United States
Environmental Protection
Agency

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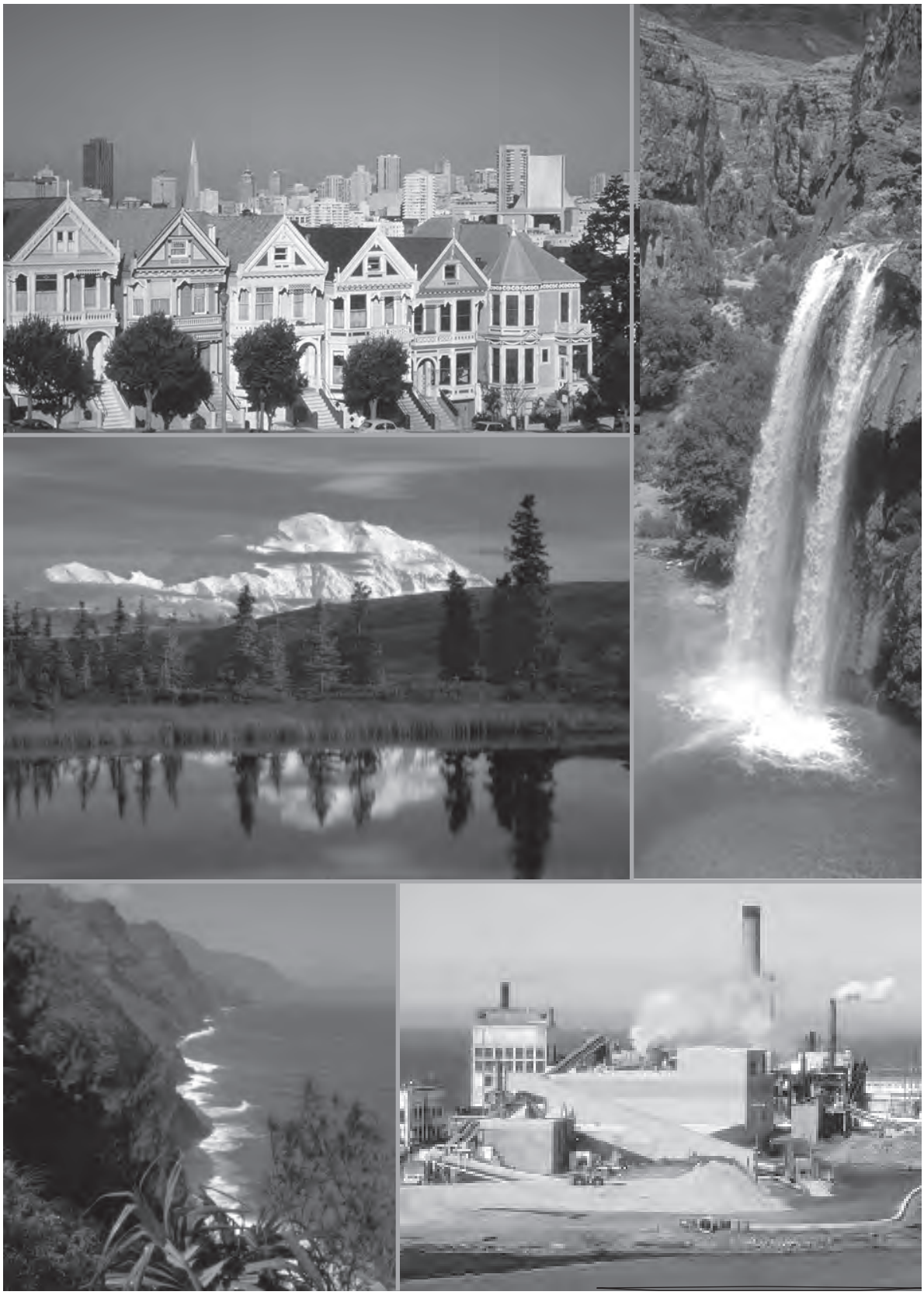
(2844)

EPA 745-R-00-007
September 2000

1998 Toxics Release Inventory

Public Data Release



Public Access to the Toxics Release Inventory (TRI)

TRI Data Products

Data Product	Point of Access	Contact Information
1998 TRI Public Data Release Report (reference EPA 745-R-00-007) 1998 State Fact Sheets Report (reference EPA 745-F-00-003)	U.S. EPA's National Service Center for Environmental Publications (NSCEP)	(800) 490-9198 (513) 489-8190 FAX: (513) 489-8695 order online: http://www.epa.gov/ncepihom
	U.S. EPA Toxics Release Inventory (TRI) Website — 1998 Data Release	http://www.epa.gov/tri/tri98
1998 State Data Files in Dbase format	U.S. EPA Toxics Release Inventory (TRI) Website	http://www.epa.gov/tri/tri98
Chemicals in the Environment (reference EPA 749-R-97-001B)	NSCEP	(800) 490-9198 (513) 489-8190 FAX: (513) 489-8695 order online: http://www.epa.gov/ncepihom

TRI Online Access

Online Provider of TRI Data	Internet Access Address
TRI Explorer provides fast and easy access to the TRI data via U.S. EPA's latest TRI tool	http://www.epa.gov/triexplorer/
U.S. EPA's TRI Program Homepage and 1998 data release page	http://www.epa.gov/tri/ http://www.epa.gov/tri/tri98/
U.S. EPA Envirofacts provides access to TRI data via U.S. EPA's Envirofacts Data Warehouse Query Engine	http://www.epa.gov/enviro/html/toxic_releases.html
Right-to-Know Network, operated by two nonprofit organizations (OMB Watch and the Center for Public Data Access), provides free access to TRI data	http://www.rtknet.org/trisearch.html
TOXNET®, the National Library of Medicine's (NLM) Toxicology Data Network, provides free access to TRI data	http://toxnet.nlm.nih.gov/

1998 Toxics Release Inventory Public Data Release

U.S. Environmental Protection Agency

Office of Information Analysis and Access (2844)

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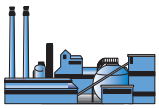
Chapter 1

Toxics Release Inventory Reporting and the 1998 Public Data Release

Chapter 1



Toxics Release Inventory Reporting and the 1998 Public Data Release

❖ Introduction ❖

Following a fatal chemical-release accident in Bhopal, India, the Emergency Planning and Community Right-to-Know Act (EPCRA) provisions were enacted to promote emergency planning, to minimize the effects of an accident such as occurred at Bhopal, and to provide the public with information on releases of toxic chemicals in their communities.

Section 313 of EPCRA established the Toxics Release Inventory (TRI) Program, a national database that identifies facilities, chemicals manufactured and used at the identified facilities, and the annual amounts of these chemicals released (in routine operations and in accidents and other one-time events) and otherwise managed on- and off-site in waste.

In 1990, Congress passed the Pollution Prevention Act (PPA). Among its requirements was a mandate to expand TRI to include additional information on toxic chemicals in waste and on source reduction methods. Beginning in 1991, covered facilities were required to report quantities of TRI chemicals recycled, combusted for energy recovery, and treated on- and off-site. This waste management data has strengthened TRI as a tool for providing information on facilities' handling of TRI chemicals as well as for analyzing progress in reducing releases.

The Toxics Release Inventory (TRI) Program has been a tremendously successful program and the results speak loudly for themselves. The industries that have reported to TRI since its inception, the manufacturing industries, have reduced their on- and off-site releases of TRI chemicals by 45 percent or 1.54 billion pounds (for chemicals reportable in all years). Governments—federal, state, and local—have used the TRI to set priorities, measure progress, and target areas of special and immediate concern. The public, our most important customer, has used the TRI data to understand their local environment, to participate in local and national debates about the choices being made that effect their health and the health of their children and, ultimately, to exert their influence on the outcome of these debates.

Since TRI began in 1987, the program has grown. In particular, 1998 marks the first reporting by seven additional industry sectors: metal mining, coal mining, electrical utilities that combust coal and/or oil, hazardous waste treatment and disposal facilities, chemical wholesale distributors, petroleum bulk stations and terminals, and solvent recovery services (see **Who Must Report?** in this chapter for specific industry identification). In recent years, federal facilities have been added to TRI, the number of reportable chemicals has nearly doubled, and EPA has lowered the reporting thresholds for certain persistent, bioaccumulative toxic (PBT) chemicals and added others to

the section 313 chemical list. Our progress is to a large degree the result of our open process. The Agency applauds those who have worked with us to assure that we meet the challenge that EPCRA posed, and we encourage those who continue to push us to assure and maintain the integrity and goals of the Program.

As we move into the second decade of the TRI Program, many challenges in the Right-to-Know Program remain to be met. TRI was designed to be a program that would evolve, over time, to meet the changing needs of an informed and involved public. The program will never be static and will never be "finished." As new chemicals of concern are identified, they will be added. Sectors that appear to contribute significantly to environmental loadings will be added. Data collection will be modified to meet new information needs and access technologies will be developed over time to assure enhanced public access.

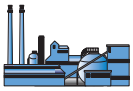
❖ 1998 Public Data Release ❖

EPA released the 1998 TRI data, including the first reporting by the seven additional industries, to the public on May 11, 2000. At the same time, the Agency unveiled TRI Explorer, a new Web tool for searching TRI data, available at **http://www.epa.gov/triexplorer**. This *1998 Toxics Release Inventory Public Data Release* provides a more detailed view of the information collected through TRI. This volume summarizes data collected for calendar year 1998, along with trends since 1995, 1991, and 1988. The companion volume, *1998 TRI Public Data Release: State Fact Sheets*, supplies TRI data in greater detail for each state and territory. (Both documents are currently available electronically at: **http://www.epa.gov/tri/tri98.**) The on-line TRI Explorer includes data collected for all years, including those not found in this report.

The 1998 Toxics Release Inventory Public Data Release contains four chapters. This chapter provides background information, important factors, and assumptions that need to be considered when using TRI data. Chapter 2 gives an overview of on- and off-site releases, management of TRI chemicals in waste, and transfers off-site for further waste management for 1998 and for 1995 to 1998 for the original industries. Data are analyzed at both the national and state level. Progress is also measured in the original TRI release and transfer categories since 1988, as well as in waste management data since 1991. Chapter 3 examines 1998 reporting by the seven new industries, with comparisons to TRI reporting by all industries. Chapter 4 examines data reported by the original TRI industries, analyzing release and waste management data for 1998 and for 1995 to 1998. Chapter 4 also summarizes changes in on- and off-site releases since 1988 and in waste management data since 1991.

❖ TRI Reporting ❖

The Toxics Release Inventory is a publicly available database that contains information on specific toxic chemical releases and other waste management activities from manufacturing and other sectors of the U.S. economy. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). Following passage of the Pollution Prevention Act of 1990, TRI was expanded to include mandatory reporting of additional waste management and pollution prevention activities. The information collected under these laws can be used by



the public to identify facilities and chemical release patterns that warrant further study and analysis. Combined with hazard and exposure information, TRI has proven to be a valuable tool for risk identification.

Since 1987, facilities in the manufacturing sector have been required to report. Federal facilities were required to report beginning in reporting year 1994. In 1998, seven industries whose activities are related to manufacturing (for example, in supplying services to that sector) were added (see **Who Must Report?** below).

Each year, facilities that meet certain thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to the state or tribal entity in whose jurisdiction the facility is located. The TRI list for 1998 included more than 600 chemicals and 28 chemical categories. Each facility submits a TRI reporting form for each TRI chemical it has manufactured, processed, or otherwise used during 1998 in amounts exceeding the thresholds (see **How Do Facilities Report?** later in this chapter).

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

Who Must Report?

Facilities in Standard Industrial Classification (SIC) primary codes 20 to 39 have been required to report to TRI since 1987 (see Box 1–1). Federal facilities have been required to report since 1994, regardless of their SIC classification. In May 1997, EPA added seven new industry sectors who began reporting in 1998:

- metal mining (SIC code 10, except 1011, 1081, and 1094),
- coal mining (SIC code 12, except 1241),
- electrical utilities that combust coal and/or oil (SIC codes 4911, 4931, and 4939),
- RCRA subtitle C hazardous waste treatment and disposal facilities (in SIC code 4953),
- chemical wholesalers (SIC code 5169),
- petroleum terminals and bulk stations (SIC code 5171), and
- solvent recovery services (SIC code 7389).

Facilities in the specified industries that have the equivalent of 10 or more full-time employees and meet the established thresholds for manufacturing, processing, or "otherwise use" of listed chemicals must report their releases and other waste management quantities (including quantities transferred off-site for further waste management).

Thresholds for manufacturing and processing are currently 25,000 pounds for each listed chemical, while the threshold for otherwise using is 10,000 pounds per chemical.

Box 1–1. Who Must Report to TRI?

Who Must Report to TRI?

A facility must report to TRI if it:

- Conducts manufacturing operations within SIC codes 20 through 39 and, beginning in the 1998 reporting year, if it is in one of the following industries: metal mining, coal mining, electrical utilities, RCRA Subtitle C hazardous waste treatment and disposal facilities, chemical distributors, petroleum terminals, and solvent recovery services
- Employs 10 or more full-time equivalent employees
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year.

Box 1–1 summarizes the requirements that determine whether facilities must report.

What Must Be Reported?

Each year, facilities report to TRI the amounts of toxic chemicals released on-site to air, water, and land and injected underground (Section 5 of TRI Reporting Form R), and the amounts of chemicals transferred off-site for recycling, energy recovery, treatment, and disposal (Section 6 of Form R). They also report production-related waste management information on quantities recycled, combusted for energy recovery, treated, or released or otherwise disposed of, both on- and off-site, and catastrophic or other one-time releases (Section 8 of Form R).

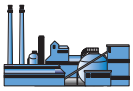
Facilities provide specific identifying information, such as:

- Name
- Location
- Type of business
- Contact names
- Name of parent company
- Environmental permit numbers

They also provide information about the manufacture, process, and otherwise use of the listed chemical at the facility and the maximum amount of the chemical on-site during the year. Facilities provide information about methods used to treat waste streams containing the toxic chemicals at the site and the efficiencies of those treatment methods. In addition to information about the amount of toxic chemicals sent off-site for waste management, facilities also must specify the destination of these transfers. Beginning with the 1991 reports, facilities were required to provide information about source reduction activities, along with the quantities managed in waste by activities such as recycling. Companies must provide a production index that can help relate changes in reported quantities of toxic chemicals in waste managed to changes in production.

These additional data elements facilitate tracking of industry progress in reducing waste generation and moving towards safer waste management alternatives. While current TRI data cannot provide an absolute measure of pollution prevention, the data can provide insights into the complete toxics cycle.

Box 1–2 summarizes what facilities must report to TRI. See **TRI Releases and Waste Management: Data Analyzed in the *1998 TRI Public Data Release***, later in this chapter for more detail on the data that facilities



Box 1–2. What Must Be Reported to TRI?

What Must Be Reported to TRI?

Information reported by facilities includes:

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

report, as those data are presented and analyzed throughout this book.

How Do Facilities Report?

TRI facilities may file their TRI reports either electronically, using the TRI reporting software, or in hard copy. Each facility submits a Form R for each TRI chemical for which it meets the reporting requirements. Starting with the 1995 reporting year, facilities with lower levels of reportable amounts that do not manufacture, process, or otherwise use more than 1 million pounds of the chemical can file a much shorter certification statement, Form A.

Form R

The Form R is the reporting form that must be submitted annually by the owner or operator of a covered facility. The reports are submitted on or before July 1 and cover activities that occurred at the facility during the previous calendar year. EPA provides the reporting forms with instructions and technical guidance on how to calculate toxic chemical releases or emissions from facilities. The *Toxic Chemical Release Inventory Reporting Forms and Instructions* are available on the Internet at **http://www.epa.gov/tri**.

Form A

While expanding chemical and industry coverage, EPA has also provided a burden-reducing option for facilities with relatively low quantities of listed toxic chemicals in waste. Beginning in 1995, as the expanded chemical list went into effect, facilities whose total annual reportable amount of a listed toxic chemical does not exceed 500 pounds can apply a higher activity threshold in determining their reporting obligations. The total annual reportable amount is defined as the sum of the waste management categories that would be reported to TRI: quantities released (including disposal), recovered as a result of on-site recycling operations, combusted on-site for energy recovery, and treated at the facility, plus amounts transferred off-site for recycling, energy recovery, treatment, and disposal. These amounts correspond to total production-related waste in this report.

If the facility does not exceed the total production-related amount of 500 pounds, and does not manufacture, process, or otherwise use more than 1 million pounds of the listed chemical, the facility does not have to

file a Form R. Instead of filing a Form R detailing its releases and waste management activities, the facility can submit a certification statement (Form A). Form A certifies that the facility met the conditions outlined above for the listed chemical, but does not require reporting of any amounts of the toxic chemical released or otherwise managed as waste.

What Are the Benefits and Limitations of the Data?

> *We believe that people know what's best for their own communities and, given the facts, they themselves will determine what is best to protect public health and the environment.*
>
> —Carol Browner, US EPA Administrator

Benefits

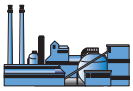
The TRI Program has given the public unprecedented direct access to toxic chemical release and other waste management data at the local, state, regional, and national level. Responsible use of this information can enable the public to identify potential concerns, gain a better understanding of potential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

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

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

Completion of three major efforts in EPA's strategy to enhance TRI's effectiveness has significantly increased the usefulness of TRI data. These actions were the TRI chemical expansion for the 1995 reporting year, facility expansion to include new industries with the 1998 reporting year, and expanded coverage of persistent, bioaccumulative toxic chemicals (PBTs) through lower reporting thresholds and addition of PBTs to the TRI chemical list beginning with the 2000 reporting year.

EPA's expansion strategy has given TRI users a substantially greater range and depth of valuable information. EPA's action on chemical expansion nearly doubled the number of chemicals that TRI addresses. As a result of the addition of seven industries, nearly 2,000 additional facilities submitted a total of 15,255 TRI reports in 1998. When TRI data for reporting year 2000 are made public, communities will have available significantly more data on releases and waste



management of PBT chemicals that pose potential threats to human health and the environment.

TRI has focused public and industry attention on the billions of pounds of toxic materials that are released directly into our air, our land and our water, injected underground, recycled, burned for energy recovery, or otherwise treated. Actions to strengthen the TRI Program over the years have given the public a much better picture of potential toxic chemical risks in their communities, while industry and government have better data for identifying opportunities and measuring successes in preventing pollution.

Limitations

While TRI provides the public, industry, and state and local governments an invaluable source of key environmental data, it has some limitations that must be considered when using the data. **What to Consider When Using TRI Data**, later in this chapter, describes specific information to keep in mind when analyzing TRI data.

Even with the expanded industry coverage, TRI does not address all sources of releases and other waste management activities of TRI chemicals. Although TRI is successful in capturing information on a significant portion of toxic chemicals currently being used by covered industry sectors, it does not cover all toxic chemicals or all industry sectors. In addition, facilities that do not meet the TRI threshold levels (those with fewer than 10 full-time employees or those not meeting TRI quantity thresholds) are not required to report. The new PBT reporting thresholds expand the information TRI will collect, but only for a subset of the TRI chemicals. Thus, while the TRI includes 87,328 reports from 23,487 facilities for 1998, the 7.31 billion pounds of on-and off-site releases reported represent only a portion of all toxic chemical releases nationwide.

Another limitation of the existing TRI Program is that the data currently collected provide limited information on the life cycle of chemicals used by facilities. Beyond reporting on releases and other waste management, TRI facilities supply only limited and very general information on chemical storage. In recent years, EPA has provided limited data on the toxicity of some chemicals in TRI reports and on the Web. TRI supplies no data on exposure and risk.

This report also does not account for toxic emissions from cars and trucks, nor from the majority of sources of releases of pesticides, volatile organic compounds, fertilizers or from many other non-industrial sources.

Furthermore, facilities report estimated data to TRI, and the program does not mandate that they monitor their releases. Various estimation techniques are used when monitoring data are not available, and EPA has published estimation guidance for the regulated community. Variations between facilities can result from the use of different estimation methodologies. These factors should be taken into account when considering data accuracy and comparability.

As discussed above, the TRI data summarized in this report reflect chemical releases and waste management activities that occur in a given calendar year. Patterns of releases and waste management activities can change dramatically from one year to

the next. Thus, it is important to recognize that current facility activities may be different from those reported for 1998 or prior years.

TRI reports reflect releases and waste management activities of chemicals, not exposures of the public to those chemicals. Release estimates alone are not sufficient to determine exposure or to calculate potential adverse effects on human health and the environment. Although additional information is necessary to assess exposure and risk, TRI data can be used to identify areas of potential concern. Furthermore, 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 of toxic chemicals. The determination of potential risk depends upon many factors, including the toxicity of the chemical, the fate of the chemical after it is released, the location of the release, and the human or other populations that are exposed to the chemical after its release.

❖ TRI In Perspective ❖

In 1987, when the Congress passed the 1987 Emergency Planning and Community Right-to-Know Act (EPCRA), 300-plus chemicals and chemical categories were included in the "TRI Chemical List" and only the manufacturing sector in SIC codes 20–39 was required to report under EPCRA section 313. Further, data coverage was initially confined to information on releases and certain transfers off-site for further waste management.

Passage of the Pollution Prevention Act of 1990 expanded TRI to include additional information on toxic chemicals in waste and on source reduction methods.

Beginning in 1991, covered facilities were required to report quantities of TRI chemicals recycled, combusted for energy recovery, and treated on- and off-site. Over time, EPA has worked to expand TRI to cover other industrial sectors and other chemicals that may have potential adverse impacts on our environment. Towards that end, the Agency has pursued an expansion strategy that has enlarged the boundaries of TRI in several directions.

