6,451	14,219	0	1,473,189
	92	976,578	0	1,912	4,235	8,190	500	991,415
	91	676,072	0	1,358	3,307	2,901	500	684,138
	88	NA	NA	8,986	8,078	3,139	2,830	NA
Styrene	93	1,074,823	5,186,338	3,106,473	95,736	2,064,768	5	11,528,143
	92	1,064,486	8,588,931	3,215,443	254,679	2,271,429	20,908	15,415,876
	91	113,007	8,436,150	2,855,961	242,630	2,026,250	9,135	13,683,133
	88	NA	NA	5,696,394	478,773	2,009,546	1,260,446	NA
Styrene oxide	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	250	750	0	NA
Sulfuric acid	93	1,182,623,222	28,498	34,382,097	19,188,364	39,001,403	98,209	1,275,321,793
	92	994,718,970	520,391	42,059,524	34,908,804	34,587,976	3,703,090	1,110,498,755
	91	719,447,354	94,156	44,252,824	33,243,151	31,390,155	128,387	828,556,027
	88	NA	NA	63,763,194	54,196,046	41,816,314	3,501,906	NA
1,1,2,2-Tetra-chloroethane	93	1,737,712	0	32,733	155	80	0	1,770,680
	92	1,446,254	0	65,142	8,113	273	0	1,519,782
	91	992,070	17,800	214,173	2,005	262	1	1,226,311
	88	NA	NA	74,982	400	128,750	0	NA
Tetrachloroethylene	93	6,033,800	823,490	2,346,817	111,007	56,340	9,709	9,381,163
	92	7,759,959	729,655	1,978,679	111,522	113,324	157,406	10,850,545
	91	10,899,318	1,263,488	3,587,201	234,642	115,933	138,019	16,238,601
	88	NA	NA	4,059,045	558,691	1,385,378	119,665	NA
Tetrachlorvinphos	93	0	0	4,310	17	8,825	0	13,152
	92	0	0	135,100	29	104,680	0	239,809
	91	0	0	5,550	9	27,969	0	33,528
	88	NA	NA	40,210	2	9,270	0	NA
Thallium	93	750	0	0	5	0	0	755
	92	No Reports Received						
	91	0	0	1	0	953	0	954
	88	No Reports Received						
Thallium compounds	93	No Reports Received						
	92	75,905	0	3,900	5	250	0	80,060
	91	1,500	0	0	5	0	0	1,505
	88	NA	NA	250	6	1,000	0	NA
Thioacetamide	93	No Reports Received						
	92	No Reports Received						
	91	0	0	0	0	0	0	0
	88	NA	NA	250	0	0	0	NA
Thiourea	93	0	0	2,645	1,534	2,446	0	6,625
	92	0	0	2,698	25,925	17,087	0	45,710
	91	335	750	4,107	16,656	1,661	0	23,509
	88	NA	NA	2,511	26,634	2,303	0	NA
Thorium dioxide	93	0	0	0	0	42,000	0	42,000
	92	0	0	0	5	64,000	0	64,005
	91	0	0	0	250	102,249	0	102,499
	88	NA	NA	0	250	677,549	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).(39) Continued.

CAS Number(40)	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
7550-45-0	Titanium tetrachloride	93	38	19,012	5,610	0	0	100	24,722
		92	41	24,186	4,094	0	0	0	28,280
		91	38	27,370	6,236	0	0	0	33,606
		88	41	38,614	40,054	0	0	1,400	80,068
108-88-3	Toluene	93	3,569	60,860,617	116,441,054	133,248	967,496	234,148	178,636,563
		92	3,770	65,637,893	128,470,429	84,042	1,573,891	708,269	196,474,524
		91	3,928	76,731,982	131,544,159	105,126	1,374,207	179,951	209,935,425
		88	3,979	105,166,199	192,139,704	197,208	1,473,666	731,449	299,708,226
584-84-9	Toluene-2,4-diiso-cyanate	93	75	4,858	54,011	0	0	0	58,869
		92	83	6,294	11,455	0	0	250	17,999
		91	105	12,148	1,309,866	0	0	250	1,322,264
		88	256	46,634	118,428	0	0	1,040	166,102
91-08-7	Toluene-2,6-diiso-cyanate	93	42	2,239	4,456	0	0	0	6,695
		92	51	2,476	3,892	0	0	250	6,618
		91	63	303,581	28,114	0	0	250	331,945
		88	189	153,253	338,939	0	0	510	492,702
95-53-4	o-Toluidine	93	20	15,421	2,980	1,266	24,600	7	44,274
		92	19	5,255	2,237	310	31,800	6,823	46,425
		91	18	8,904	1,925	260	21,100	8,111	40,300
		88	18	19,196	27,726	1,902	250	5,024	54,098
52-68-6	Trichlorfon	93	3	5	1	7	0	0	13
		92	4	5	253	9	0	0	267
		91	5	5	254	9	0	0	268
		88	5	250	3	0	0	0	253
120-82-1	1,2,4-Trichlorobenzene	93	41	103,567	159,276	1,148	5,118	1,781	270,890
		92	51	219,941	195,606	995	1,200	2,680	420,422
		91	55	127,598	283,851	1,669	3,134	4,573	420,825
		88	56	438,009	1,094,904	31,628	7,408	3,073	1,575,022
71-55-6	1,1,1-Trichloroethane	93	2,073	32,866,736	31,199,295	10,912	2,528	42,743	64,122,214
		92	3,178	57,394,283	59,679,895	13,473	561	76,381	117,164,593
		91	3,699	71,782,293	71,125,442	22,058	2,805	174,730	143,107,328
		88	3,891	92,213,890	87,022,107	95,624	1,000	204,923	179,537,544
79-00-5	1,1,2-Trichloroethane	93	24	104,697	210,700	2,030	0	5	317,432
		92	24	85,953	476,132	1,163	0	7	563,255
		91	28	94,329	433,537	1,382	2	256	529,506
		88	29	618,608	1,122,834	5,303	0	89	1,746,834
79-01-6	Trichloroethylene	93	772	14,488,988	15,625,125	5,218	460	8,212	30,128,003
		92	675	15,433,613	14,744,627	8,606	466	20,726	30,208,038
		91	723	16,998,300	18,694,402	12,784	800	62,991	35,769,277
		88	946	26,077,985	29,715,662	13,801	390	21,186	55,829,024
95-95-4	2,4,5-Trichlorophenol	93	No Reports Received						
		92	1	0	0	0	0	0	0
		91	2	0	0	0	28,000	0	28,000
		88	1	1	90	0	0	0	91
88-06-2	2,4,6-Trichlorophenol	93	1	0	69	56	0	0	125
		92	1	7	79	1	0	0	87
		91	2	1	79	1	0	1	82
		88	3	0	250	50	12,000	0	12,300
1582-09-8	Trifluralin	93	17	12,185	5,475	10	0	5	17,675
		92	20	10,637	2,672	290	0	10	13,609
		91	23	8,449	2,711	80	0	31,835	43,075
		88	17	2,020	1,257	601	0	0	3,878

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Titanium tetrachloride	93	0	86	2,958,898	0	16	0	2,959,000
	92	0	0	3,276,833	0	39,000	0	3,315,833
	91	0	2,688	2,367,140	5	958	0	2,370,791
	88	NA	NA	1,667,045	0	0	0	NA
Toluene	93	31,193,360	80,756,715	22,167,766	968,612	1,151,233	91,442	136,329,128
	92	30,096,035	79,040,678	19,839,239	1,045,966	942,920	127,595	131,092,433
	91	26,171,587	80,573,391	20,372,432	1,335,834	1,695,960	174,107	130,323,311
	88	NA	NA	47,694,960	3,591,186	9,566,528	4,633,576	NA
Toluene-2,4-diiso-cyanate	93	81,888	16,620	59,063	0	9,938	0	167,509
	92	7,400	1,020	45,644	0	1,499	2,050	57,613
	91	10,900	12,911	35,711	0	14,098	0	73,620
	88	NA	NA	193,439	500	36,178	3	NA
Toluene-2,6-diiso-cyanate	93	20,497	4,746	340	0	2,010	0	27,593
	92	1,770	48	15,433	0	475	0	17,726
	91	1,950	10	14,428	0	0	0	16,388
	88	NA	NA	45,287	250	9,444	0	NA
o-Toluidine	93	0	41,913	29,039	86,591	56	0	157,599
	92	0	232,901	11,182	2,412	188	0	246,683
	91	0	62,900	101,931	8,250	85	1,300	174,466
	88	NA	NA	31,500	15,172	670	0	NA
Trichlorfon	93	0	0	272	0	0	0	272
	92	0	0	3,109	0	274	0	3,383
	91	0	0	1,145	0	297	0	1,442
	88	NA	NA	1,079	215	487	0	NA
1,2,4-Trichlorobenzene	93	520	30,930	623,111	170,659	18,276	0	843,496
	92	48,070	80,454	1,548,060	183,020	42,753	0	1,902,357
	91	85,165	68,617	315,761	136,769	59,051	0	665,363
	88	NA	NA	734,243	262,676	164,144	0	NA
1,1,1-Trichloroethane	93	14,370,656	2,322,187	3,568,694	60,457	267,633	177,907	20,767,534
	92	23,284,982	3,649,347	4,195,755	118,518	613,824	173,815	32,036,241
	91	27,688,045	3,358,006	6,840,156	253,062	979,927	291,538	39,410,734
	88	NA	NA	12,091,960	304,353	5,944,425	1,294,443	NA
1,1,2-Trichloroethane	93	12,136,563	23,308	3,995,573	1,600	592	0	16,157,636
	92	8,905,509	1,000	3,221,849	1,200	219	0	12,129,777
	91	8,179,318	0	4,997,737	819	8,580	0	13,186,454
	88	NA	NA	239,032	750	19,810	1,000	NA
Trichloroethylene	93	6,911,325	1,196,826	1,806,930	45,777	232,950	60,207	10,254,015
	92	6,711,893	939,013	1,723,037	70,144	248,714	49,621	9,742,422
	91	6,889,209	848,596	2,580,686	73,195	115,973	94,386	10,602,045
	88	NA	NA	4,691,284	85,652	1,398,876	342,580	NA
2,4,5-Trichlorophenol	93	No Reports Received						
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	20	0	NA
2,4,6-Trichlorophenol	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	10	0	NA
Trifluralin	93	0	0	17,628	67	18,856	0	36,551
	92	250	5	44,573	32	25,332	0	70,192
	91	250	0	26,604	141	50,013	0	77,008
	88	NA	NA	149,989	371	40,557	0	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).(39) Continued.

CAS Number(40)	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
95-63-6	1,2,4-Trimethylbenzene	93	699	2,345,237	4,276,394	17,549	1,293	16,771	6,657,244
		92	645	2,260,902	3,102,993	8,481	14,409	511,202	5,897,987
		91	557	2,873,648	2,715,630	15,846	16,898	17,737	5,639,759
		88	287	2,019,468	2,320,975	10,088	7,964	61,583	4,420,078
51-79-6	Urethane	93	3	12,200	0	0	0	0	12,200
		92	5	3,200	0	0	0	0	3,200
		91	8	0	1,800	0	0	0	1,800
		88	11	140,500	4,623	0	0	0	145,123
7440-62-2	Vanadium (fume or dust)	93	12	4,769	6,407	3,200	0	36,000	50,376
		92	13	2,015	11,930	4,250	0	83,250	101,445
		91	19	2,875	14,722	685	0	74,730	93,012
		88	32	3,135	14,029	4,704	0	87,296	109,164
108-05-4	Vinyl acetate	93	154	1,188,547	3,012,385	1,341	1,408,698	1,626	5,612,597
		92	151	1,079,209	3,073,769	7,208	1,616,385	5,249	5,781,820
		91	156	1,102,854	4,382,994	9,900	3,088,362	7,237	8,591,347
		88	147	1,470,627	4,450,994	10,021	2,109,859	18,889	8,060,390
593-60-2	Vinyl bromide	93	2	257	1,400	0	0	0	1,657
		92	2	28,300	4,600	0	0	0	32,900
		91	1	260	3,300	0	0	0	3,560
		88	2	4,000	950	400	0	0	5,350
75-01-4	Vinyl chloride	93	45	306,661	707,301	277	0	6	1,014,245
		92	50	382,412	730,744	902	1	3,106	1,117,165
		91	49	390,319	657,366	4,625	4	250	1,052,564
		88	53	421,882	1,016,887	2,051	53	4,409	1,445,282
75-35-4	Vinylidene chloride	93	24	58,578	136,746	192	0	20	195,536
		92	23	55,540	188,781	1,306	0	14	245,641
		91	23	74,224	213,416	794	0	15	288,449
		88	21	104,552	191,801	3,462	170	429	300,414
1330-20-7	Xylene (mixed isomers)	93	3,371	25,653,790	85,535,823	51,944	213,157	203,182	111,657,896
		92	3,449	26,741,579	85,263,251	41,498	219,255	1,434,651	113,700,234
		91	3,587	29,135,376	92,573,195	52,147	139,949	283,432	122,184,099
		88	3,448	34,482,978	123,435,726	204,480	144,728	558,257	158,826,169
108-38-3	m-Xylene	93	61	1,236,772	424,684	2,798	5	3,751	1,668,010
		92	70	874,961	387,026	1,397	5	6,189	1,269,578
		91	62	888,807	509,426	2,260	5	3,274	1,403,772
		88	68	1,480,104	982,939	2,566	0	18,045	2,483,654
95-47-6	o-Xylene	93	81	1,310,688	641,424	1,180	5	1,143	1,954,440
		92	85	1,434,884	683,067	1,868	5	5,967	2,125,791
		91	93	1,146,683	603,135	6,507	5	1,706	1,758,036
		88	66	1,613,292	628,522	2,786	250	22,461	2,267,311
106-42-3	p-Xylene	93	49	1,268,116	3,170,089	749	5	631	4,439,590
		92	46	1,039,431	3,137,671	1,868	5	4,101	4,183,076
		91	48	1,314,514	4,066,812	1,076	5	3,723	5,386,130
		88	48	1,737,827	4,340,922	3,200	0	49,226	6,131,175
87-62-7	2,6-Xylidine	93	5	83	27	387	0	0	497
		92	3	33	26	0	0	0	59
		91	2	5	16	0	0	0	21
		88	2	0	337	1,537	0	0	1,874
7440-66-6	Zinc (fume or dust)	93	418	830,106	850,500	66,802	0	10,449,577	12,196,985
		92	454	670,618	910,739	47,289	120,000	15,308,784	17,057,430
		91	473	768,219	1,205,415	27,924	115	9,215,354	11,217,027
		88	645	1,944,168	1,515,369	849,544	140,010	25,617,365	30,066,456

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling⓫ Pounds	Transfers to Energy Recovery⓫ Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers⓬ Pounds	Total Transfers⓭ Pounds
1,2,4-Trimethylbenzene	93	1,475,226	2,976,915	261,610	219,193	43,284	3,052	4,979,280
	92	453,011	2,261,099	233,571	180,823	52,815	4,386	3,185,705
	91	492,769	1,536,167	216,694	269,685	145,762	14,361	2,675,438
	88	NA	NA	330,046	501,717	200,616	38,117	NA
Urethane	93	0	0	0	5,900	46,360	0	52,260
	92	0	0	4,700	6,400	3,200	0	14,300
	91	0	0	15,300	0	3,750	0	19,050
	88	NA	NA	3,558	260	1,350	0	NA
Vanadium (fume or dust)	93	250	0	1,080	5	6,405	0	7,740
	92	92	0	849	5	9,769	0	10,715
	91	154,749	61	1,646	270	426,571	0	583,297
	88	NA	NA	1,858	0	91,559	0	NA
Vinyl acetate	93	826,472	8,463,013	1,486,726	278,715	28,051	34,000	11,116,977
	92	1,139,485	5,897,704	838,232	190,754	395,519	5,600	8,467,294
	91	1,136	3,648,193	124,913	153,451	49,834	0	3,977,527
	88	NA	NA	354,698	2,319,733	21,811	20,015	NA
Vinyl bromide	93	0	0	0	0	0	0	0
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Vinyl chloride	93	151,324	11,613	25,360	343	18,091	0	206,731
	92	158,159	2,731	23,926	474	11,694	0	196,984
	91	236,549	59	69,619	252	6,549	0	313,028
	88	NA	NA	669,044	17,104	4,555	2,188	NA
Vinylidene chloride	93	5	8	162,129	201	1	0	162,344
	92	0	0	104,102	260	0	0	104,362
	91	0	0	74,520	94	7	0	74,621
	88	NA	NA	360,958	3,303	44,281	0	NA
Xylene (mixed isomers)	93	36,861,435	70,497,637	7,004,139	657,939	981,743	11,279	116,014,172
	92	39,483,032	64,625,353	6,421,776	861,431	1,255,373	119,128	112,766,093
	91	40,354,090	67,000,425	19,285,051	1,442,516	959,974	195,932	129,237,988
	88	NA	NA	27,182,180	4,160,974	6,461,129	3,812,132	NA
m-Xylene	93	27,264	116,095	23,518	33,378	100,441	0	300,696
	92	10,331	93,296	132,920	156,993	72,851	0	466,391
	91	15,968	47,829	106,345	19,178	49,329	0	238,649
	88	NA	NA	113,311	19,708	107,746	115	NA
o-Xylene	93	7,223	1,865,351	29,362	22,262	51,219	0	1,975,417
	92	135,247	2,327,216	48,815	53,212	11,067	0	2,575,557
	91	10,249	2,614,447	101,899	117,628	23,242	61,354	2,928,819
	88	NA	NA	95,764	44,023	52,881	12,864	NA
p-Xylene	93	1,427	71,806	16,138	31,730	5,794	0	126,895
	92	215	46,909	8,020	70,927	10,681	0	136,752
	91	1,365	10,020	48,171	18,748	14,076	296	92,676
	88	NA	NA	48,320	752	31,108	0	NA
2,6-Xylidine	93	0	0	625	0	0	0	625
	92	0	0	0	0	0	0	0
	91	0	0	0	0	0	0	0
	88	NA	NA	0	0	0	0	NA
Zinc (fume or dust)	93	75,916,019	101,807	661,883	102,336	2,221,024	500	79,003,569
	92	62,775,431	102,319	1,367,953	155,381	5,571,026	100,499	70,072,609
	91	69,286,645	50,022	3,511,627	40,108	4,259,167	146,827	77,294,396
	88	NA	NA	7,667,102	835,711	29,642,266	4,776,287	NA

Table 3-23. Releases and Transfers of TRI Chemicals Reported, 1988, 1991-1993 (Alphabetically Ordered).39 Continued.

CAS Number40	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
—	Zinc compounds	93	2,463	1,501,719	2,814,644	1,046,444	176,143	67,413,392	72,952,342
		92	2,417	1,535,800	2,605,843	1,027,476	127,197	76,536,317	81,832,633
		91	2,350	1,539,900	2,724,046	1,333,858	228,007	108,767,702	114,593,513
		88	1,644	3,242,390	3,997,032	1,196,639	109,555	113,284,711	121,830,327
12122-67-7	Zineb	93	No Reports Received						
		92	No Reports Received						
		91	1	5	0	0	0	0	5
		88	2	250	1,000	0	0	0	1,250
	Mixtures and other trade name products	93	47	86,411	18,952	5	0	2,412	107,780
		92	60	39,985	20,656	0	0	32,950	93,591
		91	157	245,343	680,758	7,463	1,540	4,852	939,956
		88	175	628,029	2,822,591	78,910	0	16,099	3,545,629
	Trade secrets	93	14	2,850	525	0	0	0	3,375
		92	16	4,400	48,385	0	0	20,000	72,785
		91	14	801	79,743	1,400	0	0	81,944
		88	6	0	0	19,700	0	0	19,700
	Total	93	79,072	480,245,942	1,175,112,806	271,092,265	575,994,149	288,973,564	2,791,418,726
		92	81,228	541,139,839	1,307,162,497	276,111,371	725,821,103	340,179,498	3,190,414,308
		91	83,625	618,630,741	1,403,697,373	245,301,508	709,185,109	416,714,015	3,393,528,746
		88	78,208	840,042,600	1,866,954,765	311,587,802	1,342,357,672	513,296,671	4,874,239,510

Table 3-23, Cont.

Chemical	Year	Transfers to Recycling (41) Pounds	Transfers to Energy Recovery (41) Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Transfers to Disposal Pounds	Other Off-site Transfers (42) Pounds	Total Transfers (43) Pounds
Zinc compounds	93	226,610,466	281,162	11,016,676	522,228	88,033,585	31,666	326,495,783
	92	232,524,416	348,371	36,543,849	591,271	45,978,362	3,449,466	319,435,735
	91	182,193,783	475,814	6,745,843	649,409	41,931,027	1,904,982	233,900,858
	88	NA	NA	17,832,721	1,527,297	67,204,260	1,416,608	NA
Zineb	93	No Reports Received						
	92	No Reports Received						
	91	0	0	5	0	0	0	5
	88	NA	NA	250	0	2,600	0	NA
Mixtures and other trade name products	93	443,745	18,662	490,154	1,151	2,985	0	956,697
	92	418,077	62,342	996,065	1,506	1,552,607	0	3,030,597
	91	1,474,618	135,210	222,318	64,463	272,504	5,700	2,174,813
	88	NA	NA	751,058	186,938	10,661,927	190,046	NA
Trade secrets	93	397,675	11,525	221,020	5	0	0	630,225
	92	68,000	23,000	575,920	5	0	0	666,925
	91	30,000	2,000	329,200	0	8,499	0	369,699
	88	NA	NA	20,650	0	0	0	NA
Total	93	3,248,969,990	486,303,735	325,662,309	314,167,969	321,552,281	1,820,373	4,698,476,657
	92	2,933,685,469	472,252,568	393,260,049	436,399,701	261,242,552	17,931,132	4,514,771,471
	91	2,288,542,499	443,312,792	351,711,653	393,878,122	261,687,384	10,672,939	3,749,805,389
	88	NA	NA	492,576,600	581,979,953	491,867,067	48,299,434	NA

(39) Does not include data for aluminum oxide, delisted chemicals, or chemicals added in 1990 and 1991.
(40) Compound categories do not have CAS numbers (—).
(41) NA: Transfers for recycling or energy recovery were not required to be reported for 1988.
(42) For 1991, 1992, and 1993, transfers reported with no waste management code or invalid codes.
For 1988, transfers reported with no waste management codes, invalid codes, or codes not required to be reported in 1988.
(43) Because transfers for recycling or energy recovery were not required to be reported in 1988, total transfers in 1988 are not comparable to total transfers reported for 1991, 1992, or 1993.

Chapter 4

TRI Reporting Profiles for 33/50 Program Chemicals

TRI REPORTING PROFILES FOR 33/50 PROGRAM CHEMICALS

INTRODUCTION

The 33/50 Program, an EPA voluntary pollution prevention initiative, derives its name from its overall goals—an interim goal of a 33% reduction in 1992 and an ultimate goal of a 50% reduction in 1995 in releases and transfers of 17 high-priority toxic chemicals (see Box 4-1), using 1988 TRI reporting as a baseline. During 1988, 1.49 billion pounds of the target chemicals were either released to the environment on-site or transferred off-site to waste management facilities. The aim of the 33/50 Program is to reduce this amount by at least 50%—744 million pounds—by 1995, with an interim reduction target of more than 491 million pounds by 1992.

The 33/50 Program represents an innovative experiment aimed at demonstrating whether voluntary programs can augment the Agency's traditional command-and-control approach by achieving targeted reductions more quickly than would regulations alone. The Program is part of a broad group of EPA activities designed to encourage pollution prevention as the best means of achieving reductions in toxic chemical releases and transfers. More than 19,000 TRI facilities have reported 33/50 Program chemicals to TRI since 1988. By contacting the chief executives of the parent companies of TRI facilities that report 33/50 Program chemicals, the Program seeks to instill a pollution prevention ethic throughout the highest echelons of American businesses.

At the time the 33/50 Program was formulated, 1988 was the most recent year for which TRI data were available, and the Program's baseline and goals were set accordingly. Reductions that companies achieved between 1988 and 1990 therefore contribute to the 33/50 Program's national reduction goals. However, these prior reductions should not be viewed as resulting from the 33/50 Program, as companies were first informed about the Program in February, 1991.

Many states, a number of industry associations, and numerous individual companies include 33/50 Program chemicals within the scope of their own environmental initiatives. Twenty-six states had established toxics use reduction and pollution prevention programs prior to establishment of the 33/50 Program, and these contributed to its design. Others have used the 33/50 Program as a model. EPA views the 33/50 Program as an umbrella under which the federal government, states, industry, and communities work in partnership to achieve common goals. Any progress in reducing releases and transfers of 33/50 Program chemicals reflects the efforts of all these partners.

Analyses of 33/50 Program progress consider only those data elements facilities were required to report in 1988: environmental releases and transfers off-site for treatment and disposal (including transfers to POTWs and transfers with missing or invalid transfer codes).

17 Priority Chemicals Targeted by the 33/50 Program

Benzene
Cadmium and compounds
Carbon tetrachloride
Chloroform
Chromium and compounds
Cyanide compounds
Dichloromethane
Lead and compounds
Mercury and compounds
Methyl ethyl ketone
Methyl isobutyl ketone
Nickel and compounds
Tetrachloroethylene
Toluene
1,1,1-Trichloroethane
Trichloroethylene
Xylenes

Box 4-1. 33/50 Program Chemicals.

Transfers off-site for energy recovery and for recycling are not included in 33/50 Program goals.

SUMMARY OF FINDINGS

Findings revealed in the 1993 TRI reporting data are summarized below. The data themselves are presented in subsequent sections.

33/50 Program Chemicals Continue Trend Toward Early Achievement of 1995 Reduction Goal

- Releases and transfers of 33/50 Program chemicals were reduced by 100 million pounds (11%) between 1992 and 1993, bringing total reductions since 1988 to 46% (685 million pounds), just shy of the Program's 1995 50% reduction goal (see Figure 4-1).
- Facilities are projecting continued reductions in their releases and transfers of 33/50 Program chemicals in 1994 and 1995, suggesting that the Program's ultimate reduction goal of 744 million pounds may be achieved a year ahead of schedule.
- Facilities owned by companies participating in the 33/50 Program reported the highest reduction levels and accounted for most of the pounds of 33/50 Program chemical reductions.
- Between 1992 and 1993, facilities owned by Program participants reduced releases and transfers of the 17 Program chemicals by 20%. The rate of reduction achieved by facilities owned by non-participating companies was just 0.6%.
- Participating companies accounted for 98% of the reduction in 33/50 Program chemical releases and transfers in the last year. Since 1988, facilities owned by participating companies have more than halved their releases and transfers of 33/50 Program chemicals, achieving a 57% reduction.

Total 33/50 Program Chemical Production-Related Waste Projected to Decline

- Total production-related waste associated with 33/50 Program chemicals increased slightly (2.9%) between 1992 and 1993, but is projected to decline by nearly 6% in 1994, while facilities expect other TRI chemical waste to continue increasing (see Figure 4-2).
- Facilities owned by 33/50 Program participating companies reported a slight decrease in production-related waste (0.5%) while facilities owned by non-participating parent companies reported an 8% increase.

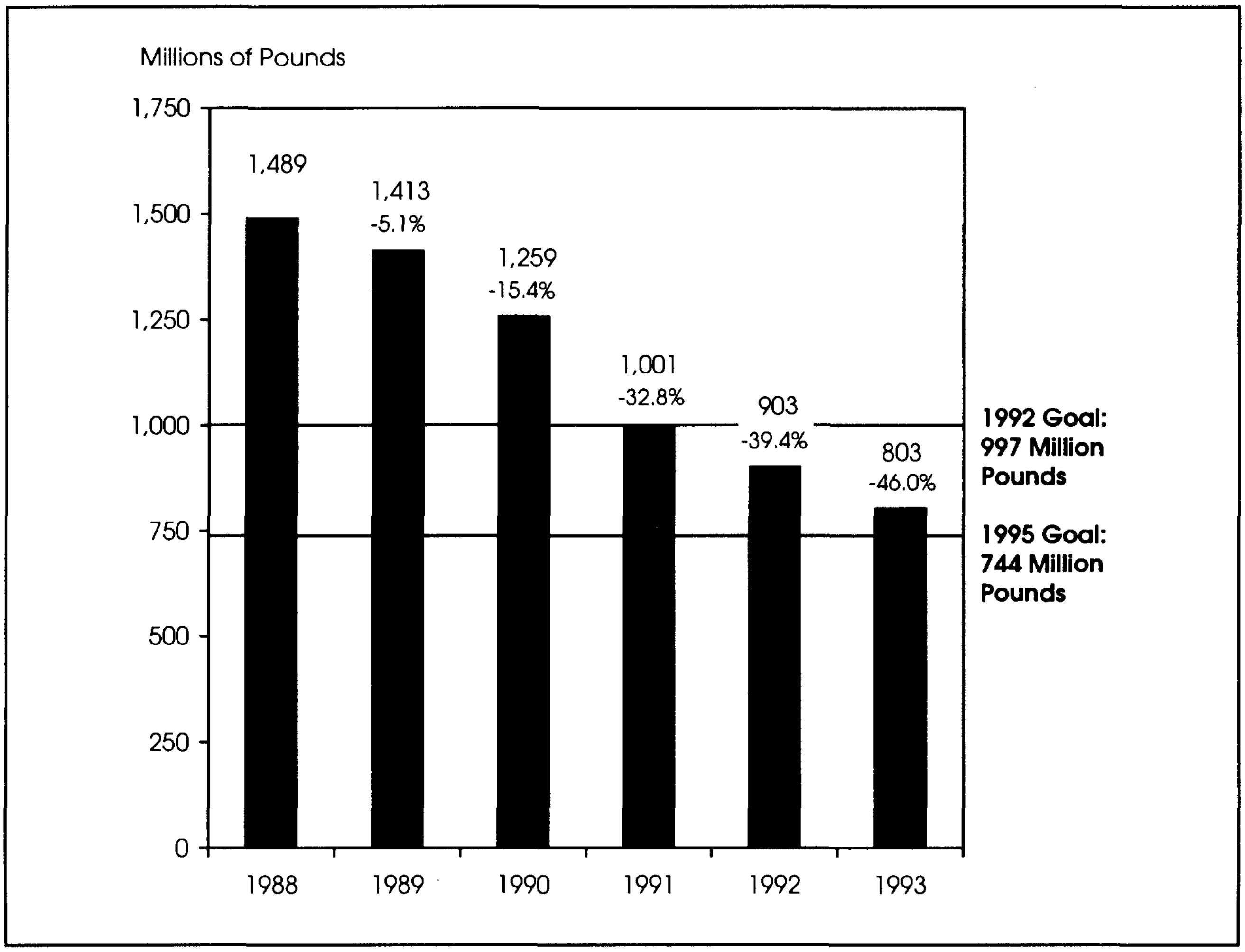


Figure 4-1. TRI Releases and Transfers of 33/50 Program Chemicals, 1988-1993.[1]

- Participating companies' facilities project a 15% decrease in production-related waste of 33/50 chemicals by 1995, compared to a 7% increase projected by non-participants.

Source Reduction Activity Highlights

- 33/50 Program chemicals again in 1993 evidenced higher rates (percentages of Form Rs) and levels (total number of Form Rs) of source reduction activity reporting than other TRI chemicals. Nearly a third of the Form Rs submitted for 33/50 Program chemicals reported the occurrence of a source reduction activity in 1993, compared to a fifth of the forms for other TRI chemicals. The 7,639 source reduction activity reports for the 17 target chemicals represented nearly 40% of the total for all chemicals.

- Individual 33/50 Program chemicals had some of the highest rates of source reduction activity reporting in 1993. The top three TRI chemicals for number of forms reporting source reduction activities in 1993 were 33/50 Program targets, and several others are among the top 30.

[1] The amounts for transfers to recycling and energy recovery reported for 1991-1993 have not been included in these totals.

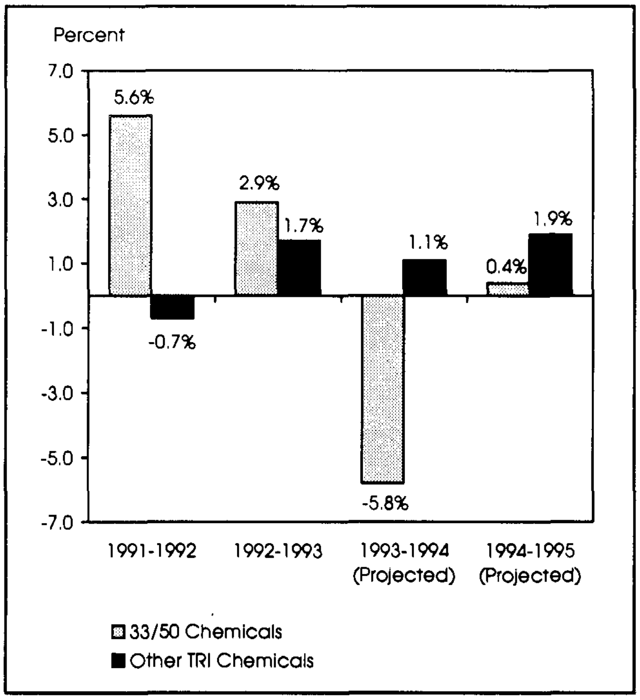


Figure 4-2. Percent Change in Total Production Related Wastes, 33/50 Chemicals vs. Other TRI Chemicals, 1991-1995.❷

COMPANY PARTICIPATION IN THE 33/50 PROGRAM

While the 33/50 Program does not have a fixed goal for the number of companies electing to participate, the Program nonetheless has placed considerable emphasis on outreach to companies in an effort to promote a pollution prevention ethic as widely as possible.

Numbers of Companies Participating

Initial communications about the 33/50 Program have been directed to the chief executive officers of the parent companies of the more than 18,600 industrial facilities that have reported to TRI any of the Program's 17 target chemicals from 1988 to 1991. At the close of the Program's fourth year in February 1995, almost 8,000 companies had been contacted by EPA with invitations to participate. Of these, 1,272 companies have elected to enroll. Releases and transfers reported by facilities belonging to these companies represent 63% of the 1988 releases and transfers of 33/50 Program chemicals. Participants have pledged to reduce voluntarily 368 million pounds of pollution (see Figure 4-3).

The "Top 600" companies with the greatest amounts of releases and transfers were the first to be contacted and have been the focus of greater outreach follow-up from the Program's headquarters and Regional Office staffs. This concentration on larger companies has proven quite effective, with more than 60% of these companies electing to participate. However, less than 13% of the nearly 7,500 smaller companies contacted by EPA since 1991 have chosen to enroll.

The 33/50 Program continues to accept new company participants, although efforts to actively solicit participation ended in 1994. While the Program's national goals are targeted for achievement by the end of 1995, companies are encouraged to set their own reduction goals oriented to their own time frames. Program participants have also targeted reductions for after 1995, for other chemicals besides the Program's 17 target chemicals, and for facilities outside of the United States. Altogether, 33% of participating parent companies have made at least one of these types of extended pledges. The 33/50 Program seeks to instill among its participants a commitment to continuous environmental improvement, not to confine companies' initiatives within the boundaries of the Program's national goals.

Reductions Pledged by Participating Companies

Nearly 1,000 (78%) of the 1,272 participating companies have provided release/transfer reduction targets for the 33/50 Program totalling

❷ 1991 as reported on the 1992 Form R for the previous year.

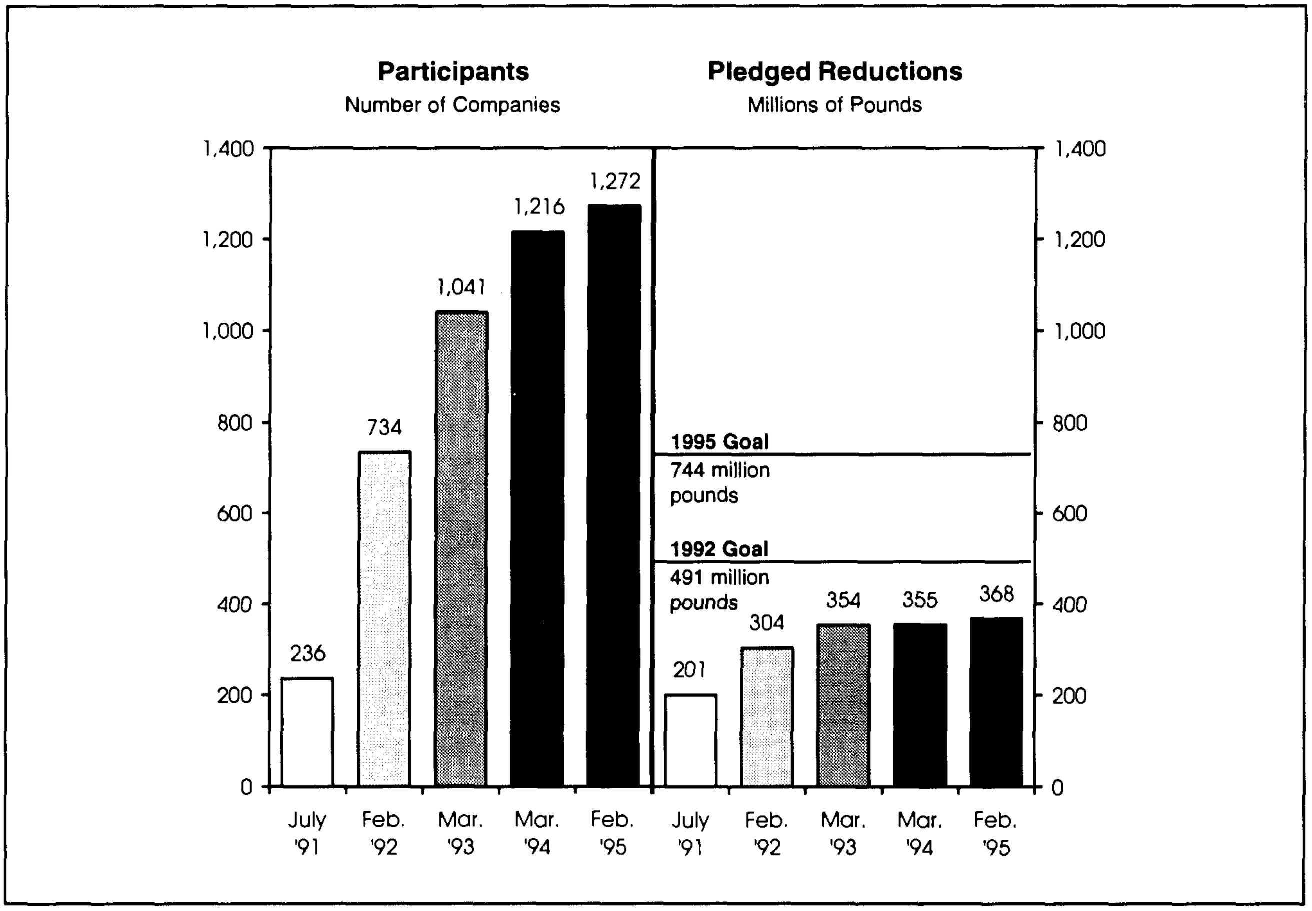


Figure 4-3. 33/50 Program Participant Status, February 1995.

