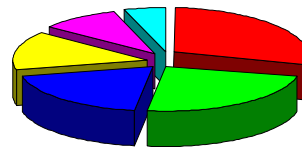

Chapter 2



National Overview of 1997 Toxics Release Inventory

Introduction

This chapter summarizes information reported by TRI facilities for calendar year 1997. This summary includes data for facilities' on- and off-site releases of TRI chemicals, other on-site waste management, and transfers to off-site locations for further management. This chapter also presents data on TRI chemicals managed in waste in 1997: quantities recycled on- and off-site, combusted for energy recovery on- and off-site, and treated on- and off-site, along with quantities released on- and off-site.

The chapter begins with a description of the categories of releases and other waste management activities that are reportable to TRI. It then describes information on toxicity and exposure considerations pertinent to use of TRI data. National, state, and chemical analyses of the 1997 data follow. Chapter 3 examines chemical reporting over time, comparing chemicals that have been reportable in all years (or "core" chemicals). Chapter 4 analyzes release and waste management data by industry sector for the 20 manufacturing sectors required to report to TRI in 1997.

TRI Releases and Waste Management

Figure 2-1 illustrates on-site and off-site releases, on-site waste management activities, and transfers off-site for further waste management, reportable to TRI. Box 2-1 describes reportable releases that may occur on-site at the facility and identifies types of activities that may contribute releases to various media. Box 2-2 describes releases that may result from a facility's transferring chemicals off-site for disposal. As noted in Box 2-2, off-site releases include additional details about off-site transfers of metals and metal compounds, beginning with reporting year 1997. Box 2-3 explains how facilities should report metals and metal compounds, and Box 2-4 describes EPA's methodology for using these data in analyses in this report. Box 2-5 lists on-site waste management activities that are reportable to TRI. Box 2-6 describes transfers off-site for further waste management.

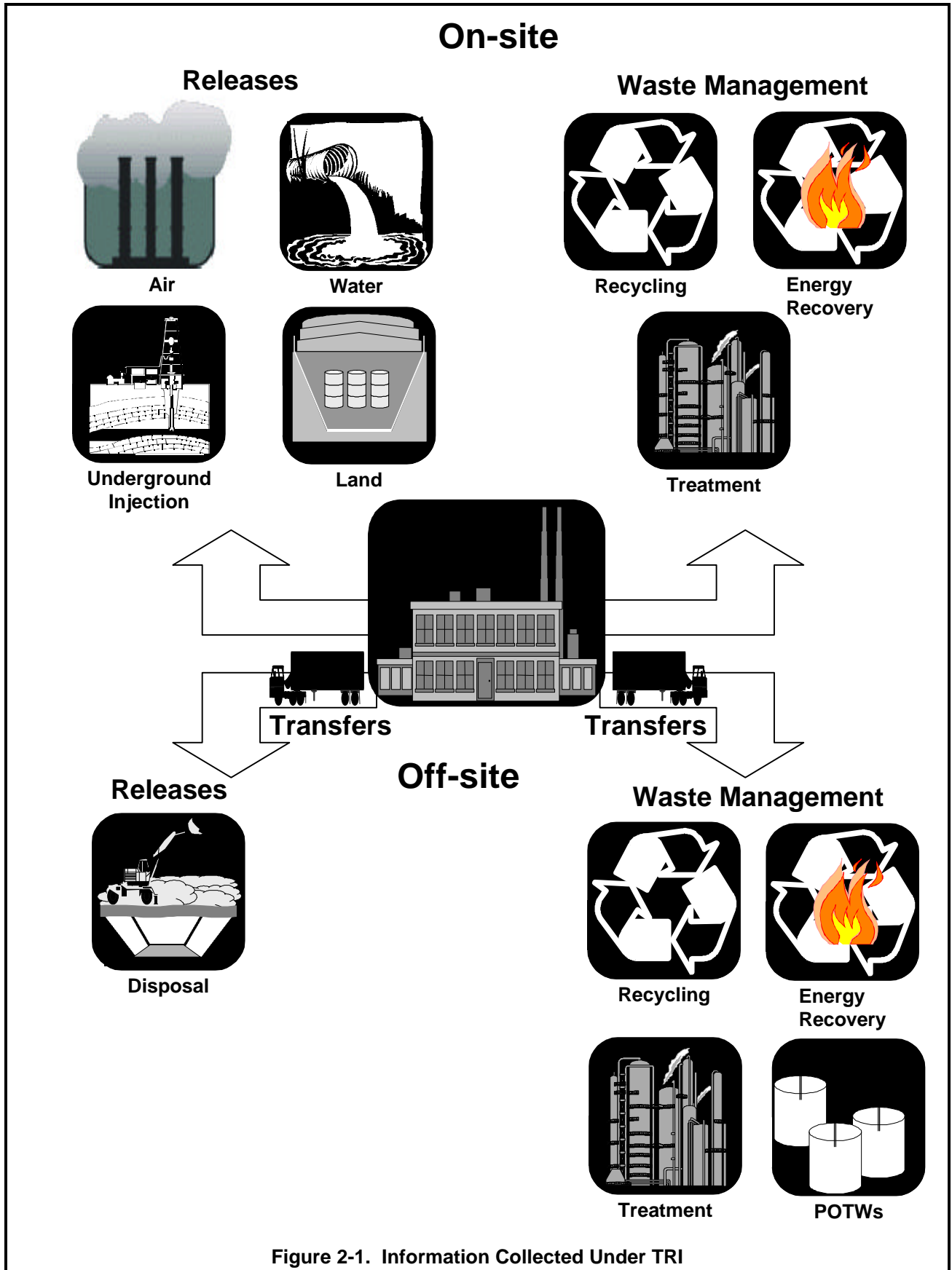


Figure 2-1. Information Collected Under TRI



Box 2 - 1. An Explanation of On-site Releases

An Explanation of On-site Releases

A release is a discharge of a toxic chemical to the environment. On-site releases include emissions to the air, discharges to bodies of water, releases at the facility to land, as well as releases into underground injection wells. Releases are reported to TRI by media type. On-site releases are reported in Section 5 of Form R.

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

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

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

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

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

On-site Land Releases. On-site releases to land occur within the boundaries of the reporting facility. Releases to land include disposal of toxic chemicals in landfills (in which wastes are buried), land treatment/application farming (in which a waste containing a listed chemical is applied to or incorporated into soil), surface impoundments (which are uncovered holding areas used to volatilize and/or settle waste materials), and other land disposal methods (such as waste piles) or releases to land (such as spills or leaks). Beginning with the 1996 reporting year, facilities separately report amounts released to RCRA subtitle C landfills from amounts released to other on-site landfills.

Box 2 - 2. An Explanation of Off-site Releases (Transfers Off-site to Disposal)

An Explanation of Off-site Releases (Transfers Off-site to Disposal)

An off-site release is a discharge of a toxic chemical to the environment that occurs as a result of a facility's transferring a waste containing a TRI chemical off-site to disposal, as reported in Section 6 of Form R. Certain other types of transfers are also categorized as off-site releases because, except for location, the outcome of transferring the chemical off-site is the same as releasing it on-site.

Transfers to Disposal. Toxic chemicals in waste that are transferred off-site for disposal generally are either released to land at an off-site facility or are injected underground. (See discussion of on-site releases to land and underground injection for a description of these release types.)

Storage Only. Generally, a toxic chemical is sent off-site for storage because there is no known disposal method. One example is toxic chemicals in mixed hazardous and radioactive waste. EPA considers this an off-site release because this method is being used as a form of disposal and the toxic chemical will remain there indefinitely.

Unknown. The "unknown" category of disposal indicates that a facility is not aware of the type of waste management used for the toxic chemical that is sent off-site. Therefore, EPA has categorized this method as the lowest type of waste management (environmentally least desirable) and has included it as a type of disposal for reporting purposes. Thus, it is considered to be an off-site release.

Metals and Metal Compounds. The transfer of metals and metal compounds to solidification/stabilization and to wastewater treatment (either publicly or privately owned treatment works) also result in releases and are classified as off-site releases (transfers to disposal) (see Box 2-3).



Box 2 - 3. How Metals and Metal Compounds Should be Reported to TRI

How Metals and Metal Compounds Should be Reported to TRI

In Section 6.1 of Form R, facilities report amounts of listed chemicals transferred to publicly owned treatment works (POTWs). Because metals are not destroyed by sewage treatment processes, amounts of metals and metal compounds reported in Section 6.1 are considered transfers to disposal.

In Section 6.2 of Form R, facilities report the amounts sent to each off-site location to which the facility ships or transfers wastes containing the reported toxic chemical for the purposes of recycling, energy recovery, treatment, or disposal. Metals and metal compounds are managed in waste either by being released (including disposal) or by being recycled. The metal has no heat value and thus cannot be combusted for energy recovery and cannot be treated because it cannot be destroyed regardless of whether the stream containing the metal is sent for energy recovery or treatment. Thus, transfers of metals and metal compounds for further waste management should be reported as either a transfer for recycling or a transfer for disposal. The applicable waste management code for transfers of metals and metal compounds for recycling is M24. Applicable codes for transfers for disposal include M10, M41, M62, M71, M72, M73, M79, M90, M94, and M99. Two codes, M41 and M62, were new for the 1997 reporting year. These codes are for transfers to waste management in which the wastestream may be treated but the metal contained in the wastestream is not treated and is ultimately released. For example, M41 would be used for a metal or metal compound which is stabilized in preparation for disposal.

Prior to the 1997 reporting year, some facilities reported transfers of metals and metal compounds for further waste management using two waste treatment codes, M40 and M61. Beginning in reporting year 1997, metals and metal compounds must be reported using one of the 10 disposal codes or the applicable recycling code (M24 for metals recovery).

Off-site Transfers for Further Waste Management: Codes from Section 6.2 of Form R

Recycling

M20	Solvents/Organics Recovery
M24	Metals Recovery
M26	Other Reuse or Recovery
M28	Acid Regeneration
M93	Transfer to Waste Broker–Recycling

Energy Recovery

M56	Energy Recovery
M92	Transfer to Waste Broker–Energy Recovery

Waste Treatment

M40	Solidification/Stabilization
M50	Incineration/Thermal Treatment
M54	Incineration/Insignificant Fuel Value
M61	Wastewater Treatment (Excluding POTWs)
M69	Other Waste Treatment
M95	Transfer to Waste Broker–Waste Treatment

Disposal

M10	Storage Only
M41	Solidification/Stabilization–Metals and Metal Compounds only
M62	Wastewater Treatment (Excluding POTWs)–Metals and Metal Compounds only
M71	Underground Injection
M72	Landfill/Disposal Surface Impoundment
M73	Land Treatment
M79	Other Land Disposal
M90	Other Off-site Management
M94	Transfers to Waste Broker–Disposal
M99	Unknown

In Section 8.1 of Form R, facilities report quantities of listed chemicals released on- and off-site (excluding one-time catastrophic or remedial releases). Except for those quantities recycled, metals and metal compounds should be reported in Section 8.1 of the Form R. This includes those quantities of metals and metal compounds reported in:

- Section 5 as on-site releases
- Section 6.2 as sent off-site for stabilization/solidification (M41) or wastewater treatment (excluding POTWs) (M62) and/or,
- Section 6.1 as discharges to POTWs.

These quantities should not be reported in Section 8.7 of the Form R.

**Box 2 - 4. Use of Data for Metals and Metal Compounds in This Report****Use of Data for Metals and Metal Compounds in This Report**

Off-site releases (transfers to disposal) in tables in this report include the quantities of metals and metal compounds that were reported using the incorrect waste management codes, M40 and M61, in Section 6.2 (e.g., waste treatment codes instead of recycling or disposal codes) along with the quantities of metals and metal compounds that were reported correctly in Section 6.2. For the years prior to 1997 (presented in Chapter 3), EPA has also included the quantities of metals and metal compounds that were reported using the two waste management codes, M40 and M61, as off-site releases rather than off-site waste treatment. In addition, when discussing off-site releases of TRI chemicals, EPA has included those quantities of metals and metals compounds reported as discharges to POTWs in Section 6.1 of the Form R.

Chemicals considered to be metals and metal compounds in this report appear in Tables 2-11 through 2-13.

Box 2 - 5. An Explanation of On-site Waste Management**An Explanation of On-site Waste Management**

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

Recycled On-site. This is the quantity of the toxic chemical recovered at the facility and made available for further use. To avoid double-counting, the amount reported represents the amount exiting the recycling unit. It is not the quantity that entered an on-site recycling or recovery operation. For example, 3,000 pounds of a listed chemical enters a recycling operation. Of this, 500 pounds of the chemical are in residues from the recycling operation that are subsequently sent off-site for disposal. The quantity reported as recycled on-site would be 2,500 pounds.

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

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



Box 2 - 6. An Explanation of Transfers Off-site for Further Waste Management

An Explanation of Transfers Off-site for Further Waste Management

An off-site transfer, reported in Section 6 of Form R, is the transfer of toxic chemicals in waste to a facility that is geographically or physically separate from the facility reporting under TRI. Chemicals reported to TRI as transferred are sent to off-site facilities for the purposes of recycling, energy recovery, treatment, or disposal. The amounts reported represent a movement of the chemical away from the reporting facility. Except for off-site transfers to disposal, these amounts do not necessarily represent entry of the chemical into the environment. Transfers to disposal represent an off-site release (see Box 2-2).

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

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

Transfers Off-site to Treatment. Toxic chemicals in waste that are transferred off-site may be treated through a variety of methods, including biological treatment, neutralization, incineration, and physical separation. These methods typically result in varying degrees of destruction of the toxic chemical.

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 of metals and metal compounds to POTWs are categorized as off-site releases, as explained in Boxes 2-2 and 2-3.

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



TRI Chemicals Managed in Waste

The Pollution Prevention Act of 1990 (PPA) requires facilities to report information about the quantities of TRI chemicals they manage in waste, both on- and off-site. The PPA also requires facilities to provide information about their efforts to reduce or eliminate those quantities. Facilities began reporting this information with the 1991 reporting year.

The Pollution Prevention Act established as national policy that source reduction is the preferred approach to managing waste. Source reduction is defined as an activity that prevents the generation of waste. The PPA also established as national policy a hierarchy of waste management options, illustrated in Figure 2-2, for situations where source reduction cannot be implemented feasibly.

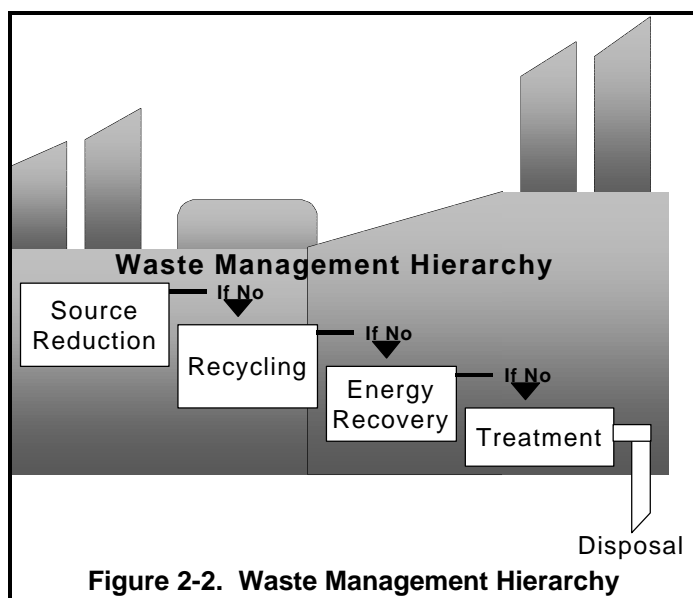


Figure 2-2. Waste Management Hierarchy

Although source reduction is the preferred method of reducing risk, environmentally sound recycling shares

many of its advantages. Like source reduction, recycling reduces the need for treatment or disposal of waste and helps conserve energy and natural resources. Where source reduction and recycling are not feasible, waste can be treated. Release (including disposal) of a chemical is viewed as a last resort, to be employed only if the preferred methods of waste management cannot be implemented. The PPA did not specifically address the combustion of waste for energy recovery as a waste management option. However, because energy recovery shares aspects of recycling and treatment, EPA chose to list this activity separately in the waste management hierarchy.

Throughout this book, data tables present waste management information in the order of the hierarchy: recycling, energy recovery, treatment, and release (including disposal).

Waste Management Information Collected

Box 2-7 describes the waste management information facilities must report to TRI. The amount of TRI chemicals in waste reported includes both waste generated by the facility and waste received by the facility for the purpose of waste management. Facilities report these data as estimates for the reporting year (1997) and the previous year (1996) and as projections for the two following years (1998 and 1999). The PPA requires this data projection to encourage facilities to consider their future waste generation, opportunities for source reduction, and potential improvement in waste management options as presented in the hierarchy. Future-year estimates are not commitments that facilities reporting to TRI must meet.



Box 2 - 7. An Explanation of Waste Management Information

An Explanation of Waste Management Information

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

Recycled On-site. This is the quantity of the toxic chemical recovered at the facility and made available for further use. To avoid double-counting, the amount reported represents the amount exiting the recycling unit. It is not the quantity that entered an on-site recycling or recovery operation. For example, 3,000 pounds of a listed chemical enters a recycling operation. Of this, 500 pounds of the chemical are in residues from the recycling operation that are subsequently sent off-site for disposal. The quantity reported as recycled on-site would be 2,500 pounds.

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

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

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

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

Treated Off-site. This is the quantity of the toxic chemical that left the facility boundary and was sent to POTWs or other off-site locations for treatment, not the amount that was destroyed at the off-site location(s). This quantity includes the amount(s) reported in Section 6 of Form R as transferred to POTWs or other off-site locations for treatment, less any amount(s) associated with non-routine events and not including quantities of metals and metal compounds (see Box 2-3).

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

Production-related Waste Managed. This includes: quantities released to the environment both at the facility and sent off-site for release (including disposal); quantities treated at the facility or sent off-site for treatment; quantities combusted for energy recovery at the facility or sent off-site for energy recovery; and quantities recycled at the facility or sent off-site for recycling. Source reduction or other movement up the waste management hierarchy is feasible for these production-related wastes. Production related wastes do not include quantities reported as released to the environment due to one-time events.

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



The individual waste management quantities reported are mutually exclusive to avoid double-counting. For example, an incinerator may destroy 99% of the chemical in the waste; in this case, the amount reported as treated on-site would be the amount destroyed by the incinerator, not the amount that entered the incinerator. The amount not destroyed in incineration (1%) would be reported as released. The sum of the individual quantities in a given year equals the total quantity of TRI chemicals in waste resulting from routine production operations at a facility during that year.

For the reporting year only, facilities must also report the quantity of waste released (including disposal) as a result of activities other than routine production operations. This quantity appears in data tables in this book as “non-production-related waste managed.” It includes waste released to the environment at the facility or transferred off-site because of catastrophic events or remedial (clean-up) actions at the facility. Non-production-related waste is considered less amenable to source reduction because facilities cannot reasonably anticipate these quantities.

It is important to note that facilities may vary in how they interpret some of the reporting requirements under the PPA. EPA has not yet specifically defined in regulations the reporting requirements for these data elements, so some facilities may include in their reports amounts that other facilities do not believe they must include. Because of this, higher quantities of TRI chemicals in waste for a particular state or industry may reflect not only differences in actual quantities, but also different interpretations of the reporting requirements.

What to Consider When Using TRI Data

Users of TRI information should be aware that TRI data reflect releases and other waste management of chemicals, not exposures of the public to those chemicals. TRI data, in conjunction with other information, can be used as a starting point in evaluating exposures that may result from releases and other waste management activities which involve toxic

chemicals. The determination of potential risk depends upon many factors, including the toxicity of the chemical, the fate of the chemical and the length of their exposure after it is released, and the human or other populations that are exposed to the chemical and the length of their exposure after its release. Listed below 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 or more toxic chemicals, when just the opposite may be true. For example, phosgene is toxic in smaller quantities than methanol. A comparison between these two chemicals for setting hazard priorities or estimating potential health concerns, solely on the basis of volumes released, may be misleading.

Exposure Considerations

- ◆ **Potential degradation or persistence of the chemical in the environment.** Exposure to a chemical is dependent upon the chemical being available. The longer the chemical remains unchanged in the environment, the greater the potential for exposure. 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 compounds, such as ethylene and propylene, react in the atmosphere and contribute 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, accumulate as they move up the food chain.
- Small releases of a chemical that bioaccumulates may result in significant exposures to consumers.

◆ **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 precipitate from 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.
- Injection of toxic chemicals into properly designed and constructed Class I wells will result in substantially lower exposure potential

than more 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 on 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 on 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 be either 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. This means that the amount of a toxic chemical that ultimately enters the environment may be an underestimate because of these differences in treatment efficiencies. For example, some high-volume pollutants, such as methanol, are readily degraded by most sewage treatment plants. Other chemicals, such as methyl ethyl ketone (MEK), may be partially treated and partially released. 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. In addition, metals sent to sewage treatment



plants may be removed with solid wastes and sent to landfills, or they may pass through the plant and be discharged into surface waters; they are not, however, destroyed.

- 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.

◆ **On-site waste management of the toxic chemical.** As with off-site waste management, the amount of the toxic chemical released to the environment depends on how the chemical was handled during disposal, treatment, energy recovery, or recycling activities. However, since the waste management is on-site, any amount of the chemical that enters the environment after waste management is reported to TRI as part of that facility's releases.

1997 National Overview

This chapter discusses and analyzes data for 1997 for all chemicals reported under TRI.

For 1997, 21,490 facilities filed 71,670 TRI reporting forms, an average of 3.3 forms per facility (see Table 2-1). Fifteen percent of the submissions were Form A certification statements rather than the Form R detailed reporting form. EPA established the Form A certification option, beginning with the 1995 reporting year, for facilities that meet TRI reporting thresholds, but whose total annual reportable amount¹ for a listed chemical does not exceed 500 pounds and who do not manufacture, process, or otherwise use more than 1

million pounds of the chemical. Form A certification statements do not report amounts of chemical releases, transfers, or other waste management activities. (Form A certification statements are further explained in Chapter 1.)

Table 2-1. 1997 TRI Facilities and Forms

	Number	Percent
Total Facilities	21,490	
Total Forms	71,670	100.0
Form Rs	61,123	85.3
Form As	10,547	14.7

On- and Off-site Releases

In 1997, on- and off-site releases reported to TRI totaled 2.58 billion pounds of toxic chemicals, as shown in Table 2-2. This includes amounts released directly to the air, water, or land, as well as disposal of toxic chemicals on-site or off-site in landfills, surface impoundments, land treatment, and underground injection wells.

On-site Releases

On-site releases totaled 2.12 billion pounds (see Table 2-2). The largest category was air emissions, with 1.33 billion pounds. These releases to air consisted of 1.01 billion pounds of point source (stack) emissions and 317.2 million pounds of non-point (fugitive) emissions. As shown in Figure 2-3, air emissions represented two-thirds (62.9%) of all on-site releases.

Facilities discharged 218.4 million pounds of toxic chemicals into the nation's rivers, lakes, bays, and other bodies of water in 1997. Underground injection totaled 219.5 million pounds, and 99.8% of this amount went to Class I wells (described in Box 2-1). Another 346.9 million pounds was released on-site to land. Of this total, the largest amount (130.0 million

¹The total annual reportable amount is defined as the sum of the production-related waste management categories that would be reported to TRI: quantities released (including disposal), recovered as a result of recycling operations, combusted for energy recovery, or treated at the facility, plus amounts transferred off-site for recycling, energy recovery, treatment, or disposal. These amounts correspond to total production-related waste in this report.



Table 2-2. 1997 TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management

	Pounds	Percent		Pounds	Percent
On-site Releases			Other On-site Waste Management		
Total Air Emissions	1,331,663,886	62.9	Recycled On-site	7,986,618,922	42.5
Fugitive Air Emissions	317,233,311	15.0	Energy Recovery On-site	3,805,792,208	20.2
Point Source Air Emissions	1,014,430,575	47.9	Treated On-site	7,012,922,513	37.3
Surface Water Discharges	218,371,961	10.3			
Underground Injection	219,513,898	10.4	Total Other On-site Waste Management	18,805,333,643	100.0
Class I Wells	219,070,242	10.4			
Class II-V Wells	443,656	0.0	Transfers Off-site for Further Waste Management		
On-site Land Releases	346,904,510	16.4	Transfers to Recycling	2,381,458,528	69.7
RCRA Subtitle C Landfills	20,472,578	1.0	Transfers to Energy Recovery	507,985,556	14.9
Other On-site Land Releases	93,639,517	4.4	Transfers to Treatment	258,693,439	7.6
Land Treatment	5,794,667	0.3	Transfers to POTWs	266,863,876	7.8
Surface Impoundments	96,952,876	4.6			
Other Disposal	130,044,872	6.1	Total Transfers Off-site for Further Waste Management	3,415,001,399	100.0
Total On-site Releases	2,116,454,255	100.0			
Off-site Releases (Transfers Off-site to Disposal)					
Storage Only ^a	6,626,857	1.4			
Solidification/Stabilization ^b	144,325,113	31.3			
Metals and Metal Compounds Only					
Wastewater Treatment (excluding POTWs) ^c	6,074,558	1.3			
Metals and Metal Compounds Only					
Transfers to POTWs ^d	2,399,930	0.5			
Metals and Metal Compounds Only					
Underground Injection	14,265,756	3.1			
Landfills/Disposal Surface Impoundments	251,854,306	54.6			
Land Treatment	1,264,484	0.3			
Other Land Disposal	10,314,727	2.2			
Other Off-site Management	11,994,251	2.6			
Transfers to Waste Broker for Disposal	7,377,734	1.6			
Unknown ^e	4,601,113	1.0			
Total Off-site Releases	461,098,829	100.0			
Total On- and Off-site Releases	2,577,553,084				

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Other On-site Waste Management** from Section 8. **Total Transfers Off-site for Further Waste Management** from Section 6 (excluding transfers off-site to disposal) of Form R.

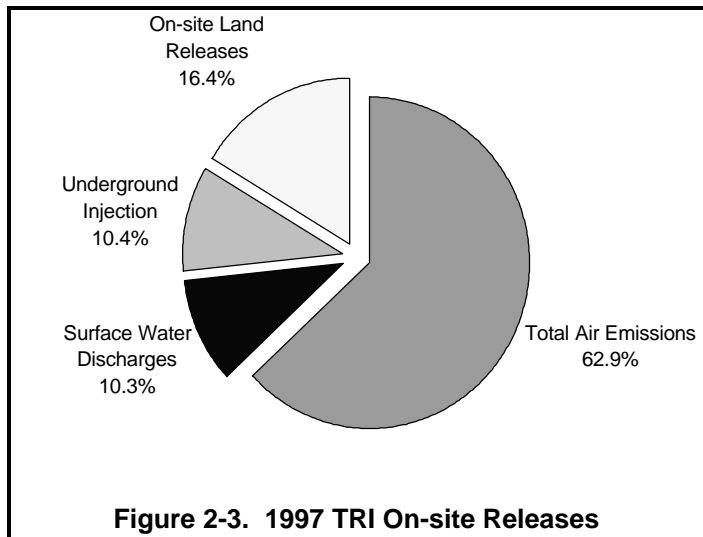
^a“Storage only” (disposal code M10) indicates that the toxic chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to “storage only” are included as a form of disposal (off-site release). See Box 2-2.

^bBeginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste management code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste management code M40). Because this treatment method prepares a metal for disposal, but does not destroy it, such transfers are included as a form of disposal (off-site release). See Box 2-3. Some facilities erroneously reported metals and metal compounds using waste treatment code M40; in this report, such amounts have been included in solidification/stabilization of metals and metal compounds.

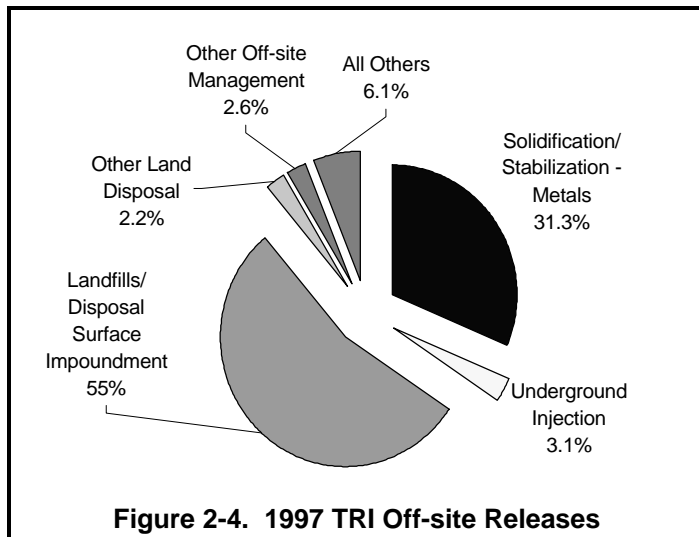
^cBeginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste management code M62) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste management code M61). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 2-3. Some facilities erroneously reported metals and metal compounds using waste management code M61; in this report, such amounts have been included in transfers of metals and metal compounds to wastewater treatment.

^dReported as discharges to POTWs in Section 6.1 of Form R. EPA considers transfers of metals and metal compounds to POTWs as an off-site release because sewage treatment does not destroy the metal content of the waste material.

^e“Unknown” (disposal code M99) indicates that a facility is not aware of the type of waste management used for the toxic chemical that is sent off-site. Amounts reported as “unknown” transfers are treated as a form of disposal (off-site release).



Note: On-site Releases from Section 5 of Form R.



Note: Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. * See notes to Table 2-2.

pounds) was reported as “other disposal”, which includes accidental releases and disposal methods other than landfilling or surface impoundment.

Off-site Releases

As explained in Box 2-2, off-site releases in this report consist of two general types of off-site transfers: transfers of all TRI chemicals to disposal (including landfills, surface impoundments, underground injection, and other disposal practices including storage) and transfers of metals and metal compounds to solidification/stabilization and to wastewater treatment by private treatment services or publicly owned treatment works (POTWs, or municipal sewage treatment facilities).

TRI facilities reported a total of 461.1 million pounds of toxic chemicals in transfers off-site that represent releases to the environment (see Table 2-2). The majority of the off-site releases – 251.9 million pounds – was sent to disposal in landfills or disposal surface impoundments. Another 144.3 million pounds consisted of metals and metal compounds sent to solidification or stabilization. Together, these two types of off-site releases – landfills/disposal surface

impoundments and metals solidification/stabilization – accounted for nearly 86% of all off-site releases in 1997, as illustrated in Figure 2-4. No other type of off-site release amounted to more than 3% of the total.

Other On-site Waste Management

Facilities reported other on-site waste management—recycling, energy recovery, and treatment—totaling 18.81 billion pounds in 1997 (see Table 2-2). Recycling amounted to 7.99 billion pounds. On-site energy recovery totaled 3.81 billion pounds in 1997, and treatment totaled 7.01 billion pounds.

As shown in Figure 2-5, 42.5% of other on-site waste management consisted of recycling.

Transfers Off-site for Further Waste Management

In 1997, facilities sent 3.42 billion pounds of toxic chemicals to off-site locations for further waste management: recycling, energy recovery, or treatment (including POTWs), as also shown in Table 2-2. As with on-site waste management, the largest category

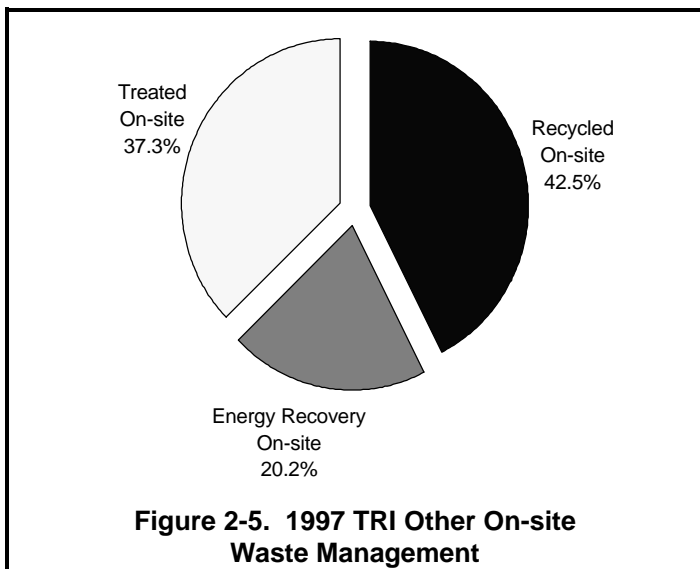


Figure 2-5. 1997 TRI Other On-site Waste Management

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

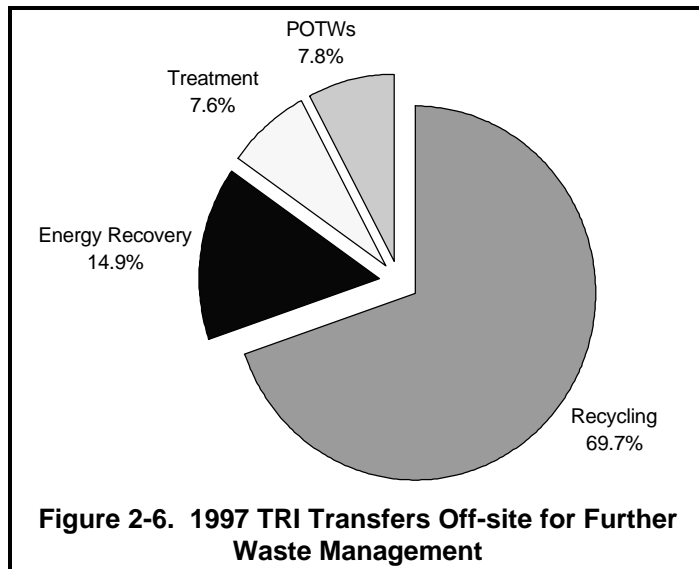


Figure 2-6. 1997 TRI Transfers Off-site for Further Waste Management

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

was recycling. Transfers to recycling totaled 2.38 billion pounds. This amounted to 69.7% of the off-site transfers, as shown in Figure 2-6.

TRI facilities also reported sending 508.0 million pounds of toxic chemicals off-site to be burned for energy recovery. Transfers to treatment totaled 258.7 million pounds, while transfers to POTWs totaled 266.9 million pounds.

TRI Chemicals Managed in Waste

In 1997, TRI facilities reported managing 24.73 billion pounds of TRI chemicals in production-related waste, as shown in Table 2-3. However, two facilities revised their submissions after the TRI data were “frozen” for preparation of this report. These revisions, described below, would change total production-related waste managed to 23.85 billion pounds.

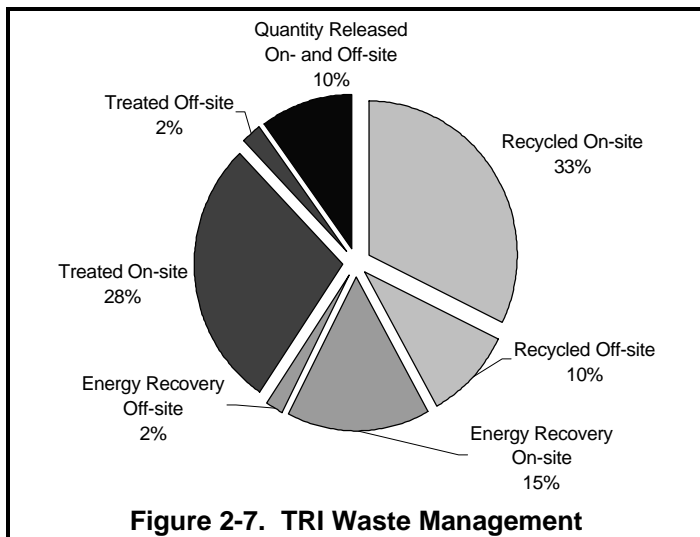
A total of 7.99 billion pounds was recycled on-site, while another 7.01 billion pounds was treated on-site. On-site energy recovery was the third-largest waste management method, with 3.81 billion pounds. However, one facility reported on-site energy recovery of 422.0 million pounds of ethylene and 272.0 million pounds of propylene in 1997. The facility has since revised these quantities to zero.

Table 2-3. 1997 TRI Waste Management

Waste Management Activity	Waste Management Activity		On- and Off-site Percent
	Pounds	Percent	
Recycled On-site	7,986,618,922	32.3	42.0
Recycled Off-site	2,390,787,879	9.7	
Energy Recovery On-site *	3,805,792,208	15.4	17.5
Energy Recovery Off-site	525,610,064	2.1	
Treated On-site	7,012,922,513	28.4	30.5
Treated Off-site	536,021,338	2.2	
Quantity Released On- and Off-site	2,467,643,821	10.0	10.0
Total Production-related Waste Managed *	24,725,396,745	100.0	100.0
Non-Production-related Waste Managed	37,761,187		

Note: Data from Section 8 of Form R.

* One facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 422,000,000 pounds of ethylene and 272,000,000 pounds of propylene in 1997. The facility has since revised these quantities to zero. Another facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery of 193,830,000 pounds of ethylene in 1997. The facility has since revised this quantity to 13,000,000 pounds. These revisions change on-site energy recovery to 2,930,962,208 pounds and total production-related waste managed to 23,850,566,745 pounds. As a percentage of total production-related waste, on-site energy recovery changes to 12.3%; other waste management activities increase by 1% or less. Percentages for on- and off-site waste management activities change as follows: recycled on- and off-site to 43.5%, energy recovery on- and off-site to 14.5%, treated on- and off-site to 31.7%, and quantity released on- and off-site to 10.3%.



Note: Data from Section 8 of Form R.

* One facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 422,000,000 pounds of ethylene and 272,000,000 pounds of propylene in 1997. The facility has since revised these quantities to zero. Another facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery of 193,830,000 pounds of ethylene in 1997. The facility has since revised this quantity to 13,000,000 pounds. These revisions change on-site energy recovery to 12.3%; other waste management activities increase by 1% or less.

has since revised this quantity to 13.0 million pounds. These revisions would change on-site energy recovery to a total of 2.93 billion pounds.

Quantities released on- and off-site ranked fourth among waste management options in 1997, with 2.47 billion pounds.

As shown in Figure 2-7, TRI facilities managed the majority of their production-related waste by recycling and energy recovery. In the waste management hierarchy (explained earlier in this chapter), these represent environmentally preferable options for chemicals in waste that cannot be prevented in the first place.

Recycling on- and off-site and energy recovery on- and off-site accounted for nearly 60% of production-related waste in 1997. Approximately 30% of the waste was treated on- and off-site, environmentally a less desirable management method. Ten percent of the waste was reported in the least desirable option, quantity released on- and off-site.

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

The quantity released on- and off-site presented in Table 2-3 is not the same as the total on- and off-site releases presented in Table 2-2. This difference arises primarily from the types of releases reported on different sections of the Form R. The quantity released on- and off-site in Table 2-3 reflects all on- and off-site releases as collected in Section 5 of the Form R and transfers off-site for disposal as reported in Section 6 (including metals and metal compounds as described in Box 2-3). However, total on- and off-site releases in Table 2-2 is limited to production-related on- and off-site releases as collected in Section 8.1 of the Form R. Although these totals are often the same, production-related releases reported in Section 8.1 do not include those releases associated with catastrophic events, remedial actions, or other one-time events not related to production. For the same reason, transfers for recycling, energy recovery, and treatment (including POTWs for non-metals) reported in Section 6 do not exactly correspond with similar quantities reported in Section 8. Once again, the relevant parts in Section 8 only include the waste management of production-related materials.

Other reasons also contribute to the different quantities reported in different sections of the Form R. For example, a release or transfer of less than 1,000 pounds may be reported in ranges in Section 5 and 6 whereas an exact amount must be included in Section 8. Furthermore, facilities may round off the quantities reported in Section 8 to two significant digits.

1997 TRI Data by State

Tables 2-4 through 2-8 present the distribution of TRI releases and other waste management by state. No reports were received in 1997 for the Northern Mariana Islands.