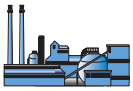
Chemical Expansion

The original TRI chemical list combined two existing lists: the New Jersey Environmental Hazardous Substance List and the Maryland Chemical Inventory Report List. This original list consisted of 320 chemicals and chemical categories. Over time, through EPA's petition process, the original list has been modified as the Agency responded to petitions to add and delete chemicals, given the law's toxicity listing criteria. These criteria focus on both acute and chronic health effects as well as environmental effects, as outlined in sections 313(c) and (d) of EPCRA.

The first chemical expansion occurred in 1993 with the addition of certain Resource Conservation and Recovery Act (RCRA) (58 FR 63500) chemicals and certain hydrochlorofluorocarbons (HCFCs) (58 FR 63496) to EPCRA section 313.

The second expansion was the addition of 286 chemicals and chemical categories[1] on November 30, 1994 (59 FR 61432). The addi-

[1] *Of the 286 chemicals, 20 were diisocyanates and 19 were polyaromatic compounds. These are reported not as individual chemicals, but as two chemical compound categories. Not individually counting the members of these two categories converts 286 to 249. Furthermore, three other chemicals have been remanded and one chemical was not reportable because of an administrative stay. Thus, the number of chemicals added to TRI, beginning with the 1995 reporting year, was 245.*



tional chemicals can be characterized as high or moderately high in toxicity, and they are currently manufactured, processed, or otherwise used in the U.S. Many are high production volume (HPV) chemicals. This list expansion raised the number of chemicals and chemical categories reported to TRI to more than 600. Specifically, the rule added more than 150 pesticides, certain Clean Air Act chemicals, certain Clean Water Act Priority Pollutants, and certain Safe Drinking Water Act chemicals. Many of the chemicals are carcinogens, reproductive toxicants, or developmental toxicants. Of particular note is the addition of industrial chemicals such as diisocyanates, n-hexane, N-methyl-2-pyrrolidone, and chemicals such as polycyclic aromatic compounds that result from the combustion of fuels.

Facility Expansion

Since the enactment of EPCRA, the TRI Program has focused on the releases and waste management activities of the manufacturing sector—facilities that classify themselves as being primarily in SIC codes 20–39. To provide the public with a more complete picture of the toxics in their community, EPA undertook a detailed examination of other, non-manufacturing industries to determine which may be significant generators of toxic chemical releases and other wastes. This effort focused particular attention on sectors linked to manufacturing—those providing energy, further managing products, or further managing waste from the manufacturing sector.

Factors used to evaluate industries for this expansion included other available data on toxic chemical releases and other waste management activities, the interrelationship of non-manufacturing operations to manufacturing operations, the degree to which reporting would be expected to occur, and the potential burden that TRI reporting might impose on these facilities.

On May 1, 1997, EPA published a final rule (62 FR 23833) adding seven industry sectors to TRI: metal mining, coal mining, electrical utilities that combust coal and/or oil, hazardous waste treatment and disposal facilities, chemical wholesale distributors, petroleum bulk stations and terminals, and solvent recovery services (**Who Must Report?**, earlier in this chapter, identifies the SIC codes for the added industries). EPA has also conducted an aggressive outreach campaign, including guidance, training, and technical assistance to assist these new industries in understanding their reporting obligations. Final guidance documents for these industries are available from EPA's Web site at **http://www.epa.gov/tri**. EPA will continue to review other industries for possible inclusion in the TRI Program.

Persistent, Bioaccumulative Toxic Chemicals (PBTs)

Beginning in reporting year 2000, lower reporting thresholds will apply to TRI facilities that manufacture, process, or otherwise use certain persistent, bioaccumulative toxic chemicals (PBTs). At the same time additional PBTs that TRI has not previously covered will be added to the section 313 chemical list.

PBT chemicals include substances such as mercury and polychlorinated biphenyls (PCBs), already on the TRI list, and dioxin, which is among the chemicals being added in 2000. The PBT chemicals are of particular concern not only because they are toxic, but also because they remain in the environment for long periods of time and are

not readily destroyed (i.e., they are persistent), and they build up or accumulate in body tissue (i.e., they bioaccumulate). Relatively small releases of PBT chemicals can pose human and environmental health threats. Consequently, these chemicals warrant recognition by communities as potential health threats and information about their releases and other waste management need to be captured by the TRI Right-to-Know Program.

EPA has created three separate thresholds for the PBTs: 10 pounds for certain highly persistent, bioaccumulative toxic chemicals, 100 pounds for other PBTs, and a special threshold of 0.1 grams for dioxin and dioxin-like chemicals. Under the existing thresholds of 25,000 pounds for manufacture of a listed chemical and 10,000 pounds for processing or otherwise using a listed chemical, TRI facilities reported very few releases or waste management of the PBTs.

In addition to the chemical category of dioxin and dioxin-like compounds (a total of 20 substances), EPA added other PBT chemicals. EPA added four individual chemicals—benzo(g,h,i)perylene, octachlorostyrene, pentachlorobenzene, and tetrabromobisphenol A (TBBPA)—and two chemicals to the polycyclic aromatic compounds (PACs) category—benzo(j,k)fluorene (fluoranthene) and 3-methylcholanthrene.

EPA proposed the PBT rule in January 1999 and published the final rule on October 29, 1999 (64 FR 58666). A proposed rule, issued August 3, 1999 (64 FR 42222), would include lead in the group of PBT chemicals subject to the new PBT reporting threshold of 10 pounds. In the future, the Agency may also consider adding other toxic chemicals that are persistent or bioaccumulative to TRI.

In a separate action, as part of the October 29, 1999 rulemaking, EPA added vanadium (except when contained in alloys) and vanadium compounds. These are not PBT chemicals.

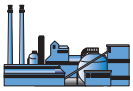
❖ TRI Releases and Waste ❖ Management: Data Analyzed in 1998 TRI Public Data Report

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 whether (or how much) the public has been exposed 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 amount and length of human or other exposure to the chemical after it is released. Listed below are some of the factors that should be considered when reviewing TRI data. Box 1–3 highlights some of these factors.

Toxicity of the Chemical

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



Box 1–3. Factors to Consider in Using TRI Data

Factors to Consider in Using TRI Data

- **Toxicity of the Chemical:** TRI chemicals vary widely in their ability to produce toxic effects. Some high-volume releases of less-toxic chemicals appear to be a more serious problem than lower-volume releases of highly toxic chemicals, when just the opposite may be true.
- **Exposure Considerations:** The potential for exposure is greater the longer the chemical remains unchanged in the environment. 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, whereas metals are persistent and will not degrade when released to the environment. Chemical exposure of a population depends on the environmental medium (air, water, land, etc.) to which a chemical is released. The medium also affects the types of exposures possible, such as inhalation, dermal exposure, or ingestion.

- Some high-volume releases of less toxic chemicals may appear to be a more serious problem than lower-volume releases of 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

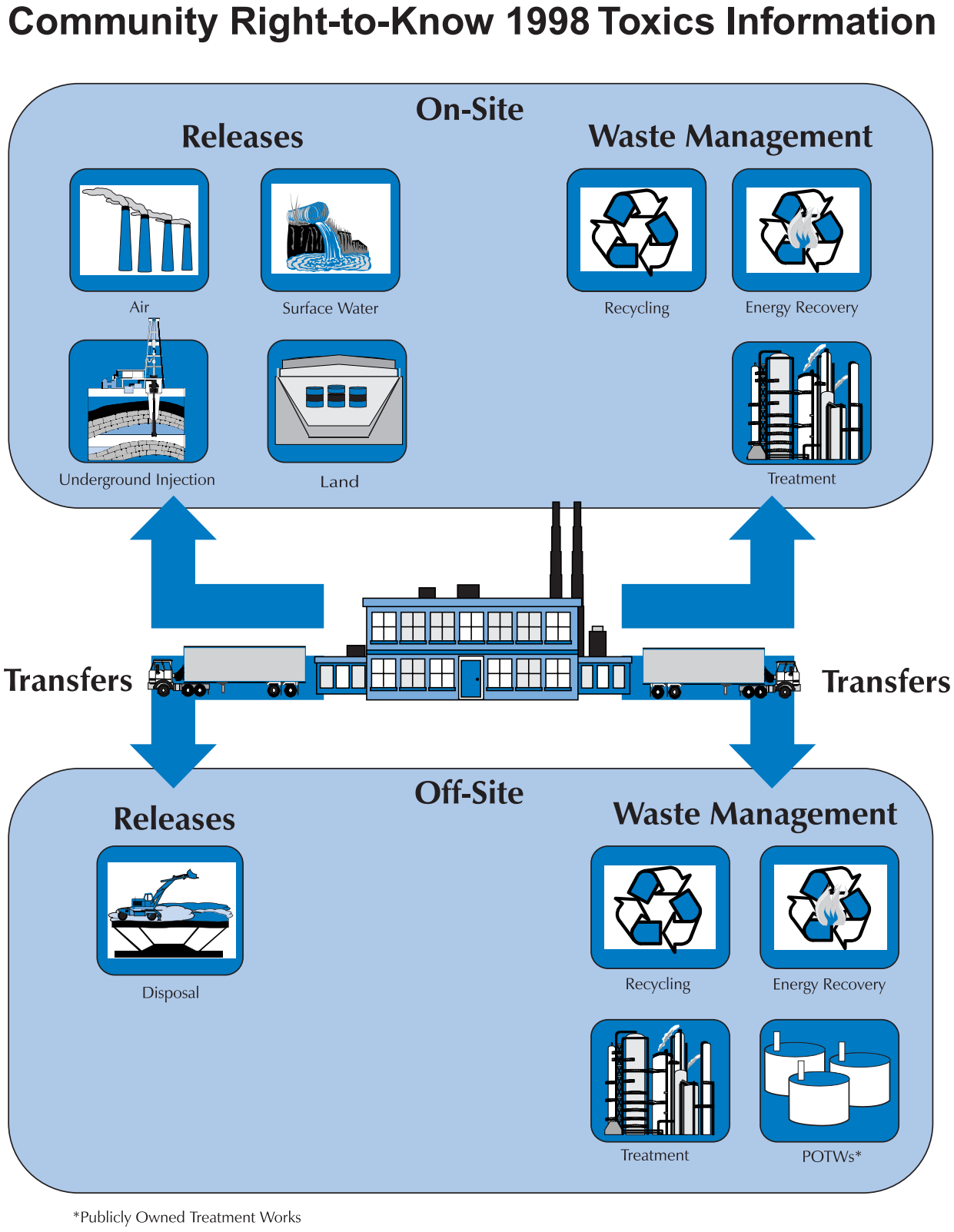
- **Potential degradation or persistence of the chemical in the environment.** Exposure to a chemical is dependent upon the chemical being available. The longer the chemical remains unchanged in the environment, the greater the potential for exposure. Sunlight, heat, or microorganisms may or may not 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 liv-

ing 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 percent to 99 percent 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. 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.

Figure 1–1. Information Collected Under TRI



Releases

On- and Off-site Releases

Figure 1–1 illustrates on-site and off-site releases, on-site waste management activities, and transfers off-site for further waste management, reportable to TRI. Box 1–4 describes reportable releases that may occur on-site at the facility and identifies types of activities that may contribute releases to various media. Box 1–5 describes releases that may ultimately result when a facility transfers chemicals off-site for disposal.

As noted in Box 1–5, data on off-site releases include additional details about off-site transfers of metals and metal compounds, beginning with reporting year 1997. Box 1–6 explains how facilities should report metals and metal compounds, and Box 1–7 describes EPA's methodology for using these data in analyses in this report.

Box 1–8 describes EPA's methodology for avoiding duplication of amounts analyzed in off-site releases (transfers to disposal) that are also reported as on-site releases by facilities that received such transfers. This potential for duplication arises now that RCRA subtitle C hazardous waste treatment and disposal facilities also report to TRI. The methodology applies to analyses that include data from the newly reporting industries.

Waste Management

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 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 1–2, for situations where source reduction cannot be implemented feasibly.

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.

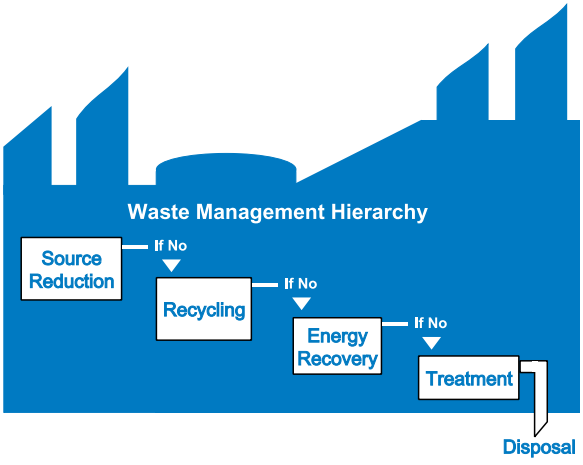
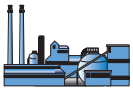


Figure 1–2. Waste Management Hierarchy



Box 1–4. 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 1–5. 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. Transfers of metals and metal compounds to solidification/stabilization, to wastewater treatment (excluding POTWs), and to publicly owned treatment works (POTWs, or municipal sewage treatment) also result in releases and are classified as off-site releases (transfers to disposal) (see Box 1–6).

Box 1–6. How Metals and Metal Compounds Should be Reported to TRI

How Metals and Metal Compounds Should be Reported to TRI

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.

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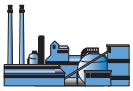

Box 1–6. How Metals and Metal Compounds Should be Reported to TRI *(continued)*

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 for 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

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 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 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 1–7. 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 the tables in Appendix B.

Box 1–8. Duplication of Off-site Transfers to Disposal

Duplication of Off-site Transfers to Disposal

TRI facilities transfer off-site chemicals in waste to other facilities for disposal. These recipient facilities can dispose of the wastes in on-site landfills, disposal surface impoundments, in land treatment facilities, other types of land disposal, and underground injection wells or, if metals are sent to a wastewater treatment facility, they may be discharged to surface waters. The recipient facilities generally are treatment, storage and disposal (TSD) facilities regulated under the federal Resources Conservation and Recovery Act (RCRA). Such facilities are one of the added industries that must, beginning with the 1998 reporting year, report their releases, transfers, and waste management to TRI. Thus, the facility that sends these transfers would report to TRI the amounts as transfers to disposal (off-site releases) and the TSD facility that receives the material would report the amounts as on-site releases to land, surface waters, or underground injection.

To avoid counting the transfers to the TSD facilities that are also reported to TRI as on-site releases by the TSD facilities, off-site transfers to disposal to these TSD facilities must be omitted from tables that compare or summarize on-site and off-site releases for all industries, including the newly added industries. Only the on-site releases from the TSD facilities are included in such analyses. In the *1998 TRI Public Data Release,* this applies to tables presented in Chapter 3.

The RCRA ID number that facilities report is used to identify such transfers and match them to on-site releases reported by TSD facilities. A TRI facility must report its own RCRA ID number as well as the RCRA ID number of the TSD facility receiving the transfer. Each amount of off-site transfer to disposal should have the RCRA ID number of the receiving facility. If this RCRA ID number matches the RCRA ID number of a TRI facility and the TRI facility receiving the waste reported on-site releases of the same chemical (or the metal and its compounds in the case of metals) that were greater than or equal to the sum of the off-site transfers received, then the off-site transfer amount is omitted from the analysis.

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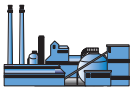

Box 1–8. Duplication of Off-site Transfers to Disposal *(continued)*

If the TRI facility receiving the waste reported on-site releases of the chemical less than the total reported as transferred to the facility, then the amount omitted from the analysis is reduced proportionally. For example, if Facility A reported 20,000 pounds transferred to Facility C and Facility B reported 80,000 pounds transferred to Facility C, but Facility C only reported 90,000 pounds released on-site (which is 90 percent of the total amount of 100,000 pounds reported as transferred), then the amount of transfers omitted from the analysis for Facility A is 18,000 pounds (or 90 percent of 20,000 pounds) and for Facility B is 72,000 pounds (or 90 percent of 80,000 pounds).

In tables that present off-site transfers but not on-site releases, these amounts are not omitted in order to present complete data on off-site transfers for analysis. Also, tables that present data on waste managed do not omit any reported data in order to present complete data on how waste is being managed.

The following shows which types of off-site transfers to disposal are matched with which types of on-site releases to determine if the transfers should be omitted:

Off-site Transfer M Code	Section 5 Checked for Recipient TRI Facilities Based on Matching Chemical or, if Metal, Metal plus Metal Compounds
M10	5.5.4
M41*	5.5.1 A and B
M62*	5.5.1 A and B, 5.5.3 and 5.3
M71	5.4
M72	5.5.1 A and B, 5.5.3
M73	5.5.2
M79	5.5.4
M90	All Section 5
M99	All Section 5

*Includes metals and metal compounds reported under codes M40 and M61.

Waste management data presented in this book appear in tables and figures in the order of the hierarchy: recycling, energy recovery, treatment, and release (including disposal).

Box 1–9 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 (1998) and the previous year (1997) and as projections for the two following years (1999 and 2000). 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 1–9. 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 percent 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 percent 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 1–6).

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.

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

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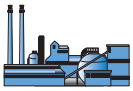

Box 1–9. An Explanation of Waste Management Information *(continued)*

between quantities that are routinely associated with production operations and are more amenable to source reduction and those that are not routinely associated with production processes and are not so amenable to source reduction because they are not readily anticipated. This separation is important in assessing progress in source reduction at facilities.

The individual waste management quantities reported are mutually exclusive to avoid double-counting. For example, an incinerator may destroy 99 percent 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 percent) 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.

Box 1–10 explains the differences between total on- and off-site releases and quantity released on- and off-site.

Transfers Off-site for Further Waste Management

Box 1–11 describes off-site transfers to recycling, energy recovery, treatment, and POTWs that TRI facilities must report.

Making Year-to-Year Comparisons of TRI Data

Year-to-year comparisons must be based on a consistent set of reporting requirements to assure that any changes in releases or waste management data do not simply reflect expansion of TRI's chemical and industry coverage or other modifications in reporting requirements over the course of the years.

Box 1–10. Differences between Amounts Reported in Sections 5 and 6 and in Section 8 of Form R

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

"Total on- and off-site releases" and "quantity released on- and off-site" are not the same. This difference arises primarily from the types of releases reported on different sections of the Form R. "Total on- and off-site releases" reflects all on-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 1–6). However, "quantity released on- and off-site" is limited to production-related on- and off-site releases as collected in Section 8.1 of the Form R. Although total amounts analyzed in these two categories 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 include only production-related wastes whereas Section 6 includes all off-site waste management amounts.

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.

Box 1–11. 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 1–5).

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.

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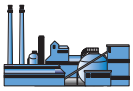


Box 1–11. An Explanation of Transfers Off-site for Further Waste Management *(continued)*

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 1–5 and 1–6.

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."

1995–1998

In addition to the industry expansion achieved in 1998, EPA has made a few changes during the 1995–1998 period to the list of chemicals that must be reported. EPA has the authority both to add chemicals to the TRI reporting list if they meet the statutory toxicity criteria and to delete chemicals from the list if EPA determines that they do not meet the toxicity criteria. Since 1995, EPA has deleted two chemicals from the TRI list. Chemicals that have been added or removed from the TRI list since 1995 would not be included in the 1995–1998 trend analysis. In addition, reporting from new industries in 1998 would be excluded from analyses of 1995–1998 trends. In reporting year 1997, TRI began distinguishing metals and metal compounds from other listed chemicals in certain types of off-site transfers. Specifically, metals and metal compounds transferred off-site to solidification/stabilization, to wastewater treatment (excluding POTWs), and to POTWs are also classified as off-site releases. (See Boxes 1–5 through 1–7.) Although this categorization was new in 1997, comparable transfers of metals and metal compounds in previous years can be identified by the waste treatment codes that applied in those years. Tables in this book present such data.

1991–1998

Waste management information added to TRI by the Pollution Prevention Act of 1990 has been collected since 1991. Chemicals added to TRI in EPA's chemical expansion initiative were first reportable in 1994 and a few other chemicals were added in 1995. All of these substances are excluded from

analyses of the 1991–1998 data. Reporting requirements for ammonia, hydrochloric acid, and sulfuric acid have changed since 1991. Therefore, these chemicals are also excluded from analyses of the 1991–1998 data.

1988–1998

Analyses for the period 1988 to 1998 exclude chemicals added to TRI since 1988 and those for which reporting requirements have changed over that time. Additional considerations also apply to analyses of TRI data for 1988 to 1998, including:

- In 1989, the reporting thresholds for manufacture and processing of TRI chemicals was reduced from 50,000 pounds to 25,000 pounds. This may affect data for 1988 and 1989, but not for subsequent years.
- Off-site transfers to recycling and energy recovery became reportable in 1991. Comparisons between 1988 and 1998 include only the transfer types that were reportable in 1988.
- Reporting of amounts injected underground into Class I wells separately from amounts injected into underground wells of other classes (II–V), and reporting of on-site land releases to RCRA subtitle C landfills separately from other types of on-site land releases began in 1996. Therefore, these release types cannot be analyzed separately for 1988 to 1998.

Reasons for Change

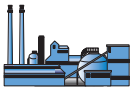
Box 1–12 provides reasons that a facility's reported amounts may change from one year to another. Explanations for changes in reported amounts include actual source reduction projects undertaken to reduce a facility's generation of waste of a particular chemical, increases or decreases in production levels, changes in a facility's methods of estimating or calculating reportable amounts (which does not indicate a corresponding change in actual releases and waste management), reporting errors in previous years for which the facility has not filed a revised submission, and others.

Apparent increases and decreases among industries can also result when facilities change the SIC codes they report from one year to another, reflecting new or discontinued facility operations or indicating a different understanding of how SIC codes relate to the facility's business.

Source Reduction

As noted above, 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 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 1–13 explains source reduction as defined by the PPA.