368 million pounds. Those companies using a baseline of 1988 accounted for 53% of the releases and transfers reported by all Program participants in that year, and their reduction commitment represents slightly less than 50% per company.

Many of the remaining Program participants have also developed reduction targets, but have structured them in ways that are difficult to assess against the 1988 release/transfer baseline. For example, some companies have reduction goals that are indexed to changes in production. If production remains constant throughout the duration of the Program, these can be read as direct reductions targets. However, where production increases or decreases, the absolute impact of the company's reduction pledge can not be determined in advance. Accordingly, EPA has not factored these commitments into its assessment of total release/transfer reductions anticipated to be obtained through the 33/50 Program.

Other Program participants have developed reduction goals that go beyond the goals of the 33/50 Program. Some have pledged to reduce all TRI releases and transfers by specified amounts or percentages, but have not indicated specific targets for 33/50 Program chemicals. Others have gone beyond targeting end-of-pipe releases or transfers by attempting to reduce their actual use of toxic chemicals, but have not stipulated the impact such pollution prevention initiatives will have on environmental releases of 33/50 Program chemicals. As a result, the 368 million pounds of release/transfer reductions represent a lower bound on the reductions that companies are attempting under the 33/50 Program.

Actual Reductions Out-Pacing Pledges

As evidenced in the TRI reporting data, actual reductions being achieved by companies for the Program's 17 target chemicals are exceeding significantly EPA's conservative interpretation of companies' reduction pledges. The 685 million pounds of 33/50 Program chemical releases and transfers reduced between 1988 and 1993 is nearly twice the 368 million pounds pledged by participating companies to be reduced by 1995.

Some of these additional reductions result from decreases being achieved by companies that are not participating in the 33/50 Program [about 151 million pounds (22%) through 1993]. Some are due to the efforts of participating companies whose reduction pledges could not be factored into the national total. Significantly, however, companies that have made reduction pledges are achieving greater results than even they anticipated.

33/50 PROGRAM RELEASES AND TRANSFERS

Releases and transfers of 33/50 Program chemicals were reduced by 11% in 1993, a slightly greater reduction than observed in 1992 (9.8%). As indicated in Figure 4-1, the 100 million pound reduction in releases and transfers of the Program's 17 target chemicals between 1992 and 1993 brings total 33/50 Program reductions since 1988 to 686 million pounds (46%), just shy of the Program's 1995 ultimate 50% reduction goal of 744 million pounds.

Facilities are projecting continued reductions in 33/50 Program emissions in 1994 and 1995. While facilities do not provide projections of the releases and transfers they report in Sections 5 and 6 of Form R, which are used to measure 33/50 Program progress, projections are reported for the quantities of TRI chemicals managed in waste in Section 8 of Form R. (See the following section of this chapter, 33/50 Program Chemicals in Waste, or the Introduction to Chapter 2 of this report for a complete description of Section 8 reporting requirements.) Adding Section 8 projections for releases (which include off-site transfers to disposal) to Section 8 projections for quantities sent for off-site treatment provides a reasonable proxy for future facility reporting (in Sections 5 and 6) of on-site releases and off-site transfers to treatment and disposal. However, these calculations do not provide an exact match: Section 8 calculations using 1993 prior year reporting for 1992 understate facilities' actual release/transfer reports for 1992 by 7.5%, while for 1993, the Section 8 calculations overstate Section 5 and 6 reporting by 1.8%.

Facilities project 33/50 Program chemicals-in-waste releases and transfers to treatment to decline by 15.5% in 1994 and another 6.9% in 1995. These projections offer strong encouragement that the 33/50 Program's 1995 ultimate 50% reduction goal indeed will be achieved, perhaps even a year ahead of schedule.

33/50 Program Chemical Reductions versus Reductions for Other TRI Chemicals

Table 4-1 presents facilities' reports of on-site releases and off-site transfers to treatment and disposal of 33/50 Program chemicals versus reports for all other TRI chemicals for 1988 (the 33/50 Program's base year), 1990 (the year prior to EPA's initiation of the Program), 1992, and 1993. In order to control for changes in the TRI chemical list over time, year-to-year comparisons for non-33/50 Program chemicals (labelled "TRI Chemicals Less 33/50 Chemicals") are based on a consistent list of chemicals that have been reported under TRI for all years 1988-1993. The trends in reductions for each grouping of chemicals are depicted in Figure 4-4.

Figure 4-5 highlights the dramatic change in the reduction trends for 33/50 Program chemicals versus other TRI chemicals that began in 1991, the year that the 33/50 Program was initiated, and continued in 1992, the Program's second year. In the two years prior to the Program's announcement, reductions in releases and off-site transfers of other TRI chemicals significantly out-paced those for 33/50 Program chemicals: 24.2% vs. 15.4%. However, in the first two years after 33/50's voluntary reduction goals were announced, releases and transfers of its 17 target chemicals were reduced at nearly three times the rate observed for all other TRI chemicals: a 28.3% reduction between 1990 and 1992 for 33/50 Program chemicals versus a 10.3% reduction for the remaining TRI chemicals.

Interestingly, non-33/50 Program chemical release/transfer reductions caught up with and slightly surpassed those achieved for the 17 Program chemicals in 1993. Other TRI chemical releases and transfers dropped by 13.1% in 1993, compared to the 11% decline for 33/50 Program chemicals. This is the first time since the 33/50 Program commenced that reductions for non-Program chemicals exceeded those observed for the Program's 17 target chemicals. This change in the reduction pattern

Table 4-1. Releases and Transfers of 33/50 Program Chemicals Compared to Other TRI Chemicals, 1988, 1990, 1992-1993.❸

	All TRI Chemicals (Excluding Additions/ Deletions)	TRI Chemicals Less 33/50 Chemicals	33/50 Chemicals Only
	Pounds	Pounds	Pounds
1988	6,488,962,564	5,000,199,508	1,488,763,056
1990	5,047,042,788	3,788,023,022	1,259,019,766
1992	4,299,247,742	3,396,602,596	902,645,146
1993	3,754,621,658	2,951,312,798	803,308,860
	Percent Change	Percent Change	Percent Change
1988-1990	-22.22%	-24.24%	-15.43%
1990-1993	-25.61%	-22.09%	-36.20%
1992-1993	-12.67%	-13.11%	-11.01%
1988-1993	-42.14%	-40.98%	-46.04%

❸ The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

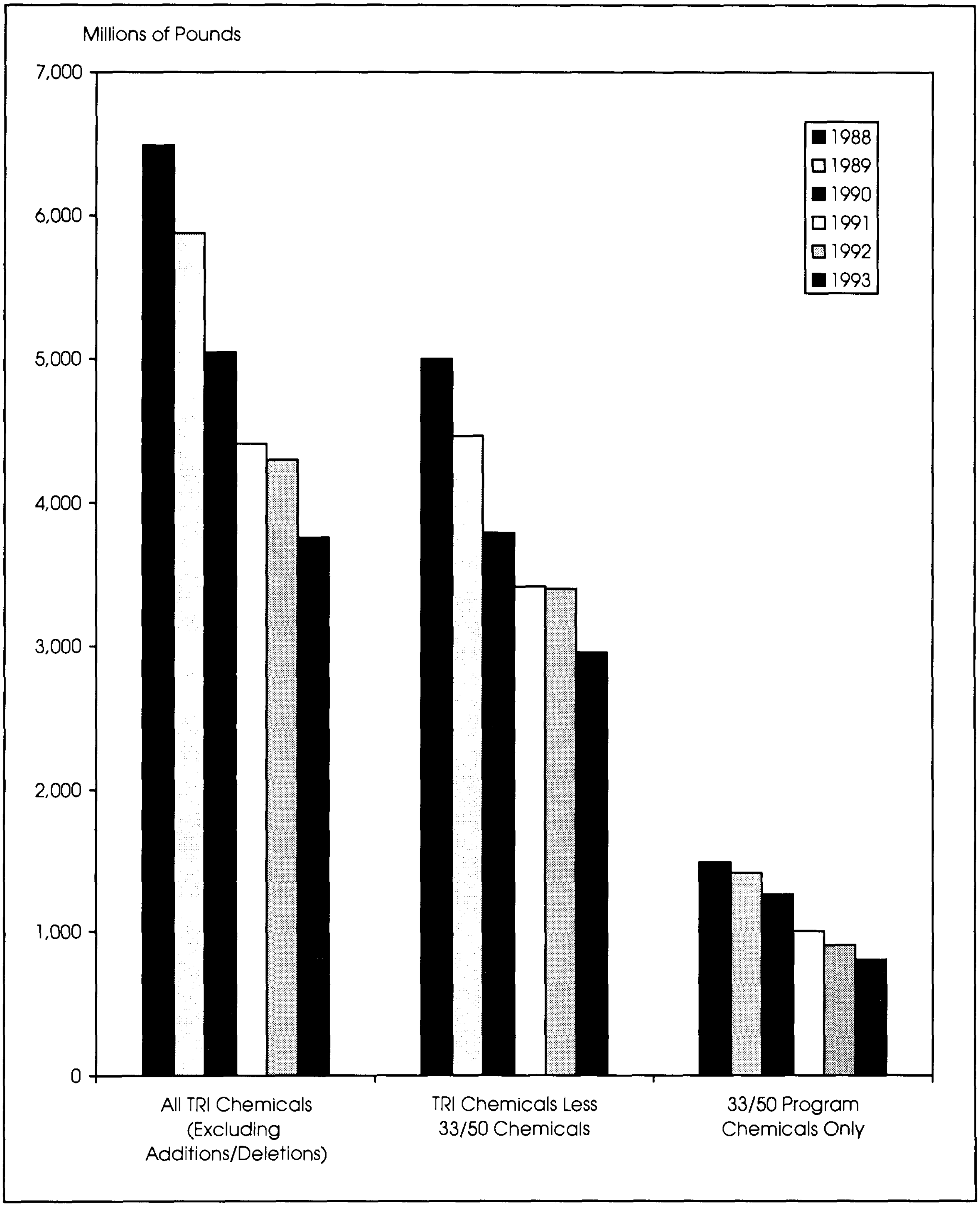


Figure 4-4. Releases and Transfers of 33/50 Program Chemicals Compared to Other TRI Chemicals, 1988-1993.❹

❹ The amounts for transfers to recycling and energy recovery reported for 1991-1993 have not been included in these totals.

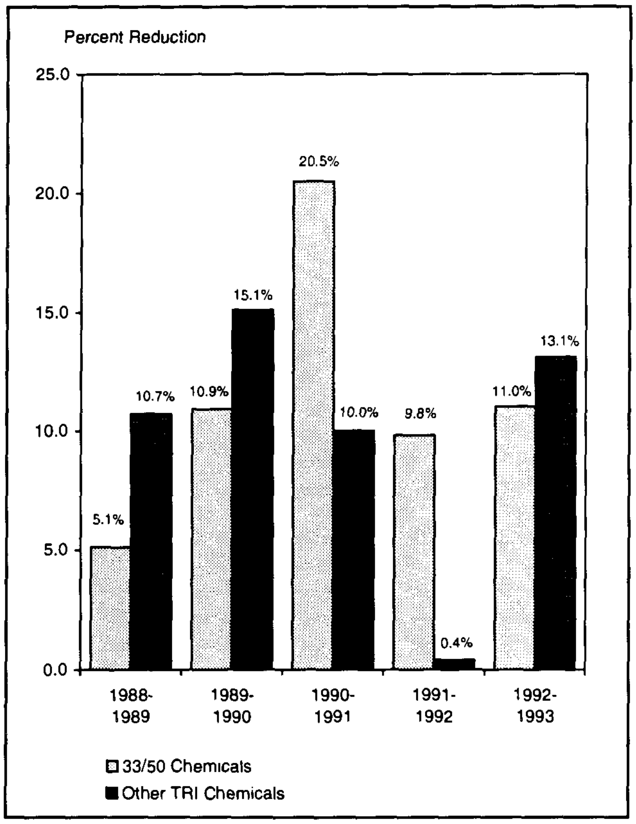


Figure 4-5. Year-to-Year Reduction Comparisons: Releases and Transfers of 33/50 Program Chemicals vs. Other TRI Chemicals, 1988-1993.[5]

occurred even though 33/50 Program chemical release/transfer reductions were greater in 1993 than in 1992, and is explained in part by a significant drop in underground injection of TRI chemicals that occurred in 1993. Since underground injection is utilized only marginally for 33/50 Program chemicals (see next section), these reductions had a disproportionate impact on non-33/50 Program chemicals.

In the 33/50 Program's first two years (1991 and 1992), reductions in the 17 Program chemicals almost equalled those of the remaining 300-plus TRI chemicals in actual pounds: the 356 million pounds of reductions for 33/50 Program chemicals is just 9.0% less than the 391 million pound drop for non-Program chemicals. In 1993, however, absolute reductions for other TRI chemicals (445 million pounds) were more than four times greater than the 100 million pound decline for the Program's 17 target chemicals.

The "leaders-in-reductions" role being played by 33/50 Program participants is also reflected in the reduction performance of the individual TRI facilities that use the target chemicals. Five of the top 10 facilities showing the greatest reductions in direct environmental releases between 1992 and 1993 (excluding underground injection), and 15 of the top 20, report 33/50 Program chemicals and are owned by companies that are participating in the Program. Of the top 50 reducing facilities, 38 report Program chemicals and are owned by participating parents.

33/50 Program Chemical Releases and Transfers, by Medium/ Transfer Type and by Chemical

Releases and off-site transfers of 33/50 Program chemicals are summarized by chemical and release medium/transfer type for the period 1988 to 1993 in Table 4-2. (Box 4-2 explains the presentation of 33/50 chemicals in these tables.) The "Subtotal" column in the transfers portion of the table represents those transfer types (POTWs, treatment, disposal, and "other" transfers) that are included in the 33/50 Program goals. The "Total" column adds in transfers for recycling and energy recovery, which have been reportable to TRI since 1991 but are not included in the 33/50 Program. Figure 4-6 presents a graphical representation of the total releases and transfers for each chemical for these years.

[5] The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

Table 4-2. TRI Releases and Transfers of 33/50 Program Chemicals, 1988, 1991-1993.

CAS Number	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
71-43-2	Benzene	93	469	6,712,433	4,086,692	18,793	363,660	27,515	11,209,093
		92	474	7,790,380	5,036,035	24,819	355,683	340,636	13,547,553
		91	486	9,764,018	7,996,689	26,970	824,342	111,933	18,723,952
		88	481	20,468,541	11,446,838	46,983	825,035	127,915	32,915,312
56-23-5	Carbon tetrachloride	93	74	585,481	1,643,428	1,453	34,332	79	2,264,773
		92	90	418,493	973,585	2,444	45,984	333	1,440,839
		91	102	528,622	1,019,252	2,844	42,470	2,152	1,595,340
		88	96	1,084,552	2,694,101	15,627	98,054	14,759	3,907,093
67-66-3	Chloroform	93	175	4,488,694	9,319,998	451,362	38,039	32,926	14,331,019
		92	180	6,023,765	10,998,651	654,314	50,240	28,568	17,755,538
		91	183	7,729,012	11,534,369	764,712	65,089	22,155	20,115,337
		88	170	7,618,276	18,315,290	1,131,584	36,002	68,544	27,169,696
75-09-2	Dichloro-methane	93	1,065	24,478,364	39,834,847	62,909	956,098	78,267	65,410,485
		92	1,131	27,620,595	46,671,300	233,786	1,183,867	79,308	75,788,856
		91	1,293	32,183,219	48,491,600	98,995	1,317,706	118,560	82,210,080
		88	1,668	49,531,437	79,419,932	349,960	1,478,833	157,156	130,937,318
78-93-3	Methyl ethyl ketone	93	2,418	29,044,598	55,770,325	197,216	360,927	134,162	85,507,228
		92	2,481	31,662,901	60,262,154	154,676	365,395	242,949	92,688,075
		91	2,570	35,753,846	71,050,033	143,003	355,736	166,707	107,469,325
		88	2,518	41,644,628	98,564,080	90,426	255,962	166,537	140,721,633
108-10-1	Methyl isobutyl ketone	93	1,006	7,777,025	17,317,092	90,214	131,600	76,771	25,392,702
		92	1,027	7,899,705	18,237,055	96,387	129,100	194,986	26,557,233
		91	1,041	7,285,523	19,092,111	166,952	161,600	130,415	26,836,601
		88	1,009	13,057,504	18,951,682	762,108	116,650	31,770	32,919,714
127-18-4	Tetrachloro-ethylene	93	474	4,422,676	6,519,343	10,152	15,041	618,026	11,585,238
		92	512	5,235,244	7,255,130	10,317	12,780	9,354	12,522,825
		91	573	6,619,885	10,265,361	7,448	14,000	23,309	16,930,003
		88	743	16,339,200	19,733,646	33,314	72,250	82,144	36,260,554
108-88-3	Toluene	93	3,569	60,860,617	116,441,054	133,248	967,496	234,148	178,636,563
		92	3,770	65,637,893	128,470,429	84,042	1,573,891	708,269	196,474,524
		91	3,928	76,731,982	131,544,159	105,126	1,374,207	179,951	209,935,425
		88	3,979	105,166,199	192,139,704	197,208	1,473,666	731,449	299,708,226
71-55-6	1,1,1-Trichloro-ethane	93	2,073	32,866,736	31,199,295	10,912	2,528	42,743	64,122,214
		92	3,178	57,394,283	59,679,895	13,473	561	76,381	117,164,593
		91	3,699	71,782,293	71,125,442	22,058	2,805	174,730	143,107,328
		88	3,891	92,213,890	87,022,107	95,624	1,000	204,923	179,537,544
79-01-6	Trichloro-ethylene	93	772	14,488,988	15,625,125	5,218	460	8,212	30,128,003
		92	675	15,433,613	14,744,627	8,606	466	20,726	30,208,038
		91	723	16,998,300	18,694,402	12,784	800	62,991	35,769,277
		88	946	26,077,985	29,715,662	13,801	390	21,186	55,829,024
	Xylenes	93	3,562	29,469,366	89,772,020	56,671	213,172	208,707	119,719,936
		92	3,650	30,090,855	89,471,015	46,631	219,270	1,450,908	121,278,679
		91	3,790	32,485,380	97,752,568	61,990	139,964	292,135	130,732,037
		88	3,630	39,314,201	129,388,109	213,032	144,978	647,989	169,708,309
	Cadmium and cadmium compounds	93	177	9,474	52,660	1,064	977	123,364	187,539
		92	186	13,639	55,432	1,418	1,211	77,146	148,846
		91	217	17,679	54,320	4,242	1,540	251,107	328,888
		88	206	32,399	90,293	4,397	2.409	389,729	519,227

Table 4-2.

CAS Number	Chemical	Year	Transfers to POTWs Pounds	Transfers Off-site for Treatment Disposal/Other❻ Pounds	Subtotal Pounds	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Total Transfers❼ Pounds
71-43-2	Benzene	93	308,621	1,855,848	2,164,469	1,101,028	1,094,354	4,359,851
		92	418,050	3,258,554	3,676,604	421,221	2,323,983	6,421,808
		91	615,849	1,796,306	2,412,155	353,207	3,675,285	6,440,647
		88	1,166,722	2,295,959	3,462,681	NA	NA	NA
56-23-5	Carbon tetrachloride	93	1,675	1,042,171	1,043,846	111,626	4,109	1,159,581
		92	1,054	851,343	852,397	345,452	24,455	1,222,304
		91	621	980,274	980,895	390,625	11,061	1,382,581
		88	5,014	1,350,011	1,355,025	NA	NA	NA
67-66-3	Chloroform	93	603,115	1,894,745	2,497,860	435,332	69,463	3,002,655
		92	553,650	960,017	1,513,667	1,417,848	765,445	3,696,960
		91	803,997	1,890,042	2,694,039	2,077,870	255,288	5,027,197
		88	1,226,573	1,369,922	2,596,495	NA	NA	NA
75-09-2	Dichloro-methane	93	843,209	9,909,042	10,752,251	20,970,440	3,241,821	34,964,512
		92	1,300,148	12,805,927	14,106,075	28,919,951	4,074,526	47,100,552
		91	1,302,744	12,889,435	14,192,179	28,472,665	3,771,339	46,436,183
		88	1,830,904	22,434,809	24,265,713	NA	NA	NA
78-93-3	Methyl ethyl ketone	93	756,561	5,944,023	6,700,584	24,231,204	45,698,371	76,630,159
		92	653,417	7,171,964	7,825,381	25,371,163	39,263,334	72,459,878
		91	777,361	10,772,234	11,549,595	27,570,244	35,471,173	74,591,012
		88	963,868	29,205,956	30,169,824	NA	NA	NA
108-10-1	Methyl isobutyl ketone	93	636,214	1,519,286	2,155,500	22,879,916	12,169,416	37,204,832
		92	776,557	1,813,291	2,589,848	20,221,693	17,380,409	40,191,950
		91	525,571	2,162,109	2,687,680	17,836,398	19,033,586	39,557,664
		88	1,509,030	10,509,249	12,018,279	NA	NA	NA
127-18-4	Tetrachloro-ethylene	93	111,007	2,412,866	2,523,873	6,033,800	823,490	9,381,163
		92	111,522	2,249,409	2,360,931	7,759,959	729,655	10,850,545
		91	234,642	3,841,153	4,075,795	10,899,318	1,263,488	16,238,601
		88	558,691	5,564,088	6,122,779	NA	NA	NA
108-88-3	Toluene	93	968,612	23,410,441	24,379,053	31,193,360	80,756,715	136,329,128
		92	1,045,966	20,909,754	21,955,720	30,096,035	79,040,678	131,092,433
		91	1,335,834	22,242,499	23,578,333	26,171,587	80,573,391	130,323,311
		88	3,591,186	61,895,064	65,486,250	NA	NA	NA
71-55-6	1,1,1-Trichloro-ethane	93	60,457	4,014,234	4,074,691	14,370,656	2,322,187	20,767,534
		92	118,518	4,983,394	5,101,912	23,284,982	3,649,347	32,036,241
		91	253,062	8,111,621	8,364,683	27,688,045	3,358,006	39,410,734
		88	304,353	19,330,828	19,635,181	NA	NA	NA
79-01-6	Trichloro-ethylene	93	45,777	2,100,087	2,145,864	6,911,325	1,196,826	10,254,015
		92	70,144	2,021,372	2,091,516	6,711,893	939,013	9,742,422
		91	73,195	2,791,045	2,864,240	6,889,209	848,596	10,602,045
		88	85,652	6,432,740	6,518,392	NA	NA	NA
	Xylenes	93	745,309	8,223,633	8,968,942	36,897,349	72,550,889	118,417,180
		92	1,142,563	8,080,631	9,223,194	39,628,825	67,092,774	115,944,793
		91	1,598,070	20,845,669	22,443,739	40,381,672	69,672,721	132,498,132
		88	4,225,457	37,917,550	42,143,007	NA	NA	NA
	Cadmium and cadmium compounds	93	4,944	3,372,687	3,377,631	2,181,549	1,142	5,560,322
		92	45,794	901,989	947,783	2,047,074	3,302	2,998,159
		91	8,559	1,319,536	1,328,095	2,263,368	7,480	3,598,943
		88	21,613	1,287,068	1,308,681	NA	NA	NA

Table 4-2. TRI Releases and Transfers of 33/50 Program Chemicals, 1988, 1991-1993, Continued.

CAS Number	Chemical	Year	Forms Number	Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds	Total Releases Pounds
	Chromium and chromium compounds	93	3,107	406,770	423,644	250,435	42,762	23,832,948	24,956,559
		92	3,045	474,918	448,600	285,703	32,470	24,156,909	25,398,600
		91	3,054	437,245	543,947	353,123	35,134	25,960,722	27,330,171
		88	2,415	627,725	702,491	397,968	54,902	40,215,263	41,998,349
	Cyanide compounds	93	292	109,667	3,023,002	98,062	3,110,685	6,055	6,347,471
		92	293	146,738	3,249,962	87,301	3,765,225	12,953	7,262,179
		91	313	125,875	2,014,049	120,504	4,727,763	22,180	7,010,371
		88	427	657,222	1,702,448	196,962	5,445,176	108,969	8,110,777
	Lead and lead compounds	93	1,655	453,147	1,273,891	75,093	1,768	14,287,079	16,090,978
		92	1,689	644,682	1,296,114	74,265	2,888	13,987,160	16,005,109
		91	1,803	652,038	1,289,907	139,248	928	17,033,155	19,115,276
		88	1,586	839,233	1,822,159	242,159	2,760	26,684,305	29,590,616
	Mercury and mercury compounds	93	35	11,856	4,267	446	15	1,812	18,396
		92	39	11,955	5,416	575	9	3,139	21,094
		91	56	12,958	8,330	676	9	5,294	27,267
		88	53	16,797	8,484	1,656	27	13,529	40,493
	Nickel and nickel compounds	93	2,459	225,313	275,493	94,194	133,238	3,292,612	4,020,850
		92	2,380	579,020	290,386	111,124	297,762	3,732,437	5,010,729
		91	2,369	400,136	328,073	131,679	370,948	1,701,734	2,932,570
		88	1,716	423,719	293,576	224,427	239,263	3,637,777	4,818,762
	Total for 33/50 Chemicals	93	23,382	216,411,205	392,582,176	1,557,442	6,372,798	43,005,426	659,929,047
		92	24,800	257,078,679	447,145,786	1,889,881	8,036,802	45,122,162	759,273,310
		91	26,200	299,508,011	492,804,612	2,162,354	9,435,041	46,259,230	850,169,248
		88	25,534	415,113,508	692,010,602	4,017,236	10,247,357	73,303,944	1,194,692,647
	Total for All Other TRI Chemicals	93	55,690	263,834,737	782,530,630	269,534,823	569,621,351	245,968,138	2,131,489,679
		92	56,428	284,061,160	860,016,711	274,221,490	717,784,301	295,057,336	2,431,140,998
		91	57,425	319,122,730	910,892,761	243,139,154	699,750,068	370,454,785	2,543,359,498
		88	52,674	424,929,092	1,174,944,163	307,570,566	1,332,110,315	439,992,727	3,679,546,863
	Total for All TRI Chemicals	93	79,072	480,245,942	1,175,112,806	271,092,265	575,994,149	288,973,564	2,791,418,726
		92	81,228	541,139,839	1,307,162,497	276,111,371	725,821,103	340,179,498	3,190,414,308
		91	83,625	618,630,741	1,403,697,373	245,301,508	709,185,109	416,714,015	3,393,528,746
		88	78,208	840,042,600	1,866,954,765	311,587,802	1,342,357,672	513,296,671	4,874,239,510

Table 4-2, Cont.

CAS Number	Chemical	Year	Transfers to POTWs Pounds	Transfers Off-site for Treatment Disposal/Other❻ Pounds	Subtotal Pounds	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Total Transfers❼ Pounds
	Chromium and chromium compounds	93	443,461	34,946,871	35,390,332	124,075,218	31,061	159,496,611
		92	947,121	19,018,511	19,965,632	99,174,280	89,965	119,229,877
		91	940,780	20,378,515	21,319,295	68,792,255	123,934	90,235,484
		88	2,080,868	26,800,100	28,880,968	NA	NA	NA
	Cyanide compounds	93	100,184	477,812	577,996	24,600	2,261	604,857
		92	88,027	635,105	723,132	94,518	500	818,150
		91	121,476	714,580	836,056	82,410	500	918,966
		88	1,152,828	2,719,248	3,872,076	NA	NA	NA
	Lead and lead compounds	93	139,125	26,323,018	26,462,143	291,053,994	83,202	317,599,339
		92	358,126	37,611,890	37,970,016	403,989,489	59,068	442,018,573
		91	335,652	20,926,102	21,261,754	223,965,984	69,482	245,297,220
		88	213,423	31,195,505	31,408,928	NA	NA	NA
	Mercury and mercury compounds	93	21	74,706	74,727	23,639	0	98,366
		92	22	239,781	239,803	51,455	1	291,259
		91	314	153,816	154,130	465,489	5	619,624
		88	1,892	275,017	276,909	NA	NA	NA
	Nickel and nickel compounds	93	219,692	9,870,359	10,090,051	90,127,604	13,405	100,231,060
		92	252,193	11,976,032	12,228,225	80,374,621	34,628	92,637,474
		91	388,355	9,232,462	9,620,817	66,310,972	19,983	75,951,772
		88	902,763	13,646,458	14,549,221	NA	NA	NA
	Total for 33/50 Chemicals	93	5,987,984	137,391,829	143,379,813	672,622,640	220,058,712	1,036,061,165
		92	7,882,872	135,488,964	143,371,836	769,910,459	215,471,083	1,128,753,378
		91	9,316,082	141,047,398	150,363,480	550,611,318	218,155,318	919,130,116
		88	19,840,837	274,229,572	294,070,409	NA	NA	NA
	Total for All Other TRI Chemicals	93	308,179,985	511,643,134	819,823,119	2,576,347,350	266,245,023	3,662,415,492
		92	428,516,829	536,944,769	965,461,598	2,163,775,010	256,781,485	3,386,018,093
		91	384,562,040	483,024,578	867,586,618	1,737,931,181	225,157,474	2,830,675,273
		88	562,139,116	758,513,529	1,320,652,645	NA	NA	NA
	Total for All TRI Chemicals	93	314,167,969	649,034,963	963,202,932	3,248,969,990	486,303,735	4,698,476,657
		92	436,399,701	672,433,733	1,108,833,434	2,933,685,469	472,252,568	4,514,771,471
		91	393,878,122	624,071,976	1,017,950,098	2,288,542,499	443,312,792	3,749,805,389
		88	581,979,953	1,032,743,101	1,614,723,054	NA	NA	NA

❻ "Other" indicates: For 1991, 1992, and 1993, transfers reported with no waste management codes or invalid codes. For 1988, transfers reported with no waste management codes, invalid codes, or codes not required to be reported in 1988.

❼ Because transfers for recycling and energy recovery were not required to be reported in 1988, total transfers in 1988 are not comparable to total transfers reported for 1991, 1992, or 1993.

33/50 Program Chemical Identities

In the tables in this chapter, the 33/50 Program chemicals appear in alphabetical order by organic chemicals followed by inorganic chemicals. Xylenes and the inorganic chemicals have been grouped into categories, as shown below. The 10 individual organic chemicals and the seven groups constitute the 17 high-priority chemicals targeted by the 33/50 Program.

Organic chemicals

71-43-2	Benzene
56-23-5	Carbon tetrachloride
67-66-3	Chloroform
75-09-2	Dichloromethane
78-93-3	Methyl ethyl ketone
108-10-1	Methyl isobutyl ketone
127-18-4	Tetrachloroethylene
108-88-3	Toluene
71-55-6	1,1,1-Trichloroethane
79-01-6	Trichloroethylene

Xylenes

108-38-3	m-Xylene
95-47-6	o-Xylene
106-42-3	p-Xylene
1330-20-7	Xylene (mixed isomers)

*Inorganic chemicals*❽

Cadmium and cadmium compounds

7440-43-9	Cadmium
—	Cadmium compounds

Chromium and chromium compounds

7440-47-3	Chromium
—	Chromium compounds

Cyanide compounds

74-90-8	Hydrogen cyanide
—	Cyanide compounds

Lead and lead compounds

7439-92-1	Lead
—	Lead compounds

Mercury and mercury compounds

7439-97-6	Mercury
—	Mercury compounds

Nickel and nickel compounds

7440-02-0	Nickel
—	Nickel compounds

Box 4-2. 33/50 Program Chemical Identities.

❽ Compound categories do not have CAS numbers (—).

Figure 4-7 shows the percentage reduction for the 11 organic chemicals and their compounds and the six inorganic chemical compounds, as well as for the total 33/50 chemicals. All percentages are calculated from a 1988 baseline. As the figure shows, releases and transfers of organic chemicals have steadily declined from 1988 to 1993 for a total reduction of nearly 46% over the time period. Releases and transfers of inorganic compounds, on the other hand, decreased from 1988 to 1991, then began increasing, with a result that, in total, releases and transfers of inorganics have decreased less than 23% from 1988 to 1993. Because the inorganics account for a much smaller percentage of the total releases and transfers of 33/50 Program chemicals, however, their relatively small percentage decrease has had little impact on the total percentage reduction of 33/50 chemicals.

The 11 organic chemicals accounted for 94% of all reductions in 33/50 chemicals between 1988 and 1993, while inorganics accounted for 6% of total reductions. There are two reasons for this result. First, organics accounted for a much larger percent of total releases and transfers in 1988 than inorganics (89% vs 11%). Second, the percentage reduction in releases and transfers of organics was much larger from 1988-1993 than for inorganics (49% vs 23%).

Five chemicals accounted for 78% of total reductions in 33/50 Program releases and transfers between 1988 and 1993: dichloromethane (12%), methyl ethyl ketone (11%), toluene (24%) 1,1,1-trichloroethane (19%), and xylenes (12%).

These results are not surprising given that these five organic chemicals were the largest source of releases and transfers of 33/50 chemicals in 1988 (74%). These chemicals still comprise

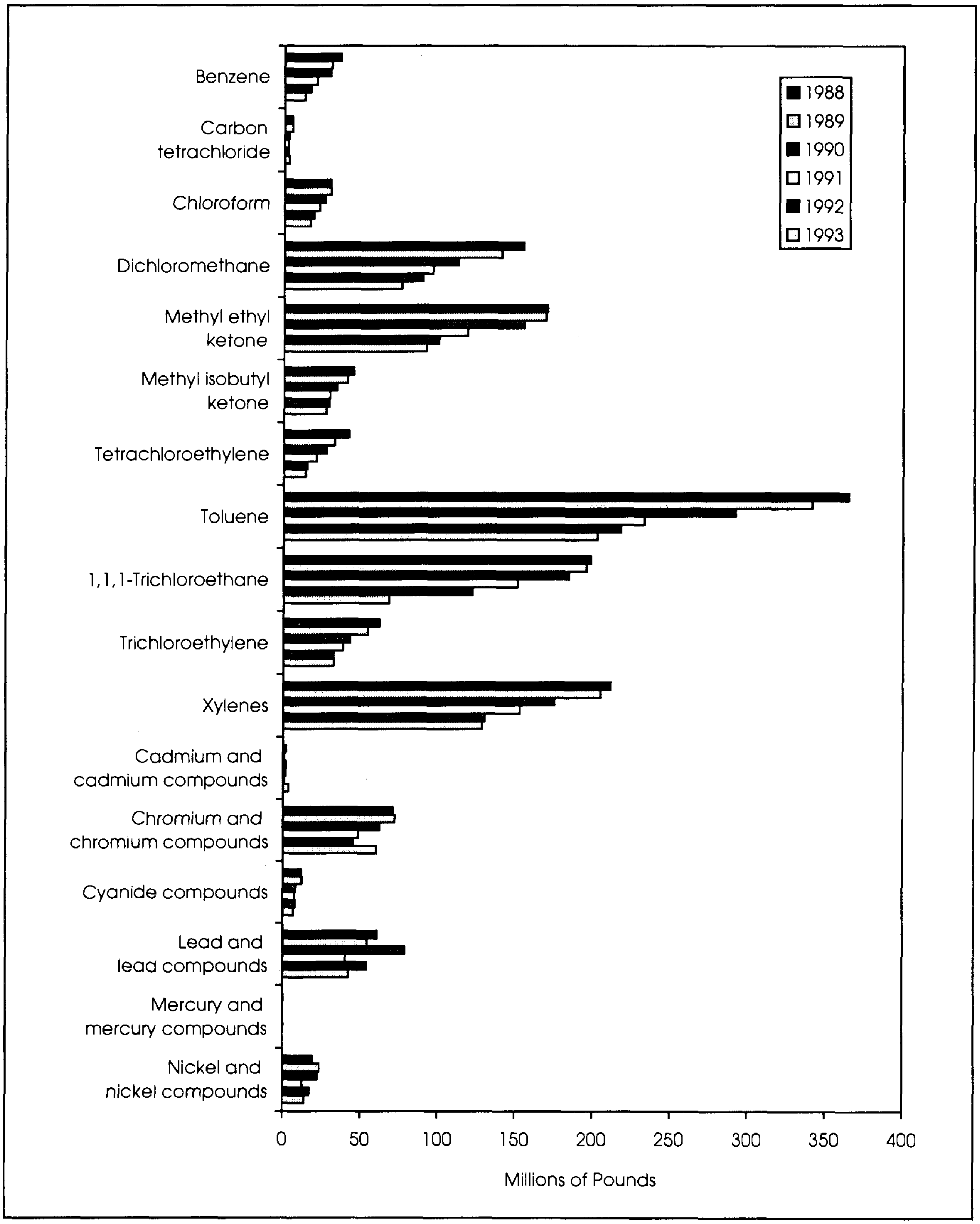


Figure 4-6. TRI Releases and Transfers of 33/50 Program Chemicals, by Chemical, 1988-1993. [9]

[9] The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

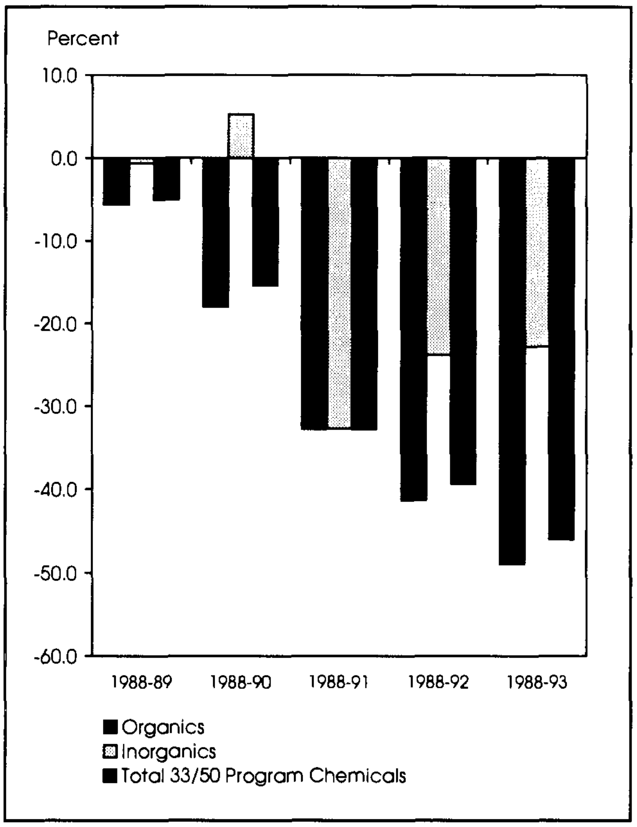


Figure 4-7. Percentage Change in Releases and Transfers of 33/50 Program Chemicals (Organics vs. Inorganics), 1988-1993.(10)

nearly 71% of all releases and transfers of 33/50 chemicals. All organics represent 84% of total releases and transfers of 33/50 chemicals. Inorganics, however, are increasing in prominence, representing 16% of total releases and transfers of 33/50 Program chemicals in 1993, up from 11% in 1988. Lead and compounds and chromium and compounds are the most important inorganics, accounting for 5% and 8% respectively of total releases and transfers of 33/50 chemicals in 1993. Cadmium and compounds had a large percentage increase during the time period, but because total quantities of these compounds are small, the impact on total releases and transfers was negligible.