On- and Off-site Releases by State

On-site Releases

The top states for total releases in 1997 were Texas with 261.7 million pounds, Louisiana with 186.0 million pounds, and Ohio with 158.7 million pounds (see Table 2-4). These were also the top-ranking states for on-site releases. Ranking fourth and fifth for total on- and off-site releases were Pennsylvania with 143.2 million pounds and Illinois with 127.6 million pounds. Another three states also exceeded 100 million pounds each: Indiana with 122.5 million pounds, Tennessee with 106.9 million pounds, and Utah with 103.7 million pounds. Map 2-1 illustrates the geographic distribution of TRI on-site releases. Texas facilities reported primarily air emissions – 108.4 million pounds—and underground injection—89.9 million pounds. These were the largest amounts of air emissions and underground injection reported in any state. Tennessee ranked second for releases to air with 81.9 million pounds, and Louisiana ranked third with 74.8 million pounds.

For underground injection, Louisiana facilities reported the second-largest total (54.2 million pounds), and Florida ranked third (with 27.5 million pounds). All underground injection in the top three states was reported as injected to Class I wells.

Facilities in California reported the largest amount of injection to Class II-V wells, 415,000 pounds. Facilities in 29 states and territories reported no underground injection. (Some states are not geologically suitable for the practice of underground injection. Others have banned this disposal method or have never implemented an underground injection control program.)

Louisiana led all states for surface water discharges, with 46.9 million pounds, followed by Pennsylvania with 38.5 million pounds and Texas with 20.8 million pounds.

Facilities reported larger total on-site land releases in Montana than in any other state, 37.7 million pounds. New Mexico facilities reported the second-largest total, 31.6 million pounds, followed by Ohio with 28.7 million pounds. In Montana and New Mexico, on-site land releases represented the great majority of total on- and off-site releases reported in the state (87.0% of the total in Montana and 92.5% in New Mexico). In both of these states, the predominant type of land release was “other disposal.” In contrast, on-site land releases by Ohio facilities amounted to 18.1% of that state’s total on- and off-site releases. The largest type of on-site land release in Ohio was surface impoundment.



Map 2-1. Geographic Distribution of TRI On-site Releases, 1997

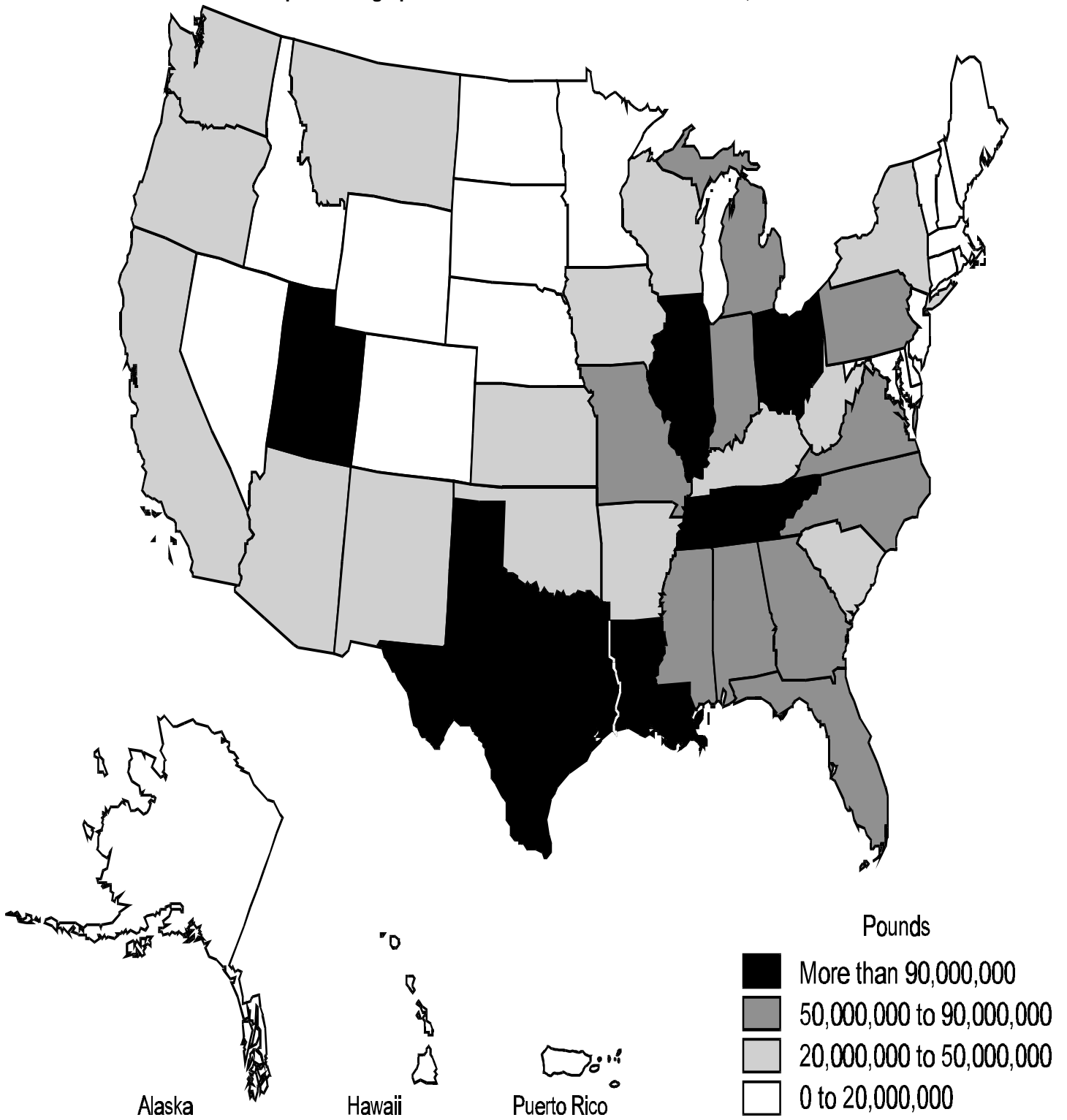




Table 2-4. TRI On-site and Off-site Releases, by State, 1997

State	On-site Releases											Off-site Releases	Total On- and Off-site Releases Pounds
	Total Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases					Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds			
Alabama	526	62,192,085	4,759,101	0	10	642,737	8,958,859	249,046	597,187	186,892	77,585,917	17,085,362	94,671,279
Alaska	8	4,279,656	333,613	20	410	0	67	0	0	1,881	4,615,647	1,507	4,617,154
American Samoa	1	12,750	0	0	0	0	0	0	0	0	12,750	0	12,750
Arizona	205	8,870,245	4,618	6	0	0	79,992	118,584	2,123,297	19,787,686	30,984,428	434,071	31,418,499
Arkansas	371	25,374,381	1,800,354	1,463,498	0	266,660	1,224,434	138,247	2,097,593	14,775	32,379,942	27,342,321	59,722,263
California	1,378	31,291,758	4,274,294	0	414,781	29,707	514,245	269,542	197,620	63,604	37,055,551	8,095,061	45,150,612
Colorado	181	3,474,142	928,029	5	0	0	58,680	18,902	5,105	22,249	4,507,112	640,449	5,147,561
Connecticut	310	5,442,235	670,797	0	0	5	38,310	0	38	278	6,151,663	3,518,017	9,669,680
Delaware	68	2,791,795	229,709	0	0	0	15,130	0	282,801	58	3,319,493	187,340	3,506,833
District of Columbia	3	3,310	5	0	0	0	0	0	0	3,300	6,615	0	6,615
Florida	519	32,103,556	8,636,614	27,506,942	0	3,552	74,934	815,426	6,844,702	12,179,513	88,165,239	7,253,482	95,418,721
Georgia	709	48,218,319	7,181,085	0	0	2,070	986,462	310,922	1,739,518	108,585	58,546,961	13,334,549	71,881,510
Guam	1	0	0	0	0	0	0	0	0	0	0	0	0
Hawaii	14	409,983	2,119	0	25,750	0	0	5,938	0	250	444,040	8,365	452,405
Idaho	62	5,346,693	1,128,221	0	0	702	512,920	504,247	6,211,663	3,786,362	17,490,808	257,770	17,748,578
Illinois	1,289	65,096,174	4,854,561	3,352	0	11,856,367	11,454,803	151,770	793,229	357,562	94,567,818	33,033,233	127,601,051
Indiana	1,004	57,036,975	2,311,707	1,262,661	0	518,457	16,665,662	50,948	0	92,759	77,939,169	44,608,861	122,548,030
Iowa	408	24,346,264	2,616,551	0	0	66,556	1,985,997	3,018	1,628	20,853	29,040,867	5,155,244	34,196,111
Kansas	274	20,100,977	571,315	996,103	0	89,549	851,772	83,023	2,200	28,719	22,723,658	4,008,558	26,732,216
Kentucky	423	35,133,354	669,063	0	0	209,524	2,499,096	0	25,100	209,567	38,745,704	8,555,487	47,301,191
Louisiana	293	74,838,852	46,909,318	54,243,582	0	4,256	5,896,933	15,805	1,729,072	139,811	183,777,629	2,260,624	186,038,253
Maine	84	6,627,367	996,800	0	0	67,994	265,088	0	251	4,690	7,962,190	1,807,793	9,769,983
Maryland	193	7,843,147	2,026,236	1	0	15	2,154,755	228,541	257,830	6,244	12,516,769	1,182,575	13,699,344
Massachusetts	475	5,620,129	49,400	0	0	8,430	14,800	0	0	24,804	5,717,563	1,335,847	7,053,410
Michigan	904	44,346,088	529,145	5,596,855	0	72,864	2,471,687	26,879	0	23,969	53,067,487	32,214,433	85,281,920
Minnesota	472	17,023,305	324,718	0	0	250	153,816	88,426	6,543	1,556	17,598,614	2,567,851	20,166,465
Mississippi	310	38,040,435	11,945,812	8,544,641	0	3,331	929,367	4,425	4,708,458	463,187	64,639,656	1,526,415	66,166,071
Missouri	553	33,788,155	3,332,020	0	0	102,017	518,716	261,827	0	19,288,597	57,291,332	5,532,654	62,823,986
Montana	29	4,314,764	97,172	0	0	500	0	0	11,845	37,707,064	42,131,345	1,221,040	43,352,385
Nebraska	161	7,332,796	543,072	0	0	0	2,510	543,125	20,126	44,477	8,486,106	9,491,869	17,977,975

Note: On-site Releases from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

Off-site Releases

As shown in Table 2-4, Pennsylvania facilities reported 63.3 million pounds of off-site releases (transfers off-site to disposal, including transfers of metals and metal compounds to solidification/stabilization, treatment, and POTWs). Ohio ranked second with 45.5 million pounds, closely followed by Indiana with 44.6 million pounds. Nearly half (44.2%) of Pennsylvania’s total releases were transferred off-site for disposal, as were more than one-quarter (28.7%) of Ohio’s and more than one-third of Indiana’s (36.4%).

Nebraska was the only state in which off-site releases (9.5 million pounds) were larger than on-site releases (8.5 million pounds).

Table 2-5 more closely examines off-site releases by state. Transfers to landfills/disposal surface impoundments accounted for more than half of off-site releases in 30 of the 55 states and territories. In Pennsylvania, which ranked first for off-site releases, facilities reported 47.9 million pounds of such transfers, representing 75.7% of the state’s total off-site releases. Pennsylvania reported the nation’s largest amount in this category, accounting for 19.0% of the U.S. total. One Pennsylvania facility reported



Table 2-4. TRI On-site and Off-site Releases, by State, 1997, continued

State	On-site Releases											Off-site Releases	Total On- and Off-site Releases Pounds	
	Total Facilities Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases						Total On-site Releases Pounds		Transfers Off-site to Disposal Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds				
Nevada	51	1,695,716	0	0	0	0	2,542,506	0	181,005	0	4,419,227	15,886	4,435,113	
New Hampshire	105	2,183,222	114,890	0	0	0	211,070	0	3,700	1,255	2,514,137	272,796	2,786,933	
New Jersey	557	9,500,420	5,399,681	2	0	440,732	586,134	1,798	3,603	226,570	16,158,940	4,608,497	20,767,437	
New Mexico	40	2,455,382	8,050	0	0	0	255	639,051	974,254	30,010,477	34,087,469	83,532	34,171,001	
New York	657	24,273,000	4,367,682	500	0	986,700	256,250	5	6,472	49,458	29,940,067	8,645,580	38,585,647	
North Carolina	848	52,057,024	6,460,436	29,100	0	40,230	7,526,328	155,171	10,839,022	18,125	77,125,436	7,941,510	85,066,946	
North Dakota	34	1,946,963	439,714	0	0	0	13	750	1,700	0	2,389,140	33,285	2,422,425	
Ohio	1,589	66,806,601	6,061,775	11,584,640	0	2,837,300	5,139,507	444	20,517,750	179,260	113,127,277	45,548,556	158,675,833	
Oklahoma	284	18,448,377	716,150	1,722,479	2,200	553,551	100,034	522	1,409	75,995	21,620,717	3,178,213	24,798,930	
Oregon	256	17,126,435	4,266,121	41,110	0	18,650	408,866	108,835	0	2,369,662	24,339,679	6,591,882	30,931,561	
Pennsylvania	1,222	39,754,658	38,517,920	0	0	133,851	265,948	81,546	114,761	1,075,905	79,944,589	63,298,931	143,243,520	
Puerto Rico	150	7,154,090	17,529	0	0	250	1,287	0	3,219	16	7,176,391	767,785	7,944,176	
Rhode Island	133	1,767,107	2,177	0	0	0	0	0	0	4,332	1,773,616	405,268	2,178,884	
South Carolina	471	44,308,861	2,648,852	0	0	44,651	1,676,997	10,997	361,640	33,721	49,085,719	9,359,020	58,444,739	
South Dakota	69	2,292,307	1,800,093	0	0	0	250	0	0	2,094	4,094,744	121,839	4,216,583	
Tennessee	644	81,947,095	1,568,988	9,273,267	0	44,057	5,035,752	66,976	954	18,005	97,955,094	8,926,783	106,881,877	
Texas	1,217	108,366,675	20,788,710	89,929,406	0	1,280,565	3,575,896	424,265	14,714,640	1,267,985	240,348,142	21,361,837	261,709,979	
Utah	143	65,561,602	1,230,027	0	0	16,749	5,635,142	103,898	21,342,716	35,957	93,926,091	9,791,134	103,717,225	
Vermont	37	216,040	188,985	0	0	0	257	0	0	5	405,287	161,408	566,695	
Virgin Islands	2	1,401,398	25,723	0	0	0	0	536	932	0	1,428,589	108	1,428,697	
Virginia *	424	47,301,315	3,807,904	51,817	0	124,390	1,056,804	7,676	30	29,880	52,379,816	5,548,253	57,928,069	
Washington	283	21,629,906	2,463,756	0	0	3,468	106,996	214,688	1,750	13,813	24,434,377	7,396,089	31,830,466	
West Virginia	139	13,979,963	6,771,631	0	0	1,049	9,997	20,275	16,129	24,206	20,823,250	3,947,692	24,770,942	
Wisconsin	875	25,893,626	2,972,233	5	0	842	1,172,593	65,793	8,069	21,871	30,135,032	20,424,365	50,559,397	
Wyoming	32	2,296,413	7,485	6,820,250	505	0	1,600	2,800	203,315	16,988	9,349,356	7,802	9,357,158	
Total	21,490	1,331,663,886	218,371,961	219,070,242	443,656	20,472,578	93,639,517	5,794,667	96,952,876	130,044,872	2,116,454,255	461,098,829	2,577,553,084	

Note: On-site Releases from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Because of an EPA data entry error for one facility, 51,817 pounds were incorrectly identified as underground injection to Class I wells in Virginia in 1997. This amount should have been entered as discharged to surface waters. The correct amount for surface water discharges in Virginia is 3,859,721 pounds and the correct amount for underground injection to Class I wells is zero. The error was corrected in the 1997 TRI Public Data Release State Fact Sheet for Virginia, but was not discovered in time to be corrected in tables throughout this book.

transferring 22.9 million pounds of zinc compounds to landfills/disposal surface impoundments.

Off-site releases of metals and metal compounds included 144.3 million pounds sent to solidification/stabilization, 6.1 million pounds in wastestreams sent to treatment, and 2.4 million pounds sent to POTWs. Arkansas facilities reported the largest transfers of metals to solidification/ stabilization, 23.5 million pounds, and this amount represented 86.0% of the state’s total off-site releases. Ohio ranked first for transfers of metals to wastewater treatment (excluding

POTWs) with 2.8 million pounds. Illinois ranked first for transfers of metals and metal compounds to POTWs with 401,000 pounds. These transfers represented a much smaller proportion of off-site releases in the two states: 6.0% of Ohio’s total and 1.2% of Illinois’.

As noted earlier in this chapter, transfers of metals to solidification/stabilization and transfers of all TRI chemicals to landfills/disposal surface impoundments together constituted the large majority (85.9%) of all off-site releases in 1997.



Table 2-5. TRI Off-site Releases (Transfers Off-site to Disposal), 1997

State	Storage Only ^a	Solidification/Stabilization Metals Only ^b	Wastewater Treatment (excluding POTWs) Metals Only ^c	Transfers to POTWs Metals Only ^d	Underground Injection
	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	47,254	2,699,127	190,905	19,610	1,405,469
Alaska	0	7	0	0	0
American Samoa	0	0	0	0	0
Arizona	0	14,036	106	5,716	0
Arkansas	335	23,524,550	1,783	18,239	254,866
California	39,316	852,305	34,117	105,122	66,155
Colorado	1,900	86,548	8,728	5,664	0
Connecticut	37,056	370,641	81,087	9,534	796
Delaware	550	4,252	39,563	6,913	76,551
District of Columbia	0	0	0	0	0
Florida	2,144,362	633,215	41,435	62,564	92,185
Georgia	5,112	10,014,893	167,612	77,014	326,700
Guam	0	0	0	0	0
Hawaii	34	0	0	0	0
Idaho	204,604	45,795	52	490	0
Illinois	715,663	13,649,299	1,048,548	400,840	677,600
Indiana	88,714	17,452,622	402,100	107,254	582,400
Iowa	3,438	1,715,907	1,598	39,493	108,746
Kansas	39,899	194,941	4,902	9,135	646,749
Kentucky	13,260	2,806,555	163,820	52,651	42,544
Louisiana	90,143	34,058	1,300	938	230,276
Maine	44,617	4,558	1,500	70,106	0
Maryland	2,522	200,243	110,660	103,036	0
Massachusetts	70,851	393,912	36,829	25,492	0
Michigan	13,144	2,024,491	198,210	113,389	4,303
Minnesota	0	88,251	2	128,031	0
Mississippi	108,939	126,061	9,907	6,415	159,861
Missouri	284,207	98,108	14,845	85,699	56,104
Montana	0	0	0	285	8,656
Nebraska	2,732	755,590	250	12,527	0
Nevada	0	12	0	2	0
New Hampshire	17,250	128,017	4,225	3,419	0
New Jersey	120,877	2,296,591	19,154	54,030	47,132
New Mexico	0	205	0	405	0
New York	324,075	3,386,718	80,881	163,264	34,914
North Carolina	45,839	4,026,333	18,864	42,631	1,450
North Dakota	0	0	60	8	0
Ohio	449,434	10,307,784	2,751,824	216,733	903,757
Oklahoma	3,676	123,510	32,647	15,722	60,859
Oregon	0	5,915,916	21	7,299	0
Pennsylvania	180,356	12,889,436	235,615	71,666	30,258
Puerto Rico	11,518	72,241	0	2,502	0
Rhode Island	20,903	118,019	20,668	11,121	0
South Carolina	4,525	2,111,075	21,997	71,574	27,126
South Dakota	0	0	0	665	0
Tennessee	45,866	2,895,994	35,985	57,140	87,207
Texas	232,398	4,778,384	96,089	62,675	8,330,980
Utah	79,901	8,919,524	0	6,915	0
Vermont	1,316	24,831	4	520	0
Virgin Islands	8	0	0	0	0
Virginia	1,083,524	2,396,362	33,729	63,838	0
Washington	17,855	3,964,589	60,465	2,520	0
West Virginia	0	272,121	34	3,759	0
Wisconsin	28,884	1,907,486	102,437	75,355	2,112
Wyoming	0	0	0	10	0
Total	6,626,857	144,325,113	6,074,558	2,399,930	14,265,756

Note: Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/ stabilization and for wastewater treatment, including to POTWs.

^a“Storage only” (disposal code M10) indicates that the toxic chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to “storage only” are included as a form of disposal (off-site release). See Box 2-2.

^bBeginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste management code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste management code M40). Because this treatment method prepares a metal for disposal, but does not destroy it, such transfers are included as a form of disposal (off-site release). See Box 2-3. Some facilities erroneously reported metals and metal compounds using waste treatment code M40; in this report, such amounts have been included in solidification/stabilization of metals and metal compounds.



Table 2-5. TRI Off-site Releases (Transfers Off-site to Disposal), 1997, continued

State	Landfills/ Disposal Surface Impoundments Pounds	Land Treatment Pounds	Other Land Disposal Pounds	Other Off-site Management Pounds	Transfers to Waste Broker for Disposal Pounds	Unknown ^f Pounds	Total Off-site Releases
							Transfers Off-site to Disposal Pounds
Alabama	3,726,736	108,894	2,181,407	6,604,044	24,194	77,722	17,085,362
Alaska	0	0	0	0	1,500	0	1,507
American Samoa	0	0	0	0	0	0	0
Arizona	297,622	0	52,350	7,087	54,904	2,250	434,071
Arkansas	3,320,601	14,776	82,195	53,576	70,630	770	27,342,321
California	6,619,961	12,711	199,959	47,584	51,733	66,098	8,095,061
Colorado	516,565	1,265	12,085	46	7,605	43	640,449
Connecticut	1,326,650	1,855	159,518	93,076	1,435,365	2,439	3,518,017
Delaware	32,775	0	26,100	351	5	280	187,340
District of Columbia	0	0	0	0	0	0	0
Florida	3,122,300	73,953	34,432	1,006,748	41,734	554	7,253,482
Georgia	2,166,678	140,495	54,139	188,516	124,610	68,780	13,334,549
Guam	0	0	0	0	0	0	0
Hawaii	6,281	0	0	0	2,050	0	8,365
Idaho	3,608	0	765	1,050	1,406	0	257,770
Illinois	15,443,557	1,950	187,461	467,768	342,448	98,099	33,033,233
Indiana	24,743,197	39,252	44,095	228,256	621,340	299,631	44,608,861
Iowa	2,986,756	20,925	26,963	198,944	26,412	26,062	5,155,244
Kansas	2,999,058	10,595	31,422	6,805	21,832	43,220	4,008,558
Kentucky	3,679,302	428	1,698,026	40,425	39,371	19,105	8,555,487
Louisiana	1,360,563	49,608	87,097	406,620	11	10	2,260,624
Maine	1,524,598	7,702	134,966	1,727	5,193	12,826	1,807,793
Maryland	514,895	0	216,300	715	12,532	21,672	1,182,575
Massachusetts	482,437	10,985	165,429	1,423	124,567	23,922	1,335,847
Michigan	28,999,752	11,547	95,773	537,604	100,803	115,417	32,214,433
Minnesota	2,253,775	14,077	1,781	39,637	38,988	3,309	2,567,851
Mississippi	1,013,709	38,977	8,395	5,582	47,360	1,209	1,526,415
Missouri	4,865,641	4,788	47,434	3,579	46,662	25,587	5,532,654
Montana	1,211,592	0	0	2	505	0	1,221,040
Nebraska	6,874,663	156,744	1,633,548	55,093	722	0	9,491,869
Nevada	15,612	0	0	0	260	0	15,886
New Hampshire	61,147	0	1,584	20,071	28,634	8,449	272,796
New Jersey	1,527,181	0	430,032	26,191	48,382	38,927	4,608,497
New Mexico	77,283	0	0	0	894	4,745	83,532
New York	4,552,032	1,856	21,072	18,077	34,977	27,714	8,645,580
North Carolina	3,300,433	23,382	51,992	58,592	229,754	142,240	7,941,510
North Dakota	33,142	0	75	0	0	0	33,285
Ohio	27,525,764	86,475	132,342	207,610	697,189	2,269,644	45,548,556
Oklahoma	2,929,259	1,348	337	2	10,733	120	3,178,213
Oregon	416,046	85,791	137,266	8,350	13,896	7,297	6,591,882
Pennsylvania	47,936,625	7,369	82,818	710,552	249,140	905,096	63,298,931
Puerto Rico	419,308	0	233,845	28,371	0	0	767,785
Rhode Island	169,631	0	17,487	0	23,467	23,972	405,268
South Carolina	4,655,171	40,002	340,854	75,302	1,951,501	59,893	9,359,020
South Dakota	75,348	79	0	0	45,747	0	121,839
Tennessee	5,317,450	1,081	26,680	363,602	39,737	56,041	8,926,783
Texas	7,143,943	112,159	257,324	205,479	91,417	50,989	21,361,837
Utah	735,016	124	0	750	255	48,649	9,791,134
Vermont	119,477	0	7	2,370	12,873	10	161,408
Virgin Islands	100	0	0	0	0	0	108
Virginia	1,811,987	9,693	35,678	0	104,135	9,307	5,548,253
Washington	2,067,951	30,427	1,137,136	12,287	93,509	9,350	7,396,089
West Virginia	3,617,372	0	51,422	424	2,560	0	3,947,692
Wisconsin	17,246,714	143,171	174,386	259,963	454,192	29,665	20,424,365
Wyoming	7,042	0	750	0	0	0	7,802
Total	251,854,306	1,264,484	10,314,727	11,994,251	7,377,734	4,601,113	461,098,829

Note: Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

^aBeginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste management code M62) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste management code M61). Because wastewater treatment does not destroy metals such transfers are included as a form of disposal (off-site release). See Box 2-3. Some facilities erroneously reported metals and metal compounds using waste treatment code M60; in this report, such amounts have been included in transfers of metals and metal compounds to wastewater treatment.

^dReported as discharges to POTWs in Section 6.1 of Form R. EPA considers transfers of metals and metal compounds to POTWs as an off-site release because sewage treatment does not destroy the metal content of the waste material.

^e“Unknown” (disposal code M99) indicates that a facility is not aware of the type of waste management used for the toxic chemical that is sent off-site. Amounts reported as “unknown” transfers are treated as a form of disposal (off-site release).



Transfers Within and Among States

Off-site Releases

TRI facilities report the specific off-site locations to which they are transferring TRI chemicals. Table 2-6 summarizes off-site releases (transfers to disposal) that were transferred within the state, received into the state from TRI facilities elsewhere, or sent out of state. The largest transfers to disposal within a state occurred in Pennsylvania, with 49.8 million pounds. Ohio received the largest amount of such transfers—61.0 million pounds—from facilities located in other states. Arkansas shipped the largest amount—25.7 million pounds—of TRI chemicals to disposal to locations outside of the state.

When all releases in a state are taken into account, Texas led all states and territories for the largest total on- and off-site releases reported as occurring within the state. TRI facilities reported on- and off-site releases in Texas of 258.3 million pounds (whether originating from facilities in Texas or transferred into Texas from facilities in other states and territories). By this accounting, Ohio ranked second with 213.0 million pounds and Louisiana ranked third with 189.4 million pounds, reversing their ranking for total on- and off-site releases (discussed above).

Most off-site releases were transferred within the state where they originated (285.9 million pounds). A total of 175.2 million pounds were sent by facilities in one state to locations in another.

Transfers Off-site for Further Waste Management

States reported larger amounts of transfers off-site for further waste management into other states than were transferred within the state. Nationwide, transfers from one state to another totaled 1.94 billion pounds, while transfers within states totaled 1.47 billion pounds, as shown in Table 2-7. These transfers off-site for further waste management include transfers to recycling, energy recovery, and treatment.

South Carolina ranked first for amounts transferred out of state for further waste management with 317.3 million pounds, principally to recycling (307.5 million pounds). The largest transfers for further waste management within a state were reported in Texas, with 213.6 million pounds. The largest transfer types within Texas were transfers to energy recovery (76.5 million pounds) and transfers to recycling (60.3 million pounds). Tennessee was the largest recipient state, with 264.3 million pounds transferred into the state for further waste management. This included 259.4 million pounds transferred into Tennessee for recycling.

Accounting for the transfer of TRI chemicals among states, Texas had the largest total transfers to destinations within its borders (whether originating from facilities in Texas or transferred into Texas from facilities in other states and territories). Transfers within and into Texas totaled 311.1 million pounds. Tennessee ranked second with 299.2 million pounds, and Pennsylvania ranked third with 285.7 million pounds.



Table 2-6 TRI Releases in the State and Transferred Out of State, 1997

State	Releases in the State					Transferred Out of State Pounds
	Total On-site Releases Pounds	Transferred Within State Pounds	Transferred into State Pounds	Total Releases in the State ^b Pounds		
Alabama	77,585,917	8,174,562	3,562,232	89,322,711	8,910,800	
Alaska	4,615,647	1,500	0	4,617,147	7	
American Samoa	12,750	0	0	12,750	0	
Arizona	30,984,428	318,186	325,378	31,627,992	115,885	
Arkansas	32,379,942	1,634,404	318,560	34,332,906	25,707,917	
California	37,055,551	2,948,698	194,765	40,199,014	5,146,363	
Colorado	4,507,112	537,531	64,355	5,108,998	102,918	
Connecticut	6,151,663	963,681	389,037	7,504,381	2,554,336	
Delaware	3,319,493	48,389	17,224	3,385,106	138,951	
District of Columbia	6,615	0	574	7,189	0	
Florida	88,165,239	1,771,893	146,268	90,083,400	5,481,589	
Georgia	58,546,961	2,025,495	308,807	60,881,263	11,309,054	
Guam	0	0	0	0	0	
Hawaii	444,040	8,365	0	452,405	0	
Idaho	17,490,808	48,020	25,996,169	43,534,997	209,750	
Illinois	94,567,818	24,307,900	15,388,095	134,263,813	8,725,333	
Indiana	77,939,169	39,990,373	1,952,183	119,881,725	4,618,488	
Iowa	29,040,867	945,884	69,739	30,056,490	4,209,360	
Kansas	22,723,658	2,820,968	3,927,143	29,471,769	1,187,590	
Kentucky	38,745,704	4,736,857	1,193,892	44,676,453	3,818,630	
Louisiana	183,777,629	1,696,311	3,939,145	189,413,085	564,313	
Maine	7,962,190	1,271,234	25,675	9,259,099	536,559	
Maryland	12,516,769	448,065	340,869	13,305,703	734,510	
Massachusetts	5,717,563	617,471	310,622	6,645,656	718,376	
Michigan	53,067,487	30,978,481	13,377,639	97,423,607	1,235,952	
Minnesota	17,598,614	1,025,936	27,395	18,651,945	1,541,915	
Mississippi	64,639,656	770,565	36,282	65,446,503	755,850	
Missouri	57,291,332	3,252,869	428,775	60,972,976	2,279,785	
Montana	42,131,345	295	1,615,870	43,747,510	1,220,745	
Nebraska	8,486,106	963,297	66,416	9,515,819	8,528,572	
Nevada	4,419,227	15,874	3,861,715	8,296,816	12	
New Hampshire	2,514,137	51,148	230,105	2,795,390	221,648	
New Jersey	16,158,940	1,857,047	1,066,750	19,082,737	2,751,450	
New Mexico	34,087,469	75,494	0	34,162,963	8,038	
New York	29,940,067	4,142,288	5,129,547	39,211,902	4,503,292	
North Carolina	77,125,436	3,434,565	493,644	81,053,645	4,506,945	
North Dakota	2,389,140	31,663	467,020	2,887,823	1,622	
Ohio	113,127,277	38,899,852	60,975,728	213,002,857	6,648,704	
Oklahoma	21,620,717	2,138,197	6,440,492	30,199,406	1,040,016	
Oregon	24,339,679	666,467	2,530,439	27,536,585	5,925,415	
Pennsylvania	79,944,589	49,778,985	3,309,558	133,033,132	13,519,946	
Puerto Rico	7,176,391	597,369	89	7,773,849	170,416	
Rhode Island	1,773,616	127,033	174,513	2,075,162	278,235	
South Carolina	49,085,719	5,107,943	5,122,072	59,315,734	4,251,077	
South Dakota	4,094,744	120,581	0	4,215,325	1,258	
Tennessee	97,955,094	5,077,135	625,660	103,657,889	3,849,648	
Texas	240,348,142	15,951,112	2,026,797	258,326,051	5,410,725	
Utah	93,926,091	1,029,479	2,452,841	97,408,411	8,761,655	
Vermont	405,287	6,156	715	412,158	155,252	
Virgin Islands	1,428,589	0	0	1,428,589	108	
Virginia	52,379,816	2,807,105	208,522	55,395,443	2,741,148	
Washington	24,434,377	1,181,880	55,663	25,671,920	6,214,209	
West Virginia	20,823,250	2,122,786	300,751	23,246,787	1,824,906	
Wisconsin	30,135,032	18,330,714	2,099,726	50,565,472	2,093,651	
Wyoming	9,349,356	6,729	0	9,356,085	1,073	
Other ^a	0	0	3,638,541	3,638,541	0	
Total	2,116,454,255	285,864,832	175,233,997	2,577,553,084	175,233,997	

Note: On-site Releases from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for stabilization/solidification and for wastewater treatment, including to POTWs.

^a"Other" includes waste sent to other countries, to sites not identified by the reporting facility and transfers to POTWs in more than one state.

^bIncludes on-site releases and off-site releases (off-site transfers to disposal) transferred within the state and transferred into the state (excludes transfers out of state).



Table 2-7. TRI Transfers Off-site for Further Waste Management Among and Within States, 1997

State	Transferred Out of State Pounds	Transferred Within State Pounds	Transferred Into State Pounds	Total Transferred Within and Into State Pounds
Alabama	43,413,736	41,337,819	54,221,028	95,558,847
Alaska	223,112	0	161,312	161,312
American Samoa	0	0	0	0
Arizona	21,575,440	38,121,312	18,783,184	56,904,496
Arkansas	43,032,529	10,211,080	26,996,078	37,207,158
California	27,877,754	90,775,623	24,386,047	115,161,670
Colorado	17,256,993	8,803,322	936,395	9,739,717
Connecticut	19,519,324	17,215,736	58,263,438	75,479,174
Delaware	12,835,256	4,352,454	1,046,487	5,398,941
District of Columbia	7,755	0	138	138
Florida	16,735,583	13,909,930	9,126,759	23,036,689
Georgia	64,312,209	9,643,648	9,683,307	19,326,955
Guam	0	0	0	0
Hawaii	41,255	6,445	33,942	40,387
Idaho	770,180	1,025,818	372,486	1,398,304
Illinois	77,714,438	53,878,659	161,170,840	215,049,499
Indiana	129,231,725	90,991,143	147,104,992	238,096,135
Iowa	32,727,334	14,390,270	17,684,899	32,075,169
Kansas	67,903,009	7,819,236	10,311,711	18,130,947
Kentucky	51,458,191	16,042,468	15,329,984	31,372,452
Louisiana	38,944,414	42,281,688	47,584,282	89,865,970
Maine	6,280,090	535,933	1,594	537,527
Maryland	10,351,515	4,749,812	18,934,509	23,684,321
Massachusetts	25,069,885	20,025,248	6,843,058	26,868,306
Michigan	93,287,880	128,330,924	98,989,262	227,320,186
Minnesota	13,686,902	20,676,608	15,837,508	36,514,116
Mississippi	20,173,594	6,077,321	2,297,667	8,374,988
Missouri	46,259,322	55,132,104	96,283,297	151,415,401
Montana	2,996,683	46,114	7,189,083	7,235,197
Nebraska	17,030,942	9,258,975	5,019,077	14,278,052
Nevada	1,951,708	50,689	1,270,312	1,321,001
New Hampshire	11,538,941	2,508,207	33,822	2,542,029
New Jersey	53,036,628	43,967,389	52,667,553	96,634,942
New Mexico	1,600,946	374,624	476,845	851,469
New York	57,226,324	27,245,661	48,434,353	75,680,014
North Carolina	84,482,919	23,490,961	36,796,696	60,287,657
North Dakota	53,780	796,591	164,514	961,105
Ohio	142,068,833	113,932,647	162,401,215	276,333,862
Oklahoma	16,717,085	23,479,164	6,310,124	29,789,288
Oregon	12,392,987	20,481,400	709,055	21,190,455
Pennsylvania	66,239,474	129,328,352	156,373,891	285,702,243
Puerto Rico	7,119,926	24,474,151	0	24,474,151
Rhode Island	7,544,422	723,695	2,843,368	3,567,063
South Carolina	317,346,210	28,991,915	53,049,512	82,041,427
South Dakota	672,627	4,147,140	206,960	4,354,100
Tennessee	58,067,082	34,835,040	264,332,298	299,167,338
Texas	98,947,288	213,588,573	97,490,538	311,079,111
Utah	1,851,618	853,065	3,331,434	4,184,499
Vermont	1,347,949	17,114	25,810	42,924
Virgin Islands	574,006	0	0	0
Virginia	28,815,070	21,083,737	17,464,222	38,547,959
Washington	5,142,709	5,200,749	5,557,332	10,758,081
West Virginia	15,180,840	4,161,566	13,177,344	17,338,910
Wisconsin	53,260,606	41,273,496	22,599,550	63,873,046
Wyoming	458,414	341	1,371,195	1,371,536
Other*	--	--	142,675,135	142,675,135
Total	1,944,355,442	1,470,645,957	1,944,355,442	3,415,001,399

* "Other" includes waste sent to other countries, to sites not identified by the reporting facility and transfers to POTWs in more than one state.

Management of TRI Chemicals in Waste by State

Texas ranked first among states and territories for total production-related waste managed, with 4.17 billion pounds (see Table 2-8). Louisiana ranked second with 2.39 billion pounds. A revision by one facility after preparation of data for this report would change Louisiana's total to 2.21 billion pounds, but would not affect the state rankings. Two other states had totals exceeding 1 billion pounds: Illinois, ranking third with 1.37 billion pounds, and South Carolina, ranking fourth with 1.02 billion pounds. Map 2-2 presents the geographic distribution of production-related waste managed in 1997.

Texas facilities reported the largest quantities in all but one waste management category. The largest quantities reported in Texas were managed on-site: 1.52 billion pounds of treatment, 1.09 billion pounds of recycling, and 984.9 million pounds of energy recovery. The state also ranked first in two off-site categories: treatment (86.2 million pounds) and energy recovery (82.8 million pounds) and first for quantity released on- and off-site (252.1 million pounds). Production-related waste reported in Texas ranged from 10.2% of the national total for quantity released on- and off-site to 25.9% of on-site energy recovery (33.6% when facility revisions previously described are taken into account).

The exception to Texas' dominance of waste management reporting occurred in off-site recycling, which South Carolina led with 302.5 million pounds (12.7% of the total in that category).