Box 1–12. Reasons Facility Estimates of Releases and Other Waste Management Change

Reasons Facility Estimates of Releases and Other Waste Management Change

Some reported increases and decreases are real—that is, they reflect changes in the amounts of TRI chemicals actually released or otherwise managed in waste. Other reported increases and decreases are accounting or "paper" changes that do not reflect change in releases or other waste management. Some examples follow.

Real Changes

Source reduction activities, such as process changes, elimination of spills and leaks, inventory control, improved maintenance, chemical substitution, and alternative methods of cleaning and degreasing can cause real reductions in the amount of waste generated and/or managed.

The installation of pollution control equipment does not reduce the amount of waste generated, but may lead to real reductions in TRI chemicals released. However, if the pollution control does not destroy the reported chemical, it may merely shift waste from one type of waste management to another.

Production changes can cause real changes in the quantities of TRI chemicals released or otherwise managed as waste by facilities. Production-related waste is likely to increase when production increases and decrease when production decreases, although the relationship is not necessarily linear.

One-time events unrelated to normal production processes, such as accidental releases or clean-up operations, can cause a real but anomalous increase in the reporting year in which they occur and then a decrease from that abnormally high level the following year.

"Paper" Changes

Changes in estimation or calculation techniques can cause a change in the amount reported without a corresponding change in actual quantities released or otherwise managed as waste.

Clarifications of reporting instructions or changes in the way a facility interprets those instructions may cause a change in reported amounts without an actual change in quantities released or otherwise managed as waste.

Changes in the reporting definition of a particular chemical may cause a change in the reported amounts without an actual change in quantities released or otherwise managed as waste. For example, revising the definitions of sulfuric acid and hydrochloric acid to include only aerosol forms, as occurred in reporting years 1994 and 1995, resulted in lower reports of releases, when non-aerosol forms were no longer reported.

Similarly, a facility's use of the alternate threshold may result in a reported decrease without an actual reduction in releases if the facility begins to take advantage of an alternate manufacture, process, or otherwise use threshold of more than 1 million pounds. Beginning in the 1995 reporting year, some facilities whose "total annual reportable amount" for a reportable chemical does not exceed 500 pounds may use an alternate manufacture, process, or otherwise use threshold of more than 1 million pounds of the chemical. If they do not exceed this alternate threshold, they no longer need to report amounts of releases or other waste management activities.

Apparent increases or decreases can occur if a facility makes a reporting error one year and does not submit a revision for that year, but does not repeat the error the following year.

Box 1–13. 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.

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.

❖ How Can I Obtain ❖ Additional TRI Information?

The TRI data are available in on-line databases and in a variety of common computer and hard copy formats to ensure that everyone can easily use the information. Information about accessing the TRI database is provided in Appendix D of this report. The TRI User Support Service **(202-260-1531)** can provide assistance in accessing and using the TRI data. On-line services include the new TRI Explorer, EPA's Envirofacts, the National Library of Medicine's TOXNET system, and the Right-to-Know Network (RTK NET).

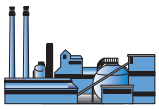
To request copies of TRI and EPCRA documents or to obtain further information about the program, contact the toll-free Emergency Planning and Community Right-to-Know Information Hotline at **1-800-424-9346**. TRI information is also available on the TRI Web site at **www.epa.gov/tri.**

Other potential sources of TRI information include the state EPCRA section 313 contact, the EPA Regional Office, or the facility itself. EPA regional and state EPCRA section 313 contacts appear in the *1998 TRI Public Data Release: State Fact Sheets* and Appendix E. Appendix F contains the TRI Form R and Form A for 1998.

Chapter 2

1998 Toxics Release Inventory Data and 1995–1998 Trends

Chapter 2



1998 Toxics Release Inventory Data and 1995–1998 Trends

❖ Introduction ❖

This chapter summarizes information reported by facilities in the original TRI industries for calendar year 1998 and examines trends in the data for 1995–1998. This overview includes TRI data for facilities' on- and off-site releases, waste management, and transfers to off-site locations for further management. Data are summarized for the nation and also by state. Also presented is a summary view of 1988 to 1998 data for TRI's original release and transfer categories.

Analyses in this chapter do not include reporting by the seven industries added to TRI in 1998. Industry-specific analyses appear in the subsequent chapters. Chapter 3 examines release and waste management data for the seven industries newly reporting to TRI in 1998, including comparisons of the new industries to TRI reporting as a whole. Chapter 4 analyzes release and waste management data reported by the original TRI industries for 1998 and examines trends in original-industry data since 1995, 1991, and 1988. Data for all TRI chemicals appear in the appendices to this volume.

Important descriptions of the categories of releases and waste management activities that are reportable to TRI appear in Chapter 1, in **TRI Releases and Waste Management: Data Analyzed in *1998 TRI Public Data Release***. Information provided in Chapter 1 is essential to understanding the data presented throughout this book.

The 1995 baseline serves to measure recent progress. Using 1995 as a baseline captures important expansions and revisions in TRI that occurred throughout the early to mid-1990s. These include the 1991 addition of waste management data under the Pollution Prevention Act of 1990, required reporting by federal facilities since 1994, the major chemical expansion that nearly doubled the TRI chemical list beginning in 1995, and availability of the Form A certification statement for facilities with low annual amounts, also beginning in 1995.

The nation's progress can be further examined using 1988 as a baseline to measure reductions in the original release and transfer categories. Data used in this analysis cover only the original TRI industries and the chemicals that have been reportable under TRI in all years from 1988 to 1998.

❖ TRI Releases, 1995–1998 ❖

For 1998, 21,517 facilities filed 72,073 TRI reporting forms (see Table 2–1). The number of facilities reporting to TRI decreased 1.9 percent from 1997, continuing a long-standing trend. Since 1995, the number of facilities has decreased 5.9 percent. The number of forms submitted showed comparable declines.

Table 2–1. TRI Facilities and Forms, 1995–1998

	1995 Number	1996 Number	1997 Number	1998 Number	Change 1997–1998 Number	Change 1997–1998 Percent	Change 1995–1998 Number	Change 1995–1998 Percent
Total Facilities	22,859	22,340	21,927	21,517	–410	–1.9	–1,342	–5.9
Total Forms	76,139	73,669	73,076	72,073	–1,003	–1.4	–4,066	–5.3
Form Rs	69,471	66,167	62,390	61,233	–1,157	–1.9	–8,238	–11.9
Form As	6,668	7,502	10,686	10,840	154	1.4	4,172	62.6

Fifteen percent of the 1998 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 amount[1] 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. As explained in TRI Reporting Forms in Chapter 1, Form A certification statements do not report amounts of chemical releases, transfers, or other waste management activities.

On- and Off-site Releases

In 1998, on-site and off-site releases reported to TRI totaled 2.50 billion pounds, as shown in Table 2–2. This amount includes releases directly to the air, water, or land, as well as disposal of toxic chemicals in on-site or off-site landfills, surface impoundments, land treatment, and underground injection wells. (On-site and off-site releases are described in detail in Chapter 1, Boxes 1–4 and 1–5.)

[1] *The 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.*

Total on-site and off-site releases decreased 141.9 million pounds from 1995 to 1998, including a reduction of 91.3 million pounds in the last year. The five-percent reduction from 1995 to 1998 reflects annual reductions in on-site releases, which constituted more than 80 percent of all TRI releases. On-site releases decreased 11.8 percent over the period. Off-site releases, however, rose substantially through 1997 and showed a 41.9 percent increase (132.6 million pounds) for 1995 to 1998.

On-site Releases

On-site releases totaled 2.05 billion pounds in 1998 (see Table 2–2). The largest category was air emissions, with 1.26 billion pounds. Releases to air consisted of 964.4 million pounds of point source (stack) emissions and 292.5 million pounds of non-point (fugitive) emissions. As shown in Figure 2–1, releases to air represented 61.4 percent of all on-site releases in 1998.

Facilities discharged 223.4 million pounds of toxic chemicals into the nation's rivers, lakes, bays, and other bodies of water in 1998. Underground injection amounted to 210.6 million pounds. On-site releases to land totaled 355.7 million pounds. Of this total, the largest amount (145.2 million pounds) was reported as other disposal, which includes accidental releases and dis-

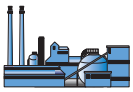


Table 2–2. TRI On-site and Off-site Releases, 1995–1998

On-site and Off-site Releases	1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	Change 1997–1998 Pounds	Change 1997–1998 Percent	Change 1995–1998 Pounds	Change 1995–1998 Percent
On-site Releases								
Total Air Emissions	1,585,156,840	1,470,214,042	1,336,600,706	1,256,949,811	–79,650,895	–6.0	–328,207,029	–20.7
Fugitive Air Emissions	392,706,983	351,331,196	318,148,917	292,502,959	–25,645,958	–8.1	–100,204,024	–25.5
Point Source Air Emissions	1,192,449,857	1,118,882,846	1,018,451,789	964,446,852	–54,004,937	–5.3	–228,003,005	–19.1
Surface Water Discharges	180,516,139	184,739,434	222,302,322	223,365,761	1,063,439	0.5	42,849,622	23.7
Underground Injection	236,194,397	209,317,311	221,732,690	210,639,389	–11,093,301	–5.0	–25,555,008	–10.8
On-site Land Releases	319,250,562	333,685,655	350,551,945	355,674,874	5,122,929	1.5	36,424,312	11.4
On-site Landfills	94,460,060	83,463,962	110,056,796	115,069,841	5,013,045	4.6	20,609,781	21.8
Land Treatment	8,087,867	6,032,164	6,115,770	5,210,603	–905,167	–14.8	–2,877,264	–35.6
Surface Impoundments	75,899,426	84,831,782	96,953,726	90,237,471	–6,716,255	–6.9	14,338,045	18.9
Other Disposal	140,803,209	159,357,747	137,425,653	145,156,959	7,731,306	5.6	4,353,750	3.1
Total On-site Releases	**2,321,117,938**	**2,197,956,442**	**2,131,187,663**	**2,046,629,835**	**–84,557,828**	**–4.0**	**–274,488,103**	**–11.8**
Off–site Releases								
Storage Only[a]	2,395,446	1,451,317	6,595,584	11,749,603	5,154,019	78.1	9,354,157	390.5
Solidification/Stabilization[b] Metals and Metal Compounds Only	26,723,956	59,253,534	144,629,694	135,977,395	–8,652,299	–6.0	109,253,439	408.8
Wastewater Treatment (excluding POTWs)[c] Metals and Metal Compounds Only	3,740,028	3,776,635	5,467,652	4,225,724	–1,241,928	–22.7	485,696	13.0
Transfers to POTWs[d] Metals and Metal Compounds Only	2,542,345	2,448,282	2,450,875	3,045,974	595,099	24.3	503,629	19.8
Underground Injection	17,956,560	11,614,971	15,187,697	16,481,522	1,293,825	8.5	–1,475,038	–8.2
Landfills/Surface Impoundments	223,840,275	237,372,538	246,075,735	232,738,747	–13,336,988	–5.4	8,898,472	4.0
Land Treatment	4,688,153	2,208,908	1,238,127	1,326,956	88,829	7.2	–3,361,197	–71.7
Other Land Disposal	13,655,120	12,085,985	12,051,182	15,597,579	3,546,397	29.4	1,942,459	14.2
Other Off-site Management	12,817,023	10,665,955	11,970,541	9,873,534	–2,097,007	–17.5	–2,943,489	–23.0
Transfers to Waste Broker for Disposal	6,418,199	4,838,441	7,678,059	14,052,361	6,374,302	83.0	7,634,162	118.9
Unknown[e]	1,638,043	1,610,439	2,439,375	3,952,214	1,512,839	62.0	2,314,171	141.3
Total Off-site Releases (Transfers Off-site to Disposal)	**316,415,148**	**347,327,005**	**455,784,521**	**449,021,609**	**–6,762,912**	**–1.5**	**132,606,461**	**41.9**
Total On-site and Off-site Releases	**2,637,533,086**	**2,545,283,447**	**2,586,972,184**	**2,495,651,444**	**–91,320,740**	**–3.5**	**–141,881,642**	**–5.4**

Note: On-site Releases *are 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.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in 1996 reporting year.

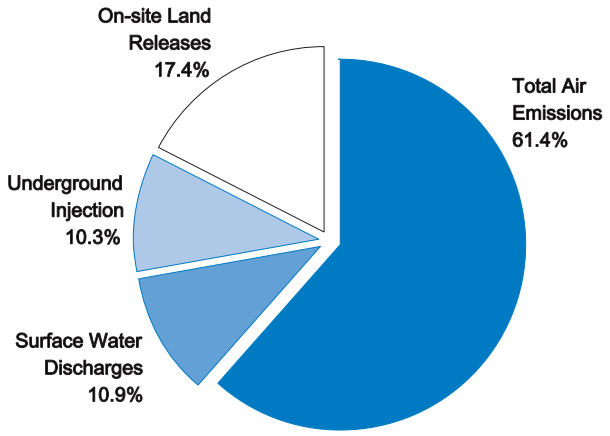
[a] *Storage only (disposal code M10) indicates the chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to storage only are included as a form of disposal (off-site release). See Box 1–5.*

[b] *Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment 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 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.*

[c] *Beginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste treatment code M61) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste treatment code M60). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 1–6. Transfers of metals and metal compounds reported under code M60 have been included in transfers of metals metal compounds to wastewater treatment.*

[d] *Reported 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** are from Section 5 of Form R.*

Figure 2–1. 1998 TRI On-site Releases

posal methods other than landfilling or surface impoundment.

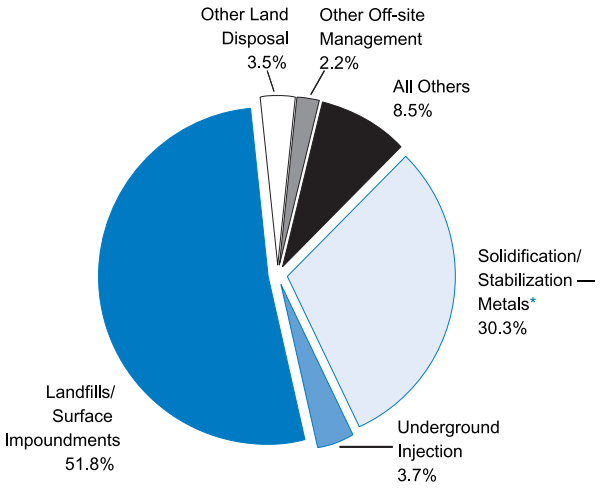
Air emissions decreased 20.7 percent from 1995 to 1998, and this 328.2-million-pound decrease was the largest factor in the overall reduction of on-site releases. Underground injection showed a reduction of 10.8 percent or 25.6 million pounds. However, both surface water discharges and on-site land releases increased from 1995 to 1998, by 23.7 percent and 11.4 percent respectively. Surface water discharges increased by 42.8 million pounds and on-site land releases by 36.4 million pounds.

Off-site Releases

As explained in Chapter 1 (see Box 1–5), 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). In Chapter 1, Boxes 1–6 and 1–7 supply detailed information on reporting and analysis of data on TRI metals and metal compounds. (1998 data for metals and their compounds appear in Appendix B.)

In 1998, TRI facilities reported a total of 449.0 million pounds of toxic chemicals in transfers off-site that represent releases to the environment (see Table 2–2). More than half—232.7 million pounds—was sent to disposal in landfills or surface impoundments. Another 136.0 million pounds consisted of metals and metal compounds sent to solidification or stabilization. These two types of off-site releases—landfills/surface impoundments and metals solidification/stabilization—accounted for 82.1 percent of all off-site releases in 1998, as illustrated in Figure 2–2.

Off-site releases rose 41.9 percent from 316.4 million pounds in 1995 to 449.0 million pounds in 1998. An abrupt one-year increase in solidification and stabilization of metals and metal compounds strongly influenced this trend. From 1996 to 1997, when TRI began collecting more detailed data on off-site transfers of metals, solidification/stabilization increased from 59.3 million pounds to 144.6 million pounds. Across the four-year period, solidification/stabilization of metals and metal compounds rose from 26.7 million pounds to 136.0 million pounds, an increase of more than 400 percent. Off-site releases showed a small reduction (1.5 percent) from 1997 to 1998.



*Note: **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.*
**See notes to Table 2–2.*

Figure 2–2. 1998 TRI Off-site Releases

❖Waste Management Data,❖ 1995–1998

Quantities of TRI Chemicals in Waste

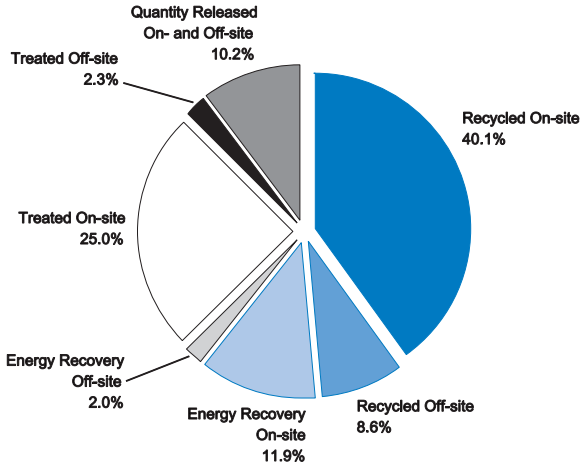
Facilities reported managing 24.05 billion pounds of total production-related waste in 1998, as shown in Table 2–3. (Detailed descriptions of the types waste management data reported to TRI appear in Chapter 1, Box 1–9.)

Most waste management occurs on-site. Facilities reported 9.65 billion pounds recycled on-site, the largest waste management quantity reported. On-site treatment totaled 6.01 billion pounds, the second-largest quantity, and on-site energy recovery amounted to 2.85 billion pounds, ranking third. As shown in Figure 2–3, 48.7 percent of the TRI chemicals in waste consisted of recycling, on- and off-site.

Quantities released on- and off-site, the least desirable activity in terms of the waste management hierarchy (see **Waste Management** in Chapter 1), amounted to 2.45 billion pounds. This represented 10.2 percent of total production-related waste in 1998. (Differences between quantity released on- and off-site analyzed here and total on- and off-site releases described above are discussed in Chapter 1, Box 1–10.)

Although 1998 total production-related waste amounted to an 11.5 percent reduction since 1995, the data show annual increases in the last two years. This follows the pattern of changes in on-site recycling, which dropped sharply from 1995 to 1996 (a 35.4 percent reduction), followed by substantial increases in 1997 (up 9.3 percent) and 1998 (up 17.2 percent).

In 1995, however, seven facilities in the food processing industry (SIC code 20) reported from 500 million pounds to 1 billion pounds each in on-site recycling of n-hexane, for a total of 4.00 billion pounds. In 1996, these facilities reported no on-site



Note: Data are from Section 8 of Form R.

Figure 2–3. 1998 Quantities of TRI Chemicals in Waste

Table 2–3. Quantities of TRI Chemicals in Waste, 1995–1998

Waste Management Activity	1995* Pounds	1996 Pounds	1997 Pounds	1998 Pounds
Recycled On-site	11,663,554,919	7,533,569,188	8,232,956,364	9,646,571,037
Recycled Off-site	2,350,533,667	2,243,302,912	2,202,661,577	2,059,338,694
Energy Recovery On-site	2,740,388,125	2,727,639,231	2,794,347,219	2,851,489,429
Energy Recovery Off-site	503,968,089	512,680,522	521,798,706	485,373,723
Treated On-site	6,794,862,115	5,943,643,124	6,020,549,126	6,012,991,050
Treated Off-site	569,710,695	511,458,178	530,911,878	547,355,031
Quantity Released On- and Off-site	2,556,354,462	2,469,858,172	2,496,082,319	2,448,429,537
Total Production-related Waste	**27,179,372,072**	**21,942,151,327**	**22,799,307,189**	**24,051,548,501**
Non-production-related Waste	34,060,993	30,846,845	35,306,677	26,712,347

Waste Management Activity	Change 1995–1996 Percent	Change 1996–1997 Percent	Change 1997–1998 Percent	Change 1995–1998 Percent
Recycled On-site	–35.4	9.3	17.2	–17.3
Recycled Off-site	–4.6	–1.8	–6.5	–12.4
Energy Recovery On-site	–0.5	2.4	2.0	4.1
Energy Recovery Off-site	1.7	1.8	–7.0	–3.7
Treated On-site	–12.5	1.3	–0.1	–11.5
Treated Off-site	–10.2	3.8	3.1	–3.9
Quantity Released On- and Off-site	–3.4	1.1	–1.9	–4.2
Total Production-related Waste	**–19.3**	**3.9**	**5.5**	**–11.5**
Non-production-related Waste	–9.4	14.5	–24.3	–21.6

Note: *All data are taken from Section 8 of Form R for year indicated.*
**Seven facilities in the food processing industry (SIC code 20) reported from 500 million pounds to 1 billion pounds each in on-site recycling of n-hexane in 1995, for a total of 4.00 billion pounds. In 1996 these facilities reported no on-site recycling of n-hexane. On their 1996 Form Rs, these facilities also reported zero for on-site recycling of n-hexane for the prior year (1995). However, they have not revised their 1995 Form Rs. The apparent facility errors change the percent change in recycled on-site from 1995–1996 to –1.7 percent and from 1995–1998 to 25.9 percent and total production-related waste from 1995–1996 to –5.3 percent and from 1995–1998 to +3.8 percent.*

recycling of n-hexane. On their 1996 Form Rs, these facilities also reported zero for on-site recycling of n-hexane for the prior year (1995). However, they have not revised their 1995 Form Rs. Removing their 1995 forms for n-hexane for purposes of this analysis would mean that on-site recycling rose from 7.66 billion pounds in 1995 to 9.65 billion pounds in 1996, a 25.9 percent increase. Total production-related waste would show an increase from 23.18 billion pounds in 1995 to 24.05 billion pounds in 1998, an increase of 3.8 percent.