Figure 4-8 shows the percent change in releases and transfers of 33/50 Program chemicals from 1988 to 1993 for each chemical. With the exception of mercury and compounds, the inorganic chemicals (presented at the bottom of the figure) show smaller percentage decreases than observed for the 11 organic chemicals between 1988 and 1993, and releases and transfers of one of the inorganics (cadmium and compounds) actually increased, nearly doubling.

Figure 4-9 presents a graphical representation of the data in Table 4-2 by release medium and transfer type for the years 1988 to 1993. Figure 4-10 shows the percent change in releases and transfers from 1988 to 1993 by release medium and transfer type. Figure 4-11 shows the contribution of each release medium and transfer type to total reductions in releases and transfers of 33/50 chemicals from 1988 to 1993. As these diagrams show, the largest quantity reductions in releases and transfers have occurred in air emissions. Reductions in these sources account for 73% of total reductions in releases and transfers of 33/50 chemicals. All sources, however, have experienced significant percentage reductions.

Transfers to Energy Recovery and Recycling

As described in Chapter 2, the Pollution Prevention Act of 1990 (PPA) substantially expanded the scope of TRI to include reporting on additional toxic chemical management activities. Off-site transfers to energy recovery and recycling processes are now reported in Section 6 of Form R in addition to the previously reported transfers to POTWs and other treatment and disposal facilities.

(10) The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

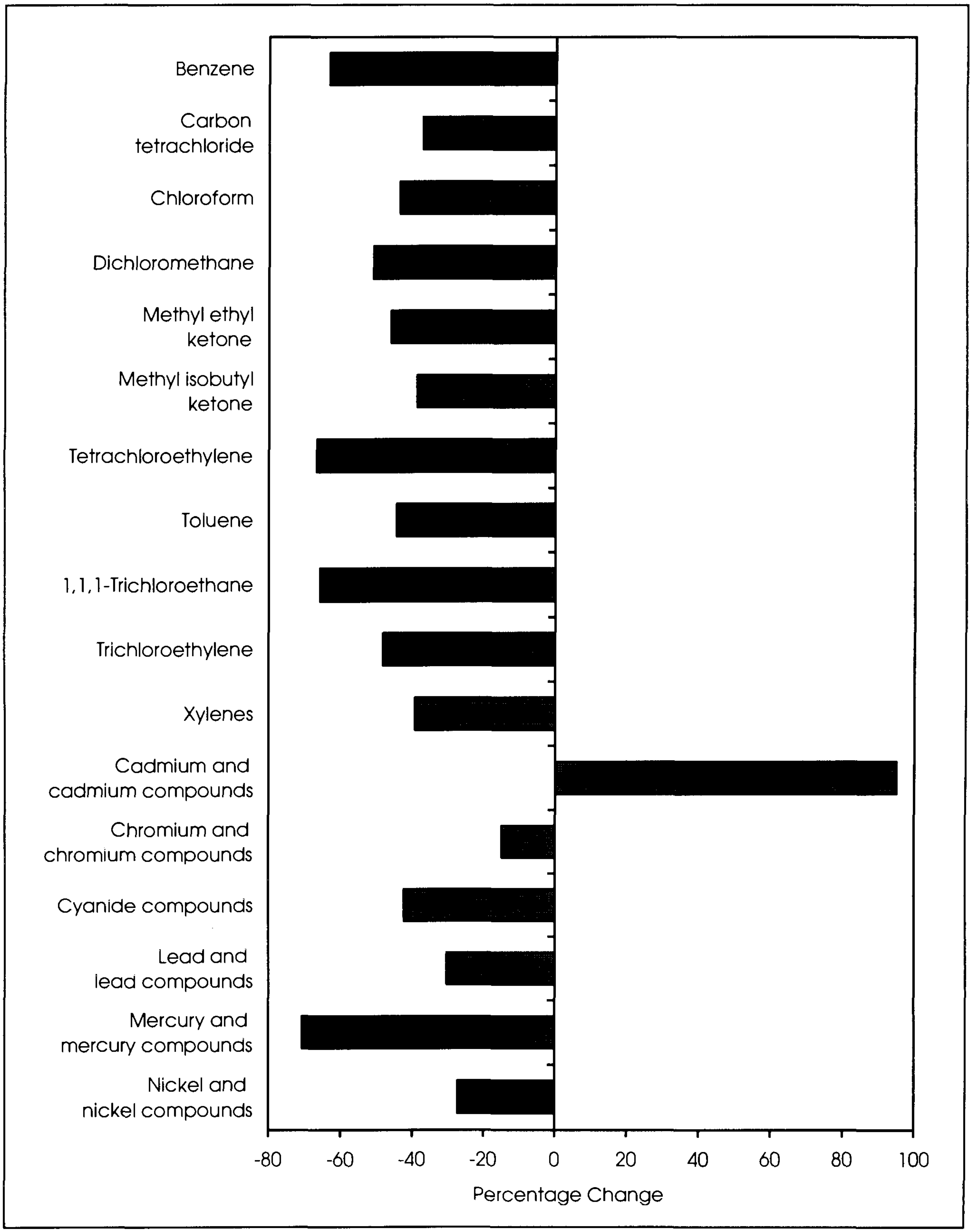


Figure 4-8. Percentage Change in Total Releases and Transfers of 33/50 Program Chemicals, 1988-1993.(11)

(11) The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

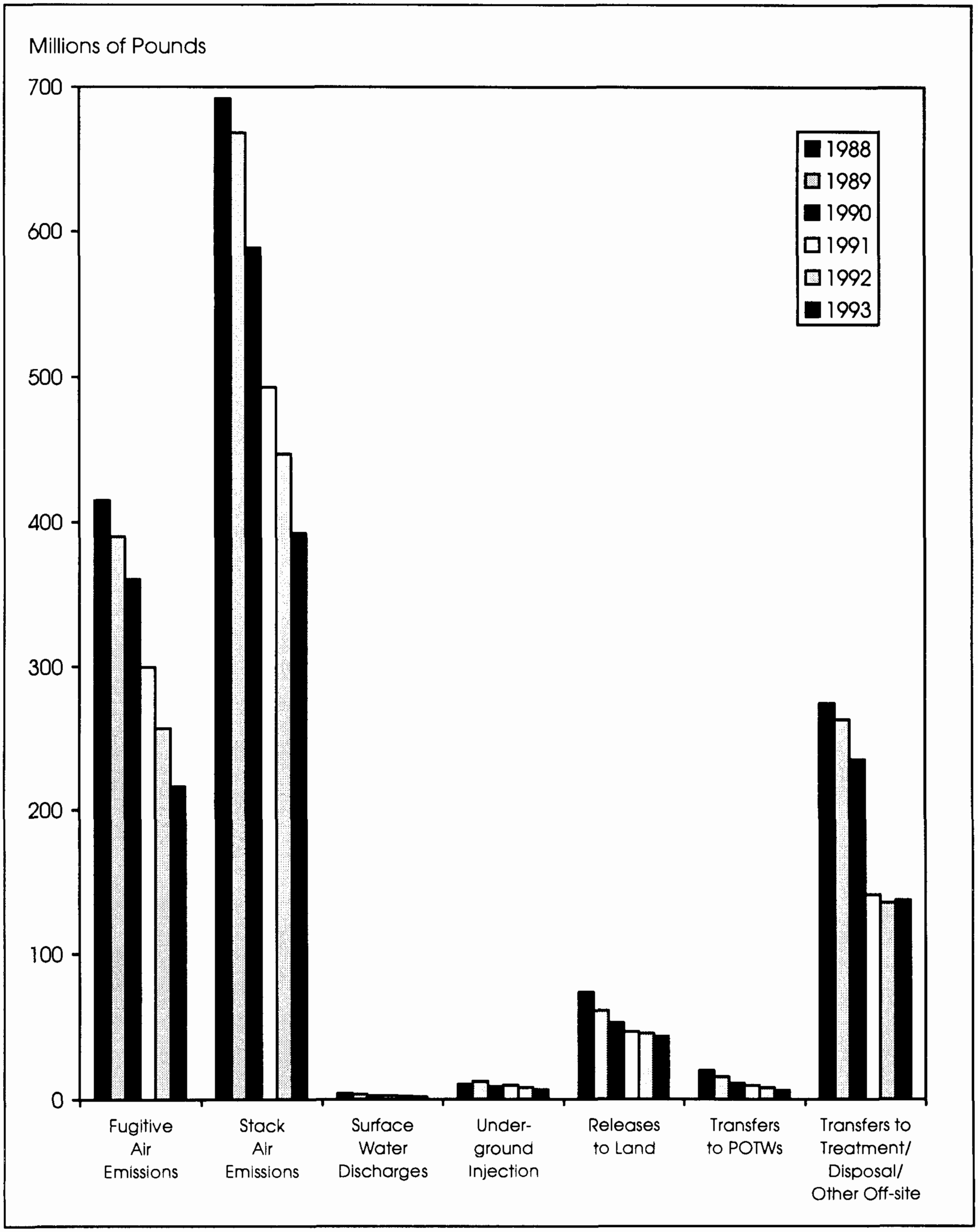


Figure 4-9. TRI Releases and Transfers of 33/50 Program Chemicals, by Release Medium and Transfer Type, 1988-1993.⑫

⑫ The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

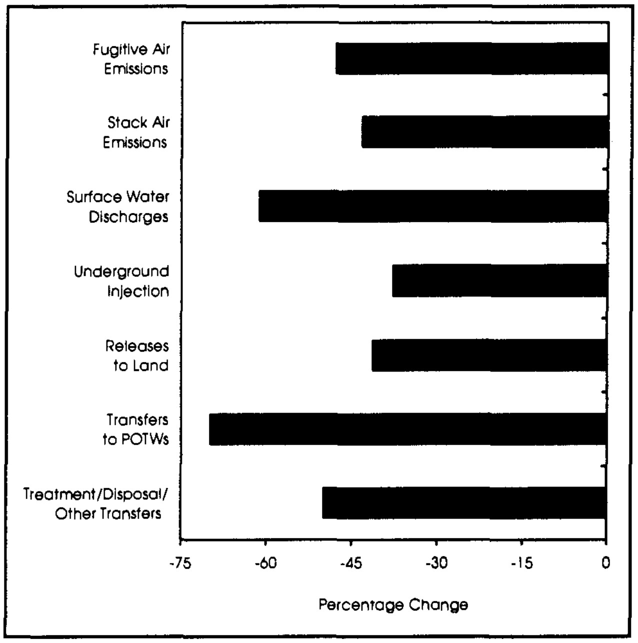


Figure 4-10. Percentage Change in Releases and Transfers by Release Medium or Transfer Type, 1988-1993.⑬

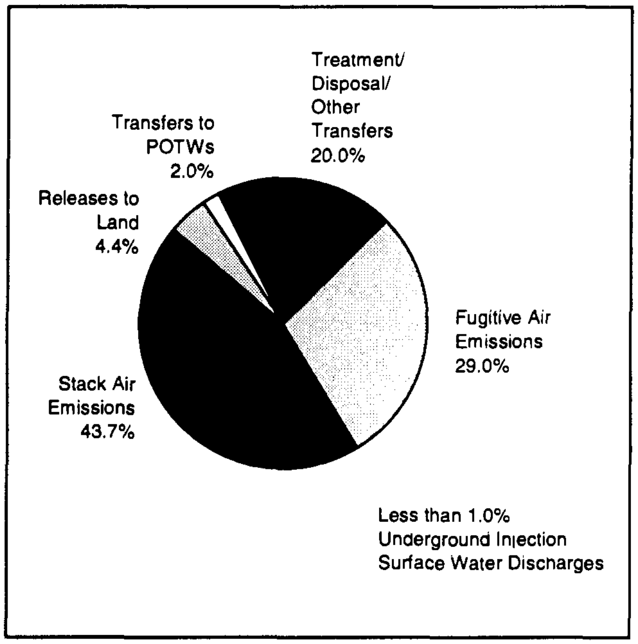


Figure 4-11. Contribution to Reductions in Releases and Transfers of 33/50 Program Chemicals by Release Medium or Transfer Type, 1988-1993.⑬

Facilities' reports of transfers to energy recovery and recycling for 1991-1993 are presented after the "Subtotal" column in Table 4-2. The absence of reporting requirements for these activities in 1988 is reflected by "NA." Transfers to energy recovery (220.1 million pounds) and transfers to recycling (672.6 million pounds) in 1993 again substantially exceeded the total for all previously reported types of off-site transfers of 33/50 Program chemicals (143.4 million pounds). Transfers to energy recovery increased slightly in 1993 (2.1%), while transfers to recycling decreased significantly (12.6%) after increasing by 40% in 1992.

33/50 PROGRAM CHEMICALS IN WASTE

In Section 8 of Form R, which was made mandatory under the PPA starting with the 1991 reporting year, facilities report the amounts of toxic chemicals:

- recycled or reused in on-site processes and/ or sent off-site for recycling;
- combusted in on-site and/or sent to off-site energy recovery systems;
- destroyed in on-site treatment systems and/ or sent to off-site treatment facilities;
- released to the environment as a result of on-site operations plus the amounts shipped off-site for disposal.

⑬ The amounts for recycling and energy recovery reported for 1991-1993 have not been included in these totals.

Table 4-3. Total Production-Related Waste for 33/50 Chemicals Compared to Other TRI Chemicals, 1991-1995.

	All TRI Chemicals	TRI Chemicals Less 33/50 Chemicals	33/50 Chemicals Only
	Pounds	Pounds	Pounds
1991⓮	32,755,040,741	27,239,462,028	5,515,578,713
1992	32,884,508,120	27,062,076,135	5,822,431,985
1993	33,498,461,670	27,508,791,099	5,989,670,571
1994⓯	33,447,534,630	27,806,339,673	5,641,194,957
1995⓯	33,986,505,265	28,321,019,790	5,665,485,475
	Percent Change	Percent Change	Percent Change
1991-1993	2.3%	1.0%	8.6%
1993-1995⓯	1.5%	3.0%	-5.4%
1991-1995⓯	3.8%	4.0%	2.7%

Section 8 reporting items described above pertain only to chemical quantities contained in waste that are the result of regular production-related activities. Toxic chemical quantities contained in waste that are generated at the facility through non-routine activities, such as spill clean-ups and catastrophic events, are reported in a separate Section 8 reporting item. Each of the items reported for production-related waste in Section 8 is reported in aggregate, by chemical, for the reporting year (1993), the prior year (1992), and forecast by facilities for the two successive years (1994 and 1995).

Analysts will note significant discrepancies between reported off-site transfers to recycling in Sections 6 and 8 of Form R. Less significant discrepancies can also be observed in the reporting of off-site shipments to energy recovery and treatment. The causes and meaning of these discrepancies are discussed in Chapter 2.

Throughout this chapter, 1991 data are drawn from prior year reports by facilities in their 1992 Form R submissions. 1992 and 1993 data are actual quantities reported in 1993 Form Rs, and 1994 and 1995 data represent facilities' future years' projections reported on 1993 Form R's.

Table 4-3 presents facilities' reports of total production-related waste for 33/50 Program chemicals versus reports for all other TRI chemicals for 1991-1995. All forms submitted for TRI chemicals for the two years 1992 and 1993 are included. The trends in reductions for each grouping of chemicals are depicted in Figure 4-2 presented at the beginning of this chapter.

Total production-related waste associated with 33/50 Program chemicals increased slightly (2.9%) in 1993, a much reduced rate from that experienced in 1992 (5.6%). Production waste

⓮ As reported for the previous year on 1992 Form Rs .

⓯ Projected amounts.

for non-Program chemicals also increased in 1993, but by a somewhat smaller proportion (1.7%).

Facilities are projecting a significant reduction in production waste of 33/50 Program chemicals in 1994, a 5.8% decline. At the same time, production-related waste for other TRI chemicals is expected to again increase slightly (1.1%). Projections for 1995 suggest no change in 33/50 Program chemical waste, while non-Program chemical waste is forecast to continue its slow but steady rise by an additional 2%.

Analyses of facility projections, particularly as national aggregates, should be viewed with caution. Forecasting waste generation is an imprecise art, and facilities are not bound by their estimates for future years. A review of our analysis of facilities' 1992 TRI reports reinforces this point. On page 284 of the 1992 Public Data Release report, we observed that facilities were projecting a decline of nearly 4% in their production waste for 33/50 Program chemicals in 1993. Actual data subsequently reported for 1993 showed an increase of nearly 3%.

Facilities owned by 33/50 Program participating companies reported reductions in production-related waste for 33/50 Program chemicals, while facilities of non-participants reported increases. Those belonging to participating companies reported a 0.5% decrease from 1992 to 1993 and projected an additional 15% decrease from 1993 to 1995. Those facilities belonging to non-participating companies reported an 8% increase from 1993 to 1995 and projected a similar 7% increase from 1993 to 1995.

33/50 Program Chemicals in Waste, by Medium/ Management Method and by Chemical

Production-related waste for 33/50 Program chemicals is summarized by chemical and waste management method for the period 1991 to 1995 in Tables 4-4 through 4-8. Figure 4-12 presents a graphical representation of the total production-related waste for each chemical for these years.

Figure 4-13 shows these data in terms of the percent change in total production-related waste for the periods 1991-1993 (actual change) and 1993-1995 (projected change).

From 1991 to 1993, total production-related waste decreased significantly (over 50 million pounds for each of four chemicals) in terms of quantity for 1,1,1-trichloroethane (156 million pounds), benzene (120 million pounds), lead and compounds (94 million pounds), and methyl isobutyl ketone (54 million pounds). Total production-related waste of three other chemicals, carbon tetrachloride, tetrachloroethylene, and chloroform, decreased significantly on a percentage basis (over 10%). Production/import of 1,1,1-trichloroethane and carbon tetrachloride is banned in the United States after January 1, 1996.

From 1991 to 1993, total production-related waste increased over 50 million pounds each for four chemicals: toluene (613 million pounds), chromium and compounds (119 million pounds), trichloroethylene (72 million pounds), and xylene (65 million pounds). On a percentage basis, total production-related waste increased by over 10% for an additional three chemicals: mercury and compounds, cadmium and compounds, and nickel and compounds. The increase in total production-related waste for these chemicals suggests that the decrease in

Table 4-4. Quantity of 33/50 Chemicals Recycled On-site and Off-site, by Chemical, 1991-1995. [16]

CAS Number	Chemical	1991 Recycled Pounds	1992 Recycled Pounds	1993 Recycled Pounds	Projected Data 1994 Recycled Pounds	Projected Data 1995 Recycled Pounds
	Recycled On-site					
71-43-2	Benzene	170,751,241	58,140,117	64,592,187	57,933,552	57,948,453
56-23-5	Carbon tetrachloride	10,540,016	9,236,700	2,550,095	2,967,261	2,287,051
67-66-3	Chloroform	5,924,899	6,502,899	4,968,367	4,788,270	4,299,120
75-09-2	Dichloromethane	72,046,695	74,553,992	86,323,177	70,650,427	74,756,704
78-93-3	Methyl ethyl ketone	152,220,826	167,239,880	170,138,600	172,326,231	256,172,729
108-10-1	Methyl isobutyl ketone	110,036,801	57,776,059	50,396,415	46,634,071	43,383,419
127-18-4	Tetrachloroethylene	95,135,088	73,767,202	75,066,459	66,125,470	60,848,582
108-88-3	Toluene	595,782,778	1,038,335,627	1,159,918,428	1,077,941,693	1,075,531,359
71-55-6	1,1,1-Trichloroethane	190,012,133	160,864,056	111,402,660	94,457,572	81,103,230
79-01-6	Trichloroethylene	221,288,591	293,278,354	293,306,078	270,421,086	180,004,285
	Xylenes	118,379,096	112,874,807	124,956,236	120,414,398	122,050,873
	Cadmium and cadmium compounds	3,610,253	11,749,796	4,085,968	4,254,187	4,250,378
	Chromium and chromium compounds	65,509,364	63,740,754	72,122,696	66,602,127	62,037,898
	Cyanide compounds	3,523,828	632,924	575,782	560,672	562,271
	Lead and lead compounds	774,811,943	701,521,076	682,260,064	587,405,788	516,429,330
	Mercury and mercury compounds [17]	1,118,830	1,597,398	13,969,063	14,009,246	14,046,905
	Nickel and nickel compounds	47,342,031	45,123,020	48,652,367	66,699,132	78,241,543
	Subtotal for 33/50 Chemicals	2,638,034,413	2,876,934,661	2,965,284,642	2,724,191,183	2,633,954,130
	Subtotal for All Other TRI Chemicals	9,560,402,737	9,288,899,428	10,226,021,866	10,954,691,259	11,076,020,920
	Subtotal for All TRI Chemicals	12,198,437,150	12,165,834,089	13,191,306,508	13,678,882,442	13,709,975,050
	Recycled Off-site					
71-43-2	Benzene	1,420,007	565,557	1,079,229	587,808	538,656
56-23-5	Carbon tetrachloride	390,924	290,483	111,606	107,764	107,714
67-66-3	Chloroform	2,094,019	1,417,917	435,102	452,586	452,036
75-09-2	Dichloromethane	26,563,629	24,946,875	21,079,024	17,210,281	14,007,676
78-93-3	Methyl ethyl ketone	24,414,975	25,226,050	21,612,758	18,867,392	18,967,066
108-10-1	Methyl isobutyl ketone	16,670,629	19,388,510	23,026,951	22,606,704	21,910,014
127-18-4	Tetrachloroethylene	12,004,595	9,388,106	7,712,315	7,249,241	7,027,729
108-88-3	Toluene	25,372,734	29,683,884	31,868,427	21,941,647	21,217,897
71-55-6	1,1,1-Trichloroethane	26,605,801	19,297,809	14,606,493	6,658,052	3,218,518
79-01-6	Trichloroethylene	7,275,576	6,395,902	7,091,492	6,773,498	5,767,852
	Xylenes	33,647,064	36,070,567	36,142,814	35,024,904	34,785,644
	Cadmium and cadmium compounds	1,860,251	1,632,131	2,086,210	1,969,814	1,990,990
	Chromium and chromium compounds	100,263,398	112,502,108	127,799,872	129,133,371	150,125,384
	Cyanide compounds	46,631	15,226	15,533	12,837	13,291
	Lead and lead compounds	295,857,177	266,314,184	291,107,147	287,000,510	289,885,188
	Mercury and mercury compounds	60,547	51,388	24,288	329,650	26,950
	Nickel and nickel compounds	81,086,951	85,609,029	93,936,825	97,214,709	98,108,484
	Subtotal for 33/50 Chemicals	655,634,908	638,795,726	679,736,086	653,140,768	668,151,089
	Subtotal for All Other TRI Chemicals	2,336,056,325	2,551,973,435	2,644,877,989	2,674,911,986	2,881,684,184
	Subtotal for All TRI Chemicals	2,991,691,233	3,190,769,161	3,324,614,075	3,328,052,754	3,549,835,273
	Total for 33/50 Chemicals	3,293,669,321	3,515,730,387	3,645,020,728	3,377,331,951	3,302,105,219
	Total for All Other TRI Chemicals	11,896,459,062	11,840,872,863	12,870,899,855	13,629,603,245	13,957,705,104
	Total for All TRI Chemicals	15,190,128,383	15,356,603,250	16,515,920,583	17,006,935,196	17,259,810,323

[16] Data from 1991 as reported on 1992 forms; all other years from 1993 forms.

[17] A reporting error by one facility resulted in on-site recycling of mercury being overstated by nearly 13 million pounds for 1993, 1994, and 1995. At the time this error was detected, it was too late to correct the tables and figures presented in this report.

Table 4-5. Quantity of 33/50 Chemicals Used for Energy Recovery On-site and Off-site, by Chemical, 1991-1995.[18]

CAS Number	Chemical	1991 Energy Recovery Pounds	1992 Energy Recovery Pounds	1993 Energy Recovery Pounds	Projected Data 1994 Energy Recovery Pounds	Projected Data 1995 Energy Recovery Pounds
Energy Recovery On-site						
71-43-2	Benzene	33,591,155	37,366,545	26,250,860	27,638,258	28,141,591
56-23-5	Carbon tetrachloride	4,421,868	4,803,854	5,139,747	5,070,222	5,073,782
67-66-3	Chloroform	5,495,474	13,818,864	16,980,876	17,215,650	17,310,574
75-09-2	Dichloromethane	10,662,551	10,706,117	10,502,937	11,553,556	12,153,787
78-93-3	Methyl ethyl ketone	88,017,835	88,676,279	99,289,155	107,767,007	171,316,793
108-10-1	Methyl isobutyl ketone	39,271,740	43,905,284	39,090,875	40,757,131	44,458,876
127-18-4	Tetrachloroethylene	5,507,721	7,507,732	11,124,256	11,358,592	11,476,521
108-88-3	Toluene	254,268,130	289,201,036	254,771,684	282,553,285	309,458,527
71-55-6	1,1,1-Trichloroethane	5,422,186	8,010,000	4,534,328	4,502,533	4,511,100
79-01-6	Trichloroethylene	2,248,000	1,083,000	1,216,631	1,118,700	1,149,366
	Xylenes	218,652,341	243,832,323	245,700,894	267,101,655	294,200,290
	Cadmium and cadmium compounds	0	0	0	0	0
	Chromium and chromium compounds	8,331	0	69,034	29,518	35,422
	Cyanide compounds	21,987,509	22,807,069	12,229,599	14,527,863	16,530,983
	Lead and lead compounds	3,500	4,000	39,325	39,125	46,110
	Mercury and mercury compounds	0	0	0	0	0
	Nickel and nickel compounds	0	0	0	0	0
	Subtotal for 33/50 Chemicals	689,558,341	771,722,103	726,940,201	791,233,095	915,863,722
	Subtotal for All Other TRI Chemicals	2,370,806,616	2,365,066,193	2,111,404,739	2,231,557,742	2,286,670,841
	Subtotal for All TRI Chemicals	3,060,364,957	3,136,788,296	2,838,344,940	3,022,790,837	3,202,534,563
Energy Recovery Off-site						
71-43-2	Benzene	4,621,375	3,331,203	1,996,334	1,912,548	1,563,917
56-23-5	Carbon tetrachloride	9,955	2,351	4,116	3,513	2,213
67-66-3	Chloroform	713,071	175,369	60,631	44,229	46,159
75-09-2	Dichloromethane	3,619,976	2,435,825	3,252,921	2,647,429	2,497,953
78-93-3	Methyl ethyl ketone	32,535,051	39,889,681	46,796,184	43,443,289	42,033,167
108-10-1	Methyl isobutyl ketone	13,506,753	9,998,054	12,145,798	12,738,010	12,746,683
127-18-4	Tetrachloroethylene	597,416	510,982	887,593	659,843	615,361
108-88-3	Toluene	75,210,184	77,975,615	86,966,647	78,939,246	74,372,577
71-55-6	1,1,1-Trichloroethane	2,967,446	2,066,496	2,408,852	1,221,420	705,608
79-01-6	Trichloroethylene	894,895	780,913	1,485,511	1,206,577	901,321
	Xylenes	61,909,144	64,293,309	72,416,669	66,660,656	63,897,743
	Cadmium and cadmium compounds	6,525	3,052	1,142	1,009	1,006
	Chromium and chromium compounds	171,399	19,817	93,386	83,083	84,061
	Cyanide compounds	24	285	1,812	1,768	1,818
	Lead and lead compounds	2,535,207	52,221	80,422	81,206	80,779
	Mercury and mercury compounds	0	0	0	0	0
	Nickel and nickel compounds	20,884	8,086	8,031	9,382	9,848
	Subtotal for 33/50 Chemicals	199,319,305	201,543,259	228,606,049	209,653,208	199,560,214
	Subtotal for All Other TRI Chemicals	250,816,216	252,466,616	283,168,892	258,281,300	242,492,651
	Subtotal for All TRI Chemicals	450,135,521	454,009,875	511,774,941	467,934,508	442,052,865
	Total for 33/50 Chemicals	888,877,646	973,265,362	955,546,250	1,000,886,303	1,115,423,936
	Total for All Other TRI Chemicals	2,621,622,832	2,617,532,809	2,394,573,631	2,489,839,042	2,529,163,492
	Total for All TRI Chemicals	3,510,500,478	3,590,798,171	3,350,119,881	3,490,725,345	3,644,587,428

[18] Data from 1991 as reported on 1992 forms; all other years from 1993 forms.

Table 4-6. Quantity of 33/50 Chemicals Treated On-site and Off-site, by Chemical, 1991-1995. [19]

CAS Number	Chemical	1991 Treated Pounds	1992 Treated Pounds	1993 Treated Pounds	1994 Treated Pounds (Projected Data)	1995 Treated Pounds (Projected Data)
	Treated On-site					
71-43-2	Benzene	30,119,976	27,829,162	33,534,801	31,809,928	35,781,910
56-23-5	Carbon tetrachloride	15,315,779	14,767,625	14,828,380	15,102,091	14,688,253
67-66-3	Chloroform	23,235,891	13,999,132	14,082,436	13,766,146	13,718,792
75-09-2	Dichloromethane	32,784,823	35,268,167	27,362,316	20,515,418	24,371,737
78-93-3	Methyl ethyl ketone	46,612,283	51,383,051	54,609,698	55,367,005	56,199,052
108-10-1	Methyl isobutyl ketone	10,488,809	10,091,327	12,760,735	12,709,751	12,541,566
127-18-4	Tetrachloroethylene	14,129,320	15,141,102	16,700,355	16,718,061	16,704,623
108-88-3	Toluene	114,635,977	129,175,878	155,856,226	157,391,031	174,646,088
71-55-6	1,1,1-Trichloroethane	1,527,388	1,512,933	1,914,565	1,936,117	1,784,442
79-01-6	Trichloroethylene	3,733,915	4,987,486	6,515,991	6,662,985	7,195,208
	Xylenes	40,924,880	44,416,177	64,246,861	61,791,374	66,876,892
	Cadmium and cadmium compounds	523,743	605,392	163,206	156,907	511,331
	Chromium and chromium compounds	35,008,451	86,124,374	91,481,853	100,376,036	100,503,098
	Cyanide compounds	18,951,283	24,475,591	33,658,137	32,582,601	32,837,005
	Lead and lead compounds	36,789,290	35,958,348	41,310,490	43,155,159	44,436,811
	Mercury and mercury compounds	35,303	31,042	44,176	23,173	23,173
	Nickel and nickel compounds	1,898,249	2,321,002	2,615,003	2,581,963	2,423,804
	Subtotal for 33/50 Chemicals	426,715,360	498,087,789	571,685,229	572,645,746	605,243,785
	Subtotal for All Other TRI Chemicals	9,415,437,028	9,385,490,508	9,196,588,064	9,025,178,244	9,249,460,926
	Subtotal for All TRI Chemicals	9,842,152,388	9,883,578,297	9,768,273,293	9,597,823,990	9,854,704,711
	Treated Off-site					
71-43-2	Benzene	2,190,932	1,390,189	2,085,219	2,020,307	1,299,192
56-23-5	Carbon tetrachloride	820,033	778,012	906,664	610,525	562,094
67-66-3	Chloroform	2,082,474	1,930,016	2,405,711	2,675,485	2,246,126
75-09-2	Dichloromethane	9,573,955	13,965,999	10,509,299	9,356,395	9,569,689
78-93-3	Methyl ethyl ketone	7,777,191	6,353,837	6,533,657	5,268,961	6,031,620
108-10-1	Methyl isobutyl ketone	2,186,478	1,913,351	1,919,172	1,802,453	1,533,699
127-18-4	Tetrachloroethylene	3,098,538	1,981,397	2,488,782	2,117,815	1,938,357
108-88-3	Toluene	14,108,349	18,716,023	16,997,430	17,390,007	18,000,579
71-55-6	1,1,1-Trichloroethane	4,888,401	3,687,100	3,423,144	2,115,715	1,447,987
79-01-6	Trichloroethylene	1,584,257	2,250,300	1,818,275	1,497,837	1,212,789
	Xylenes	10,889,446	8,971,445	8,083,355	7,989,388	7,937,851
	Cadmium and cadmium compounds	310,881	542,137	232,879	227,344	220,010
	Chromium and chromium compounds	4,176,295	4,333,947	19,993,798	3,848,693	3,652,251
	Cyanide compounds	463,621	435,005	455,380	359,080	342,477
	Lead and lead compounds	4,860,034	4,772,651	6,405,526	5,692,218	6,584,469
	Mercury and mercury compounds	56,340	9,276	1,329	1,211	1,207
	Nickel and nickel compounds	1,969,278	2,674,637	2,436,417	2,292,532	2,143,908
	Subtotal for 33/50 Chemicals	71,036,503	74,705,322	86,696,037	65,265,966	64,724,305
	Subtotal for All Other TRI Chemicals	611,460,693	625,644,432	571,089,060	535,941,684	503,872,097
	Subtotal for All TRI Chemicals	682,497,196	700,349,754	657,785,097	601,207,650	568,596,402
	Total for 33/50 Chemicals	497,751,863	572,793,111	658,381,266	637,911,712	669,968,090
	Total for All Other TRI Chemicals	10,026,897,721	10,011,134,940	9,767,677,124	9,561,119,928	9,753,333,023
	Total for All TRI Chemicals	10,524,649,584	10,583,928,051	10,426,058,390	10,199,031,640	10,423,301,113

[19] Data from 1991 as reported on 1992 forms; all other years from 1993 forms.