Louisiana ranked second in three waste management categories—on-site recycling, on-site treatment, and quantity released on- and off-site—and ranked third for on-site energy recovery. The largest quantities of production-related waste managed in Louisiana were 858.4 million pounds treated on-site, 746.9 million pounds recycled on-site, and 528.1 million pounds burned for energy recovery on-site. The facility revision previously mentioned would change on-site



Table 2-8. Quantities of TRI Chemicals in Waste, by State, 1997

State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
Alabama	266,066,193	41,610,934	54,993,029	33,306,201	288,994,880	17,224,155	82,908,645	785,104,037	153,670
Alaska	32,133	220,038	456,085	9,423	2,562,157	2,812	4,627,993	7,910,641	102,867
American Samoa	0	0	0	0	0	0	12,750	12,750	0
Arizona	201,656,876	54,239,088	1,157,897	832,659	8,843,621	4,915,653	31,292,633	302,938,427	148,978
Arkansas	217,902,230	50,501,079	52,342,924	6,085,102	117,185,581	1,064,592	57,077,521	502,159,029	275,781
California	55,746,988	76,635,699	39,353,765	22,087,802	77,309,592	16,729,705	46,419,635	334,283,186	122,957
Colorado	22,745,533	16,314,398	209,711	6,087,968	9,444,535	1,847,447	5,344,502	61,994,094	37,489
Connecticut	118,391,038	24,579,626	3,400,445	2,809,593	39,959,725	10,289,214	11,102,578	210,532,219	30,290
Delaware	32,896,062	10,540,245	19,255,280	1,643,031	68,642,233	4,999,545	3,499,696	141,476,092	13,626
District of Columbia	0	7,500	0	0	303	1	6,617	14,421	0
Florida	142,443,179	15,218,840	32,403,559	4,947,217	108,215,564	13,473,106	82,190,057	398,891,522	7,154,759
Georgia	289,377,913	56,836,367	52,445,180	11,671,644	165,226,092	4,847,787	70,356,043	650,761,026	481,339
Guam	0	0	0	0	0	0	0	0	0
Hawaii	40,618	45,511	0	616	3,580,530	1,488	449,743	4,118,506	938
Idaho	2,753,590	1,042,715	28,600	157,375	96,279,582	711,199	16,977,869	117,950,930	56,150
Illinois	314,553,894	92,981,867	40,497,594	27,325,176	764,811,973	16,187,464	117,532,113	1,373,890,081	252,386
Indiana	168,107,111	185,877,776	157,374,206	13,195,301	135,292,880	15,822,349	119,914,250	795,583,873	155,904
Iowa	152,237,630	32,048,553	1,686,347	3,621,310	25,903,394	10,444,333	31,816,520	257,758,087	133,929
Kansas	169,145,559	66,696,369	88,572,790	3,503,418	25,239,157	5,387,253	27,931,469	386,476,015	112,956
Kentucky	326,907,570	50,962,133	58,010,928	7,504,357	142,280,834	10,806,098	42,662,478	639,134,398	322,056
Louisiana ^a	746,853,862	55,863,841	528,113,029	14,703,797	858,448,408	10,741,231	179,794,155	2,394,518,323	2,576,537
Maine	10,624,371	6,281,909	8,327,078	376,338	63,134,599	654,189	9,334,122	98,732,606	2,905
Maryland	13,446,585	5,172,039	15,084,938	1,112,858	29,935,385	9,324,872	13,500,222	87,576,899	103,173
Massachusetts	18,197,626	29,715,353	6,763,717	5,337,558	22,952,311	10,749,906	6,596,628	100,313,099	47,650
Michigan	378,336,073	128,073,875	83,687,074	67,480,236	89,642,433	38,111,751	80,762,315	866,093,757	304,376
Minnesota	161,863,212	21,296,995	8,016,186	2,359,251	34,693,861	10,884,199	20,592,140	259,705,844	28,193
Mississippi	223,048,853	20,316,877	23,640,421	3,957,984	166,301,942	1,660,949	64,275,403	503,202,429	167,222
Missouri	229,823,661	63,356,210	98,456,987	22,336,016	174,927,067	14,861,872	61,515,495	665,277,308	131,397
Montana	46,586,065	2,966,505	2,629,689	59,947	9,236,891	18,892	42,177,572	103,675,561	267
Nebraska	5,730,188	24,885,114	838,327	591,364	9,192,742	1,431,896	13,369,541	56,039,172	49,292
Nevada	1,923,358	1,101,743	0	101,184	11,123,073	23,990	4,443,474	18,716,822	11
New Hampshire	16,698,742	12,663,886	1,490,392	739,937	10,124,456	962,439	2,702,623	45,382,475	16,479
New Jersey	65,692,010	40,686,255	219,383,087	29,506,963	130,644,642	30,015,188	21,394,926	537,323,071	3,014,554
New Mexico	1,480,337	1,190,543	26,313,209	147,019	4,017,170	633,512	41,787,552	75,569,342	0
New York	172,842,264	68,275,239	29,371,265	7,076,667	127,109,643	11,609,888	37,289,240	453,574,206	1,123,167
North Carolina	448,336,582	87,204,537	27,818,415	14,017,992	135,606,112	6,261,666	84,658,221	803,903,525	77,401
North Dakota	6,574	596,287	0	31,171	4,446,858	221,419	2,491,558	7,793,867	2,600
Ohio	217,112,974	188,951,868	108,525,378	38,359,015	140,033,290	34,935,397	153,761,315	881,679,237	3,464,602
Oklahoma ^b	44,023,906	36,333,994	694,233,700	1,383,754	35,229,082	2,647,032	24,265,278	838,116,746	84,540
Oregon	37,958,112	20,003,439	13,964,005	1,336,309	71,513,926	13,852,045	28,787,064	187,414,900	23,939
Pennsylvania	360,008,264	133,879,998	77,893,692	19,317,617	166,360,441	26,732,395	133,685,107	917,877,514	6,256,039
Puerto Rico	22,957,397	13,834,881	486,257	10,392,249	17,038,395	8,308,705	7,849,122	80,867,006	31,654
Rhode Island	14,512,098	11,704,702	224,327	792,257	7,242,505	726,078	2,036,452	37,238,419	3,708
South Carolina	449,687,937	302,459,979	65,484,208	14,921,886	116,610,643	14,031,629	55,635,721	1,018,832,003	1,348,509
South Dakota	59,132,065	814,772	1,159,000	247,666	2,689,981	3,801,806	4,142,933	71,988,223	6,251
Tennessee	220,492,375	77,421,606	48,945,665	6,293,238	107,647,244	11,420,987	106,232,230	578,453,345	1,034,219
Texas	1,086,499,032	158,569,874	984,889,997	82,814,401	1,518,558,745	86,209,030	252,075,456	4,169,616,535	2,342,993
Utah	1,940,716	1,997,415	25,388,793	139,834	235,120,198	772,988	96,115,730	361,475,674	5,650,581
Vermont	122,855	2,120,867	0	21,898	1,105,112	157,535	436,086	3,964,353	0
Virgin Islands	634,022	220,119	0	2,060	13,384,698	351,827	1,428,702	16,021,428	0
Virginia	175,060,942	19,598,037	35,839,169	10,140,409	311,231,341	22,099,062	58,508,860	632,477,820	93,220
Washington	96,663,620	6,416,187	12,166,288	857,072	75,521,856	3,627,965	30,845,848	226,098,836	146,155
West Virginia	116,453,349	7,263,396	41,657,129	6,224,775	110,528,227	6,956,661	24,716,703	313,800,240	39,469
Wisconsin	57,504,628	62,772,874	12,737,855	17,638,679	117,250,445	16,405,819	38,957,047	323,267,347	29,846
Wyoming	3,360,150	417,925	74,591	2,470	4,546,158	62,317	9,355,868	17,819,479	4,163
Total ^c	7,986,618,922	2,390,787,879	3,805,792,208	525,610,064	7,012,922,513	536,021,338	2,467,643,821	24,725,396,745	37,761,187

Note: Data from Section 8 of Form R.

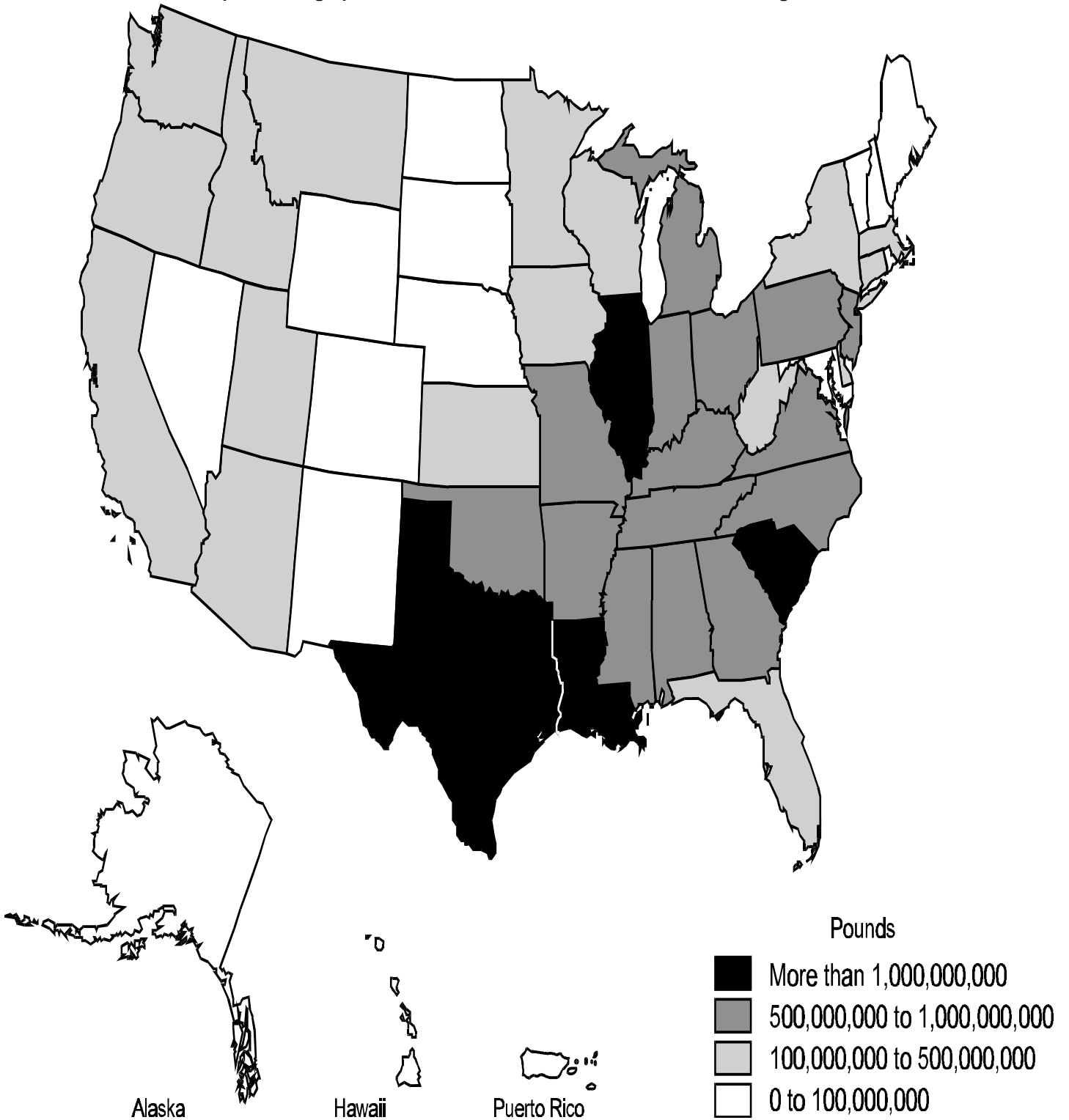
^aOne facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery of 193,830,000 pounds of ethylene in 1997. The facility has since revised this quantity to 13,000,000 pounds. For Louisiana, this changes on-site energy recovery to 347,283,029 pounds and total production-related waste managed to 2,213,688,323 pounds.

^bOne facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 422,000,000 pounds of ethylene and 272,000,000 pounds of propylene in 1997. The facility has since revised these quantities to zero. For Oklahoma, this changes on-site energy recovery to 233,700 pounds and total production-related waste managed to 144,116,746 pounds.

^cRevisions by two facilities (in Louisiana and Oklahoma, respectively) change on-site energy recovery to 2,930,962,208 pounds and total production-related waste managed to 23,850,566,745 pounds.



Map 2-2. Geographic Distribution of Production-related Waste Managed, 1997



Note: One facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 422,000,000 pounds of ethylene and 272,000,000 pounds of propylene in 1997. The facility has since revised these quantities to zero. In Oklahoma, this changes total production-related waste managed to 144,116,746 pounds. Oklahoma's shading in the map changes to light gray. Another facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery of 193,830,000 pounds of ethylene in 1997. The facility has since revised this quantity to 13,000,000 pounds. In Louisiana, this changes on-site energy recovery to 347,283,029 pounds and total production-related waste managed to 2,213,688,323 pounds. Louisiana's shading in the map remains unchanged.



energy recovery in Louisiana to 347.3 million pounds, but Louisiana would still rank third among all states in this category.

Although Illinois ranked third for total production-related waste managed, the state appeared in the top three for only one method of waste management, ranking third for on-site treatment with 764.8 million pounds.

1997 TRI Data by Chemical

This section presents chemical-specific TRI data for 1997, including the chemicals with the largest releases. It also reviews data for three groups of TRI chemicals of particular concern: metals, chemicals identified as known or suspected OSHA carcinogens, and chemicals that may adversely affect children's health. Also included is information about the uses, toxicity, and environmental fate of the TRI chemicals with the largest reported releases. At the end of this chapter, Table 2-20 presents on- and off-site releases and waste management data for all TRI chemicals for which 1997 reports were received.

Top 20 Chemicals for On- and Off-site Releases

Table 2-9 lists the 20 TRI chemicals with the largest total releases in 1997. With 1.93 billion pounds in releases, these chemicals represented three-quarters (75.0%) of all on- and off-site releases reported to TRI in 1997.

Zinc compounds led all TRI chemicals with releases totaling 306.0 million pounds. Off-site releases (transfers to disposal) contributed nearly 60% (182.4 million pounds) of this total. As explained above, off-site releases of metals and their compounds include transfers to solidification/stabilization and to wastewater treatment including POTWs.

Methanol ranked second for total releases with 221.1 million pounds. In contrast to zinc compounds, 99.6% of methanol releases occurred on-site, especially as air emissions. Methanol led all TRI chemicals for air releases with 194.4 million pounds (25.3 million pounds fugitive emissions and 169.1 million pounds stack emissions).

Ammonia ranked third overall with total releases of just under 200.0 million pounds. Air emissions of ammonia totaled 156.1 million pounds (35.6 million pounds fugitive and 120.6 million pounds stack). Ammonia ranked second for releases to air. Altogether, air emissions represented more than three-quarters of total on- and off-site releases for 12 of the top 20 chemicals. (In addition to methanol and ammonia, these were toluene, xylene, n-hexane, chlorine, hydrochloric acid, methyl ethyl ketone, carbon disulfide, dichloromethane, styrene, and glycol ethers.)



Table 2-9. Top 20 Chemicals with Largest Total On-site and Off-site Releases, 1997

CAS Number	Chemical	Air		Surface Water Discharges	Underground Injection		On-site Land Releases	
		Fugitive or Nonpoint Emissions Pounds	Stack or Point Air Emissions Pounds		Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other Landfills Pounds
--	Zinc compounds	1,439,010	3,261,934	1,203,833	368,483	0	9,827,280	27,785,517
67-56-1	Methanol	25,252,347	169,124,405	7,019,881	17,621,227	187,607	5,540	315,317
7664-41-7	Ammonia	35,558,747	120,590,003	7,023,065	30,953,105	197,387	23,352	181,233
--	Nitrate compounds	11,960	384,896	148,846,835	40,552,663	250	3,772	11,496
--	Manganese compounds	614,981	906,999	4,206,997	14,412,830	0	3,234,107	25,656,779
108-88-3	Toluene	40,624,222	72,314,721	30,998	510,930	2,705	20,962	18,375
7664-38-2	Phosphoric acid	795,056	1,006,529	43,514,457	13,257	0	5,400	7,617,169
1330-20-7	Xylene (mixed isomers)	17,980,805	56,380,452	36,604	130,995	2,620	2,207	2,897
110-54-3	n-Hexane	22,680,532	48,867,921	58,540	13,221	0	265	861
7782-50-5	Chlorine	1,015,459	63,403,973	301,119	60,595	0	0	50,005
7647-01-0	Hydrochloric acid	2,841,558	56,408,752	1,216	489,005	0	0	10
--	Copper compounds	4,742,739	745,434	105,892	237,184	0	942,977	2,463,555
78-93-3	Methyl ethyl ketone	20,029,691	32,944,541	41,781	485,144	5	7,282	8,596
75-15-0	Carbon disulfide	2,961,175	48,023,779	28,651	517,565	0	0	5
--	Chromium compounds	110,947	276,081	99,497	1,131,559	0	576,612	1,866,187
75-09-2	Dichloromethane	16,374,955	31,290,200	9,492	528,026	0	259	2,200
100-42-5	Styrene	10,826,037	33,300,628	43,954	202,387	0	61,302	418,188
--	Lead compounds	188,278	689,359	36,516	263,980	0	1,120,106	2,542,805
--	Glycol ethers	8,461,559	28,556,856	337,884	5,462	0	806	22,213
7440-66-6	Zinc (fume or dust)	940,823	2,323,823	17,508	1	0	270,093	761,460
	Subtotal	213,450,881	770,801,286	212,964,720	108,497,619	390,574	16,102,322	69,724,868
	Total	317,233,311	1,014,430,575	218,371,961	219,070,242	443,656	20,472,578	93,639,517

Note: On-site Releases from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

More nitrate compounds (added to TRI reporting in 1995) were discharged to surface waters than any other chemical, with 148.8 million pounds. TRI facilities also reported surface water discharges of 43.5 million pounds of phosphoric acid, the second-largest amount of such discharges. These two chemicals accounted for 88.1% of all surface water discharges reported to TRI in 1997.

Nitrate compounds and ammonia ranked first and second, respectively, for underground injection. Injection in Class I wells totaled 40.6 million pounds of nitrate compounds and 31.0 million pounds of ammonia. As noted earlier, relatively little injection of

TRI chemicals was reported to other classes of underground wells; ammonia ranked first for injection in Class II-V wells with 198,000 pounds.

Zinc compounds led all TRI chemicals for total on-site land releases, with 117.3 million pounds, followed by manganese compounds, with 50.2 million pounds. Zinc compounds ranked first in three of the five types of on-site land releases summarized in Table 2-9, with 9.8 million pounds released to RCRA subtitle C landfills, 27.8 million pounds to other landfills, and 61.7 million pounds to other on-site land disposal. Ammonia was released to on-site land treatment in larger amounts, totaling 2.1 million



Table 2-9. Top 20 Chemicals with Largest Total On-site and Off-site Releases, 1997, continued

CAS Number	Chemical	On-site Land Releases			Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
		Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds		Transfers Off-site to Disposal Pounds	
--	Zinc compounds	77,639	17,940,915	61,663,962	123,568,573	182,410,387	305,978,960
67-56-1	Methanol	120,042	380,628	141,887	220,168,881	952,260	221,121,141
7664-41-7	Ammonia	2,067,833	843,712	138,286	197,576,723	2,417,150	199,993,873
--	Nitrate compounds	1,739,402	1,252,109	72,262	192,875,645	4,498,878	197,374,523
--	Manganese compounds	331,134	18,724,654	2,223,807	70,312,288	46,231,218	116,543,506
108-88-3	Toluene	5,316	952	694,801	114,223,982	1,452,282	115,676,264
7664-38-2	Phosphoric acid	190,328	9,027,575	13,387,076	75,556,847	2,734,781	78,291,628
1330-20-7	Xylene (mixed isomers)	12,129	1,720	58,724	74,609,153	723,974	75,333,127
110-54-3	n-Hexane	3,032	250	23,625	71,648,247	297,787	71,946,034
7782-50-5	Chlorine	23,011	5	755	64,854,922	46,946	64,901,868
7647-01-0	Hydrochloric acid	12	0	48,048	59,788,601	447,822	60,236,423
--	Copper compounds	3,597	9,474,619	25,283,483	43,999,480	10,770,350	54,769,830
78-93-3	Methyl ethyl ketone	3	109	143,332	53,660,484	466,246	54,126,730
75-15-0	Carbon disulfide	0	0	0	51,531,175	32,503	51,563,678
--	Chromium compounds	25,593	25,381,630	1,476,411	30,944,517	19,465,080	50,409,597
75-09-2	Dichloromethane	12	0	8,709	48,213,853	226,085	48,439,938
100-42-5	Styrene	8,500	509	48,551	44,910,056	1,583,171	46,493,227
--	Lead compounds	2,362	3,897,020	6,205,566	14,945,992	30,465,946	45,411,938
--	Glycol ethers	7,415	74	9,697	37,401,966	948,930	38,350,896
7440-66-6	Zinc (fume or dust)	750	3,195	6,857,943	11,175,596	24,974,649	36,150,245
	Subtotal	4,618,110	86,929,676	118,486,925	1,601,966,981	331,146,445	1,933,113,426
	Total	5,794,667	96,952,876	130,044,872	2,116,454,255	461,098,829	2,577,553,084

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

pounds, than any other TRI chemical. Ranking 15th overall, chromium compounds had the largest on-site releases to surface impoundments, with 25.4 million pounds.

Use, Toxicity, and Environmental Fate Information

TRI chemicals may cause a variety of adverse health and environmental effects. Information on use, toxicity, and environmental fate is provided here for the top five chemicals with the largest releases in 1997 (see Table 2-9).

Zinc Compounds

Uses. Zinc is used as a coating on iron and steel and in making brass metal alloys. Zinc compounds are widely used in industry, to make paint, rubber, dye, wood preservatives, and ointments.

Toxicity. Zinc compounds are listed on TRI primarily because of concerns for the toxicity of the parent metal, zinc. EPA has categorized zinc as a Group D carcinogen, meaning that sufficient evidence is not available to classify zinc as to its cancer-causing potential. EPA has established an oral reference dose (RfD) of 0.3 mg/kg/day for soluble zinc salts. Zinc has been shown to damage the developing fetus at doses as low as 100 mg/kg/day in animal studies.



Environmental Fate. Many zinc salts are highly soluble in water. Zinc and its salts are highly toxic in aquatic organisms. Zinc is likely to persist in water. Its concentration in aquatic tissue is expected to be significantly higher than its concentration in surrounding water.

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 readily absorbed from the gastrointestinal tract and the respiratory tract, and is toxic to humans in moderate to high doses. In the body, methanol is converted into formaldehyde and formic acid. Observed toxic effects at high dose levels include central nervous system damage and blindness. Inhalation of methanol at relatively high doses affects the liver and blood in animals.

Methanol is expected to have low toxicity to aquatic organisms and 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 chemicals or be washed out by rain. Methanol is readily degraded by microorganisms in soils and surface waters.

Ammonia

Uses. Ammonia is used in the manufacture of nitrogen compounds, including chemicals used as fertilizers or in making nylon and plastics. It 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.

Aqueous ammonia is moderately toxic to aquatic organisms. Because it is a source of nitrogen, an essential element for aquatic plant growth, ammonia can stimulate primary production of plants and can produce changes in the dominant species of plants, leading to cultural eutrophication and ultimately to deterioration of water quality.

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.

Nitrate Compounds

Uses. Many compounds are covered by the nitrate compounds category, and they have many uses. The most significant use is as fertilizers, either straight or blended to make complex fertilizers. Some compounds are also used as oxidizing agents and as constituents in some explosives and pyrotechnics. Nitrate compounds are also used as refining agents for removing air bubbles from melts in the glass and enamel industry and in metallurgy as heat-transfer baths for quench hardening and tempering of steel, light alloys, and copper alloys.

Toxicity. Nitrate compounds that are soluble in water release nitrate ion, which can cause both human health and environmental effects. Human infants exposed to aqueous solutions of nitrate ion can develop a condition in which the blood's ability to carry oxygen is reduced. This reduced supply of oxygen can lead to damaged organs and death.

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



Environmental Fate. Nitrate-nitrogen is the form of nitrogen most available to plants. In the environment, nitrate ion is taken up by plants and becomes part of the natural nitrogen cycle. Excess nitrate can stimulate primary production of plants and can produce changes in the dominant species of plants, leading to cultural eutrophication and ultimately to deterioration of water quality.

Manganese Compounds

Uses. Manganese metal is used primarily in the production of steel such as carbon steel, stainless steel, high-temperature steel, and tool steel where it increases hardness, stiffness, and strength. There are a variety of uses for manganese compounds including the production of dry-cell batteries, matches, fireworks, ceramics, fungicides, and fertilizers. Additional uses include as a catalyst in the chlorination of certain organic compounds, a supplement for animal feed, and in the treatment of wastewater.

Toxicity. Manganese is a widespread element that is essential for normal body functioning in all animal species. Because manganese is an essential nutrient, there are human disease states associated with either deficiencies or excess intakes of manganese. The Food and Nutrition Board of the National Research Council (NRC, 1989) determined an “estimated safe and adequate daily dietary intake” (ESADDI) of manganese to be 2-5 mg/day for adults. Human diets with too little manganese can lead to slowed blood clotting times, dermatitis, changes in hair color, lowered cholesterol levels, and other alterations in metabolism.

Too much manganese can cause serious illness such as effects on the central nervous system. Workers in certain industries who have been exposed to airborne dust containing manganese for many months or years may have mental or emotional disturbances and their body movements may become slow and clumsy. Some of these symptoms may be treated but some may be

caused by permanent brain injury. EPA’s inhalation reference concentration is 0.00005 milligrams per cubic meter.

It is not certain that eating or drinking too much manganese can cause these same serious symptoms although some studies have indicated that excess dietary intake may be of concern. EPA’s oral reference dose is 0.14 mg/kg-day, which is estimated to be an intake for the general population that is not associated with adverse health effects; this is not meant to imply that intakes above the reference dose are necessarily associated with toxicity.

Manganese is also toxic to aquatic organisms with aquatic acute toxicity values as low as 3.2 to 5.7 parts per million (ppm) for invertebrates and as low as 12 ppm for fish. Concentrations as low as 0.2 to 0.3 ppm are toxic to some marine algae.

Environmental Fate. Manganese compounds can be released to the air by industrial emissions and by the erosion of soils containing manganese. These compounds may be present as small dust-like particles that settle out on land and water bodies with the larger particles tending to settle out faster than smaller ones. Manganese compounds from industrial sources can enter the soil, surface water, groundwater, and sewage waters. The chemical state of the manganese, its concentration, and the type of soil or water conditions present, determines the availability of manganese in a particular environment.

Top 20 Chemicals for Quantities Managed in Waste

Table 2-10 lists the 20 TRI chemicals with the largest total production-related waste managed. They accounted for 17.94 billion pounds of production-related waste, nearly three-quarters (72.6%) of the total reported production-related waste managed in 1997. However, revisions by two facilities after data



were “frozen” for this report would change total production-related waste managed to 17.07 billion pounds for the top 20 chemicals.

Facilities reported managing 2.42 billion pounds of methanol in production-related waste, the chemical with the largest total. Methanol was most likely to be managed by on-site treatment (960.2 million pounds) or by on-site recycling (652.6 million pounds). These two categories represented two thirds (66.6%) of the methanol managed in production-related waste. Methanol ranked first for on-site treatment and second for on-site recycling. Methanol also had the largest reported quantities of off-site energy recovery (92.1 million pounds) and off-site treatment (131.7 million pounds) and ranked second for quantity released (226.5 million pounds).

Ethylene ranked second for total production-related waste managed with 1.81 billion pounds. However, the two facilities’ revisions previously noted would change this quantity to 1.21 billion pounds, placing ethylene fourth among all TRI chemicals for total production-related waste managed. TRI facilities reported managing 1.80 billion pounds of toluene and 1.44 billion pounds of copper in production-related waste in 1997. These chemicals would rank second and third, respectively, when the revisions affecting ethylene are taken into account. One facility’s revision would also change production-related waste reported for propylene from 1.10 billion pounds in 1997 to 825.9 million pounds, and propylene would rank eighth rather than fifth. Nearly two-thirds of the toluene managed (1.12 billion pounds or 62.1% of the total for this chemical) was recycled on-site. Toluene ranked first among TRI chemicals for on-site recycling. Copper was the chemical with the largest quantity of off-site recycling, with 783.5 million pounds. Taking into account the facility revisions, ethylene and propylene were combusted for energy recovery in larger quantities (548.8 million pounds and 446.4 million pounds, respectively) than any other TRI chemical.

Ranking ninth overall, zinc compounds ranked first for quantity released on- and off-site with 277.3 million pounds.

Metals and Metal Compounds

Both metals and their compounds are listed on TRI. Release and waste management data reported in 1997 for these chemicals appear in Tables 2-11 through 2-13. Under EPCRA section 313, facilities that manufacture, process, or otherwise use metal compounds report 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 information on the listed portion of the compound is collected in TRI.

Metals (including the metal portion of metal compounds) differ 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 hexavalent chromium (a known carcinogen) to the less toxic trivalent form before releasing or transferring it 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.



On- and Off-site Releases of Metals and Metal Compounds

On- and off-site releases of TRI metals and metal compounds in 1997 totaled 732.8 million pounds, as shown in Table 2-11. TRI facilities reported on- and off-site releases of 342.1 million pounds of zinc and its compounds, 46.7% of the total for metals. Manganese and its compounds ranked second with 143.6 million pounds (19.6%). (As seen in Table 2-9, above, zinc compounds alone ranked first among all TRI chemicals for total releases and manganese compounds alone ranked fifth.)

Off-site releases of 391.5 million pounds represented 53.4% of total releases of metals and metal compounds. (As explained above, transfers of metals to disposal include transfers to solidification/stabilization and to wastewater treatment at private or public facilities.) Off-site releases of 207.4 million pounds of zinc and its compounds far outweighed those of other metals. The largest type of on-site release of metals was “other disposal”, a category of on-site land releases. Other disposal totaled 114.0 million pounds or 15.6% of all on- and off-site releases. Again, the largest component was zinc and

its compounds, with 68.5 million pounds. Non-RCRA subtitle C landfills and surface impoundments each received approximately 11% of total releases of metals, with 79.8 million pounds and 82.4 million pounds, respectively. Metals with the largest amounts in these categories were manganese and its compounds with 35.3 million pounds released to other landfills and chromium and its compounds with 25.4 million pounds released to surface impoundments. Altogether, on-site land releases of metals amounted to 296.5 million pounds, 40.5% of the total.

Table 2-12 more closely examines off-site releases of metals. Again, zinc and its compounds had the largest amount with 207.4 million pounds (53.0% of the total). By far the largest amount of metals and their compounds—207.2 million pounds—was sent to off-site landfills and disposal surface impoundments. Solidification/stabilization services received another 144.0 million pounds. These amounts represented 52.9% and 36.8%, respectively, of all off-site releases of metals and metal compounds. Zinc and its compounds had the largest amounts with 97.3 million pounds to landfills/surface impoundments and 99.9 million pounds to solidification/stabilization.



Table 2-10. Top 20 TRI Chemicals with Largest Quantities in Waste, 1997

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
67-56-1	Methanol	652,646,250	19,047,443	338,486,384	92,054,052	960,162,594	131,720,870	226,499,488	2,420,617,081	198,274
74-85-1	Ethylene ^a	115,302,995	14,410	1,151,632,258	14,141,146	496,425,339	1,798,509	29,264,637	1,808,579,294	602,721
108-88-3	Toluene	1,119,206,056	28,405,851	216,605,276	88,849,998	217,192,273	19,924,367	113,112,450	1,803,296,271	272,801
7440-50-8	Copper	603,925,697	783,470,245	225,424	3,551,787	41,296,581	2,006,069	9,658,847	1,444,134,650	368,800
115-07-1	Propylene ^b	65,774,345	35	718,371,130	2,068	297,708,572	125,675	15,905,795	1,097,887,620	955,453
7664-41-7	Ammonia	348,336,500	9,620,303	118,146,876	112,444	290,578,256	16,712,554	194,820,109	978,327,042	714,157
7647-01-0	Hydrochloric acid	72,162,656	4,211,505	180,000	6,673,069	782,653,538	11,481,225	60,106,472	937,468,465	45,552
8001-58-9	Creosote	66,432,245	1,700,000	702,717	67,254	865,430,718	362,602	2,606,664	937,302,200	497,301
--	Zinc compounds	107,656,323	257,386,303	613,266	261,459	70,211,629	18,374,257	277,306,831	731,810,068	6,770,405
--	Lead compounds	333,440,293	303,148,397	56,000	50,842	3,202,463	4,556,056	34,566,800	679,020,851	3,730,552
7664-38-2	Phosphoric acid	453,512,929	4,387,637	2,000	65,620	128,525,343	5,572,441	69,947,907	662,013,877	7,162,494
107-21-1	Ethylene glycol	452,791,021	76,990,931	6,836,406	17,472,536	55,214,574	29,734,918	12,985,925	652,026,311	66,961
110-54-3	n-Hexane	371,918,727	14,085,860	30,687,478	19,134,402	72,743,563	4,724,666	69,383,458	582,678,154	704,970
--	Copper compounds	310,075,700	167,470,119	0	25,643	42,125,835	4,452,985	57,625,028	581,775,310	3,073,536
1330-20-7	Xylene (mixed isomers)	122,408,183	42,050,232	139,297,715	77,876,899	64,130,806	10,457,390	75,793,914	532,015,139	150,541
7664-93-9	Sulfuric acid	245,755,305	2,206,540	940	20	186,759,219	2,867,753	21,847,891	459,437,668	12,115
75-01-4	Vinyl chloride	398,418,771	82,698	21,752,907	17,663	33,633,983	134,349	957,085	454,997,456	6,426
--	Nitrate compounds	99,267,015	1,600,700	0	271,802	49,691,186	73,381,286	202,947,298	427,159,287	182,840
7697-37-2	Nitric acid	28,640,127	2,812,833	27,246	257	306,863,652	16,414,079	22,042,219	376,800,413	115,681
7782-50-5	Chlorine	79,099,777	111,317	0	2,161	229,962,293	1,106,905	64,957,305	375,239,758	40,564
	Subtotal ^c	6,046,770,915	1,718,803,359	2,743,624,023	320,631,122	5,194,512,417	355,908,956	1,562,336,123	17,942,586,915	25,672,144
	Total ^c	7,986,618,922	2,390,787,879	3,805,792,208	525,610,064	7,012,922,513	536,021,338	2,467,643,821	24,725,396,745	37,761,187

Note: Data from Section 8 of Form R.

^aOne facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery of 193,830,000 pounds of ethylene in 1997. The facility has since revised this quantity to 13,000,000 pounds. Another facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 422,000,000 pounds of ethylene in 1997. The facility has since revised this quantity to zero. For ethylene, on-site energy recovery changes to 548,802,258 pounds and total production-related waste managed changes to 1,205,749,294 pounds. Ethylene changes in rank from second to fourth.

^bOne facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 272,000,000 pounds of propylene in 1997. The facility has since revised this quantity to zero. For propylene, on-site energy recovery changes to 446,371,130 pounds and total production-related waste managed changes to 825,887,620 pounds. Propylene changes in rank from fifth to eighth.

^cRevisions by two facilities for ethylene and propylene change on-site energy recovery to 1,868,794,023 pounds and total production-related waste managed to 17,067,756,915 pounds for the top 20 chemicals. For all chemicals, on-site energy recovery changes to 2,930,962,208 pounds and total production-related waste changes to 23,850,566,745 pounds.



Table 2-11. TRI On-site and Off-site Releases of Metals and Metal Compounds, 1997

Chemical	On-site Releases											Off-site Releases	Total On- and Off-site Releases Pounds
	Air		Underground Injection			On-site Land Releases						Transfers Off-site to Disposal Pounds	
	Fugitive or Nonpoint Emissions Pounds	Stack or Point Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds	Total On-site Releases Pounds		
Antimony and antimony compounds	33,112	60,657	41,708	12,212	0	212,830	175,186	1,143	10,394	847,648	1,394,890	4,432,103	5,826,993
Arsenic and arsenic compounds	30,868	169,050	4,133	76,170	0	16,922	1,744,039	2	3,207,391	797,898	6,046,473	1,900,539	7,947,012
Barium and barium compounds	68,095	510,349	966,023	152,000	0	2,569,499	4,509,435	168,293	1,610,709	838,160	11,392,563	10,555,529	21,948,092
Beryllium and beryllium compounds	36	1,145	28	0	0	580	55,890	5	38	0	57,722	10,343	68,065
Cadmium and cadmium compounds	9,971	56,617	2,455	52	0	50,125	33,477	867	484,266	427,964	1,065,794	1,485,431	2,551,225
Chromium and chromium compounds	285,762	674,038	111,302	1,131,560	0	603,820	2,153,750	25,747	25,443,708	1,553,064	31,982,751	25,427,173	57,409,924
Cobalt and cobalt compounds	24,200	42,160	36,814	44,664	0	33,197	81,426	3,449	171,987	349,989	787,886	1,242,382	2,030,268
Copper and copper compounds	5,107,341	1,273,180	146,349	294,697	0	1,159,855	3,310,715	159,321	9,488,448	25,822,478	46,762,384	29,148,825	75,911,209
Lead and lead compounds	298,739	1,003,786	51,234	263,980	0	1,297,680	2,940,071	2,367	3,998,217	9,759,365	19,615,439	36,292,950	55,908,389
Manganese and manganese compounds	1,120,972	1,220,626	4,354,743	14,412,836	6	3,310,389	35,316,215	341,376	18,788,948	2,328,436	81,194,547	62,440,650	143,635,197
Mercury and mercury compounds	9,888	4,543	420	41	0	406	585	5	0	6,885	22,773	50,561	73,334
Nickel and nickel compounds	241,384	523,788	118,351	142,076	0	129,933	660,756	7,213	1,184,103	2,625,135	5,632,739	10,985,703	16,618,442
Selenium and selenium compounds	9,419	73,728	2,432	3,409	0	580	103,751	5	92,280	121,478	407,082	35,796	442,878
Silver and silver compounds	6,861	8,686	6,252	156	0	581	2,130	830	9,600	27,850	62,946	92,702	155,648
Thallium and thallium compounds	0	256	0	0	0	1,000	0	0	0	0	1,256	1,680	2,936
Vanadium* (CAS Number 7440-62-2)	1,001	11,435	708	0	0	1,000	116,500	10	0	0	130,654	43,211	173,865
Zinc and zinc compounds*	2,379,833	5,585,757	1,221,341	368,484	0	10,097,373	28,546,977	78,389	17,944,110	68,521,905	134,744,169	207,385,036	342,129,205
Total	9,627,482	11,219,801	7,064,293	16,902,337	6	19,485,770	79,750,903	789,022	82,434,199	114,028,255	341,302,068	391,530,614	732,832,682

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

* Only fume or dust forms are reportable.



Table 2-12. TRI Off-site Releases of Metals and Metal Compounds, 1997

Chemical	Storage Only ^b Pounds	Solidification/ Stabilization Metals Only ^c Pounds	Wastewater Treatment (Excluding POTWs) Metals Only ^d Pounds	Transfers to POTWs Metals Only ^e Pounds	Underground Injection Pounds	Landfills/ Disposal Surface Impoundments Pounds
Antimony and antimony compounds	4,438	252,593	18,102	120,945	9,433	3,643,194
Arsenic and arsenic compounds	9,728	149,416	7	1,071	209,716	1,460,728
Barium and barium compounds	250,740	2,084,996	63,171	279,402	14,918	4,668,715
Beryllium and beryllium compounds	0	1,273	230	5	0	8,668
Cadmium and cadmium compounds	250	208,279	98,173	4,105	0	1,146,008
Chromium and chromium compounds	84,896	8,090,368	1,110,653	271,422	412,988	13,835,905
Cobalt and cobalt compounds	1,900	65,263	137,502	14,956	0	970,477
Copper and copper compounds	252,744	3,649,326	379,438	384,045	19,813	15,638,386
Lead and lead compounds	21,502	14,955,787	63,866	44,415	6,600	20,250,579
Manganese and manganese compounds	951,900	12,709,986	2,744,338	693,864	5,153	40,523,581
Mercury and mercury compounds	3,365	13,859	29	5	3	18,683
Nickel and nickel compounds	52,271	1,843,649	295,246	160,194	385,256	7,594,813
Selenium and selenium compounds	0	14,206	4,500	285	0	9,034
Silver and silver compounds	4,270	7,548	5	1,767	0	61,514
Thallium and thallium compounds	0	680	0	0	0	1,000
Vanadium ^a (CAS Number 7440-62-2)	0	801	0	390	0	42,020
Zinc and zinc compounds ^a	2,561,004	99,939,436	465,975	423,059	2,095,539	97,320,367
Total	4,199,008	143,987,466	5,381,235	2,399,930	3,159,419	207,193,672

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

^aOnly fume or dust forms are reportable.

^b“Storage only” (disposal code M10) indicates that the toxic chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to “storage only” are included as a form of disposal (off-site release). See Box 2-2.

^cBeginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste management code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it, such transfers are included as a form of disposal (off-site release). See Box 2-3. Some facilities erroneously reported metals and metal compounds using waste treatment code M40; in this report, such amounts have been included in solidification/stabilization of metals and metal compounds.

^dBeginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste management code M62) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste management code M61). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 2-3. Some facilities erroneously reported metals and metal compounds using waste management code M61; in this report, such amounts have been included in transfers of metals and metal compounds to wastewater treatment.

^eReported as discharges to POTWs in Section 6.1 of Form R. EPA considers transfers of metals and metal compounds to POTWs as an off-site release because sewage treatment does not destroy the metal content of the waste material.