Table 2–3 shows that quantities released on- and off-site decreased from 2.56 billion pounds in 1995 to 2.45 billion pounds in 1998. Most of this 4.2 percent reduction occurred in the first year. The quantity released on- and off-site presented in Table 2–3 is not the same as total on- and off-site releases presented in Table 2–2. As explained in Chapter 1 (see Box 1–10), the difference arises principally from the types of releases reported in different sections of TRI Form R.

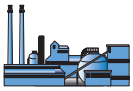


Table 2–4. TRI Transfers Off-site for Further Waste Management, 1995–1998

Transfers Off-site for Further Waste Management	1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	Change 1997–1998 Pounds	Change 1997–1998 Percent	Change 1995–1998 Pounds	Change 1995–1998 Percent
Transfers to Recycling	2,264,288,077	2,200,626,637	2,189,348,418	1,989,464,928	–199,883,490	–9.1	–274,823,149	–12.1
Transfers to Energy Recovery	518,969,202	478,301,979	507,689,578	478,821,401	–28,868,177	–5.7	–40,147,801	–7.7
Transfers to Treatment	250,844,541	226,781,151	262,423,782	251,823,538	–10,600,244	–4.0	978,997	0.4
Transfers to POTWs	250,389,543	244,511,023	272,349,506	266,724,175	–5,625,331	–2.1	16,334,632	6.5
Other Off-site Transfers*	2,510,305	1,044,503	34,528	921,574	887,046	2,569.1	–1,588,731	–63.3
Total Transfers Off-site for Further Waste Management	**3,287,001,668**	**3,151,265,293**	**3,231,845,812**	**2,987,755,616**	**–244,090,196**	**–7.6**	**–299,246,052**	**–9.1**

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

Transfers Off-site for Further Waste Management

In 1998, facilities sent 2.99 billion pounds of toxic chemicals to off-site locations for further waste management by recycling, energy recovery, or treatment (including POTWs), as shown in Table 2–4. Box 1–11 in Chapter 1 describes the types of off-site transfers analyzed in this section.

As with the waste management data, the largest category was recycling. Transfers to recycling totaled 1.99 billion pounds. As shown in Figure 2–4, this amounted to two thirds (66.6 percent) of the off-site transfers.

TRI facilities also reported sending 478.8 million pounds of toxic chemicals off-site to be burned for energy recovery. Transfers to treatment totaled 251.8 million pounds, while transfers to POTWs totaled 266.7 million pounds.

Although recycling remains by far the largest type of transfer off-site for further waste management, it declined by 12.1 percent or 274.8 million pounds from 1995 to 1998. Transfers to energy recovery decreased by 7.7 percent or 40.1 million pounds. Transfers to treatment and to POTWs both increased from 1995 to 1998, but all four types of transfers showed reductions in the last year.

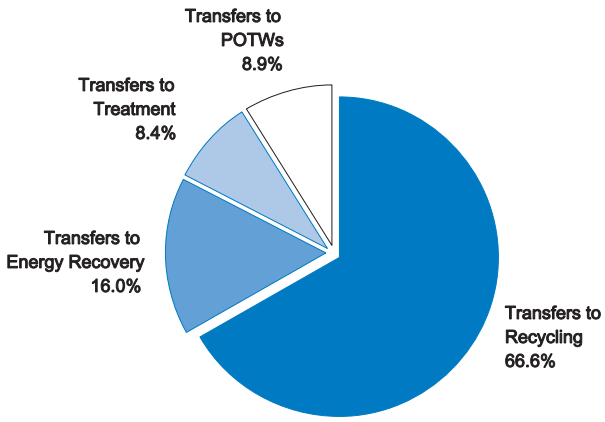
❖ TRI Data by State, 1995–1998 ❖

Tables 2–5 through 2–10 present the distribution of TRI releases and waste management by state for the original industries.

On- and Off-site Releases by State

The top states for total releases in 1998 were Texas with 262.7 million pounds, Louisiana with 175.6 million pounds, and Ohio with 153.6 million pounds (see Table 2–5). Texas also had the largest four-year reduction in releases, down 43.0 million pounds from a 1995 total of 305.6 million pounds. Louisiana's releases decreased from 1995 to 1998 by 4.7 million pounds and Ohio's by 3.7 million pounds. In percentage terms, Texas facilities decreased their releases by 14.1 percent, Louisiana by 2.6 percent, and Ohio by 2.4 percent.

Alabama facilities reported the second-largest decrease. With 115.0 million pounds



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

Figure 2–4. 1998 TRI Transfers Off-site for Further Waste Management

in 1995 and 89.5 million pounds in 1998, Alabama's reduction amounted to 25.5 million pounds. New Mexico ranked third for decreases, dropping from 45.0 million pounds in 1995 to 24.8 million pounds in 1998. Both represented substantial percentage reductions: Alabama by 22.2 percent and New Mexico by 44.9 percent.

In four states—Utah, Pennsylvania, Arizona, and Arkansas—total on- and off-site releases rose by more than 10 million pounds from 1995 to 1998. Utah facilities reported an increase of 26.4 million pounds, with a total of 106.3 million pounds in 1998. In Pennsylvania, the increase was 16.0 million pounds and the 1998 total was 145.7 million pounds. Arizona's increase of 13.9 million pounds brought that state's releases to a total of 54.3 million pounds in 1998. Arkansas facilities reported an increase of 12.0 million pounds, with a 1998 total of 50.7 million pounds. Except for Pennsylvania, which had a 12.4 percent increase, releases in each of these states (Utah, Arizona, Arkansas) rose more than 30 percent from 1995 to 1998.

On-site Releases

The three states with the largest total releases in 1998—Texas, Louisiana, and Ohio—also reported the largest on-site releases, as shown in Table 2–6.

Texas' releases totaled 244.3 million pounds, and Texas also reported the largest releases to air (110.7 million pounds) and to underground injection (88.2 million pounds). Louisiana's on-site releases totaled 173.5 million pounds. Louisiana did not rank first for any release type, but reported substantial amounts of air emissions (75.5 million pounds), surface water discharges (37.2 million pounds), and underground injection (52.8 million pounds). Ohio's total of 108.6 million pounds of on-site releases consisted primarily of air emissions (63.6 million pounds) and on-site land releases (totaling 25.8 million pounds).

Pennsylvania facilities discharged the largest amount to surface waters, with 45.5 million pounds. Arizona reported a total of 47.4 million pounds of on-site land releases, including 46.0 million pounds of other disposal, the largest amounts in both categories.

Map 2–1 presents the geographic distribution of on-site releases in 1998.

Off-site Releases

Table 2–7 supplies additional detail on the states' off-site releases. Off-site releases consist of transfers of all TRI chemicals off-site to disposal, as well as transfers of metals and metal compounds to solidification/stabilization, treatment, and POTWs. The disposal methods applied to such transfers result in some of the same types of releases

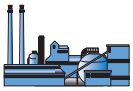


Table 2–5. TRI Total On-site and Off-site Releases by State, 1995–1998

State	Total On-site and Off-site Releases				Change 1997–1998		Change 1995–1998	
	1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	Pounds	Percent	Pounds	Percent
Alabama	115,003,067	103,332,043	94,777,907	89,519,922	–5,257,985	–5.5	–25,483,145	–22.2
Alaska	6,840,330	6,908,783	4,617,154	1,948,559	–2,668,595	–57.8	–4,891,771	–71.5
American Samoa	5,300	10,500	7,000	8,750	1,750	25.0	3,450	65.1
Arizona	40,492,953	47,549,250	31,641,811	54,346,031	22,704,220	71.8	13,853,078	34.2
Arkansas	38,742,824	42,146,898	59,618,614	50,743,995	–8,874,619	–14.9	12,001,171	31.0
California	56,312,582	53,788,702	44,677,505	42,580,329	–2,097,176	–4.7	–13,732,253	–24.4
Colorado	5,307,467	5,290,856	5,152,559	5,473,006	320,447	6.2	165,539	3.1
Connecticut	11,860,417	9,149,657	10,238,786	7,604,324	–2,634,462	–25.7	–4,256,093	–35.9
Delaware	5,520,318	4,479,297	4,180,960	5,503,568	1,322,608	31.6	–16,750	–0.3
District of Columbia	56,970	9,460	6,615	11,511	4,896	74.0	–45,459	–79.8
Florida	81,525,208	88,401,454	97,507,175	78,499,582	–19,007,593	–19.5	–3,025,626	–3.7
Georgia	61,042,615	62,192,067	72,830,528	64,867,232	–7,963,296	–10.9	3,824,617	6.3
Guam	3,100	3,000	0	0	0	—	–3,100	–100.0
Hawaii	656,692	540,267	452,405	435,831	–16,574	–3.7	–220,861	–33.6
Idaho	16,120,221	18,310,011	17,761,541	22,750,923	4,989,382	28.1	6,630,702	41.1
Illinois	120,924,965	115,330,836	127,158,423	116,483,095	–10,675,328	–8.4	–4,441,870	–3.7
Indiana	114,966,053	112,817,420	122,643,217	120,941,009	–1,702,208	–1.4	5,974,956	5.2
Iowa	38,928,564	35,407,819	34,194,004	40,100,994	5,906,990	17.3	1,172,430	3.0
Kansas	29,164,165	26,798,538	26,831,425	29,137,835	2,306,410	8.6	–26,330	–0.1
Kentucky	48,539,755	49,974,774	46,844,950	41,033,286	–5,811,664	–12.4	–7,506,469	–15.5
Louisiana	180,310,077	190,278,748	187,808,271	175,603,883	–12,204,388	–6.5	–4,706,194	–2.6
Maine	11,497,422	9,631,285	9,973,645	9,636,269	–337,376	–3.4	–1,861,153	–16.2
Maryland	18,271,418	13,336,439	14,106,599	13,251,453	–855,146	–6.1	–5,019,965	–27.5
Massachusetts	10,091,082	8,105,515	7,178,480	7,278,796	100,316	1.4	–2,812,286	–27.9
Michigan	102,920,423	94,885,669	86,381,065	83,648,982	–2,732,083	–3.2	–19,271,441	–18.7
Minnesota	24,467,157	22,075,160	20,201,397	19,870,654	–330,743	–1.6	–4,596,503	–18.8
Mississippi	61,434,085	58,207,309	66,823,769	60,520,702	–6,303,067	–9.4	–913,383	–1.5
Missouri	61,155,281	59,980,750	61,742,224	57,045,614	–4,696,610	–7.6	–4,109,667	–6.7
Montana	43,931,043	48,520,477	43,621,812	51,377,382	7,755,570	17.8	7,446,339	17.0
Nebraska	15,164,831	12,962,565	18,128,326	16,186,981	–1,941,345	–10.7	1,022,150	6.7
Nevada	3,922,022	3,798,706	4,444,713	4,204,845	–239,868	–5.4	282,823	7.2
New Hampshire	2,923,904	2,966,639	2,872,430	2,970,927	98,497	3.4	47,023	1.6
New Jersey	19,224,662	18,907,321	20,546,909	19,959,412	–587,497	–2.9	734,750	3.8
New Mexico	45,032,577	44,347,541	41,779,667	24,827,806	–16,951,861	–40.6	–20,204,771	–44.9
New York	43,490,743	37,954,432	39,491,267	35,489,850	–4,001,417	–10.1	–8,000,893	–18.4
North Carolina	96,546,219	94,878,345	85,758,466	76,800,683	–8,957,783	–10.4	–19,745,536	–20.5
North Dakota	2,932,925	2,325,812	2,422,425	2,449,976	27,551	1.1	–482,949	–16.5
Ohio	157,260,172	153,643,964	155,865,505	153,558,752	–2,306,753	–1.5	–3,701,420	–2.4
Oklahoma	30,045,985	26,546,507	24,886,232	24,397,829	–488,403	–2.0	–5,648,156	–18.8

Note: ***On-site Releases*** *are 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 2–5. TRI Total On-site and Off-site Releases by State, 1995–1998 *(continued)*

State	Total On-site and Off-site Releases				Change 1997–1998		Change 1995–1998	
	1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	Pounds	Percent	Pounds	Percent
Oregon	28,545,660	28,713,017	30,492,618	33,180,800	2,688,182	8.8	4,635,140	16.2
Pennsylvania	129,697,137	120,389,458	144,947,172	145,737,350	790,178	0.5	16,040,213	12.4
Puerto Rico	10,051,513	9,019,800	7,959,917	7,288,665	–671,252	–8.4	–2,762,848	–27.5
Rhode Island	3,409,326	2,402,424	2,207,449	1,751,380	–456,069	–20.7	–1,657,946	–48.6
South Carolina	59,417,978	58,353,270	56,823,857	59,695,616	2,871,759	5.1	277,638	0.5
South Dakota	4,186,498	3,731,672	4,218,481	3,251,231	–967,250	–22.9	–935,267	–22.3
Tennessee	110,980,496	107,014,100	106,744,974	94,907,549	–11,837,425	–11.1	–16,072,947	–14.5
Texas	305,641,800	267,670,497	262,400,508	262,681,842	281,334	0.1	–42,959,958	–14.1
Utah	79,853,420	88,118,018	103,895,386	106,252,499	2,357,113	2.3	26,399,079	33.1
Vermont	692,851	501,317	567,574	417,357	–150,217	–26.5	–275,494	–39.8
Virgin Islands	1,493,257	1,506,143	1,428,697	1,055,561	–373,136	–26.1	–437,696	–29.3
Virginia	59,952,147	58,856,804	58,378,853	56,848,332	–1,530,521	–2.6	–3,103,815	–5.2
Washington	29,992,922	29,364,350	32,185,569	32,108,843	–76,726	–0.2	2,115,921	7.1
West Virginia	32,571,087	29,333,199	25,310,249	26,185,485	875,236	3.5	–6,385,602	–19.6
Wisconsin	47,056,858	44,724,438	44,877,440	43,780,692	–1,096,748	–2.4	–3,276,166	–7.0
Wyoming	11,354,542	9,790,124	9,357,659	9,437,664	80,005	0.9	–1,916,878	–16.9
Total	**2,637,533,086**	**2,545,283,447**	**2,586,972,184**	**884,580,866**	**–91,320,740**	**–3.5**	**–141,881,642**	**–5.4**

Note: ***On-site Releases*** *are 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.*

as those facilities report on-site. Pennsylvania facilities reported 59.5 million pounds of off-site releases in 1998, more than in any other state. Indiana ranked second with 50.6 million pounds, followed by Ohio with 45.0 million pounds.

Off-site releases constituted less than half of total releases in all states and territories. Michigan had the highest proportion of off-site releases, 36.6 million pounds of an 83.6-million-pound total releases, or 43.7 percent (see Table 2–6).

Landfills/disposal surface impoundments received the largest amount of off-site releases in 1998 (232.7 million pounds for all states, of the 449.0-million-pound total). Pennsylvania facilities sent 44.2 million pounds to disposal in landfills/surface impoundments. Michigan ranked second in this category with 33.8 million pounds, and Ohio's 25.7 million pounds ranked third.

Off-site releases of metals and metal compounds included 136.0 million pounds sent to solidification/stabilization, 4.2 million pounds in wastewater sent to treatment, and 3.0 million pounds sent to POTWs. Indiana facilities transferred 24.6 million pounds of metals to solidification/stabilization, the largest amount of any state. Arkansas ranked second with 15.7 million pounds, and Illinois ranked third with 12.0 million pounds.

Transfers Within and Among States

Off-site Releases

TRI facilities report the specific off-site locations to which they are transferring TRI chemicals. Table 2–8 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 in 1998 occurred in Pennsylvania, with 40.3 million pounds. Ohio received the largest amount of such transfers—46.4 million pounds—from facilities located in other states. Pennsylvania also shipped the largest amount—19.2 million pounds—of TRI chemicals to disposal to locations outside 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 in the state. Releases in Texas totaled 264.6 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 189.5 million pounds and Louisiana ranked third with 178.7 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 (275.2 million pounds). A total of 173.8 million pounds was sent by facilities in one state to locations in another.

Map 2–1. TRI On-site Releases, 1998

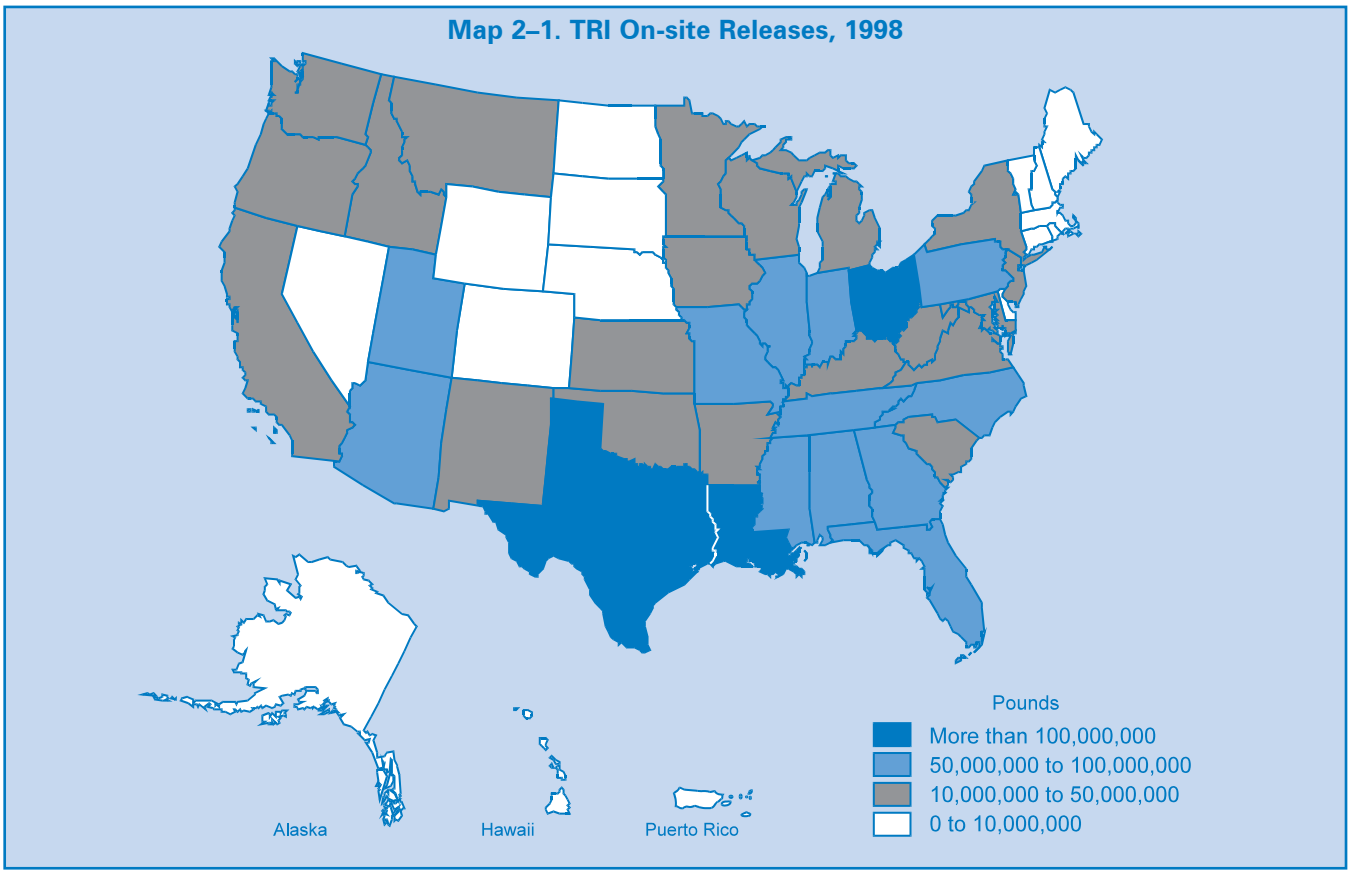


Table 2–6. TRI On-site and Off-site Releases by State, 1998

State	Total Forms Number	On-site Releases			
		Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection	
				Class I Wells Pounds	Class II–V Wells Pounds
Alabama	2,015	54,160,590	4,810,219	0	5
Alaska	30	1,838,917	96,428	0	256
American Samoa	1	8,750	0	0	0
Arizona	542	5,840,821	5,038	4	0
Arkansas	1,280	25,858,289	1,820,349	1,172,182	5
California	3,787	26,782,830	3,854,111	0	81,905
Colorado	469	2,987,059	996,480	0	0
Connecticut	843	4,813,164	600,326	0	0
Delaware	266	4,238,492	747,352	0	0
District of Columbia	5	2,700	6	0	0
Florida	1,308	31,915,108	2,049,041	27,473,112	0
Georgia	2,356	46,621,812	6,288,967	0	0
Hawaii	57	376,116	2,057	0	3,849
Idaho	209	6,250,363	5,575,048	0	0
Illinois	4,253	58,775,372	6,264,554	250	0
Indiana	3,344	52,797,207	2,117,917	1,039,913	0
Iowa	1,249	25,575,473	3,118,336	0	0
Kansas	896	19,492,825	620,344	1,350,665	0
Kentucky	1,604	30,707,376	613,048	0	0
Louisiana	2,202	75,490,120	37,153,990	52,845,038	0
Maine	306	6,521,208	1,096,895	0	0
Maryland	580	8,213,866	2,375,596	0	0
Massachusetts	1,255	4,838,904	51,598	0	0
Michigan	3,228	40,997,059	483,956	3,431,059	0
Minnesota	1,290	15,904,943	812,176	0	0
Mississippi	1,088	35,436,941	11,383,390	6,892,506	0
Missouri	1,847	30,206,648	2,528,218	0	0
Montana	160	4,190,212	94,176	0	0
Nebraska	494	6,338,728	2,487,238	0	0
Nevada	121	1,750,522	0	0	0
New Hampshire	309	2,298,511	127,630	0	0
New Jersey	1,957	9,330,070	6,132,478	2	0
New Mexico	168	1,531,690	12,508	0	0
New York	1,897	21,867,773	7,873,875	500	0
North Carolina	2,462	44,780,426	7,294,815	29,100	0
North Dakota	92	2,255,973	43,280	0	0
Ohio	5,263	63,602,506	5,778,926	13,329,724	0
Oklahoma	908	16,867,200	751,512	3,318,269	0