Table 4-7. Quantity of 33/50 Chemicals Released/Disposed of, by Chemical, 1991-1995. [20]

CAS Number	Chemical	1991 Quantity Released/ Disposed of Pounds	1992 Quantity Released/ Disposed of Pounds	1993 Quantity Released/ Disposed of Pounds	Projected Data 1994 Quantity Released/ Disposed of Pounds	Projected Data 1995 Quantity Released/ Disposed of Pounds
71-43-2	Benzene	18,515,198	13,435,686	11,218,310	10,156,862	9,514,913
56-23-5	Carbon tetrachloride	1,492,508	2,203,795	2,352,503	1,750,112	1,640,568
67-66-3	Chloroform	20,457,275	17,159,852	14,413,609	12,864,728	11,720,062
75-09-2	Dichloromethane	79,805,530	75,982,689	66,718,011	56,898,915	50,879,972
78-93-3	Methyl ethyl ketone	101,617,718	90,299,687	85,805,403	77,421,299	72,864,907
108-10-1	Methyl isobutyl ketone	26,212,313	24,780,173	25,426,035	24,640,846	22,332,776
127-18-4	Tetrachloroethylene	15,425,167	11,493,032	11,651,832	9,245,692	7,859,261
108-88-3	Toluene	195,627,939	198,040,224	181,399,292	159,256,140	148,151,574
71-55-6	1,1,1-Trichloroethane	127,354,830	95,687,254	64,594,783	39,984,432	21,976,845
79-01-6	Trichloroethylene	32,112,823	28,507,688	29,884,219	27,343,971	21,530,172
	Xylenes	121,722,576	115,834,532	119,799,283	113,373,997	110,218,335
	Cadmium and cadmium compounds	1,066,365	529,372	3,306,540	3,871,866	3,823,767
	Chromium and chromium compounds	40,887,764	36,968,850	53,501,023	42,258,883	40,370,441
	Cyanide compounds	6,985,338	7,276,639	6,400,402	6,633,527	11,424,295
	Lead and lead compounds	34,616,771	32,516,338	34,043,402	31,093,663	32,150,236
	Mercury and mercury compounds	83,239	229,385	57,137	45,488	42,428
	Nickel and nickel compounds	11,296,529	9,697,929	20,150,543	8,224,570	11,487,678
	Total for 33/50 Chemicals	835,279,883	760,643,125	730,722,327	625,064,991	577,988,230
	Total for All Other TRI Chemicals	2,694,482,413	2,592,535,523	2,475,640,489	2,125,777,458	2,080,818,171
	Total for All TRI Chemicals	3,529,762,296	3,353,178,648	3,206,362,816	2,750,842,449	2,658,806,401

Table 4-8. Total Quantity of 33/50 Chemicals in Production-Related Waste, by Chemical, 1991-1995. [20]

CAS Number	Chemical	1991 Total Production-Related Waste Pounds	1992 Total Production-Related Waste Pounds	1993 Total Production-Related Waste Pounds	Projected Data 1994 Total Production-Related Waste Pounds	Projected Data 1995 Total Production-Related Waste Pounds
71-43-2	Benzene	261,209,884	142,058,459	140,756,940	132,059,263	134,788,632
56-23-5	Carbon tetrachloride	32,991,083	32,082,820	25,893,111	25,611,488	24,361,675
67-66-3	Chloroform	60,003,103	55,004,049	53,346,732	51,807,094	49,792,869
75-09-2	Dichloromethane	235,057,159	237,859,664	225,747,685	188,832,421	188,237,518
78-93-3	Methyl ethyl ketone	453,195,879	469,068,465	484,785,455	480,461,184	623,585,334
108-10-1	Methyl isobutyl ketone	218,373,523	167,852,758	164,765,981	161,888,966	158,907,033
127-18-4	Tetrachloroethylene	145,897,845	119,789,553	125,631,592	113,474,714	106,470,434
108-88-3	Toluene	1,275,006,091	1,781,128,287	1,887,778,134	1,795,413,049	1,821,378,601
71-55-6	1,1,1-Trichloroethane	358,778,185	291,125,648	202,884,825	150,875,841	114,747,730
79-01-6	Trichloroethylene	269,138,057	337,283,643	341,318,197	315,024,654	217,760,993
	Xylenes	606,124,547	626,293,160	671,346,112	672,356,372	699,967,628
	Cadmium and cadmium compounds	7,378,018	15,061,880	9,875,945	10,481,127	10,797,482
	Chromium and chromium compounds	246,025,002	303,689,850	365,061,662	342,331,711	356,808,555
	Cyanide compounds	51,958,234	55,642,739	53,336,645	54,678,348	61,712,140
	Lead and lead compounds	1,149,473,922	1,041,138,818	1,055,246,376	954,467,669	889,612,923
	Mercury and mercury compounds	1,354,259	1,918,489	14,095,993	14,408,768	14,140,663
	Nickel and nickel compounds	143,613,922	145,433,703	167,799,186	177,022,288	192,415,265
	Total for 33/50 Chemicals	5,515,578,713	5,822,431,985	5,989,670,571	5,641,194,957	5,665,485,475
	Total for All Other TRI Chemicals	27,239,462,028	27,062,076,135	27,508,791,099	27,806,339,673	28,321,019,790
	Total for All TRI Chemicals	32,755,040,741	32,884,508,120	33,498,461,670	33,447,534,630	33,986,505,265

[20] Data from 1991 as reported on 1992 forms; all other years from 1993 forms.

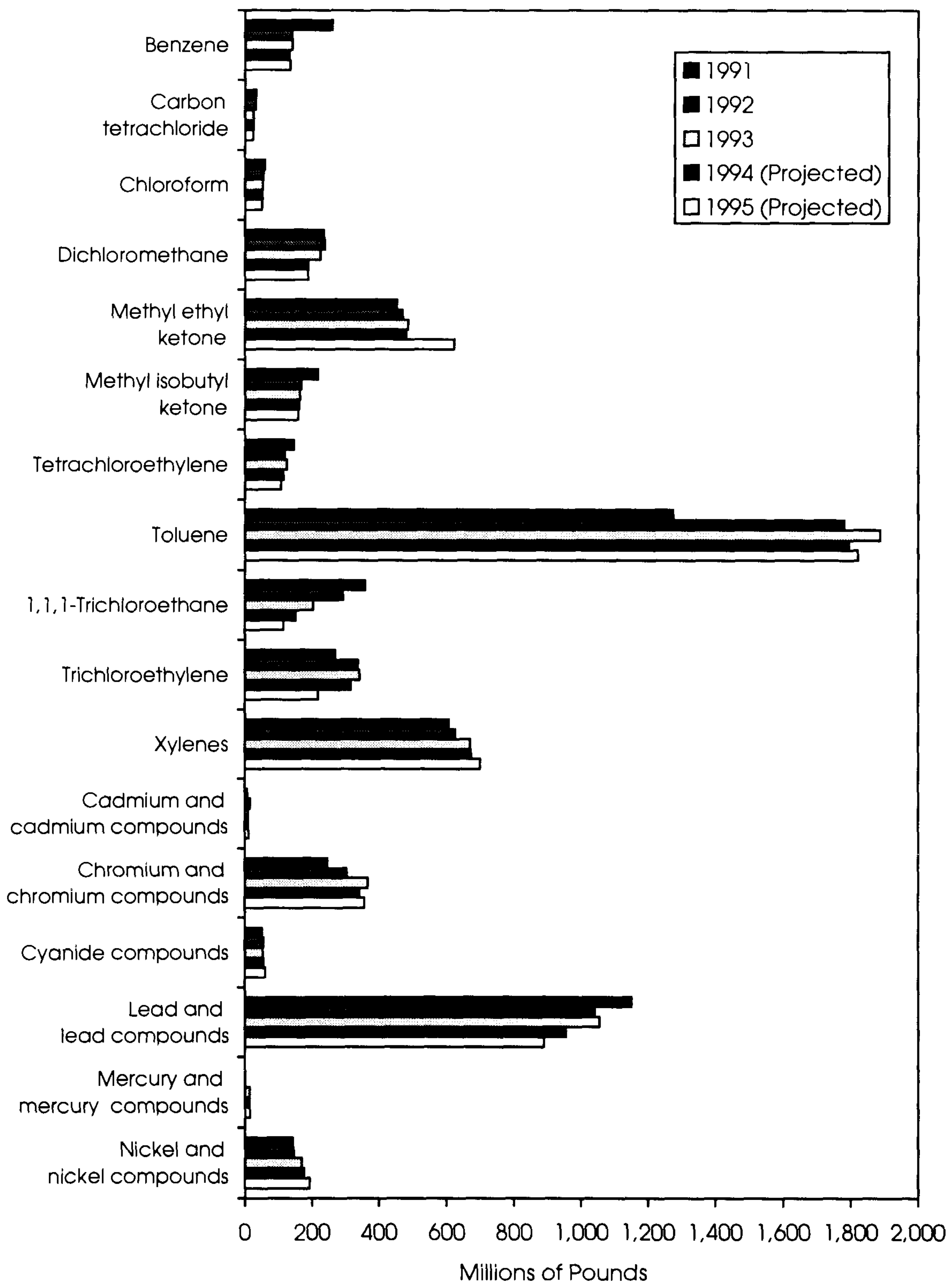


Figure 4-12. Total Production-Related Waste, 33/50 Program Chemicals, Actual and Projected, 1991-1995.[21]

[21] A reporting error by one facility resulted in on-site recycling of mercury being overstated by nearly 13 million pounds for 1993, 1994, and 1995. At the time this error was detected, it was too late to correct the tables and figures.

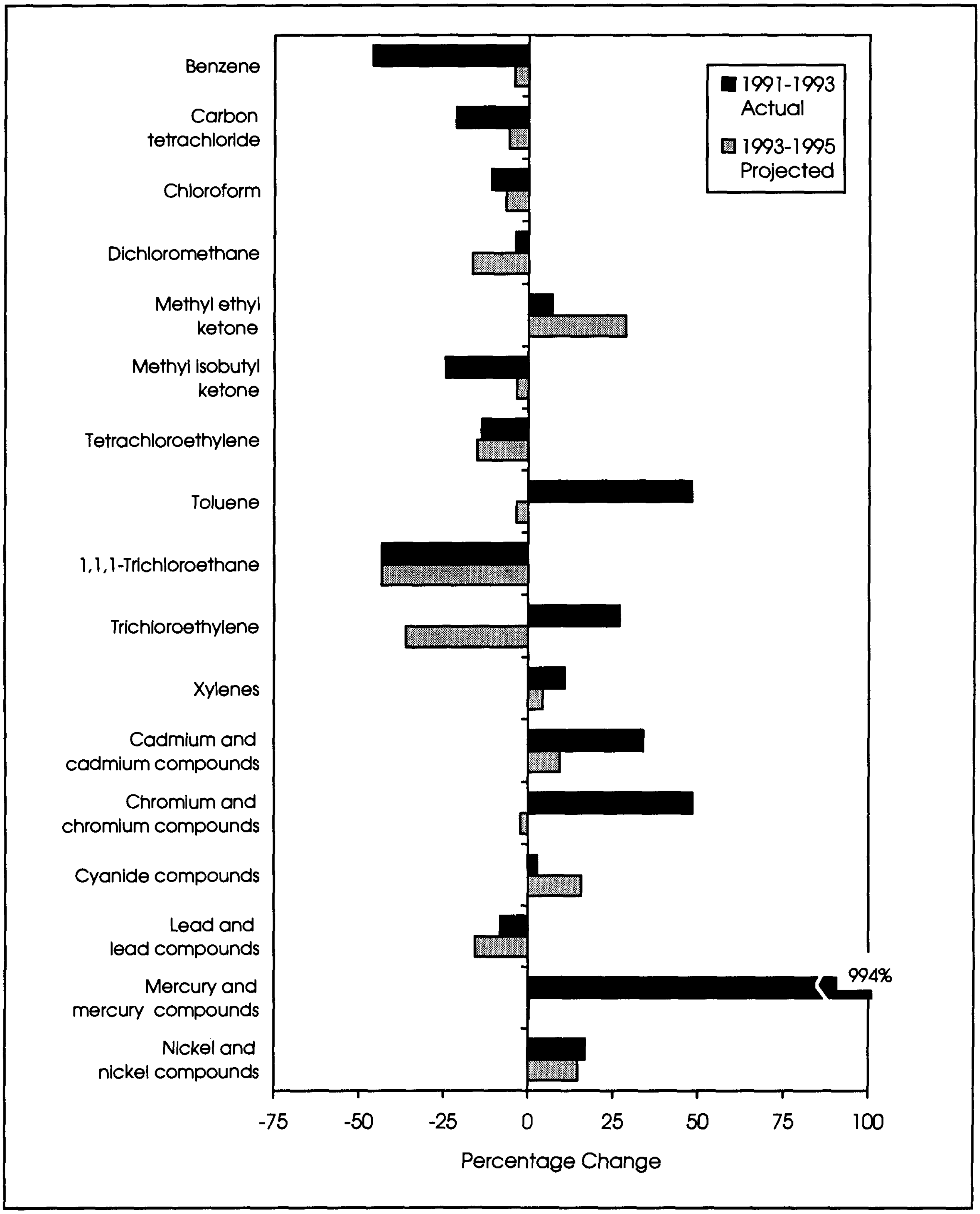


Figure 4-13. Percentage Change in Total Production-Related Waste, 33/50 Program Chemicals, Actual and Projected, 1991-1995. [22]

[22] A reporting error by one facility resulted in on-site recycling of mercury being overstated by nearly 13 million pounds for 1993, 1994, and 1995. At the time this error was detected, it was too late to correct the tables and figures.

releases and transfers observed in Figure 4-7, particularly for the organic chemicals, did not result from source reduction measures.

Facilities are projecting that total production-related waste will decrease significantly from 1993 to 1995 for four chemicals: lead and compounds (166 million pounds), trichloroethylene (124 million pounds), 1,1,1-trichloroethane (88 million pounds), and toluene (66 million pounds). Total production-related waste of dichloromethane and of tetrachloroethylene is also projected to decrease significantly on a percentage basis during this time period. Total production-related waste is also projected to decrease by smaller quantities/ percentages for five other chemicals.

Total production-related waste is projected to increase for six chemicals, most notably, methyl ethyl ketone, which is projected to increase by 139 million pounds (29%). Total production-related waste of cyanide compounds and nickel and nickel compounds is also projected to increase by 16% and 15% respectively.

Figure 4-14 shows the total production-related waste for 1991 to 1995 by management method. Data for 1991 through 1993 represent actual figures, while data for 1994 and 1995 represent facilities' projections. 1991 figures are drawn from 1992 prior year reports; all others are from 1993 reports. Figure 4-15 shows these data, in terms of the percent change for the periods 1991-1993 (observed changes) and 1993-1995 (projected change).

From 1991 to 1993, on-site releases and off-site disposal of 33/50 chemicals decreased by nearly 105 million pounds (12.5%). These decreases were offset by increases in all other waste management methods, most notably on-site recycling which increased by over 327 million pounds (12%) and on-site treatment which increased by 145 million pounds (34%).

Facilities are projecting that, from 1993 to 1995, on-site releases and off-site disposal of 33/50 Program chemicals will continue to decrease by 153 million pounds (21%) and on-site recycling will decrease by 331 million pounds (11%). Only on-site energy recovery is projected to increase significantly (189 million pounds, 26%).

In comparison, on- and off-site recycling of non-33/50 chemicals increased from 1991 to 1993 by over 666 million pounds (7%) and 309 million pounds (13%) respectively. On- and off-site recycling is projected to continue to increase from 1993 to 1995 (8% and 9% respectively). Quantities released are expected to decrease by 16% from 1993 to 1995. On-site energy recovery of non-33/50 chemicals decreased 11% from 1991 to 1993 while off-site energy recovery increased by 13%. On-site energy recovery is expected to increase by 8% from 1993 to 1995 while off-site energy recovery is expected to decrease by 14% during this time period.

SOURCE REDUCTION REPORTING FOR 33/50 PROGRAM CHEMICALS

Facilities are also required to report in Section 8 of Form R any source reduction efforts that were directed toward TRI chemicals during the reporting year and the methods they employed in identifying source reduction opportunities.

Source Reduction Activities

Table 4-9 summarizes facilities' reporting of source reduction activities for each of the 17 33/50 Program chemicals for 1991-1993. As a group and individually, 33/50 Program chemicals evidenced higher rates and levels of source reduction activity reporting than other TRI chemicals. Of the more than 19,700

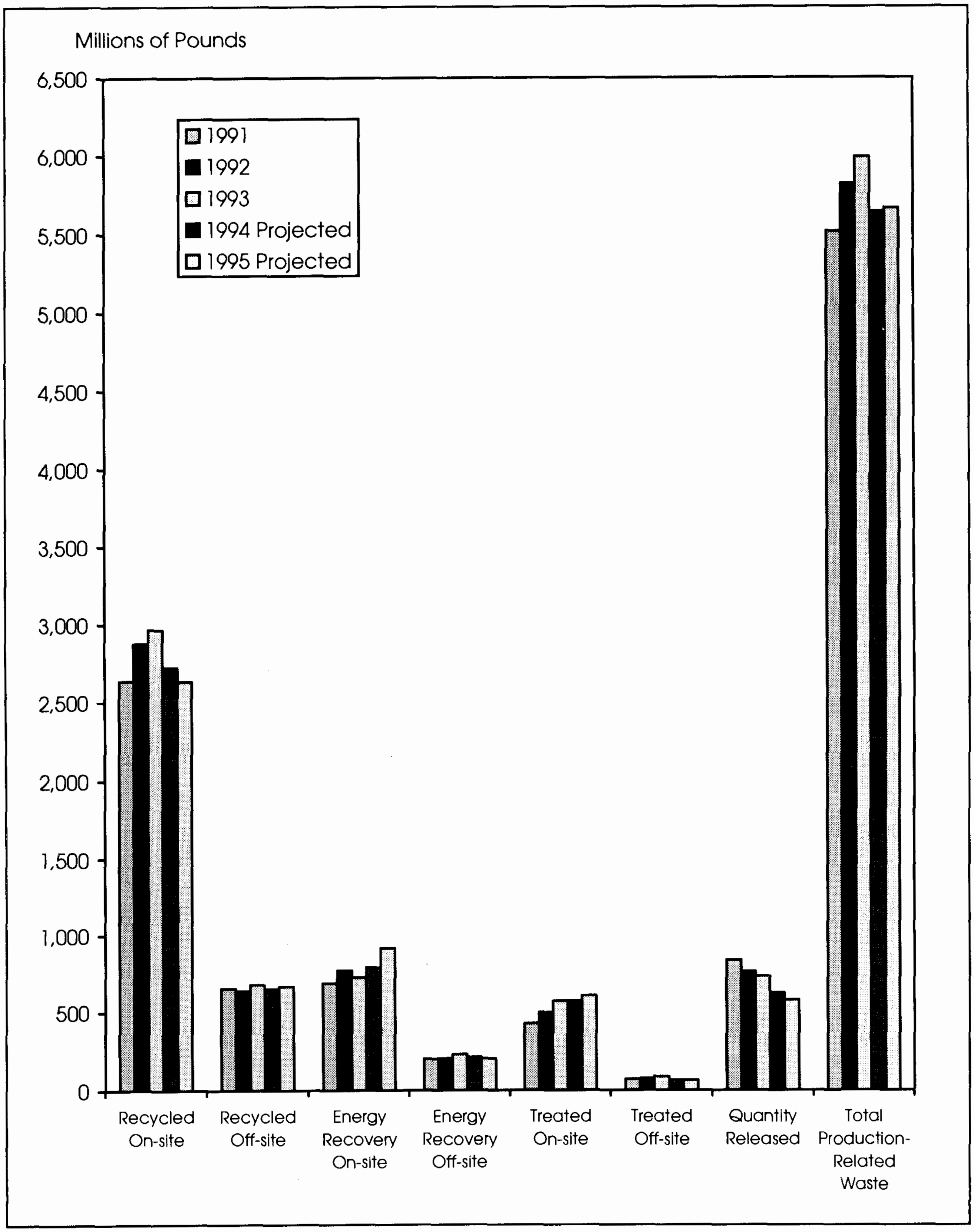


Figure 4-14. TRI Data Collected Under the Pollution Prevention Act for 33/50 Program Chemicals, by Management Type, Actual and Projected, 1991-1995.

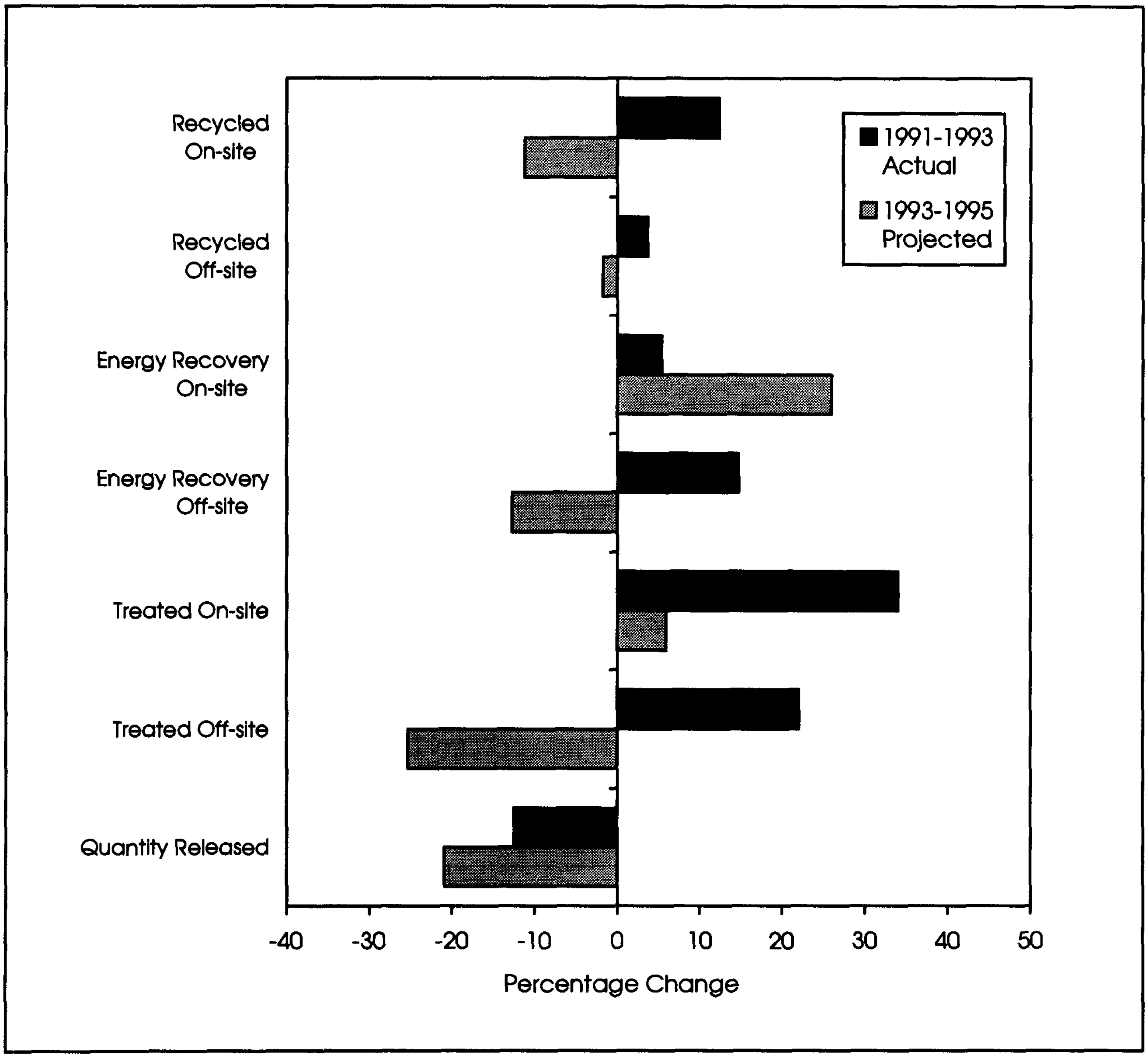


Figure 4-15. Percentage Change in Waste Management Practices, 33/50 Program Chemicals, 1988-1993.

Table 4-9. Number of TRI Forms Reporting Source Reduction Activity, by 33/50 Program Chemical, 1991-1993.

CAS Number	Chemical	Number of TRI Forms			Forms Reporting Source Reduction Activities: Number			Percent of All Forms		
		1991	1992	1993	1991	1992	1993	1991	1992	1993
71-43-2	Benzene	486	474	469	156	154	143	32.1	32.5	30.5
56-23-5	Carbon tetrachloride	102	90	74	29	27	18	28.4	30.0	24.3
67-66-3	Chloroform	183	180	175	67	62	54	36.6	34.4	30.9
75-09-2	Dichloromethane	1,293	1,131	1,065	524	419	380	40.5	37.0	35.7
78-93-3	Methyl ethyl ketone	2,570	2,481	2,418	970	911	904	37.7	36.7	37.4
108-10-1	Methyl isobutyl ketone	1,041	1,027	1,006	385	360	338	37.0	35.1	33.6
127-18-4	Tetrachloroethylene	573	512	474	215	191	175	37.5	37.3	36.9
108-88-3	Toluene	3,928	3,770	3,569	1,501	1,443	1,376	38.2	38.3	38.6
71-55-6	1,1,1-Trichloroethane	3,699	3,178	2,073	1,616	1,494	1,154	43.7	47.0	55.7
79-01-6	Trichloroethylene	723	675	772	291	248	285	40.2	36.7	36.9
	Xylenes	3790	3650	3,562	1368	1318	1,281	36.1	36.1	36.0
	Cadmium and cadmium compounds	217	186	177	61	64	63	28.1	34.4	35.6
	Chromium and chromium compounds	3054	3045	3,107	602	565	567	19.7	18.6	18.2
	Cyanide compounds	313	293	292	93	86	78	29.7	29.4	26.7
	Lead and lead compounds	1803	1689	1,655	486	442	427	27.0	26.2	25.8
	Mercury and mercury compounds	56	39	35	12	8	10	21.4	20.5	28.6
	Nickel and nickel compounds	2369	2380	2,459	379	352	386	16.0	14.8	15.7
	Total for 33/50 Chemicals	26,200	24,800	23,382	8,755	8,144	7,639	33.4	32.8	32.7
	Total for All Other TRI Chemicals	58,591	57,473	56,605	12,995	12,508	12,093	22.2	21.8	21.4
	Total for All TRI Chemicals	84,791	82,273	79,987	21,750	20,652	19,732	25.7	25.1	24.7

Form Rs reporting that a source reduction activity was implemented during 1993, nearly 40% (7,639) were for the 17 33/50 Program chemicals, even though Program chemicals account for only 30% of total TRI Form Rs. One-third of the Form Rs for 33/50 Program chemicals reported the occurrence of source reduction, compared to slightly more than one-fifth of the forms for other TRI chemicals.

Individual 33/50 Program chemicals had some of the highest rates of reporting on source reduction. Four of the five TRI chemicals with the greatest number of Form Rs reporting source reduction are 33/50 Program chemicals [toluene, xylene (mixed isomers), 1,1,1-trichloroethane, and methyl ethyl ketone]. The high ranking for 33/50 Program chemicals is partially due to the fact that they rank among the highest TRI chemicals in total number of Form Rs submitted, but they also evidenced some of the highest percentages of Form R submissions indicating source reduction. Among 33/50 Program chemicals, the highest was 1,1,1-trichloroethane, with 56% of its TRI forms indicating source reduction activity.

Twelve 33/50 Program chemicals are among the top 50 TRI chemicals for numbers of forms reporting source reduction. Of these, organic chemicals generally evidenced higher percentages of Form Rs reporting source reduction than did the metals, ranging from 24% to 56% for the eleven organic chemicals and from 16% to 36% for the metals.

For the period 1991-1993, source reduction activity reporting has declined both in absolute terms, due mostly to reductions in total Form Rs submitted to TRI, and in percentage terms,

Table 4-10. Number of TRI Forms Reporting Source Reduction Activity, by Category, by Chemical, 1993.

CAS Number	Chemical	Forms Reporting per 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
71-43-2	Benzene	64	7	106	9	84	7	2	3
56-23-5	Carbon tetrachloride	6	1	6	3	9	1	0	0
67-66-3	Chloroform	13	1	11	19	39	0	0	0
75-09-2	Dichloromethane	164	34	96	113	117	89	21	43
78-93-3	Methyl ethyl ketone	448	161	160	239	262	111	268	108
108-10-1	Methyl isobutyl ketone	181	57	69	73	124	35	100	46
127-18-4	Tetrachloroethylene	94	10	44	23	43	59	5	14
108-88-3	Toluene	648	198	304	364	404	132	426	168
71-55-6	1,1,1-Trichloroethane	350	66	106	361	183	579	104	116
79-01-6	Trichloroethylene	128	16	50	18	56	178	6	16
	Xylenes	584	182	281	287	380	104	464	139
	Cadmium and cadmium compounds	19	6	14	25	28	2	1	16
	Chromium and chromium compounds	302	76	137	115	219	39	24	53
	Cyanide compounds	29	9	10	10	50	15	1	4
	Lead and lead compounds	216	55	93	132	175	8	9	65
	Mercury and mercury compounds	1	0	0	3	6	0	0	2
	Nickel and nickel compounds	221	63	75	55	166	34	14	31
	Total for 33/50 Chemicals	3,468	942	1,562	1,849	2,345	1,393	1,445	824
	Total for All Other TRI Chemicals	6,108	1,507	4,039	1,989	4,729	1,002	872	874
	Total for All TRI Chemicals	9,576	2,449	5,601	3,838	7,074	2,395	2,317	1,698

though only marginally (1% from 1991-1993). Similar patterns are observed for both 33/50 and non-33/50 Program chemicals.

Facilities described the type of source reduction activity that they implemented for each chemical (see Table 4-10). 33/50 Program chemicals as a group did not differ significantly from other TRI chemicals in the types of activities employed. Improvement in facility operating practices is the most common approach.

Methods Used to Identify Source Reduction Opportunities

Table 4-11 summarizes facilities' reporting of source reduction activity identification methods for each of the 17 33/50 Program chemicals in 1993. Here again, facilities did not seem to treat Program chemicals differently than other TRI chemicals in their search for source reduction opportunities, although the data do show a somewhat greater reliance on assistance from federal programs, industry associations, and vendors in the case of 33/50 Program chemicals compared to other TRI chemicals.

LOOKING TO THE FUTURE: AN AGENDA FOR ACTION

Many people think that the 33/50 Program ends at the end of 1995, since its ultimate national 50% reduction goal is targeted for 1995. However, public release of 1995 TRI data, used to monitor companies' and the Program's progress in meeting our goals, will not occur until the spring of 1997. Accordingly, EPA's administration of the 33/50 Program will continue well beyond 1995, guided by an ambitious agenda.

Recognizing Companies' 33/50 Program Achievements

EPA offers public recognition to companies to encourage them to participate in the 33/50 Program and to undertake pollution reduction activities. All participants receive Certificates of Appreciation upon enrollment. Last year, in conjunction with the announcement that the Program's 1992 interim 33% reduction goal had been exceeded by nearly 100 million pounds, more than 300 companies were singled out to receive Certificates of Environmental Achievement for reducing releases and transfers of Program chemicals either by 100% or by more than 1 million pounds.

As the Program approaches achieving its ultimate 50% reduction goal, the Agency is assessing options for commending companies for their reduction achievements. One option is to recognize all companies that achieve their own written reduction pledges. Another is to single out companies that achieve substantial reductions. A major concern that has been raised regarding both of these options is that TRI does not explain whether reductions are the result of real changes in facility operations (vs. changes in release estimating procedures, plant closures, etc.) nor how real reductions were achieved. Addressing such concerns may require EPA to verify reductions in conjunction with recognizing companies' 33/50 Program achievements.

33/50 Program Awards

EPA is working with a panel of representatives from industry, states, and environmental groups to determine whether 33/50 Program Awards should be issued to a select set of companies whose pollution reduction achievements could be considered truly remarkable. Concerns have been raised, however, that such a selection process might unfairly stigmatize those companies not receiving the awards. Other concerns address the issue of reviewing and verifying award nominations.

One idea being considered by this panel is to encourage companies to submit 33/50 program Success Stories detailing the ways in which they achieved significant reductions in emissions of the target chemicals. Such Success Stories could be reviewed and distributed by EPA, providing a wealth of "how-to" information for other companies to draw on in reducing their own wastes. EPA has already produced a series of 33/50 Program Company Reduction Profiles, and more are scheduled for release this spring. However, asking companies to nominate their own Success Stories for recognition by EPA would broaden substantially the coverage of this information.

These and other recognition options are being explored. Recognition of some type will be made at a major 33/50 Program Conference timed to celebrate achievement of the Program's 50% reduction goal.

Decisions on categories, criteria, and nomination procedures will be announced in the summer of 1995.

Table 4-11. Methods Used to Identify Source Reduction Activity, by 33/50 Program Chemical, 1993.

CAS Number	Chemical	Forms Reporting Source Reduction Activities	Pollution Prevention Opportunity Audit		Materials Balance Audit	Participative Team Management	Employee Recommendation	
			Internal	External			Informal	Formal Program
		Number	Number	Number	Number	Number	Number	Number
71-43-2	Benzene	143	79	9	12	44	23	24
56-23-5	Carbon tetrachloride	18	7	0	2	4	2	3
67-66-3	Chloroform	54	15	2	5	27	6	6
75-09-2	Dichloromethane	380	146	17	46	171	73	36
78-93-3	Methyl ethyl ketone	904	326	49	147	440	171	100
108-10-1	Methyl isobutyl ketone	338	134	21	48	174	64	47
127-18-4	Tetrachloroethylene	175	82	9	26	77	30	15
108-88-3	Toluene	1,376	515	65	180	621	234	149
71-55-6	1,1,1-Trichloroethane	1,154	444	58	108	515	149	105
79-01-6	Trichloroethylene	285	118	21	36	125	49	22
	Xylenes	1,281	483	55	152	561	229	154
	Cadmium and cadmium compounds	63	25	2	10	25	8	10
	Chromium and chromium compounds	567	215	28	97	295	100	65
	Cyanide compounds	78	35	2	9	38	15	2
	Lead and lead compounds	427	168	29	53	223	85	44
	Mercury and mercury compounds	10	3	2	1	5	1	3
	Nickel and nickel compounds	386	130	14	72	218	79	34
Total for 33/50 Chemicals		7,639	2,925	383	1,004	3,563	1,318	819
Total for All Other TRI Chemicals		12,093	4,788	536	1,568	5,791	2,177	1,326
Total for All TRI Chemicals		19,732	7,713	919	2,572	9,354	3,495	2,145

33/50—The Next Generation

As calendar year 1995—the 33/50 Program's final year—proceeds, EPA increasingly is being asked what, if anything, it plans to do as a follow-up. A general consensus has emerged that voluntary partnerships between government and industry can be effective in promoting pollution prevention. However, perspectives differ on both the need for and the design of a next generation of the 33/50 Program.

EPA has been spearheading public discussion on the prospects for a next generation voluntary program. The objective is to obtain input from industry, environmental groups, citizens, states, and other constituencies on two basic questions:

- Should there be a next generation of the 33/50 Program?
- How should a next-generation 33/50 Program be designed?

This decision-making process will conclude with a formal announcement in the summer of 1995.

Call for Comments

Anyone interested in offering suggestions or commenting on company recognition options, 33/50 Program Awards, or prospects for a next- generation voluntary environmental partnership program is encouraged to call or write the 33/50 Program staff at the phone numbers and addresses provided at the end of this chapter.

Table 4-11.

Chemical	**State Program** Number	**Federal Program** Number	**Trade/ Industry Program** Number	**Vendor Assistance** Number	**Other** Number
Benzene	2	1	9	17	56
Carbon tetrachloride	0	0	1	0	7
Chloroform	0	0	3	4	21
Dichloromethane	2	1	16	90	84
Methyl ethyl ketone	17	1	63	311	159
Methyl isobutyl ketone	7	0	20	102	60
Tetrachloroethylene	4	0	13	50	29
Toluene	23	5	101	501	273
1,1,1-Trichloroethane	19	17	85	417	241
Trichloroethylene	9	0	13	77	51
Xylenes	26	4	92	466	256
Cadmium and cadmium compounds	0	0	3	13	20
Chromium and chromium compounds	5	1	29	134	96
Cyanide compounds	1	0	5	26	10
Lead and lead compounds	3	1	30	91	107
Mercury and mercury compounds	0	0	0	0	1
Nickel and nickel compounds	3	1	20	65	73
Total for 33/50 Chemicals	121	32	503	2,364	1,544
Total for All Other TRI Chemicals	138	40	686	2,652	2,372
Total for All TRI Chemicals	259	72	1,189	5,016	3,916

FOR MORE INFORMATION . . . .