Table 2-12. TRI Off-site Releases of Metals and Metal Compounds, 1997, continued

Chemical	Land Treatment Pounds	Other Land Disposal Pounds	Other Off-site Management Pounds	Transfers to Waste Broker for Disposal Pounds	Unknown ^f Pounds	Total Off-site Releases
						Transfers Off-site to Disposal Pounds
Antimony and antimony compounds	7,790	253,794	23,422	63,672	34,720	4,432,103
Arsenic and arsenic compounds	250	43,476	4,150	21,997	0	1,900,539
Barium and barium compounds	109,231	435,947	264,623	158,660	2,225,126	10,555,529
Beryllium and beryllium compounds	0	0	0	167	0	10,343
Cadmium and cadmium compounds	480	11,000	15,720	1,411	5	1,485,431
Chromium and chromium compounds	29,145	650,658	591,147	293,299	56,692	25,427,173
Cobalt and cobalt compounds	41	15,346	7,655	25,150	4,092	1,242,382
Copper and copper compounds	16,545	187,642	6,904,351	1,663,942	52,593	29,148,825
Lead and lead compounds	0	417,505	44,237	384,793	103,666	36,292,950
Manganese and manganese compounds	147,620	3,498,564	234,483	917,183	13,978	62,440,650
Mercury and mercury compounds	0	0	5,817	8,800	0	50,561
Nickel and nickel compounds	11,830	160,133	122,316	244,027	115,968	10,985,703
Selenium and selenium compounds	0	0	7,771	0	0	35,796
Silver and silver compounds	7	274	1	17,316	0	92,702
Thallium and thallium compounds	0	0	0	0	0	1,680
Vanadium ^a (CAS Number 7440-62-2)	0	0	0	0	0	43,211
Zinc and zinc compounds ^a	123,431	1,807,877	474,705	1,946,902	226,741	207,385,036
Total	446,370	7,482,216	8,700,398	5,747,319	2,833,581	391,530,614

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

^aOnly fume or dust forms are reportable.

^f“Unknown” (disposal code M99) indicates that a facility is not aware of the type of waste management used for the toxic chemical that is sent off-site. Amounts reported as “unknown” transfers are treated as a form of disposal (off-site release).



Table 2-13. Quantities of TRI Metals and Metal Compounds in Waste, 1997

Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
Antimony and antimony compounds	8,899,552	4,791,476	29,269	60,344	1,266,484	633,512	4,707,114	20,387,751	18,326
Arsenic and arsenic compounds	5,352,853	1,245,876	0	355	139,290	1,113,238	5,161,910	13,013,522	1,885,285
Barium and barium compounds	30,469,704	2,121,883	735,764	334,114	7,987,627	1,774,373	15,664,260	59,087,725	2,240,371
Beryllium and beryllium compounds	110,428	158,981	0	0	0	1,657	65,520	336,586	0
Cadmium and cadmium compounds	9,027,946	1,565,571	0	1,501	6,681,712	55,252	2,362,318	19,694,300	66,080
Chromium and chromium compounds	56,898,370	132,895,449	144,221	61,953	1,685,198	6,311,835	49,957,865	247,954,891	1,339,465
Cobalt and cobalt compounds	4,927,303	9,891,672	0	6,773	1,356,795	82,451	1,581,585	17,846,579	1,407
Copper and copper compounds	914,001,397	950,940,364	225,424	3,577,430	83,422,416	6,459,054	67,283,875	2,025,909,960	3,442,336
Lead and lead compounds	556,936,521	347,664,109	328,104	63,386	5,113,409	5,395,447	43,338,187	958,839,163	3,839,062
Manganese and manganese compounds	60,269,170	110,163,098	20,349	35,897	1,809,283	5,859,604	133,536,603	311,694,004	936,905
Mercury and mercury compounds	438,003	46,999	0	0	4,239	13,408	44,964	547,613	20
Nickel and nickel compounds	38,419,220	119,380,709	57,870	62,802	6,050,029	1,688,147	14,723,550	180,382,327	194,915
Selenium and selenium compounds	782,528	9,693	74,135	582	1	10,629	350,475	1,228,043	104,800
Silver and silver compounds	4,167,289	2,316,127	0	29	554,600	5,621	212,189	7,255,855	2,910
Thallium and thallium compounds	0	8	90,406	2	0	328	1,020	91,764	0
Vanadium* (CAS Number 7440-62-2)	358477	21714	0	0	440	1205	172015	553851	128
Zinc and zinc compounds*	132,488,144	318,033,921	664,642	323,753	70,976,284	18,823,298	312,500,391	853,810,433	6,770,655
Total	1,823,546,905	2,001,247,650	2,370,184	4,528,921	187,047,807	48,229,059	651,663,841	4,718,634,367	20,842,665

Note: Data from Section 8 of Form R.

* Only fume or dust forms are reportable.

Quantities of Metals and Metal Compounds Managed in Waste

TRI facilities reported managing a total of 4.72 billion pounds of metals and metal compounds in waste in 1997, as shown in Table 2-13. Copper and its compounds ranked first with 2.03 billion pounds, followed by lead and its compounds (958.8 million pounds) and zinc and its compounds (853.8 million pounds). Together, these chemicals represented 81.3% of all production-related waste of metals and metal compounds.

Most metals and metal compounds in waste were recycled. With on-site recycling of 1.82 billion pounds and off-site recycling of 2.00 billion pounds,

this waste management option accounted for 81.1% of total production-related waste management of metals and metal compounds. More than 90% of both copper and lead and their compounds was recycled. In contrast, only about half (52.8%) of the zinc and its compounds in production-related waste was managed by recycling.

For all metals and metal compounds, quantities released on- and off-site totaled 651.7 million pounds, the next largest waste management option for these substances after on- and off-site recycling. More than one third (36.6%) of the zinc and its compounds was reported as quantity released on- and off-site.



OSHA Carcinogens

Some chemicals are listed in TRI because they are either known human carcinogens or suspect carcinogens (see Box 2-8). 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. Table 2-14 shows on- and off-site releases of these chemicals.

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 determinations and release and other waste management 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 1910.1900), because much of the information that 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 2-8 shows the specific bases for which the individual chemical was designated as a known or suspect carcinogen. This list was updated for the 1997 TRI Public Data Release, based on a review of the NTP, IARC, and OSHA sources.

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. These groups are included in Table 2-14, because not all compounds meet the criteria.

On- and Off-site Releases of OSHA Carcinogens

As shown in Table 2-14, TRI facilities reported releases of 247.9 million pounds of OSHA carcinogens, about one-tenth (9.6%) of all TRI on- and off-site releases in 1997. Releases were reported for 115 OSHA carcinogens out of 167 such chemicals on the TRI list. Air emissions of 173.5 million pounds amounted to 70.0% of the total. Dichloromethane and styrene were released in the largest amounts, 48.4 million pounds and 46.5 million pounds, respectively, and air emissions accounted for more than 90% of releases of both chemicals. Releases of these two chemicals represented 38.3% of all OSHA carcinogen releases.



Box 2-8. Basis of OSHA Carcinogen Listing for Individual Chemicals

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

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

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

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

OSHA: Z—The chemical appears at 29 CFR part 1910 Subpart Z.

†† Certain compounds.

‡‡ Chlorophenoxy herbicides (IARC 2B).



Box 2-8. Basis of OSHA Carcinogen Listing for Individual Chemicals, continued

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

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

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

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

OSHA: Z—The chemical appears at 29 CFR part 1910 Subpart Z.

†† Certain compounds.

‡‡ Chlorophenoxy herbicides (IARC 2B).



Table 2-14. TRI On-site and Off-site Releases of OSHA Carcinogens, 1997

CAS Number	Chemical	On-site Releases					On-site Land Releases
		Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		RCRA Subtitle C Landfills Pounds
					Class I Wells Pounds	Class II-V Wells Pounds	
75-07-0	Acetaldehyde	1,546,521	11,189,528	223,370	371,576	0	98
60-35-5	Acetamide	250	0	1	1,863,202	0	0
79-06-1	Acrylamide	5,440	11,838	6,355	7,074,021	0	305,545
107-13-1	Acrylonitrile	288,966	935,603	1,229	4,031,900	0	47
60-09-3	4-Aminoazobenzene	0	0	0	6	0	0
92-67-1	4-Aminobiphenyl	0	0	0	0	0	0
90-04-0	o-Anisidine	1,389	72	76	0	0	0
7440-38-2	Arsenic	11,167	40,392	679	0	0	500
1332-21-4	Asbestos (friable)	353	6,902	2	0	0	0
1912-24-9	Atrazine	3,948	31,171	2,242	418	0	0
71-43-2	Benzene	3,064,782	5,688,418	11,464	362,350	750	834
98-07-7	Benzoic trichloride	5,915	152	0	0	0	0
7440-41-7	Beryllium	36	780	27	0	0	580
--	Beryllium compounds	0	365	1	0	0	0
542-88-1	Bis(chloromethyl) ether	4	3	0	0	0	0
106-99-0	1,3-Butadiene	1,535,616	1,175,119	2,552	1,000	0	0
7440-43-9	Cadmium	660	1,716	521	0	0	665
--	Cadmium compounds	9,311	54,901	1,934	52	0	49,460
56-23-5	Carbon tetrachloride	121,135	236,364	315	32,958	0	0
115-28-6	Chlorendic acid	0	49	0	0	0	0
106-47-8	p-Chloroaniline	15,295	37	869	0	0	0
67-66-3	Chloroform	2,435,839	4,769,557	164,654	26,954	0	106
107-30-2	Chloromethyl methyl ether	2,079	2,076	5	0	0	0
563-47-3	3-Chloro-2-methyl-1-propene	145	25,837	0	0	0	0
--	Chlorophenols	1,957	2,822	16	92,980	0	0
6459-94-5	C.I. Acid Red 114	0	0	0	0	0	0
7440-48-4	Cobalt	19,725	15,229	2,164	40	0	0
--	Cobalt compounds	4,475	26,931	34,650	44,624	0	33,197
8001-58-9	Creosote	491,542	797,457	8,452	0	0	26,055
120-71-8	p-Cresidine	1,427	1,600	0	0	0	0
135-20-6	Cupferron	0	0	0	0	0	0
94-75-7	2,4-D (acetic acid)	2,184	2,807	59	250	0	250
1929-73-3	2,4-D butoxyethyl ester	250	250	0	0	0	0
94-80-4	2,4-D butyl ester	0	1	0	0	0	0
1928-43-4	2,4-D 2-Ethylhexyl ester	2,084	3,522	0	0	0	0
101-80-4	4,4'-Diaminodiphenyl ether	15	9	360	0	0	0
95-80-7	2,4-Diaminotoluene	211	1,747	0	0	0	0
25376-45-8	Diaminotoluene (mixed isomers)	6,632	4,822	556	27,000	0	0
106-93-4	1,2-Dibromoethane	8,146	1,561	4	10	0	0
106-46-7	1,4-Dichlorobenzene	119,122	143,144	1,728	2,000	0	0
25321-22-6	Dichlorobenzene (mixed isomers)	264	15,010	0	0	0	0
91-94-1	3,3'-Dichlorobenzidine	5	250	0	0	0	0
612-83-9	3,3'-Dichlorobenzidine dihydrochloride	0	0	0	0	0	0
64969-34-2	3,3'-Dichlorobenzidine sulfate	0	0	0	0	0	0
107-06-2	1,2-Dichloroethane	332,725	584,039	1,826	4,549	0	0
75-09-2	Dichloromethane	16,374,955	31,290,200	9,492	528,026	0	259
10061-02-6	trans-1,3-Dichloropropene	445	23	0	0	0	0
542-75-6	1,3-Dichloropropylene	8,093	728	67	0	0	0
62-73-7	Dichlorvos	255	250	5	0	0	0
117-81-7	Di-(2-ethylhexyl) phthalate	62,161	173,340	583	0	0	66
64-67-5	Diethyl sulfate	7,293	126	0	0	0	0
101-90-6	Diglycidyl resorcinol ether	10	10	0	0	0	0

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.



Table 2-14. TRI On-site and Off-site Releases of OSHA Carcinogens, 1997, continued

CAS Number	Chemical	On-site Releases					Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
		On-site Land Releases				Transfers Off-site to Disposal Pounds			
		Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds				
75-07-0	Acetaldehyde	108,531	7,179	2,363	5	13,449,171	5,483	13,454,654	
60-35-5	Acetamide	0	0	0	0	1,863,453	0	1,863,453	
79-06-1	Acrylamide	0	0	0	0	7,403,199	26,290	7,429,489	
107-13-1	Acrylonitrile	265	10	250	255	5,258,525	4,879	5,263,404	
60-09-3	4-Aminoazobenzene	0	0	0	0	6	0	6	
92-67-1	4-Aminobiphenyl	0	0	0	0	0	0	0	
90-04-0	o-Anisidine	0	0	0	0	1,537	4	1,541	
7440-38-2	Arsenic	3,652	2	22	6,110	62,524	530,960	593,484	
1332-21-4	Asbestos (friable)	486,500	0	0	28,000	521,757	4,329,603	4,851,360	
1912-24-9	Atrazine	0	388,928	0	0	426,707	166,947	593,654	
71-43-2	Benzene	872	3,294	283	57,192	9,190,239	83,518	9,273,757	
98-07-7	Benzoic trichloride	0	0	0	0	6,067	520	6,587	
7440-41-7	Beryllium	55,500	5	38	0	56,966	5,741	62,707	
--	Beryllium compounds	390	0	0	0	756	4,602	5,358	
542-88-1	Bis(chloromethyl) ether	0	0	0	0	7	0	7	
106-99-0	1,3-Butadiene	0	287	0	7	2,714,581	6,600	2,721,181	
7440-43-9	Cadmium	251	117	867	6,704	11,501	135,195	146,696	
--	Cadmium compounds	33,226	750	483,399	421,260	1,054,293	1,350,236	2,404,529	
56-23-5	Carbon tetrachloride	63	32	0	40	390,907	18,947	409,854	
115-28-6	Chlorendic acid	0	0	0	0	49	0	49	
106-47-8	p-Chloroaniline	0	0	5	0	16,206	0	16,206	
67-66-3	Chloroform	4,918	1,896	604	0	7,404,528	14,498	7,419,026	
107-30-2	Chloromethyl methyl ether	0	0	0	0	4,160	54	4,214	
563-47-3	3-Chloro-2-methyl-1-propene	0	0	0	0	25,982	0	25,982	
--	Chlorophenols	0	0	0	0	97,775	839	98,614	
6459-94-5	C.I. Acid Red 114	0	0	0	0	0	0	0	
7440-48-4	Cobalt	1,115	652	15	7,212	46,152	685,258	731,410	
--	Cobalt compounds	80,311	2,797	171,972	342,777	741,734	557,124	1,298,858	
8001-58-9	Creosote	0	0	0	1,875	1,325,381	2,301,965	3,627,346	
120-71-8	p-Cresidine	0	0	0	0	3,027	2,100	5,127	
135-20-6	Cupferron	0	0	0	0	0	0	0	
94-75-7	2,4-D (acetic acid)	0	0	0	5	5,555	6,616	12,171	
1929-73-3	2,4-D butoxyethyl ester	0	0	0	0	500	0	500	
94-80-4	2,4-D butyl ester	0	0	0	0	1	0	1	
1928-43-4	2,4-D 2-Ethylhexyl ester	0	0	0	0	5,606	2,036	7,642	
101-80-4	4,4'-Diaminodiphenyl ether	0	0	0	0	384	58	442	
95-80-7	2,4-Diaminotoluene	0	0	0	0	1,958	0	1,958	
25376-45-8	Diaminotoluene (mixed isomers)	0	0	0	8	39,018	284,524	323,542	
106-93-4	1,2-Dibromoethane	0	1	0	0	9,722	5,116	14,838	
106-46-7	1,4-Dichlorobenzene	1,800	0	0	160	267,954	289	268,243	
25321-22-6	Dichlorobenzene (mixed isomers)	0	0	0	0	15,274	9	15,283	
91-94-1	3,3'-Dichlorobenzidine	0	0	0	0	255	7,400	7,655	
612-83-9	3,3'-Dichlorobenzidine dihydrochloride	0	0	0	0	0	0	0	
64969-34-2	3,3'-Dichlorobenzidine sulfate	0	0	0	0	0	0	0	
107-06-2	1,2-Dichloroethane	0	0	0	27	923,166	120,476	1,043,642	
75-09-2	Dichloromethane	2,200	12	0	8,709	48,213,853	226,085	48,439,938	
10061-02-6	trans-1,3-Dichloropropene	0	0	0	0	468	3	471	
542-75-6	1,3-Dichloropropylene	0	0	0	0	8,888	0	8,888	
62-73-7	Dichlorvos	0	0	0	0	510	0	510	
117-81-7	Di-(2-ethylhexyl) phthalate	70,812	126	0	5	307,093	995,038	1,302,131	
64-67-5	Diethyl sulfate	0	0	0	0	7,419	0	7,419	
101-90-6	Diglycidyl resorcinol ether	0	0	0	0	20	0	20	

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.



Table 2-14. TRI On-site and Off-site Releases of OSHA Carcinogens, 1997, continued

CAS Number	Chemical	On-site Releases					On-site Land Releases RCRA Subtitle C Landfills
		Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		
					Class I Wells Pounds	Class II-V Wells Pounds	Pounds
94-58-6	Dihydrosafrole	500	5	0	0	0	0
119-90-4	3,3'-Dimethoxybenzidine	0	0	0	0	0	0
20325-40-0	3,3'-Dimethoxybenzidine dihydrochloride	0	0	0	0	0	0
612-82-8	3,3'-Dimethylbenzidine dihydrochloride	0	0	0	0	0	0
79-44-7	Dimethylcarbonyl chloride	3	115	0	0	0	0
68-12-2	N,N-Dimethylformamide	315,017	1,030,948	45,694	730,005	0	750
57-14-7	1,1-Dimethyl hydrazine	751	151	0	0	0	0
77-78-1	Dimethyl sulfate	4,303	196	0	0	0	0
121-14-2	2,4-Dinitrotoluene	1,798	3	90	0	0	0
606-20-2	2,6-Dinitrotoluene	437	1	24	0	0	0
123-91-1	1,4-Dioxane	43,031	98,231	196,272	0	0	0
120-36-5	2,4-DP	7	250	0	0	0	0
2702-72-9	2,4-D sodium salt	0	0	0	0	0	0
106-89-8	Epichlorohydrin	220,224	94,025	9,304	0	0	1
140-88-5	Ethyl acrylate	68,574	114,547	159	0	0	0
151-56-4	Ethyleneimine	0	6	0	0	0	0
75-21-8	Ethylene oxide	272,532	653,838	3,634	15,147	0	0
96-45-7	Ethylene thiourea	5	281	0	0	0	0
50-00-0	Formaldehyde	1,675,452	9,859,116	246,857	9,905,754	0	28
118-74-1	Hexachlorobenzene	125	29	276	139	0	0
302-01-2	Hydrazine	8,094	3,565	12	0	0	0
10034-93-2	Hydrazine sulfate	0	0	0	110,000	0	0
7439-92-1	Lead	110,461	314,427	14,718	0	0	177,574
58-89-9	Lindane	43	11	5	0	0	0
93-65-2	Mecoprop	270	1,005	0	0	0	0
94-74-6	Methoxone	255	500	0	0	0	250
101-14-4	4,4'-Methylenebis(2-chloroaniline)	2,256	10	0	0	0	0
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzeneamine	0	0	0	0	0	0
101-77-9	4,4'-Methylenedianiline	8,182	1,039	86	15,050	0	0
90-94-8	Michler's ketone	0	401	0	0	0	0
134-32-7	alpha-Naphthylamine	0	0	0	0	0	0
7440-02-0	Nickel	162,785	248,773	24,911	25,642	0	12,688
--	Nickel compounds	78,599	275,015	93,440	116,434	0	117,245
139-13-9	Nitrilotriacetic acid	0	0	7,474	2,400	0	0
98-95-3	Nitrobenzene	23,483	40,831	299	638,059	0	7
79-46-9	2-Nitropropane	13,961	9,766	2,789	0	0	0
87-86-5	Pentachlorophenol	1,966	5,082	952	0	0	28,000
57-41-0	Phenytion	0	1	0	0	0	0
--	Polybrominated biphenyls	0	0	0	0	0	0
1336-36-3	Polychlorinated biphenyls (PCBs)	0	0	0	0	0	6,794
--	Polycyclic aromatic compounds	115,825	379,411	1,652	0	0	673
7758-01-2	Potassium bromate	250	5	0	0	0	0
1120-71-4	Propane sultone	0	0	0	0	0	0
75-55-8	Propyleneimine	190	40	0	0	0	0
75-56-9	Propylene oxide	196,218	347,385	22,961	11,700	0	0
81-07-2	Saccharin (manufacturing)	150	21	0	0	0	0
94-59-7	Safrole	500	5	0	0	0	0
100-42-5	Styrene	10,826,037	33,300,628	43,954	202,387	0	61,302
96-09-3	Styrene oxide	0	11	0	0	0	0

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.



Table 2-14. TRI On-site and Off-site Releases of OSHA Carcinogens, 1997, continued

CAS Number	Chemical	On-site Releases					Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
		On-site Land Releases				Transfers Off-site to Disposal Pounds			
		Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds				
94-58-6	Dihydrosafrole	0	0	0	0	505	0	505	
119-90-4	3,3'-Dimethoxybenzidine	0	0	0	0	0	0	0	
20325-40-0	3,3'-Dimethoxybenzidine dihydrochloride	0	0	0	0	0	0	0	
612-82-8	3,3'-Dimethylbenzidine dihydrochloride	0	0	0	0	0	0	0	
79-44-7	Dimethylcarbonyl chloride	0	0	0	0	118	0	118	
68-12-2	N,N-Dimethylformamide	250	0	0	32	2,122,696	292,012	2,414,708	
57-14-7	1,1-Dimethyl hydrazine	0	0	0	0	902	437	1,339	
77-78-1	Dimethyl sulfate	0	0	0	0	4,499	2,308	6,807	
121-14-2	2,4-Dinitrotoluene	0	0	0	0	1,891	0	1,891	
606-20-2	2,6-Dinitrotoluene	0	0	0	0	462	0	462	
123-91-1	1,4-Dioxane	0	4,609	0	0	342,143	305,787	647,930	
120-36-5	2,4-DP	0	0	0	0	257	0	257	
2702-72-9	2,4-D sodium salt	0	0	0	0	0	0	0	
106-89-8	Epichlorohydrin	2,008	2	0	7,499	333,063	4,016	337,079	
140-88-5	Ethyl acrylate	0	0	513	0	183,793	4,821	188,614	
151-56-4	Ethyleneimine	0	0	0	0	6	0	6	
75-21-8	Ethylene oxide	0	981	0	5	946,137	52	946,189	
96-45-7	Ethylene thiourea	0	0	0	0	286	5,657	5,943	
50-00-0	Formaldehyde	57,651	5,730	49,388	496	21,800,472	157,083	21,957,555	
118-74-1	Hexachlorobenzene	0	0	0	0	569	12,038	12,607	
302-01-2	Hydrazine	0	0	0	250	11,921	30,430	42,351	
10034-93-2	Hydrazine sulfate	0	0	0	0	110,000	0	110,000	
7439-92-1	Lead	397,266	5	101,197	3,553,799	4,669,447	5,827,004	10,496,451	
58-89-9	Lindane	0	0	0	0	59	753	812	
93-65-2	Mecoprop	0	0	0	5	1,280	250	1,530	
94-74-6	Methoxone	0	0	0	0	1,005	4,853	5,858	
101-14-4	4,4'-Methylenebis(2-chloroaniline)	0	0	0	0	2,266	0	2,266	
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzeneamine	0	0	0	0	0	0	0	
101-77-9	4,4'-Methylenedianiline	0	0	0	0	24,357	16,765	41,122	
90-94-8	Michler's ketone	0	0	0	0	401	0	401	
134-32-7	alpha-Naphthylamine	0	0	0	0	0	0	0	
7440-02-0	Nickel	122,538	2,173	17,048	83,202	699,760	3,872,894	4,572,654	
--	Nickel compounds	538,218	5,040	1,167,055	2,541,933	4,932,979	7,112,809	12,045,788	
139-13-9	Nitrilotriacetic acid	0	0	0	0	9,874	0	9,874	
98-95-3	Nitrobenzene	0	0	0	0	702,679	240	702,919	
79-46-9	2-Nitropropane	0	0	0	0	26,516	25	26,541	
87-86-5	Pentachlorophenol	5,047	0	0	250	41,297	66,982	108,279	
57-41-0	Phenytoin	0	0	0	0	1	12,420	12,421	
--	Polybrominated biphenyls	0	0	0	0	0	0	0	
1336-36-3	Polychlorinated biphenyls (PCBs)	0	0	0	0	6,794	980,846	987,640	
--	Polycyclic aromatic compounds	5,786	5,339	2,067	1,042	511,795	1,394,568	1,906,363	
7758-01-2	Potassium bromate	0	0	0	0	255	0	255	
1120-71-4	Propane sultone	0	0	0	0	0	0	0	
75-55-8	Propyleneimine	0	0	0	0	230	0	230	
75-56-9	Propylene oxide	200	436	0	251	579,151	29,904	609,055	
81-07-2	Saccharin (manufacturing)	0	0	0	0	171	1,400	1,571	
94-59-7	Safrole	0	0	0	0	505	0	505	
100-42-5	Styrene	418,188	8,500	509	48,551	44,910,056	1,583,171	46,493,227	
96-09-3	Styrene oxide	0	0	0	0	11	0	11	

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.



Table 2-14. TRI On-site and Off-site Releases of OSHA Carcinogens, 1997, continued

CAS Number	Chemical	On-site Releases					On-site Land Releases
		Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		RCRA Subtitle C Landfills Pounds
					Class I Wells Pounds	Class II-V Wells Pounds	
127-18-4	Tetrachloroethylene	2,741,951	4,143,117	2,282	15,118	0	0
62-56-6	Thiourea	982	44	347	5,000	0	0
584-84-9	Toluene-2,4-diisocyanate	3,673	2,830	5	0	0	0
91-08-7	Toluene-2,6-diisocyanate	1,019	1,781	0	0	0	0
26471-62-5	Toluenediisocyanate (mixed isomers)	19,274	32,530	255	0	0	0
95-53-4	o-Toluidine	32,824	7,667	273	7,440	0	0
79-01-6	Trichloroethylene	8,943,064	8,643,261	563	986	0	0
88-06-2	2,4,6-Trichlorophenol	119	13	27	0	0	0
96-18-4	1,2,3-Trichloropropane	12,561	785	62	0	0	0
51-79-6	Urethane	0	0	0	0	0	0
108-05-4	Vinyl acetate	738,057	2,610,895	2,669	119,320	0	18
593-60-2	Vinyl bromide	130	5,300	0	0	0	0
75-01-4	Vinyl chloride	258,419	661,265	82	370	0	0
87-62-7	2,6-Xylydine	1	51	0	0	0	0
	Subtotal	53,397,185	120,125,971	1,198,386	26,384,867	750	822,992
	Total for All TRI Chemicals	317,233,311	1,014,430,575	218,371,961	219,070,242	443,656	20,472,578

Note: On-site Releases from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

Quantities of OSHA Carcinogens Managed in Waste

TRI facilities managed 3.67 billion pounds of OSHA carcinogens in waste in 1997, as shown in Table 2-15. This total represented 14.8% of production-related waste for all TRI chemicals. Three-quarters (73.6%) of the OSHA carcinogens in waste were treated on-site (1.38 billion pounds) or recycled on-site (1.32 billion pounds).

Creosote ranked first among OSHA carcinogens for production-related waste managed with 937.3 million pounds. Most (92.3%) of the creosote was treated on-site—865.4 million pounds. No other OSHA carcinogen exceeded 100 million pounds of on-site treatment.

Vinyl chloride and lead ranked second and third, respectively, among OSHA carcinogens for total production-related waste managed in 1997. The 455.0

million pounds of vinyl chloride in waste included 398.4 million pounds managed by on-site recycling. Production-related waste for lead totaled 279.8 million pounds, and that quantity included 223.5 million pounds recycled on-site. These were the largest amounts of on-site recycling among OSHA carcinogens.

Chemicals Affecting Children’s Health

Children are especially vulnerable to toxic chemicals for a number of reasons, including their body weight relative to food and air intake, their behavior (play) patterns that result in the potential for higher outdoor exposures, their developing systems, and their relative inability to identify and protect themselves from exposures that are not obvious threats. For those reasons, parents may wish to use TRI information to identify chemicals that may be of potential concern for their children’s development.



Table 2-14. TRI On-site and Off-site Releases of OSHA Carcinogens, 1997, continued

CAS Number	Chemical	On-site Releases					Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
		On-site Land Releases							
		Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds				
127-18-4	Tetrachloroethylene	0	1	5	5,068	6,907,542	24,753	6,932,295	
62-56-6	Thiourea	0	0	250	0	6,623	4,212	10,835	
584-84-9	Toluene-2,4-diisocyanate	0	0	0	0	6,508	6,178	12,686	
91-08-7	Toluene-2,6-diisocyanate	0	0	0	0	2,800	1,360	4,160	
26471-62-5	Toluenediisocyanate (mixed isomers)	0	0	0	359	52,418	37,897	90,315	
95-53-4	o-Toluidine	0	0	0	5	48,209	3,151	51,360	
79-01-6	Trichloroethylene	0	0	0	3,975	17,591,849	176,747	17,768,596	
88-06-2	2,4,6-Trichlorophenol	0	0	0	0	159	0	159	
96-18-4	1,2,3-Trichloropropane	0	0	0	0	13,408	13	13,421	
51-79-6	Urethane	0	0	0	0	0	500	500	
108-05-4	Vinyl acetate	1,316	0	831	3	3,473,109	28,974	3,502,083	
593-60-2	Vinyl bromide	0	0	0	0	5,430	0	5,430	
75-01-4	Vinyl chloride	1	0	0	0	920,137	90,248	1,010,385	
87-62-7	2,6-Xylidine	0	0	0	0	52	0	52	
	Subtotal	2,398,875	438,904	1,998,681	7,127,076	213,893,687	33,972,571	247,866,258	
	Total for All TRI Chemicals	93,639,517	5,794,667	96,952,876	130,044,872	2,116,454,255	461,098,829	2,577,553,084	

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

Beginning with the 1995 reporting year, EPA added 286 toxic chemicals to the TRI list. A full one-third of these chemicals were added because of the developmental effects they can cause. These chemicals may cause effects such as structural abnormalities, reduced birth weight, non-viable births (as shown in animal studies) as well as effects upon a growing child. In 1997, on- and off-site releases of these chemicals totaled 11.5 billion pounds. Table 2-16 details the releases of the top 10 of these chemicals. With 6.5 million pounds, the solvent N-methyl-2-pyrrolidone (NMP) ranked first among developmental toxins for total on- and off-site releases. Air emissions, reported by facilities in many industry sectors, constituted the majority of NMP releases, totaling 3.1 million pounds. Two facilities in the chemical manufacturing industry (SIC code 28) reported most of the underground injection of NMP—one reporting 1.8 million pounds and the other 749,000 pounds (both to Class I wells). NMP is used as a solvent, including applications in extraction, separation, and recovery of aromatics.

Nitrate Compounds and Children's Health

Of the chemicals added in the 1995 reporting year, nitrate compounds were released in the greatest amounts in the 1997 reporting year. Since modern water treatment plants are required to monitor and control nitrate levels in drinking water, exposure to these compounds is limited. In addition to causing adverse environmental impacts, nitrates have been linked to infantile methemoglobinemia, or “blue-baby” syndrome. This condition, which occurs in human infants exposed to aqueous solutions of nitrate ion and which can cause damage to developing organs and death, is caused by the reduced capacity of the blood to carry oxygen. Infants 0-3 months of age are the most sensitive population to nitrate-induced methemoglobinemia. This is primarily due to their higher stomach pH which favors the growth of nitrate-reducing bacteria, the immaturity of their metabolic enzyme systems, and reduced capacity of their erythrocytes to reduce methemoglobinemia to hemoglobin. Information concerning this chemical is important to a family's right-to-know.



Table 2-15. Quantities of OSHA Carcinogens in Waste, 1997

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
75-07-0	Acetaldehyde	332,000	33	9,848,731	56,699	15,532,164	1,192,757	13,449,700	40,412,084	10,453
60-35-5	Acetamide	0	0	64,008	145	1	194	1,863,448	1,927,796	0
79-06-1	Acrylamide	2,266	3	86,000	13,306	144,607	219,594	7,427,483	7,893,259	4,010
107-13-1	Acrylonitrile	12,690,465	58,092	5,300,722	198,012	10,143,286	1,170,267	5,329,623	34,890,467	1,602
60-09-3	4-Aminoazobenzene	0	0	0	0	0	76	6	82	0
92-67-1	4-Aminobiphenyl	0	0	0	0	100,000	190	0	100,190	0
90-04-0	o-Anisidine	0	0	1,315	0	3,867	6,925	1,541	13,648	0
7440-38-2	Arsenic	1,546,013	433,597	0	0	69,967	10,075	113,610	2,173,262	15,011
1332-21-4	Asbestos (friable)	195,118	0	0	0	667,313	709,910	5,382,618	6,954,959	273,483
1912-24-9	Atrazine	250	0	0	0	342,091	126,897	806,780	1,276,018	250
71-43-2	Benzene	46,015,599	381,821	60,211,346	1,146,425	47,653,556	2,274,444	9,202,991	166,886,182	62,271
98-07-7	Benzoic trichloride	0	0	0	22,000	210,000	0	6,596	238,596	0
7440-41-7	Beryllium	110,428	120,381	0	0	0	14	61,323	292,146	0
--	Beryllium compounds	0	38,600	0	0	0	1,643	4,197	44,440	0
542-88-1	Bis(chloromethyl) ether	0	0	0	0	6,500	0	7	6,507	0
106-99-0	1,3-Butadiene	5,481,906	14,451,023	40,873,920	57,787	65,299,067	314,610	2,210,086	128,688,399	510,546
7440-43-9	Cadmium	1,090,072	310,225	0	0	33,925	10,497	128,622	1,573,341	0
--	Cadmium compounds	7,937,874	1,255,346	0	1,501	6,647,787	44,755	2,233,696	18,120,959	66,080
56-23-5	Carbon tetrachloride	2,801,998	139,227	983,907	37,782	42,300,623	1,158,420	382,418	47,804,375	11,773
115-28-6	Chlorendic acid	0	0	0	0	0	914	49	963	0
106-47-8	p-Chloroaniline	0	0	46,000	400	0	5,815	16,898	69,113	0
67-66-3	Chloroform	5,675,765	735,446	5,823,214	314,634	16,142,192	1,548,310	7,389,584	37,629,145	17,372
107-30-2	Chloromethyl methyl ether	0	0	0	0	12,823	0	4,227	17,050	0
563-47-3	3-Chloro-2-methyl-1-propene	0	0	0	0	625,186	14,191	25,983	665,360	0
--	Chlorophenols	2,897,377	0	0	100	237,504	5,540	97,871	3,238,392	749
6459-94-5	C.I. Acid Red 114	0	0	0	0	0	0	0	0	0
7440-48-4	Cobalt	4,423,572	7,919,086	0	0	147,031	24,592	277,126	12,791,407	3
--	Cobalt compounds	503,731	1,972,586	0	6,773	1,209,764	57,859	1,304,459	5,055,172	1,404
8001-58-9	Creosote	66,432,245	1,700,000	702,717	67,254	865,430,718	362,602	2,606,664	937,302,200	497,301
120-71-8	p-Cresidine	0	0	0	0	0	32,491	5,127	37,618	0
135-20-6	Cupferron	0	0	2,595	0	0	0	0	2,595	0
94-75-7	2,4-D (acetic acid)	98,184	0	0	0	29,710	46,125	11,467	185,486	191
1929-73-3	2,4-D butoxyethyl ester	0	0	0	0	0	0	349	349	0
94-80-4	2,4-D butyl ester	0	0	92,200	34	9,362	2	1	101,599	0
1928-43-4	2,4-D 2-Ethylhexyl ester	3,982	0	0	0	0	11,151	7,540	22,673	0
101-80-4	4,4'-Diaminodiphenyl ether	0	0	0	0	150	6,272	379	6,801	0
95-80-7	2,4-Diaminotoluene	0	0	0	0	74,135	275	1,747	76,157	0
25376-45-8	Diaminotoluene (mixed isomers)	0	0	2,871,215	2,891,505	534,411	779,888	47,547	7,124,566	280,003
106-93-4	1,2-Dibromoethane	0	0	0	30,740	11,862	645	9,611	52,858	0
106-46-7	1,4-Dichlorobenzene	2,638,810	0	133,690	2,073	1,793	197,383	340,436	3,314,185	38
25321-22-6	Dichlorobenzene (mixed isomers)	0	0	293,565	745	230,056	10,523	15,282	550,171	0
91-94-1	3,3'-Dichlorobenzidine	0	0	0	0	7,400	74,000	7,300	88,700	0
612-83-9	3,3'-Dichlorobenzidine dihydrochloride	0	0	0	0	12,378	38,000	0	50,378	0
64969-34-2	3,3'-Dichlorobenzidine sulfate	0	0	0	0	750	3,800	0	4,550	0
107-06-2	1,2-Dichloroethane	50,816,240	17,461,011	47,830,815	420,603	53,835,059	1,741,248	902,553	173,007,529	27,434
75-09-2	Dichloromethane	115,695,827	11,621,741	8,620,172	3,659,871	20,671,899	13,076,828	48,751,274	222,097,612	70,356
10061-02-6	trans-1,3-Dichloropropene	11,000	160	12,144,000	124	6,590	500	465	12,162,839	0
542-75-6	1,3-Dichloropropylene	9,445,000	240	14,000,000	4,320	2,229,589	42,522	8,787	25,730,458	48
62-73-7	Dichlorvos	0	0	0	0	10	50	1,306	1,366	0
117-81-7	Di-(2-ethylhexyl) phthalate	2,840,681	1,699,965	1,298,057	311,076	238,989	257,221	1,120,306	7,766,295	5,272
64-67-5	Diethyl sulfate	0	0	0	3,699,098	2,673	394	4,775	3,706,940	118
101-90-6	Diglycidyl resorcinol ether	0	0	0	800	0	0	15	815	0
94-58-6	Dihydrosofrole	0	0	0	0	0	53	100	153	0
119-90-4	3,3'-Dimethoxybenzidine	0	0	0	0	0	0	0	0	0
20325-40-0	3,3'-Dimethoxybenzidine dihydrochloride	0	0	0	0	10	0	0	10	0
612-82-8	3,3'-Dimethylbenzidine dihydrochloride	0	0	0	0	0	0	0	0	0
79-44-7	Dimethylcarbonyl chloride	0	0	0	0	25,445	0	118	25,563	0
68-12-2	N,N-Dimethylformamide	7,815,007	268,701	11,766,149	5,590,193	14,497,941	4,913,049	3,176,537	48,027,577	2,555

Note: Data from Section 8 of Form R.