Note: ***On-site Releases*** *are 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.*

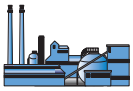


Table 2–6. TRI On-site and Off-site Releases by State, 1998 *(continued)*

State	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills Pounds	Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Alabama	718,739	10,417,563	87,932	781,474	57,657	71,034,179	18,485,743	89,519,922
Alaska	0	0	0	0	1,872	1,937,473	11,086	1,948,559
American Samoa	0	0	0	0	0	8,750	0	8,750
Arizona	4,554	31,940	20,206	1,312,298	46,027,367	53,242,228	1,103,803	54,346,031
Arkansas	169,622	854,230	37,332	1,189,389	10,163	31,111,561	19,632,434	50,743,995
California	17,224	770,311	355,774	216,933	501,243	32,580,331	9,999,998	42,580,329
Colorado	0	25,100	15,643	5,829	16,249	4,046,360	1,426,646	5,473,006
Connecticut	0	36,902	0	32	9	5,450,433	2,153,891	7,604,324
Delaware	250	42,153	61,456	243,290	38	5,333,031	170,537	5,503,568
District of Columbia	0	0	0	0	8,800	11,506	5	11,511
Florida	2,064	57,368	1,010,952	7,218,982	6,264,827	75,991,454	2,508,128	78,499,582
Georgia	238,189	469,821	258,058	1,048,537	157,711	55,083,095	9,784,137	64,867,232
Hawaii	0	0	33,135	0	499	415,656	20,175	435,831
Idaho	0	126,811	301,155	5,530,403	4,706,041	22,489,821	261,102	22,750,923
Illinois	9,286,090	9,375,254	50,505	731,934	244,680	84,728,639	31,754,456	116,483,095
Indiana	1,172,555	13,212,433	4,662	0	32,071	70,376,758	50,564,251	120,941,009
Iowa	336,491	1,648,641	2,324	2,452	292,091	30,975,808	9,125,186	40,100,994
Kansas	292	1,036,547	49,246	1,400	22,040	22,573,359	6,564,476	29,137,835
Kentucky	485,532	2,713,054	9,155	18,000	72,255	34,618,420	6,414,866	41,033,286
Louisiana	782	6,128,373	21,916	1,672,302	182,059	173,494,580	2,109,303	175,603,883
Maine	155,561	639,211	0	5,322	61,415	8,479,612	1,156,657	9,636,269
Maryland	0	1,698,300	102,257	184,736	9,225	12,583,980	667,473	13,251,453
Massachusetts	0	1,529	0	0	2,768	4,894,799	2,383,997	7,278,796
Michigan	86,194	2,058,960	8,537	0	4,566	47,070,331	36,578,651	83,648,982
Minnesota	1,069	167,405	81,572	35,973	1,503	17,004,641	2,866,013	19,870,654
Mississippi	6,703	720,092	3,356	4,476,760	302,394	59,222,142	1,298,560	60,520,702
Missouri	75,750	505,227	336,815	0	18,908,894	52,561,552	4,484,062	57,045,614
Montana	2,298	0	440	13,175	42,230,856	46,531,157	4,846,225	51,377,382
Nebraska	3	5,076	508,034	41,126	21,355	9,401,560	6,785,421	16,186,981
Nevada	0	2,377,138	0	44,331	0	4,171,991	32,854	4,204,845
New Hampshire	0	77,427	0	3,400	1,260	2,508,228	462,699	2,970,927
New Jersey	71,759	236,674	655	1,024	32,422	15,805,084	4,154,328	19,959,412
New Mexico	0	3,053	635,642	560,705	21,975,087	24,718,685	109,121	24,827,806
New York	14,688	93,666	25,508	4,948	998	29,881,956	5,607,894	35,489,850
North Carolina	1,335	7,103,498	93,727	11,430,333	14,501	70,747,735	6,052,948	76,800,683
North Dakota	0	6	750	1,750	0	2,301,759	148,217	2,449,976
Ohio	1,378,051	14,464,047	108	9,945,746	57,288	108,556,396	45,002,356	153,558,752
Oklahoma	525,142	159,917	938	6,767	22,332	21,652,077	2,745,752	24,397,829

Note: On-site Releases *are 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 2–6. TRI On-site and Off-site Releases by State, 1998 *(continued)*

State	Total Forms Number	On-site Releases			
		Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II–V Wells Pounds
Oregon	766	16,266,446	2,573,110	0	0
Pennsylvania	4,086	38,602,369	45,483,216	0	0
Puerto Rico	440	6,504,721	128,874	0	0
Rhode Island	331	1,433,349	1,465	0	0
South Carolina	1,781	43,284,655	3,343,152	0	0
South Dakota	150	2,314,440	808,061	0	0
Tennessee	2,078	77,905,764	1,442,948	3,816,300	0
Texas	5,961	110,705,485	25,158,641	88,189,920	8,000
Utah	486	61,208,838	1,131,818	0	0
Vermont	77	189,210	151,374	0	0
Virgin Islands	25	1,016,014	37,903	0	0
Virginia	1,394	45,297,883	2,561,850	0	0
Washington	957	21,604,993	3,497,496	0	0
West Virginia	695	12,404,749	7,266,259	20	0
Wisconsin	2,560	25,035,473	3,711,391	0	0
Wyoming	145	1,708,858	6,325	7,656,300	505
Total	**72,073**	**1,256,949,811**	**223,365,761**	**210,544,864**	**94,525**

***Note: On-site Releases** are 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.*

Transfers Off-site for Further Waste Management

States reported larger amounts of transfers off-site for further waste management sent to other states than transferred within the state. Nationwide, transfers from one state to another for further waste management totaled 1.67 billion pounds, while transfers within the state totaled 1.32 billion pounds, as shown in Table 2–9. These transfers off-site for further waste management include transfers to recycling, energy recovery, and treatment.

The largest transfers for further waste management within a state were reported in Texas, with 222.8 million pounds. Illinois was the largest recipient state, with 166.0 million pounds, closely followed by Indiana with 165.4 million pounds. Ohio ranked first for amounts transferred out of state for further waste management with 140.2 million pounds.

Accounting for the movement of transfers 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 314.9 million pounds in 1998. Indiana and Ohio followed with 256.6 million pounds and 255.5 million pounds respectively.

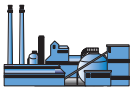


Table 2–6. TRI On-site and Off-site Releases by State, 1998 *(continued)*

State	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills (Pounds)	Other Landfills (Pounds)	Land Treatment (Pounds)	Surface Impoundments (Pounds)	Other Disposal (Pounds)	Total On-site Releases (Pounds)	Off-site Releases: Transfers Off-site to Disposal (Pounds)	Total On-and Off-site Releases (Pounds)
Oregon	24,997	622,908	101,339	0	1,803,256	21,392,056	11,788,744	33,180,800
Pennsylvania	95,834	1,715,648	91,755	196,523	51,823	86,237,168	59,500,182	145,737,350
Puerto Rico	250	1,261	0	0	8,046	6,643,152	645,513	7,288,665
Rhode Island	0	0	0	0	505	1,435,319	316,061	1,751,380
South Carolina	35,750	1,491,150	3,108	295,699	191,072	48,644,586	11,051,030	59,695,616
South Dakota	0	250	0	0	13,557	3,136,308	114,923	3,251,231
Tennessee	137,682	3,594,950	20,376	143,342	57,320	87,118,682	7,788,867	94,907,549
Texas	167,524	3,666,684	342,305	15,484,880	576,238	244,299,677	18,382,165	262,681,842
Utah	11,158	8,629,720	119,748	27,351,971	35,561	98,488,814	7,763,685	106,252,499
Vermont	0	750	0	0	255	341,589	75,768	417,357
Virgin Islands	0	0	459	1,043	0	1,055,419	142	1,055,561
Virginia	104,229	1,508,973	1,339	25	2,786	49,477,085	7,371,247	56,848,332
Washington	255	102,176	219,401	1,000	21,383	25,446,704	6,662,139	32,108,843
West Virginia	10,036	10,132	274	19,000	4,115	19,714,585	6,470,900	26,185,485
Wisconsin	842	1,126,558	191,209	7,982	115,472	30,188,927	13,591,765	43,780,692
Wyoming	0	1,460	1,500	6,655	31,034	9,412,637	25,027	9,437,664
Total	**15,339,494**	**99,730,347**	**5,210,603**	**90,237,471**	**145,156,959**	**2,046,629,835**	**449,021,609**	**2,495,651,444**

Note: On-site Releases *are 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.*

Management of TRI Chemicals in Waste by State

Texas ranked first among states and territories for total production-related waste managed in 1998, with 4.00 billion pounds, as shown in Table 2–10. Louisiana ranked second with 2.32 billion pounds. Ranking third, Illinois reported 1.80 billion pounds. No other state reported more than 1 billion pounds. Map 2–2 presents the geographic distribution of production-related waste managed in 1998.

The states with the largest quantities released on- and off-site were Texas, ranking first with 261.7 million pounds; Louisiana, second with 174.8 million pounds; and Ohio, third with 148.7 million pounds.

Texas also ranked first for energy recovery (829.3 million pounds on-site and 87.8 million pounds off-site) and treatment (1.46 billion pounds on-site and 95.3 million pounds off-site) and second for on-site recycling (1.12 billion pounds). Illinois facilities reported the largest quantity of on-site recycling, 1.33 billion pounds. The largest quantity of off-site recycling, 197.2 million pounds, was reported in Indiana.

Louisiana ranked second in two on-site waste management categories, with 880.4 million pounds in treatment and 337.9 million pounds in energy recovery. With 844.9 million pounds in on-site recycling, Louisiana ranked third in that category.

Table 2–7. TRI Off-site Releases (Transfers Off-site to Disposal), 1998

State	Storage Only[a] Pounds	Solidification/ Stabilization Metals Only[b] Pounds	Wastewater Treatment (excluding POTWs) Metals Only[c] Pounds	Transfers to POTWs Metals Only[d] Pounds	Underground Injection Pounds
Alabama	5,750,834	1,423,711	40,759	40,413	951,976
Alaska	0	0	0	0	0
American Samoa	0	0	0	0	0
Arizona	190,648	465,498	265	6,047	0
Arkansas	93,895	15,692,320	1,931	21,895	386,763
California	75,035	1,283,452	102,367	115,447	83,064
Colorado	690	65,453	364,652	2,621	0
Connecticut	26,245	422,878	113,342	8,859	0
Delaware	0	8,126	21,554	11,332	75,234
District of Columbia	0	0	0	0	0
Florida	59,506	464,753	99,218	13,659	211,534
Georgia	59,593	7,801,654	58,567	70,047	4,526
Hawaii	0	0	0	0	0
Idaho	193,800	29,797	130	472	0
Illinois	814,118	12,010,647	136,849	729,528	1,719,417
Indiana	961,353	24,587,107	434,530	162,462	554,106
Iowa	21,674	5,065,971	805	256,579	142,525
Kansas	15,876	234,531	8,805	41,380	3,466,081
Kentucky	222,634	1,454,391	408,258	46,435	35,227
Louisiana	28,333	152,847	1,909	897	244,583
Maine	12,091	28,756	1,563	57,292	0
Maryland	402	128,214	2,194	65,973	0
Massachusetts	65,602	342,594	39,830	23,331	0
Michigan	22,885	1,531,600	290,803	132,499	21,642
Minnesota	5	69,492	524	134,379	0
Mississippi	77,177	267,456	582	8,291	128,355
Missouri	299,547	146,342	31,427	130,507	54,907

Note: 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.*

[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 1–5.*

[b] *Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment 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 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.*

[c] *Beginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste treatment code M61) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste treatment code M60). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 1–6. Transfers of metals and metal compounds reported under code M60 have been included in transfers of metals metal compounds to wastewater treatment.*

[d] *Reported 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.*

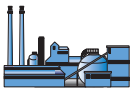


Table 2–7. TRI Off-site Releases (Transfers Off-site to Disposal), 1998 *(continued)*

State	Landfills/ Disposal Surface Impoundment Pounds	Land Treatment Pounds	Other Land Disposal Pounds	Other Off-site Management Pounds	Transfers to Waste Broker for Disposal Pounds	Unknown[e] Pounds	Total Off-site Releases: Transfers Off-site to Disposal Pounds
Alabama	3,838,838	24,467	2,310,739	3,804,990	40,077	258,939	18,485,743
Alaska	10,836	0	0	0	250	0	11,086
American Samoa	0	0	0	0	0	0	0
Arizona	315,516	0	78,631	4,849	37,564	4,785	1,103,803
Arkansas	3,202,126	2,757	7,595	20,721	88,460	113,971	19,632,434
California	7,605,638	5,010	75,827	60,675	490,104	103,379	9,999,998
Colorado	905,108	752	0	0	53,619	33,751	1,426,646
Connecticut	1,132,169	48,750	185,984	95,731	70,625	49,308	2,153,891
Delaware	53,564	0	0	318	67	342	170,537
District of Columbia	0	0	0	0	5	0	5
Florida	1,024,478	56,965	21,583	393,931	149,359	13,142	2,508,128
Georgia	1,559,533	52,986	7,322	38,171	86,240	45,498	9,784,137
Hawaii	18,075	0	0	0	2,100	0	20,175
Idaho	19,970	0	9,379	250	5,309	1,995	261,102
Illinois	11,556,412	16,845	303,903	234,650	4,019,800	212,287	31,754,456
Indiana	21,741,244	4,674	974,598	143,977	249,525	750,675	50,564,251
Iowa	2,744,094	46,191	325,868	174,217	46,832	300,430	9,125,186
Kansas	2,510,922	3,550	133,299	64,055	64,023	21,954	6,564,476
Kentucky	4,034,437	0	5,716	7,295	86,391	114,082	6,414,866
Louisiana	1,604,080	17,284	1,420	26,166	28,695	3,089	2,109,303
Maine	896,732	11,555	127,276	10,800	10,342	250	1,156,657
Maryland	245,735	780	163,699	24,873	18,711	16,892	667,473
Massachusetts	755,763	9,470	912,906	35,653	173,255	25,593	2,383,997
Michigan	33,829,665	7,305	110,118	272,633	310,932	48,569	36,578,651
Minnesota	2,527,674	25,087	841	29,743	56,263	22,005	2,866,013
Mississippi	755,683	16,720	23,493	2,587	14,760	3,456	1,298,560
Missouri	3,177,293	1,390	188,421	6,916	411,760	35,552	4,484,062

Note: 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.*
[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).*

Table 2–7. TRI Off-site Releases (Transfers Off-site to Disposal), 1998 *(continued)*

State	Storage Only[a] Pounds	Solidification/ Stabilization Metals Only[b] Pounds	Wastewater Treatment (excluding POTWs) Metals Only[c] Pounds	Transfers to POTWs Metals Only[d] Pounds	Underground Injection Pounds
Montana	0	0	0	255	11,321
Nebraska	0	3,665,020	750	12,962	0
Nevada	482	270	0	2	0
New Hampshire	19,672	98,503	843	3,787	0
New Jersey	185,404	1,896,934	65,453	47,427	8,197
New Mexico	0	30,123	0	409	0
New York	419,915	824,827	262,076	147,138	17,000
North Carolina	28,412	1,240,260	25,530	26,887	2,000
North Dakota	0	0	220	17	266
Ohio	47,035	8,619,590	172,400	321,551	570,560
Oklahoma	1,543	110,847	44,951	13,591	114,626
Oregon	5,654	10,253,608	0	6,698	0
Pennsylvania	242,861	10,893,615	1,128,904	78,220	314,599
Puerto Rico	57,744	5,910	1	2,379	0
Rhode Island	18,207	38,089	4,318	11,410	0
South Carolina	13,701	6,701,514	45,128	43,438	57,964
South Dakota	0	0	0	1,317	0
Tennessee	221,923	2,031,499	24,188	49,617	43,708
Texas	347,951	2,374,724	30,361	47,851	7,112,441
Utah	93,071	7,018,976	260	2,581	0
Vermont	2,000	23,181	4	525	0
Virgin Islands	0	1	0	0	0
Virginia	936,663	368,710	37,849	57,514	148,150
Washington	96,320	4,408,187	9,995	2,700	0
West Virginia	0	306,650	66,041	4,405	0
Wisconsin	19,102	1,388,767	145,588	82,928	750
Wyoming	0	0	0	20	0
Total	**11,749,603**	**135,977,395**	**4,225,724**	**3,045,974**	**16,481,522**

Note: 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.*

[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 1–5.*

[b]*Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment 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 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.*

[c]*Beginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste treatment code M61) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste treatment code M60). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 1–6. Transfers of metals and metal compounds reported under code M60 have been included in transfers of metals metal compounds to wastewater treatment.*

[d]*Reported 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.*

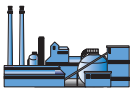


Table 2–7. TRI Off-site Releases (Transfers Off-site to Disposal), 1998 *(continued)*

State	Landfills/ Disposal Surface Impoundment Pounds	Land Treatment Pounds	Other Land Disposal Pounds	Other Off-site Management Pounds	Transfers to Waste Broker for Disposal Pounds	Unknown[e] Pounds	Total Off-site Releases Transfers Off-site to Disposal Pounds
Montana	4,834,649	0	0	0	0	0	4,846,225
Nebraska	657,053	222,487	29,209	31,056	2,166,884	0	6,785,421
Nevada	23,288	0	0	250	8,562	0	32,854
New Hampshire	100,842	0	1,636	22,652	192,147	22,617	462,699
New Jersey	1,482,927	24,505	279,445	45,112	79,589	39,335	4,154,328
New Mexico	32,501	0	0	255	662	45,171	109,121
New York	3,122,740	7,334	362,375	139,899	44,877	259,713	5,607,894
North Carolina	3,625,867	79,108	113,414	46,255	719,249	145,966	6,052,948
North Dakota	147,686	0	27	1	0	0	148,217
Ohio	25,708,283	20,842	5,877,443	3,140,565	409,965	114,122	45,002,356
Oklahoma	2,345,962	1,935	786	77,971	11,270	22,270	2,745,752
Oregon	1,258,019	10,645	230,988	15,945	7,187	0	11,788,744
Pennsylvania	44,174,443	187,313	256,469	182,682	1,201,036	840,040	59,500,182
Puerto Rico	313,916	0	211,327	21,226	0	33,010	645,513
Rhode Island	175,154	0	15,477	0	30,277	23,129	316,061
South Carolina	3,238,675	47,401	387,861	67,571	441,934	5,843	11,051,030
South Dakota	75,482	3,019	0	0	35,105	0	114,923
Tennessee	4,958,964	2,004	3,297	305,360	135,659	12,648	7,788,867
Texas	7,193,722	212,511	699,589	102,006	194,548	66,461	18,382,165
Utah	573,582	2,155	0	8,306	15	64,739	7,763,685
Vermont	37,953	8,300	0	2,500	1,305	0	75,768
Virgin Islands	141	0	0	0	0	0	142
Virginia	4,560,696	8,231	31,300	13,927	1,207,110	1,097	7,371,247
Washington	1,369,858	63,730	567,462	13,982	81,000	48,905	6,662,139
West Virginia	6,052,576	0	16,049	22,649	2,530	0	6,470,900
Wisconsin	10,583,176	72,898	544,807	160,163	566,382	27,204	13,591,765
Wyoming	25,007	0	0	0	0	0	25,027
Total	**232,738,747**	**1,326,956**	**15,597,579**	**9,873,534**	**14,052,361**	**3,952,214**	**449,021,609**

Note: 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.*
[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).*

Table 2–8. TRI Releases in the State and Transferred Out of State, 1998

State	Releases in the State			Total Releases in the State*	Transferred Out of State
	Total On-site Releases Pounds	Transferred Within State Pounds	Transferred Into State Pounds	Pounds	Pounds
Alabama	71,034,179	9,664,312	4,910,070	85,608,561	8,821,431
Alaska	1,937,473	0	3	1,937,476	11,086
American Samoa	8,750	0	0	8,750	0
Arizona	53,242,228	321,962	380,903	53,945,093	781,841
Arkansas	31,111,561	2,922,135	513,987	34,547,683	16,710,299
California	32,580,331	4,742,896	453,608	37,776,835	5,257,102
Colorado	4,046,360	871,789	28,183	4,946,332	554,857
Connecticut	5,450,433	1,127,700	256,344	6,834,477	1,026,191
Delaware	5,333,031	79,744	672,275	6,085,050	90,793
District of Columbia	11,506	0	795	12,301	5
Florida	75,991,454	1,345,282	79,152	77,415,888	1,162,846
Georgia	55,083,095	1,477,656	427,831	56,988,582	8,306,481
Hawaii	415,656	2,742	0	418,398	17,433
Idaho	22,489,821	31,893	23,870,168	46,391,882	229,209
Illinois	84,728,639	23,258,581	18,258,911	126,246,131	8,495,875
Indiana	70,376,758	34,653,852	2,422,572	107,453,182	15,910,399
Iowa	30,975,808	1,326,254	88,643	32,390,705	7,798,932
Kansas	22,573,359	2,544,834	101,114	25,219,307	4,019,642
Kentucky	34,618,420	3,394,833	1,295,627	39,308,880	3,020,033
Louisiana	173,494,580	1,445,221	3,796,033	178,735,834	664,082
Maine	8,479,612	973,141	43,053	9,495,806	183,516
Maryland	12,583,980	260,540	123,159	12,967,679	406,933
Massachusetts	4,894,799	614,590	297,814	5,807,203	1,769,407
Michigan	47,070,331	34,348,007	15,468,149	96,886,487	2,230,644
Minnesota	17,004,641	932,353	150,799	18,087,793	1,933,660
Mississippi	59,222,142	774,513	377,165	60,373,820	524,047
Missouri	52,561,552	3,519,468	290,659	56,371,679	964,594
Montana	46,531,157	295	8,300	46,539,752	4,845,930
Nebraska	9,401,560	3,559,764	658,944	13,620,268	3,225,657
Nevada	4,171,991	23,124	4,646,119	8,841,234	9,730
New Hampshire	2,508,228	170,980	293,519	2,972,727	291,719
New Jersey	15,805,084	2,401,920	1,296,800	19,503,804	1,752,408
New Mexico	24,718,685	58,231	0	24,776,916	50,890
New York	29,881,956	3,547,449	6,353,271	39,782,676	2,060,445
North Carolina	70,747,735	4,114,067	543,690	75,405,492	1,938,881
North Dakota	2,301,759	144,830	33,606	2,480,195	3,387
Ohio	108,556,396	34,539,239	46,425,718	189,521,353	10,463,117
Oklahoma	21,652,077	1,974,914	3,368,017	26,995,008	770,838
Oregon	21,392,056	1,415,533	1,794,359	24,601,948	10,373,211
Pennsylvania	86,237,168	40,327,740	6,886,111	133,451,019	19,172,442