Companies' written communications with the 33/50 Program are available to the public along with a variety of Program information materials, including computer-generated lists of participating companies. Anyone interested in obtaining additional information about the 33/50 Program can do so by calling EPA's TSCA Assistance Hotline at (202) 554-1404 Monday through Friday between 8:30 a.m. and 5:00 p.m. EST. Or contact the 33/50 Program staff directly at EPA headquarters at (202) 260-6907 or by directing letters to Mail Code 7408, Office of Pollution Prevention and Toxics, U.S. EPA, 401 M Street, SW., Washington, DC 20460. Program staff can also be reached via fax at (202) 401-8142, or via the Internet at BURNS.MIKE@EPAMAIL.EPA.GOV. Information about the 33/50 Program can also be obtained from 33/50 Program Coordinators in EPA's 10 Regional Offices:

US EPA - Region I
(MS: ATR)
1 Congress Street
Boston, MA 02203
PH#: (617) 565-4502
FAX: (617) 565-4939

US EPA - Region II
(MS: 105)
2890 Woodbridge Ave, Bldg. 10
Edison, NJ 08837
PH#: (908) 906-6815
FAX: (908) 321-6788

US EPA - Region III
(MS: 3AT01)
841 Chestnut Bldg
Philadelphia, PA 19107
PH#: (215) 597-9302
FAX: (215) 580-2011

US EPA - Region IV
345 Courtland Street, NE
Atlanta, GA 30365
PH#: (404) 347-1033
FAX: (404) 347-1681

US EPA - Region V
(MS: SP-14J)
77 W. Jackson Blvd.
Chicago, IL 60604
PH#: (312) 886-6219
FAX: (312) 353-4342

US EPA - Region VI
(MS: 6T-PT)
1445 Ross Avenue
Dallas, TX 75202
PH#: (214) 665-7582
FAX: (214) 665-2164

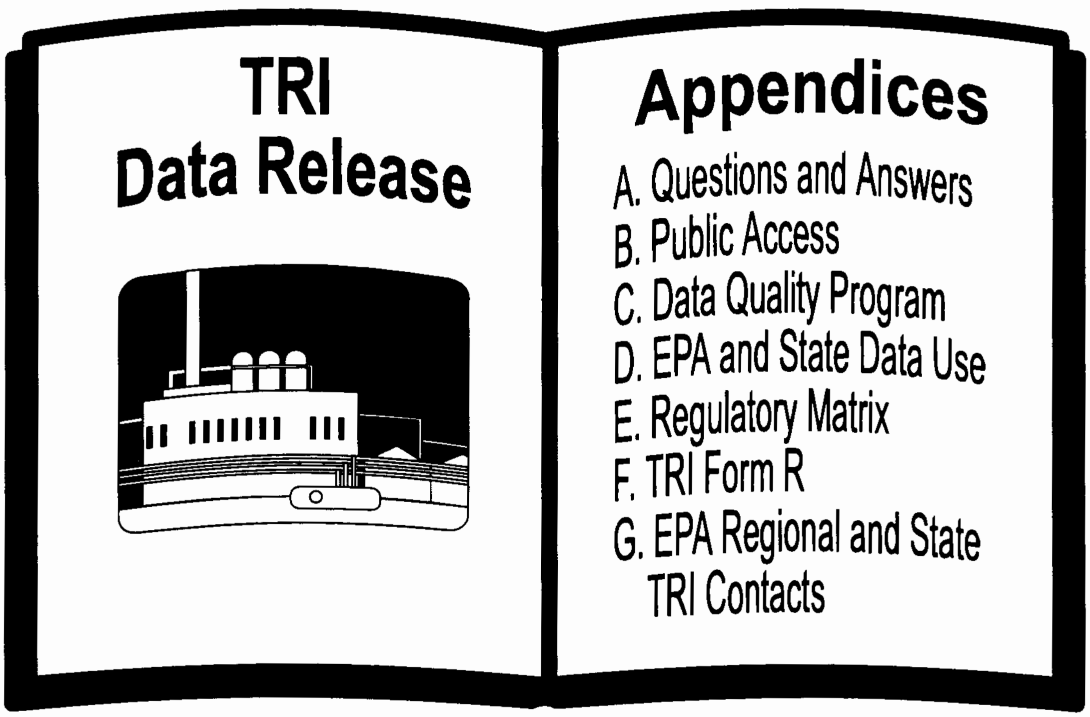
US EPA - Region VII
(MS: ARTX)
726 Minnesota Avenue
Kansas City, KS 66101
PH#: (913) 551-7315
FAX: (913) 551-7065

US EPA - Region VIII
(MS: 8ART-AP)
999 - 18th St., Suite 600
Denver, CO 80202-2405
PH#: (303) 294-7684
FAX: (303) 293-1229

US EPA - Region IX
(MS: A-4-3)
75 Hawthorne Street
San Francisco, CA 94105
PH#: (415) 744-1061
FAX: (415) 744-1073

US EPA - Region X
(MS: AT-083)
1200 - 6th Avenue
Seattle, WA 98101
PH#: (206) 553-4762
FAX: (206) 553-8338

Appendices


TRI
Data Release
Appendices
A. Questions and Answers
B. Public Access
C. Data Quality Program
D. EPA and State Data Use
E. Regulatory Matrix
F. TRI Form R
G. EPA Regional and State
TRI Contacts

APPENDIX A

QUESTIONS AND ANSWERS

I. ALTERNATE THRESHOLD FOR FACILITIES WITH REPORTABLE AMOUNTS

For more information:
Tim Crawford, Environmental Assistance Division (202) 260-1715

Q1 How did the Alternate Threshold Rule come about, and how will it be implemented?

A EPA has finalized a reporting modification that is effective for activities beginning on January 1, 1995. In the Final rule, 59 FR 61488 entitled "TRI Alternate Threshold for Facilities with Low Annual Reportable Amounts", EPA established a reduced reporting option for facilities that meet TRI reporting thresholds for a listed chemical, but that do not exceed 500 pounds for the total annual reportable amount (defined below) for that chemical. This rulemaking was pursued in response to two petitions that requested EPA to provide some regulatory relief for a subset of currently reporting facilities.

This reporting modification provides facilities that do not exceed the 500 pound criterion for a listed chemical the option of applying an alternate manufacture, process or otherwise use threshold of 1 million pounds to that chemical. If a facility does not exceed the 1 million pound threshold, then that facility is eligible to submit a certification statement in lieu of a full Form R for activities beginning January 1, 1995.

Q2 Why was this done?

A EPA believes that this modification will provide a significant degree of burden reduction to industry. EPA estimates approximately 20,100 Form Rs can be converted to certification statements.

Q3 How much money is this expected to save?

A EPA estimates that this modification will save industry and EPA an annual total of $17.3 million and $700 thousand, respectively.

Q4 Won't we lose valuable TRI data because of this?

A Some of the detailed information, such as the media to which a chemical was released or which waste management method was applied will no longer be available for those chemicals that are reported via a certification statement.

Q5 What information will be collected on the certification statement, and how will that information be made available to the public?

A The certification statement is a simplified form of reporting and is intended as a means to reduce the compliance burden associated with EPCRA section 313. The certification statement must be submitted on an annual basis for each eligible chemical. The information submitted on the certification statement includes facility identification information and the chemical or chemical category identity. The information submitted on the certification statement will appear in the TRI data base in the same manner that information submitted on Form Rs appears. An approved certification statement, including a magnetic media version, will be made available in the 1995 Form R and Instructions package.

Q6 Aren't there some chemicals for which 500 pounds of releases could be a potentially serious environmental or health problem? Why is the 500 pound cut-off the same for all chemicals, regardless of their toxicity?

A When EPA began evaluating approaches to a reporting modification that would provide regulatory burden reduction, it considered making a distinction among the listed chemicals. However, EPA did not attempt to apply risk-based concepts in this rulemaking. EPA believes the level of 500 pounds selected for the final rulemaking, coupled with the information collected by the certification statement, will provide a significant amount of burden reduction while not appreciably lessening the value of currently collected information. EPA may consider a future modification of current thresholds to more fully capture information on chemicals that persist in the environment and bioaccumulate.

Q7 What is included in the total annual reportable amount?

A For the purpose of this reporting modification, the annual reportable amount is equal to the combined total quantities released at the facility, disposed of within the facility, treated at the facility (as represented by amounts destroyed or converted by treatment processes), recovered at the facility as a result of recycle operations, combusted for the purpose of energy recovery at the facility, and amounts transferred from the facility to off-site locations for the purpose of recycle, energy recovery, treatment, and/or disposal. These volumes correspond to the sum of amounts reportable for data elements on EPA Form R (EPA Form 9350-1; Rev. 12/4/93) as Part II column B of section 8, data elements 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), and 8.7 (quantity treated off-site).

Q8 What kind of recordkeeping is required of facilities?

A Each owner or operator who determines that they are eligible, and wishes to apply the alternate threshold to a particular chemical, must retain records substantiating this determination for a period of 3 years from the date of the submission of the certification statement. These records must include sufficient documentation to support calculations as well as the calculations made by the facility that confirm their eligibility for each chemical for which the alternate threshold was applied.

A facility that fits within the category description, and manufactures, processes or otherwise uses no more than 1 million pounds of a listed toxic chemical annually, and whose owner/operator elects to take advantage of the alternate threshold is not considered a TRI covered facility for that chemical for the purpose of submitting a Form R. This determination may provide further regulatory relief from other federal or state regulations that apply to facilities on the basis of their TRI reporting status. A facility will need to refer to other applicable regulations in order to determine their actual requirements that may be affected by this reporting modification.

II. INDUSTRY EXPANSION

For more information:
Bryan Symmes, Environmental Assistance Division (202) 260-9121

Q9 Do all industrial facilities in the U.S. that meet reporting thresholds have to report to TRI?

A No. Only manufacturing facilities, classified in SIC codes 20-39, were required to report for 1993. Federal facilities will be required to report beginning with the 1994 reporting year. Many other industrial facilities that may be significant sources of toxic chemical releases do not have to report. These facilities include mines, oil and gas drilling operations, electric power plants, waste treatment and disposal facilities, and warehouses.

Q10 Does EPA plan to expand the reporting requirements to cover industries that are not currently required to report?

A Yes. EPA has the statutory authority to require additional facilities to report under EPCRA section 313 and is in the process of determining which industries are most appropriate for addition to TRI.

Q11 How is EPA identifying and selecting industries for possible addition to TRI?

A EPA is making its determination based upon such factors as estimated releases of TRI chemicals and the relationship between manufacturing activities and other facilities engaged in activities which support the manufacturing process. That is, EPA has focused on those industries where reportable releases of TRI chemicals seem to occur, and which support manufacturing activities in some direct way, such as by providing energy or raw materials, transporting products, or treating and disposing of wastes. EPA believes that toxic release reporting from some combination of these industries would substantially improve and enhance the public's knowledge about chemicals in the environment.

Q12 What industries have been identified?

A EPA has examined a number of industries that are part of sectors identified last year. The broad sectors identified as being closely related to manufacturing are energy production, materials extraction, materials distribution, and waste management. Several industries were identified within these sectors - electric utilities, mining, oil & gas exploration & production, commercial waste treatment, POTWs and landfills, materials recycling and recovery, airports, and some transportation and warehousing operations - and are still under consideration. No decisions have been reached regarding which industries (or portions of industries) will be included in a proposal.

Q13 What has EPA done in this effort during the past year?

A As part of this examination, EPA has continued to refine its analysis regarding the use and release of toxic chemicals at facilities within the industries under consideration. It has also conducted an on-going series of meetings with representatives of these different industries to discuss EPA's analysis and its approach to expansion. These meetings have proven productive for both EPA and industry, and will continue to serve as a major part of EPA's approach to expanding the universe of facilities required to report to TRI.

Q14 What are the issues that will determine how TRI industry expansion is conducted?

A The issues EPA faces in determining which industries to propose for an expanded TRI are both external and internal to TRI. Externally, EPA must consider the costs to industry of complying with the regulatory burden associated with TRI reporting. In particular, mounting concern over "unfunded mandates" at the state and local level means that EPA must take into account the burden that other levels of government will bear, both as potential reporters and as recipients of TRI data from facilities in their jurisdictions. Internally, EPA must consider its own data management capabilities. Moreover, the current reporting structure of TRI, with its reporting definitions, thresholds, and exemptions, may inhibit valuable reporting from some facilities under consideration. Therefore, EPA is currently examining these issues before attempting to craft an effective proposal.

Q15 When does EPA expect to apply the reporting requirements to additional industries?

A EPA anticipates publishing a proposed rule for comment in the Federal Register during early 1996 which will indicate the industries EPA proposes to add to TRI. EPA anticipates a significant amount of public comment regarding its proposal, and foresees the need for considerable periods of review and revision. Assuming a regular period of comment and review, EPA anticipates promulgation of a final rule in early 1997.

III. QUESTIONS ON THE FEDERAL FACILITIES EXECUTIVE ORDER

For more information:
Eileen Fesco, Environmental Assistance Division (202) 260-7232

Q16 Are federal facilities required to report under section 313 of EPCRA?

A Prior to the 1994 reporting year, government-owned and government-operated facilities (GOGOs) had not been required to report by law, but some have reported voluntarily. However, the Department of Energy voluntarily submitted reports for the 1993 reporting year to EPA and the states for 23 facilities. Government-owned and contractor-operated facilities (known as GOCOs) are currently covered and do report under EPCRA section 313.

On August 3, 1993, the President signed Executive Order 12856, "Federal Facility Compliance with Right-to-Know and Pollution Prevention Laws," requiring federal facilities (GOGOs) to comply with the federal Right-to-Know laws. All federal facilities must comply with EPCRA reporting requirements beginning with reporting year 1994. The Executive Order also asks all federal agencies to set a voluntary goal of 50% reduction from baseline quantities of their releases and transfers for treatment and disposal of toxic pollutants from their facilities by 1999.

Q17 Does the reduction apply only to TRI toxic chemicals or all toxic chemicals?

A The toxic pollutant reduction program applies to the TRI chemicals used by the federal agency, but the agency may go beyond the TRI list and set a voluntary reduction goal for other chemicals that its facilities use.

Q18 Are all federal agencies required to develop a pollution prevention strategy?

A The head of each federal agency that has one or more facilities meeting EPCRA reporting requirements is responsible for the development of a written pollution prevention strategy. These strategies are available to the public from the EPA Pollution Prevention Clearinghouse at (202) 260-1023 and from each individual agency.

Q19 How many federal facilities are predicted to report in 1995?

A The Executive Order required federal agencies to send a list to EPA of the facilities they believe will be covered under all sections of the Executive Order. The agencies have indicated that approximately 1,900 federal facilities will be subject to some portion of the Executive Order. EPA does not know what percentage of these 1,900 facilities will exceed reporting thresholds and therefore be required to report to TRI.

Q20 Will EPA report to the public on the federal agencies' progress toward meeting their voluntary 50% reduction goals?

A EPA is to report annually to the President on the federal agencies' progress toward reducing their releases and transfers of toxic chemicals.

IV. QUESTIONS ON THE TRI LIST OF CHEMICALS

For more information:
Maria Doa, Environmental Assistance Division (202) 260-9592

Q21 How was the list of chemicals subject to TRI reporting created?

A A list of chemicals subject to TRI reporting was given to EPA by Congress in EPCRA. The statutory list was derived from separate lists from the states of New Jersey and Maryland. The criteria for chemicals on the Maryland and New Jersey lists differ from the criteria established under EPCRA section 313. For instance, the Maryland list is a survey list and consists of chemicals that are noted for toxicity and/or high-volume activities in that state. As a result of these differences in listing criteria, a number of chemicals have been added to the TRI list that were not on the original state lists. Also, a number of chemicals have been deleted from the original TRI list of toxic chemicals because EPA determined that they did not meet any of the criteria for listing.

Under EPCRA section 313, anyone can petition EPA to add a chemical(s) to, or delete a chemical(s) from, the list of chemicals.

EPA has developed criteria and is currently refining the process for reviewing the TRI list of chemicals. The result of this exercise will allow EPA to more effectively add chemicals to and delete chemicals from the list. This will result in reporting on chemicals that meet the intent of section 313.

Q22 What are the criteria for listing a chemical under section 313 of EPCRA?

A For a chemical or chemical category to be kept on or added to the TRI list, it must be known to cause or reasonably be anticipated to cause one of the following:

- significant adverse acute health effects at concentration levels that are reasonably likely to exist beyond facility boundaries as a result of continuous, or frequently recurring, releases;
- in humans–cancer; teratogenic effects; or serious or irreversible reproductive dysfunction, neurological disorders, heritable genetic mutations, or other chronic health effects;
- a significant adverse effect on the environment because of its toxicity, its toxicity and persistence in the environment, or its toxicity and tendency to bioaccumulate in the environment of sufficient seriousness to warrant release reporting under EPCRA section 313.

Q23 What chemicals have been added to the TRI list?

A EPA added to the list nine chemicals that were subject to reporting for the 1990 reporting year. These chemicals were added to the list for cancer and chronic toxicity concerns. These chemicals are:

Allyl alcohol
Creosote
2,3-Dichloropropene
m-Dinitrobenzene
o-Dinitrobenzene
p-Dinitrobenzene
Dinitrotoluene (mixed isomers)
Isosafrole
Toluene diisocyanate (mixed isomers)

As a result of a petition submitted by three governors and the Natural Resources Defense Council, EPA also added to the list seven chlorofluorocarbons (CFCs) and halons that were subject to reporting beginning with the 1991 reporting year. These chemicals were added because they are stratospheric ozone depleters. Depletion of stratospheric ozone can lead to adverse human health and environmental effects. These chemicals are:

Bromochlorodifluoromethane (Halon 1211)
Bromotrifluoromethane (Halon 1301)
Dibromotetrafluoroethane (Halon 2402)
Dichlorodifluoromethane (CFC-12)
Dichlorotetrafluoroethane (CFC-114)
Monochloropentafluoroethane (CFC-115)
Trichlorofluoromethane (CFC-11)

In response to another petition, 11 hydrochlorofluorocarbons (HCFCs) were also added, subject to reporting beginning with the 1994 reporting year (reports due by July 1, 1995). These chemicals were added because they are listed as Class II ozone-depleting substances in section 602(b) of the Clean Air Act. These chemicals are:

Chlorodifluoromethane (HCFC-22)
Dichlorotrifluoroethane (HCFC-123) and isomers
Chlorotetrafluoroethane (HCFC-124) and isomers
1,1-Dichloro-1-fluoroethane (HCFC-141b) and isomers
1-Chloro-1,1-difluoroethane (HCFC-142b)

An additional 21 chemicals and two chemical categories that appear on the Resource Conservation and Recovery Act (RCRA) list of hazardous wastes were added to the TRI list. Reporting for these chemicals will be required beginning with the 1994 reporting year (reports due by July 1, 1995). These chemicals are:

Acetophenone
Amitrole
Bis(2-chloroethoxy)methane
1,4-Dichloro-2-butene
Dihydrosafrole
Ethylene bisdithiocarbanic acid, salts and esters
Ethylidene dichloride
Formic acid
Hexachlorophene
Hydrogen sulfide*
Malononitrile
Methacrylonitrile
Methyl chlorocarbonate
Methyl mercaptan*
2-Methylpyridine
5-Nitro-o-toluidine
Paraldehyde
Pentachloroethane
Pronamide
1,1,1,2-Tetrachloroethane
Thiram
Trypan blue
Warfarin and salts

*Reporting for these chemicals has been suspended

Q24 In January 1994, EPA proposed the addition of 313 toxic chemicals to the TRI list. Were these chemicals added?

A On November 30, 1994 EPA issued a final rule adding 286 of these chemicals to the TRI list, including about 160 pesticides. Many of these chemicals have been identified as of concern under the Clean Water Act, the Clean Air Act, and the Safe Drinking Water Act.

Q25 How were these additional chemicals selected?

A EPA began with a pool of 1,031 chemicals regulated or identified as of concern under various environmental statutes. In addition, EPA considered chemicals designated as possible, probable, or known carcinogens in the

Monographs of the International Agency for Research on Cancer (IARC) and the 6th annual Report on Carcinogens of the National Toxicology Program (NTP), U.S. Department of Health and Human Services.

This list was narrowed by excluding those chemicals already on TRI or proposed for addition in response to a petition. The remaining chemicals underwent a toxicity screen using numerical criteria guidelines and a production volume screen. This narrowed the list of candidates to approximately 400 chemicals.

The candidates underwent a further hazard assessment, including a detailed review of the toxicity of each to determine whether the chemical meets the statutory criteria for listing.

Q26 How many of the chemicals proposed to be added by EPA were not added because they did not meet the criteria for listing?

A EPA determined that three of the proposed chemicals did not meet the statutory criteria for listing and so they were not added. These three chemicals are:

Clomazone
5-Chloro-2-(2,4-dichlorophenoxy)phenol
Tetrasodium ethylenediaminetetraacetate

Q27 Why did EPA defer the addition of 40 chemicals and one chemical category?

A EPA decided to defer action on 40 chemicals and one chemical category. More time was needed to address technical and policy issues that were raised about these chemicals. EPA did not wish to delay action on the addition of 286 chemicals that met the listing criteria, so the public comments on the deferred chemicals will be addressed in a future rulemaking.

Q28 If EPA proposed 313 chemicals and deferred or dropped 44, how is it that 286 chemicals were finalized?

A The discrepancy arises from the addition of the diisocyanates. The 313 chemicals in the proposed rule includes three individual diisocyanates. As an alternative, EPA proposed adding the three diisocyanates and 17 other diisocyanates as a delimited category, but the additional 17 diisocyanates were not counted in the 313 proposed chemicals. EPA finalized the alternative proposal, and the 17 additional diisocyanates were counted among the 286 chemicals finalized.

Q29 Where can lists of the added and deferred chemicals be obtained?

A The lists are in the final rule which was published in the Federal Register on November 30, 1994 (59 FR 61432). Copies may be obtained by contacting the EPCRA Hotline.

Q30 How many additional reports will be submitted due to the addition of 286 chemicals?

A The first reports for these chemicals will be required for reporting year 1995 and will be submitted by July 1, 1996. EPA estimates that about 10,500 additional reports and 3,500 certification statements will be submitted, assuming facilities use the alternate threshold reporting option, which is also effective for the 1995 reporting year and beyond. The alternate threshold reporting option is further discussed in Section I of this Appendix.

Q31 What chemicals have been deleted from the TRI list?

A The following chemicals have been deleted from the TRI list:

Barium sulfate
Butyl benzyl phthalate
Color Index (C.I.) Acid Blue 9 diammonium salt
C.I. Acid Blue 9 disodium salt
Copper phthalocyanine compounds substituted with only bromine, chlorine, and/or hydrogen
Di-n-Octyl phthalate (n-dioctyl phthalate)
Melamine
Sodium hydroxide (solution)
Sodium sulfate (solution)
Terephthalic acid
Titanium dioxide

EPA modified the listing for aluminum oxide to cover only fibrous forms of the chemical.

Q32 What is the status of EPCRA section 313 petitions to date?

A EPA has responded to and is currently working on many petitions to modify the EPCRA section 313 list of toxic chemicals. The following is a summary of section 313 petition activity to date.

EPCRA Section 313 Petitions

Chemical	Action Requested	Status
Acetone	Delist	Proposed
Aluminum oxide (non-fibrous)	Delist	Granted
Alloys	Delist	Denied (1)
Ammonium sulfate (solution) (2)	Delist	Proposed
Antimony tris(iso-octyl -mercaptoacetate	Delist	Denied
Barium sulfate	Delist	Granted
Butyl benzyl phthalate	Delist	Granted
Cadmium selenide	Delist	Denied
Cadmium sulfide	Delist	Denied
CFC-11 (3)	List	Granted
CFC-114	List	Granted
CFC-115	List	Granted
CFC-12	List	Granted
Chromium (III) compounds	Delist	Denied
C.I. Acid Blue 9 disodium and diammonium salts (4)	Delist	Granted
C.I. Pigment Blue 15	Delist	Granted
C.I. Pigment Green 36	Delist	Granted
C.I. Pigment Green 7	Delist	Granted
Cobalt and compounds	Delist	Denied
Copper mono-chlorophthalocyanine (5)	Delist	Proposed
Cyclohexane	Delist	Denied
Chromium antimony titanium buff rutile	Delist	Denied
Decabromodiphenyl ether	Delist	Denied
Di-n-Octyl phthalate	Delist	Granted
Di(2-ethylhexyl)adipate	Delist	Pending
Diethyl phthalate	Delist	Pending
Disodium and monosodium methane arsenate	Delist	Pending
Ethylene	Delist	Denied
Ethylene glycol	Delist	Pending
Glycol ethers	Modify	Granted
Halon 1211	List	Granted
Halon 1301	List	Granted
Halon 2402	List	Granted
Hydrochlorofluorocarbons (6)	List	Partially Granted

Hydrochloric acid	Modify	Pending
Inorganic fluorides	List	Denied
Iron chromite	Delist	Withdrawn
Manganese and compounds	Delist	Denied
Manganese and compounds in slags	Delist	Pending
Melamine	Delist	Granted
Methyl ethyl ketone	Delist	Withdrawn
Methyl isobutyl ketone	Delist	Withdrawn
Molybdenum trioxide	Delist	Withdrawn
Nickel and compounds	Delist	Denied
ortho-Phenylphenol	Delist	Denied
Phosphoric acid	Delist	Withdrawn
Phosphoric acid	Delist	Pending
Phthalic anhydride	Delist	Withdrawn
Propylene	Delist	Denied
Sodium hydroxide (solution)	Delist	Granted
Sodium sulfate (solution)	Delist	Granted
Sulfuric acid	Delist	Denied
Sulfuric acid	Modify	Proposed
Terephthalic acid	Delist	Granted
Titanium dioxide	Delist	Granted
Trifluralin	Delist	Withdrawn
Zinc borate hydrate	Delist	Denied
Zinc sulfide	Delist	Denied
82 RCRA Chemicals (6)	List	Partially Granted

(1) EPA is reviewing whether certain constituent metals of alloys should be reportable.
(2) The ammonium sulfate (solution) proposed deletion will not result in a loss of reporting, but rather in more focused reporting.
(3) CFC = Chlorofluorocarbon
(4) C.I. = Color Index
(5) Finalized as copper phthalocyanine compounds substituted only with bromine, chlorine, and/or hydrogen.
(6) Refer to Question 23 for a complete list of the HCFCs and RCRA chemicals that were added to the list.

V. POLLUTION PREVENTION QUESTIONS

For more information:
Anning Smith, Environmental Assistance Division (202) 260-1576

Q33 When will EPA publish the final guidance for the PPA-required data elements?

A The information required by the Pollution Prevention Act of 1990 (PPA) and the guidance for reporting that information have been discussed by the Toxics Data Reporting Subcommittee of the National Advisory Council for Environmental Policy and Technology (NACEPT). NACEPT is an independent advisory council that provides advice and recommendations to EPA on environmental issues. EPA has considered the Council's ideas as it developed final guidance for the requirements of the PPA. EPA anticipates publishing the proposed guidance for public review in August 1995 and final guidance by December 1995.

Q34 The Form R expiration date is listed as 11/92. Is the Form R valid for reporting year 1993?

A November 1992 was the expiration date given by the Office of Management and Budget (OMB) when it approved the form on May 19, 1992. However, the Pollution Prevention Act Implementation provisions of the 1993 Appropriations Act allows the Agency to continue to use this Form R until revisions are promulgated by law. Therefore, this Form R is still valid and should be used for all submissions until changes are made to the Form R.

Q35 Why don't the totals reported for off-site transfers for energy recovery, recycling, and treatment for one part of the Form R equal the quantities of chemicals reported for energy recovery off-site, recycling off-site, and treatment off-site in another part? Do these represent different quantities? Why are the data reported in two places on the Form R?

A The Source Reduction and Recycling Activities section (Section 8) of Form R contains the aggregate quantities undergoing each type of off-site waste management practice (recycling, energy recovery, treatment, or disposal). In the Transfers of the Toxic Chemical in Wastes to Off-Site Locations section (Section 6) of Form R, the same quantity is reported, but by off-site location and by the specific type of each waste management practice applied to the chemical. The quantities reported in Sections 6 and 8 are different if the facility has reported accidental or one-time releases not related to production. Quantities reported in Section 8 do not include such quantities, while quantities reported in Section 6 do. If the facility has not reported any non-production related releases, the quantities reported in Section 8 and Section 6 should be the same. Differences in the data are also due to different interpretations made by reporting facilities when completing Sections 6 and 8. EPA is building on the experience gained from the 1991, 1992, and 1993 reports to develop final guidance for reporting facilities.

Q36 How does the quantity released as reported in the "Source Reduction and Recycling Activities" section (Section 8) of the Form R differ from the quantities reported in the "Releases of the Toxic Chemical to the Environment On-Site" section (Section 5)?

A The quantity reported as released in Section 8.1 can differ from the total of the releases reported in Section 5 in two basic ways. First, the quantity reported in Section 8 includes quantities sent off-site for disposal, which are reported in Section 6 and not in Section 5. Second, the quantity reported in Section 8 should not include any quantities released to the environment because of catastrophic, remedial, or one-time events that are non-routine (not associated with production operations). Such quantities would be included as part of the total releases reported in Section 5.

Q37 Why are the off-site energy recovery, recycling, and treatment data characterized differently from these same activities on-site?

A The difference in how the data are characterized is based on the level of knowledge the facility has. For example, a facility is able to estimate the amount of the toxic chemical recovered by on-site recycling processes because this activity is under its control. The facility is not likely to know the amount recovered through a similar activity occurring off-site which is not under its control. What the facility should know, however, is the quantity of the chemical sent off-site for the purpose of recycling. This same difference in knowledge applies to on-site and off-site energy recovery and treatment. The facility can estimate amounts combusted for energy and destroyed through their treatment processes, but only know the amounts sent off-site for the purpose of energy recovery and treatment.

Q38 Why are the quantities reported in the "Source Reduction and Recycling Activities" section (Section 8) mutually exclusive of one another?

A These quantities are designed to add up to the total amount of the TRI chemical in wastes (exclusive of catastrophic, remedial, or one-time non-production related releases). To accomplish this, the individual quantities undergoing each type of waste management activity must be mutually exclusive. Any double or multiple counting of an amount of the reported TRI chemical in waste will inflate the actual total. This also gives a more accurate picture of how the toxic chemical in wastes is managed within the waste management hierarchy.

Q39 Why are catastrophic releases reported separately?

A The amounts reported as recycled, used for energy recovery, treated, and released in Section 8 identify the quantities of the toxic chemical in waste that should be subject to pollution prevention efforts. The catastrophic releases are reported separately because they cannot be predicted and are generally not amenable to pollution prevention efforts.

Q40 Why are the recycling numbers so large?

A The recycling numbers are especially large in comparison with amounts of the toxic chemical reported as being released to the environment. These amounts are not unexpected, however. Quantities recycled are likely to be much larger than release quantities because the purpose of recycling is to recover the chemical for further use. Unlike the quantities released, which leave the process, the recycled amounts return to the process again and again, and can be estimated based on the total number of times an amount is recovered from wastes and returned for further use.

Q41 How will EPA use the future years' estimates? What if actual estimates differ from the projected estimates?

A EPA will use the future estimates data as indicators of future trends in waste management. The future year estimates are projections and do not represent a commitment or a quantity that the facility must meet under penalty of enforcement.

Q42 What is the purpose of the production index?

A The production index is a ratio of production during the reporting year and production during the prior year and is intended to provide a potential indicator of progress in source reduction. It also allows data users to assess the impact of business changes on changes in total waste generated. By multiplying the sum of the waste quantities reported for the prior year by the production index, a data user can estimate the amount of the toxic chemical that would have been expected to enter wastes in the reporting year, given the change in production. Comparing this expected quantity for the current reporting year to the sum of the actual quantities for the current reporting year can yield an indication of whether source reduction is occurring. (See analysis in Chapter 2 of this document.)

Q43 How is a chemical that is treated on-site and then disposed of reported in the "Source Reduction and Recycling Activities" section (Section 8) of the Form R?

A The amount of a chemical destroyed in on-site treatment is the quantity reported as treated on-site. Any amount not destroyed (the balance) is reported as the quantity "released" (including transferred off-site for disposal).

Q44 Does EPA plan to review the quality of the data reported in Section 8 of the Form R?

A EPA has instituted a computerized review of the new data, primarily to check potential data discrepancies between different sections of the form.

Q45 Over 800,000 pounds of various metals and metal compounds have been reported as transferred to energy recovery. Can metal compounds be used for energy recovery?

A No. These reports were made in error. They may represent metal compounds in waste solvents that were sent to an energy recovery unit. EPA's instructions cite metals as an example of the type of chemicals that should not be reported as undergoing energy recovery because they do not contribute to the heating value of the waste stream.

Q46 A large quantity of toluene was reported as burned off-site for energy recovery in 1993. Does any of the toluene get released to the environment as a result of this?

A Energy recovery processes are not 100% efficient. Therefore, some small amount of the toluene is likely to be released, either as un-combusted material or as fugitive releases from the handling of the toluene-containing material prior to combustion.

Q47 What is the difference between energy recovery and incineration?

A Both incineration and energy recovery involve combustion of a toxic chemical in a waste. However, they have different purposes. Energy recovery is combustion occurring in a boiler, kiln, or industrial furnace in which the heat from the combustion is used to generate steam or to heat other materials in a manufacturing process. Incineration is combustion with the primary purpose being the destruction of the toxic chemical.

Q48 How are the data elements in Section 8 of Form R different from those stated in the PPA?

A Facilities do not report the "quantity entering any waste stream prior to recycling, treatment, or disposal" as stated in the PPA. This number is derived by EPA by adding up the individual quantities that were reported as released, used for energy recovery, treated, and recycled. This total number is available in the public database for each chemical reported by a facility. Energy recovery, not discussed in the PPA, has aspects of both recycling and waste treatment, and is reported separately rather than included as part of the quantities reported as treated or recycled. Instead of reporting the percent changes of quantities from the prior year and for the next two years, the Form R collects the actual prior year quantity and the estimated two future years' quantities in pounds per year. Quantities treated, recycled, or undergoing energy recovery are reported separately by whether they occur on-site or off-site.

Q49 Will 1994 TRI reporting be different from 1993 TRI reporting?

A The 1994 TRI reporting will use essentially the same Form R and instructions as were used for the 1993 reporting.

Q50 What is the Office of Pollution Prevention and Toxics (OPPT) doing to reduce TRI releases?

A OPPT is using TRI data to help target activities, chemicals, facilities, and industry categories that are of high concern. The Pollution Prevention Policy Council's initiative, "Source Reduction Review Project," is one example where the TRI data were used as a screening tool to identify a group of industrial categories as long-term targets of opportunity. As a part of this project, OPPT is working with other program offices to incorporate prevention into their programs, through regulation where feasible and through guidance and voluntary efforts. OPPT is also working with industry (usually through trade associations) to raise awareness of the benefits of pollution prevention. OPPT also conducts training programs that help orient government and industry toward pollution prevention and incorporate prevention into what they do. A state grants program is available to help states develop pollution prevention programs. OPPT and the Office of Research and Development have developed a clearinghouse that provides information on pollution prevention for industry, government, and public interest groups to use in encouraging and implementing prevention.

Q51 The quantity of certain chemicals released (at a particular facility or nationwide) is decreasing. What does this mean?

A The TRI database does not include specific explanations of the reasons for changes in quantities reported by facilities. The new TRI data can give some indication of whether changes are due to shifting of chemicals off-site for energy recovery or recycling, decrease in economic activity or production levels, or source reduction. However, other factors may also cause changes, such as substitution of one chemical (that may or may not be in TRI) for another, changes in accounting or estimation techniques, and other reasons. A study completed by OPPT examined how some of the above factors contributed to changes in releases and transfers between 1989 and 1990. The study found that source reduction was a significant factor in explaining some of the changes. However, fluctuations in production were more frequently cited than changes due to source reduction for individual facilities' increases and decreases. This is an important consideration because measuring progress in source reduction must also take into account production changes.

Source reduction is too complex to be captured by only one measure. These new data collected on Form R will help EPA better evaluate release trends and will also be critical in developing a comprehensive understanding of the effects of pollution prevention activities. The data provide EPA a more comprehensive view of waste management practices. They shift the focus from releases to movement up the waste management hierarchy.

VI. EXPOSURE AND HEALTH EFFECTS QUESTIONS

For more information:
Linda Rusak, Chemical Screening and Risk Assessment Division (202) 260-5273

Q52 How much of these chemicals am I exposed to?

A Estimating exposure based on release quantities requires an analysis of chemical- and site-specific characteristics. There is no simple conversion of release quantity to concentration in the environment or dose received by individuals.

Natural environmental processes can: transform the chemical (e.g., sunlight decomposes some chemicals); transfer it from one medium to another (e.g., water to air); or concentrate it (e.g., bioaccumulation of the chemical in fish). Concentration in the environment can depend on the volume of water in the receiving stream into which the chemical is released; dispersion of air releases as a function of local meteorological conditions; the height from which the release occurs; integrity of landfill liners or other containment of disposed materials; and many other factors. Finally, your exposure to the chemicals will depend on factors such as distance from the release, source and treatment of your drinking water supply, etc.

Q53 What are my chances of getting sick when I have been exposed to chemicals?

A The likelihood of becoming sick from chemicals is determined by the length of time someone is exposed and the amount of chemical to which he or she is exposed, as well as the "inherent" toxicity of the chemical. The risk increases as the amount of exposure increases.

Q54 When are higher exposures more likely?

A Accidents can expose the facility's workers and surrounding community to higher concentrations of the chemicals. Other conditions that increase risk of exposure include dust-releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills, and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.). During process start-up and shutdown operations, there also is a greater likelihood of exposure. The closer one is to a release, the greater the potential for exposure.

Q55 Is the risk of getting sick higher for workers in the facilities than for community residents?

A Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of sensitive populations, such as children or people who are already ill, community exposures may cause health problems.

Q56 If I have acute (short-term) health effects, will these actually develop into chronic effects?

A Not always. Most chronic (long-term) effects result from repeated exposures to a chemical. Although many acute effects are reversible, some exposures may also cause chronic health effects.

Q57 Can I get long-term effects without ever having short-term effects?

A Yes, because long-term effects can occur from repeated or continuous exposures to a chemical at levels not high enough to make you immediately sick.

Q58 Don't all chemicals cause cancer?

A No. Most chemicals tested by scientists do not cause cancer.

Q59 Should I be concerned if a chemical causes cancer in animals?

A Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q60 Should I be concerned if a chemical is a teratogen (a substance which causes fetal malformations) in animals?

A Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that damage can occur in humans.

Q61 But don't they test animals using much higher levels of a chemical than people usually are exposed to?

A Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless the chemical is a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses, especially over long periods of time.

Q62 Can men as well as women be affected by chemicals that cause reproductive system damage?

A Yes. Some chemicals reduce potency or fertility in either men or women. Some damage sperm and eggs, possibly leading to birth defects.

Q63 Aren't pregnant women at the greatest risk from reproductive hazards?

A Not necessarily. Pregnant women are at greatest risk from chemicals which harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of child-bearing age are at higher risk.

Q64 What is the risk to public health resulting from toxic emissions to the air?

A While the TRI data represent a useful means of identifying potential air toxics sources, these data are not sufficient to accurately determine the magnitude of the public health risk posed by the emissions from a given facility. For example, TRI provides no information concerning the potential exposure to these emissions. These data are most useful to point out the direction for further analyses of public health risk. In addition to identifying new regulatory projects, the data can be used to make priority decisions for the air toxics regulatory agenda.

Q65 Is there any difference between fugitive and stack air emissions when it comes to my health?

A Dispersion of the chemical and its concentration at various distances from the point of release are affected by whether, for example, the chemical is emitted from a tall stack at high temperatures or a pipe fitting near the ground at ambient temperature. Thus, your exposure could vary depending on the manner in which the release occurs. In general, a ground or near-ground release, such as through fugitive emissions, will more likely result in a higher exposure and, therefore, a greater possible health hazard for nearby residents than emissions from tall stacks.