Table 2-15. Quantities of OSHA Carcinogens in Waste, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
57-14-7	1,1-Dimethyl hydrazine	0	2	0	1,900	2,314	796	905	5,917	0
77-78-1	Dimethyl sulfate	0	54,525	62,628	0	10,457	2,323	4,223	134,156	0
121-14-2	2,4-Dinitrotoluene	0	1,500	50,182	5,363	35,419	1,500	1,883	95,847	0
606-20-2	2,6-Dinitrotoluene	0	0	477	0	17,119	110	462	18,168	0
123-91-1	1,4-Dioxane	620,000	4	1,269,899	927,524	1,292,021	117,066	725,779	4,952,293	11
120-36-5	2,4-DP	3,000	0	0	0	0	11	9	3,020	192
2702-72-9	2,4-D sodium salt	0	0	0	0	18,993	0	0	18,993	0
106-89-8	Epichlorohydrin	20,870,748	17,715	5,878,951	83,883	6,048,675	1,329,239	317,147	34,546,358	3,583
140-88-5	Ethyl acrylate	390,000	40,206	16,473,174	832,383	329,187	160,956	184,447	18,410,353	285
151-56-4	Ethyleneimine	0	0	0	0	22,000	0	6	22,006	0
75-21-8	Ethylene oxide	70,880	1,610	38,000	7	11,312,884	105,228	598,688	12,127,297	389,284
96-45-7	Ethylene thiourea	780	0	0	0	4,170	0	5,334	10,284	0
50-00-0	Formaldehyde	90,741,776	643,236	14,449,258	411,094	83,203,482	3,436,540	21,883,140	214,768,526	22,015
118-74-1	Hexachlorobenzene	7,100	4	140,000	4,172	1,690,651	21,984	12,622	1,876,533	11
302-01-2	Hydrazine	25	41	0	650	248,339	21,912	32,825	303,792	190
10034-93-2	Hydrazine sulfate	0	0	0	0	1,700	0	110,002	111,702	0
7439-92-1	Lead	223,496,228	44,515,712	272,104	12,544	1,910,946	839,391	8,771,387	279,818,312	108,510
58-89-9	Lindane	84	0	0	0	0	2,790	67	2,941	0
93-65-2	Mecoprop	1,750	0	0	0	740	1,335	551	4,376	96
94-74-6	Methoxone	3,391	0	0	0	0	271	6,361	10,023	96
101-14-4	4,4'-Methylenebis(2-chloroaniline)	0	0	0	2,956	0	7,809	2,004	12,769	0
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzeneamine	0	0	0	0	0	0	0	0	0
101-77-9	4,4'-Methylenedianiline	3,700	138	960,204	5,478	97,414	71,650	36,244	1,174,828	0
90-94-8	Michler's ketone	0	0	0	230	0	0	401	631	0
134-32-7	alpha-Naphthylamine	0	0	0	0	0	0	0	0	0
7440-02-0	Nickel	29,304,518	87,162,134	26,213	57,392	1,398,988	646,126	3,953,432	122,548,803	4,374
--	Nickel compounds	9,114,702	32,218,575	31,657	5,410	4,651,041	1,042,021	10,770,118	57,833,524	190,541
139-13-9	Nitritotriacetic acid	0	0	0	0	1,238,653	12,140	9,874	1,260,667	0
98-95-3	Nitrobenzene	1,432,350	0	2,229,827	6,795	1,150,986	1,298,784	704,915	6,823,657	1,520
79-46-9	2-Nitropropane	0	0	1,165,892	837	53,022	5,803	26,516	1,252,070	0
87-86-5	Pentachlorophenol	1,282,753	0	0	7,282	10,928	112,876	31,703	1,445,542	82,213
57-41-0	Phenytol	0	0	0	0	180	950	13,000	14,130	0
--	Polybrominated biphenyls	0	5,071	0	0	0	0	549	5,620	0
1336-36-3	Polychlorinated biphenyls (PCBs)	0	1,400	0	0	0	62,928	8,994	73,322	981,191
--	Polycyclic aromatic compounds	1,335,135	599,044	7,624,658	56,921	1,147,152	13,441	1,881,453	12,657,804	9,078
7758-01-2	Potassium bromate	0	0	53,129	2	0	0	455	53,586	0
1120-71-4	Propane sultone	0	0	0	0	4,900	120	0	5,020	0
75-55-8	Propyleneimine	0	0	0	0	4,000	0	230	4,230	0
75-56-9	Propylene oxide	1,475,188	0	13,432,224	81,598	13,013,027	624,849	625,866	29,252,752	3,929
81-07-2	Saccharin (manufacturing)	0	0	0	0	10,000	10	1,600	11,610	0
94-59-7	Safrole	0	0	0	0	1	25	100	126	0
100-42-5	Styrene	15,296,876	1,109,081	26,721,098	7,388,173	10,169,393	4,250,300	44,387,903	109,322,824	283,482
96-09-3	Styrene oxide	0	0	30,000	0	0	0	11	30,011	0
127-18-4	Tetrachloroethylene	40,942,533	8,921,720	4,556,500	1,232,892	17,289,521	1,173,229	6,844,562	80,960,957	13,494
62-56-6	Thiourea	4,456	872	0	0	12,779	11,821	9,087	39,015	0
584-84-9	Toluene-2,4-diisocyanate	317	389	0	29,423	1,596	9,715	10,992	52,432	21,320
91-08-7	Toluene-2,6-diisocyanate	79	0	0	2,754	714	2,111	2,750	8,408	439
26471-62-5	Toluenediisocyanate (mixed isomers)	6,300	1,235	16,421,251	39,793	720,297	910,358	56,838	18,156,072	30,757
95-53-4	o-Toluidine	60	0	232,012	48,861	160,399	83,592	48,194	573,118	69
79-01-6	Trichloroethylene	136,927,893	5,812,121	5,788,807	876,284	3,793,003	1,354,282	17,415,699	171,968,089	388,927
88-06-2	2,4,6-Trichlorophenol	0	0	0	0	1,014,286	0	159	1,014,445	0
96-18-4	1,2,3-Trichloropropane	1,500,000	0	680,000	470	1,224,000	8,635,576	13,473	12,053,519	14
51-79-6	Urethane	0	0	0	0	0	0	1,500	1,500	0
108-05-4	Vinyl acetate	827,369	93,926	21,696,559	13,187,593	17,449,172	1,146,917	3,446,620	57,848,156	18,204
593-60-2	Vinyl bromide	0	0	46,470	17	74	1	5,400	51,962	0
75-01-4	Vinyl chloride	398,418,771	82,698	21,752,907	17,663	33,633,983	134,349	957,085	454,997,456	6,426
87-62-7	2,6-Xylidine	0	0	43,038	5,500	11	0	52	48,601	0
	Subtotal	1,321,580,172	241,850,243	385,121,457	43,867,844	1,379,774,631	58,150,916	238,664,245	3,669,009,508	4,418,574
	Total for All TRI Chemicals	7,986,618,922	2,390,787,879	3,805,792,208	525,610,064	7,012,922,513	536,021,338	2,467,643,821	24,725,396,745	37,761,187

Note: Data from Section 8 of Form R.



Table 2-16. TRI On-site and Off-site Releases for Some Developmental Toxins, Added to TRI for 1995 Reporting Year, Top 10 Chemicals for Total Releases, 1997

CAS Number	Chemical	On-site Releases				
		Fugitive or Nonpoint Air Emissions	Stack or Point Air Emissions	Surface Water Discharges	Underground Injection	
		Pounds	Pounds	Pounds	Class I Wells Pounds	Class II-V Wells Pounds
872-50-4	N-Methyl-2-pyrrolidone	843,385	2,281,899	27,896	2,570,958	41,000
108-93-0	Cyclohexanol	66,226	113,397	420	3,616,560	0
	-- Nicotine and salts	20,146	414,803	956	0	0
128-04-1	Sodium dimethyldithiocarbamate	12,778	4,906	10	0	0
1918-00-9	Dicamba	250	791	26	65,535	0
122-34-9	Simazine	505	2,434	348	0	0
1689-99-2	Bromoxynil octanoate	1,136	250	0	0	0
333-41-5	Diazinon	26	13,798	15	0	0
759-94-4	Ethyl dipropylthiocarbamate	1,588	620	113	9,501	0
1918-16-7	Propachlor	0	50	0	0	0
	Subtotal	946,040	2,832,948	29,784	6,262,554	41,000
	Total for Developmental Toxins Added to TRI for 1995 Reporting Year	951,767	2,848,683	31,959	6,273,247	41,000

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

Table 2-16. TRI On-site and Off-site Releases for Some Developmental Toxins, Added to TRI for 1995 Reporting Year, Top 10 Chemicals for Total Releases, 1997, continued

CAS Number	Chemical	On-site Releases					Total On-site Releases Pounds	Off-site Releases Pounds	Total On-and Off-site Releases Pounds
		On-site Land Releases							
		RCRA Subtitle C Landfills Pounds	Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds			
872-50-4	N-Methyl-2-pyrrolidone	4,841	186,094	4,770	4,447	9,127	5,974,417	528,483	6,502,900
108-93-0	Cyclohexanol	0	0	12	0	0	3,796,615	810	3,797,425
	-- Nicotine and salts	0	0	0	0	0	435,905	351,431	787,336
128-04-1	Sodium dimethyldithiocarbamate	0	0	0	0	0	17,694	126,741	144,435
1918-00-9	Dicamba	0	0	0	0	0	66,602	2,180	68,782
122-34-9	Simazine	0	0	0	0	0	3,287	48,629	51,916
1689-99-2	Bromoxynil octanoate	0	0	0	0	0	1,386	17,990	19,376
333-41-5	Diazinon	0	0	0	0	0	13,839	1,862	15,701
759-94-4	Ethyl dipropylthiocarbamate	0	0	0	0	0	11,822	2,778	14,600
1918-16-7	Propachlor	0	0	0	0	0	50	13,000	13,050
	Subtotal	4,841	186,094	4,782	4,447	9,127	10,321,617	1,093,904	11,415,521
	Total for Developmental Toxins Added to TRI for 1995 Reporting Year	5,091	186,099	4,782	4,447	9,127	10,356,202	1,125,430	11,481,632

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

Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.



On- and off-site releases of nitrate compounds reported to TRI in 1997 totaled 197.4 million pounds. This chemical ranked fourth among all TRI chemicals for total releases (see Table 2-9). TRI facilities managed 427.2 million pounds of nitrate compounds in production-related waste; nitrate compounds ranked 18th for total production-related waste (see Table 2-10).

Mercury and Children's Health

Exposure to high levels of mercury has been associated with serious neurological and developmental effects in humans. The fetal nervous system has been found to be more sensitive to mercury toxicity than that of adults. Women of child-bearing age are therefore at greatest risk. Fish consumption dominates the pathway for human and wildlife exposure to mercury. While most United States consumers need not be concerned about their exposure to mercury, some exposures may be of concern. Those who regularly and frequently consume large amounts of fish -- either marine species that typically have much higher levels of mercury than other seafood, or freshwater fish that have been affected by mercury pollution -- are more highly exposed. In its Mercury Study Report to Congress, EPA concluded that between 1% and 3% of women of child-bearing age eat sufficient amounts of fish to be at risk from mercury exposure.

In 1997, on- and off-site releases of mercury and its compounds totaled 73,000 pounds; production-related waste totaled 548,000 pounds (see Tables 2-11 and 2-13). Reporting of mercury and mercury compounds is expected to increase in the 1998 reporting year, as electric utilities and other industry sectors are added to TRI.

Ozone and Children's Health

EPA has also noted that there are special concerns relating to children's exposure to ozone. Children are most at risk from exposure to ozone because: children breathe more air per pound of body weight than adults; children are more susceptible than adults to

environmental threats because of their developing respiratory systems; and children are outside most during the summer, when ozone levels are highest. Also, because asthma in children is a growing concern, additional factors must be taken into account in understanding ozone exposure of asthmatic children. Concern has grown recently because children are 25% of the population and comprise 40% of the asthma cases; the asthma death rate is three times as great as it was 20 years ago; African-Americans die from asthma at a rate six times that of Caucasians; and ozone aggravates asthma, increasing use of medication, medical treatment, and visits to emergency clinics.

Ozone releases reported to TRI totaled 776,000 pounds in 1997, all emitted to air. TRI facilities reported production-related waste for this chemical of 3.6 million pounds, including 2.8 million pounds of on-site treatment. (TRI release and waste management data for all chemicals appear in Table 2-20 at the end of this chapter.) In addition to the ozone released directly to the environment, the majority of ozone is formed in the atmosphere as a reaction between nitrogen oxides (NO_x) and volatile organic compounds or VOCs [e.g., methyl isobutyl ketone (MIBK) and methyl ethyl ketone (MEK)] in the presence of sunlight. VOCs result from combustion; evaporation of hydrocarbons, such as gasoline; and emissions from processes employing hydrocarbons, from major sources such as chemical plants to small sources such as dry cleaners and charcoal lighter fluids. NO_x results primarily from combustion and is emitted by utilities, industrial boilers, and automobiles.

Prevention of TRI Chemicals in Waste

As noted earlier in this chapter, the Pollution Prevention Act of 1990 (PPA) requires facilities to report the quantities of TRI chemicals they manage in waste, both on- and off-site. The PPA also requires facilities to provide information about the efforts they have made to reduce or eliminate those quantities.



With the 1991 reporting year, facilities began reporting to TRI information about any source reduction activities they implemented during the year.

Source Reduction

Source reduction activities are undertaken to reduce the amount of a toxic chemical which enters a wastestream or is otherwise released to the environment. By reducing the generation of toxic chemicals in waste, source reduction activities reduce the need to recycle, treat, or dispose of toxic chemicals. Box 2-9 explains source reduction as defined by the PPA.

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

Table 2-17 summarizes source reduction activity reporting by category for 1997. The most frequently reported categories of source reduction activities were good operating practices (9.4% of all forms), process modifications (6.5%), and spill and leak prevention (4.5%). These categories were also the most frequently reported in previous years. More than 4,100 facilities reported at least one source reduction activity, 22.1% of all reporting facilities. They submitted 12,872 forms that indicated at least one source reduction activity, 21.1% of all Form Rs submitted in 1997. Thus, for every Form R indicating source reduction activity in 1997, four did not.

Box 2 - 9. What is Source Reduction

What is Source Reduction?

Through source reduction, 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. Source reduction is defined in the Pollution Prevention Act of 1990 as any practice that:

- reduces the amount of any hazardous substance, pollutant, or contaminant entering any wastestream 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.

Source reduction practices can include modifications in equipment, process, procedure, or technology, 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 source reduction.

Facility Projections of TRI Chemicals in Waste

National Overview

In 1997, facilities reported managing 24.73 billion pounds of TRI chemicals in production-related waste, as summarized in Table 2-3 earlier in this chapter. These facilities projected a 1.2% decrease, to 24.43 billion pounds, by reporting year 1999 (see Table 2-18). Late revisions by two facilities would change the 1997 total for production-related waste managed to 23.85 billion pounds, as noted earlier in this chapter. These revisions would also change the total projected for 1999 to 23.47 billion pounds, a projected decrease of 1.6%.

Reductions of more than 100 million pounds each were expected in on-site recycling (from 7.99 billion pounds to 7.83 billion pounds), quantity released on- and off-site (from 2.47 billion pounds to 2.34 billion pounds), and on-site treatment (from 7.01 billion pounds to 6.90 billion pounds). In percentage terms,

**Table 2-17. Facilities and Forms Reporting Source Reduction Activity, by Category, 1997**

Source Reduction Activity Categories	Facilities Reporting Source Reduction Activity As Percent of TRI Facilities Reporting Form Rs*		Forms Reporting Source Reduction Activity As Percent of TRI Form Rs*	
	Number	Percent	Number	Percent
	Good Operating Practices	2,505	13.3	5,737
Inventory Control	587	3.1	1,357	2.2
Spill and Leak Prevention	1,087	5.8	2,736	4.5
Raw Material Modifications	1,314	7.0	2,210	3.6
Process Modifications	1,884	10.0	3,972	6.5
Cleaning and Degreasing	600	3.2	892	1.5
Surface Preparation/Finishing	635	3.4	1,234	2.0
Product Modification	491	2.6	904	1.5
Any Source Reduction Activity	4,147	22.1	12,872	21.1

Note: All source reduction activities on a form are counted in the corresponding category. Totals do not equal the sum of the above categories because facilities and forms may report more than one source reduction activity.

*Source Reduction Activity reporting is only done using the Form R; Form As do not contain source reduction activity information.

Table 2-18. Current Year and Projected Quantities of TRI Chemicals in Waste, 1997-1999

Waste Management Activity	Current Year 1997	Projected 1998	Projected 1999
	Pounds	Pounds	Pounds
Recycled On-site	7,986,618,922	7,794,833,050	7,827,180,611
Recycled Off-site	2,390,787,879	2,356,648,275	2,401,111,687
Energy Recovery On-site *	3,805,792,208	3,862,018,153	3,965,274,628
Energy Recovery Off-site	525,610,064	486,154,779	489,841,732
Treated On-site	7,012,922,513	6,959,462,725	6,904,993,529
Treated Off-site	536,021,338	502,784,443	501,254,860
Quantity Released On- and Off-site	2,467,643,821	2,370,733,085	2,343,743,515
Total Production-related Waste Managed *	24,725,396,745	24,332,634,510	24,433,400,562

Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1997.

*One facility, TPI Petroleum in Ardmore, Oklahoma, reported on-site energy recovery for ethylene of 422,000,000 pounds in 1997 and projected 443,100,000 pounds for 1998 and 465,255,000 pounds for 1999. This facility also reported on-site energy recovery for propylene of 272,000,000 pounds in 1997 and projected 285,600,000 pounds for 1998 and 299,880,000 pounds for 1999. The facility has since revised these quantities to zero. Another facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery for ethylene of 198,830,000 pounds in 1997 and projected 213,213,000 pounds for both 1998 and 1999. The facility has since revised all three quantities to 13,000,000 pounds. These revisions change on-site energy recovery to 2,930,962,208 pounds in 1997, 2,933,105,153 pounds projected for 1998, and 2,999,926,628 projected for 1999. Total production-related waste managed changes to 23,850,566,745 pounds in 1997, 23,403,721,510 pounds projected for 1998, and 23,468,052,562 pounds projected for 1999.



the largest projected decreases were 6.8% in off-site energy recovery and 6.5% in off-site treatment, although these represented relatively small absolute reductions.

At the same time, on-site energy recovery was expected to increase from 3.81 billion pounds to 3.97 billion pounds, a projected 4.2% increase. The facility revisions previously described would change projected on-site energy recovery totals to 2.93 billion in 1997 and a projected 3.00 billion in 1999, for a projected increase of 2.4%. For off-site recycling, an increase of 0.4%, from 2.39 billion pounds to 2.40 billion pounds, was projected.

These projections represent little change in how facilities expected to manage TRI chemicals in waste. From 1997 to 1999, quantities released—the least desirable waste management option—would decrease from 10.3% to 10.0% of total production-related waste managed as projected in facilities' submissions to TRI. Taking into account the facility revisions noted throughout this chapter, on-site energy recovery would rise from 12.3% to 12.8%.

These are the largest projected changes in the distribution of waste management methods. Although they constitute a slight positive shift from releases toward a more preferred option, these changes represent little or no progress in improving the management of TRI chemicals in waste.

Projected Waste Management Data by State

Texas, the state with the largest production-related waste managed in 1997, was also the state projecting the largest absolute reduction in production-related

waste over the next two years. As shown in Table 2-19, production-related waste in Texas was expected to decrease from 4.17 billion pounds in 1997 to 3.93 billion pounds in 1999. This amounted to a projected 5.8% decrease for 1997 to 1999, compared to a 3.0% increase over the last year (1996 to 1997). North Carolina facilities projected the second-largest reduction, from 803.9 million pounds in 1997 to 668.7 million pounds in 1999. This amounted to a 16.8% decrease expected over the next two years, compared to an 11.8% increase from 1996 to 1997. No other state or territory projected a decrease of more than 100 million pounds from 1997 to 1999.

Pennsylvania ranked first for projected increase in production-related waste, from 917.9 million pounds in 1997 to 1.01 billion pounds in 1999, the only projected increase exceeding 100 million pounds. Pennsylvania's projected 10.4% increase from 1997 to 1999 compares to an 8.4% increase for 1996 to 1997.

Chemical-specific Release and Waste Management Data

Table 2-20 presents on- and off-site releases and waste management data for all reported TRI chemicals for 1997. Pesticides are denoted by an asterisk (*) next to the chemical name. These are chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the U.S.) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-19. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1996-1999

State	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds		
Alabama	96	238,148,336	35,101,704	40,674,988	25,087,761	270,928,758	7,936,970	99,477,178	717,355,695
	97	266,066,193	41,610,934	54,993,029	33,306,201	288,994,880	17,224,155	82,908,645	785,104,037
	98	275,134,840	41,455,438	61,218,034	37,770,876	302,026,791	15,023,759	77,815,340	810,445,078
	99	258,312,826	40,915,384	66,850,983	40,248,768	316,666,357	26,051,125	76,223,544	825,268,987
Alaska	96	25,842	235,363	457,493	5,869	1,561,278	1,363	6,906,358	9,193,566
	97	32,133	220,038	456,085	9,423	2,562,157	2,812	4,627,993	7,910,641
	98	34,844	36,500	456,000	53	4,132,367	779	2,395,260	7,055,803
	99	34,844	209,238	456,000	3	4,045,047	779	2,311,607	7,057,518
American Samoa	96	0	0	0	0	0	0	10,500	10,500
	97	0	0	0	0	0	0	12,750	12,750
	98	0	0	0	0	0	0	10,000	10,000
	99	0	0	0	0	0	0	8,800	8,800
Arizona	96	147,955,494	77,562,752	719,450	785,060	6,812,734	10,970,040	46,788,641	291,594,171
	97	201,656,876	54,239,088	1,157,897	832,659	8,843,621	4,915,653	31,292,633	302,938,427
	98	184,975,829	55,179,659	944,634	868,455	9,278,598	4,968,202	27,118,184	283,333,561
	99	207,823,736	52,719,928	961,347	927,022	9,617,863	4,944,483	21,649,923	298,644,302
Arkansas	96	198,396,747	59,035,261	32,913,002	6,328,691	112,720,103	1,061,241	38,843,292	449,298,337
	97	217,902,230	50,501,079	52,342,924	6,085,102	117,185,581	1,064,592	57,077,521	502,159,029
	98	126,270,976	50,018,679	50,537,356	5,706,572	117,349,921	739,673	55,398,399	406,021,576
	99	123,368,652	55,397,604	51,719,435	5,675,131	118,179,545	721,412	66,159,204	421,220,983
California	96	49,768,416	65,626,379	21,633,349	21,655,068	139,326,264	16,623,563	50,896,177	365,529,216
	97	55,746,988	76,635,699	39,353,765	22,087,802	77,309,592	16,729,705	46,419,635	334,283,186
	98	52,189,063	72,707,240	29,269,419	9,173,629	71,520,724	16,677,475	42,981,821	294,519,371
	99	53,818,001	74,436,905	29,779,388	8,832,142	73,503,727	18,043,710	48,512,944	306,926,817
Colorado	96	17,578,836	18,139,898	268,767	4,203,242	8,120,225	1,557,536	5,110,865	54,979,369
	97	22,745,533	16,314,398	209,711	6,087,968	9,444,535	1,847,447	5,344,502	61,994,094
	98	27,832,384	19,934,957	255,182	5,872,269	9,499,530	1,420,285	4,675,712	69,490,319
	99	31,523,881	21,640,046	261,182	10,391,738	10,697,058	1,472,619	4,678,476	80,665,000
Connecticut	96	89,558,810	20,505,185	4,443,149	1,562,144	37,366,890	6,797,103	8,361,579	168,594,860
	97	118,391,038	24,579,626	3,400,445	2,809,593	39,959,725	10,289,214	11,102,578	210,532,219
	98	117,839,256	22,463,375	3,411,184	2,479,150	39,864,805	9,899,442	6,659,526	202,616,738
	99	117,799,714	22,784,411	3,517,286	2,498,658	38,996,846	9,864,040	6,302,629	201,763,584
Delaware	96	29,780,181	10,058,476	17,439,115	1,180,844	65,816,453	3,440,749	4,073,325	131,789,143
	97	32,896,062	10,540,245	19,255,280	1,643,031	68,642,233	4,999,545	3,499,696	141,476,092
	98	34,997,612	10,825,257	19,292,014	1,323,496	67,758,291	4,376,018	3,385,605	141,958,293
	99	36,828,255	11,008,548	19,343,814	1,300,778	68,094,777	4,505,464	3,401,622	144,483,258
District of Columbia	96	0	12,000	0	0	1,690	181	9,295	23,166
	97	0	7,500	0	0	303	1	6,617	14,421
	98	0	7,500	0	0	1,503	201	8,017	17,221
	99	0	6,000	0	0	1,462	201	8,014	15,677
Florida	96	132,390,846	15,626,150	17,252,983	2,197,653	103,506,465	12,845,860	76,510,067	360,330,024
	97	142,443,179	15,218,840	32,403,559	4,947,217	108,215,564	13,473,106	82,190,057	398,891,522
	98	151,165,406	18,319,849	31,511,843	3,285,144	220,122,793	10,330,460	81,249,665	515,985,160
	99	150,900,236	18,414,291	31,522,712	2,850,422	112,774,170	9,926,335	79,156,702	405,544,868

Note: Data from Section 8 of Form R for 1997: 96 is prior year, 97 is current year, 98 and 99 are projected years.



Table 2-19. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1996-1999, continued

State	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production- related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds		
Georgia	96	258,497,480	41,183,920	47,458,371	10,060,819	153,257,797	4,215,956	59,551,039	574,225,382
	97	289,377,913	56,836,367	52,445,180	11,671,644	165,226,092	4,847,787	70,356,043	650,761,026
	98	263,402,381	57,251,332	53,664,931	11,500,962	170,642,537	4,396,883	68,457,424	629,316,450
	99	263,166,348	60,996,002	55,466,543	12,641,575	178,962,051	4,326,033	65,570,175	641,128,727
Guam	96	0	0	0	0	0	0	0	0
	97	0	0	0	0	0	0	0	0
	98	0	0	0	0	0	0	0	0
	99	0	0	0	0	0	0	0	0
Hawaii	96	6,611	53,077	0	0	3,590,519	2,283	532,633	4,185,123
	97	40,618	45,511	0	616	3,580,530	1,488	449,743	4,118,506
	98	30,553	44,077	0	0	3,586,738	2,086	477,657	4,141,111
	99	30,553	44,079	0	0	3,586,761	856	458,515	4,120,764
Idaho	96	809,960	869,296	26,900	151,474	18,815,043	591,130	14,846,619	36,110,422
	97	2,753,590	1,042,715	28,600	157,375	96,279,582	711,199	16,977,869	117,950,930
	98	2,773,568	1,181,354	30,700	153,699	96,715,319	704,341	16,306,118	117,865,099
	99	2,771,877	1,175,761	33,000	160,261	96,828,881	715,209	16,834,777	118,519,766
Illinois	96	261,676,108	96,438,030	35,408,457	27,468,698	151,553,768	24,254,399	102,469,044	699,268,504
	97	314,553,894	92,981,867	40,497,594	27,325,176	764,811,973	16,187,464	117,532,113	1,373,890,081
	98	343,569,107	89,948,250	35,154,863	24,538,496	640,866,752	13,652,187	114,532,118	1,262,261,773
	99	379,772,540	91,624,864	35,275,127	23,199,350	642,002,893	13,500,814	113,088,318	1,298,463,906
Indiana	96	214,323,760	192,196,136	121,859,205	14,577,099	131,718,685	12,280,013	104,820,666	791,775,564
	97	168,107,111	185,877,776	157,374,206	13,195,301	135,292,880	15,822,349	119,914,250	795,583,873
	98	161,539,808	169,691,291	152,549,801	13,028,527	132,858,350	15,425,927	123,586,261	768,679,965
	99	161,950,395	162,534,787	153,096,214	12,883,795	131,419,711	15,677,077	130,834,609	768,396,588
Iowa	96	138,856,751	26,220,312	1,847,853	2,860,844	26,093,199	10,354,114	33,917,560	240,150,633
	97	152,237,630	32,048,553	1,686,347	3,621,310	25,903,394	10,444,333	31,816,520	257,758,087
	98	147,346,648	32,584,820	1,683,650	3,108,437	30,954,628	10,492,758	31,556,704	257,727,645
	99	147,638,057	33,406,258	1,670,000	2,670,498	31,314,608	11,259,766	32,145,280	260,104,467
Kansas	96	205,658,430	55,205,677	86,409,462	2,735,484	25,258,056	5,293,626	26,137,981	406,698,716
	97	169,145,559	66,696,369	88,572,790	3,503,418	25,239,157	5,387,253	27,931,469	386,476,015
	98	122,578,440	67,113,987	95,562,065	2,743,034	25,760,784	3,759,601	28,095,325	345,613,236
	99	123,796,718	68,649,011	100,130,477	2,814,151	27,622,660	2,410,151	27,274,657	352,697,825
Kentucky	96	259,719,542	45,247,480	62,005,995	9,440,652	119,086,152	9,292,502	43,923,670	548,715,993
	97	326,907,570	50,962,133	58,010,928	7,504,357	142,280,834	10,806,098	42,662,478	639,134,398
	98	356,109,501	51,046,718	67,021,784	7,907,462	143,343,714	9,470,287	35,737,085	670,636,551
	99	385,827,489	53,185,365	66,968,554	8,644,319	141,137,014	9,517,110	35,878,008	701,157,859
Louisiana ^a	96	723,078,271	51,810,671	358,839,774	15,930,231	819,290,398	8,680,129	183,146,306	2,160,775,780
	97	746,853,862	55,863,841	528,113,029	14,703,797	858,448,408	10,741,231	179,794,155	2,394,518,323
	98	755,816,670	64,552,862	555,333,479	14,987,212	841,955,437	12,568,067	171,276,379	2,416,490,106
	99	754,980,421	69,739,709	574,765,909	15,380,317	835,488,103	11,461,271	169,464,881	2,431,280,611
Maine	96	10,123,083	3,231,274	7,905,993	378,446	64,398,634	379,383	9,138,143	95,554,956
	97	10,624,371	6,281,909	8,327,078	376,338	63,134,599	654,189	9,334,122	98,732,606
	98	5,860,006	5,506,356	8,690,627	368,278	63,939,345	661,704	8,881,756	93,908,072
	99	5,292,796	5,516,136	9,132,877	273,050	64,427,849	665,978	8,773,392	94,082,078

Note: Data from Section 8 of Form R for 1997: 96 is prior year, 97 is current year, 98 and 99 are projected years.

^aOne facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery for ethylene of 193,830,000 pounds in 1997 and projected 213,213,000 pounds for both 1998 and 1999. The facility has since revised these quantities to 13,000,000 pounds each. For Louisiana, these revisions change on-site energy recovery to 347,283,029 pounds in 1997, 355,120,479 pounds projected for 1998, and 374,552,909 pounds projected for 1999. Total production-related waste managed in Louisiana changes to 2,213,688,323 pounds in 1997, 2,216,277,106 pounds projected for 1998, and 2,231,067,611 pounds projected for 1999.



Table 2-19. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1996-1999, continued

State	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production- related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds		
Maryland	96	18,540,680	4,114,968	13,452,901	1,415,366	32,917,065	7,791,848	12,532,769	90,765,597
	97	13,446,585	5,172,039	15,084,938	1,112,858	29,935,385	9,324,872	13,500,222	87,576,899
	98	13,990,366	6,172,184	15,384,392	780,803	31,403,566	9,426,689	13,145,589	90,303,589
	99	14,967,066	5,501,415	16,921,727	756,696	31,379,712	9,508,667	12,966,560	92,001,843
Massachusetts	96	18,165,666	29,301,573	5,051,745	6,431,634	23,749,511	10,338,761	7,044,444	100,083,334
	97	18,197,626	29,715,353	6,763,717	5,337,558	22,952,311	10,749,906	6,596,628	100,313,099
	98	17,519,318	28,701,588	7,068,632	4,651,385	23,392,693	10,921,992	6,005,900	98,261,508
	99	17,701,931	28,867,675	7,367,913	4,650,478	23,857,366	11,079,050	5,434,012	98,958,425
Michigan	96	224,706,218	105,513,207	86,491,089	71,871,393	84,750,336	38,776,615	88,419,625	700,528,483
	97	378,336,073	128,073,875	83,687,074	67,480,236	89,642,433	38,111,751	80,762,315	866,093,757
	98	450,981,176	120,632,592	85,757,163	64,616,982	90,353,199	32,036,472	77,511,306	921,888,890
	99	469,750,433	122,376,462	88,262,000	63,614,278	89,099,432	31,712,512	64,317,028	929,132,145
Minnesota	96	146,741,482	22,682,606	10,879,979	2,190,126	29,845,240	9,090,943	21,902,441	243,332,817
	97	161,863,212	21,296,995	8,016,186	2,359,251	34,693,861	10,884,199	20,592,140	259,705,844
	98	165,602,709	20,436,218	8,010,722	2,175,596	35,036,443	11,136,822	19,721,354	262,119,864
	99	183,922,358	20,677,236	7,947,221	2,047,702	35,091,782	11,040,716	19,382,251	280,109,266
Mississippi	96	210,421,671	24,170,038	15,514,699	2,621,258	95,820,076	1,354,087	61,269,848	411,171,677
	97	223,048,853	20,316,877	23,640,421	3,957,984	166,301,942	1,660,949	64,275,403	503,202,429
	98	215,506,196	18,290,852	27,472,964	3,644,139	151,393,115	1,391,336	72,100,837	489,799,439
	99	212,340,601	18,574,582	26,697,841	3,665,824	152,307,416	1,199,170	71,372,234	486,157,668
Missouri	96	229,133,539	62,750,478	80,708,193	26,087,552	65,419,238	12,701,978	57,458,863	534,259,841
	97	229,823,661	63,356,210	98,456,987	22,336,016	174,927,067	14,861,872	61,515,495	665,277,308
	98	238,584,045	56,448,235	92,890,656	16,064,221	176,969,682	14,204,210	60,724,259	655,885,308
	99	244,854,548	56,815,318	92,919,654	15,664,996	178,124,901	14,427,422	58,334,948	661,141,787
Montana	96	46,319,148	589,042	2,513,550	25,559	8,610,078	37,460	48,175,693	106,270,530
	97	46,586,065	2,966,505	2,629,689	59,947	9,236,891	18,892	42,177,572	103,675,561
	98	41,005,714	96,311	2,492,100	34,000	9,370,301	14,489	42,054,665	95,067,580
	99	41,005,275	134,311	2,492,100	44,000	9,370,301	16,265	41,529,716	94,591,968
Nebraska	96	18,021,979	18,423,900	1,327,579	400,667	9,234,445	1,261,763	12,296,991	60,967,324
	97	5,730,188	24,885,114	838,327	591,364	9,192,742	1,431,896	13,369,541	56,039,172
	98	2,182,933	24,392,162	589,197	641,723	9,368,442	1,409,941	8,887,594	47,471,992
	99	2,109,979	25,315,421	589,197	679,313	9,552,667	1,411,982	8,666,933	48,325,492
Nevada	96	2,125,559	764,872	0	10,452	8,629,895	39,177	3,702,504	15,272,459
	97	1,923,358	1,101,743	0	101,184	11,123,073	23,990	4,443,474	18,716,822
	98	2,314,077	762,052	0	21,000	11,350,091	14,023	3,713,062	18,174,305
	99	2,314,077	757,252	0	11,200	11,352,810	14,223	3,740,774	18,190,336
New Hampshire	96	16,778,010	12,394,121	1,854,725	229,238	9,710,502	993,909	2,598,305	44,558,810
	97	16,698,742	12,663,886	1,490,392	739,937	10,124,456	962,439	2,702,623	45,382,475
	98	16,578,561	12,338,390	1,566,653	2,181,535	10,135,327	718,378	2,668,378	46,187,222
	99	16,601,394	11,762,501	1,633,542	2,162,783	10,125,220	726,564	2,681,574	45,693,578
New Jersey	96	64,843,303	44,308,078	347,706,044	30,387,301	125,300,814	21,809,723	20,951,807	655,307,070
	97	65,692,010	40,686,255	219,383,087	29,506,963	130,644,642	30,015,188	21,394,926	537,323,071
	98	64,284,401	41,106,286	215,898,411	25,965,511	123,110,516	27,734,798	18,199,156	516,299,079
	99	62,699,243	41,487,518	215,941,339	25,880,288	112,836,162	27,110,993	19,818,737	505,774,280

Note: Data from Section 8 of Form R for 1997: 96 is prior year, 97 is current year, 98 and 99 are projected years.



Table 2-19. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1996-1999, continued

State	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds		
New Mexico	96	1,510,473	1,060,244	33,800,000	148,320	1,933,276	541,898	44,372,379	83,366,590
	97	1,480,337	1,190,543	26,313,209	147,019	4,017,170	633,512	41,787,552	75,569,342
	98	1,482,684	1,198,125	26,313,209	145,160	4,199,678	532,205	42,095,421	75,966,482
	99	1,483,449	1,363,021	26,313,209	143,390	4,271,283	518,902	42,089,459	76,182,713
New York	96	175,916,891	61,760,010	24,170,625	7,872,346	106,965,235	12,999,212	35,813,575	425,497,894
	97	172,842,264	68,275,239	29,371,265	7,076,667	127,109,643	11,609,888	37,289,240	453,574,206
	98	168,150,294	70,972,866	27,291,602	7,189,407	129,845,857	10,273,577	30,909,855	444,633,458
	99	171,975,410	73,555,269	27,542,573	6,647,898	130,803,772	10,082,022	28,027,879	448,634,823
North Carolina	96	349,842,803	84,714,337	25,996,736	13,523,746	149,977,403	8,562,365	86,752,086	719,369,476
	97	448,336,582	87,204,537	27,818,415	14,017,992	135,606,112	6,261,666	84,658,221	803,903,525
	98	420,296,222	89,998,387	28,223,412	14,656,531	151,026,485	5,529,643	78,543,668	788,274,348
	99	296,970,179	92,736,743	30,777,538	15,293,161	149,590,354	5,467,241	77,825,088	668,660,304
North Dakota	96	43,138	1,020,391	0	21,050	4,223,802	210,664	2,345,481	7,864,526
	97	6,574	596,287	0	31,171	4,446,858	221,419	2,491,558	7,793,867
	98	6,665	596,256	0	29,880	4,342,185	229,892	2,401,283	7,606,161
	99	6,730	596,256	0	29,380	4,344,664	235,250	2,363,660	7,575,940
Ohio	96	366,527,090	188,982,472	96,658,345	37,134,997	150,232,422	35,970,100	151,389,926	1,026,895,352
	97	217,112,974	188,951,868	108,525,378	38,359,015	140,033,290	34,935,397	153,761,315	881,679,237
	98	181,033,291	187,570,068	116,770,065	29,575,471	140,326,345	33,387,278	144,577,984	833,240,502
	99	196,357,878	186,713,112	122,618,788	29,351,988	140,365,794	31,429,551	139,419,630	846,256,741
Oklahoma ^b	96	53,433,555	18,044,086	52,783,667	992,954	16,175,386	1,531,173	25,272,131	168,232,952
	97	44,023,906	36,333,994	694,233,700	1,383,754	35,229,082	2,647,032	24,265,278	838,116,746
	98	38,990,870	34,711,998	728,934,200	1,269,307	36,678,536	2,228,318	22,617,167	865,430,396
	99	37,115,237	35,815,834	765,369,500	1,280,190	37,497,284	3,763,399	22,355,290	903,196,734
Oregon	96	34,054,406	20,305,236	17,274,416	1,193,022	57,409,075	12,202,651	28,078,226	170,517,032
	97	37,958,112	20,003,439	13,964,005	1,336,309	71,513,926	13,852,045	28,787,064	187,414,900
	98	38,060,926	15,860,607	14,105,944	1,368,026	72,865,219	17,832,266	27,132,017	187,225,005
	99	37,726,932	16,021,460	14,072,544	1,421,325	73,755,884	17,453,479	26,373,289	186,824,913
Pennsylvania	96	373,067,680	136,235,050	47,242,949	17,357,922	139,069,495	22,398,525	111,105,633	846,477,254
	97	360,008,264	133,879,998	77,893,692	19,317,617	166,360,441	26,732,395	133,685,107	917,877,514
	98	361,519,945	132,484,805	76,623,585	21,383,625	165,462,867	25,446,534	129,843,068	912,764,429
	99	360,836,248	135,575,823	156,006,303	23,291,874	180,540,520	25,820,379	131,608,780	1,013,679,927
Puerto Rico	96	24,293,358	13,857,440	0	9,932,801	18,657,054	7,371,625	8,132,901	82,245,179
	97	22,957,397	13,834,881	486,257	10,392,249	17,038,395	8,308,705	7,849,122	80,867,006
	98	19,255,092	8,986,462	499,237	11,250,288	16,569,338	9,336,865	7,068,835	72,966,117
	99	17,157,535	8,800,265	483,966	12,310,620	16,980,025	8,878,688	7,074,978	71,686,077
Rhode Island	96	13,297,430	12,475,036	226,972	825,924	6,802,689	718,238	2,281,665	36,627,954
	97	14,512,098	11,704,702	224,327	792,257	7,242,505	726,078	2,036,452	37,238,419
	98	12,746,342	13,017,531	226,433	791,944	7,296,664	480,245	1,909,658	36,468,817
	99	11,938,912	14,881,483	227,033	796,044	7,408,886	388,311	1,823,829	37,464,498
South Carolina	96	267,195,098	90,366,020	73,724,448	8,335,343	109,312,729	8,407,475	55,726,951	613,068,064
	97	449,687,937	302,459,979	65,484,208	14,921,886	116,610,643	14,031,629	55,635,721	1,018,832,003
	98	387,578,607	309,565,638	74,341,397	12,124,189	115,571,754	12,792,300	55,380,067	967,353,952
	99	396,048,839	323,525,604	76,339,316	10,809,239	115,328,533	12,759,855	54,279,066	989,090,452

Note: Data from Section 8 of Form R for 1997: 96 is prior year, 97 is current year, 98 and 99 are projected years.