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

Table 2–8. TRI Releases in the State and Transferred Out of State, 1998 *(continued)*

State	Releases in the State: Total On-site Releases Pounds	Releases in the State: Transferred Within State Pounds	Releases in the State: Transferred Into State Pounds	Total Releases in the State* Pounds	Transferred Out of State Pounds
Puerto Rico	6,643,152	608,267	4	7,251,423	37,246
Rhode Island	1,435,319	101,252	272,957	1,809,528	214,809
South Carolina	48,644,586	4,836,247	2,080,156	55,560,989	6,214,783
South Dakota	3,136,308	114,417	0	3,250,725	506
Tennessee	87,118,682	5,079,229	444,997	92,642,908	2,709,638
Texas	244,299,677	13,633,531	6,696,858	264,630,066	4,748,634
Utah	98,488,814	4,926,115	7,725,461	111,140,390	2,837,570
Vermont	341,589	15,675	9,886	367,150	60,093
Virgin Islands	1,055,419	0	0	1,055,419	142
Virginia	49,477,085	5,430,013	115,430	55,022,528	1,941,234
Washington	25,446,704	799,893	12,921	26,259,518	5,862,246
West Virginia	19,714,585	4,768,427	462,010	24,945,022	1,702,473
Wisconsin	30,188,927	12,001,667	2,935,904	45,126,498	1,590,098
Wyoming	9,412,637	5,813	0	9,418,450	19,214
Other**	0	0	6,416,624	6,416,624	0
Total	**2,046,629,835**	**275,232,930**	**173,788,679**	**2,495,651,444**	**173,788,679**

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

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

Map 2–2. TRI Production-related Waste Managed, 1998

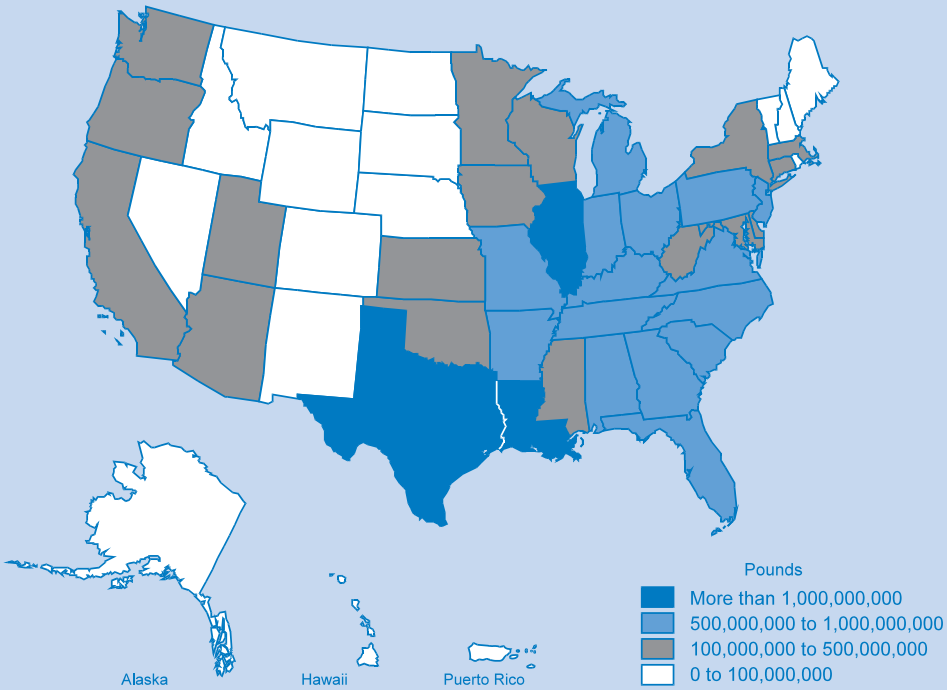


Table 2–9. TRI Transfers Off-site for Further Waste Management Among and Within State, 1998

State	Transferred Within or Into State		Total Transferred Within and Into State	Transferred Out of State
	Transferred Within State Pounds	Transferred into State Pounds	Pounds	Pounds
Alabama	16,429,716	53,729,752	70,159,468	40,778,206
Alaska	0	68,884	68,884	32,302
American Samoa	0	1,264,125	1,264,125	0
Arizona	11,361,638	15,267,726	26,629,364	21,949,772
Arkansas	11,663,311	36,758,670	48,421,981	41,470,668
California	78,101,869	39,672,275	117,774,144	23,936,355
Colorado	7,947,270	779,131	8,726,401	19,415,737
Connecticut	11,576,700	66,061,499	77,638,199	18,032,956
Delaware	3,378,145	1,246,830	4,624,975	14,048,745
District of Columbia	5,700	1,300	7,000	7,300
Florida	16,989,065	4,672,396	21,661,461	17,336,484
Georgia	12,267,500	6,687,358	18,954,858	59,754,421
Hawaii	10,633	6,300	16,933	103,637
Idaho	1,129,792	271,974	1,401,766	1,988,639
Illinois	50,147,392	166,029,409	216,176,801	80,085,860
Indiana	91,171,443	165,406,010	256,577,453	115,890,037
Iowa	18,283,621	26,188,559	44,472,180	47,130,636
Kansas	6,836,846	7,171,940	14,008,786	57,938,070
Kentucky	15,105,173	12,875,512	27,980,685	52,604,432
Louisiana	38,955,984	29,838,571	68,794,555	39,324,481
Maine	767,097	2,386	769,483	2,041,256
Maryland	5,529,304	14,831,506	20,360,810	9,056,766
Massachusetts	19,097,094	3,140,813	22,237,907	22,958,253
Michigan	119,205,892	92,541,974	211,747,866	100,786,776
Minnesota	20,642,041	19,661,370	40,303,411	14,234,087
Mississippi	4,948,305	3,112,097	8,060,402	20,000,640
Missouri	39,577,714	107,364,122	146,941,836	41,984,172
Montana	62,046	3,764,496	3,826,542	71,799
Nebraska	3,574,224	6,393,743	9,967,967	21,702,168
Nevada	70,946	778,213	849,159	1,549,725
New Hampshire	2,526,927	47,667	2,574,594	14,427,339
New Jersey	41,998,938	59,807,562	101,806,500	49,710,382
New Mexico	325,259	376,377	701,636	1,037,661
New York	25,047,527	55,697,575	80,745,102	75,148,237
North Carolina	21,333,817	16,684,948	38,018,765	78,152,170
North Dakota	1,214,737	301	1,215,038	112,632
Ohio	108,909,808	146,549,648	255,459,456	140,233,311
Oklahoma	5,840,956	2,104,359	7,945,315	21,516,257

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

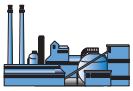


Table 2–9. TRI Transfers Off-site for Further Waste Management Among and Within State, 1998 *(continued)*

State	Transferred Within or Into State		Total Transferred Within and Into State	Transferred Out of State
	Transferred Within State Pounds	Transferred into State Pounds	Pounds	Pounds
Oregon	21,595,319	1,025,840	22,621,159	10,345,130
Pennsylvania	112,735,865	140,721,580	253,457,445	66,304,282
Puerto Rico	23,612,537	0	23,612,537	10,733,784
Rhode Island	603,721	2,436,889	3,040,610	11,581,223
South Carolina	27,649,767	46,280,817	73,930,584	48,980,456
South Dakota	1,400,212	0	1,400,212	1,087,109
Tennessee	24,568,231	36,391,552	60,959,783	55,337,655
Texas	222,844,899	92,083,753	314,928,652	101,541,111
Utah	1,464,381	2,856,569	4,320,950	2,312,828
Vermont	268,498	17,742	286,240	873,135
Virgin Islands	0	0	0	536,305
Virginia	19,050,760	15,730,969	34,781,729	23,405,452
Washington	5,962,438	2,822,972	8,785,410	4,798,657
West Virginia	3,911,165	18,246,460	22,157,625	18,126,598
Wisconsin	40,825,743	20,293,026	61,118,769	45,841,966
Wyoming	284	177,040	177,324	115,379
Other*	0	122,541,476	122,541,476	753,927
Total	**1,318,528,250**	**1,668,484,063**	**2,987,012,313**	**1,668,484,063**

***Note: Transfers Off-site for Further Waste Management** are from Section 6 (excluding transfers off-site to disposal) of Form R.*
**Other includes waste sent to other countries, to sites not identified by the reporting facility and transfers to POTWs in more than one state.*

Ohio ranked second in one type of waste management activity, off-site recycling with 183.1 million pounds, and third in off-site energy recovery (35.6 million pounds) and off-site treatment (34.8 million pounds).

❖ TRI Releases, 1988–1998 ❖

As noted in **Making Year-to-Year Comparisons of TRI Data** in Chapter 1, comparisons of TRI data across years must be based on a consistent set of chemicals and industries. Tables in this section address only data for the chemicals that were reportable in all years 1988 through 1998. Because reporting requirements for ammonia, hydrochloric acid, and sulfuric acid changed during that period, these substances are not included in the 1988–1998 analyses. Reporting by facilities in the industries added to TRI beginning in 1998 is also not included here.

Table 2–11 compares TRI on-site and off-site releases for 1988 and 1995 to 1998. For the chemicals reportable in all years, total releases decreased from 3.40 billion pounds in 1988 to 1.86 billion pounds in 1998, a 45.4 percent reduction. At the same time, the number of forms submitted decreased by 4.1 percent.

On-site releases fell by more than half (51.9 percent), from 2.97 billion pounds in 1988 to 1.43 billion pounds in 1998. All release categories decreased. As shown in Figure 2–5 most of the overall reduction occurred in air emissions, a decrease of 1.26 billion

Table 2–10. Quantities of TRI Chemicals in Waste by State, 1998

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	293,178,514	37,396,496	65,522,981	11,172,203	284,398,610	13,390,960	78,418,482	783,478,246	233,142
Alaska	29,841	26,770	450,000	4,979	1,535,357	832	1,951,419	3,999,198	7,656
American Samoa	0	0	0	0	0	0	8,750	8,750	0
Arizona	83,318,075	29,357,820	603,220	1,118,310	9,462,416	3,293,116	54,472,730	181,625,687	29,476
Arkansas	307,082,125	45,083,148	31,483,664	6,312,538	120,250,468	1,540,244	47,275,247	559,027,434	4,106,494
California	41,450,940	79,640,702	27,993,472	10,022,282	77,512,667	20,306,906	43,049,212	299,976,181	175,937
Colorado	15,020,295	19,227,144	392,668	4,745,334	6,941,988	3,280,735	5,249,439	54,857,603	82,863
Connecticut	94,526,224	19,528,393	3,070,165	2,305,077	44,169,482	8,793,271	6,841,765	179,234,377	62,444
Delaware	34,449,054	11,979,531	16,155,665	1,496,321	66,770,660	3,953,988	5,490,957	140,296,176	8,305
District of Columbia	0	7,000	0	0	300	5,700	11,512	24,512	0
Florida	706,626,708	21,487,365	15,126,614	3,637,599	108,998,283	9,037,205	76,662,033	941,575,807	50,634
Georgia	280,851,010	53,769,200	45,242,232	11,927,123	174,892,589	7,366,156	64,208,570	638,256,880	65,965
Hawaii	0	110,652	0	1,139	3,568,243	2,468	435,396	4,117,898	0
Idaho	3,568,753	2,119,253	31,000	158,899	22,561,924	796,900	22,762,659	51,999,388	3,148
Illinois	1,327,391,943	91,148,220	43,023,655	24,961,812	186,856,266	16,836,814	111,580,789	1,801,799,499	199,733
Indiana	164,005,314	197,221,070	149,035,099	12,679,271	135,790,062	16,302,192	119,296,537	794,329,545	297,556
Iowa	187,987,387	51,296,173	1,302,522	3,698,314	44,900,575	11,046,771	38,189,865	338,421,607	1,232,058
Kansas	126,542,458	59,430,708	105,332,327	3,791,045	13,754,125	5,081,096	25,583,848	339,515,607	99,249
Kentucky	348,344,246	48,524,049	66,899,304	8,146,849	117,330,012	8,634,842	38,829,320	636,708,622	58,826
Louisiana	844,859,683	47,139,502	337,940,984	19,099,381	880,378,400	16,761,232	174,819,499	2,320,998,681	375,410
Maine	9,499,057	2,145,059	9,903,867	299,639	64,160,587	360,869	9,800,532	96,169,610	934
Maryland	25,867,890	12,711,729	13,281,742	905,351	31,078,971	9,597,164	13,170,908	106,613,755	85,946
Massachusetts	27,120,870	24,626,565	6,549,099	6,991,254	21,053,259	12,325,582	5,890,441	104,557,070	707,790
Michigan	335,609,755	113,906,959	179,352,021	62,742,845	92,220,412	41,034,588	83,342,074	908,208,654	412,668
Minnesota	187,351,415	21,940,758	7,034,602	2,191,446	36,106,015	10,716,446	20,096,775	285,437,457	19,320
Mississippi	218,143,589	17,567,013	26,001,891	5,817,512	159,925,362	2,051,241	69,192,130	498,698,738	447,356
Missouri	225,246,952	55,448,281	97,649,194	11,436,473	63,212,942	12,486,677	56,525,357	522,005,876	64,217
Montana	33,461,138	161,043	2,736,683	54,685	8,727,209	29,422	51,408,605	96,578,785	74,742
Nebraska	1,660,358	26,345,794	534,716	476,364	11,072,700	4,544,108	20,480,915	65,114,955	10,296
Nevada	2,362,845	1,534,498	0	48,834	18,800,024	74,576	4,199,511	27,020,288	1,178
New Hampshire	19,759,819	14,636,857	1,291,862	2,310,099	12,528,800	826,675	2,610,514	53,964,626	6,661
New Jersey	86,428,952	40,389,248	205,384,100	25,742,415	132,394,426	27,467,724	20,739,656	538,546,521	123,335
New Mexico	2,231,074	743,952	25,925,563	52,123	4,485,523	559,469	24,272,903	58,270,607	2,110
New York	156,470,019	83,112,852	29,244,695	7,742,986	101,936,741	11,745,062	34,482,342	424,734,697	103,088
North Carolina	450,977,261	79,998,828	24,962,940	13,655,285	136,366,086	6,062,485	76,984,678	789,007,563	90,473
North Dakota	131,875	683,398	0	37,540	4,581,936	559,345	2,467,835	8,461,929	12,700
Ohio	268,220,342	183,145,482	115,563,551	35,621,104	141,513,103	34,776,713	148,744,315	927,584,610	570,267
Oklahoma	40,910,547	21,345,349	232,300	4,679,332	18,606,140	1,514,188	23,129,013	110,416,869	284,686
Oregon	31,674,879	15,126,650	15,244,417	2,021,771	137,251,954	14,225,060	32,818,337	248,363,068	8,477
Pennsylvania	399,505,129	140,635,343	54,321,983	22,163,998	176,655,847	28,973,270	142,164,686	964,420,256	3,335,635

Note: *Data are from Section 8.*

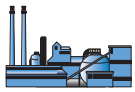


Table 2–10. Quantities of TRI Chemicals in Waste by State, 1998 *(continued)*

State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
Puerto Rico	12,450,070	11,561,577	692,502	11,095,257	18,518,748	11,680,723	7,306,280	73,305,157	12,304
Rhode Island	8,516,176	10,988,271	206,716	794,872	7,275,506	499,916	1,681,961	29,963,418	3,085
South Carolina	461,741,175	54,051,753	73,648,246	14,236,094	108,285,284	14,812,906	59,871,574	786,647,032	92,491
South Dakota	479,727	899,786	1,092,000	209,283	1,891,554	1,267,051	3,198,539	9,037,940	371
Tennessee	213,074,975	69,924,557	89,442,272	4,868,429	89,279,362	10,284,402	94,201,404	571,075,401	746,569
Texas	1,118,957,774	149,833,364	829,307,121	87,792,352	1,455,423,890	95,273,974	261,684,178	3,998,272,653	3,361,190
Utah	1,596,040	2,756,858	25,386,759	159,747	231,471,430	900,241	97,487,844	359,758,919	8,754,117
Vermont	136,592	1,644,156	0	17,016	1,319,812	379,625	454,462	3,951,663	16,005
Virgin Islands	736,904	145,485	0	0	14,488,182	390,821	1,055,560	16,816,952	0
Virginia	254,849,274	18,914,718	37,236,947	7,662,931	109,085,977	17,193,602	56,241,714	501,185,163	22,730
Washington	87,128,868	6,791,475	14,323,943	949,756	73,796,501	3,987,101	31,444,599	218,422,243	115,891
West Virginia	43,338,962	6,081,695	44,353,486	9,802,836	110,440,195	7,055,196	26,112,905	247,185,275	80,476
Wisconsin	60,149,181	54,941,089	10,932,984	17,504,954	115,987,625	17,267,203	40,616,199	317,399,235	36,926
Wyoming	1,548,983	105,056	45,655	10,664	2,976,520	178	9,412,762	14,099,818	19,417
Total	**9,646,571,037**	**2,059,338,694**	**2,851,489,429**	**485,373,723**	**6,012,991,050**	**547,355,031**	**2,448,429,537**	**24,051,548,501**	**26,712,347**

Note: *Data are from Section 8.*

pounds (from 2.18 billion pounds to 920.7 million pounds). This amounted to a 57.8 percent decrease in air emissions. The largest percentage reduction appeared in surface water discharges, which declined 72.9 percent (from 164.6 million pounds to 44.7 million pounds).

Fluctuations in off-site releases (transfers to disposal) over the period resulted in almost no net change from 1988 to 1998. Although these releases fell from the 1988 level of 428.0 million pounds to a 1995 level of 289.4 million, the total in 1998 was 428.9 million pounds. This amounted to an increase of 868,106 pounds, or 0.2 percent, from 1988 to 1998. This reflected a sharp increase in solidification/stabilization of metals from 1996 to 1997, as identified earlier in this chapter. This increase was offset by reductions in other types of off-site releases.

Amounts sent to landfills/surface impoundment, the largest type of off-site release, decreased overall (from 267.3 million pounds in 1988 to 222.8 million pounds in 1998), but have been increasing in recent years.