Q66 Can my drinking water be contaminated by these toxic chemicals?

A Again, this depends on the amount and concentration released, characteristics at the site, including the relationship of the release to the water supply, both surface and below ground, the distance to where the drinking water intake/ well is located, and treatment, if any, the water receives before it is piped to your house.

Q67 Are the plants with the largest releases always the most important in terms of public health?

A No. It is not possible to determine risks to public health strictly from knowing the amount of a chemical which is released by a facility over a year. A release total is an important first step in identifying a facility that may pose a public health hazard. Other factors that are necessary to the risk assessment process include specific information on: the environmental medium of the release, chemical toxicity and potency, local meteorological and topographical characteristics, where people live and work (potential population exposure), and when and how releases occur. Because some chemicals are more toxic than others, knowing only the quantity of chemicals released to the environment is not sufficient to determine its importance with respect to risk.

Q68 Is there a risk of getting sick when I have been exposed to a chemical that is released in small quantity?

A It depends upon the inherent ability of the chemical to cause effect. Chemicals such as cyanide can make you sick even if you are exposed in small quantity.

Q69 Why should I be concerned about getting ill when I am exposed to pharmaceuticals and pesticides which have been tested for safety?

A Uncontrolled use of such chemicals may pose the likelihood of an individual becoming sick depending upon how long that person is exposed and the amount of exposure. It will also depend upon the inherent toxicity of the chemical.

Q70 How does EPA determine the health and environmental effects of chemicals?

A EPA has developed guidelines to assess these effects. The available information on each chemical is evaluated using these guidelines and a determination is made on a case-by-case-basis. EPA is currently in the process of revising these guidelines. For further information call the EPCRA Hotline, (800) 535-0202.

Q71 Why should I be concerned about chemicals that accumulate at extremely low levels?

A These chemicals are persistent and accumulate in soil, plants, and organisms and, therefore, pose the chance of causing an adverse impact on human health and the environment even when released at low levels. Over a number of years such chemicals can accumulate in larger quantities.

Q72 If I am exposed to a neurotoxin, will it affect my ability to work?

A TRI contains chemicals that produce a variety of effects on the nervous system. However, depending upon how long a person is exposed to and the amount of the chemical, the effect may be slight to severe.

VII. COMPLIANCE AND ENFORCEMENT QUESTIONS

For more information:
Maria Eisemann, Office of Compliance (202) 564-7016
Barbara Reilly, Office of Regulatory Enforcement (202) 564-4176

Q73 How many inspections have EPA's Regional offices conducted in support of the Office of Compliance (OC) EPCRA section 313 program?

A Since October 1988, EPA field offices have conducted 4,446 inspections of facilities subject to EPCRA section 313 reporting requirements.

FY 1988 - 153
FY 1989 - 768
FY 1990 - 701
FY 1991 - 666
FY 1992 - 774
FY 1993 - 836
FY 1994 - 548

Q74 How many civil complaints have been issued?

A EPA has issued 916 civil complaints (almost all of which were against non-reporters) since October 1988.

FY 1990 - 206
FY 1991 - 179
FY 1992 - 134
FY 1993 - 219
FY 1994 - 178

Q75 What is the total amount of proposed penalties levied against EPCRA section 313 violators?

A EPA's Office of Compliance has levied proposed penalties in excess of $54,000,000 in the EPCRA section 313 program since October 1988. In fiscal year 1994 EPA proposed $14,671,911 in civil administrative penalties.

Q76 What is EPA doing about Supplemental Environmental Projects (SEPs)?

A A Supplemental Environmental Project is one that the respondent/defendant agrees to conduct as a term of settlement in exchange for partial mitigation of a civil penalty. These projects reduce risk to human health and the environment beyond that which is required by law (federal, state, or local). Since fiscal year 1991 (when EPA began tracking SEPs), EPA has settled 185 EPCRA section 313 cases containing one or more SEPs.

Q77 What is the EPCRA section 313 compliance and enforcement program doing about data quality?

A Data quality has emerged as a second important focus for the EPCRA section 313 compliance and enforcement programs, both at Headquarters and in the Regions. Now that the section 313 non-reporters compliance and enforcement program has matured, EPA is beginning to concentrate more on the quality of the TRI data submitted to EPA and the states. EPA and its Regions are using a variety of tools, from compliance assistance to issuing cases, to ensure compliance with the regulations.

Q78 Without a final regulation in place, how is EPA enforcing the Pollution Prevention Act reporting requirements?

A Submission of the data to EPA and the states is required by the Pollution Prevention Act as mandated by Congress. Each of the EPA Regional offices will receive a complete listing of those facilities that have received a Notice of Noncompliance (NON) for not reporting on the revised Form R. In accordance with the EPCRA Enforcement Response Policy, EPA may issue civil penalties against those facilities that do not comply with the terms of the NON.

VIII. 33/50 PROGRAM QUESTIONS

For more information:
Mike Burns, Environmental Assistance Division (202) 260-6394

Q79 How is the 33/50 Program related to the TRI program?

A In February 1991, the EPA Administrator announced the establishment of the 33/50 Program. It is a voluntary TRI release reduction program that asks industries to work with EPA, the environmental community, and the states to initiate or expand pollution prevention activities at individual facilities. EPA sought a 33% reduction in TRI releases and off-site transfers for treatment and disposal of 17 selected toxic chemicals and chemical categories by 1992 and is seeking a 50% or greater reduction by 1995. These reductions will be measured using the 1988 TRI data as a baseline. EPA expects the public accountability fostered by TRI and the Pollution Prevention Act to continue to play a vital role in persuading companies to take voluntary actions to prevent pollution from toxic chemicals.

The 17 chemicals and chemical categories targeted for reductions are: benzene, cadmium and compounds, carbon tetrachloride, chloroform, chromium and compounds, cyanide and compounds, dichloromethane, lead and compounds, mercury and compounds, methyl ethyl ketone, methyl isobutyl ketone, nickel and compounds, tetrachloroethylene, toluene, 1,1,1-trichloroethane, trichloroethylene, and xylenes. For further information, see Chapter 4, "TRI Reporting Profiles for 33/50 Program Chemicals," of this document.

Q80 Is the 33/50 Program ending at the end of 1995?

A The 33/50 Program's ultimate 50% reduction goal is targeted to be achieved by the end of 1995. In fact, 1993 TRI projection data suggest that the goal may have been achieved by the end of 1994. However, the 33/50 Program will continue at EPA at least through 1996 and into 1997. Companies are still encouraged to enroll in the Program throughout 1995, and company reduction goals need not be constrained to the Program's 1995 national target year. Some 33/50 Program companies have set pollution reduction goals that extend well past 1995. Furthermore, while many company reduction projects may be completed by the end of 1995, EPA must wait for 1994 and 1995 TRI data to be reported and assembled to analyze and report on the full extent of 33/50 Program achievements. Accordingly, EPA's administration of the 33/50 Program will not terminate at the close of the 1995 calendar year.

Q81 What is EPA planning to do as a follow-up to the 33/50 Program?

A EPA has initiated a decision-making process to determine what, if anything, should be the next generation of the 33/50 Program. Public input is being sought on key questions, such as whether a next-generation voluntary program is warranted, what its goals would be, what industries would be encouraged to participate, etc. The full set of next-generation decision-making questions appears at the end of the 33/50 Program chapter (Chapter 4) of this report. EPA hopes to make a public announcement concerning a next-generation program early in the summer of 1995.

Q82 What company recognition activities is EPA planning for 33/50 Program participants throughout the remaining life of the Program?

A All companies that enroll in the 33/50 Program receive Certificates of Appreciation signed by the Administrator, and their names are listed by EPA in periodic 33/50 Program Progress Reports. As the Program approaches achieving its 50% reduction goal, the Agency is assessing options for commending companies for their reduction achievements, including recognizing companies that meet their own reduction targets and/or all companies that contribute to achieving the Program's national goals. EPA is also working with a panel of interested parties to determine whether 33/50 Program Awards should be issued to a select set of companies undertaking exemplary reduction activities. Other recognition options are also being explored by this group, including developing a compendium of 33/50 Program Success Stories, Recognition of some type will be made at a major 33/50 Program conference timed to celebrate achievement of the Program's 50% reduction goal.

IX. AIR QUESTIONS

For more information:
Vasu Kilaru, Office of Air Quality Planning and Standards (919) 541-5332
Al Rush, Office of Air and Radiation (202) 260-6002

Q83 What legal tools are available to the Agency to reduce toxic air emissions?

A Title III of the amended Clean Air Act (CAA) is the primary regulatory tool by which EPA will control emissions of air toxics. Under section 112(d), EPA must issue regulations requiring the maximum degree of reduction in emissions that is achievable. After the application of the maximum achievable control technology (MACT) standards, section 112(f) states that EPA must issue additional standards within eight years if necessary to further protect the public.

Also, EPA has authority to abate "imminent and substantial endangerment" to public health under several statutes. In particular, section 303 of the CAA and section 106 of Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) provide that EPA can issue administrative orders or seek injunctive relief in court to address such hazards. Any facility-specific enforcement action would typically be preceded by a detailed facility-specific analysis of emissions and risk. EPA would consider use of these authorities to reduce emissions from facilities that pose high risks due to toxic air pollutants.

Q84 How much of the 1.7 billion pounds of toxic chemicals emitted to the air is addressed by the air toxics section of the 1990 Clean Air Act Amendments?

A The 1990 Clean Air Act Amendments (CAAA) address over 1.2 billion pounds of the 1.7 billion pounds of toxic chemicals released to the air as reported to the TRI for 1993. The remaining 500 million pounds are subject to control under Title I of the CAA as volatile organic compounds under the ambient air standard for ozone or are subject to the particulate matter ambient air standard.

Q85 When will EPA promulgate regulations to reduce these emissions?

A In accordance with the CAA, EPA published on July 16, 1992, the final list of categories of sources to be regulated (57 FR 31576). The proposed schedule for regulation was published by EPA on September 24, 1992 in the *Federal Register* (57 FR 44147). A final regulation for Hazardous Organic National Emission Standards for Hazardous Air Pollutants (HON) for the synthetic organic chemical manufacturing industry was published on February 28, 1994. The HON will have far-reaching effects because it requires reductions of up to 110 hazardous air pollutants. The requirement will result in substantial reductions in emissions from the affected facilities.

Q86 Why are some of the 189 hazardous air pollutants listed in the amendments to the Clean Air Act not included in the TRI?

A Below are 14 chemicals listed as hazardous air pollutants in the new CAA that were not listed on EPCRA section 313 for the 1993 reporting year. Nine of the 14 were proposed for addition on January 12, 1994, as part of the Agency's proposed expansion of the TRI chemical list. On November 22, 1994, EPA issued a rule that added six of those nine chemicals to the TRI list.

Proposed and added
- Dimethyl formamide
- Hexamethylene-1,6-diisocyanate
- Hexane
- Phosphine
- Polycyclic Organic Matter (polycyclic aromatic compounds)
- Triethylamine

Proposed and deferred
- Caprolactam
- Isophorone
- Mineral fibers

Not proposed
- Coke Oven Emissions
- p,p'-Dichlorodiphenyldichloroethylene (DDE)
- Radionuclides (including radon)
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin
- 2,2,4-Trimethylpentane

There are various reasons why the remaining hazardous air pollutants were not proposed for addition to EPCRA section 313. Two examples follow: 1) Coke oven emissions is a process category. It consists of a mixture of various chemicals that are individually listed on EPCRA section 313 or are being proposed for addition to EPCRA section 313, i.e., polycyclic aromatic compounds. EPA believes that for the purposes of the Toxics Release Inventory coke oven emissions are more appropriately covered by listing the constituents rather than the process category. 2) Other chemicals such as 2,3,7,8-tetrachlorodibenzo-p-dioxin are not produced in quantities that will meet or exceed the EPCRA section 313 reporting thresholds. Listing this type of chemical would not result in the submission of TRI reports.

Q87 How will EPA regulate TRI chemicals with large quantities of air emissions?

A Listed below are the 10 chemicals with the greatest total reported air emissions in TRI for 1993 (see Table 1-25), and the authority by which they will be regulated under the Clean Air Act Amendments.

Chemical	Regulated under Clean Air Act Amendment
Toluene	Title I and Title III, section 112(b)
Methanol	Title I and Title III, section 112(b)
Ammonia	Title III, section 112(r)
Acetone	Title I
Xylene	Title I and Title III, section 112(b)
Carbon disulfide	Title I and Title III, section 112(b)
Methyl ethyl ketone	Title I and Title III, section 112(b)
Hydrochloric acid	Title III, section 112(b)
Chlorine	Title III, section112(b) and 112(r)
Dichloromethane	Title III, section 112(b)

Title I of the CAAA covers emission reduction programs for volatile organic compounds (VOCs) to meet ambient air quality standards. These programs are controlled to some extent by state and/or local governments. Six of the 10 TRI chemicals listed above are regulated under Title I as VOCs that participate in atmospheric photochemical reactions to produce ozone, a regulated ambient air pollutant.

Title III, section 112(b) of the CAAA, lists hazardous air pollutants (HAPs) that EPA is required to regulate by source categories. Eight of the 10 TRI chemicals listed above are considered CAAA HAPs. EPA's approach will lead to the early regulation of source categories that emit one or more of the HAPs. Therefore, significant reductions of all of the HAPs emitted by an industrial plant will be achieved rather than reduction of just one specific pollutant. For example, the HAPs (also referred to as air toxics) will be regulated under one of the first emission standards to be promulgated under the CAAA. The Hazardous Organic National Emissions Standards for Hazardous Air Pollutants will affect many sources of toxic emissions, such as process vents, equipment leaks, and storage tanks at chemical manufacturing plants, and will address the emissions of over 110 of the pollutants listed in section 112 of Title III. Hydrochloric acid emissions will be regulated by Maximum Available Control Technology (MACT) standards covering other source categories.

Title III, Section 112(r) of the CAAA, requires EPA to develop risk management planning (RMP) regulations to help prevent accidental releases of at least 100 substances. In January 1994, EPA promulgated a final list consisting of 140 toxic and flammable substances, as well as Division 1.1 explosives, which will be subject to the requirements in the RMP rulemaking. Facilities producing, handling, or storing threshold quantities of listed substances, including chlorine and ammonia, will be required to undertake a risk management program and develop risk management plans available to the public. The program must include a hazard assessment, prevention program, and emergency response program. EPA published a proposed RMP rule in October 1993.

In addition to the other air pollutant regulations, section 604 of Title VI mandates restrictions of ozone-depleting chemicals. On December 10, 1993, EPA published a final rule (58 FR 65018) that phases out the production of ozone-depleting chemicals, including Freon 113, dichlorodifluoromethane (CFC-12), and 1,1,1-trichloroethane (methyl chloroform), by January 1, 1996, due to their ozone-depleting potential. The effective date of this rule was January 1, 1994. (See question 23 for the ozone depleters added to TRI.)

The EPA's Technology Transfer Network Bulletin Board System (TTN BBS) is an excellent resource for information regarding proposed and promulgated rules pursuant to the 1990 CAAA. The modem number is (919) 541-5742, and it operates at 8N1 (8 databits, No parity, 1 stopbit). For more information regarding the TTN BBS, contact the help desk at (919) 541-5384.

X. WATER QUESTIONS

For more information:
Arnold Kuzmak, Office of Water (202) 260-5821

Q88 How do the surface water releases compare from 1992 to 1993 for specific chemicals?

A Of the top 15 chemicals released to water, the following chemicals showed a decrease: sulfuric acid (-13%), methanol (-45%), ammonium sulfate (solution) (-25%), ethylene glycol (-13%), ammonia (-16%), hydrochloric acid (-63%), formaldehyde (-5%), chloroform (-31%), chlorine (-30%), and manganese compounds (-23%). Chromium compounds, listed as the chemical with the 15th largest total releases to water in 1990, decreased 13% between 1992 and 1993. Chloroform and chromium compounds are both chemicals targeted for release reduction by EPA's 33/50 program.

Decreases for these chemicals were nearly off-set by phosphoric acid releases, which increased by 17 million pounds, or about 11%, due primarily to releases from a single fertilizer facility.

Q89 What are the water quality impacts and toxicity concerns for the TRI chemicals with the largest surface water releases?

A TRI reports 217 chemicals discharged directly into the water environment. Nearly 97% (by weight) of these discharges consists of seven chemicals.

Two of these chemicals (phosphoric acid and sulfuric acid) affect water quality primarily by altering the pH of the water body, a chemical parameter EPA already regulates for industrial and municipal discharges to water.

Three other chemicals (ammonium sulfate, ammonia, and ammonium nitrate) primarily affect water quality by the introduction of ammonia to the water body. EPA has issued water quality criteria for ammonia. For several years, EPA has required states to pay special attention to them when developing water quality standards and regulatory control strategies. EPA also regulates the oxygen demand from ammonia and the nutrient impact of all three ammonia chemicals.

Methanol is a semi-volatile chemical that biodegrades readily and is toxic only at moderately high levels.

Ethylene glycol is essentially antifreeze. Ethylene glycol is not a priority pollutant, and EPA does not have water quality criteria for this chemical. It is moderately toxic to aquatic organisms at high levels.

EPA will examine the remaining 210 chemicals to see if their toxicity or the characteristics of the receiving waters require short-term or long-term attention. The environmental impact of these discharges is much more dependent on the toxicity of the chemicals and on the physical, chemical, and biological characteristics of the receiving waters than simply on the weight of these chemicals.

Q90 How does EPA (or the states) regulate EPCRA section 313 chemicals discharged to water?

A Under section 301 of the Clean Water Act (CWA), the discharge of any pollutant by any person is unlawful unless it is in compliance with the provision of the Act. This provision is implemented by EPA and the states through the development of effluent guidelines, the adoption of water quality standards, and the issuance of a National Pollutant Discharge Elimination System (NPDES) permit. Pursuant to Congressional directive, these programs have focused on a subset of toxic pollutants of greatest concern. There are 126 such toxic chemicals; they are known as "priority pollutants." This list includes 94 of the TRI chemicals. States are in the process of adopting water quality standards for those priority pollutants that could reasonably be expected to interfere with water quality. The states and EPA then use standards, together with best available treatment guidelines, to set enforceable permit limits on the amounts of these and other toxic pollutants that cities and industries are allowed to discharge to waters of the United States.

While many of the TRI chemicals with the largest surface water discharges are controlled, a number of the small-volume chemicals with high toxicity levels are not fully regulated. EPA will continue to work with the states to ensure that all appropriate standards and permits are adopted. EPA is also preparing to issue federal water quality standards if states do not adopt standards as Congress has directed. In addition, states and EPA regulate the overall toxicity of effluents with permit limits that rely upon biological toxicity tests; these limits serve, in part, to control the discharge of those TRI chemicals for which there are no state water quality standards.

Q91 Which of the TRI chemicals are covered by water quality criteria? What are your plans to develop water quality criteria for chemicals that are on the EPCRA section 313 list, but for which criteria have not been developed?

A EPA has published aquatic life and/or human health protective ambient water quality criteria for 134 of the TRI chemicals. There is a current capability to develop four to six aquatic life protective water quality criteria a year. Obviously, at this level of effort, it would take many years to complete criteria for all of the chemicals on the TRI list.

Because criteria and advisory development is a multi-year process, EPA is careful to set priorities before beginning work. First, EPA collects a variety of toxicology and exposure information on chemicals we are considering for criteria or advisories. Then, EPA ranks the pollutants. Finally, EPA meets with other affected offices to obtain their views before making a final selection of chemicals for criteria and advisory development. TRI data will play a major role in setting these priorities.

Once EPA issues a criteria document for a chemical, the next step is for states to adopt them as water quality standards under state law. Those standards are then used to derive enforceable NPDES permit limits for specific direct discharging facilities.

Q92 Are the TRI chemicals covered by the state water quality standards? If not, why not?

A A number of the TRI chemicals are covered by state water quality standards. Recently, under the CWA, EPA's emphasis on adoption and revision of chemicals in state water quality standards has been on the subset of TRI chemicals appearing on the CWA section 307(a)(1) list. This is a list of 126 pollutants that Congress has identified for priority attention in EPA's water program. The emphasis on this list for state standards stems from the mandate in the 1987 CWA amendments that EPA ensure that these chemicals, in particular, are covered in state water quality standards.

The Agency is very concerned with any pollution sources causing problems with human health or with aquatic life. EPA will review the TRI data, particularly in the context of the pollutant ranking described above, and intends to move aggressively in the water quality standards area for unregulated pollutants.

Q93 EPA has completed its review of the state assessments under Section 304(1) of the CWA, which reported the names and locations of water bodies in the United States that are not in attainment with water quality standards. Separate lists have been prepared for waters impacted by any pollutants and for waters and point sources where water quality is entirely or substantially impacted due to priority pollutants from point sources. Were the TRI data used in these assessments?

A States may have used similar types of information in generating their lists, but the actual TRI data submitted to EPA were not available to them at the time they did their assessments.

Q94 Were the TRI data used in EPA's review of the states' lists developed under Section 304(1)?

A Yes, to some degree. Under the statute, EPA had until June 4, 1990, to approve or disapprove the state lists. At a minimum, the list of facilities submitted by states and planned EPA additions to these lists were reviewed against the list of facilities identified in the TRI as discharging significant amounts of priority pollutants.

Q95 Will future state assessments of waters under Section 304(1) use TRI data?

A Yes, EPA will continue to review updates to state lists against the current and subsequent TRI submittals.

Q96 What are the difficulties in resolving any differences between the 304(1) lists submitted by the states and the TRI data?

A Each facility reporting to TRI a significant release of toxics will need a separate review to determine if its receiving water should be included on future state lists of waters not meeting water quality standards. Although EPA expects the state lists to be generally consistent with the TRI data, in some cases, the TRI data include loadings from spills and other releases not regulated by permits. There are also some cases where states did not list waters on the section 304(1) lists due to a lack of discharge or ambient data for some toxics. In such cases, EPA and the states will, over time, fill any data gaps by collecting (and/or having dischargers collect) additional effluent and ambient data. In some cases, this may also require permitting of previously unpermitted discharges.

Q97 The Office of Prevention, Pesticides and Toxic Substances has prepared information on the industrial categories that are responsible for the majority of the discharges of the TRI chemicals. What is the process for deciding whether to revise effluent guidelines or to develop new effluent guidelines to reflect the TRI information?

A EPA is required to publish a biennial effluent guidelines plan under section 304(m) of the CWA. The purpose of the plan is to identify those industrial categories for which effluent limitations and standards should be developed or revised. Plans were published in 1990 and 1992. The choice of industries to be regulated is based on a number of factors, including TRI data. A Task Force is currently advising EPA on how to improve the process for selection of additional industries, and this may lead to a greater reliance on TRI data.

Q98 How will EPA use TRI to implement the Public Water Supply Supervision Program of the Safe Drinking Water Act?

A The Office of Ground Water and Drinking Water will use the TRI data in a variety of ways to identify potential contaminants in specific geographic areas.

- In particular, these data could be source data for vulnerability assessments to determine frequency of monitoring by public water systems.

- The Office of Ground Water and Drinking Water could review chemicals reported in the TRI database to identify candidates for future maximum contaminant level developments.

- The Office of Ground Water and Drinking Water compares hazardous waste injection data with TRI data to identify and match those contaminants released.

Q99 How will EPA use the TRI data to improve the management of the permit program?

A EPA will investigate the feasibility of EPA Headquarters and Regions and states using TRI data to determine whether permits issued to some or all of these facilities control contaminants listed as releases in TRI reports.

The Office of Wastewater Enforcement and Compliance (OWEC) used TRI data to begin to identify new undetected significant industrial users discharging to POTWs and to identify illegal unpermitted discharges.

OWEC used data to identify discharges by industrial users to POTWs to determine whether additional NPDES permit limits are needed.

OWEC, EPA Regional offices, and states will use the data for geographic and national planning and targeting of activities to high priority areas (i.e., near coastal areas, wetlands) and to target inspections to suspected violators that could lead to permit modification, new or revised limits when the permit is reissued, or an enforcement action.

XI. UNDERGROUND INJECTION QUESTIONS

For more information:
Robert Smith, Office of Water (202) 260-5559

Q100 How are the TRI data used in the Underground Injection Control (UIC) program of the Safe Drinking Water Act?

A EPA and the implementing states verify the accuracy of TRI-reported underground injection operations to determine if these operations are properly authorized and in compliance with the program's requirements.

Q101 What does a TRI injection discharge listing mean to an area's groundwater resources?

A A listing for any particular facility may, depending on well classification and operating status, pose a threat to underground sources of drinking water. For that reason, each underground injection listing in the TRI database is checked against authorized facilities. If not properly authorized, the operation would be subject to state or EPA enforcement action. If authorized, the operation would be subject to a compliance review on a prescribed schedule.

Q102 What do the TRI data show as underground injection operations?

A Generally, the largest number of facilities are injecting waste into Class I wells, which are industrial or municipal disposal wells injecting waste below the lowermost underground sources of drinking water. When constructed and operated in compliance with program requirements, these wells are expressly designed to prevent the movement of formation and disposed fluids into protected aquifers. Other facilities may be injecting waste into Class V wells, which are important because they may be directly discharging into aquifers protected by the program and are a high priority for inspection and enforcement follow-up. EPA bans injection of hazardous waste at or above underground sources of drinking water.

Q103 Does EPA have any estimation of what percentage of the TRI releases to underground injection wells are going to Class I (deep underground injection of industrial or municipal wastes) wells?

A The current TRI Form R does not differentiate between underground injection releases by well type. Other UIC volume data reported by the states and the Regions indicate that the major percentage of TRI releases are to Class I industrial (non-hazardous) and Class I hazardous injection wells.

Q104 How are Class I injection wells monitored to ensure against any toxic releases to the environment?

A All Class I wells are rigorously monitored to prevent any loss of fluids injected in the receiving geologic formations. Class I wells must be properly sited and adequately cased and cemented to protect underground sources of drinking water and isolate the injection zone; the well casing, tubing, and annular seal must be tested for mechanical integrity; a test for any fluid movement along the borehole must be run at least every five years, and the operator must identify all wells within a specified distance from the injection well bore to assure that all abandoned wells are properly plugged so that there is no potential for fluid movement by these paths.

Q105 Have any Class I wells released fluids to underground sources of drinking water (USDWs), and, if so, were these wells adequately repaired?

A Instances of contamination of underground sources of drinking water by Class I wells have been rare. EPA and the states have identified only two cases where hazardous injected wastes contaminated underground sources of drinking water (USDWs), and one case where a Class I well was suspected of causing contamination. All three cases occurred prior to the implementation of a state or federal UIC program. EPA also identified eight cases where leakage from Class I hazardous wells entered non-USDW formations. These leaks were minor in nature and immediately adjacent to the well bore. All of these cases were addressed by either repairing the wells or properly plugging and abandoning operations.

XII. SOLID AND HAZARDOUS WASTE QUESTIONS

For more information:
Chris Prins, Office of Solid Waste and Emergency Response (202) 260-4608

Q106 How can a Local Emergency Planning Committee (LEPC) and the community use the TRI data?

A LEPCs can use the TRI data for emergency planning for response to chemical accidents. The LEPCs receive notifications of accidental releases under EPCRA section 304. They can compare the data received under section 304 to the TRI data to help screen the risks posed by manufacturing facilities in their community. They also can review TRI information along with chemical inventory information submitted by facilities under sections 311 and 312 of EPCRA to obtain a "chemical profile" of their community for use in planning for response to chemical accidents.

Q107 What role do TRI data play in chemical accident prevention?

A TRI data are used to support two activities related to chemical accident prevention:

- TRI data are used to identify chemical handling facilities that could benefit from information on chemical process safety for preventing accidental chemical releases.
- TRI data are used as one source of background material in learning more about facility activities. For example, these data can assist a team in preparing for a chemical safety audit at a particular chemical-handling facility.

Q108 Are the TRI chemicals regulated under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)?

A Approximately 263 of the 316 individually listed TRI chemicals reportable for 1993 are also CERCLA hazardous substances. TRI chemicals that are also CERCLA hazardous substances are subject to all of the requirements of CERCLA, as amended, such as reporting, liability, financial responsibility, clean-up, and penalties.

Q109 Are the EPCRA section 313 reporting requirements similar to CERCLA reporting requirements?

A There are few similarities between the reporting requirements of EPCRA section 313 and those of CERCLA section 103. Section 313 requires the owner or operator of a facility where a toxic chemical is manufactured, processed, or otherwise used to submit a toxic chemical release form to the EPA when the quantity of the toxic chemical exceeds the threshold quantity established by section 313(f) of EPCRA.

The reporting requirements of section 103 of CERCLA require any person in charge of a vessel or facility to report the release of a hazardous substance into the environment, in a quantity equal to or greater than its reportable quantity, to the National Response Center. The purpose of reporting under CERCLA section 103 is to allow the federal government to assess each reported release to determine if a response action is warranted.

In addition, EPCRA section 304 requires reporting of these releases to state and local authorities.

Q110 How many TRI chemicals are regulated under the Resource Conservation and Recovery Act (RCRA)?

A Approximately two-thirds of the 316 individually listed TRI chemicals reportable for 1993 are regulated under RCRA. An additional 21 chemicals and two chemical categories subject to RCRA were recently added to the TRI list (see Q23). More detailed information is contained in the TRI Chemical Regulatory Matrix in Appendix E of this document.

Forty of the individually listed TRI chemicals are currently used to identify a waste as a characteristic hazardous waste. When such chemicals are found in the waste above specified levels, the waste is subject to RCRA regulation.

In addition, 153 of the individually listed TRI chemicals are also listed as hazardous wastes when they are unused or discarded in commercial chemical products.

Q111 Are all land releases reported under TRI regulated under RCRA?

A Some land releases may be accidental releases or chemicals in wastes that are not regulated by RCRA. Most of the land releases reported to TRI fall under one of the following categories: on-site disposal of hazardous wastes which are regulated under RCRA or authorized state hazardous waste programs; and industrial solid waste or waste from mining and mineral processing activities that would be regulated under state solid waste management programs insofar as they do exist. Some mineral processing wastes are regulated as hazardous wastes.

Under EPCRA section 313, facilities that manufactured or processed 25,000 pounds or used 10,000 pounds of a listed chemical must report. Under RCRA, only those facilities that generate more than 100 kilograms (220 pounds) of hazardous waste per month must report.

Q112 Can you make direct comparisons between TRI data and data in the RCRA program for amounts of hazardous waste generated, waste minimization, etc.?

A It is difficult to make comparisons for several reasons:

- TRI reports individual chemical constituent data; RCRA requires reporting on a total waste stream that represents a substantially larger volume than any single chemical contained in the waste stream. A RCRA hazardous waste stream may or may not contain TRI chemicals.

- TRI reports toxic chemicals released to air, land, water; data collected in the RCRA program report hazardous waste generation and management in regulated land disposal, incineration, storage, or treatment units.

- RCRA also distinguishes between regulated and exempt wastes. A particular TRI chemical may occur in a waste that is exempt and need not be reported under RCRA. For example, certain wastewater treatment activities are exempt from RCRA, as are small quantity generators who generate less than 100 kg/month of hazardous waste.

- Currently, only facilities in SIC codes 20-39 are required to report to TRI; RCRA is not limited by SIC code.

- Under RCRA, hazardous waste generators are required to report on existing or planned waste minimization activities at facilities on a biennial basis. The current reporting forms request information on reduction of the volume of waste generated. These data differ from TRI data in that they represent specific RCRA waste streams rather than individual chemical constituents. EPA's Office of Solid Waste is exploring approaches to refine the utility of the waste minimization data collected through the biennial reporting system and to coordinate the results with TRI data.

- The biennial report does request the CAS number of TRI chemicals that are contained in RCRA waste streams, to facilitate a link between the two data sources.

Q113 How many facilities are regulated by the RCRA program and what is the overlap with facilities that report for TRI?

A Under Subtitle C, RCRA regulates about 4,850 Treatment, Storage, Incineration, and Land Disposal facilities, including: 1,500 land disposal facilities; 350 incinerators; 3,000 storage/treatment facilities. RCRA also regulates more than 200,000 large and small quantity generators and about 18,000 transporters. These sites and facilities are listed in the Resource Conservation and Recovery Information System (RCRIS) and may be cross-checked with TRI facilities by EPA ID number.

Of the 200,000 large and small quantity generators that are regulated under Subtitle C of RCRA, approximately 17,000 of the large quantity generators (LQGs) report to RCRA's biennial reporting system. Approximately 10,000 of these LQGs fall within SIC codes 20 to 39, and, of these, approximately 7,000 sites report for TRI.

Q114 How are TRI releases of hazardous wastes regulated?

A Hazardous wastes must be stored, treated, or disposed of in hazardous waste management units regulated under the RCRA or under authorized state laws. Hazardous waste land disposal units, including landfills, land treatment, surface impoundments, and waste piles, must meet applicable design and operating controls, such as liners and leak detection systems and groundwater monitoring systems to detect releases out of the unit. All facilities that store, treat, or dispose of hazardous wastes are subject to corrective action requirements to clean up hazardous wastes or hazardous constituents that migrate from any waste management unit at the facility.

APPENDIX B

PUBLIC ACCESS TO THE TOXICS RELEASE INVENTORY

EPA continues to add new avenues of public access to the Toxics Release Inventory (TRI). Every year, EPA expands its outreach activities to new potential users of the data. Through its outreach activities, EPA identifies and engages the assistance of organizations to help promote TRI awareness, provide access, and increase data usage. Libraries, journalists, national public interest and environmental groups, and state governments remain key outreach participants. Since the value of TRI increases as more people use it, EPA hopes that these organizations will acquaint new users with TRI, help people who already know about TRI to better use and understand the data, and, when possible, provide information on how to improve TRI products and services.

Accessing TRI is easy. EPA offers the data in a variety of common computer and hard copy formats to ensure that everyone can easily use the information. TRI is available on diskette, CD-ROM, and computer bulletin boards. It is available on an on-line national computer database. TRI reports are available from the states and from EPA. For each reporting year, many states make their data available before EPA releases data from the national database. You can contact your state EPCRA Coordinator or you can call your EPA Regional TRI Coordinator for assistance. (See listing of Regional coordinators and state EPCRA contacts in Appendix G.) Many other routes for accessing TRI are described below.

TRI has proven to be a rich source of data for a broad public audience. For instance, educators are using the data to conduct studies and courses on the environment; labor unions are using the TRI data to improve conditions for workers; and businesses are using the data in many ways—as a basis for reducing large stocks of toxic chemicals, to cut costs, to improve operations, to reduce the use of toxic chemicals, and for a variety of other reasons. Concerned citizens are a growing user group. These individuals, on their own and through organized groups, are using TRI to raise and answer questions about chemical releases in their communities. States use the national data to compare releases within industries.

Looking forward, avenues of public access to TRI will continue to grow, and TRI will continue to be an important first step for discovering which chemicals are being manufactured, released, or transferred in communities across the country. The diversity of the groups across the country who use TRI will also increase as will the varied uses of the data. TRI will increasingly become the data source used to positively influence the views of companies, legislators, and the public regarding the overall conditions of the nation's environment.

ACCESSING TOXICS RELEASE INVENTORY (TRI) PRODUCTS AND SERVICES

(For addresses and detailed ordering information, see page B-7.)

Assistance Services

TRI User Support Service (TRI-US)

The **TRI-US Service** provides general information about the Toxics Release Inventory and support for access to any of the data formats. TRI specialists can help determine the data product best suited for the individual user's needs. The service provides a comprehensive search assistance for the TRI on-line and CD-ROM applications. TRI-US provides both NLM/TOXNET and CD-ROM training through individual sessions and workshops. Documentation for all TRI products is available from TRI-US. This support service provides referrals to EPA Regional and state TRI contacts and to the libraries where TRI is available. Referrals to other TRI resource centers in local areas are also available. Hours: 8:00 a.m. - 4:30 p.m. (Eastern Time), Monday - Friday. Contact: EPA/TRI-US.

EPCRA Hotline

The **Emergency Planning and Community Right-to-Know (EPCRA) Hotline** provides regulatory, policy, and technical assistance to federal agencies, local and state governments, the public, the regulated community, and other interested parties in response to questions related to EPCRA. The Hotline provides information on the availability of documents related to EPCRA and copies of selected EPCRA documents on a limited basis. Contact: EPCRA Hotline.

On-line Access

- The **National Library of Medicine (NLM) TOXNET System** makes TRI accessible to concerned citizens and to businesses and organizations interested in environmental or public health issues. TOXNET offers state-of-the-art, user-friendly, on-line searching. The system features a variety of on-line user assistance features, a flexible command language, and "free text" search capability. Users can print specific portions of the records either on-line or off-line, and there are a wide variety of customized text options built into the system. The menu-driven search package allows individuals with limited computer skills to use the TRI on-line database efficiently and effectively. The chemical fact sheets can also be accessed via the TOXNET system. On-line costs range from $18 - $20 per hour. Access is available 7 days/week, 24 hours/day. An NLM password is necessary to use the file. The system contains the complete national TRI data for all reporting years.

  The TOXNET is also available on the Internet. The address for the file is toxnet.nlm.nih.gov. Contact the TRI Representative at NLM for more information. Contact/Availability: NLM/ 1993 data will be available spring 1995.

- The **Integrated Risk Information System (IRIS)** contains health risk assessment and adverse health effects information summaries agreed on by various EPA programs. It is available on-line via the NLM TOXNET system. The system is useful in the risk assessment process. IRIS is also available on diskette from NTIS. Contact/Availability: National Technical Information Service (NTIS), NLM.