^bOne facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery for ethylene of 36,250,000 pounds in 1996 and 422,000,000 pounds in 1997, and projected 443,100,000 pounds for 1998 and 465,255,000 pounds for 1999. This facility also reported on-site energy recovery for propylene of 16,300,000 pounds in 1996 and 272,000,000 pounds in 1997 and projected 285,600,000 pounds for 1998 and 299,880,000 pounds for 1999. The facility has since revised these quantities to zero. For Oklahoma, these revisions change on-site energy recovery to 233,667 pounds in 1996, 233,700 pounds in 1997, 234,200 pounds projected for 1998, and 234,500 pounds projected for 1999. Total production-related waste managed in Oklahoma changes to 115,682,952 pounds in 1996, 144,116,746 pounds in 1997, 136,730,396 pounds projected for 1998, and 138,061,734 pounds projected for 1999.



Table 2-19. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1996-1999, continued

State	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production- related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds		
South Dakota	96	30,205,084	509,338	1,050,000	185,382	1,781,258	1,869,580	3,639,018	39,239,660
	97	59,132,065	814,772	1,159,000	247,666	2,689,981	3,801,806	4,142,933	71,988,223
	98	38,656,974	869,500	1,246,000	245,486	2,718,011	3,826,372	4,299,090	51,861,433
	99	38,670,017	722,937	1,334,000	247,288	2,746,020	3,837,712	4,318,684	51,876,658
Tennessee	96	158,035,768	53,284,787	50,001,832	5,517,084	94,497,682	11,495,245	104,036,538	476,868,936
	97	220,492,375	77,421,606	48,945,665	6,293,238	107,647,244	11,420,987	106,232,230	578,453,345
	98	227,162,006	80,906,157	40,390,815	5,507,371	105,675,307	8,971,236	99,714,282	568,327,174
	99	236,237,247	81,676,666	44,345,815	4,939,518	106,574,656	8,586,417	98,126,376	580,486,695
Texas	96	1,267,388,152	169,952,306	822,362,230	75,394,065	1,365,719,875	75,996,925	272,306,898	4,049,120,451
	97	1,086,499,032	158,569,874	984,889,997	82,814,401	1,518,558,745	86,209,030	252,075,456	4,169,616,535
	98	1,100,691,311	142,259,136	970,102,281	81,756,517	1,404,643,479	80,608,114	242,663,151	4,022,723,989
	99	1,086,852,922	143,676,891	900,018,108	78,812,345	1,410,878,213	70,708,993	238,827,750	3,929,775,222
Utah	96	3,902,770	4,182,833	25,599,827	116,190	226,773,781	687,497	83,428,194	344,691,092
	97	1,940,716	1,997,415	25,388,793	139,834	235,120,198	772,988	96,115,730	361,475,674
	98	2,669,428	2,255,280	24,625,500	143,178	236,705,525	763,201	98,541,171	365,703,283
	99	2,613,483	2,419,793	24,625,500	175,892	236,787,797	671,649	99,224,100	366,518,214
Vermont	96	456,815	2,206,359	0	18,572	1,103,104	260,438	391,885	4,437,173
	97	122,855	2,120,867	0	21,898	1,105,112	157,535	436,086	3,964,353
	98	120,125	2,024,575	0	11,010	1,090,894	82,932	469,615	3,799,151
	99	119,425	1,197,575	0	11,560	1,121,076	82,109	491,790	3,023,535
Virgin Islands	96	717,893	96,920	0	46,053	10,248,528	377,449	1,506,138	12,992,981
	97	634,022	220,119	0	2,060	13,384,698	351,827	1,428,702	16,021,428
	98	634,022	220,119	0	2,060	13,384,698	351,827	1,500,141	16,092,867
	99	634,022	220,119	0	2,060	13,384,698	351,827	1,500,141	16,092,867
Virginia	96	180,870,708	21,873,173	27,414,021	6,502,293	299,239,874	18,518,886	57,827,037	612,245,992
	97	175,060,942	19,598,037	35,839,169	10,140,409	311,231,341	22,099,062	58,508,860	632,477,820
	98	152,955,837	18,657,666	37,933,809	9,365,325	369,745,118	21,239,026	53,652,631	663,549,412
	99	161,736,826	18,254,997	39,562,778	9,342,089	370,390,334	21,372,585	53,317,693	673,977,302
Washington	96	85,508,648	11,411,353	18,479,801	834,400	75,171,957	3,664,177	26,414,750	221,485,086
	97	96,663,620	6,416,187	12,166,288	857,072	75,521,856	3,627,965	30,845,848	226,098,836
	98	97,145,769	5,507,940	12,005,234	898,129	73,508,854	4,055,261	31,582,769	224,703,956
	99	103,989,908	9,027,351	12,246,224	900,318	74,474,260	4,204,052	27,904,037	232,746,150
West Virginia	96	120,294,295	5,377,887	10,336,621	7,944,588	144,043,385	6,485,015	30,891,441	325,373,232
	97	116,453,349	7,263,396	41,657,129	6,224,775	110,528,227	6,956,661	24,716,703	313,800,240
	98	121,251,919	6,704,337	43,634,046	5,926,643	112,312,479	6,462,449	24,246,759	320,538,632
	99	125,912,180	6,941,020	45,940,111	6,770,126	116,606,488	6,569,286	23,049,679	331,788,890

Note: Data from Section 8 of Form R for 1997: 96 is prior year, 97 is current year, 98 and 99 are projected years.



Table 2-19. Actual and Projected Quantities of TRI Chemicals in Waste, by State, 1996-1999, continued

State	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production- related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds		
Wisconsin	96	53,276,222	57,563,629	12,553,158	22,214,520	110,128,958	15,787,377	38,928,914	310,452,778
	97	57,504,628	62,772,874	12,737,855	17,638,679	117,250,445	16,405,819	38,957,047	323,267,347
	98	62,055,120	72,531,451	14,956,928	16,920,116	126,593,751	14,767,772	37,389,207	345,214,345
	99	64,542,255	70,208,450	15,651,940	16,693,421	137,840,457	14,753,311	37,918,883	357,608,717
Wyoming	96	1,770,770	296,654	62,250	2,910	4,989,220	5,866	9,747,950	16,875,620
	97	3,360,150	417,925	74,591	2,470	4,546,158	62,317	9,355,868	17,819,479
	98	4,353,213	503,000	76,000	2,470	4,837,379	7,845	8,858,790	18,638,697
	99	4,350,733	507,000	76,000	2,470	4,837,379	7,845	8,842,590	18,624,017
Total ^c	96	7,533,759,806	2,094,947,485	2,762,802,708	504,395,107	5,847,666,499	486,836,786	2,432,213,945	21,662,622,336
	97	7,986,618,922	2,390,787,879	3,805,792,208	525,610,064	7,012,922,513	536,021,338	2,467,643,821	24,725,396,745
	98	7,794,833,050	2,356,648,275	3,862,018,153	486,154,779	6,959,462,725	502,784,443	2,370,733,085	24,332,634,510
	99	7,827,180,611	2,401,111,687	3,965,274,628	489,841,732	6,904,993,529	501,254,860	2,343,743,515	24,433,400,562

Note: Data from Section 8 of Form R for 1997: 96 is prior year, 97 is current year, 98 and 99 are projected years.

^aRevisions by two facilities (in Louisiana and Oklahoma, respectively) change the totals presented in this table as follows: On-site energy recovery changes to 2,710,252,708 pounds in 1996, 2,930,962,208 pounds in 1997, 2,933,105,153 pounds projected for 1998, and 2,999,926,628 pounds projected for 1999. Total production-related waste managed changes to 21,610,072,336 pounds in 1996, 23,850,566,745 pounds in 1997, 23,403,721,510 pounds projected for 1998, and 23,468,052,562 pounds projected for 1999.





Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases	
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds		
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds				
71751-41-2*	Abamectin	2	0	9	0	0	0	0	0	9	0	9
30560-19-1*	Acephate	7	1,505	0	0	0	0	0	0	1,505	0	1,505
75-07-0*	Acetaldehyde	250	12,736,049	223,370	371,576	0	98	118,078	13,449,171	5,483	13,454,654	
60-35-5	Acetamide	6	250	1	1,863,202	0	0	0	1,863,453	0	1,863,453	
75-05-8	Acetonitrile	100	890,612	7,461	18,894,762	0	58	5	19,792,898	3,084,414	22,877,312	
98-86-2*	Acetophenone	43	179,786	650	499,070	0	0	3,500	683,006	42,552	725,558	
62476-59-9*	Acifluorfen, sodium salt	7	290	253	0	0	0	5	548	570,359	570,907	
107-02-8*	Acrolein	19	81,130	298	71,990	0	0	0	153,418	175	153,593	
79-06-1*	Acrylamide	77	17,278	6,355	7,074,021	0	305,545	0	7,403,199	26,290	7,429,489	
79-10-7	Acrylic acid	194	414,885	8,089	6,237,000	0	0	76,151	6,736,125	45,129	6,781,254	
107-13-1*	Acrylonitrile	110	1,224,569	1,229	4,031,900	0	47	780	5,258,525	4,879	5,263,404	
15972-60-8*	Alachlor	3	2,700	290	0	0	0	0	2,990	3,600	6,590	
116-06-3*	Aldicarb	3	386	0	0	0	0	5	391	0	391	
28057-48-9	d-trans-Allethrin	1	0	0	0	0	0	0	0	0	0	
107-18-6*	Allyl alcohol	27	53,528	5,226	411,350	0	0	4	470,108	7,245	477,353	
107-11-9	Allylamine	3	1,662	0	0	0	0	0	1,662	0	1,662	
107-05-1	Allyl chloride	22	78,187	10	0	0	0	0	78,197	503	78,700	
7429-90-5*	Aluminum (fume or dust)	326	1,589,904	42,374	0	0	2,400	2,211,096	3,845,774	8,278,292	12,124,066	
1344-28-1	Aluminum oxide (fibrous forms)	51	38,451	755	0	0	14	428,666	467,886	10,338,111	10,805,997	
20859-73-8*	Aluminum phosphide	1	0	0	0	0	0	0	0	0	0	
834-12-8*	Ametryn	4	2,161	42	0	0	0	0	2,203	0	2,203	
60-09-3	4-Aminoazobenzene	2	0	0	6	0	0	0	6	0	6	
92-67-1	4-Aminobiphenyl	1	0	0	0	0	0	0	0	0	0	
7664-41-7*	Ammonia	2,734	156,148,750	7,023,065	30,953,105	197,387	23,352	3,231,064	197,576,723	2,417,150	199,993,873	
62-53-3*	Aniline	65	285,954	11,228	1,095,429	0	181	1,204	1,393,996	67,266	1,461,262	
90-04-0	o-Anisidine	7	1,461	76	0	0	0	0	1,537	4	1,541	
104-94-9	p-Anisidine	1	0	0	0	0	0	0	0	0	0	
120-12-7	Anthracene	69	94,661	311	0	0	4,739	1,447	101,158	108,190	209,348	
7440-36-0	Antimony	126	6,628	14,415	0	0	1,067	26,045	48,155	279,569	327,724	
--	Antimony compounds	548	87,141	27,293	12,212	0	211,763	1,008,326	1,346,735	4,152,534	5,499,269	
7440-38-2	Arsenic	52	51,559	679	0	0	500	9,786	62,524	530,960	593,484	
--	Arsenic compounds	339	148,359	3,454	76,170	0	16,422	5,739,544	5,983,949	1,369,579	7,353,528	
1332-21-4*	Asbestos (friable)	63	7,255	2	0	0	0	514,500	521,757	4,329,603	4,851,360	
1912-24-9*	Atrazine	20	35,119	2,242	418	0	0	388,928	426,707	166,947	593,654	
7440-39-3	Barium	73	120,075	25,436	0	0	500	503,789	649,800	874,975	1,524,775	
--	Barium compounds	645	458,369	940,587	152,000	0	2,568,999	6,622,808	10,742,763	9,680,554	20,423,317	
22781-23-3*	Bendiocarb	3	0	0	0	0	0	0	0	0	0	
1861-40-1*	Benfluralin	4	1,960	0	0	0	0	0	1,960	8,400	10,360	
17804-35-2*	Benomyl	3	0	0	0	0	0	0	0	0	0	
98-87-3	Benzal chloride	3	1,030	1,500	0	0	0	0	2,530	0	2,530	
71-43-2*	Benzene	467	8,753,200	11,464	362,350	750	834	61,641	9,190,239	83,518	9,273,757	
98-07-7	Benzoic trichloride	7	6,067	0	0	0	0	0	6,067	520	6,587	
98-88-4	Benzoyl chloride	22	17,911	5	0	0	0	0	17,916	1,000	18,916	
94-36-0*	Benzoyl peroxide	58	1,590	250	0	0	0	1,186	3,026	5,794	8,820	
100-44-7	Benzyl chloride	45	27,407	2,706	570	0	0	24	30,707	5,924	36,631	
7440-41-7	Beryllium	13	816	27	0	0	580	55,543	56,966	5,741	62,707	

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997

Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
	On-site	Off-site	On-site	Off-site	On-site	Off-site			
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds			
71751-41-2* Abamectin	0	0	0	0	1,900	131	9	2,040	0
30560-19-1* Acephate	20	0	0	0	11,000	11,580	944	23,544	0
75-07-0* Acetaldehyde	332,000	33	9,848,731	56,699	15,532,164	1,192,757	13,449,700	40,412,084	10,453
60-35-5 Acetamide	0	0	64,008	145	1	194	1,863,448	1,927,796	0
75-05-8 Acetonitrile	13,116,437	2,215,038	23,490,849	6,631,333	12,681,271	7,690,047	22,804,584	88,629,559	6,264
98-86-2* Acetophenone	1,800	5,743	30,262,873	278,450	1,003,454	397,022	747,016	32,696,358	1,078
62476-59-9* Acifluorfen, sodium salt	0	0	0	0	310	3,554	570,691	574,555	0
107-02-8* Acrolein	0	0	3,772,684	33,413	5,288,092	23	142,204	9,236,416	93
79-06-1* Acrylamide	2,266	3	86,000	13,306	144,607	219,594	7,427,483	7,893,259	4,010
79-10-7 Acrylic acid	4,151,368	119,172	31,904,896	3,478,312	28,539,687	879,415	6,690,854	75,763,704	3,162
107-13-1* Acrylonitrile	12,690,465	58,092	5,300,722	198,012	10,143,286	1,170,267	5,329,623	34,890,467	1,602
15972-60-8* Alachlor	0	0	0	0	44,000	160,000	6,600	210,600	0
116-06-3* Aldicarb	0	0	0	0	502	28,107	382	28,991	0
28057-48-9 d-trans-Allethrin	0	0	0	0	0	0	0	0	0
107-18-6* Allyl alcohol	110,892	0	1,911,736	798,451	971,358	258,500	475,498	4,526,435	1
107-11-9 Allylamine	0	0	0	1,571	1,547	0	1,662	4,780	0
107-05-1 Allyl chloride	210,000	0	2,403,008	210,974	387,733	298,546	77,167	3,587,428	2,200
7429-90-5* Aluminum (fume or dust)	13,981,740	26,584,429	0	91,568	19,350,982	227,033	10,994,583	71,230,335	155
1344-28-1 Aluminum oxide (fibrous forms)	5,050,000	252,140	0	0	14,897	104,877	935,611	6,357,525	200
20859-73-8* Aluminum phosphide	0	0	0	0	0	0	0	0	0
834-12-8* Ametryn	25	0	0	0	38,200	16,000	1,744	55,969	0
60-09-3 4-Aminoazobenzene	0	0	0	0	0	76	6	82	0
92-67-1 4-Aminobiphenyl	0	0	0	0	100,000	190	0	100,190	0
7664-41-7* Ammonia	348,336,500	9,620,303	118,146,876	112,444	290,578,256	16,712,554	194,820,109	978,327,042	714,157
62-53-3* Aniline	7,119,031	0	7,637,850	629,784	3,641,784	2,188,848	1,418,107	22,635,404	5,959
90-04-0 o-Anisidine	0	0	1,315	0	3,867	6,925	1,541	13,648	0
104-94-9 p-Anisidine	0	0	0	0	0	0	0	0	0
120-12-7 Anthracene	229,292	7,563	380,721	106,516	294,868	2,989	210,086	1,232,035	1,938
7440-36-0 Antimony	3,873,483	876,978	25,969	49,316	328,072	28,355	320,843	5,503,016	6,339
-- Antimony compounds	5,026,069	3,914,498	3,300	11,028	938,412	605,157	4,386,271	14,884,735	11,987
7440-38-2 Arsenic	1,546,013	433,597	0	0	69,967	10,075	113,610	2,173,262	15,011
-- Arsenic compounds	3,806,840	812,279	0	355	69,323	1,103,163	5,048,300	10,840,260	1,870,274
1332-21-4* Asbestos (friable)	195,118	0	0	0	667,313	709,910	5,382,618	6,954,959	273,483
1912-24-9* Atrazine	250	0	0	0	342,091	126,897	806,780	1,276,018	250
7440-39-3 Barium	47,730	123,254	593,764	117,119	479,717	10,998	1,404,223	2,776,805	0
-- Barium compounds	30,421,974	1,998,629	142,000	216,995	7,507,910	1,763,375	14,260,037	56,310,920	2,240,371
22781-23-3* Bendiocarb	0	0	0	0	0	0	0	0	0
1861-40-1* Benfluralin	72,000	0	0	0	1,700	55	10,500	84,255	0
17804-35-2* Benomyl	0	0	0	0	374,000	4,002	0	378,002	0
98-87-3 Benzal chloride	0	0	0	130,000	51,100	1,100	2,461	184,661	0
71-43-2* Benzene	46,015,599	381,821	60,211,346	1,146,425	47,653,556	2,274,444	9,202,991	166,886,182	62,271
98-07-7 Benzoic trichloride	0	0	0	22,000	210,000	0	6,596	238,596	0
98-88-4 Benzoyl chloride	0	0	0	0	1,974,302	365,304	18,706	2,358,312	111
94-36-0* Benzoyl peroxide	22,502	0	0	1	62,392	42,704	8,677	136,276	0
100-44-7 Benzyl chloride	17,000	0	21,472	455,495	277,157	23,534	35,866	830,524	0
7440-41-7 Beryllium	110,428	120,381	0	0	0	14	61,323	292,146	0

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases Pounds	
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds		
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds				
--	Beryllium compounds	7	365	1	0	0	0	0	390	756	4,602	5,358
82657-04-3*	Bifenthrin	4	6	0	0	0	0	0	0	6	0	6
92-52-4*	Biphenyl	132	595,892	2,771	31,699	0	4,459	245	635,066	48,529	683,595	683,595
111-91-1	Bis(2-chloroethoxy) methane	1	1,702	0	4,015	0	1,400	0	7,117	0	7,117	7,117
111-44-4*	Bis(2-chloroethyl) ether	13	1,515	5	0	0	0	0	1,520	0	1,520	1,520
542-88-1	Bis(chloromethyl) ether	2	7	0	0	0	0	0	7	0	7	7
108-60-1	Bis(2-chloro-1-methylethyl) ether	2	3,860	0	0	0	0	3	3,863	0	3,863	3,863
56-35-9*	Bis(tributyltin) oxide	2	0	7	0	0	0	50	57	2,280	2,337	2,337
10294-34-5	Boron trichloride	7	754	0	0	0	0	0	754	0	754	754
7637-07-2	Boron trifluoride	25	21,290	0	0	0	0	0	21,290	5	21,295	21,295
314-40-9*	Bromacil	3	10	3,284	0	0	0	0	3,294	0	3,294	3,294
7726-95-6*	Bromine	48	107,808	15	7	0	0	545	108,375	433,404	541,779	541,779
35691-65-7*	1-Bromo-1-(bromomethyl)-1,3-propanedicarbonitrile	2	0	0	0	0	0	0	0	0	0	0
353-59-3	Bromochlorodifluoromethane (Halon 1211)	3	2,042	0	0	0	0	0	2,042	0	2,042	2,042
74-83-9*	Bromomethane	47	1,876,553	14	244	0	0	6	1,876,817	0	1,876,817	1,876,817
75-63-8	Bromotrifluoromethane (Halon 1301)	6	27,405	0	0	0	0	0	27,405	0	27,405	27,405
1689-84-5*	Bromoxynil	2	506	0	0	0	0	0	506	2,842	3,348	3,348
1689-99-2*	Bromoxynil octanoate	5	1,386	0	0	0	0	0	1,386	17,990	19,376	19,376
357-57-3	Brucine	1	0	0	0	0	0	0	0	0	0	0
106-99-0	1,3-Butadiene	186	2,710,735	2,552	1,000	0	0	294	2,714,581	6,600	2,721,181	2,721,181
141-32-2	Butyl acrylate	158	232,375	7,242	0	0	0	805	240,422	21,150	261,572	261,572
71-36-3	n-Butyl alcohol	1,001	21,456,156	79,743	3,122,078	0	286	34,198	24,692,461	188,914	24,881,375	24,881,375
78-92-2*	sec-Butyl alcohol	120	959,349	11,965	152,939	0	0	10	1,124,263	17,496	1,141,759	1,141,759
75-65-0*	tert-Butyl alcohol	86	577,415	29,477	980,424	0	0	751	1,588,067	279,582	1,867,649	1,867,649
106-88-7	1,2-Butylene oxide	13	16,001	70	0	0	0	0	16,071	12	16,083	16,083
123-72-8*	Butyraldehyde	33	346,922	362	29,000	0	0	1	376,285	233	376,518	376,518
7440-43-9	Cadmium	53	2,376	521	0	0	665	7,939	11,501	135,195	146,696	146,696
--	Cadmium compounds	95	64,212	1,934	52	0	49,460	938,635	1,054,293	1,350,236	2,404,529	2,404,529
156-62-7*	Calcium cyanamide	4	105	0	0	0	0	0	105	0	105	105
133-06-2*	Captan	12	6,316	5	5	0	0	0	6,326	391	6,717	6,717
63-25-2*	Carbaryl	18	17,776	12	0	0	5,772	1,796	25,356	16,634	41,990	41,990
1563-66-2*	Carbofuran	4	8,728	1	0	0	0	0	8,729	42	8,771	8,771
75-15-0*	Carbon disulfide	92	50,984,954	28,651	517,565	0	0	5	51,531,175	32,503	51,563,678	51,563,678
56-23-5*	Carbon tetrachloride	65	357,499	315	32,958	0	0	135	390,907	18,947	409,854	409,854
463-58-1	Carbonyl sulfide	77	21,081,227	0	0	0	0	0	21,081,227	0	21,081,227	21,081,227
5234-68-4*	Carboxin	3	7	0	0	0	0	0	7	142	149	149
120-80-9	Catechol	135	6,673	22,660	0	0	6	1,824	31,163	337	31,500	31,500

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
--	Beryllium compounds	0	38,600	0	0	0	1,643	4,197	44,440	0
82657-04-3 *	Bifenthrin	0	0	0	0	0	46	6	52	0
92-52-4 *	Biphenyl	290,759	302,713	1,573,135	143,730	4,050,685	834,719	696,431	7,892,172	5,291
111-91-1	Bis(2-chloroethoxy) methane	0	0	0	0	0	0	6,887	6,887	0
111-44-4 *	Bis(2-chloroethyl) ether	0	185,170	468,431	91,738	430,386	243,182	1,061	1,419,968	0
542-88-1	Bis(chloromethyl) ether	0	0	0	0	6,500	0	7	6,507	0
108-60-1	Bis(2-chloro-1-methylethyl) ether	13,000,000	0	0	0	11,685,200	0	3,900	24,689,100	1
56-35-9 *	Bis(tributyltin) oxide	0	36,426	0	0	167	180	2,337	39,110	0
10294-34-5	Boron trichloride	7,000	0	0	0	59,600	0	318	66,918	0
7637-07-2	Boron trifluoride	0	0	0	0	497,548	152	21,343	519,043	280
314-40-9 *	Bromacil	0	0	0	0	16,912	19,881	3,313	40,106	0
7726-95-6 *	Bromine	5,438,500	0	0	0	16,973,278	3,199,452	545,537	26,156,767	293
35691-65-7 *	1-Bromo-1-(bromomethyl)-1,3-propanedicarbonitrile	0	0	0	0	12,000	7,871	0	19,871	0
353-59-3	Bromochlorodifluoromethane (Halon 1211)	554,000	0	0	0	0	0	2,053	556,053	0
74-83-9 *	Bromomethane	23,310	0	273,200	280	967,441	0	1,856,305	3,120,536	13,155
75-63-8	Bromotrifluoromethane (Halon 1301)	410,000	0	0	0	0	0	27,410	437,410	316
1689-84-5 *	Bromoxynil	0	0	0	0	0	50	2,611	2,661	0
1689-99-2 *	Bromoxynil octanoate	0	0	0	0	0	167	19,596	19,763	0
357-57-3	Brucine	0	0	0	0	0	0	0	0	0
106-99-0	1,3-Butadiene	5,481,906	14,451,023	40,873,920	57,787	65,299,067	314,610	2,210,086	128,688,399	510,546
141-32-2	Butyl acrylate	110,060	165,089	9,499,188	608,286	3,403,674	91,101	258,068	14,135,466	130
71-36-3	n-Butyl alcohol	10,377,274	3,504,078	28,650,346	7,777,463	35,473,237	4,283,777	24,850,956	114,917,131	28,564
78-92-2 *	sec-Butyl alcohol	138,499	36,291	13,475,118	1,981,948	2,115,036	51,775	1,121,428	18,920,095	57
75-65-0 *	tert-Butyl alcohol	274,074	214,894	49,091,300	11,272,389	2,585,298	1,779,964	1,973,750	67,191,669	8,042
106-88-7	1,2-Butylene oxide	0	0	0	310,195	348,570	264	15,895	674,924	0
123-72-8 *	Butyraldehyde	0	1,200	2,864,034	224,224	2,102,870	297,449	376,908	5,866,685	1
7440-43-9	Cadmium	1,090,072	310,225	0	0	33,925	10,497	128,622	1,573,341	0
--	Cadmium compounds	7,937,874	1,255,346	0	1,501	6,647,787	44,755	2,233,696	18,120,959	66,080
156-62-7 *	Calcium cyanamide	0	8,365	0	0	0	0	101	8,466	0
133-06-2 *	Captan	3,580	0	0	0	9,700	540	6,099	19,919	0
63-25-2 *	Carbaryl	63,043	0	77,740	630	669,175	29,709	13,029	853,326	15,493
1563-66-2 *	Carbofuran	0	0	0	0	3	29,338	8,728	38,069	0
75-15-0 *	Carbon disulfide	24,187,118	442	10,044,054	385,297	27,944,668	271,540	50,848,980	113,682,099	29,778
56-23-5 *	Carbon tetrachloride	2,801,998	139,227	983,907	37,782	42,300,623	1,158,420	382,418	47,804,375	11,773
463-58-1	Carbonyl sulfide	0	0	2,286,198	0	16,734,387	25	21,206,950	40,227,560	0
5234-68-4 *	Carboxin	1,017	0	0	0	0	360	149	1,526	0
120-80-9	Catechol	0	10,813	10,008,900	96,059	4,046,473	61,960	35,836	14,260,041	660

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases
		Total Forms	Total Air Emissions	Surface Water Discharges	Underground Injection		On-site Land Releases		Total On-site Releases	Transfers Off-site to Disposal	
					Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases			
		Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
115-28-6	Chlorendic acid	2	49	0	0	0	0	0	49	0	49
90982-32-4*	Chlorimuron ethyl	2	8	0	0	0	0	0	8	0	8
7782-50-5*	Chlorine	1,257	64,419,432	301,119	60,595	0	0	73,776	64,854,922	46,946	64,901,868
10049-04-4*	Chlorine dioxide	126	1,311,372	58	0	0	0	0	1,311,430	0	1,311,430
79-11-8*	Chloroacetic acid	30	6,125	8	0	0	0	19,746	25,879	500	26,379
4080-31-3*	1-(3-Chloroallyl)-3,5,7-triaza-1-azonia adamantane chloride	14	549	21	0	0	0	672	1,242	4,804	6,046
106-47-8*	p-Chloroaniline	4	15,332	869	0	0	0	5	16,206	0	16,206
108-90-7*	Chlorobenzene	76	962,904	1,217	113,901	0	0	1,550	1,079,572	105,300	1,184,872
75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	27	5,964,553	193	0	0	0	0	5,964,746	14,550	5,979,296
75-45-6*	Chlorodifluoromethane (HCFC-22)	231	8,929,443	3,650	0	0	0	1	8,933,094	73,609	9,006,703
75-00-3	Chloroethane	57	2,532,822	905	0	0	0	0	2,533,727	5,128	2,538,855
67-66-3*	Chloroform	144	7,205,396	164,654	26,954	0	106	7,418	7,404,528	14,498	7,419,026
74-87-3*	Chloromethane	98	3,259,431	1,608	186,931	0	0	59	3,448,029	205	3,448,234
107-30-2	Chloromethyl methyl ether	3	4,155	5	0	0	0	0	4,160	54	4,214
563-47-3	3-Chloro-2-methyl-1-propene	3	25,982	0	0	0	0	0	25,982	0	25,982
--	Chlorophenols	6	4,779	16	92,980	0	0	0	97,775	839	98,614
76-06-2*	Chloropicrin	16	10,147	0	0	0	0	0	10,147	10,700	20,847
126-99-8	Chloroprene	11	996,060	0	94,000	0	0	0	1,090,060	0	1,090,060
354-25-6	1-Chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	3	549,113	0	0	0	0	0	549,113	0	549,113
2837-89-0	2-Chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	20	865,860	5	0	0	0	0	865,865	0	865,865
1897-45-6*	Chloroethalonil	19	7,914	83	0	0	0	0	7,997	171,838	179,835
75-88-7	2-Chloro-1,1,1-trifluoroethane (HCFC-133a)	4	23,310	60	0	0	0	0	23,370	80	23,450
75-72-9	Chlorotrifluoromethane (CFC-13)	1	16,900	5	0	0	0	0	16,905	0	16,905
5598-13-0*	Chlorpyrifos methyl	4	1,000	0	0	0	0	0	1,000	0	1,000
64902-72-3*	Chlorsulfuron	1	1	0	0	0	0	0	1	0	1
7440-47-3	Chromium	1,845	572,772	11,805	1	0	27,208	426,448	1,038,234	5,962,093	7,000,327
--	Chromium compounds	1,460	387,028	99,497	1,131,559	0	576,612	28,749,821	30,944,517	19,465,080	50,409,597
6459-94-5	C.I. Acid Red 114	2	0	0	0	0	0	0	0	0	0
569-64-2*	C.I. Basic Green 4	3	15	0	0	0	0	0	15	750	765
989-38-8	C.I. Basic Red 1	1	0	0	0	0	0	0	0	0	0
28407-37-6	C.I. Direct Blue 218	6	10	10	0	0	0	0	20	2,489	2,509
2832-40-8	C.I. Disperse Yellow 3	4	338	29	0	0	0	0	367	593	960
81-88-9	C.I. Food Red 15	2	0	0	0	0	0	0	0	0	0
97-56-3	C.I. Solvent Yellow 3	1	0	0	0	0	0	0	0	0	0

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
115-28-6	Chlorendic acid	0	0	0	0	0	914	49	963	0
90982-32-4 *	Chlorimuron ethyl	0	0	0	0	0	16,223	8	16,231	0
7782-50-5 *	Chlorine	79,099,777	111,317	0	2,161	229,962,293	1,106,905	64,957,305	375,239,758	40,564
10049-04-4 *	Chlorine dioxide	3,868,805	0	0	0	52,622,530	6,000	1,333,906	57,831,241	2,095
79-11-8 *	Chloroacetic acid	37,000	0	0	0	1,290,589	20,014	6,421	1,354,024	700
4080-31-3 *	1-(3-Chloroallyl)-3,5,7-triaza-1-azonia adamantane chloride	31,708	0	0	0	2,404	15,666	7,105	56,883	0
106-47-8 *	p-Chloroaniline	0	0	46,000	400	0	5,815	16,898	69,113	0
108-90-7 *	Chlorobenzene	5,571,993	1,492,007	6,799,180	1,359,228	10,248,621	3,422,433	1,118,897	30,012,359	3,374
75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	0	25,169	0	5,000	272,446	97,136	5,986,413	6,386,164	30,300
75-45-6 *	Chlorodifluoromethane (HCFC-22)	1,787,283	201,044	0	250	469,293	324,199	8,930,366	11,712,435	155,681
75-00-3	Chloroethane	3,923,357	165,400	8,196,910	41,817	31,313,445	576,354	2,536,920	46,754,203	1,888
67-66-3 *	Chloroform	5,675,765	735,446	5,823,214	314,634	16,142,192	1,548,310	7,389,584	37,629,145	17,372
74-87-3 *	Chloromethane	3,181,750	4,750	3,252,115	8,489	6,038,027	318,569	3,357,148	16,160,848	25,468
107-30-2	Chloromethyl methyl ether	0	0	0	0	12,823	0	4,227	17,050	0
563-47-3	3-Chloro-2-methyl-1-propene	0	0	0	0	625,186	14,191	25,983	665,360	0
--	Chlorophenols	2,897,377	0	0	100	237,504	5,540	97,871	3,238,392	749
76-06-2 *	Chloropicrin	2,210	0	0	0	343	1,469	20,781	24,803	14
126-99-8	Chloroprene	0	374,960	1,226,280	2,599	8,601,500	431,665	1,089,960	11,726,964	30
354-25-6	1-Chloro-1,1,2,2-tetrafluoroethane (HCFC-124a)	0	0	0	0	37,725	0	548,521	586,246	0
2837-89-0	2-Chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	0	267,438	0	0	34,892	20,753	868,043	1,191,126	0
1897-45-6 *	Chlorothalonil	2,445	0	0	0	18,720	144,424	180,811	346,400	180
75-88-7	2-Chloro-1,1,1-trifluoroethane (HCFC-133a)	0	0	0	0	8,700	17,158	23,700	49,558	8
75-72-9	Chlorotrifluoromethane (CFC-13)	0	0	0	0	0	0	16,910	16,910	0
5598-13-0 *	Chlorpyrifos methyl	2,000	0	0	0	0	2,233	1,000	5,233	0
64902-72-3 *	Chlorsulfuron	0	0	0	0	0	7,173	1	7,174	0
7440-47-3	Chromium	26,785,710	98,912,248	70,198	310	293,650	850,114	6,903,128	133,815,358	184,283
--	Chromium compounds	30,112,660	33,983,201	74,023	61,643	1,391,548	5,461,721	43,054,737	114,139,533	1,155,182
6459-94-5	C.I. Acid Red 114	0	0	0	0	0	0	0	0	0
569-64-2 *	C.I. Basic Green 4	0	0	0	0	0	998	20	1,018	0
989-38-8	C.I. Basic Red 1	0	0	0	0	0	0	0	0	0
28407-37-6	C.I. Direct Blue 218	2	0	0	0	374	1,531	3,688	5,595	0
2832-40-8	C.I. Disperse Yellow 3	0	0	0	0	0	3,664	960	4,624	0
81-88-9	C.I. Food Red 15	0	0	0	0	0	0	0	0	0
97-56-3	C.I. Solvent Yellow 3	0	0	0	0	0	0	0	0	0

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds		
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
7440-48-4	Cobalt	260	34,954	2,164	40	0	0	8,994	46,152	685,258	731,410
--	Cobalt compounds	260	31,406	34,650	44,624	0	33,197	597,857	741,734	557,124	1,298,858
7440-50-8*	Copper	2,712	892,348	40,457	57,513	0	216,878	1,555,708	2,762,904	18,378,475	21,141,379
--	Copper compounds	1,488	5,488,173	105,892	237,184	0	942,977	37,225,254	43,999,480	10,770,350	54,769,830
8001-58-9*	Creosote	77	1,288,999	8,452	0	0	26,055	1,875	1,325,381	2,301,965	3,627,346
120-71-8	p-Cresidine	4	3,027	0	0	0	0	0	3,027	2,100	5,127
108-39-4*	m-Cresol	24	54,374	139	430,000	0	0	0	484,513	2,694	487,207
95-48-7	o-Cresol	24	10,091	40	260,000	0	0	0	270,131	16,440	286,571
106-44-5	p-Cresol	28	51,348	51	263,000	0	110	0	314,509	78,311	392,820
1319-77-3*	Cresol (mixed isomers)	143	1,669,098	7,693	1,233,058	0	52	2,664	2,912,565	16,381	2,928,946
4170-30-3*	Crotonaldehyde	7	35,145	1,200	1,400	0	0	0	37,745	0	37,745
98-82-8	Cumene	241	1,474,589	1,343	859	0	3	8,242	1,485,036	18,491	1,503,527
80-15-9	Cumene hydroperoxide	45	71,106	88	300,000	0	0	7,200	378,394	11,251	389,645
135-20-6	Cupferron	1	0	0	0	0	0	0	0	0	0
21725-46-2*	Cyanazine	5	1,915	415	0	0	0	0	2,330	4,186	6,516
--	Cyanide compounds	228	638,507	65,394	3,752,094	0	1,372	101,819	4,559,186	98,604	4,657,790
1134-23-2*	Cycloate	3	82	671	71	0	0	0	824	158	982
110-82-7*	Cyclohexane	371	6,500,730	80,765	322,903	0	18	17,642	6,922,058	51,600	6,973,658
108-93-0*	Cyclohexanol	27	179,623	420	3,616,560	0	0	12	3,796,615	810	3,797,425
68359-37-5*	Cyfluthrin	2	0	0	0	0	0	0	0	0	0
94-75-7*	2,4-D (acetic acid)	19	4,991	59	250	0	250	5	5,555	6,616	12,171
533-74-4*	Dazomet	16	0	0	0	0	0	0	0	1,850	1,850
53404-60-7*	Dazomet, sodium salt	2	0	0	0	0	0	0	0	250	250
94-82-6*	2,4-DB	2	72	0	0	0	0	0	72	0	72
1929-73-3*	2,4-D butoxyethyl ester	3	500	0	0	0	0	0	500	0	500
94-80-4*	2,4-D butyl ester	3	1	0	0	0	0	0	1	0	1
1163-19-5	Decabromodiphenyl oxide	135	28,068	2,494	0	0	500	868,794	899,856	707,431	1,607,287
13684-56-5*	Desmedipham	1	83	0	0	0	0	0	83	0	83
1928-43-4*	2,4-D 2-Ethylhexyl ester	11	5,606	0	0	0	0	0	5,606	2,036	7,642
101-80-4	4,4'-Diaminodiphenyl ether	3	24	360	0	0	0	0	384	58	442
95-80-7	2,4-Diaminotoluene	3	1,958	0	0	0	0	0	1,958	0	1,958
25376-45-8	Diaminotoluene (mixed isomers)	13	11,454	556	27,000	0	0	8	39,018	284,524	323,542
333-41-5*	Diazinon	27	13,824	15	0	0	0	0	13,839	1,862	15,701
132-64-9	Dibenzofuran	36	34,770	15	0	0	0	280	35,065	54,220	89,285
106-93-4*	1,2-Dibromoethane	13	9,707	4	10	0	0	1	9,722	5,116	14,838
124-73-2	Dibromotetrafluoroethane (Halon 2402)	1	10	0	0	0	0	0	10	0	10
84-74-2*	Dibutyl phthalate	108	39,485	151	160,000	0	91	1,176	200,903	21,072	221,975
1918-00-9*	Dicamba	7	1,041	26	65,535	0	0	0	66,602	2,180	68,782
99-30-9*	Dichloran	2	0	0	0	0	0	0	0	0	0
95-50-1*	1,2-Dichlorobenzene	30	158,412	2,039	5,600	0	704	90	166,845	20,461	187,306
541-73-1	1,3-Dichlorobenzene	7	3,495	818	0	0	0	0	4,313	1	4,314
106-46-7*	1,4-Dichlorobenzene	23	262,266	1,728	2,000	0	0	1,960	267,954	289	268,243
25321-22-6	Dichlorobenzene (mixed isomers)	7	15,274	0	0	0	0	0	15,274	9	15,283
91-94-1	3,3'-Dichlorobenzidine	1	255	0	0	0	0	0	255	7,400	7,655

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
7440-48-4	Cobalt	4,423,572	7,919,086	0	0	147,031	24,592	277,126	12,791,407	3
--	Cobalt compounds	503,731	1,972,586	0	6,773	1,209,764	57,859	1,304,459	5,055,172	1,404
7440-50-8*	Copper	603,925,697	783,470,245	225,424	3,551,787	41,296,581	2,006,069	9,658,847	1,444,134,650	368,800
--	Copper compounds	310,075,700	167,470,119	0	25,643	42,125,835	4,452,985	57,625,028	581,775,310	3,073,536
8001-58-9*	Creosote	66,432,245	1,700,000	702,717	67,254	865,430,718	362,602	2,606,664	937,302,200	497,301
120-71-8	p-Cresidine	0	0	0	0	0	32,491	5,127	37,618	0
108-39-4*	m-Cresol	1,740,898	930,000	757,870	16,492	553,372	28,850	491,702	4,519,184	6
95-48-7	o-Cresol	89,071	0	347,145	1,632	234,441	34,727	424,417	1,131,433	5
106-44-5	p-Cresol	91,290	780,000	179,023	102,147	1,272,477	78,718	395,224	2,898,879	103
1319-77-3*	Cresol (mixed isomers)	339,319	464,967	4,539,730	397,074	9,992,872	275,741	2,888,535	18,898,238	4
4170-30-3*	Crotonaldehyde	0	0	2,317,000	0	501,900	16	37,545	2,856,461	0
98-82-8	Cumene	17,810,313	104,904	7,920,812	535,057	7,630,812	161,103	1,643,207	35,806,208	8,397
80-15-9	Cumene hydroperoxide	0	0	0	0	513,396	175,021	387,526	1,075,943	1,600
135-20-6	Cupferron	0	0	2,595	0	0	0	0	2,595	0
21725-46-2*	Cyanazine	0	0	0	10,400	39,000	19,755	6,516	75,671	20,000
--	Cyanide compounds	433,269	51,565	7,191,619	2,442	14,844,831	672,091	4,587,333	27,783,150	4,199
1134-23-2*	Cycloate	0	0	0	0	64	2,007	980	3,051	0
110-82-7*	Cyclohexane	55,645,913	131,524	14,303,721	4,463,196	31,267,815	4,105,909	6,774,856	116,692,934	117,376
108-93-0*	Cyclohexanol	0	19,759	2,020,445	145,035	272,856	100,776	3,843,305	6,402,176	0
68359-37-5*	Cyfluthrin	0	0	0	0	0	0	0	0	0
94-75-7*	2,4-D (acetic acid)	98,184	0	0	0	29,710	46,125	11,467	185,486	191
533-74-4*	Dazomet	0	0	0	0	11,400	621	2,200	14,221	0
53404-60-7*	Dazomet, sodium salt	0	0	0	0	90	12,072	100	12,262	0
94-82-6*	2,4-DB	35	0	0	0	0	23	73	131	0
1929-73-3*	2,4-D butoxyethyl ester	0	0	0	0	0	0	349	349	0
94-80-4*	2,4-D butyl ester	0	0	92,200	34	9,362	2	1	101,599	0
1163-19-5	Decabromodiphenyl oxide	289,049	57,236	646	6,602	50,690	370,462	1,646,812	2,421,497	0
13684-56-5*	Desmedipham	0	0	0	0	0	379	83	462	0
1928-43-4*	2,4-D 2-Ethylhexyl ester	3,982	0	0	0	0	11,151	7,540	22,673	0
101-80-4	4,4'-Diaminodiphenyl ether	0	0	0	0	150	6,272	379	6,801	0
95-80-7	2,4-Diaminotoluene	0	0	0	0	74,135	275	1,747	76,157	0
25376-45-8	Diaminotoluene (mixed isomers)	0	0	2,871,215	2,891,505	534,411	779,888	47,547	7,124,566	280,003
333-41-5*	Diazinon	50,419	0	0	0	26,183	33,074	16,258	125,934	0
132-64-9	Dibenzofuran	128,988	960	240,210	16,170	27,823	335	102,426	516,912	6
106-93-4*	1,2-Dibromoethane	0	0	0	30,740	11,862	645	9,611	52,858	0
124-73-2	Dibromotetrafluoroethane (Halon 2402)	93,800	0	0	0	0	0	10	93,810	0
84-74-2*	Dibutyl phthalate	32,125	18,084	468,416	205,442	132,864	60,660	249,098	1,166,689	58
1918-00-9*	Dicamba	0	0	0	0	61	58,850	68,501	127,412	0
99-30-9*	Dichloran	0	0	0	0	0	0	0	0	0
95-50-1*	1,2-Dichlorobenzene	39,382,322	2,259,567	1,546,421	787,537	445,251	2,074,144	193,212	46,688,454	4,376
541-73-1	1,3-Dichlorobenzene	2,994	1,180	91,900	31	13	2,473	5,361	103,952	1
106-46-7*	1,4-Dichlorobenzene	2,638,810	0	133,690	2,073	1,793	197,383	340,436	3,314,185	38
25321-22-6	Dichlorobenzene (mixed isomers)	0	0	293,565	745	230,056	10,523	15,282	550,171	0
91-94-1	3,3'-Dichlorobenzidine	0	0	0	0	7,400	74,000	7,300	88,700	0

Note: Data from Section 8 of Form R.