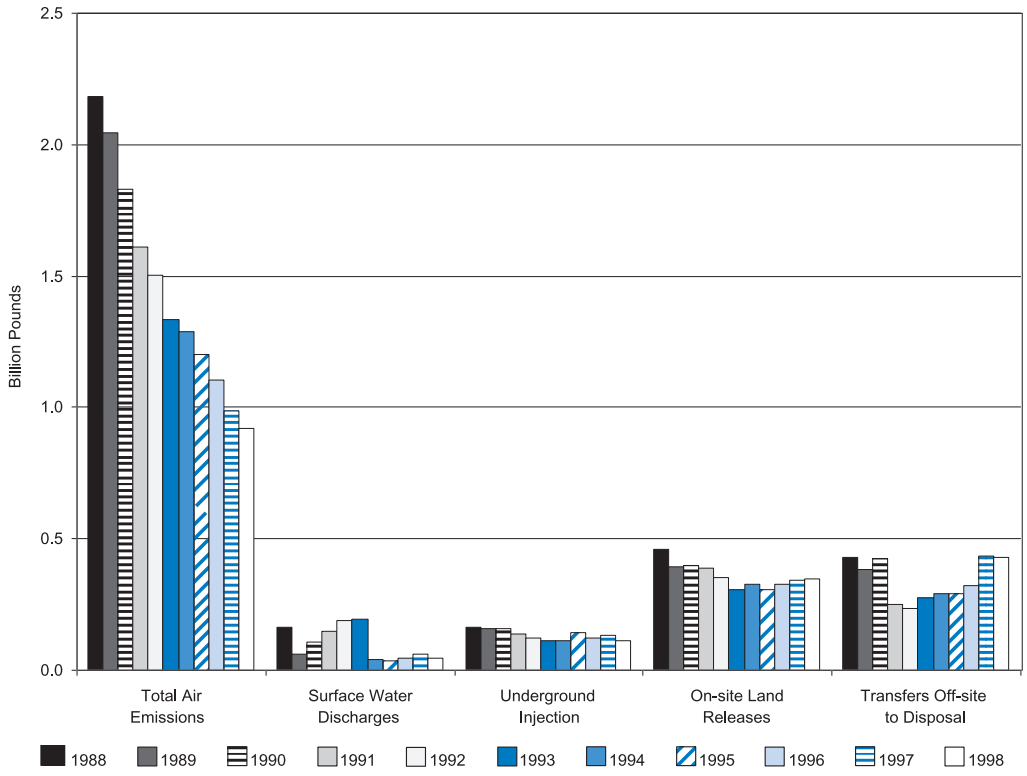
❖ Source Reduction and Projections of TRI Chemicals in Waste ❖

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

Table 2–11. Comparison of TRI On-site and Off-site Releases, 1988 and 1995–1998

	1988 Number	1995 Number	1996 Number	1997 Number	1998 Number	Change 1988–1998 Number	Change 1988–1998 Percent
Total Forms	62,826	63,161	61,636	61,213	60,251	–2,575	–4.1
Form Rs	62,826	57,813	55,546	52,554	51,479	—	—
Form As	—	5,348	6,090	8,659	8,772	—	—
On-site Releases	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Percent
Total Air Emissions	2,182,565,290	1,201,484,542	1,104,879,205	986,118,909	920,703,397	–1,261,861,893	–57.8
Fugitive Air Emissions	681,200,525	306,608,931	270,369,623	242,048,463	216,214,182	–464,986,343	–68.3
Point Source Air Emissions	1,501,364,765	894,875,611	834,509,582	744,070,446	704,489,215	–796,875,550	–53.1
Surface Water Discharges	164,566,331	37,178,869	44,607,289	61,601,861	44,660,052	–119,906,279	–72.9
Underground Injection	161,969,122	142,514,672	122,769,454	131,462,206	114,554,014	–47,415,108	–29.3
On-site Land Releases	459,273,405	306,589,692	325,331,861	342,010,439	347,031,866	–112,241,539	–24.4
Total On-site Releases	**2,968,374,148**	**1,687,767,775**	**1,597,587,809**	**1,521,193,415**	**1,426,949,329**	**–1,541,424,819**	**–51.9**
Off-site Releases							
Storage Only[a]	13,841,320	2,233,367	1,236,411	6,324,984	11,228,031	–2,613,289	–18.9
Solidification/Stabilization[b] Metals and Metal Compounds Only	29,540,884	26,723,956	59,253,534	144,626,202	135,892,168	106,351,284	360.0
Wastewater Treatment (excluding POTWs)[c] Metals and Metal Compounds Only	4,647,706	3,740,028	3,751,119	5,417,580	4,080,969	–566,737	–12.2
Transfers to POTWs[d] Metals and Metal Compounds Only	9,587,698	2,542,345	2,448,282	2,450,875	3,045,974	–6,541,724	–68.2
Underground Injection	8,962,004	12,531,911	9,046,874	10,834,074	13,274,293	4,312,289	48.1
Landfills/Surface Impoundments	267,252,441	211,887,103	223,246,208	233,850,749	222,761,082	–44,491,359	–16.6
Land Treatment	2,785,480	1,137,699	546,817	650,128	584,785	–2,200,695	–79.0
Other Land Disposal	9,646,794	11,632,875	6,176,823	9,115,316	13,287,506	3,640,712	37.7
Other Off-site Management	39,569,635	10,871,972	9,345,011	10,061,063	8,559,942	–31,009,693	–78.4
Transfers to Waste Broker for Disposal	30,402,269	4,562,335	4,368,125	7,241,334	12,446,486	–17,955,783	–59.1
Unknown[e]	11,773,104	1,541,114	1,514,421	2,213,534	3,716,205	–8,056,899	–68.4
Total Off-site Releases (Transfers Off-site to Disposal)	**428,009,335**	**289,404,705**	**320,933,625**	**432,785,839**	**428,877,441**	**868,106**	**0.2**
Total On- and Off-site Releases	**3,396,383,483**	**1,977,172,480**	**1,918,521,434**	**1,953,979,254**	**1,855,826,770**	**–1,540,556,713**	**–45.4**

Note: ***On-site Releases*** *are 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.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in 1996 reporting year.
[a]*Storage only (disposal code M10) indicates the 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 1–5.*
[b]*Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment 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 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.*
[c]*Beginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste treatment code M61) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste treatment code M60). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 1–6. Transfers of metals and metal compounds reported under code M60 have been included in transfers of metals metal compounds to wastewater treatment.*
[d]*Reported 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: *Does not include delisted chemicals, chemicals added in 1990, 1991, 1994 and 1995, aluminum oxide, ammonia, hydrochloric acid and sulfuric acid.* ***On-site Releases*** *are 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.*

Figure 2–5. Distribution of TRI On-site and Off-site Releases, 1988–1998

information about 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. Chapter 1 further explains source reduction as defined by the PPA (see Box 1–13).

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 2–12 summarizes source reduction activity reporting by category for 1998. The most frequently reported categories of source reduction activities were good operating practices (9.3 percent of all forms), process modifications (6.2 percent), and spill and leak prevention (4.3 percent).

These categories were also the most frequently reported in previous years. More than 5,300 facilities reported at least one source reduction activity in 1998, 28.3 percent of all reporting facilities. They submitted 12,358 forms that indicated at least one source reduction activity, 20.2 percent of all Form Rs submitted in 1998. Thus, for every Form R indicating source reduction activity in 1998, four did not.

Facility Projections of TRI Chemicals in Waste

In 1998, facilities reported managing 24.05 billion pounds of TRI chemicals in production-related waste, as summarized in Table 2–3 earlier in this chapter. Table 2–13 shows that these facilities have projected reducing the total to 23.14 billion pounds in reporting year 1999, with an increase in the next year to 23.26 billion pounds. These figures amount to a 3.8 percent projected decrease for 1998 to 1999 and a 0.6 percent projected increase for 1999 to 2000.

By the year 2000, facilities expected to make the largest reductions in on-site recycling (down from 9.65 billion pounds to a projected 9.23 billion pounds), on-site treatment (down from 6.01 billion pounds to a projected 5.85 billion pounds), and quantity released on- and off-site (down from 2.45 billion pounds to a projected 2.29 billion pounds).

These projections represent little change in how facilities expected to manage TRI chemicals in waste. **Waste Management**, in Chapter 1, explains the waste management hierarchy of preferred options for managing TRI chemicals in waste. From 1998 to 2000, quantities released—the least desirable waste management option—would decrease from 10.2 percent to 9.8 percent of total production-related waste managed, as projected in facilities' submissions to TRI. This suggests only a slight positive shift from releases toward more preferred options.

Table 2–12. Facilities and Forms Reporting Source Reduction Activity by Category, 1998

	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	2,562	13.7	5,694	9.3
Inventory Control	590	3.1	1,281	2.1
Spill and Leak Prevention	1,051	5.6	2,608	4.3
Raw Material Modifications	1,156	6.2	1,971	3.2
Process Modifications	1,828	9.7	3,821	6.2
Cleaning and Degreasing	554	3.0	856	1.4
Surface Preparation/Finishing	613	3.3	1,154	1.9
Product Modification	501	2.7	928	1.5
Any Source Reduction Activity	**5,303**	**28.3**	**12,358**	**20.2**

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.*

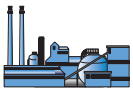


Table 2–13. Current Year and Projected Quantities of TRI Chemicals in Waste, 1998–2000

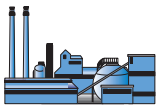
Waste Management Activity	1998 Pounds	1999 Pounds	2000 Pounds
Recycled On-site	9,646,571,037	9,024,524,241	9,232,083,438
Recycled Off-site	2,059,338,694	2,037,822,415	2,067,927,238
Energy Recovery On-site	2,851,489,429	2,807,514,489	2,820,082,686
Energy Recovery Off-site	485,373,723	543,757,972	478,709,496
Treated On-site	6,012,991,050	5,920,424,136	5,847,049,549
Treated Off-site	547,355,031	511,516,434	528,134,462
Quantity Released On- and Off-site	2,448,429,537	2,289,787,601	2,289,656,392
Total Production-related Waste	**24,051,548,501**	**23,135,347,288**	**23,263,643,261**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*

Chapter 3

Toxics Release Inventory Data for New Reporting Industries

Chapter 3



Toxics Release Inventory Data for New Reporting Industries

This chapter provides an overview of 1998 TRI data by industry sector for the seven industries that were required to report to TRI for the first time in 1998. Analyses of TRI reporting by the 20 industries in the manufacturing sector (Standard Industrial Classification codes 20–39) that have been required to report to TRI since the program began in 1987 appear in Chapter 4.

Data analyses in this chapter begin with summary tables that compare 1998 release and waste management data for the original TRI industries, the industries newly required to report, and all TRI industries. A separate analysis of reporting by federal facilities follows. The chapter then presents separate sections on each new industry and its TRI data. To help put the TRI data in context, the industry sections describe the industry's products and services, employment and production levels, processes involving toxic chemicals, general environmental issues, and management of toxic chemicals in waste. Information and TRI data for RCRA subtitle C hazardous waste treatment and disposal facilities (in SIC code 4953) and solvent recovery services (in SIC code 7389) are presented together because of their similarity.

Chapter 1 explains the types of releases and waste management activities and provides important information on factors to consider when using TRI data.

❖ New Industries ❖

As noted in Chapter 1 (see **Who Must Report?** and **Facility Expansion**), EPA conducted a detailed examination of non-manufacturing industries to determine which sectors release or otherwise manage significant quantities of TRI chemicals in waste. This effort, undertaken in 1992, focused particular attention on sectors linked to manufacturing—those providing energy, providing raw materials as inputs, further managing products, or further managing waste from the manufacturing sector. As a result, on May 1, 1997 (62 FR 23833), EPA added to TRI seven new industry sectors, beginning in reporting year 1998:

- metal mining (SIC code 10, except 1011, 1081, and 1094),
- coal mining (SIC code 12, except 1241),
- electrical utilities that combust coal and/or oil (SIC codes 4911, 4931, and 4939),
- RCRA subtitle C hazardous waste treatment and disposal facilities (in SIC code 4953),
- chemical wholesalers (SIC code 5169),
- petroleum terminals and bulk stations (SIC code 5171), and
- solvent recovery services (SIC code 7389).

Box 3–1 explains SIC codes and their use in TRI. This information is important for understanding TRI data and analyses for the new industries.

❖ TRI Data for Original and New Industries, 1998 ❖

As shown in Table 3–1, 1,970 facilities in industries reporting to TRI for the first time in 1998 submitted 15,255 forms. Although they amounted to 8.4 percent of all TRI facilities reporting, these facilities submitted 17.5 percent of the TRI forms.

On- and Off-site Releases

The new industries' on- and off-site releases totaled 4.93 billion pounds, two-thirds (67.4 percent) of TRI's 1998 total. Table 3–1 shows that most of the new industries' releases were on-site land releases (4.00 billion pounds). While 15.0 percent of the original TRI industries' total was released on-site to land, 80.3 percent of the new industries' total was released on-site to land. TRI reports from the new industries contributed 91.7 percent of all TRI on-site land releases in 1998. As discussed later in this chapter, metal mining facilities reported the bulk of the on-site land releases.

Air emissions by the new industries totaled 796.6 million pounds, including 789.6 million pounds of point source air emissions. The large proportion of on-site land releases by the new industries substantially influences the percentages of other release types. For example, air emissions amounted

Box 3–1. An Explanation of SIC Codes and TRI

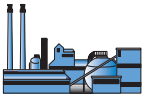
An Explanation of SIC Codes and TRI

SIC codes are the Standard Industrial Classification codes used throughout the federal government to classify economic activity by industry. Facilities in the manufacturing sectors, that is, SIC codes 20 through 39, have been required to report to TRI since the program began. Federal facilities have been required to report to TRI since 1994, regardless of their SIC code. In 1998, seven additional industries began reporting.

On TRI Form Rs and Form A certification statements, facilities report the four-digit SIC codes that define their operations. A facility might report, for example, SIC code 2873, nitrogenous fertilizers. These industries are grouped into broader categories at the three-digit and two-digit SIC code levels. For example, nitrogenous fertilizers falls into the agricultural chemicals group at the three-digit level (SIC code 287) and the chemicals and allied products major group (SIC code 28). Producers of nitrogenous fertilizers have been required to report to TRI since 1987. A facility that mines silver ore (in SIC code 1044; in the gold and silver ores group SIC code 104; in the metal mining major group SIC code 10) was newly required to report to TRI in 1998. A solvent recovery facility in SIC code 7389 was also required to report in 1998, although other types of economic activity in that SIC code (miscellaneous business services) do not report to TRI.

Tables in this chapter present data only for the SIC codes—and the economic activities within those codes—that are specifically required to report to TRI.

Industrial facilities often conduct inter-related operations that result in products or services classified in different SIC codes. TRI forms with multiple SIC codes are generally analyzed in Chapter 4 (Box 4–2 explains the methodology). However, if a facility reported for the first time in 1998 with SIC codes for both new and original industries, it is included in the analyses in this chapter under the new industry code.



to 16.2 percent of the new industries' total releases, compared to 52.8 percent of the original industries' releases. However, when all TRI releases to air are considered, 38.8 percent came from the new industries' forms. Electrical utilities reported the great majority of the new industries' air emissions, as presented later in this chapter.

Notably, the new industries also reported 99.7 percent of all underground injection to Class II–V wells (explained in Box 1–4 in Chapter 1). The new industries reported 33.25 million pounds of the TRI total of 33.35 million pounds of such underground injection.

Transfers to landfills/surface impoundments were the largest type of off-site release for both original and new industries. Facilities in the new industries reported 79.0 million pounds in this category. This amounted to just 1.6 percent of the new industries' total releases. The original industries sent 212.6 million pounds to off-site landfills and surface impoundments, 8.9 percent of their total releases.

The addition of hazardous waste treatment and disposal facilities in SIC code 4953 in 1998 means that TRI chemicals in waste may be sent by one TRI facility (reporting the amounts as transfers off-site to disposal) to another TRI facility (reporting the amounts as on-site releases). Box 3–2 explains EPA's methodology for avoiding the duplication of this data in analyses throughout this chapter.

❖ Total Releases by State ❖

The geographic distribution of total releases differed considerably between the original and new industries, and the new industries' data strongly influence state rankings for total releases by all TRI industries in 1998. State-by-state comparisons of amounts and rank for total releases by original industries, new industries, and all TRI industries appear in Table 3–2.

States with the largest releases by new industries were Nevada with 1.27 billion pounds, Arizona with 1.02 billion pounds, and Utah with 475.0 million pounds. As seen later in this chapter, metal mining facilities reported large releases in these three states. These were also the top states for total releases by all TRI industries. For total releases by the original industries, Nevada ranked 44th, Arizona 18th, and Utah seventh. As discussed in Chapter 2 (**TRI Data by State, 1995–1998,** and Table 2–5), the top states for total releases by original industries in 1998 were Texas with 262.7 million pounds, Louisiana with 175.6 million pounds, and Ohio with 153.6 million pounds.

Three states, including Utah, ranked in the top 10 for both original and new industries. Ohio ranked third for total releases by original industries and sixth for new industries. Pennsylvania ranked fourth in the original industries' reporting and seventh for the new industries. As noted, Utah was seventh for original industries and third for new industries.

Waste Management Data

Quantities of TRI Chemicals in Waste

The original industries reported production-related waste totaling 24.05 billion pounds in 1998, and 10.2 percent of that total consisted of quantities released on- and off-site (2.45 billion pounds). For the

Table 3–1. TRI On-site and Off-site Releases, Original and New Industries, 1998

	Original Industries		New Industries		All TRI Industries		New Industries as Percent of All TRI Industries
	Number		Number		Number		Percent
Total Facilities	21,517		1,970		23,487		8.4
Total Forms	72,073		15,255		87,328		17.5
Form Rs	61,233		12,567		73,800		17.0
Form As	10,840		2,688		13,528		19.9
	Pounds	**Percent of Total**	Pounds	**Percent of Total**	Pounds	**Percent of Total**	Percent
On-site Releases							
Total Air Emissions	1,256,949,811	52.8	796,550,006	16.2	2,053,499,817	28.1	38.8
Fugitive Air Emissions	292,502,959	12.3	6,983,226	0.1	299,486,185	4.1	2.3
Point Source Air Emissions	964,446,852	40.5	789,566,780	16.0	1,754,013,632	24.0	45.0
Surface Water Discharges	223,365,761	9.4	8,074,161	0.2	231,439,922	3.2	3.5
Underground Injection	210,639,389	8.9	56,677,417	1.1	267,316,806	3.7	21.2
Class I Wells	210,544,864	8.9	23,425,024	0.5	233,969,888	3.2	10.0
Class II-V Wells	94,525	0.0	33,252,393	0.7	33,346,918	0.5	99.7
On-site Land Releases	355,674,874	15.0	3,955,141,581	80.3	4,310,816,455	59.0	91.7
RCRA Subtitle C Landfills	15,339,494	0.6	197,617,507	4.0	212,957,001	2.9	92.8
Other On-site Landfills	99,730,347	4.2	162,677,586	3.3	262,407,933	3.6	62.0
Land Treatment	5,210,603	0.2	1,313,197	0.0	6,523,800	0.1	20.1
Surface Impoundments	90,237,471	3.8	1,289,578,793	26.2	1,379,816,264	18.9	93.5
Other Disposal	145,156,959	6.1	2,303,954,498	46.7	2,449,111,457	33.5	94.1
Total On-site Releases	**2,046,629,835**	**86.0**	**4,816,443,165**	**97.7**	**6,863,073,000**	**93.9**	**70.2**

*Note: **On-site Releases** are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R.*
Facilities/forms are included in the original industry category if they did not report a new industry SIC code.
Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39.
If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category.
If the facility reported for the first time in 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
One facility, Cyprus Miami Mining in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1998 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

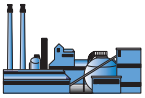


Table 3–1. TRI On-site and Off-site Releases, Original and New Industries, 1998 *(continued)*

	Original Industries		New Industries		All TRI Industries		New Industries as Percent of All TRI Industries
	Pounds	Percent of Total	Pounds	Percent of Total	Pounds	Percent of Total	Percent
Off-site Releases							
Storage Only[a]	11,749,488	0.5	2,746,021	0.1	14,495,509	0.2	18.9
Solidification/Stabilization[b]	42,775,589	1.8	5,801,379	0.1	48,576,968	0.7	11.9
Metals and Metal Compounds Only							
Wastewater Treatment (excluding POTWs)[c]	3,992,958	0.2	114,693	0.0	4,107,651	0.1	2.8
Metals and Metal Compounds Only							
Transfers to POTWs[d]	3,045,974	0.1	493,189	0.0	3,539,163	0.0	13.9
Metals and Metal Compounds Only							
Underground injection	13,382,660	0.6	334,945	0.0	13,717,605	0.2	2.4
Landfills/Surface Impoundments	212,628,687	8.9	78,974,124	1.6	291,602,811	4.0	27.1
Land Treatment	1,326,956	0.1	495,175	0.0	1,822,131	0.0	27.2
Other Land Disposal	15,597,579	0.7	11,328,044	0.2	26,925,623	0.4	42.1
Other Off-site Management	9,816,029	0.4	10,520,218	0.2	20,336,247	0.3	51.7
Transfers to Waste Broker for Disposal	14,052,361	0.6	673,476	0.0	14,725,837	0.2	4.6
Unknown[e]	3,784,392	0.2	567,726	0.0	4,352,118	0.1	13.0
Total Off-site Releases	**332,152,673**	**14.0**	**112,048,990**	**2.3**	**444,201,663**	**6.1**	**25.2**
(Transfers Off-site to Disposal)							
Total On-site and Off-site Releases	**2,378,782,508**	**100.0**	**4,928,492,155**	**100.0**	**7,307,274,663**	**100.0**	**67.4**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Facilities/forms are included in the original industry category if they did not report a new industry SIC code.
Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39.
If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category.
If the facility reported for the first time in 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
One facility, Cyprus Miami Mining in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1998 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.
[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 1–5.*
[b]*Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment 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 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.*
[c]*Beginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste treatment code M61) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste treatment code M60). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 1–6. Transfers of metals and metal compounds reported under code M60 have been included in transfers of metals metal compounds to wastewater treatment.*
[d]*Reported 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).*

Box 3–2. Duplication of Off-site Transfers to Disposal

Duplication of Off-site Transfers to Disposal

TRI facilities transfer off-site chemicals in waste to other facilities for disposal. These other facilities can dispose of the wastes in on-site landfills, disposal surface impoundments, in land treatment facilities, other types of land disposal, and underground injection wells or, if metals are sent to a wastewater treatment facility, they may be discharged to surface waters. These other facilities generally are treatment, storage and disposal (TSD) facilities regulated under the federal Resources Conservation and Recovery Act (RCRA). Such facilities are in one of the added industries that must, beginning with the 1998 reporting year, report their releases and other waste management to TRI. Thus, the facility that transfers these toxic chemicals in waste would report the amounts as transfers to disposal (off-site releases) and the TSD facility that receives the material would report the amounts as on-site releases to land or to surface waters.

To avoid counting the transfers to the TSD facilities that are also reported to TRI as on-site releases by the TSD facilities, off-site transfers to disposal to these TSD facilities must be omitted from tables that compare or summarize on-site and off-site releases for all industries, including the newly added industries. Only the on-site releases from the TSD facilities are included in such analyses. This applies to tables presented in this chapter of the *1998 TRI Public Data Release*.

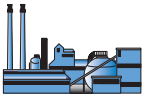
The RCRA ID number that facilities report is used to identify such transfers and match them to on-site releases reported by TSD facilities. A TRI facility must report its own RCRA ID number as well as the RCRA ID number of the TSD facility receiving the transfer. Each amount of off-site transfer to disposal should have the RCRA ID number of the receiving facility. If this RCRA ID number matches the RCRA ID number of a TRI facility and the TRI facility receiving the waste reported on-site releases of the same chemical (or the metal and its compounds in the case of metals) that were greater than or equal to the sum of the off-site transfers received, then the off-site transfer amount is omitted from the analysis.