- The **Right-to-Know Computer Network (RTK NET)** has TRI data for 1987-1993, along with health facts for each TRI chemical. RTK NET is an on-line computer telecommunications link to environmental and other databases. This service promotes pollution prevention by putting TRI data together with other prevention strategies. It provides communication among individuals concerned about toxics use reduction and seeks to increase use and analysis of TRI and related data. RTK NET links TRI with other environmental data, all civil cases brought by the U.S. EPA, and a portion of the 1990 Census, among other databases. The Internet telnet address for RTK NET is rtknet.org.

The TRI data can be accessed by modem from any computer. (Set computer parameters to 2400, 8,N,1. Dial-in using the modem number listed under ordering information and type "public" (lower case) at the prompt for user i.d.) Participants can communicate with one another through computer-generated mail, in addition to exchanging and reviewing documents electronically.

In addition to the TRI data, the following databases on RTK NET may be of interest to TRI users:

- **CENSUS** - U.S. Census Bureau 1990 extracted demographic data for states, counties, and "places" with TRI and FINDS links
- **CERCLIS** - CERCLA "Superfund" Information System
- **DOCKET** - EPA civil litigation cases filed by the Department of Justice
- **ERNS** - EPA Emergency Response Notification System, 1991 data
- **FINDS** - Identifying information and location of all facilities regulated by EPA
- **NPL** - EPA Superfund National Priorities List of Sites
- **PCS** - EPA Water Permit Compliance System contains files on facilities, pipes, and pollutant limits
- **ROADMAPS**- Regulatory levels and health effects of TRI chemicals

Training is available from the computer service on using telecommunications, using RTK NET, and searching the database. Contact/Availability: RTK NET/1993 data will be available spring 1995.

Public Access Servers and Bulletin Boards

Internet Access to TRI

EPA has the following TRI information available to Internet users free of charge from three different EPA sources: the EPA Gopher server, the EPA FTP file server, and the EPA World Wide Web (WWW) server.

- 1993 TRI Public Data Release document—ASCII Text format and Lotus spreadsheet files corresponding to the data tables in the document. An index to the files is available; see below for location of this index.

- ARC/INFO GIS files for all 50 states—TRI data from 1987-1992, written in ARC/Info format for geographical information system (GIS) applications. These are extremely large files, ranging in size from 1 to 65 megabytes each. (The accompanying Metadata record gives a listing of file sizes and approximate download times.)

The information available through the EPA servers is identical; which server you use will depend on your preferred method of access. Internet users are advised to consult with their system administrators for specific access procedures. The address of each EPA server is given below:

- **EPA GOPHER SERVER**
  Address gopher.epa.gov

  The Gopher server is a menu-driven, user-friendly Internet utility which allows users to download files directly to their Internet accounts. The user starts at a Main Menu and follows a series of sub-menus to the desired items.

  To get to the TRI files, use the following menus:

  Main -> Option 9 (EPA Offices and Regions) -> Option 2 (Office of Prevention, Pesticides, and Toxic Substances) -> Option 3 (Toxic Substances) -> Option 1 (Toxic Release Inventory)

- **EPA FTP SERVER**
  Address ftp.epa.gov

  The FTP server also allows the user to log directly onto EPA's servers by 'anonymous login' and download files directly. Operation is slightly more complex than that of the Gopher as the user is required to know a specific pathname to the files.

  The TRI Public Data Release files can be found in the directory \pub\gopher\TRI_Chem (NOTE: The FTP server is case sensitive, so filenames must be entered exactly as written.) The index to these files is in a file called 00_index.txt.

  The TRI ARC-INFO GIS files for 1987-1993 are in the directory \pub\gopher\TRI_coverages. The GIS format files are organized by state and stored in compressed (gzip) form in subdirectories by EPA region (e.g. reg1). Accompanying documentation for the files are in: metadat.txt, doc2.txt, doc3.txt, and doc4.txt.

  An extract of the TRI ARC-INFO GIS files for 1993 only is in the directory \pub\gopher\tri93. These files are organized by state and are in uncompressed form.

- **EPA WORLD WIDE WEB SERVER**
  Address http:\\www.epa.gov\

  The World Wide Web server is a graphical user interface allowing access not only to text but to images as well. Using a WWW program (or 'browser') such as Mosaic, users can access both the Gopher and the FTP servers in a user-friendly fashion. A text-based World Wide Web program called "lynx" is available on some systems, which allows downloading capabilities without graphics.

For more information on the EPA's Internet servers, contact the Internet support group at the e-mail address: internet_support@unixmail.rtpnc.epa.gov.

- **GPO ELECTRONIC BULLETIN BOARD**

  The Government Printing Office (GPO) provides an electronic bulletin board with TRI state-specific data. Contact/Availability: GPO/1993 (data will be available summer 1995).

Electronic Media

Compact Disc— Read Only Memory (CD-ROM)

The **TRI CD-ROM** contains the complete national TRI, starting with the first inventory in 1987. Chemical Fact Sheets (formerly TRI-FACTS) containing reference material on the health and ecological effects of the regulated substances are also available on the same CD-ROM. Contact/Availability: NTIS, Government Printing Office (GPO), Federal Depository Libraries, EPA Regional Offices/a CD-ROM containing 1993 data will be available from these sources summer 1995.

The **NESE-DB (National Economics, Social and Environmental Data Bank) CD-ROM** includes the TRI state data and the national public data file on CD-ROM. The disc is produced quarterly by the Department of Commerce and provides access to socio-economic as well as environmental statistics and information. The data are gathered from over 15 federal agencies. Contact/Availability: Department of Commerce, selected federal depository libraries/1993 data will be available summer 1995.

Diskettes

Requestors can select either 5.25 or 3.5 inch diskettes by state or for the country in DBASE III PLUS or Lotus 1-2-3 (version 2.0). Diskettes are accompanied by documentation. Contact/Availability: NTIS, GPO/1993 data will be available summer 1995.

Magnetic Tapes

Each annual TRI from 1987 to the most recent release is available on 9-track tapes and includes tape documentation. The magnetic tapes contain the complete national data which are updated for back years. Tapes can be ordered in ASCII or EBCDIC format in a 1600 or 6250 bpi density. The reporting facilities' names and addresses are also available on tape in the same formats and densities with tape documentation. Contact/Availability: NTIS/1993 data will be available summer 1995.

Printed Media

TRI Information Kit

The TRI Information Kit is designed to acquaint a broad and disparate audience with the TRI. The information kit is appropriate for those familiar or unfamiliar with TRI. It contains a brochure, bookmark, poster, and other explanatory materials. It is designed to answer the "who, what, when, why, where, and how" questions of TRI in clear, non-jargon language. The kit provides a broad explanation of TRI, as well as examples of how various groups have used TRI, where it can be accessed or obtained, and organizations that are sources for further information about TRI and the chemicals reported. Order No. EPA-749-F-93-002. Contact: National Center for Environmental Publications and Information (NCEPI).

Chemical Fact Sheets

In July 1994 OPPT initiated a pilot project, entitled Chemicals in the Environment, designed to provide brief (two-page) information summaries on chemicals of interest to the Office as part of its effort to provide the public with information on chemicals. The initial goal was to provide summaries that would supplement environmental release information for TRI chemicals. During the information collection phase for the first 20 summaries, the Staff began preparing more detailed (10-page) summaries of technical information on which statements in the shorter summary were based. OPPT identified the short summary as a "fact sheet" and the longer summary as a "support document."

Differing in the level of detail and in the use of technical information, each summary provides a reader with information about a chemical's:

- identity,
- production and use,
- environmental fate, and
- health and environmental effects.

The summaries also contain a directory of names and phone numbers of groups to contact for additional information.

The pilot project has been completed. Fact sheets are now available for 20 high-volume TRI chemicals. Fact sheets for 20 additional TRI chemicals are in various stages of review. Plans are to complete fact sheets for additional TRI chemicals, as well as for other chemicals of interest to OPPT. OPPT intends to make these fact sheets and the support documents available to the public through the Internet system.

TRI Reports

EPA assembles several detailed annual reports providing summaries, analyses, and comparison of TRI data by year. The reports summarize data on total releases and transfers of TRI chemicals; geographic distribution of TRI releases and transfers; industrial patterns of releases and transfers; the interstate and intrastate transport of wastes and other kinds of analyses. Contact: EPCRA Information Hotline.

Microfiche

TRI microfiche contain the complete TRI for each reporting year through 1990. EPA discontinued microfiche for distribution to focus more attention on other media. The microfiche have a users' guide and indices to help locate specific facility reports. Microfiche can be obtained for a specific state or the whole country. The microfiche are available in over 3,000 libraries across the country. Availability: Selected public libraries.

Form R Facsimile

Computer-generated facsimiles of TRI reporting forms will be provided upon request. Contact/ Availability: TRI Information Management Branch/1993 data will be available spring 1995.

Guidance Documents

"Toxic Chemical Release Inventory Risk Screening Guide"—Method for evaluating TRI data for environmental managers. Vols. 1 and 2, July 1989. EPA Document No.: 560/2-89-002. Contact: NTIS.

"Chemicals, the Press and the Public" -- A journalist's guide to reporting on chemicals in the community. Contact: National Safety Council.

For a comprehensive listing and ordering information for TRI products, services, and documents contact **TRI-US** and the **EPCRA Hotline.** (See TRI-US and EPCRA Hotline, under "Ordering Information.")

Ordering Information

National Library of Medicine (NLM)
Specialized Information Services
TRI Representative
8600 Rockville Pike
Bethesda, MD 20894
Call: (301) 496-6531
Hours: 7 days/week; 24 hours/day

National Technical Information Service (NTIS)
U.S. Department of Commerce
5285 Port Royal Rd.
Springfield, VA 22161
Call: (703) 487-4650
Fax: (703) 321-8547
Rush order: (800) 553-NTIS
Hours: 8:30 a.m. - 5:00 p.m. (Eastern Time)

U.S. Government Printing Office (GPO)
Superintendent of Documents
P.O. Box 371954
Pittsburgh, PA 15250-7954
Call: (202) 512-1800
Fax: (202) 512-2250
Hours: 8:30 a.m. - 4:00 p.m. (Eastern Time)
(To order CD-ROM and printed reports)

U.S. Government Printing Office (GPO)
Superintendent of Documents
Attn: Electronic Products Sales Coordinator
P.O. Box 37082
Washington, DC 20013-7082
Call: (202) 512-1530
Fax: (202) 512-1262
Hours: 8:30 a.m. - 4:00 p.m. (Eastern Time)
(To order diskettes and magnetic tapes and to access the electronic bulletin board)

Public and Depository Libraries
Contact the EPCRA Information Hotline at (800) 535-0202 or TRI-US at (202) 260-1531.

TRI Information Management Branch
Tonya Richardson
Call: (202) 260-3757
Fax: (202) 260-4655

Emergency Planning and Community Right-to-Know Information (EPCRA) Hotline
Call: (800) 535-0202
Fax: (703) 412-3333
(To request documents only)
Hours: 8:30 a.m. - 7:30 p.m. (Eastern Time)

U.S. Department of Commerce
NESE-DB CD-ROM
STAT-USA, Room 4885
Washington, DC 20277-2787
Call: (202) 482-1986 or (800) STAT-USA

Toxics Release Inventory User Support Service (TRI-US)
U.S. EPA
401 M Street, SW. (MC-7407)
Washington, DC 20460
Call: (202) 260-1531
Fax: (202) 260-4659
Hours: 8:00 a.m. - 4:30 p.m. (Eastern Time)

National Center for Environmental Publications and Information (NCEPI)
Cathy Cain
26 West Martin Luther King Drive
Cincinnati, OH 45268
Call: (513) 489-8190
Fax: (513) 489-8695

Right-to-Know Computer Network (RTK NET)
1742 Connecticut Avenue, NW.
Washington, DC 20009-1171
Call: (202) 797-7200
Fax: (202) 234-8584
Modem: (202) 234-8570
(Parameters 8,n,1. Login as "public.")

National Safety Council (NSC)
Environmental Health Center
1050 17th Street, NW., Suite 770
Washington, DC 20036
Call: (202) 293-2270

APPENDIX C

TRI DATA QUALITY PROGRAM

The goals of EPA's data quality program for TRI are to: (1) identify and assist facilities that must report so that data submitted will be of the highest quality; (2) insure high quality data entry; (3) correct and normalize as much of the submitted data as possible in order to maximize the utility of the data; (4) accurately assess the relative validity of release estimates and other data, and (5) ensure completeness of the database with compliance and enforcement measures.

IDENTIFICATION AND ASSISTANCE TO FACILITIES

Through mass mailings to all facilities within the manufacturing sector of the economy, work with a wide variety of trade associations, local and national seminars, training courses, and enforcement activities, EPA has endeavored to locate all facilities required to report under section 313 of EPCRA and inform them of their obligations. In addition, EPA has prepared various materials to assist facilities in complying with EPCRA. These include detailed reporting instructions, a question-and-answer document, magnetic media reporting instructions, general technical guidance, and 16 industry-specific guidance documents. In addition, EPA maintains a toll-free hotline to answer regulatory and technical questions to assist facilities.

DATA ENTRY QUALITY ACTIVITIES

EPA continues to place a high emphasis on data entry accuracy within the Toxics Release Inventory database. EPA's internal review of 3% of the records showed a data entry accuracy rate of over 99%. This is up from a 1987 reporting year rate of 97.5%. EPA continued the computerized edit checks at the point of data entry, including a high percent of verification and formalization of data reconciliation activities. EPA mailed copies of the release and transfer estimates to all reporting facilities to allow them to verify the entered data. EPA also received 53% of the 1993 submissions from facilities reporting on magnetic media, which ensures against EPA data entry errors. This compares to 35% magnetic media submissions for 1992. EPA is continuing to encourage the use of magnetic media by all submitters.

CORRECTION AND NORMALIZATION OF DATA

Because Congress has required that EPA make the TRI data available to the public through computer telecommunications, EPA has found it necessary to undertake a variety of activities to make the data more usable. This is due to the fact that computers only retrieve data in exactly the format requested (e.g., if asked for "Los Angeles," the computer will not identify facilities listed under "LA"), and facilities report their data in a wide variety of ways. As a result, EPA has taken steps to use a consistent name for all counties, used a variety of nomenclature standards for names within the database, added latitude and longitude representing the center of the zip code area in which the facility is found, and has taken other steps to assist in the utilization of the data.

EPA generates a facility identification number at the time of data entry. Linkage between all years of reports has been made to the best of EPA's ability. This allows easy retrieval of cross-year data, even when a facility is sold or changes its name. The identification number has been sent to all facilities. Facilities are required to use this number on all future Form R reports submitted to the Agency. Use of this number facilitates data quality and cross-year analysis.

In 1994, EPA provided all states with a listing of facilities that reported for 1993 to verify that both the state and federal government received the same data. States that responded found cases where facilities had not reported to one or the other government. States provided copies of forms to the EPA where EPA had not received copies, and vice-versa. This activity has provided a critical step to assist EPA in coordinating the data collection with the states.

Every year EPA issues Notices of Noncompliance (NONs) to facilities who use invalid forms or provide incomplete forms, incomplete facility identification, or incorrect/missing chemical identification. These facilities are also notified by telephone to make sure their follow-up revisions correct these errors. A facility that does not comply with a NON may be subject to civil penalties.

For reporting year 1993, EPA has again issued Notices of Technical Error (NOTEs) for missing required data or for incorrect information, such as facility identification numbers or invalid codes. The response rate to the NONs and NOTEs has been very good and has prevented errors from recurring in following years. To help facilities avoid these types of errors, a list of common errors was provided in the 1989 through 1993 reporting year instructions. Due to lack of a final regulation for the pollution prevention data elements and budget cuts for the TRI program, EPA did not issue NOTEs for the 1991 and 1992 reporting years.

ACCURACY EVALUATION

The accuracy of the release data can vary. Some releases can be estimated fairly easily, just by knowing how much of the chemical was used during the reporting year or by weighing drums of solid/liquid waste. Where monitoring of release streams or wastes has been done, release estimates may be within 20% of actual amount released, although infrequent, non-representative sampling may lead to much less accuracy. Estimates of fugitive air emissions and complex wastewaters for which monitoring data are not available may be off by one or even two orders of magnitude, particularly when the release is a small percentage of the amount of the chemical actually processed.

For the 1987 and 1988 reporting years, EPA conducted audits at facilities to determine how well facilities complied with the law and estimated release quantities. These audits did not "confirm" estimates through monitoring, but determined how well facilities used available data and estimation techniques to calculate releases.

Overall, based on the audit of 156 facilities, 1987 total annual releases appeared to have been underestimated by 2%, representing the net effect of overestimates and underestimates. For non-zero release estimates, more than three-quarters were within a factor of two of EPA's best estimate. About 15% were in error by an order of magnitude or more.

The survey of the 1988 data focused on facilities in Standard Industrial Classification (SIC) codes 28 (chemical manufacturing), 29 (petroleum refining), and 34 (metal finishing and fabrication). Ninety facilities were visited. The aggregate 1988 release estimates in these industries were more accurate than their 1987 estimates, since their aggregate 1988 estimates were found to be approximately equal to the estimates calculated by the EPA contractor.

For the 1987 and 1988 reporting years, in a different type of survey, EPA also identified approximately 1,800 forms with suspect release data and telephoned facilities to discuss how to improve and correct their estimates. The information from this survey was also used to improve the reporting instructions and technical guidance.

COMPLIANCE ACTIVITIES

EPA has taken steps to make data quality a priority in its enforcement program. Some inspections also focused on data quality in addition to non-reporting violations. EPA has developed a guidance manual for EPA Regional inspectors outlining what to look for when auditing an EPCRA reporting facility. The manual contains detailed guidance on how to determine if a facility has identified all reportable chemicals, made proper threshold determinations, and provided reasonable release estimates.

In fiscal year 1990, $1 million was awarded to 11 states to develop and implement TRI data quality assurance programs. These projects focused on one or more broad data quality assurance objectives: 1) verification of the accuracy of the estimates and other data submitted by the facilities; 2) identification of facilities that should have reported but did not; and 3) identification of discrepancies between TRI data reported to EPA and to the state. Quality assurance activities included facility site visits and telephone audits, cross-checking TRI data against other state data, such as permit data, using computer algorithms to identify suspect estimates, and comparing TRI data across reporting years.

APPENDIX D

SUMMARY OF EPA PROGRAM OFFICE, REGIONAL OFFICE, AND STATE USES OF TRI DATA

EPA PROGRAM OFFICE USE

Office of Enforcement and Compliance Assurance (OECA)

TRI data will continue to be heavily used by the new Office of Enforcement and Compliance Assurance (OECA), the consolidated office that is replacing both the Office of Enforcement and the Office of Compliance Monitoring. OECA is composed of several smaller offices, including the Office of Regulatory Enforcement and the Office of Compliance.

TRI data will, as in the past, be used as a tool in facility inspection targeting, both in the Regions and at Headquarters. TRI reporting data are used in the EPCRA Targeting System (ETS), which provides local access to TRI reporting-status data and additional facility information contained in EPA's Facility Index System (FINDS), as well as to Dun & Bradstreet, for facilities potentially subject to EPCRA Section 313 reporting requirements. TRI data will also continue to be cross-checked with data collected under the Toxic Substances Control Act (TSCA) to identify those facilities or types of businesses that reported under some but not all of the reporting rules.

The TRI database is among the 12 Agency databases that are linked in the Agency's Integrated Data for Enforcement Analysis (IDEA) system. IDEA provides enforcement planners with complete compliance profiles of industry sectors (as well as individual corporations) across the different statutes administered and enforced by EPA. IDEA will be used by all of the offices comprising the Office of Enforcement and Compliance Assurance for enforcement screening, targeting, and planning, as well as development of enforcement policy.

Enforcement planners will continue to use TRI data to distinguish between industrial sectors based on risk, in terms of types of chemicals reported, total pounds of toxic chemicals released, types of releases, and average pounds released per facility (or industrial sector). Until new techniques for assessing risk can be developed, TRI data give the Agency a sound "surrogate" for the risks posed to the public by toxic chemical releases.

TRI data, already an important tool in achieving pollution prevention, will continue to play a key role in the Office of Enforcement and Compliance Assurance. Because it gives Agency enforcement staff a picture of what chemicals are being released to air, land, and/or water, or transferred off-site, TRI is an excellent starting point for identifying opportunities for both toxics use reduction and source reduction among a broad spectrum of facilities, from small, single-facility business to multi-facility corporations. It will only grow in importance as more chemicals are added to the list of those covered by EPCRA Section 313.

Finally, because EPCRA is a right-to-know statute that places data on toxic releases into the hands of the public, it is a good mechanism for EPA to begin implementing the environmental justice program. That program calls upon both the government and industry to be more sensitive to the issues of both the environmental and human health conditions in minority and low-income communities.

Office of Air and Radiation (OAR)

OAR has used the data for a variety of tasks related to the implementation of the Clean Air Act Amendments of 1990 (CAAA), including the following:

- TRI data on the number of facilities emitting a chemical and amount emitted are used in setting research priorities for the 189 Hazardous Air Pollutants (HAPs) identified in the CAAA.
- TRI data were used to estimate the number of major sources of HAPs that might be affected by regulations under section 112(g), the modifications provision of the CAAA.
- TRI estimates of transfers to publicly owned treatment works (POTWs) were used in establishing maximum achievable control technology (MACT) standards required by Title III of the CAAA.
- TRI data are used to target potential sources for inclusion in the Early Reductions Program, which is a means of achieving enforceable reductions of toxic emissions before a regulation is in place.
- TRI data are used in inventories of air toxics emissions and in air toxics "Locating and Estimating" documents, which help state and local air agencies identify potential source categories of air toxics in their communities.
- TRI data are used to verify the quality and completeness of point source emission inventories in state implementation plans.
- TRI data are used to aid in identifying potential or actual violations of the National Ambient Air Quality Standards (NAAQS) for lead.
- TRI data were used to identify which of the 189 HAPs might be emitted as particulates and thus might be captured by control equipment used in response to the NAAQS for particulate matter.
- TRI data will be used as a measure of the progress of the CAAA in reducing air toxics.
- TRI facility-level locational information (latitude/longitude) is being used in conjunction with other geographic/demographic data to improve exposure assessment.

Office of Pollution Prevention and Toxics (OPPT)

OPPT is using TRI data in a variety of ways to support EPA's Source Reduction Review Project (SRRP). The SRRP is an EPA-wide effort to promote source reduction in the regulatory development process. For example, data on the types of source reduction practices already adopted by some facilities are helpful for identifying candidate facilities for site visits, as well as technologies that could serve as the basis for prevention-oriented standards under the Agency's traditional environmental control programs (e.g., effluent guidelines under the Clean Water Act).

TRI data form the backbone of EPA's innovative 33/50 Program, which seeks to achieve voluntary national reductions of 33% by 1992 and 50% by 1995 in the releases and off-site transfers of 17 high-priority TRI chemicals, using 1988 TRI reporting as a baseline. EPA has used TRI reporting data to identify more than 8,900 parent companies of the more than 19,300 facilities that have reported one or more of the target chemicals since 1988 (see Chapter 4). Assessments of the 33/50 Program's progress in meeting its ambitious national goals, as well as the progress individual companies are making in achieving their own reduction targets, are made directly from environmental data already being reported annually in TRI.

The OPPT Existing Chemicals Program continues to use the TRI data for risk screening, testing, and pollution prevention activities in the Risk Management assessment processes. TRI data serve as a major input to exposure and risk assessments in OPPT. TRI data have also been useful in identifying target audiences for risk notification efforts following Risk Management assessment.

The TRI is especially important to the Existing Chemical Program's new initiatives on pollution prevention. TRI data are used for targeting chemicals/uses/facilities for pollution prevention assessment and for evaluating pollution prevention actions. TRI data are also used by the Chemical Assessment Desk and other OPPT outreach efforts to respond to inquiries from a variety of sources.

Office of Solid Waste and Emergency Response (OSWER)

TRI data, in combination with other information on waste minimization, are useful in analyzing long-term trends and identifying particular industry practices that warrant attention by the program.

With respect to enforcement, TRI data supplement other existing data sources and can be called on to assist in the development of OSWER enforcement priorities. TRI data also are valuable as a means of establishing liability under both the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA).

Another site-specific function of the TRI database relates to its role in providing release and transfer information that can be used when developing inventories for the Superfund site discovery program and when undertaking Superfund preliminary assessments of sites. In the reportable quantity (RQ) program, TRI data could be used to support future rulemaking under CERCLA (e.g., designation of additional hazardous substances). In addition, states use the TRI data in conjunction with other data obtained under EPCRA for accident prevention planning.

Office of Water (OW)

TRI is being used as a source of data regarding discharge/release of contaminants to groundwater and surface water. The TRI data are used with other pertinent exposure and toxicity-related factors (e.g., quantity produced, occurrence in water, human health effects) in identifying and prioritizing drinking water contaminants. The prioritized list will be used to identify candidates for regulatory consideration.

TRI data were used as a screening mechanism for possible sources of wellhead contamination. Using TRI and other relevant data in a Geographic Information System (GIS), potential contamination sources have been identified. These sources may affect community groundwater systems in the development and implementation of wellhead protection programs. EPA Regional offices continue to coordinate groundwater programs, using GIS as a cross-program tool.

The OW document, "Guidance for Water Quality-based Decisions: The TMDL Process," identifies the TRI as an important information source. In particular, TRI data can be used when developing section 303(d) lists. Section 303(d) lists, which must be submitted biennially by states, are composed of impaired waters which need additional controls in order to meet or maintain water quality standards.

OW's Gulf of Mexico Program uses the TRI data and other information to identify and quantify inputs of toxic chemicals to the Gulf. This information is then used to calculate a toxicity index for various Gulf estuaries.

The Office of Water Enforcement and Compliance (OWEC) has used TRI data to identify industrial users with the greatest combination of toxic pollutants to city sewer systems. Certain facilities are referred to EPA Regional offices for further evaluation.

OWEC also used TRI data to identify industrial users (IUs) that are subject to pretreatment standards, but that are located in cities that are not required to have pretreatment programs. Comparing location of users to cities without approved pretreatment programs may be a way of identifying IUs for which EPA is responsible. OW is also matching permitted facilities with facilities that reported TRI discharges to surface water. This will help identify unpermitted dischargers.

The TRI data were also used in compiling a report to Congress on the National Pretreatment Program and in identifying the types and sources of pollutants discharged to publicly owned treatment works (POTWs).

OW is evaluating the types and volumes of TRI discharges reported by "minor" and "major" National Pollutant Discharge Elimination System (NPDES) facilities to assess the relative risk presented by minor as compared to major facilities.

In developing effluent guidelines, OW needs to understand which pollutants are released from pesticide manufacturing facilities and the patterns of those releases. Some TRI data are useful for screening purposes; however, the OW effluent guidelines program also screens for a number of pollutants not reported under TRI.

TRI data, in conjunction with the Permit Compliance System (PCS) database, were used in the development of a national database of point source discharges that may result in sediment contamination. The data generated from this inventory will be combined with data on conditions at specific locations. This will provide a valuable tool for identifying the potential magnitude of contamination problems in the nation's freshwater and estuarine bottom deposits, selecting facilities and industries that may require additional regulation, determining where permitting efforts should be focused, and identifying locations for further sediment testing.

REGION AND STATE USE OF TRI DATA

EPA's 10 Regional Offices continue to use and promote the use of TRI data both internally and externally. Some on-going applications of TRI data include:

- Targeting facilities for compliance and enforcement inspections. In 1994, 548 inspections were conducted. To date, proposed fines totaling more than $54 million have been assessed by EPA Regional Offices against facilities who either did not report, reported late, or sent in poor quality data. Ohio, the state with the most aggressive EPCRA section 313 enforcement program, conducted over 100 inspections in 1993.

- Developing approaches for integrating the TRI with other databases to identify industries or geographic areas of concern. The TRI has been used by Regions III, IV, and IX to identify sites for environmental justice projects. Eighteen states are conducting GIS studies using TRI, and 10 states have used or are using the TRI for environmental justice studies.

- Identifying and reporting on pollution prevention practices by reporting facilities. These analyses have led to the development of technical assistance and peer information exchange programs in a number of Regions. A majority of the states have toxics use reduction or pollution prevention legislation that uses TRI data to track progress.

- Generating interest in and awareness of EPA's Right-to-Know program in order to foster a better informed public. TRI demonstrations and presentations have been given at a variety of educational institutions which have led to the development of course offerings that include the TRI as a tool.

Below are some more detailed descriptions of how some of the EPA Regional Offices and states are using the TRI data.

REGIONS' USE OF TRI

Targeting Project

U.S. EPA Region IX is leading an effort to develop a partnership between industry and regulatory agencies to reduce the level of releases and transfers in southwest Los Angeles County by fostering and implementing pollution prevention projects. This area was selected due to the high concentration of industrial facilities. Data from the TRI have shown that the area's toxic releases are the highest in the state and Region IX. The central theme of the partnership will be industry-driven, agency-supported, voluntary pollution prevention projects. All projects submitted by industry to the partnership will be evaluated with respect to the pollution prevention hierarchy of media reductions and must go "beyond compliance" (below allowable limits, ahead of schedule, and a voluntary action). Projects must make good business sense with a suitable return on investment, particularly in an area such as Los Angeles County which has experienced a severe business downturn. The partnership is named "Mutual Efforts to Reduce Industrial Toxics" (MERIT).

Region IX has drafted a set of guidelines for the partnership that will help companies to voluntarily assess their releases to all media and work with other companies and agencies to develop pollution prevention projects. Also, a community advisory board is being established to provide input into the program.

Companies that participate will be eligible for expedited processing of their permit applications and will be able to receive compliance assistance from other partnership companies. Participating companies will also have an opportunity to provide meaningful input to regulators on how to encourage additional pollution prevention projects.

Examples of MERIT partnership projects include:

The Oil Refinery Roundtable and the Metal Finishers Waste Minimization Audit Workshop are designed to identify pollution prevention options that are available, transferable, and free of legal, regulatory, and proprietary barriers.

A project associated with electric car development involves the principles of "Design for the Environment" engineering to design batteries for disassembly and recycling/reuse, while avoiding hazardous waste disposal problems.

TRIPQUIC

The Air and Toxics Division in U.S. EPA Region VI has used the TRI data to analyze releases and transfers in areas of interest to the states, in particular the Louisiana industrial corridor, the Houston metropolitan area, the U.S./Mexico border, and the Gulf of Mexico. TRIPQUIC, a TRI data manipulation and mapping tool, is being used to produce numerical tables, bar graphs, pie charts, and maps that help federal and state officials better understand and analyze the data. Some of these TRIPQUIC analyses assisted the Region VI staff in negotiations with industrial groups to arrange for 33/50 Program and pollution prevention workshops. TRI data were used to aid the EPA staff in the development of environmental justice calculation software.

STATES' USE OF TRI

Healthy People 2000

The Arizona Department of Health Services (ADHS), in support of the objectives of the Public Health Services (PHS) of the U.S. Department of Health and Human Services (DHHS) "Healthy People 2000," has established goals to reduce human exposure to toxic agents by reducing the total pounds of those agents released into the air, water, and soil each year. The baseline for Arizona will come from two sources : the 1988 TRI and the Arizona Department of Environmental Quality 1991 Toxic Data Reports (state filers not otherwise subject to TRI).

ADHS will monitor the number of pounds reported which are DHHS-listed carcinogens and toxic agents listed by the Agency of Toxic Substances and Disease Registry.

TRI Used to Identify Customers

South Carolina has created TRI software that allows users to customize searches and reports on one year's entire database. The program gives public, private, and governmental interests the chance to work with the data much more efficiently. Michael Juras, South Carolina's EPCRA 313 Coordinator, has advertised the availability of this software program in state trade publications, noting, "My thought was to at least make it easier to market pollution prevention technology for those firms who need detailed information on waste streams. Enabling the free enterprise resolution of toxic pollution is an important goal." South Carolina's new Air Toxics Program and new Storm Water Program are using the TRI package to identify their own customers.

Waste Reduction Assistance Program

The Florida Department of Environmental Regulation sponsors a voluntary, cooperative, non-regulatory waste reduction program known as the Waste Reduction Assistance Program (WRAP). Retired engineers are sent out at the request of the facility to provide expertise in reducing the use of hazardous substances, the generation of hazardous waste, and releases of air toxics. The program covers facilities handling TRI chemicals. The initial focus of the visit is on housekeeping issues, but inventory management, preventive maintenance, and potential process modifications are also examined. Upon completion of the visit, the engineer provides the facility with a list of suggestions to reduce waste generation and save related expenses. Typical suggestions include materials substitution, such as replacing 1,1,1-trichloroethane with less hazardous materials or non-toxic cleaners, or recycling used water in electroplating operations.

Over the past four years, more than 184 facilities have participated in the program, including a number of Department of Defense facilities. More than $3.7 million in economic savings have been achieved by Florida businesses and government facilities as a result of these source reduction efforts.

Multi-Media Waste Reduction Targeting

North Carolina's Department of Environment, Health, and Natural Resources has developed a database that contains release and transfer data and waste reduction data from a variety of sources to facilitate waste reduction assessment by the North Carolina Pollution Prevention Program. The objective of this project is to integrate multi-media environmental release data into other statewide waste reduction efforts, including technical assistance, training, grants, research, and demonstration efforts of hazardous waste reduction.

Currently, this database is used by North Carolina's Office of Waste Reduction to determine various multi-media waste releases by industries in preparation for site visits and technical assistance. Ongoing projects utilizing these data include: using the data to assist industries in waste reduction plans; and evaluating the toxicological factors versus the risk factors of various chemicals in the database and directing technical assistance efforts towards the reduction of those chemicals. The database will also be used as a basis for targeting problem sectors (e.g., SIC codes, geographic regions, company sizes), and allocating funding, resources, and technical assistance.

APPENDIX E

REGULATORY MATRIX: TRI CHEMICALS IN OTHER FEDERAL PROGRAMS

Many of the chemicals covered under TRI are also subject to other environmental laws. The following matrix indicates whether the currently listed TRI chemicals are subject to any of the following selected environmental laws:

1. EPCRA 302: EPCRA section 302 (codified at 40 CFR Part 355), facilities with listed extremely hazardous substances (EHSs) in quantities greater than their Threshold Planning Quantities (TPQs) must report to the State Emergency Response Commission. TPQs are based on a combination of acute toxicity and ability of the substance to become airborne. The list of EHSs and their TPQs can be found at 40 CFR Part 355 Appendix A. For more information, contact the EPCRA Information Hotline: 1-800-535-0202.

2. CAA 112: The Clean Air Act (CAA) section 112(b), National Emission Standards for Hazardous Air Pollutants (NESHAPS; codified at 40 CFR Part 61), lists the Hazardous Air Pollutants and includes emissions standards and monitoring requirements for plants with listed chemicals.

3. CERCLA: Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA; 42 USC 9601 et seq.), releases of listed substances at or above their Reportable Quantities (RQs) must be reported to the National Response Center. RQs are set on the basis of aquatic toxicity, acute mammalian toxicity, ignitability, reactivity, chronic toxicity, and carcinogenicity, with possible adjustment on the basis of biodegradation, hydrolysis, and photolysis. The list of CERCLA hazardous substances and their RQs can be found at 40 CFR 302.4. For more information, contact the RCRA/Superfund Hotline: 1-800-424-9346.

4. FIFRA: The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) creates a statutory framework under which EPA, through a registration process, regulates the development, sale, distribution, and use of pesticides.

5. NPDWR: The National Primary Drinking Water Regulations under the Safe Drinking Water Act, Subparts B and G (codified at 40 CFR Part 141) list Maximum Contaminant

Levels (MCLs) for certain chemicals. The MCL is the maximum permissible level of a contaminant in public drinking water systems. MCLs are based on health factors, but are also required by law to reflect the technological and economic feasibility of removing the contaminant from the water supply. Further information is available from the Safe Drinking Water Hotline: 1-800-424-4791.

6. PPL: The Clean Water Act (CWA) regulates the discharge of pollutants into waterways by industrial sources, municipal sources, and other sources. These sources of water pollution are subject to effluent limitations based on guidelines and water quality standards. Approximately 125 pollutants make up a "Priority Pollutants List." EPA has developed water quality criteria for all the priority pollutants.

7. RCRA (P/U): Under the Resource Conservation and Recovery Act (RCRA), hazardous waste is required to be managed "cradle to grave" (i.e., from the point of generation to the point of ultimate disposal). For a waste to be classified as hazardous, it can be an F, K, P, or U listed hazardous waste (40 CFR 261.30 - 261.33) or exhibit one of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. The chemicals on the P and U list are commercial chemical products, off-specification species, container residues, and spill residues. The chemicals on the P list have been identified as acute hazardous waste; those on the U list have been identified as toxic waste. For more information, contact the RCRA/Superfund Hotline: 1-800-424-9346.