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Chapter 2 – National Overview of 1997 Toxics Release Inventory

Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases	
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases			Total On-site Releases Pounds		Transfers Off-site to Disposal Pounds
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds				
612-83-9	3,3'-Dichlorobenzidine dihydrochloride	17	0	0	0	0	0	0	0	0	0	0
64969-34-2	3,3'-Dichlorobenzidine sulfate	1	0	0	0	0	0	0	0	0	0	0
75-27-4	Dichlorobromomethane	1	2,400	0	0	0	0	0	100	2,500	0	2,500
764-41-0	1,4-Dichloro-2-butene	2	2,650	0	1,800	0	0	0	0	4,450	0	4,450
1649-08-7	1,2-Dichloro-1,1-difluoroethane (HCFC-132b)	1	1,400	60	0	0	0	0	0	1,460	170	1,630
75-71-8*	Dichlorodifluoromethane (CFC-12)	61	810,736	43	5,766	0	0	0	0	816,545	550	817,095
107-06-2*	1,2-Dichloroethane	78	916,764	1,826	4,549	0	0	0	27	923,166	120,476	1,043,642
540-59-0	1,2-Dichloroethylene	10	7,772	17	0	0	0	0	0	7,789	0	7,789
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)	234	7,473,102	239	0	0	0	0	4,970	7,478,311	320,848	7,799,159
75-43-4	Dichlorofluoromethane (HCFC-21)	2	131,260	0	0	0	0	0	0	131,260	8,440	139,700
75-09-2*	Dichloromethane	804	47,665,155	9,492	528,026	0	259	10,921	0	48,213,853	226,085	48,439,938
507-55-1	1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	3	34,811	0	0	0	0	0	0	34,811	0	34,811
422-56-0	3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	3	28,251	0	0	0	0	0	0	28,251	0	28,251
120-83-2	2,4-Dichlorophenol	5	3,296	134	16,020	0	0	0	0	19,450	0	19,450
78-87-5*	1,2-Dichloropropane	14	378,454	2,609	0	0	0	0	30	381,093	12,368	393,461
10061-02-6	trans-1,3-Dichloropropene	3	468	0	0	0	0	0	0	468	3	471
78-88-6*	2,3-Dichloropropene	4	914	0	0	0	0	0	0	914	0	914
542-75-6*	1,3-Dichloropropylene	11	8,821	67	0	0	0	0	0	8,888	0	8,888
76-14-2*	Dichlorotetrafluoroethane (CFC-114)	15	878,128	5	0	0	0	0	0	878,133	9	878,142
34077-87-7	Dichlorotrifluoroethane	1	1,000	0	0	0	0	0	0	1,000	0	1,000
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (HCFC-123a)	1	65,575	5	0	0	0	0	0	65,580	0	65,580
306-83-2	2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)	13	180,046	58	0	0	0	0	0	180,104	69	180,173
62-73-7*	Dichlorvos	4	505	5	0	0	0	0	0	510	0	510
115-32-2*	Dicofol	6	510	0	0	0	0	0	0	510	629	1,139
77-73-6	Dicyclopentadiene	80	355,102	19,866	0	0	698	9	0	375,675	9,410	385,085
111-42-2	Diethanolamine	336	380,549	150,696	11,642	0	0	69,266	0	612,153	264,071	876,224
117-81-7*	Di-(2-ethylhexyl) phthalate	298	235,501	583	0	0	66	70,943	0	307,093	995,038	1,302,131
64-67-5	Diethyl sulfate	36	7,419	0	0	0	0	0	0	7,419	0	7,419
35367-38-5*	Diiflubenzuron	1	0	0	0	0	0	0	0	0	0	0
101-90-6	Diglycidyl resorcinol ether	3	20	0	0	0	0	0	0	20	0	20
94-58-6	Dihydrosafrole	3	505	0	0	0	0	0	0	505	0	505
--	Diisocyanates	1,220	457,214	260	0	0	16	95,482	0	552,972	892,666	1,445,638

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
612-83-9	3,3'-Dichlorobenzidine dihydrochloride	0	0	0	0	12,378	38,000	0	50,378	0
64969-34-2	3,3'-Dichlorobenzidine sulfate	0	0	0	0	750	3,800	0	4,550	0
75-27-4	Dichlorobromomethane	0	0	0	0	0	0	2,500	2,500	0
764-41-0	1,4-Dichloro-2-butene	1,800,000	0	0	0	3,300,000	300,000	4,450	5,404,450	0
1649-08-7	1,2-Dichloro-1,1-difluoroethane (HCFC-132b)	0	0	0	0	107,000	72,000	1,600	180,600	0
75-71-8*	Dichlorodifluoromethane (CFC-12)	211,228	154,956	0	90	13,617	40,079	817,009	1,236,979	86,550
107-06-2*	1,2-Dichloroethane	50,816,240	17,461,011	47,830,815	420,603	53,835,059	1,741,248	902,553	173,007,529	27,434
540-59-0	1,2-Dichloroethylene	1,520,000	331,902	1,020,000	0	2,904,290	1,384	7,716	5,785,292	115
1717-00-6	1,1-Dichloro-1-fluoroethane (HCFC-141b)	246,249	131,231	0	840,910	446,481	700,282	7,423,438	9,788,591	1,736
75-43-4	Dichlorofluoromethane (HCFC-21)	0	0	0	0	0	200	141,560	141,760	0
75-09-2*	Dichloromethane	115,695,827	11,621,741	8,620,172	3,659,871	20,671,899	13,076,828	48,751,274	222,097,612	70,356
507-55-1	1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	3,600	3,490	0	0	0	1,200	34,811	43,101	0
422-56-0	3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	2,900	2,850	0	0	0	1,000	28,251	35,001	0
120-83-2	2,4-Dichlorophenol	1,450	0	3	0	315,825	0	19,445	336,723	0
78-87-5*	1,2-Dichloropropane	38,220,000	3,300	22,160,926	13,021	7,776,117	90,189	390,794	68,654,347	53
10061-02-6	trans-1,3-Dichloropropene	11,000	160	12,144,000	124	6,590	500	465	12,162,839	0
78-88-6*	2,3-Dichloropropene	9,200,000	0	2,500,000	2,200	280,000	1,500,000	910	13,483,110	20
542-75-6*	1,3-Dichloropropylene	9,445,000	240	14,000,000	4,320	2,229,589	42,522	8,787	25,730,458	48
76-14-2*	Dichlorotetrafluoroethane (CFC-114)	89,000	53,493	0	0	1,419,246	194,248	877,909	2,633,896	0
34077-87-7	Dichlorotrifluoroethane	0	0	0	0	716,000	0	968	716,968	0
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (HCFC-123a)	0	0	0	0	0	0	60,585	60,585	5,000
306-83-2	2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)	225,000	0	0	0	194,831	400	179,611	599,842	0
62-73-7*	Dichlorvos	0	0	0	0	10	50	1,306	1,366	0
115-32-2*	Dicofol	0	0	0	0	0	928	841	1,769	0
77-73-6	Dicyclopentadiene	494,995	44,544	1,361,269	1,260,622	720,935	92,963	381,775	4,357,103	609
111-42-2	Diethanolamine	13,443	259,960	94,815	25,938	2,211,021	1,829,165	735,408	5,169,750	30,847
117-81-7*	Di-(2-ethylhexyl) phthalate	2,840,681	1,699,965	1,298,057	311,076	238,989	257,221	1,120,306	7,766,295	5,272
64-67-5	Diethyl sulfate	0	0	0	3,699,098	2,673	394	4,775	3,706,940	118
35367-38-5*	Diflubenzuron	0	0	0	0	0	40	0	40	0
101-90-6	Diglycidyl resorcinol ether	0	0	0	800	0	0	15	815	0
94-58-6	Dihydrosafrole	0	0	0	0	0	53	100	153	0
--	Diisocyanates	1,558,751	542,822	435,039	701,574	905,529	1,508,455	1,045,303	6,697,473	18,698

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
55290-64-7*	Dimethipin	1	0	0	0	0	0	0	0	0	0
60-51-5*	Dimethoate	4	71	0	0	0	0	0	71	0	71
119-90-4	3,3'-Dimethoxybenzidine	1	0	0	0	0	0	0	0	0	0
20325-40-0	3,3'-Dimethoxybenzidine dihydrochloride	7	0	0	0	0	0	0	0	0	0
124-40-3	Dimethylamine	71	467,039	46,242	18,250	0	0	4,135	535,666	15,016	550,682
2300-66-5*	Dimethylamine dicamba	3	140	0	0	0	0	0	140	0	140
121-69-7	N,N-Dimethylaniline	21	39,009	1,385	0	0	0	0	40,394	0	40,394
612-82-8	3,3'-Dimethylbenzidine dihydrochloride	1	0	0	0	0	0	0	0	0	0
79-44-7	Dimethylcarbaryl chloride	1	118	0	0	0	0	0	118	0	118
2524-03-0	Dimethyl chlorothiophosphate	3	69	0	6,952	0	0	0	7,021	0	7,021
68-12-2*	N,N-Dimethylformamide	163	1,345,965	45,694	730,005	0	750	282	2,122,696	292,012	2,414,708
57-14-7*	1,1-Dimethyl hydrazine	4	902	0	0	0	0	0	902	437	1,339
105-67-9*	2,4-Dimethylphenol	25	51,895	20	170,000	0	0	0	221,915	1,863	223,778
131-11-3*	Dimethyl phthalate	97	175,524	636	4,450	0	0	692	181,302	6,389	187,691
77-78-1	Dimethyl sulfate	37	4,499	0	0	0	0	0	4,499	2,308	6,807
99-65-0	m-Dinitrobenzene	1	421	81,587	0	0	451	0	82,459	0	82,459
528-29-0	o-Dinitrobenzene	2	54	1,044	0	0	58	0	1,156	0	1,156
100-25-4	p-Dinitrobenzene	1	14	29	0	0	16	0	59	0	59
88-85-7*	Dinitrobutyl phenol	5	1,110	23	0	0	0	0	1,133	7,388	8,521
534-52-1*	4,6-Dinitro-o-cresol	7	101	0	0	0	0	0	101	115,801	115,902
51-28-5*	2,4-Dinitrophenol	7	422	51,069	0	0	21	0	51,512	0	51,512
121-14-2	2,4-Dinitrotoluene	4	1,801	90	0	0	0	0	1,891	0	1,891
606-20-2	2,6-Dinitrotoluene	1	438	24	0	0	0	0	462	0	462
25321-14-6	Dinitrotoluene (mixed isomers)	6	11,551	63	56,000	0	0	0	67,614	46,491	114,105
123-91-1	1,4-Dioxane	44	141,262	196,272	0	0	0	4,609	342,143	305,787	647,930
122-39-4*	Diphenylamine	31	69,246	66	17,855	0	0	250	87,417	23,487	110,904
2164-07-0*	Dipotassium endothall	1	0	0	0	0	0	0	0	0	0
138-93-2*	Disodium cyanodithioimido-carbonate	5	0	0	0	0	0	0	0	0	0
330-54-1*	Diuron	10	2,060	257	0	0	0	0	2,317	2,637	4,954
120-36-5*	2,4-DP	3	257	0	0	0	0	0	257	0	257
2702-72-9*	2,4-D sodium salt	1	0	0	0	0	0	0	0	0	0
106-89-8*	Epichlorohydrin	77	314,249	9,304	0	0	1	9,509	333,063	4,016	337,079
13194-48-4*	Ethoprop	6	26	0	0	0	0	132,926	132,952	0	132,952
110-80-5	2-Ethoxyethanol	25	130,062	1	0	0	33	0	130,096	500	130,596
140-88-5	Ethyl acrylate	94	183,121	159	0	0	0	513	183,793	4,821	188,614
100-41-4	Ethylbenzene	1,005	8,730,416	5,739	559,425	255	43	151,926	9,447,804	71,872	9,519,676
541-41-3	Ethyl chloroformate	4	4,017	5	0	0	0	5	4,027	0	4,027
759-94-4*	Ethyl dipropylthiocarbamate	4	2,208	113	9,501	0	0	0	11,822	2,778	14,600
74-85-1*	Ethylene	305	30,269,807	927	2,632	0	0	110	30,273,476	1,459	30,274,935
--	Ethylenebisdithiocarbamic acid, salts and esters	6	571	0	0	0	0	0	571	600	1,171

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
55290-64-7*	Dimethipin	0	0	0	0	0	0	0	0	0
60-51-5*	Dimethoate	243	0	0	0	0	598	912	1,753	0
119-90-4	3,3'-Dimethoxybenzidine	0	0	0	0	0	0	0	0	0
20325-40-0	3,3'-Dimethoxybenzidine dihydrochloride	0	0	0	0	10	0	0	10	0
124-40-3	Dimethylamine	503,203	0	126,268	1,648	2,676,460	417,279	541,113	4,265,971	8,675
2300-66-5*	Dimethylamine dicamba	0	0	0	0	0	0	140	140	0
121-69-7	N,N-Dimethylaniline	46,000	0	0	748,779	9,273	217,456	39,824	1,061,332	0
612-82-8	3,3'-Dimethylbenzidine dihydrochloride	0	0	0	0	0	0	0	0	0
79-44-7	Dimethylcarbaryl chloride	0	0	0	0	25,445	0	118	25,563	0
2524-03-0	Dimethyl chlorothiophosphate	0	0	0	0	0	4,806	7,021	11,827	0
68-12-2*	N,N-Dimethylformamide	7,815,007	268,701	11,766,149	5,590,193	14,497,941	4,913,049	3,176,537	48,027,577	2,555
57-14-7*	1,1-Dimethyl hydrazine	0	2	0	1,900	2,314	796	905	5,917	0
105-67-9*	2,4-Dimethylphenol	23,760	67,958	1,319,661	59,659	633,730	21,718	223,980	2,350,466	2
131-11-3*	Dimethyl phthalate	0	13,624	604,012	27,507	834,023	89,534	179,099	1,747,799	0
77-78-1	Dimethyl sulfate	0	54,525	62,628	0	10,457	2,323	4,223	134,156	0
99-65-0	m-Dinitrobenzene	0	0	0	0	734,287	11,352	82,459	828,098	0
528-29-0	o-Dinitrobenzene	0	0	0	0	103,312	1,452	1,156	105,920	0
100-25-4	p-Dinitrobenzene	0	0	0	0	28,432	396	59	28,887	0
88-85-7*	Dinitrobutyl phenol	0	0	590,492	0	71,830	1,700	8,232	672,254	0
534-52-1*	4,6-Dinitro-o-cresol	0	0	1,347,500	1,800	28,000	11,413	116,467	1,505,180	0
51-28-5*	2,4-Dinitrophenol	0	0	674,605	69,679	1,923,457	1	51,522	2,719,264	0
121-14-2	2,4-Dinitrotoluene	0	1,500	50,182	5,363	35,419	1,500	1,883	95,847	0
606-20-2	2,6-Dinitrotoluene	0	0	477	0	17,119	110	462	18,168	0
25321-14-6	Dinitrotoluene (mixed isomers)	0	0	0	2	213,007	501,414	68,691	783,114	75,831
123-91-1	1,4-Dioxane	620,000	4	1,269,899	927,524	1,292,021	117,066	725,779	4,952,293	11
122-39-4*	Diphenylamine	2,000,000	619	4,868,832	655,045	52,359	58,800	111,594	7,747,249	1
2164-07-0*	Dipotassium endothall	0	0	0	0	0	0	0	0	0
138-93-2*	Disodium cyanodithioimido-carbonate	0	0	0	0	0	0	0	0	0
330-54-1*	Diuron	250	0	0	0	0	1,032	4,564	5,846	0
120-36-5*	2,4-DP	3,000	0	0	0	0	11	9	3,020	192
2702-72-9*	2,4-D sodium salt	0	0	0	0	18,993	0	0	18,993	0
106-89-8*	Epichlorohydrin	20,870,748	17,715	5,878,951	83,883	6,048,675	1,329,239	317,147	34,546,358	3,583
13194-48-4*	Ethoprop	0	0	0	0	0	3,820	132,953	136,773	0
110-80-5	2-Ethoxyethanol	1,500	551	697,714	72,295	774,979	151,641	169,665	1,868,345	13,237
140-88-5	Ethyl acrylate	390,000	40,206	16,473,174	832,383	329,187	160,956	184,447	18,410,353	285
100-41-4	Ethylbenzene	30,036,542	6,986,553	35,462,089	11,283,948	14,600,710	1,805,729	9,470,382	109,645,953	29,727
541-41-3	Ethyl chloroformate	0	0	0	0	2,970	0	3,890	6,860	0
759-94-4*	Ethyl dipropylthiocarbamate	0	0	0	0	4,184	50,685	14,041	68,910	323
74-85-1*	Ethylene ^a	115,302,995	14,410	1,151,632,258	14,141,146	496,425,339	1,798,509	29,264,637	1,808,579,294	602,721
--	Ethylenebisdithiocarbamic acid, salts and esters	0	0	0	0	0	2,995	1,289	4,284	0

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.

^aOne facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 422,000,000 pounds of ethylene in 1997. The facility has since revised this quantity to zero. Another facility, Shell Chemical Co. in Geismar, LA, reported on-site energy recovery of 193,830,000 pounds of ethylene in 1997. The facility has since revised this quantity to 13,000,000 pounds. For ethylene, on-site energy recovery changes to 548,802,258 pounds and total production-related waste managed changes to 1,205,749,294 pounds.



Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases Pounds
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
107-21-1*	Ethylene glycol	1,275	5,529,550	638,973	3,541,494	992	26,906	389,572	10,127,487	1,564,736	11,692,223
151-56-4	Ethyleneimine	1	6	0	0	0	0	0	6	0	6
75-21-8*	Ethylene oxide	156	926,370	3,634	15,147	0	0	986	946,137	52	946,189
96-45-7*	Ethylene thiourea	13	286	0	0	0	0	0	286	5,657	5,943
75-34-3	Ethylidene dichloride	6	18,119	3	0	0	0	0	18,122	0	18,122
52-85-7*	Famphur	1	0	0	0	0	0	0	0	0	0
60168-88-9*	Fenarimol	1	0	0	0	0	0	0	0	0	0
13356-08-6*	Fenbutatin oxide	2	3	0	3,420	0	0	0	3,423	0	3,423
72490-01-8*	Fenoxycarb	1	0	0	0	0	0	0	0	0	0
39515-41-8*	Fenpropathrin	1	0	0	0	0	0	0	0	0	0
55-38-9*	Fenthion	1	2	0	0	0	0	0	2	1	3
51630-58-1*	Fenvalerate	1	1	0	0	0	0	0	1	0	1
69806-50-4*	Fluazifop butyl	1	0	0	0	0	0	0	0	0	0
2164-17-2*	Fluometuron	6	695	0	0	0	0	0	695	3,543	4,238
7782-41-4	Fluorine	9	29,785	54,200	0	0	0	0	83,985	0	83,985
51-21-8	Fluorouracil	1	0	0	0	0	250	0	250	250	500
69409-94-5*	Fluvalinate	1	0	0	0	0	0	0	0	0	0
133-07-3*	Folpet	8	42	10	0	0	0	0	52	3,836	3,888
72178-02-0	Fomesafen	2	695	1,230	0	0	0	0	1,925	13,182	15,107
50-00-0*	Formaldehyde	812	11,534,568	246,857	9,905,754	0	28	113,265	21,800,472	157,083	21,957,555
64-18-6*	Formic acid	272	1,704,989	35,026	11,067,451	0	0	3,536	12,811,002	88,548	12,899,550
76-13-1	Freon 113	50	1,063,709	1,876	0	0	0	0	1,065,585	2,355	1,067,940
--	Glycol ethers	2,010	37,018,415	337,884	5,462	0	806	39,399	37,401,966	948,930	38,350,896
118-74-1*	Hexachlorobenzene	12	154	276	139	0	0	0	569	12,038	12,607
87-68-3	Hexachloro-1,3-butadiene	7	1,410	9	299	0	0	0	1,718	200	1,918
77-47-4*	Hexachlorocyclo-pentadiene	4	6,927	3	250	0	0	0	7,180	930	8,110
67-72-1*	Hexachloroethane	15	1,863	15	659	0	0	0	2,537	4,720	7,257
110-54-3	n-Hexane	787	71,548,453	58,540	13,221	0	265	27,768	71,648,247	297,787	71,946,034
51235-04-2*	Hexazinone	4	260	3,006	0	0	0	0	3,266	250	3,516
67485-29-4*	Hydramethylnon	2	20	0	0	0	0	0	20	0	20
302-01-2	Hydrazine	44	11,659	12	0	0	0	250	11,921	30,430	42,351
10034-93-2	Hydrazine sulfate	3	0	0	110,000	0	0	0	110,000	0	110,000
7647-01-0*	Hydrochloric acid	1,000	59,250,310	1,216	489,005	0	0	48,070	59,788,601	447,822	60,236,423
74-90-8*	Hydrogen cyanide	50	1,158,784	241	657,902	0	8	0	1,816,935	2,198	1,819,133
7664-39-3*	Hydrogen fluoride	603	12,422,535	31,680	0	2,879	0	15,047	12,472,141	118,837	12,590,978
123-31-9	Hydroquinone	60	16,649	1,749	303,000	0	0	0	321,398	730	322,128
55406-53-6*	3-Iodo-2-propynyl butyl-carbamate	18	3,396	21	0	0	0	295	3,712	5,957	9,669
13463-40-6	Iron pentacarbonyl	1	1,461	0	0	0	0	0	1,461	0	1,461
78-84-2	Isobutyraldehyde	20	213,407	1,336	0	0	0	0	214,743	34,992	249,735
25311-71-1*	Isofenphos	2	500	0	0	0	0	0	500	0	500
67-63-0*	Isopropyl alcohol (manufacturing)	76	922,901	250	0	0	0	0	923,151	250	923,401
80-05-7	4,4'-Isopropylidenediphenol	116	217,654	3,777	0	0	280,000	10,009	511,440	500,386	1,011,826
77501-63-4*	Lactofen	3	77	0	0	0	0	0	77	28	105

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
107-21-1*	Ethylene glycol	452,791,021	76,990,931	6,836,406	17,472,536	55,214,574	29,734,918	12,985,925	652,026,311	66,961
151-56-4	Ethyleneimine	0	0	0	0	22,000	0	6	22,006	0
75-21-8*	Ethylene oxide	70,880	1,610	38,000	7	11,312,884	105,228	598,688	12,127,297	389,284
96-45-7*	Ethylene thiourea	780	0	0	0	0	4,170	5,334	10,284	0
75-34-3	Ethylidene dichloride	1,300,000	0	807,315	0	3,291,684	75,308	18,109	5,492,416	6
52-85-7*	Famphur	0	0	0	0	0	2,664	0	2,664	0
60168-88-9*	Fenarimol	0	0	0	0	0	0	0	0	0
13356-08-6*	Fenbutatin oxide	0	0	0	0	0	0	1,000	1,000	0
72490-01-8*	Fenoxycarb	0	0	0	0	0	0	0	0	0
39515-41-8*	Fenpropathrin	0	0	0	0	0	0	0	0	0
55-38-9*	Fenthion	5	0	0	0	0	1,000	2	1,007	0
51630-58-1*	Fenvalerate	0	0	0	0	0	1,000	0	1,000	0
69806-50-4*	Fluazifop butyl	0	0	0	0	0	0	0	0	0
2164-17-2*	Fluometuron	0	0	0	0	0	12,784	3,251	16,035	0
7782-41-4	Fluorine	0	0	0	0	19,500	0	83,985	103,485	1
51-21-8	Fluorouracil	1,285	0	0	0	0	0	0	1,285	0
69409-94-5*	Fluvalinate	0	0	0	0	0	0	0	0	0
133-07-3*	Folpet	221	0	0	0	1,800	368	3,889	6,278	0
72178-02-0	Fomesafen	0	0	0	0	0	5,847	18,428	24,275	0
50-00-0*	Formaldehyde	90,741,776	643,236	14,449,258	411,094	83,203,482	3,436,540	21,883,140	214,768,526	22,015
64-18-6*	Formic acid	862,842	33	5,770,006	2,436,610	145,340,583	3,157,416	13,149,351	170,716,841	119
76-13-1	Freon 113	610,745	139,726	50,633	11,000	191,059,556	299,648	1,065,260	193,236,568	729
--	Glycol ethers	179,203,160	3,777,684	32,394,994	14,032,831	38,143,112	10,724,998	40,420,969	318,697,748	38,155
118-74-1*	Hexachlorobenzene	7,100	4	140,000	4,172	1,690,651	21,984	12,622	1,876,533	11
87-68-3	Hexachloro-1,3-butadiene	0	4	37,000	0	8,091,000	228,996	1,818	8,358,818	264
77-47-4*	Hexachlorocyclo-pentadiene	0	0	0	0	284,679	19,055	8,097	311,831	2,400
67-72-1*	Hexachloroethane	0	3	897,000	103,469	3,209,000	43,379	2,286	4,255,137	4,628
110-54-3	n-Hexane	371,918,727	14,085,860	30,687,478	19,134,402	72,743,563	4,724,666	69,383,458	582,678,154	704,970
51235-04-2*	Hexazinone	0	0	0	0	3,831	260,835	3,535	268,201	0
67485-29-4*	Hydramethylnon	0	0	0	0	0	475	10	485	0
302-01-2	Hydrazine	25	41	0	650	248,339	21,912	32,825	303,792	190
10034-93-2	Hydrazine sulfate	0	0	0	0	1,700	0	110,002	111,702	0
7647-01-0*	Hydrochloric acid	72,162,656	4,211,505	180,000	6,673,069	782,653,538	11,481,225	60,106,472	937,468,465	45,552
74-90-8*	Hydrogen cyanide	61,391	250	78,124,873	331	28,815,443	4,793	1,816,558	108,823,639	107
7664-39-3*	Hydrogen fluoride	100,395,164	232,309	0	5,910	120,560,424	3,065,078	12,270,652	236,529,537	113,189
123-31-9	Hydroquinone	710	0	6,034,221	8,232	1,380,026	63,041	320,498	7,806,728	11
55406-53-6*	3-Iodo-2-propynyl butyl-carbamate	6,954	0	0	7,225	339	158,524	5,317	178,359	0
13463-40-6	Iron pentacarbonyl	0	0	0	0	0	0	1,461	1,461	0
78-84-2	Isobutyraldehyde	0	1,400	1,400,398	575,253	734,068	23,593	249,335	2,984,047	0
25311-71-1*	Isofenphos	2,000	0	0	0	0	2,000	989	4,989	0
67-63-0*	Isopropyl alcohol (manufacturing)	1,180,102	148,807	10,069,726	483,057	94,225	86,520	914,339	12,976,776	42
80-05-7	4,4'-Isopropylidenediphenol	98,401	67,350	9,258,664	72,155	1,599,908	137,685	753,985	11,988,148	5,912
77501-63-4*	Lactofen	72	0	0	0	0	12,840	78	12,990	0

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Chapter 2 – National Overview of 1997 Toxics Release Inventory

Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds		
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
7439-92-1	Lead	804	424,888	14,718	0	0	177,574	4,052,267	4,669,447	5,827,004	10,496,451
--	Lead compounds	816	877,637	36,516	263,980	0	1,120,106	12,647,753	14,945,992	30,465,946	45,411,938
58-89-9*	Lindane	7	54	5	0	0	0	0	59	753	812
330-55-2*	Linuron	3	10	5	0	0	0	0	15	0	15
554-13-2	Lithium carbonate	33	10,907	255	300	0	3,600	10,100	25,162	234,559	259,721
121-75-5*	Malathion	21	4,665	5	0	0	0	0	4,670	250	4,920
108-31-6	Maleic anhydride	210	471,855	5	5	0	750	4,770	477,385	9,160	486,545
109-77-3	Malononitrile	3	119	0	104,975	0	0	0	105,094	0	105,094
12427-38-2*	Maneb	8	11,641	0	0	0	11,641	0	23,282	15,613	38,895
7439-96-5	Manganese	1,659	819,618	147,746	6	6	76,282	9,838,601	10,882,259	16,209,432	27,091,691
--	Manganese compounds	1,181	1,521,980	4,206,997	14,412,830	0	3,234,107	46,936,374	70,312,288	46,231,218	116,543,506
93-65-2	Mecoprop	7	1,275	0	0	0	0	5	1,280	250	1,530
149-30-4*	2-Mercaptobenzothiazole	31	6,690	1,030	50,000	0	0	0	57,720	207,509	265,229
7439-97-6*	Mercury	20	11,805	386	0	0	406	7,475	20,072	25,053	45,125
--	Mercury compounds	9	2,626	34	41	0	0	0	2,701	25,508	28,209
150-50-5*	Merphos	1	169	0	0	0	0	0	169	0	169
126-98-7	Methacrylonitrile	5	943	0	110,190	0	0	0	111,133	0	111,133
137-42-8*	Metham sodium	10	5,959	3	0	0	0	0	5,962	310	6,272
67-56-1*	Methanol	2,239	194,376,752	7,019,881	17,621,227	187,607	5,540	957,874	220,168,881	952,260	221,121,141
94-74-6*	Methoxone	7	755	0	0	0	250	0	1,005	4,853	5,858
72-43-5*	Methoxychlor	3	0	0	0	0	0	0	0	0	0
109-86-4*	2-Methoxyethanol	44	1,035,779	16,006	0	0	0	123	1,051,908	1,500	1,053,408
96-33-3	Methyl acrylate	64	184,651	666	15,902	0	0	8,940	210,159	1,657	211,816
1634-04-4	Methyl tert-butyl ether	201	2,626,323	163,716	9,120	7,200	0	124	2,806,483	118,121	2,924,604
79-22-1	Methyl chlorocarbonate	3	3,387	5	0	0	0	5	3,397	0	3,397
101-14-4	4,4'-Methylenebis(2-chloro-aniline)	24	2,266	0	0	0	0	0	2,266	0	2,266
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzeneamine	2	0	0	0	0	0	0	0	0	0
74-95-3	Methylene bromide	5	57,743	0	0	0	0	0	57,743	0	57,743
101-77-9	4,4'-Methylenedianiline	26	9,221	86	15,050	0	0	0	24,357	16,765	41,122
78-93-3*	Methyl ethyl ketone	1,977	52,974,232	41,781	485,144	5	7,282	152,040	53,660,484	466,246	54,126,730
60-34-4	Methyl hydrazine	4	867	0	0	0	0	0	867	0	867
74-88-4	Methyl iodide	10	121,458	48	3,929	0	0	0	125,435	27	125,462
108-10-1*	Methyl isobutyl ketone	852	16,005,859	19,146	86,400	0	0	4,089	16,115,494	311,182	16,426,676
624-83-9	Methyl isocyanate	5	488	0	0	0	0	1	489	0	489
556-61-6*	Methyl isothiocyanate	3	78	0	0	0	0	0	78	0	78
75-86-5	2-Methylacetonitrile	6	5,466	0	62,090	0	0	0	67,556	0	67,556
80-62-6	Methyl methacrylate	276	2,108,671	6,516	140,000	0	0	1,340	2,256,527	184,017	2,440,544
924-42-5	N-Methylolacrylamide	31	4,381	1,308	0	0	0	33	5,722	3,402	9,124
298-00-0*	Methyl parathion	4	481	0	0	0	0	0	481	0	481
109-06-8	2-Methylpyridine	7	21,742	0	47,000	0	0	0	68,742	21	68,763
872-50-4	N-Methyl-2-pyrrolidone	365	3,125,284	27,896	2,570,958	41,000	4,841	204,438	5,974,417	528,483	6,502,900
21087-64-9*	Metribuzin	6	359	24	0	0	0	0	383	0	383
7786-34-7*	Mevinphos	1	0	0	0	0	0	0	0	0	0
90-94-8	Michler's ketone	1	401	0	0	0	0	0	401	0	401
2212-67-1*	Molinate	3	667	4	0	0	0	0	671	6,437	7,108

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
7439-92-1	Lead	223,496,228	44,515,712	272,104	12,544	1,910,946	839,391	8,771,387	279,818,312	108,510
--	Lead compounds	333,440,293	303,148,397	56,000	50,842	3,202,463	4,556,056	34,566,800	679,020,851	3,730,552
58-89-9*	Lindane	84	0	0	0	0	2,790	67	2,941	0
330-55-2*	Linuron	25	0	0	0	0	0	50	75	0
554-13-2	Lithium carbonate	31,190	0	0	0	1,200	2,400	241,578	276,368	0
121-75-5*	Malathion	224	0	0	0	0	3,200	3,823	7,247	0
108-31-6	Maleic anhydride	11,053	0	3,673,279	180,626	49,248,507	1,313,924	475,172	54,902,561	4,607
109-77-3	Malononitrile	0	0	0	0	3	690	105,094	105,787	0
12427-38-2*	Maneb	0	0	0	0	0	3,684	3,972	7,656	23,282
7439-96-5	Manganese	42,094,599	63,013,817	0	460	256,743	471,320	25,457,423	131,294,362	428,218
--	Manganese compounds	18,174,571	47,149,281	20,349	35,437	1,552,540	5,388,284	108,079,180	180,399,642	508,687
93-65-2	Mecoprop	1,750	0	0	0	740	1,335	551	4,376	96
149-30-4*	2-Mercaptobenzothiazole	3,932	10,538	0	819,814	403,993	11,463	265,831	1,515,571	0
7439-97-6*	Mercury	398,999	39,661	0	0	4,239	10,606	19,903	473,408	20
--	Mercury compounds	39,004	7,338	0	0	0	2,802	25,061	74,205	0
150-50-5*	Merphos	0	0	0	0	0	0	169	169	0
126-98-7	Methacrylonitrile	0	0	0	0	394	0	111,133	111,527	0
137-42-8*	Metham sodium	0	0	0	909	388	4,641	6,921	12,859	507
67-56-1*	Methanol	652,646,250	19,047,443	338,486,384	92,054,052	960,162,594	131,720,870	226,499,488	2,420,617,081	198,274
94-74-6*	Methoxone	3,391	0	0	0	0	271	6,361	10,023	96
72-43-5*	Methoxychlor	0	0	0	0	0	0	0	0	0
109-86-4*	2-Methoxyethanol	1,274,454	11,150	329,218	1,135,401	2,133,850	1,534,239	1,125,869	7,544,181	1,570
96-33-3	Methyl acrylate	1,034,001	7,822	490,480	402,873	2,513,567	41,418	184,972	4,675,133	0
1634-04-4	Methyl tert-butyl ether	2,346,757	466,198	367,993	2,675,435	3,964,927	848,129	2,908,348	13,577,787	3,817
79-22-1	Methyl chlorocarbonate	0	0	0	0	39,010	0	3,370	42,380	10
101-14-4	4,4'-Methylenebis(2-chloro-aniline)	0	0	0	2,956	0	7,809	2,004	12,769	0
101-61-1	4,4'-Methylenebis(N,N-dimethyl) benzeneamine	0	0	0	0	0	0	0	0	0
74-95-3	Methylene bromide	969,440	0	0	0	0	0	57,743	1,027,183	0
101-77-9	4,4'-Methylenedianiline	3,700	138	960,204	5,478	97,414	71,650	36,244	1,174,828	0
78-93-3*	Methyl ethyl ketone	53,877,400	19,088,054	77,959,795	41,862,752	70,061,993	5,743,445	54,277,916	322,871,355	205,539
60-34-4	Methyl hydrazine	0	800	0	0	5,584	1,642	504	8,530	1
74-88-4	Methyl iodide	0	0	0	6	9,686	6,704	126,398	142,794	98
108-10-1*	Methyl isobutyl ketone	65,117,922	11,934,282	30,845,396	16,896,647	13,794,459	1,363,149	16,414,952	156,366,807	9,910
624-83-9	Methyl isocyanate	0	0	0	0	92,534	0	486	93,020	2
556-61-6*	Methyl isothiocyanate	0	0	0	0	0	191	78	269	0
75-86-5	2-Methylacetonitrile	0	0	0	0	15,270	360	67,525	83,155	0
80-62-6	Methyl methacrylate	1,282,943	51,663	2,433,787	1,959,654	5,787,869	437,999	2,287,796	14,241,711	576
924-42-5	N-Methylolacrylamide	0	0	0	3,553	13,038	50,351	9,125	76,067	1
298-00-0*	Methyl parathion	0	0	0	0	0	72,300	318	72,618	68,000
109-06-8	2-Methylpyridine	66,000	190,000	30,000	7,818	52,000	25,043	68,935	439,796	840
872-50-4	N-Methyl-2-pyrrolidone	586,566	8,821,400	1,389,250	2,866,773	5,655,591	3,665,480	6,592,639	29,577,699	127
21087-64-9*	Metribuzin	0	0	0	0	4,895	16,040	225	21,160	0
7786-34-7*	Mevinphos	0	0	0	0	0	0	0	0	0
90-94-8	Michler's ketone	0	0	0	230	0	0	401	631	0
2212-67-1*	Molinate	0	0	0	10	2,290	41,234	8,117	51,651	1,287

Note: Data from Section 8 of Form R.