CAS Number[1]	Chemical	EPCRA 302	CAA 112(b)	CERCLA	FIFRA	NPDWR	PPL	RCRA P	RCRA U
75-07-0	Acetaldehyde		X	X					X
60-35-5	Acetamide		X	X					
67-64-1	Acetone			X					X
75-05-8	Acetonitrile		X	X					X
53-96-3	2-Acetylaminofluorene		X	X					X
107-02-8	Acrolein	X	X	X	X		X	X	
79-06-1	Acrylamide	X	X	X		X			X
79-10-7	Acrylic acid		X	X					X
107-13-1	Acrylonitrile	X	X	X			X		X
309-00-2	Aldrin	X		X			X	X	
107-18-6	Allyl alcohol	X		X				X	
107-05-1	Allyl chloride		X	X					
7429-90-5	Aluminum (fume or dust)								
1344-28-1	Aluminum oxide (fibrous forms)								
117-79-3	2-Aminoanthraquinone								
60-09-3	4-Aminoazobenzene								
92-67-1	4-Aminobiphenyl		X	X					
82-28-0	1-Amino-2-methylanthraquinone								
7664-41-7	Ammonia	X		X					
6484-52-2	Ammonium nitrate (solution)								
7783-20-2	Ammonium sulfate (solution)								
62-53-3	Aniline	X	X	X					X
90-04-0	o-Anisidine		X	X					
104-94-9	p-Anisidine								
134-29-2	o-Anisidine hydrochloride								
120-12-7	Anthracene			X			X		
7440-36-0	Antimony			X		X	X		
—	Antimony compounds		X	X		X			
7440-38-2	Arsenic			X		X	X		
—	Arsenic compounds		X	X		X			
1332-21-4	Asbestos (friable)		X	X		X	X		
7440-39-3	Barium					X			
—	Barium compounds					X			
98-87-3	Benzal chloride	X		X					X
55-21-0	Benzamide								
71-43-2	Benzene		X	X		X	X		X
92-87-5	Benzidine		X	X			X		X
98-07-7	Benzoic trichloride	X	X	X					X
98-88-4	Benzoyl chloride			X					
94-36-0	Benzoyl peroxide								
100-44-7	Benzyl chloride	X	X	X				X	
7440-41-7	Beryllium		X	X		X	X		
—	Beryllium compounds		X	X		X			
92-52-4	Biphenyl		X	X	X				
111-44-4	Bis(2-chloroethyl) ether	X	X	X			X		X
542-88-1	Bis(chloromethyl) ether	X	X	X				X	
108-60-1	Bis(2-chloro-1-methylethyl) ether			X			X		X
103-23-1	Bis(2-ethylhexyl) adipate					X			
353-59-3	Bromochlorodifluoromethane (Halon 1211)			X					
75-25-2	Bromoform		X	X		X*	X		X
74-83-9	Bromomethane	X	X	X	X		X		X
75-63-8	Bromotrifluoromethane (Halon 1301)			X					

CAS Number[1]	Chemical	EPCRA 302	CAA 112(b)	CERCLA	FIFRA	NPDWR	PPL	RCRA P	RCRA U
106-99-0	1,3-Butadiene		X	X					
141-32-2	Butyl acrylate								
71-36-3	n-Butyl alcohol			X					X
78-92-2	sec-Butyl alcohol								
75-65-0	tert-Butyl alcohol								
85-68-7	Butyl benzyl phthalate			X			X		
106-88-7	1,2-Butylene oxide		X	X					
123-72-8	Butyraldehyde								
4680-78-8	C.I. Acid Green 3								
569-64-2	C.I. Basic Green 4								
989-38-8	C.I. Basic Red 1								
1937-37-7	C.I. Direct Black 38								
2602-46-2	C.I. Direct Blue 6								
16071-86-6	C.I. Direct Brown 95								
2832-40-8	C.I. Disperse Yellow 3								
3761-53-3	C.I. Food Red 5								
81-88-9	C.I. Food Red 15								
3118-97-6	C.I. Solvent Orange 7								
97-56-3	C.I. Solvent Yellow 3								
842-07-9	C.I. Solvent Yellow 14								
492-80-8	C.I. Solvent Yellow 34			X					X
128-66-5	C.I. Vat Yellow 4								
7440-43-9	Cadmium		X	X		X	X		
—	Cadmium compounds		X	X		X			
156-62-7	Calcium cyanamide		X	X					
133-06-2	Captan		X	X	X				
63-25-2	Carbaryl		X	X	X				
75-15-0	Carbon disulfide	X	X	X				X	
56-23-5	Carbon tetrachloride		X	X		X	X		X
463-58-1	Carbonyl sulfide		X	X					
120-80-9	Catechol		X	X					
133-90-4	Chloramben		X	X					
57-74-9	Chlordane	X	X	X	X	X	X		X
7782-50-5	Chlorine	X	X	X	X				
10049-04-4	Chlorine dioxide				X				
79-11-8	Chloroacetic acid	X	X	X					
532-27-4	2-Chloroacetophenone		X	X					
108-90-7	Chlorobenzene		X	X		X	X		X
510-15-6	Chlorobenzilate		X	X					X
75-00-3	Chloroethane		X	X			X		
67-66-3	Chloroform	X	X	X		X*	X		X
74-87-3	Chloromethane		X	X			X		X
107-30-2	Chloromethyl methyl ether	X	X	X					X
—	Chlorophenols			X					
126-99-8	Chloroprene		X	X					
1897-45-6	Chlorothalonil				X				
7440-47-3	Chromium		X	X		X	X		
—	Chromium compounds		X	X		X			
7440-48-4	Cobalt		X						
—	Cobalt compounds		X	X					
7440-50-8	Copper			X	X	X	X		
—	Copper compounds			X	X	X			
8001-58-9	Creosote			X	X				X
120-71-8	p-Cresidine								

CAS Number [1]	Chemical	EPCRA 302	CAA 112(b)	CERCLA	FIFRA	NPDWR	PPL	RCRA P	RCRA U
1319-77-3	Cresol (mixed isomers)		X	X					X
108-39-4	m-Cresol		X	X	X				
95-48-7	o-Cresol	X	X	X					
106-44-5	p-Cresol		X	X					
98-82-8	Cumene		X	X					X
80-15-9	Cumene hydroperoxide			X					X
135-20-6	Cupferron								
—	Cyanide compounds	X	X	X		X			
110-82-7	Cyclohexane			X					X
94-75-7	2,4-D (acetic acid)		X	X	X	X			X
1163-19-5	Decabromodiphenyl oxide								
2303-16-4	Diallate			X					X
615-05-4	2,4-Diaminoanisole								
39156-41-7	2,4-Diaminoanisole sulfate								
101-80-4	4,4'-Diaminodiphenyl ether								
25376-45-8	Diaminotoluene (mixed isomers)			X					X
95-80-7	2,4-Diaminotoluene		X	X					X
334-88-3	Diazomethane		X	X					
132-64-9	Dibenzofuran		X	X					
96-12-8	1,2-Dibromo-3-chloropropane		X	X		X			X
106-93-4	1,2-Dibromoethane		X	X	X	X			X
124-73-2	Dibromotetrafluoroethane (Halon 2402)			X					
84-74-2	Dibutyl phthalate		X	X			X		X
25321-22-6	Dichlorobenzene (mixed isomers)			X					
95-50-1	1,2-Dichlorobenzene			X	X	X	X		X
541-73-1	1,3-Dichlorobenzene			X			X		X
106-46-7	1,4-Dichlorobenzene		X	X	X	X	X		X
91-94-1	3,3'-Dichlorobenzidine		X	X			X		X
75-27-4	Dichlorobromomethane			X		X	X		
75-71-8	Dichlorodifluoromethane (CFC-12)			X	X				X
107-06-2	1,2-Dichloroethane		X	X	X	X	X		X
540-59-0	1,2-Dichloroethylene								
75-09-2	Dichloromethane		X	X	X	X	X		X
120-83-2	2,4-Dichlorophenol			X			X		X
78-87-5	1,2-Dichloropropane		X	X		X	X		X
78-88-6	2,3-Dichloropropene			X					
542-75-6	1,3-Dichloropropylene		X	X	X				X
76-14-2	Dichlorotetrafluoroethane (CFC-114)			X					
62-73-7	Dichlorvos	X	X	X	X				
115-32-2	Dicofol			X	X				
1464-53-5	Diepoxybutane	X		X					X
111-42-2	Diethanolamine		X	X					
117-81-7	Di-(2-ethylhexyl) phthalate		X	X		X	X		X
84-66-2	Diethyl phthalate			X			X		X
64-67-5	Diethyl sulfate		X	X					
119-90-4	3,3'-Dimethoxybenzidine		X	X					X
60-11-7	4-Dimethylaminoazobenzene		X	X					X
119-93-7	3,3'-Dimethylbenzidine		X	X					X
79-44-7	Dimethylcarbamyl chloride		X	X					X
57-14-7	1,1-Dimethyl hydrazine	X	X	X					X
105-67-9	2,4-Dimethylphenol			X	X		X		X

CAS Number❶	Chemical	EPCRA 302	CAA 112(b)	CERCLA	FIFRA	NPDWR	PPL	RCRA P	RCRA U
131-11-3	Dimethyl phthalate		X	X			X		X
99-65-0	m-Dinitrobenzene			X					
528-29-0	o-Dinitrobenzene			X					
100-25-4	p-Dinitrobenzene			X					
534-52-1	4,6-Dinitro-o-cresol	X	X	X	X		X	X	
51-28-5	2,4-Dinitrophenol		X	X			X	X	
121-14-2	2,4-Dinitrotoluene		X	X			X		X
606-20-2	2,6-Dinitrotoluene			X			X		X
25321-14-6	Dinitrotoluene (mixed isomers)			X					
123-91-1	1,4-Dioxane		X	X					X
122-66-7	1,2-Diphenylhydrazine		X	X			X		X
106-89-8	Epichlorohydrin	X	X	X		X			X
110-80-5	2-Ethoxyethanol		X+	X					X
140-88-5	Ethyl acrylate		X	X					X
100-41-4	Ethylbenzene		X	X		X	X		
541-41-3	Ethyl chloroformate								
74-85-1	Ethylene				X				
107-21-1	Ethylene glycol		X	X					
151-56-4	Ethyleneimine	X	X	X				X	
75-21-8	Ethylene oxide	X	X	X	X				X
96-45-7	Ethylene thiourea		X	X					X
2164-17-2	Fluometuron				X				
50-00-0	Formaldehyde	X	X	X	X				X
76-13-1	Freon 113								
—	Glycol ethers		X	X					
76-44-8	Heptachlor		X	X	X	X	X	X	
118-74-1	Hexachlorobenzene		X	X		X	X		X
87-68-3	Hexachloro-1,3-butadiene		X	X			X		X
77-47-4	Hexachlorocyclopentadiene	X	X	X		X	X		X
67-72-1	Hexachloroethane		X	X			X		X
1335-87-1	Hexachloronaphthalene								
680-31-9	Hexamethylphosphoramide		X	X					
302-01-2	Hydrazine	X	X	X					X
10034-93-2	Hydrazine sulfate								
7647-01-0	Hydrochloric acid	X	X	X	X				
74-90-8	Hydrogen cyanide	X		X		X		X	
7664-39-3	Hydrogen fluoride	X	X	X					X
123-31-9	Hydroquinone	X	X	X					
78-84-2	Isobutyraldehyde								
67-63-0	Isopropyl alcohol (manufacturing)				X				
80-05-7	4,4'-Isopropylidenediphenol								
120-58-1	Isosafrole			X					X
7439-92-1	Lead		X	X		X	X		
—	Lead compounds		X	X		X			
58-89-9	Lindane	X	X	X	X	X	X		X
108-31-6	Maleic anhydride		X	X					X
12427-38-2	Maneb				X				
7439-96-5	Manganese		X						
—	Manganese compounds		X	X					
7439-97-6	Mercury		X	X		X	X		
—	Mercury compounds		X	X		X			
67-56-1	Methanol		X	X	X				X
72-43-5	Methoxychlor		X	X	X	X			X
109-86-4	2-Methoxyethanol		X+		X				

CAS Number[1]	Chemical	EPCRA 302	CAA 112(b)	CERCLA	FIFRA	NPDWR	PPL	RCRA P	RCRA U
96-33-3	Methyl acrylate								
1634-04-4	Methyl tert-butyl ether		X	X					
101-14-4	4,4'-Methylenebis (2-chloroaniline)		X	X					X
101-61-1	4,4'-Methylenebis(N,N-dimethyl)								
101-68-8	Methylenebis(phenylisocyanate)		X	X					
74-95-3	Methylene bromide			X					X
101-77-9	4,4'-Methylenedianiline		X	X					
78-93-3	Methyl ethyl ketone		X	X					X
60-34-4	Methyl hydrazine	X	X	X				X	
74-88-4	Methyl iodide		X	X					X
108-10-1	Methyl isobutyl ketone		X	X					X
624-83-9	Methyl isocyanate	X	X	X				X	
80-62-6	Methyl methacrylate		X	X					X
90-94-8	Michler's ketone								
1313-27-5	Molybdenum trioxide								
76-15-3	Monochloropentafluoroethane (CFC-115)			X					
505-60-2	Mustard gas	X							
91-20-3	Naphthalene		X	X	X		X		X
134-32-7	alpha-Naphthylamine			X					X
91-59-8	beta-Naphthylamine			X					X
7440-02-0	Nickel		X	X		X	X		
—	Nickel compounds		X	X					
7697-37-2	Nitric acid	X		X					
139-13-9	Nitrilotriacetic acid								
99-59-2	5-Nitro-o-anisidine								
98-95-3	Nitrobenzene	X	X	X			X		X
92-93-3	4-Nitrobiphenyl		X	X					
1836-75-5	Nitrofen								
51-75-2	Nitrogen mustard	X							
55-63-0	Nitroglycerin			X				X	
88-75-5	2-Nitrophenol			X			X		
100-02-7	4-Nitrophenol		X	X	X		X		X
79-46-9	2-Nitropropane		X	X					X
156-10-5	p-Nitrosodiphenylamine								
121-69-7	N,N-Dimethylaniline		X	X					
924-16-3	N-Nitrosodi-n-butylamine			X					X
55-18-5	N-Nitrosodiethylamine			X					X
62-75-9	N-Nitrosodimethylamine	X	X	X			X	X	
86-30-6	N-Nitrosodiphenylamine			X			X		
621-64-7	N-Nitrosodi-n-propylamine			X			X		X
4549-40-0	N-Nitrosomethylvinylamine			X				X	
59-89-2	N-Nitrosomorpholine		X	X					
759-73-9	N-Nitroso-N-ethylurea			X					X
684-93-5	N-Nitroso-N-methylurea		X	X					X
16543-55-8	N-Nitrosonornicotine								
100-75-4	N-Nitrosopiperidine			X					X
2234-13-1	Octochloronaphthalene								
20816-12-0	Osmium tetroxide			X				X	
56-38-2	Parathion	X	X	X	X			X	
87-86-5	Pentachlorophenol		X	X	X	X	X		X
79-21-0	Peracetic acid	X			X				
108-95-2	Phenol	X	X	X	X		X		X

CAS Number[1]	Chemical	EPCRA 302	CAA 112(b)	CERCLA	FIFRA	NPDWR	PPL	RCRA P	RCRA U
106-50-3	p-Phenylenediamine		X	X					
90-43-7	2-Phenylphenol				X				
75-44-5	Phosgene	X	X	X				X	
7664-38-2	Phosphoric acid			X	X				
7723-14-0	Phosphorus (yellow or white)	X	X	X	X				
85-44-9	Phthalic anhydride		X	X					X
88-89-1	Picric acid								
—	Polybrominated biphenyls								
1336-36-3	Polychlorinated biphenyls (PCBs)		X	X		X			
1120-71-4	Propane sultone		X	X					X
57-57-8	beta-Propiolactone	X	X	X					
123-38-6	Propionaldehyde		X	X					
114-26-1	Propoxur		X	X	X				
115-07-1	Propylene								
75-55-8	Propyleneimine	X	X	X				X	
75-56-9	Propylene oxide	X	X	X	X				
110-86-1	Pyridine			X					X
91-22-5	Quinoline		X	X					
106-51-4	Quinone		X	X					X
82-68-8	Quintozene		X	X	X				X
81-07-2	Saccharin (manufacturing)			X					X
94-59-7	Safrole			X					X
7782-49-2	Selenium		X	X		X	X		
—	Selenium compounds		X	X		X			
7440-22-4	Silver			X	X		X		
—	Silver compounds			X	X				
100-42-5	Styrene		X	X		X			
96-09-3	Styrene oxide		X	X					
7664-93-9	Sulfuric acid	X		X	X				
79-34-5	1,1,2,2-Tetrachloroethane		X	X			X		X
127-18-4	Tetrachloroethylene		X	X		X	X		X
961-11-5	Tetrachlorvinphos				X				
7440-28-0	Thallium			X		X	X		
62-55-5	Thioacetamide			X					X
139-65-1	4,4'-Thiodianiline								
62-56-6	Thiourea			X					X
1314-20-1	Thorium dioxide								
7550-45-0	Titanium tetrachloride	X	X	X					
108-88-3	Toluene		X	X		X	X		X
584-84-9	Toluene-2,4-diisocyanate	X	X	X					X
7440-28-0	Thallium			X		X	X		
—	Thallium compounds			X					
62-55-5	Thioacetamide			X					X
139-65-1	4,4'-Thiodianiline								
62-56-6	Thiourea			X					X
1314-20-1	Thorium dioxide								
7550-45-0	Titanium tetrachloride	X	X	X					
108-88-3	Toluene		X	X		X	X		X
584-84-9	Toluene-2,4-diisocyanate	X	X	X					X
91-08-7	Toluene-2,6-diisocyanate	X		X					X
26471-62-5	Toluenediisocyanate (mixed isomers)			X					X
95-53-4	o-Toluidine		X	X					X
636-21-5	o-Toluidine hydrochloride			X					X

CAS Number[1]	Chemical	EPCRA 302	CAA 112(b)	CERCLA	FIFRA	NPDWR	PPL	RCRA P	RCRA U
8001-35-2	Toxaphene	X	X	X	X	X	X	X	
68-76-8	Triaziquone								
52-68-6	Trichlorfon			X	X				
120-82-1	1,2,4-Trichlorobenzene		X	X		X	X		
71-55-6	1,1,1-Trichloroethane		X	X	X	X	X		X
79-00-5	1,1,2-Trichloroethane		X	X		X	X		X
79-01-6	Trichloroethylene		X	X		X	X		X
75-69-4	Trichlorofluoromethane (CFC-11)			X					X
95-95-4	2,4,5-Trichlorophenol		X	X					X
88-06-2	2,4,6-Trichlorophenol		X	X			X		X
1582-09-8	Trifluralin		X	X	X				
95-63-6	1,2,4-Trimethylbenzene								
126-72-7	Tris(2,3-dibromopropyl) phosphate			X					X
51-79-6	Urethane		X	X					X
7440-62-2	Vanadium (fume or dust)								
108-05-4	Vinyl acetate	X	X	X					
593-60-2	Vinyl bromide		X	X					
75-01-4	Vinyl chloride		X	X		X	X		X
75-35-4	Vinylidene chloride		X	X		X	X		X
1330-20-7	Xylene (mixed isomers)		X	X	X	X			X
108-38-3	m-Xylene		X	X					X
95-47-6	o-Xylene		X	X					X
106-42-3	p-Xylene		X	X					X
87-62-7	2,6-Xylidine								
7440-66-6	Zinc (fume or dust)			X	X		X		
—	Zinc compounds			X	X				
12122-67-7	Zineb								

[1] Compound categories do not have CAS numbers (—).

APPENDIX F

TRI FORM R FOR 1993

The 1993 Form R (a copy of which follows) 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, on-site release and transfer amounts, on-site waste treatment methods and efficiencies, and data on source reduction and recycling activities.

Readers who are interested in a more in-depth understanding of who is required to report to TRI and how to fill out the Form R are referred to the EPCRA Information Hotline at 1-800-535-0202.

(IMPORTANT: Type or print; read instructions before completing form)

Form Approved OMB Number: 2070-0093
Approval Expires: 11/92

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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

TRI FACILITY ID NUMBER

Toxic Chemical, Category, or Generic Name

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 3 trade secret?

☐ Yes (Answer question 2.2; Attach substantiation forms) ☐ No (Do not answer 2.2; Go to Section 3)

2.2 If yes in 2.1, is this copy: ☐ Sanitized ☐ Unsanitized

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

4.1

Facility or Establishment Name

TRI Facility ID Number

Street Address

City

County

State

Zip Code

Mailing Address (if different from street address)

City

State

Zip Code

PUT LABEL HERE

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PART I. FACILITY IDENTIFICATION INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER
Toxic Chemical, Category, or Generic Name

SECTION 4. FACILITY IDENTIFICATION (Continued)

4.2	This report contains information for: **(Important: check only one)**	a. ☐ An entire facility			b. ☐ Part of a 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 (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)**

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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 complete 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:**	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
3.2	**Process the toxic chemical:**	a. ☐ As a reactant b. ☐ As a formulation component	c. ☐ As an article component d. ☐ Repackaging
3.3	**Otherwise use the toxic chemical:**	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.)

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PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER
Toxic Chemical, Category, or Generic Name

SECTION 5. RELEASES OF THE TOXIC CHEMICAL TO THE ENVIRONMENT ON-SITE

			A. Total Release (pounds/ year) (enter range code 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)				
5.3.1	Stream or Water Body Name				
5.3.2	Stream or Water Body Name				
5.3.3	Stream or Water Body Name				
5.4	Underground injections on-site	☐ NA			
5.5	Releases to land on-site				
5.5.1	Landfill	☐ NA			
5.5.2	Land treatment/ application farming	☐ NA			
5.5.3	Surface impoundment	☐ NA			
5.5.4	Other disposal	☐ NA			

☐ Check here only if additional Section 5.3 information is provided on page 5 of this form.

Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

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PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER
Toxic Chemical, Category, or Generic Name

SECTION 5.3 ADDITIONAL INFORMATION ON RELEASES OF THE TOXIC CHEMICAL TO THE ENVIRONMENT ON-SITE

5.3	Discharges to receiving streams or water bodies (enter one name per box)	A. Total Release (pounds/ year) (enter range code from instructions or estimate)	B. Basis of Estimate (enter code)	C. % From Stormwater
5.3.__	Stream or Water Body Name			
5.3.__	Stream or Water Body Name			
5.3.__	Stream or Water Body Name			

SECTION 6. TRANSFERS OF THE TOXIC CHEMICAL IN WASTES TO OFF-SITE LOCATIONS

6.1 DISCHARGES TO PUBLICLY OWNED TREATMENT WORKS (POTW)

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 and Location Information

6.1.B.__ POTW Name		6.1.B.__ POTW Name	
Street Address		Street Address	
City	County	City	County
State	Zip Code	State	Zip Code

If additional pages of Part II, Sections 5.3 and/or 6.1 are attached, indicate the total number of pages in this box ☐ and indicate which Part II, Sections 5.3/6.1 page this is, here. ☐
(example: 1, 2, 3, etc.)

Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds;
C = 500 - 999 pounds.

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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

6.2. ___ Off-site EPA Identification Number (RCRA ID No.)

Off-Site Location Name

Street Address

City | County

State | Zip Code | Is location under control of reporting facility or parent company? ☐ Yes ☐ No

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

SECTION 6.2 TRANSFERS TO OTHER OFF-SITE LOCATIONS

6.2. ___ Off-site EPA Identification Number (RCRA ID No.)

Off-Site Location Name

Street Address

City | County

State | Zip Code | Is location under control of reporting facility or parent company? ☐ Yes ☐ No

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

If additional pages of Part II, Section 6.2 are attached, indicate the total number of pages in this box ☐ and indicate which Part II, Section 6.2 page this is, here. ☐ (example: 1, 2, 3, etc.)

Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

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PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER

Toxic Chemical, Category, or Generic Name

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 copies of page 7 are attached, indicate the total number of pages in this box ☐ and indicate which page 7 this is, here. ☐ (example: 1, 2, 3, etc.)

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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

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PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI FACILITY ID NUMBER
Chemical, Category, or Generic Name

SECTION 8. SOURCE REDUCTION AND RECYCLING ACTIVITIES

	All quantity estimates can be reported using up to two significant figures.	Column A 1992 (pounds/year)	Column B 1993 (pounds/year)	Column C 1994 (pounds/year)	Column D 1995 (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.

APPENDIX G

EPA REGIONAL OFFICE AND STATE TRI CONTACTS

EPA REGIONAL SECTION 313 COORDINATORS

USEPA Region I

Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Dwight Peavey (ATO)
Office of Technical Assistance
One Congress Street
Boston, MA 02203
(617) 565-4502
FAX (617) 565-4939

USEPA Region II

New Jersey, New York, Puerto Rico, Virgin Islands

Nora Lopez (MS-105)
Pesticides and Toxics Branch
2890 Woodbridge Ave., Bldg. 10
Edison, NJ 08837-3679
(908) 906-6890
FAX (908) 321-6788

USEPA Region III

Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia

Mikal Shabazz (3AT32)
Pesticides and Toxics Branch
Air, Radiation, and Toxics Division
841 Chestnut Street Bldg.
Philadelphia, PA 19107
(215) 597-3659
FAX (215) 597-3156

USEPA Region IV

Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

Pat Steed
Title III Implementation Unit
345 Courtland St., NE
Atlanta, GA 30365
(404) 347-1033 (ext. 36)
FAX (404) 347-1681

USEPA Region V

Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin

Thelma Codina (SP-14J)
Pesticides and Toxics Branch
77 W. Jackson Blvd.
Chicago, IL 60604
(312) 886-6219
FAX (312) 353-4342

USEPA Region VI

Arkansas, Louisiana, New Mexico, Oklahoma, Texas

Warren Layne (6TPT)
Pesticides and Toxics Branch
1445 Ross Avenue, Suite 700
Dallas, TX 75202-2733
(214) 665-8013
FAX (214) 665-2164

USEPA Region VII

Iowa, Kansas, Missouri, Nebraska

Jim Hirtz (TOPE)
Toxics and Pesticides Branch
726 Minnesota Ave.
Kansas City, KS 66101
(913) 551-7020
FAX (913) 551-7065

USEPA Region VIII

Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming

Kathie Atencio (8ART-TS)
Toxic Substances Branch
999 18th Street, Suite 500
Denver, CO 80202-2405
(303) 293-1735
FAX (303) 293-1229

USEPA Region IX

Arizona, California, Hawaii, Nevada, American Samoa, Guam, Northern Marianas

Pam Tsai (A-4-3)
Pesticides and Toxics Branch
75 Hawthorne Street
San Francisco, CA 94105
(415) 744-1116
FAX (415) 744-1073

USEPA Region X

Alaska, Idaho, Oregon, Washington

Phil Wong (AT083)
Pesticides and Toxics Branch
1200 Sixth Avenue
Seattle, WA 98101
(206) 553-4016
FAX (206) 553-8338

STATE TRI PUBLIC CONTACTS

Alabama

Ed Poolos
Alabama Emergency Response Commission
Alabama Department of Environmental Management
1751 Congressman W.L. Dickinson Drive
Montgomery, AL 36109
(205) 260-2717
Fax (205) 272-8131

Alaska

Camille Stephens
Department of Environmental Conservation
Government Preparedness and Response Program
410 Willoughby Avenue, Suite 105
Juneau, AK 99801-1795
(907) 465-5220
Fax (907) 465-5244

American Samoa

Pati Faiai
American Samoa Environmental Protection Agency
Office of the Governor
American Samoa Government
Pago Pago, AS 96799
International Number (684) 633-2304

Arizona

Daniel Roe
Arizona Emergency Response Commission
Division of Emergency Management
5636 East McDowell Road
Phoenix, AZ 85008
(602) 231-6346
Fax (602) 231-6313

Arkansas

John Ward
Arkansas Department of Pollution Control and Ecology
8001 National Drive
Little Rock, AR 72209
(501) 562-7444
Fax (501) 562-0297

California

Steve Hanna
California Environmental Protection Agency
555 Capitol Mall, Suite 235
Sacramento, CA 95814
(916) 324-9924
Fax (916) 322-6005

Colorado

Tamara Vanhorn
Colorado Emergency Planning Commission
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80222-1530
(303) 692-3017
Fax (303) 759-5355

Connecticut

David Jorsey
SERC Coordinator
Department of Environmental Protection
Bureau of Waste Management
79 Elm Street
Hartford, CT 06106-5127
(203) 424-3373
Fax (203) 566-5255

Delaware

Joanne Deramo
Division of Air and Waste Management
Department of Natural Resources and
Environmental Control
89 Kings Highway
P.O. Box 1401
Dover, DE 19903
(302) 739-4791
Fax (302) 739-3106

District of Columbia

Leslie B. Nesbitt
SARA Title III
Office of Emergency Preparedness
Frank Reeves Center for Municipal Affairs
2000 14th Street, Northwest
8th Floor
Washington, DC 20009
(202) 673-2101 Ext. 3161
Fax (202) 673-7054

Florida

Bret Timmons
Florida Emergency Response Commission
Secretary, Florida Department of
Community Affairs
2740 Centerview Drive
Tallahassee, FL 32399-2100
(904) 413-9929
(800) 635-7179 (in Florida)
Fax (904) 488-1739

Georgia

Burt Langley
Georgia Emergency Response Commission
205 Butler Street, Southeast
Floyd Tower East, Suite 1166
Atlanta, GA 30334
(404) 656-6905
Fax (404) 657-7893

Guam

Fred M. Castro
Guam Environmental Protection Agency
D-107 Harmon Plaza
130 Rojas Street
Harmon, Guam 96911
International Number (671) 646-8863/8864

Hawaii

Marsha Mealey
Hawaii State Emergency Response
Commission
Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801
(808) 586-4694
Fax (808) 586-7537

Idaho

Margaret Ballard
Idaho Emergency Response Commission
1109 Main Street
State House
Boise, ID 83720-3401
(208) 334-3263
Fax (208) 334-3267

Illinois

Joe Goodner
Office of Chemical Safety
Illinois Environmental Protection Agency
P.O. Box 19276
2200 Churchill Road
Springfield, IL 62794-9276
(217) 785-0830
Fax (217) 782-1431

Indiana

Paula Smith
Indiana Department of Environmental Management
Office of Pollution Prevention and Technical Assistance
P. O. Box 6015
Indianapolis, IN 46206-6015
(317) 232-8172
Fax (317) 233-5627

Iowa

Pete Hamlin
Department of Natural Resources
Wallace Office Building
900 East Grand Avenue
Des Moines, IA 50319
(515) 281-8852
Fax (515) 281-8895

Kansas

Jon Flint
Kansas Emergency Response Commission
Forbes Field Building 283
Topeka, KS 66620
(913) 296-1690
Fax (913) 296-1545

Kentucky

Alex Barber
Kentucky Department for Environmental Protection
14 Reilly Road
Frankfort, KY 40601-1132
(502) 564-2150
Fax (502) 564-4245

Louisiana

Linda Brown
Department of Environmental Quality
P.O. Box 82263
Baton Rouge, LA 70884-2263
(504) 765-0737
Fax (504) 765-0742

Maine

Rayna Leibowitz
State Emergency Response Commission
Station Number 72
Augusta, ME 04333
(207) 287-4080
Fax (207) 287-4079

Maryland

Patricia Williams
SARA Title III Reporting
Maryland Department of the Environment
Toxics Inventory Program
2500 Broening Highway
Baltimore, MD 21224
(410) 631-3800
Fax (410) 631-3321

Massachusetts

Suzi Peck
Massachusetts Department of Environmental Protection
Bureau of Waste Prevention
Toxics Use Reduction Program
1 Winter Street
Boston, MA 02108
(617) 292-5870
Fax (617) 556-1090

Michigan

Richard Jackson
Emergency Planning and Community Right-to-Know Commission
Michigan Department of Natural Resources
Environmental Response Division
P.O. Box 30028
Lansing, MI 48909
(517) 373-8481
Fax (517) 335-3624

Minnesota

Steven Tomlyanovich
Minnesota Emergency Response Commission
B5 State Capitol Building
75 Constitution Avenue
St. Paul, MN 55155
(612) 282-5396
Fax (612) 296-0459

Mississippi

John David Burns
Mississippi Emergency Response Commission
Mississippi Emergency Management Agency
P.O. Box 4501
Jackson, MS 39296-4501
(601) 960-9000
Fax (601) 352-8314

Missouri

Jim Penfold
Technical Assistance Program
Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102
(314) 526-6627
Fax (314) 526-3350

Montana

Tom Ellerhoff
Montana Emergency Response Commission
ESD/DHES
Cogswell Building C-108, Capitol Station
Helena, MT 59620
(406) 444-2544
Fax (406) 444-1374

Nebraska

John Steinauer
State of Nebraska Department of Environmental Quality
P.O. Box 98922
Lincoln, NE 68509-8922
(402) 471-4230
Fax (402) 471-2909

Nevada

Kelli Hammack
Nevada Division of Environmental Protection
333 West Nye Lane
Capitol Complex
Carson City, NV 89710
(702) 687-5872
Fax (702) 885-0868

New Hampshire

Leland Kimball
New Hampshire Office of Emergency Management
Title III Program
State Office Park South
107 Pleasant Street
Concord, NH 03301
(603) 271-2231
Fax (603) 225-7341

New Jersey

Andrew Opperman
Bureau of Hazardous Substances Information
Division of Environmental Safety, Health, and Analytical Programs
New Jersey Department of Environmental Protection and Energy
401 East State Street, CN-405
Trenton, NJ 08625
(609) 984-3219
Fax (609) 633-7031

New Mexico

Max Johnson
New Mexico Emergency Response Commission
Chemical Safety Office
Emergency Management Bureau
P.O. Box 1628
Santa Fe, NM 87504-1628
(505) 827-9223
Fax (505) 827-3456

New York

William Miner
New York Emergency Response Commission
State Department of Environmental Conservation
Bureau of Spill Prevention and Response
50 Wolf Road/Room 340
Albany, NY 12233-3510
(518) 457-4107
Fax (518) 457-4332

North Carolina

Emily Kilpatrick
North Carolina Emergency Response Commission
North Carolina Division of Emergency Management
116 West Jones Street
Raleigh, NC 27603-1335
(919) 733-3865
Fax (919) 733-6327

North Dakota

Robert W. Johnston
North Dakota State Division of Emergency Management
P.O. Box 5511
Bismarck, ND 58502-5511
(701) 328-2111
Fax (701) 328-2119

Northern Marianas

F. Russell Mecham, III
Division of Environmental Quality
Commonwealth of the Northern Mariana Islands
Doctor Torres Hospital
P.O. Box 1304
Saipan, MP 96950
International Number (670) 234-6984

Ohio

Cindy DeWulf
Division of Air Pollution Control
P. O. Box 163669
Columbus, OH 43216-3669
(614) 644-4830
Fax (614) 644-3681

Oklahoma

Monty Elder
Department of Environmental Quality
Risk Communication
1000 Northeast Tenth Street
Oklahoma City, OK 73117-1212
(405) 271-8062
Fax (405) 271-1152

Oregon

Dennis Walthall
Oregon Emergency Response Commission
State Fire Marshall
4760 Portland Road, Northeast
Salem, OR 97305-1760
(503) 378-3473 Extension 231
Fax (503) 373-1825

Pennsylvania

James Tinney
Bureau of Worker and Community
Right-to-Know
Room 1503/Labor and Industry Building
7th and Forster Streets
Harrisburg, PA 17120
(717) 783-2071
Fax (717) 787-8363

Puerto Rico

Genaro Torres
Director of Superfund and Emergencies
Title III-SARA Section 313
Environmental Quality Board
Fernandez Junco Station
P.O. Box 11488
Santurce, PR 00910
(809) 766-8056
Fax (809) 766-2483

Rhode Island

Martha Delaney Mulcahey
Department of Environmental Management
Division of Air Resources
Attention: Toxic Release Inventory
291 Promenade Street
Providence, RI 02908-5767
(401) 277-2808 Ext. 7032
Fax (401) 277-2017

South Carolina

Michael Juras
South Carolina SERC - EPCRA
Reporting Point
Department of Health and
Environmental Control
2600 Bull Street
Columbia, SC 29201
(803) 896-4117
Fax (803) 896-4002

South Dakota

Lee Ann Smith
South Dakota Emergency Response Commission
Department of Environment and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181
(605) 773-3296
Fax (605) 773-6035

Tennessee

Betty Eaves
Tennessee Emergency Response Council
Tennessee Emergency Management Agency
3041 Sidco Drive
Nashville, TN 37204
(615) 741-2986
Fax (615) 242-9635

Texas

Becky Kurka, TRI Coordinator
Office of Pollution Prevention and Recycling
Texas Natural Resources Conservation Commission
P.O. Box 13087
Austin, TX 78711-3087
(512) 239-3100
Fax (512) 239-3165

Utah

John Jones
Utah Hazardous Chemical Emergency Response Commission
Utah Department of Environmental Quality
Division of Environmental Response and Remediation
P.O. Box 144840
Salt Lake City, UT 84116
(801) 536-4100
Fax (801) 536-4113

Vermont

Gary Gulka
Pollution Prevention and
Education Division
103 South Main Street
West Office Building
Waterbury, VT 05671-0404
(802) 241-3888
Fax (802) 241-3296

Virgin Islands

Ben Nazario
Department of Planning and Natural Resources
U.S. Virgin Islands Emergency Response Commission Title III
Nisky Center, Suite 231
Charlotte Amalie
St. Thomas, VI 00802
(809) 773-0565 (St. Croix)
(809) 773-9310 (St. Croix Fax)
(809) 774-3320 (St. Thomas)
(809) 774-5416 (St. Thomas Fax)

Virginia

Roland Owens
Virginia Emergency Response Council
Virginia Department of Environmental Quality
(9th Floor)
P.O. Box 10009
Richmond, VA 23240-0009
(804) 762-4482
Fax (804) 762-4453

Washington

Idell Hansen
Department of Ecology
Community Right-to-Know Unit
P.O. Box 47659
Olympia, WA 98504-7659
(206) 407-6727
Fax (206) 407-6715

West Virginia

Carl L. Bradford
West Virginia Emergency
Response Commission
West Virginia Office of Emergency Services
Main Capital Building 1, Room EB-80
Charleston, WV 25305-0360
(304) 558-5380
Fax (304) 344-4538

Wisconsin

Russ Dunst
Department of Natural Resources
101 South Webster
P.O. Box 7921
Madison, WI 53707
(608) 266-9255
Fax (608) 267-5231

Wyoming

Mike Davis
Hazardous Materials Planner
Wyoming Emergency Response Commission
Wyoming Emergency Management Agency
P.O. Box 1709
Cheyenne, WY 82003-1709
(307) 777-4900
Fax (307) 635-6017

EPA

United States
Environmental Protection Agency
(7408)
Washington, DC 20460