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Chapter 2 – National Overview of 1997 Toxics Release Inventory

Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases Pounds	
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases			Total On-site Releases Pounds		Transfers Off-site to Disposal Pounds
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds				
1313-27-5	Molybdenum trioxide	159	222,987	39,645	276,580	0	7,285	56,798	603,295	453,770	1,057,065	
76-15-3	Monochloropenta-fluoroethane (CFC-115)	8	188,262	5	0	0	0	0	188,267	0	188,267	
88671-89-0*	Myclobutanil	4	500	0	0	0	0	0	500	0	500	
142-59-6*	Nabam	3	0	0	0	0	0	0	0	0	0	
300-76-5*	Naled	1	0	0	0	0	0	0	0	0	0	
91-20-3*	Naphthalene	533	2,485,690	13,098	187,927	0	12,368	69,836	2,768,919	501,134	3,270,053	
134-32-7	alpha-Naphthylamine	2	0	0	0	0	0	0	0	0	0	
7440-02-0	Nickel	2,002	411,558	24,911	25,642	0	12,688	224,961	699,760	3,872,894	4,572,654	
--	Nickel compounds	959	353,614	93,440	116,434	0	117,245	4,252,246	4,932,979	7,112,809	12,045,788	
--	Nicotine and salts	39	434,949	956	0	0	0	0	435,905	351,431	787,336	
1929-82-4*	Nitrapyrin	3	0	0	0	0	0	0	0	0	0	
--	Nitrate compounds	916	396,856	148,846,835	40,552,663	250	3,772	3,075,269	192,875,645	4,498,878	197,374,523	
7697-37-2*	Nitric acid	1,767	2,656,400	421,395	18,399,512	0	15,478	302,367	21,795,152	1,881,909	23,677,061	
139-13-9	Nitrotriacetic acid	9	0	7,474	2,400	0	0	0	9,874	0	9,874	
100-01-6	p-Nitroaniline	4	12,018	13	0	0	0	0	12,031	0	12,031	
99-59-2	5-Nitro-o-anisidine	1	10	0	0	0	0	0	10	0	10	
98-95-3*	Nitrobenzene	14	64,314	299	638,059	0	7	0	702,679	240	702,919	
55-63-0	Nitroglycerin	18	10,177	15,622	0	0	0	0	25,799	0	25,799	
88-75-5	2-Nitrophenol	4	47	39	0	0	0	0	86	0	86	
100-02-7*	4-Nitrophenol	7	969	0	0	0	0	0	969	0	969	
79-46-9*	2-Nitropropane	3	23,727	2,789	0	0	0	0	26,516	25	26,541	
86-30-6	N-Nitrosodiphenylamine	3	10	0	0	0	0	0	10	0	10	
156-10-5	p-Nitrosodiphenylamine	2	24	0	0	0	0	0	24	210	234	
99-55-8	5-Nitro-o-toluidine	4	20	0	0	0	0	0	20	50	70	
27314-13-2*	Norflurazon	2	7	0	0	0	0	0	7	43,000	43,007	
19044-88-3*	Oryzalin	3	10	0	0	0	0	0	10	0	10	
301-12-2*	Oxydemeton methyl	1	0	0	0	0	0	0	0	0	0	
19666-30-9*	Oxydiazon	5	1,200	0	0	0	0	0	1,200	0	1,200	
42874-03-3*	Oxyfluorfen	3	86	0	0	0	0	0	86	1,308	1,394	
10028-15-6	Ozone	39	776,231	0	0	0	0	0	776,231	0	776,231	
123-63-7	Paraldehyde	3	35	0	0	0	0	0	35	0	35	
1910-42-5*	Paraquat dichloride	3	500	0	0	0	0	0	500	0	500	
56-38-2*	Parathion	1	0	0	0	0	0	0	0	0	0	
1114-71-2*	Pebulate	2	523	4	0	0	0	0	527	529	1,056	
40487-42-1*	Pendimethalin	5	2,520	42	0	0	0	5	2,567	1,942	4,509	
76-01-7*	Pentachloroethane	5	2,392	11	0	0	0	0	2,403	0	2,403	
87-86-5*	Pentachlorophenol	36	7,048	952	0	0	28,000	5,297	41,297	66,982	108,279	
57-33-0	Pentobarbital sodium	1	0	0	0	0	0	0	0	0	0	
79-21-0*	Peracetic acid	21	6,362	10	0	0	0	987	7,359	0	7,359	
594-42-3*	Perchloromethyl mercaptan	3	516	0	0	0	0	0	516	0	516	
52645-53-1*	Permethrin	18	4,607	14	0	0	0	0	4,621	1,019	5,640	
85-01-8	Phenanthrene	53	124,720	174	0	0	9,420	26,628	160,942	152,638	313,580	
108-95-2*	Phenol	763	8,697,953	54,206	1,539,987	0	6,513	224,868	10,523,527	1,223,376	11,746,903	
26002-80-2*	Phenothrin	2	0	0	0	0	0	0	0	0	0	

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
1313-27-5	Molybdenum trioxide	5,870,979	2,415,356	0	0	24,307	572,013	964,067	9,846,722	1,200
76-15-3	Monochloropentafluoroethane (CFC-115)	35,000	0	0	0	3,851	4,092	188,268	231,211	0
88671-89-0 *	Myclobutanil	0	0	0	0	0	1,809	220	2,029	0
142-59-6 *	Nabam	0	0	0	0	0	0	0	0	0
300-76-5 *	Naled	0	0	0	0	0	0	0	0	0
91-20-3 *	Naphthalene	11,152,489	217,597	7,706,210	1,020,682	11,452,141	634,640	3,486,068	35,669,827	13,023
134-32-7	alpha-Naphthylamine	0	0	0	0	0	0	0	0	0
7440-02-0	Nickel	29,304,518	87,162,134	26,213	57,392	1,398,988	646,126	3,953,432	122,548,803	4,374
--	Nickel compounds	9,114,702	32,218,575	31,657	5,410	4,651,041	1,042,021	10,770,118	57,833,524	190,541
--	Nicotine and salts	0	82,149	0	0	878,410	311,032	744,317	2,015,908	14,000
1929-82-4 *	Nitrapyrin	0	0	0	0	0	1,255,450	0	1,255,450	0
--	Nitrate compounds	99,267,015	1,600,700	0	271,802	49,691,186	73,381,286	202,947,298	427,159,287	182,840
7697-37-2 *	Nitric acid	28,640,127	2,812,833	27,246	257	306,863,652	16,414,079	22,042,219	376,800,413	115,681
139-13-9	Nitrioltriacetic acid	0	0	0	0	1,238,653	12,140	9,874	1,260,667	0
100-01-6	p-Nitroaniline	0	0	0	0	115	178,165	12,233	190,513	0
99-59-2	5-Nitro-o-anisidine	0	0	0	0	0	0	5	5	0
98-95-3 *	Nitrobenzene	1,432,350	0	2,229,827	6,795	1,150,986	1,298,784	704,915	6,823,657	1,520
55-63-0	Nitroglycerin	18,000	0	0	28,675	219,672	69,222	26,009	361,578	1
88-75-5	2-Nitrophenol	0	0	62,000	0	95,000	34,000	91	191,091	0
100-02-7 *	4-Nitrophenol	0	0	40,372	4	79,013	916,121	991	1,036,501	0
79-46-9 *	2-Nitropropane	0	0	1,165,892	837	53,022	5,803	26,516	1,252,070	0
86-30-6	N-Nitrosodiphenylamine	0	0	0	340,000	72,865	771	10	413,646	1
156-10-5	p-Nitrosodiphenylamine	0	0	7,800	14,890	0	270	1,224	24,184	0
99-55-8	5-Nitro-o-toluidine	0	0	0	0	0	0	70	70	0
27314-13-2 *	Norflurazon	0	0	0	0	0	45,000	7	45,007	0
19044-88-3 *	Oryzalin	0	0	0	0	0	63,000	5	63,005	0
301-12-2 *	Oxydemeton methyl	0	0	0	0	0	0	0	0	0
19666-30-9 *	Oxydiazon	18,000	0	0	0	4,000	305	949	23,254	0
42874-03-3 *	Oxyfluorfen	0	0	0	0	130	23,975	1,386	25,491	0
10028-15-6	Ozone	0	0	52,682	0	2,819,881	0	775,393	3,647,956	0
123-63-7	Paraldehyde	0	0	24,426	10	250,028	0	35	274,499	0
1910-42-5 *	Paraquat dichloride	0	0	0	0	0	106	41	147	0
56-38-2 *	Parathion	0	0	0	0	0	0	0	0	0
1114-71-2 *	Pebulate	0	0	0	0	140	1,439	1,535	3,114	0
40487-42-1 *	Pendimethalin	2,000	0	0	0	160,000	27,000	4,740	193,740	0
76-01-7 *	Pentachloroethane	240,000	0	180,000	0	5,666,697	69,291	2,403	6,158,391	5
87-86-5 *	Pentachlorophenol	1,282,753	0	0	7,282	10,928	112,876	31,703	1,445,542	82,213
57-33-0	Pentobarbital sodium	0	0	0	0	0	0	0	0	0
79-21-0 *	Peracetic acid	0	0	0	0	31,858	7,372	7,345	46,575	0
594-42-3 *	Perchloromethyl mercaptan	0	0	0	0	86,690	8	508	87,206	0
52645-53-1 *	Permethrin	0	0	0	0	292	9,905	6,263	16,460	0
85-01-8	Phenanthrene	266,859	21,574	97,469	108,549	641,029	121,866	329,099	1,586,445	124,890
108-95-2 *	Phenol	48,295,915	113,268	27,801,431	3,364,888	25,562,763	6,277,195	11,471,816	122,887,276	8,962
26002-80-2 *	Phenothrin	0	0	0	0	0	0	0	0	0

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Chapter 2 – National Overview of 1997 Toxics Release Inventory

Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases									Off-site Releases	Total On- and Off-site Releases Pounds
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases			Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds				
95-54-5	1,2-Phenylenediamine	7	514	3,900	0	0	7,568	0	11,982	3	11,985	
108-45-2	1,3-Phenylenediamine	21	6,972	104,122	0	0	59,168	6,569	176,831	18,151	194,982	
106-50-3	p-Phenylenediamine	10	3,509	504	0	0	2,064	0	6,077	6,930	13,007	
90-43-7*	2-Phenylphenol	15	374	1	0	0	0	250	625	1,131	1,756	
57-41-0	Phenytol	1	1	0	0	0	0	0	1	12,420	12,421	
75-44-5	Phosgene	31	21,877	0	0	0	0	3	21,880	0	21,880	
7803-51-2*	Phosphine	6	20,562	0	0	0	365	0	20,927	0	20,927	
7664-38-2*	Phosphoric acid	2,736	1,801,585	43,514,457	13,257	0	5,400	30,222,148	75,556,847	2,734,781	78,291,628	
7723-14-0*	Phosphorus (yellow or white)	55	20,970	3,859	0	0	0	2,581,846	2,606,675	6,291	2,612,966	
85-44-9	Phthalic anhydride	161	398,498	183	0	0	0	0	398,681	2,948,099	3,346,780	
1918-02-1*	Picloram	2	2,900	0	0	0	0	0	2,900	0	2,900	
88-89-1	Picric acid	9	0	0	110,875	0	0	0	110,875	0	110,875	
51-03-6*	Piperonyl butoxide	8	251	0	0	0	0	0	251	0	251	
--	Polybrominated biphenyls	3	0	0	0	0	0	0	0	0	0	
--	Polychlorinated alkanes	67	24,888	5,830	0	0	0	0	30,718	34,585	65,303	
1336-36-3*	Polychlorinated biphenyls (PCBs)	6	0	0	0	0	6,794	0	6,794	980,846	987,640	
--	Polycyclic aromatic compounds	159	495,236	1,652	0	0	673	14,234	511,795	1,394,568	1,906,363	
7758-01-2	Potassium bromate	3	255	0	0	0	0	0	255	0	255	
128-03-0*	Potassium dimethyldithio-carbamate	19	510	750	0	0	0	5	1,265	0	1,265	
137-41-7*	Potassium N-methyldithio-carbamate	7	0	0	0	0	0	0	0	0	0	
41198-08-7*	Profenofos	1	0	0	0	0	0	0	0	0	0	
7287-19-6*	Prometryn	6	933	37	0	0	0	0	970	250	1,220	
23950-58-5*	Pronamide	2	255	0	0	0	0	0	255	0	255	
1918-16-7*	Propachlor	4	50	0	0	0	0	0	50	13,000	13,050	
1120-71-4	Propane sultone	1	0	0	0	0	0	0	0	0	0	
709-98-8*	Propanil	3	2,155	750	0	0	0	0	2,905	500	3,405	
2312-35-8*	Propargite	3	260	0	0	0	0	0	260	0	260	
107-19-7*	Propargyl alcohol	17	6,342	600	237,098	0	0	0	244,040	866	244,906	
60207-90-1*	Propiconazole	7	153	0	0	0	0	0	153	0	153	
123-38-6*	Propionaldehyde	21	165,862	39,054	97,161	0	0	0	302,077	43	302,120	
114-26-1*	Propoxur	1	0	0	0	0	0	0	0	0	0	
115-07-1	Propylene	357	16,285,889	5,198	2,632	0	0	670	16,294,389	130	16,294,519	
75-55-8	Propyleneimine	5	230	0	0	0	0	0	230	0	230	
75-56-9*	Propylene oxide	120	543,603	22,961	11,700	0	0	887	579,151	29,904	609,055	
110-86-1*	Pyridine	43	105,037	545	612,968	0	0	4	718,554	38,319	756,873	
91-22-5	Quinoline	24	20,002	25	27,000	0	0	305	47,332	11,582	58,914	
106-51-4*	Quinone	5	4,801	350	0	0	0	0	5,151	0	5,151	
82-68-8*	Quintozene	17	978	0	0	0	0	0	978	364	1,342	
76578-14-8*	Quizalofop-ethyl	2	0	0	0	0	0	0	0	0	0	
10453-86-8*	Resmethrin	2	1	0	0	0	0	0	1	0	1	
81-07-2	Saccharin (manufacturing)	2	171	0	0	0	0	0	171	1,400	1,571	
94-59-7*	Safrole	2	505	0	0	0	0	0	505	0	505	
7782-49-2*	Selenium	16	290	58	0	0	580	5	933	6,767	7,700	

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
95-54-5	1,2-Phenylenediamine	0	0	0	0	155,100	17,073	11,985	184,158	0
108-45-2	1,3-Phenylenediamine	720	0	0	1,384	1,025,440	553,136	190,560	1,771,240	0
106-50-3	p-Phenylenediamine	0	0	0	0	331,074	31,958	6,517	369,549	1
90-43-7*	2-Phenylphenol	0	0	229	0	137,977	816	1,407	140,429	0
57-41-0	Phenytion	0	0	0	0	180	950	13,000	14,130	0
75-44-5	Phosgene	304	0	9	0	13,946,068	892	21,831	13,969,104	29
7803-51-2*	Phosphine	0	365	0	0	350,000	0	20,523	370,888	30
7664-38-2*	Phosphoric acid	453,512,929	4,387,637	2,000	65,620	128,525,343	5,572,441	69,947,907	662,013,877	7,162,494
7723-14-0*	Phosphorus (yellow or white)	0	238,971	0	0	694,999	13,268	2,612,061	3,559,299	31,014
85-44-9	Phthalic anhydride	301,472	1,456	2,488,912	2,489,429	19,170,287	214,019	537,135	25,202,710	4,606
1918-02-1*	Picloram	0	0	0	0	70,488	0	2,900	73,388	0
88-89-1	Picric acid	0	0	183,393	56,831	1,354,964	1	110,875	1,706,064	0
51-03-6*	Piperonyl butoxide	0	0	0	0	0	4,700	157	4,857	0
--	Polybrominated biphenyls	0	5,071	0	0	0	0	549	5,620	0
--	Polychlorinated alkanes	3,183	405,065	55,000	93,658	7,650	463,245	137,965	1,165,766	2,320
1336-36-3*	Polychlorinated biphenyls (PCBs)	0	1,400	0	0	0	62,928	8,994	73,322	981,191
--	Polycyclic aromatic compounds	1,335,135	599,044	7,624,658	56,921	1,147,152	13,441	1,881,453	12,657,804	9,078
7758-01-2	Potassium bromate	0	0	53,129	2	0	0	455	53,586	0
128-03-0*	Potassium dimethyldithio-carbamate	0	33,700	0	1	0	132,277	793	166,771	0
137-41-7*	Potassium N-methyldithio-carbamate	0	0	0	0	10,500	0	0	10,500	0
41198-08-7*	Profenofos	0	0	0	0	0	0	0	0	0
7287-19-6*	Prometryn	0	0	0	0	161	816	832	1,809	0
23950-58-5*	Pronamide	5,400	0	0	0	0	2,466	250	8,116	0
1918-16-7*	Propachlor	0	0	0	0	0	74,400	50	74,450	0
1120-71-4	Propane sultone	0	0	0	0	4,900	120	0	5,020	0
709-98-8*	Propanil	0	0	0	0	37	7,200	3,230	10,467	250
2312-35-8*	Propargite	0	0	0	3,164	0	4,959	85	8,208	0
107-19-7*	Propargyl alcohol	9	0	269,073	481,890	116,170	28,401	248,946	1,144,489	0
60207-90-1*	Propiconazole	0	0	0	0	0	30,493	2,054	32,547	0
123-38-6*	Propionaldehyde	66,000	0	1,146,337	11,939	4,486,626	168,603	302,267	6,181,772	22
114-26-1*	Propoxur	0	0	0	0	0	0	0	0	0
115-07-1	Propylene ^b	65,774,345	35	718,371,130	2,068	297,708,572	125,675	15,905,795	1,097,887,620	955,453
75-55-8	Propyleneimine	0	0	0	0	4,000	0	230	4,230	0
75-56-9*	Propylene oxide	1,475,188	0	13,432,224	81,598	13,013,027	624,849	625,866	29,252,752	3,929
110-86-1*	Pyridine	4,319,946	10,343	2,371,309	101,071	1,104,973	740,334	699,798	9,347,774	1,580
91-22-5	Quinoline	21,380	880	122,120	2,541	114,609	210	61,015	322,755	2
106-51-4*	Quinone	0	0	190,238	0	365,345	20,662	5,101	581,346	0
82-68-8*	Quintozene	2,573	0	0	417,048	0	24,119	1,838	445,578	0
76578-14-8*	Quizalofop-ethyl	0	0	0	0	0	0	1	1	0
10453-86-8*	Resmethrin	0	0	0	0	0	400	0	400	0
81-07-2	Saccharin (manufacturing)	0	0	0	0	10,000	10	1,600	11,610	0
94-59-7*	Safrole	0	0	0	0	1	25	100	126	0
7782-49-2*	Selenium	9,720	0	74,135	582	0	1,001	6,491	91,929	0

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.

^bOne facility, TPI Petroleum in Ardmore, OK, reported on-site energy recovery of 272,000,000 pounds of propylene in 1997. The facility has since revised this quantity to zero. For propylene, on-site energy recovery changes to 446,371,130 pounds and total production-related waste managed changes to 825,887,620 pounds.



Chapter 2 – National Overview of 1997 Toxics Release Inventory

Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases					
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds				
--	Selenium compounds	43	82,857	2,374	3,409	0	0	0	317,509	406,149	29,029	435,178
74051-80-2*	Sethoxydim	3	0	0	0	0	0	0	0	0	0	0
7440-22-4*	Silver	77	7,629	143	0	0	581	5	8,358	40,221	48,579	
--	Silver compounds	64	7,918	6,109	156	0	0	40,405	54,588	52,481	107,069	
122-34-9*	Simazine	8	2,939	348	0	0	0	0	3,287	48,629	51,916	
26628-22-8*	Sodium azide	12	24,417	5	0	0	156	0	24,578	28,909	53,487	
1982-69-0*	Sodium dicamba	2	255	0	250	0	0	0	505	0	505	
128-04-1*	Sodium dimethyldithio-carbamate	67	17,684	10	0	0	0	0	17,694	126,741	144,435	
7632-00-0*	Sodium nitrite	372	254,878	481,319	747,000	0	0	192,355	1,675,552	793,104	2,468,656	
100-42-5	Styrene	1,507	44,126,665	43,954	202,387	0	61,302	475,748	44,910,056	1,583,171	46,493,227	
96-09-3	Styrene oxide	2	11	0	0	0	0	0	11	0	11	
7664-93-9*	Sulfuric acid	894	21,259,394	24,447	113,255	0	0	46,421	21,443,517	668,139	22,111,656	
2699-79-8*	Sulfuryl fluoride	3	428,000	0	0	0	0	0	428,000	0	428,000	
34014-18-1*	Tebuthiuron	2	10	0	0	0	0	0	10	0	10	
3383-96-8*	Temephos	1	0	0	0	0	0	0	0	0	0	
5902-51-2*	Terbacil	2	0	10,318	0	0	0	0	10,318	0	10,318	
630-20-6	1,1,1,2-Tetrachloroethane	8	4,938	0	0	0	0	0	4,938	2	4,940	
79-34-5*	1,1,2,2-Tetrachloroethane	14	13,614	0	0	0	0	0	13,614	511	14,125	
127-18-4*	Tetrachloroethylene	372	6,885,068	2,282	15,118	0	0	5,074	6,907,542	24,753	6,932,295	
354-11-0	1,1,1,2-Tetrachloro-2-fluoroethane	1	19,700	1	0	0	0	0	19,701	0	19,701	
961-11-5*	Tetrachlorvinphos	4	365	5	0	0	0	0	370	3,760	4,130	
64-75-5*	Tetracycline hydrochloride	3	474	0	0	0	0	0	474	1,735	2,209	
7696-12-0*	Tetramethrin	2	0	0	0	0	0	0	0	0	0	
7440-28-0	Thallium	3	256	0	0	0	1,000	0	1,256	1,500	2,756	
--	Thallium compounds	1	0	0	0	0	0	0	0	180	180	
148-79-8*	Thiabendazole	4	2,520	0	0	0	0	0	2,520	0	2,520	
28249-77-6*	Thiobencarb	2	634	0	0	0	0	0	634	4,935	5,569	
59669-26-0*	Thiodicarb	3	792	0	0	0	250	0	1,042	1,000	2,042	
23564-05-8*	Thiophanate-methyl	9	13,749	0	0	0	13,240	0	26,989	14,318	41,307	
62-56-6*	Thiourea	30	1,026	347	5,000	0	0	250	6,623	4,212	10,835	
137-26-8*	Thiram	61	3,024	16	0	0	5	57	3,102	80,186	83,288	
1314-20-1	Thorium dioxide	1	0	0	0	0	0	0	0	0	0	
7550-45-0	Titanium tetrachloride	36	21,202	0	0	0	0	0	21,202	37,660	58,862	
108-88-3*	Toluene	3,062	112,938,943	30,998	510,930	2,705	20,962	719,444	114,223,982	1,452,282	115,676,264	
584-84-9	Toluene-2,4-diisocyanate	62	6,503	5	0	0	0	0	6,508	6,178	12,686	
91-08-7	Toluene-2,6-diisocyanate	30	2,800	0	0	0	0	0	2,800	1,360	4,160	
26471-62-5	Toluenediisocyanate (mixed isomers)	174	51,804	255	0	0	0	359	52,418	37,897	90,315	
95-53-4	o-Toluidine	22	40,491	273	7,440	0	0	5	48,209	3,151	51,360	
43121-43-3*	Triadimefon	3	0	0	0	0	0	0	0	0	0	
2303-17-5*	Triallate	2	519	0	0	0	0	0	519	14,264	14,783	
101200-48-0*	Tribenuron methyl	1	1	0	0	0	0	0	1	0	1	
2155-70-6*	Tributyltin methacrylate	2	14	3	0	0	0	0	17	0	17	

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
--	Selenium compounds	772,808	9,693	0	0	1	9,628	343,984	1,136,114	104,800
74051-80-2 *	Sethoxydim	0	0	0	0	0	0	0	0	0
7440-22-4 *	Silver	805,582	1,315,535	0	29	3,635	121	138,036	2,262,938	291
--	Silver compounds	3,361,707	1,000,592	0	0	550,965	5,500	74,153	4,992,917	2,619
122-34-9 *	Simazine	50	0	0	0	77,000	12,480	9,372	98,902	0
26628-22-8 *	Sodium azide	48,963	773,161	0	0	75,278	1,109,199	41,281	2,047,882	106
1982-69-0 *	Sodium dicamba	0	0	0	0	0	4,200	505	4,705	0
128-04-1 *	Sodium dimethyldithiocarbamate	200	287,077	0	0	439,994	849,275	55,140	1,631,686	0
7632-00-0 *	Sodium nitrite	501,890	36,851	0	61,249	14,773,132	3,439,826	2,192,274	21,005,222	65,876
100-42-5	Styrene	15,296,876	1,109,081	26,721,098	7,388,173	10,169,393	4,250,300	44,387,903	109,322,824	283,482
96-09-3	Styrene oxide	0	0	30,000	0	0	0	11	30,011	0
7664-93-9 *	Sulfuric acid	245,755,305	2,206,540	940	20	186,759,219	2,867,753	21,847,891	459,437,668	12,115
2699-79-8 *	Sulfuryl fluoride	0	0	0	0	0	0	428,000	428,000	0
34014-18-1 *	Tebuthiuron	15	0	0	0	1,100	1,200	1	2,316	0
3383-96-8 *	Temephos	0	0	0	0	0	0	0	0	0
5902-51-2 *	Terbacil	0	0	0	0	2,793	33,665	10,318	46,776	0
630-20-6	1,1,1,2-Tetrachloroethane	2,100,000	0	0	301,000	2,933,725	62,211	4,936	5,401,872	0
79-34-5 *	1,1,2,2-Tetrachloroethane	4,908,000	2,458,805	2,416,000	0	7,744,618	135,714	13,545	17,676,682	14
127-18-4 *	Tetrachloroethylene	40,942,533	8,921,720	4,556,500	1,232,892	17,289,521	1,173,229	6,844,562	80,960,957	13,494
354-11-0	1,1,1,2-Tetrachloro-2-fluoroethane	6,100	1,820	0	0	0	10	19,700	27,630	0
961-11-5 *	Tetrachlorvinphos	345	0	35,000	49,500	850	0	3,862	89,557	0
64-75-5 *	Tetracycline hydrochloride	0	0	0	0	0	1,750	2,034	3,784	0
7696-12-0 *	Tetramethrin	0	0	0	0	0	0	0	0	0
7440-28-0	Thallium	0	8	90,406	2	0	148	1,020	91,584	0
--	Thallium compounds	0	0	0	0	0	180	0	180	0
148-79-8 *	Thiabenzazole	0	0	0	0	0	1,073	2,600	3,673	0
28249-77-6 *	Thiobencarb	147	0	0	0	0	35	5,053	5,235	0
59669-26-0 *	Thiodicarb	160,780	0	0	0	29,309	13,942	1,063	205,094	831
23564-05-8 *	Thiophanate-methyl	9,400	0	0	0	0	6,819	11,755	27,974	26,480
62-56-6 *	Thiourea	4,456	872	0	0	12,779	11,821	9,087	39,015	0
137-26-8 *	Thiram	46,680	40,807	0	1,402	42	22,889	108,595	220,415	0
1314-20-1	Thorium dioxide	6,100	0	0	0	0	0	640	6,740	0
7550-45-0	Titanium tetrachloride	0	148,361	0	5	26,440,106	212,926	58,778	26,860,176	11
108-88-3 *	Toluene	1,119,206,056	28,405,851	216,605,276	88,849,998	217,192,273	19,924,367	113,112,450	1,803,296,271	272,801
584-84-9	Toluene-2,4-diisocyanate	317	389	0	29,423	1,596	9,715	10,992	52,432	21,320
91-08-7	Toluene-2,6-diisocyanate	79	0	0	2,754	714	2,111	2,750	8,408	439
26471-62-5	Toluenediisocyanate (mixed isomers)	6,300	1,235	16,421,251	39,793	720,297	910,358	56,838	18,156,072	30,757
95-53-4	o-Toluidine	60	0	232,012	48,861	160,399	83,592	48,194	573,118	69
43121-43-3 *	Triadimefon	0	0	0	0	0	26	0	26	0
2303-17-5 *	Triallate	0	0	0	0	16,000	91,390	7,962	115,352	0
101200-48-0 *	Tribenuron methyl	0	0	0	0	0	17,581	1	17,582	0
2155-70-6 *	Tributyltin methacrylate	0	0	0	296	0	29,806	27	30,129	0

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20A. TRI On-site and Off-site Releases, by Chemical, 1997, continued

CAS Number	Chemical	On-site Releases								Off-site Releases	Total On- and Off-site Releases Pounds	
		Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds		
					Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds				
78-48-8*	S,S,S-Tributyl-triophosphate	2	1,611	2	0	0	0	0	0	1,613	0	1,613
52-68-6*	Trichlorfon	3	0	0	0	0	0	0	0	0	0	0
76-02-8	Trichloroacetyl chloride	1	1	0	0	0	0	0	0	1	0	1
120-82-1*	1,2,4-Trichlorobenzene	31	150,883	533	5,800	0	0	156,200	313,416	2,632	316,048	
71-55-6*	1,1,1-Trichloroethane	250	3,879,346	195	1,245	0	0	60,167	3,940,953	17,134	3,958,087	
79-00-5*	1,1,2-Trichloroethane	23	296,348	621	0	0	0	0	296,969	113	297,082	
79-01-6*	Trichloroethylene	627	17,586,325	563	986	0	0	3,975	17,591,849	176,747	17,768,596	
75-69-4*	Trichlorofluoromethane (CFC-11)	28	431,631	558	0	0	0	395	432,584	228	432,812	
88-06-2*	2,4,6-Trichlorophenol	1	132	27	0	0	0	0	159	0	159	
96-18-4	1,2,3-Trichloropropane	7	13,346	62	0	0	0	0	13,408	13	13,421	
57213-69-1*	Triclopyrtriethyl-ammonium salt	3	22	0	0	0	0	0	22	0	22	
121-44-8	Triethylamine	163	1,633,313	18,482	245,917	0	552	29,047	1,927,311	3,946	1,931,257	
1582-09-8*	Trifluralin	21	11,908	5	0	0	0	5	11,918	26,370	38,288	
26644-46-2*	Triforine	1	0	0	0	0	0	0	0	0	0	
95-63-6	1,2,4-Trimethylbenzene	830	7,884,672	7,820	9,097	0	0	24,323	7,925,912	148,595	8,074,507	
639-58-7*	Triphenyltin chloride	1	0	0	0	0	0	0	0	0	0	
76-87-9*	Triphenyltin hydroxide	3	3	0	0	0	0	0	3	381	384	
51-79-6	Urethane	2	0	0	0	0	0	0	0	500	500	
7440-62-2	Vanadium (fume or dust)	20	12,436	708	0	0	1,000	116,510	130,654	43,211	173,865	
50471-44-8*	Vincllozolin	2	0	0	0	0	0	0	0	0	0	
108-05-4	Vinyl acetate	188	3,348,952	2,669	119,320	0	18	2,150	3,473,109	28,974	3,502,083	
593-60-2	Vinyl bromide	2	5,430	0	0	0	0	0	5,430	0	5,430	
75-01-4	Vinyl chloride	43	919,684	82	370	0	0	1	920,137	90,248	1,010,385	
75-35-4*	Vinylidene chloride	23	182,141	412	323	0	0	0	182,876	104	182,980	
108-38-3	m-Xylene	63	1,368,270	552	3,980	0	210	12,579	1,385,591	4,535	1,390,126	
95-47-6	o-Xylene	76	1,358,782	439	2,896	0	0	251,709	1,613,826	17,524	1,631,350	
106-42-3	p-Xylene	42	2,492,320	303	3,027	0	0	32,862	2,528,512	10,602	2,539,114	
1330-20-7*	Xylene (mixed isomers)	2,912	74,361,257	36,604	130,995	2,620	2,207	75,470	74,609,153	723,974	75,333,127	
87-62-7*	2,6-Xylidine	3	52	0	0	0	0	0	52	0	52	
7440-66-6*	Zinc (fume or dust)	411	3,264,646	17,508	1	0	270,093	7,623,348	11,175,596	24,974,649	36,150,245	
--	Zinc compounds	2,649	4,700,944	1,203,833	368,483	0	9,827,280	107,468,033	123,568,573	182,410,387	305,978,960	
12122-67-7*	Zineb	1	0	0	0	0	0	0	0	0	0	
--	Mixtures and other trade name products	16	150,313	0	0	0	0	9,250	159,563	39,867	199,430	
--	Trade secrets	11	14,000	0	0	0	0	0	14,000	0	14,000	
Total		71,670	1,331,663,886	218,371,961	219,070,242	443,656	20,472,578	326,431,932	2,116,454,255	461,098,829	2,577,553,084	

Note: On-site Releases from Section 5 and Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

*Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.



Table 2-20B. TRI Chemicals in Waste, by Chemical, 1997, continued

CAS Number	Chemical	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-Production-related Waste Managed Pounds
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds			
78-48-8*	S,S,S-Tributyl-trithiophosphate	0	0	0	0	2,754	111	1,671	4,536	0
52-68-6*	Trichlorfon	0	0	0	0	0	0	0	0	0
76-02-8	Trichloroacetyl chloride	0	0	0	0	0	0	1	1	0
120-82-1*	1,2,4-Trichlorobenzene	1,152,862	4,572	207,700	36,965	352,037	345,803	172,533	2,272,472	31,168
71-55-6*	1,1,1-Trichloroethane	37,510,004	721,333	2,211,307	703,916	321,475	378,782	3,831,775	45,678,592	2,703
79-00-5*	1,1,2-Trichloroethane	28,255,000	12,969,046	9,751,363	82,358	20,447,763	2,599,108	299,040	74,403,678	10,206
79-01-6*	Trichloroethylene	136,927,893	5,812,121	5,788,807	876,284	3,793,003	1,354,282	17,415,699	171,968,089	388,927
75-69-4*	Trichlorofluoromethane (CFC-11)	67,669	116,557	12,800	15,138	300,034	236,829	432,963	1,181,990	41
88-06-2*	2,4,6-Trichlorophenol	0	0	0	0	1,014,286	0	159	1,014,445	0
96-18-4	1,2,3-Trichloropropane	1,500,000	0	680,000	470	1,224,000	8,635,576	13,473	12,053,519	14
57213-69-1*	Triclopypyrtriethyl-salt ammonium	0	0	0	0	33	59	22	114	0
121-44-8	Triethylamine	847,575	826,633	235,817	457,030	3,597,276	603,914	1,968,347	8,536,592	164
1582-09-8*	Trifluralin	73,000	0	0	0	1,416,990	112,940	21,150	1,624,080	0
26644-46-2*	Triforine	0	0	0	0	0	0	0	0	0
95-63-6	1,2,4-Trimethylbenzene	12,018,755	1,406,156	4,453,521	2,744,955	16,580,512	742,131	8,118,080	46,064,110	19,489
639-58-7*	Triphenyltin chloride	0	0	0	0	0	9,987	0	9,987	0
76-87-9*	Triphenyltin hydroxide	0	0	0	0	33,497	4,146	384	38,027	0
51-79-6	Urethane	0	0	0	0	0	0	1,500	1,500	0
7440-62-2	Vanadium (fume or dust)	358,477	21,714	0	0	440	1,205	172,015	553,851	128
50471-44-8*	Vinclozolin	0	0	0	0	0	0	0	0	0
108-05-4	Vinyl acetate	827,369	93,926	21,696,559	13,187,593	17,449,172	1,146,917	3,446,620	57,848,156	18,204
593-60-2	Vinyl bromide	0	0	46,470	17	74	1	5,400	51,962	0
75-01-4	Vinyl chloride	398,418,771	82,698	21,752,907	17,663	33,633,983	134,349	957,085	454,997,456	6,426
75-35-4*	Vinylidene chloride	1,651,035	2	250,000	184,033	6,027,739	73,599	182,993	8,369,401	125
108-38-3	m-Xylene	1,913,415	138,753	1,031,056	202,604	621,697	116,048	1,392,785	5,416,358	6,569
95-47-6	o-Xylene	120,668	56,898	2,964,558	1,082,547	2,001,686	880,772	1,472,204	8,579,333	17,460
106-42-3	p-Xylene	156,443	13,487	4,860,571	14,703	3,481,031	119,088	2,536,264	11,181,587	21,316
1330-20-7*	Xylene (mixed isomers)	122,408,183	42,050,232	139,297,715	77,876,899	64,130,806	10,457,390	75,793,914	532,015,139	150,541
87-62-7*	2,6-Xylidine	0	0	43,038	5,500	11	0	52	48,601	0
7440-66-6*	Zinc (fume or dust)	24,831,821	60,647,618	51,376	62,294	764,655	449,041	35,193,560	122,000,365	250
--	Zinc compounds	107,656,323	257,386,303	613,266	261,459	70,211,629	18,374,257	277,306,831	731,810,068	6,770,405
12122-67-7*	Zineb	0	0	0	0	0	0	0	0	0
--	Mixtures and other trade name products	0	2,182	3,700	8,282	0	0	188,915	203,079	0
--	Trade secrets	0	0	0	0	0	3,600	14,000	17,600	0
Total ^f		7,986,618,922	2,390,787,879	3,805,792,208	525,610,064	7,012,922,513	536,021,338	2,467,643,821	24,725,396,745	37,761,187

Note: Data from Section 8 of Form R.

* Chemicals that are currently active ingredients in EPA's Pesticide Product Information System (all pesticide products imported and/or manufactured in the US) and/or Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Active Ingredients, including Special Review, Canceled/Denied or Suspended, and Restricted Use Pesticides.

^cRevisions by two facilities to quantities reported for on-site recycling of ethylene and propylene change total on-site energy recovery to 2,930,962,208 pounds and total production-related waste managed to 23,850,566,745 pounds in 1997.