If the TRI facility receiving the waste reported on-site releases of the chemical less than the total reported as transferred to the facility, then the amount omitted from the analysis is reduced proportionally. For example, if Facility A reported 20,000 pounds transferred to Facility C and Facility B reported 80,000 pounds transferred to Facility C, but Facility C only reported 90,000 pounds released on-site (which is 90 percent of the total amount of 100,000 pounds reported as transferred), then the amount of transfers omitted from the analysis for Facility A is 18,000 pounds (or 90 percent of 20,000 pounds) and for Facility B is 72,000 pounds (or 90 percent of 80,000 pounds).

In tables that present off-site transfers but not on-site releases, these amounts are not omitted in order to present complete data on off-site transfers for analysis. Also, tables that present data on waste managed do not omit any reported data in order to present complete data on how waste is being managed.

The following shows which types of off-site transfers to disposal are matched with which types of on-site releases to determine if the transfers should be omitted, along with the amounts omitted for 1998:

(continued)



Box 3–2. Duplication of Off-site Transfers to Disposal *(continued)*

Off-site Transfer M code	Total Transfers to Disposal Pounds	Transfers to Disposal for Matching RCRA ID Pounds	Transfers to be Omitted Because Duplicated in Section 5 of Recipient TRI Facility Pounds	Section 5 Checked for Recipient TRI Facilities Based on Matching Chemical or, if Metal, Metal Plus Metal Compound
M10	14,495,624	5,189,974	115	5.5.4
M41*	144,372,954	139,073,158	94,689,199	5.5.1 A and B
M62*	4,343,782	3,611,148	236,131	5.5.1 A and B, 5.5.3 and 5.3
M71	16,880,096	16,460,668	3,162,491	5.4
M72	315,517,509	147,965,555	23,914,698	5.5.1 A and B, 5.5.3
M73	1,822,131	160,990	0	5.5.2
M79	26,925,623	17,307,748	0	
M90	20,666,431	6,511,395	330,184	All Section 5
M99	4,544,022	3,425,400	191,904	All Section 5
Total	549,568,172	339,706,036	122,524,722	
Number of Form Rs	73,800	11,432	2,709	

*Includes metals and metal compounds reported under codes M40 and M61.

new industries, production-related waste totaled 6.48 billion pounds and 78.8 percent of that total was quantities released on- and off-site (5.11 billion pounds). In contrast, the original industries recycled on-site 40.1 percent (9.65 billion pounds) of their production-related waste, while the new industries managed 2.8 percent of their total by on-site recycling (180.9 million pounds). Table 3–3 compares the quantities of TRI chemicals in waste for original and new industries.

The new industries contributed 21.2 percent of all TRI production-related waste in 1998, including 67.6 percent of the quantities released on- and off-site. The new industries also reported 46.4 percent (419.7 million pounds) of the TRI total for off-site energy recovery.

Transfers Off-site for Further Waste Management/Disposal

As shown in Table 3–4, transfers off-site for further waste management and disposal totaled 3.44 billion pounds for the original TRI industries and 669.7 million pounds for the new industries. The original industries sent the majority of the transfers to recycling (1.99 billion pounds or 57.9 percent). The new industries transferred a majority

Table 3–2. TRI Total Releases, by State, Original and New Industries, 1998

State	Total On-site and Off-site Releases					
	Original Industries		New Industries		All TRI Industries	
	Pounds	Rank	Pounds	Rank	Pounds	Rank
Alabama	89,519,922	9	59,390,313	16	147,971,814	12
Alaska	1,948,559	48	305,081,385	4	307,019,139	6
American Samoa	8,750	54	5,147	54	13,897	54
Arizona	54,346,031	18	1,015,396,357	2	1,069,459,422	2
Arkansas	50,743,995	20	3,809,170	46	39,015,235	33
California	42,580,329	22	30,302,691	25	70,690,378	26
Colorado	5,473,006	43	25,485,527	27	30,257,725	38
Connecticut	7,604,324	39	2,638,515	48	9,964,122	46
Delaware	5,503,568	42	7,747,477	43	13,167,440	45
District of Columbia	11,511	53	66,250	51	77,761	53
Florida	78,499,582	11	69,004,865	13	146,950,228	13
Georgia	64,867,232	13	58,556,640	17	116,050,668	19
Guam	0	—	11,058	53	11,058	55
Hawaii	435,831	51	3,193,929	47	3,612,853	49
Idaho	22,750,923	32	76,876,735	10	99,581,448	23
Illinois	116,483,095	6	67,113,615	14	169,297,551	11
Indiana	120,941,009	5	75,188,636	12	189,475,570	9
Iowa	40,100,994	24	13,723,851	33	49,019,069	30
Kansas	29,137,835	28	11,057,823	38	40,063,944	32
Kentucky	41,033,286	23	61,618,147	15	101,459,789	22
Louisiana	175,603,883	2	13,339,377	35	188,608,079	10
Maine	9,636,269	37	111,301	50	9,746,764	47
Maryland	13,251,453	36	25,687,120	26	38,916,981	34
Massachusetts	7,278,796	41	7,757,062	42	14,947,545	44
Michigan	83,648,982	10	57,990,784	18	140,944,017	14
Minnesota	19,870,654	34	12,996,182	36	32,376,326	36
Mississippi	60,520,702	14	11,342,053	37	71,751,244	25
Missouri	57,045,614	16	79,878,997	8	136,845,034	16
Montana	51,377,382	19	76,389,299	11	123,520,951	18
Nebraska	16,186,981	35	8,195,519	41	21,281,764	42
Nevada	4,204,845	44	1,267,747,887	1	1,271,722,674	1
New Hampshire	2,970,927	46	4,098,253	45	7,061,002	48

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Facilities/forms are included in the original industry category if they did not report a new industry SIC code.
Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39.
If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category.
If the facility reported for the first time in 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
One facility, Cyprus Miami Mining in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1998 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

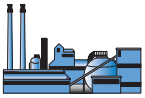


Table 3–2. TRI Total Releases, by State, Original and New Industries, 1998 *(continued)*

State	Total On-site and Off-site Releases					
	Original Industries		New Industries		All TRI Industries	
	Pounds	Rank	Pounds	Rank	Pounds	Rank
New Jersey	19,959,412	33	10,874,960	39	30,763,455	37
New Mexico	24,827,806	30	235,291,509	5	260,119,315	7
New York	35,489,850	25	35,469,205	23	70,444,506	27
North Carolina	76,800,683	12	57,812,311	19	133,397,919	17
North Dakota	2,449,976	47	20,932,726	29	23,382,206	39
Northern Marianas	0	—	3,086	55	3,086	56
Ohio	153,558,752	3	192,271,551	6	336,268,276	4
Oklahoma	24,397,829	31	17,652,989	32	41,831,334	31
Oregon	33,180,800	26	31,878,264	24	55,140,807	29
Pennsylvania	145,737,350	4	80,197,223	7	216,164,765	8
Puerto Rico	7,288,665	40	10,666,587	40	17,945,579	43
Rhode Island	1,751,380	49	540,804	49	2,273,531	50
South Carolina	59,695,616	15	53,408,668	21	107,300,428	20
South Dakota	3,251,231	45	19,059,501	30	22,310,732	41
Tennessee	94,907,549	8	46,205,203	22	139,312,649	15
Texas	262,681,842	1	55,631,302	20	312,239,546	5
Utah	106,252,499	7	475,024,134	3	574,225,505	3
Vermont	417,357	52	0	56	412,965	52
Virgin Islands	1,055,561	50	30,589	52	1,086,150	51
Virginia	56,848,332	17	23,502,936	28	79,924,886	24
Washington	32,108,843	27	7,005,385	44	34,491,128	35
West Virginia	26,185,485	29	77,689,489	9	103,840,324	21
Wisconsin	43,780,692	21	17,853,380	31	60,732,242	28
Wyoming	9,437,664	38	13,344,174	34	22,781,837	40
Total	**2,495,651,444**		**4,934,147,941**		**7,307,274,663**	

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Facilities/forms are included in the original industry category if they did not report a new industry SIC code.
Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39.
If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category.
If the facility reported for the first time in 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
One facility, Cyprus Miami Mining in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1998 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

Table 3–3. Quantities of TRI Chemicals in Waste by Waste Management Activity, Original and New Industries, 1998

Waste Management Activity	Original Industries Pounds	New Industries Pounds	All TRI Industries Pounds	New Industries as Percent of All TRI Industries Percent
Recycled On-site	9,646,571,037	180,854,791	9,827,425,828	1.8
Recycled Off-site	2,059,338,694	39,905,983	2,099,244,677	1.9
Energy Recovery On-site	2,851,489,429	11,399,201	2,862,888,630	0.4
Energy Recovery Off-site	485,373,723	419,669,514	905,043,237	46.4
Treated On-site	6,012,991,050	630,290,874	6,643,281,924	9.5
Treated Off-site	547,355,031	91,837,013	639,192,044	14.4
Quantity Released On- and Off-site	2,448,429,537	5,106,263,945	7,554,693,482	67.6
Total Production-related Waste	**24,051,548,501**	**6,480,221,321**	**30,531,769,822**	**21.2**
Non-production-related Waste	26,712,347	1,730,941	28,443,288	6.1
	Percent of Total Production-related Waste			
Waste Management Activity	Percent	Percent	Percent	
Recycled On-site	40.1	2.8	32.2	
Recycled Off-site	8.6	0.6	6.9	
Energy Recovery On-site	11.9	0.2	9.4	
Energy Recovery Off-site	2.0	6.5	3.0	
Treated On-site	25.0	9.7	21.8	
Treated Off-site	2.3	1.4	2.1	
Quantity Released On- and Off-site	10.2	78.8	24.7	
Total Production-related Waste	**100.0**	**100.0**	**100.0**	

Note: *Data are from Section 8 of Form R for 1998.*
Facilities/forms are included in the original industry category if they did not report a new industry SIC code.
Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39.
If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category.
If the facility reported for the first time in 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
One facility, Cyprus Miami Mining in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1998 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

to energy recovery (436.2 million pounds or 65.1 percent).

The new industries reported 47.7 percent of all TRI transfers to energy recovery in 1998, along with 22.6 percent (73.4 million pounds) to treatment and 20.8 percent (117.2 million pounds) of other transfers to disposal.

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

As described in **Waste Management** in Chapter 1, on each Form R that it submits, a facility reports actual waste management quantities for the current and prior years and projected quantities for the next two years. By 2000, all TRI facilities (original and new industries) projected a reduction in total production-related waste to 29.22 billion pounds (down from 30.53 billion pounds in 1998, as shown in Table 3–5).

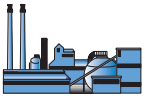


Table 3–4. TRI Off-site Transfers for Further Waste Management/Disposal, Original and New Industries, 1998

	Original Industries		New Industries		All TRI Industries		New Industries as Percent of All TRI Industries
	Pounds	Percent of Total	Pounds	Percent of Total	Pounds	Percent of Total	Percent
Transfers to Recycling	1,989,464,928	57.9	40,897,048	6.1	2,030,361,976	49.4	2.0
Transfers to Energy Recovery	478,821,401	13.9	436,183,569	65.1	915,004,970	22.3	47.7
Transfers to Treatment	251,823,538	7.3	73,407,861	11.0	325,231,399	7.9	22.6
Transfers to POTWs	269,770,149	7.8	2,001,753	0.3	271,771,902	6.6	0.7
Non-metal TRI Chemicals	266,724,175	7.8	1,508,564	0.2	268,232,739	6.5	0.6
Metals and Metal Compounds	3,045,974	0.1	493,189	0.1	3,539,163	0.1	13.9
Other Off-site Transfers*	921,574	0.0	6,740	0.0	928,314	0.0	0.7
Other Transfers Off-site to Disposal**	445,975,635	13.0	117,211,587	17.5	563,187,222	13.7	20.8
Total Transfers Off-site for Further Waste Management Disposal	**3,436,777,225**	**100.0**	**669,708,558**	**100.0**	**4,106,485,783**	**100.0**	**16.3**

Note: Total Transfers Off-site for Further Waste Management *are from Section 6 (excluding transfers off-site to disposal) of Form R.*
Facilities/forms are included in the original industry category if they did not report a new industry SIC code.
Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39.
If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category.
If the facility reported for the first time in 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
One facility, Cyprus Miami Mining in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1998 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.
**Other Off-site Transfers are transfers reported without a valid waste management code.*
***Does not include transfers to POTWs of metals and metal compounds.*

Both original and new industries expected to decrease their totals, the original industries from 24.05 billion pounds to 23.26 billion pounds and the new industries from 6.48 billion pounds to 5.95 billion pounds.

The expected decreases would slightly reduce the new industries' proportion of total production-related waste, from 21.2 percent in 1998 to a projected 20.4 percent in 2000. Based on their projections, their share of all TRI quantities released on-site and off-site would be reduced from 67.6 percent to 66.8 percent and their share of all TRI off-site energy recovery from 46.4 percent to 44.0 percent.

Economic Overview, by Industry

TRI data present significant information about toxic chemicals that are released on- and off-site, managed in waste on- and off-site, and transferred off-site for further waste management. However, as discussed in Chapter 1, TRI data also have limitations. One limitation is that TRI data do not distinguish the industry-specific factors that influence the chemicals, amounts, and types of releases and waste management facilities report. For the new TRI industries, this chapter supplies information about some of these factors, such as the industry-specific processes that involve toxic chemicals. The *1996 TRI Public Data Release*, in two volumes (EPA 745-R-98-005, May 1998, and EPA 745-R-98-018, December 1998), provided similar information for the original TRI industries.

Table 3–5. Current Year and Projected Quantities of TRI Chemicals in Waste, Original and New Industries, 1998–2000

	Original Industries			New Industries		
Waste Management Activity	1998 Pounds	1999 Pounds	2000 Pounds	1998 Pounds	1999 Pounds	2000 Pounds
Recycled On-site	9,646,571,037	9,024,524,241	9,232,083,438	180,854,791	167,617,877	175,960,372
Recycled Off-site	2,059,338,694	2,037,822,415	2,067,927,238	39,905,983	38,213,870	38,098,700
Energy Recovery On-site	2,851,489,429	2,807,514,489	2,820,082,686	11,399,201	11,640,308	11,848,679
Energy Recovery Off-site	485,373,723	543,757,972	478,709,496	419,669,514	376,091,119	376,785,027
Treated On-site	6,012,991,050	5,920,424,136	5,847,049,549	630,290,874	634,755,050	641,275,218
Treated Off-site	547,355,031	511,516,434	528,134,462	91,837,013	94,387,418	97,207,454
Quantity Released On- and Off-site	2,448,429,537	2,289,787,601	2,289,656,392	5,106,263,945	4,791,404,816	4,612,345,620
Total Production-related Waste	**24,051,548,501**	**23,135,347,288**	**23,263,643,261**	**6,480,221,321**	**6,114,110,458**	**5,953,521,070**

	All TRI Industries			New Industries as a Percent of Total		
Waste Management Activity	1998 Pounds	1999 Pounds	2000 Pounds	1998 Pounds	1999 Pounds	2000 Pounds
Recycled On-site	9,827,425,828	9,192,142,118	9,408,043,810	1.8	1.8	1.9
Recycled Off-site	2,099,244,677	2,076,036,285	2,106,025,938	1.9	1.8	1.8
Energy Recovery On-site	2,862,888,630	2,819,154,797	2,831,931,365	0.4	0.4	0.4
Energy Recovery Off-site	905,043,237	919,849,091	855,494,523	46.4	40.9	44.0
Treated On-site	6,643,281,924	6,555,179,186	6,488,324,767	9.5	9.7	9.9
Treated Off-site	639,192,044	605,903,852	625,341,916	14.4	15.6	15.5
Quantity Released On- and Off-site	7,554,693,482	7,081,192,417	6,902,002,012	67.6	67.7	66.8
Total Production-related Waste	**30,531,769,822**	**29,249,457,746**	**29,217,164,331**	**21.2**	**20.9**	**20.4**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*
Facilities/forms are included in the original industry category if they did not report a new industry SIC code.
Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39.
If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category.
If the facility reported for the first time in 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
One facility, Cyprus Miami Mining in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1998 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

Basic economic information also helps to distinguish certain industry characteristics. Table 3–6 presents two basic economic measures (employment and dollar value of sales, receipts, shipments, or revenue) that suggest the relative size of the industries newly reporting to TRI in 1998. Economic analyses make use of data on the value of production (sales, receipts, shipments, or revenue) as one way to indicate the size of industrial sectors, because no direct comparison can be drawn among products and services of the sectors. Economic data in Table 3–6 are from the 1997 Economic Census, the latest consistent data available across all TRI industries, original and new.

Table 3–6 also includes total production-related waste managed that TRI facilities reported for 1998 to allow approximate comparisons with the economic activity of the industry sectors. The ratio of total production-related waste managed to production value (sales, receipts, shipments, or revenue), in the last column, compares the 1998 reported TRI quantities for each industry with that industry's production level for 1997. Relating TRI quantities to the

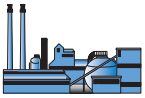


Table 3–6. Employees and Sales (1997) and Total Production-related Waste (1998), by Industry

US SIC Code	NAICS Code*		Paid Employees 1997 Number	Sales, Receipts, Shipments, or Revenue, 1997 ($000)	TRI Total Production-related Waste Managed, 1998 Pounds	Production-related Waste Managed per Sales, Receipts, Shipments, or Revenue Pounds per $1,000,000
10		Metal Mining**	36,884	9,166,095	3,720,598,087	405,909
1021	212234	Copper Ores				
1031	212231	Lead and Zinc Ores				
1041	212221	Gold Ores				
1044	212222	Silver Ores				
1061		Ferroalloy Ores, exc. Vanadium (included in 109920)				
1099	109920	Misc. metal ores, *nec****				
12		Coal Mining†	87,793	23,377,137	13,836,849	592
1221	212111	Bituminous Coal and Lignite Surface Mining				
1222	212112	Bituminous Coal Underground Mining				
1231	212113	Anthracite Mining				
5169	4226	Chemical and Allied Products Wholesale	165,768	128,923,496	55,770,131	433
5171	42271	Petroleum Bulk Stations and Terminals‡	102,489	176,419,246	59,961,607	340
	221112	Fossil Fuel Electric Power Generation	93,765	48,324,008	1,548,764,374	32,050
4911 (part)		Electric Services (electric power generation by fossil fuels)				
4931 (part)		Electric and Other Services Combined (electric power generation by fossil fuels)				
4939 (part)		Combination utilities n.e.c. (electric power generation by fossil fuels)				
4953 (part) 7389 (part)	562211	Hazardous Waste Treatment and Disposal Solvent Recovery Services	17,816	2,877,982	1,081,290,273	375,711
20–39		Manufacturing Industries	17,633,977	3,964,788,992	22,950,113,332	5,788

Note: Paid Employees and Sales, Receipts, Shipments or Revenue *are from U.S. Census Bureau, 1997 Economic Census. http://www.census.gov/epcd/www/econ97.html [accessed June 4, 2000]. These data are preliminary and are subject to change; includes only establishments with payroll. Data are in current dollars and have not been adjusted for inflation.*

**1997 Economic Census data were collected and published using the 1997 North American Industry Classification System (NAICS). Data presented here with the 1987 Standard Industrial Classification (SIC) codes, used by TRI, follow the U.S. Census Bureau crosswalk between the two systems.*

***Economic data for SIC code 10, metal mining, include activities not covered by TRI (processing or otherwise use of TRI chemical in mining overburden).*

****nec: *not elsewhere classified.*

†*Economic data for SIC code 12, coal mining, include extraction activities not covered by TRI.*

‡*1997 Economic Census data revised March 2000.*

Total Production-related Waste Managed *are from Section 8 (total of 8.1 through 8.7, Column B) of TRI Form for 1998.*

Total Production-related Waste Managed *in this table does not include forms reporting more than one 2-digit SIC code and forms reporting SIC codes outside the 20–39 range.*

dollar value of each industry's products takes into account one measure of the differences among industries in their level of production.

As shown in Table 3–6, metal mines reporting to TRI managed 405,909 pounds of total production-related waste for each $1 million of shipments. This was the largest ratio among the new TRI industries. Hazardous waste treatment and disposal facilities managed 375,711 pounds of total production-related waste per $1 million of receipts, the second-highest ratio, and electrical utilities ranked third with 32,050 pounds per $1 million.

❖ Federal Facilities ❖

Facilities owned and operated by federal agencies are required to report to TRI, regardless of SIC code. In 1993, President Clinton signed Executive Order 12856, which mandated that federal facilities report to TRI starting with the 1994 reporting year. The Executive Order also directs each federal agency to achieve by 1999 an agency-wide reduction of 50 percent in on-site releases and off-site transfers to treatment and disposal, based on their 1994 TRI reporting. The Executive Order encourages federal facilities to use source reduction wherever practicable to achieve their reductions.

Tables in this section list the federal agencies that have facilities reporting to TRI. Department of Defense (DOD) data are presented for DOD as a whole and for each defense agency.

1998 TRI Data for Federal Facilities

In 1998, a total of 123 federal facilities submitted 481 TRI forms, as shown in Table 3–7. Of these, 106 facilities and 309 forms were from original TRI industries, and 17 facilities and 172 forms from new industries.

Facilities owned or operated by DOD agencies submitted 210 forms in the original TRI industries. DOD submissions included 85 reports by Army facilities and 54 reports by Air Force facilities. The Department of Energy submitted 44 forms.

In the new industries, Tennessee Valley Authority (TVA) facilities submitted 160 forms (along with three in the original TRI industries). Two Energy Department facilities filed a total of 11 forms in new-industry SIC codes. One DOD form, from the Navy, was submitted in a new industry, but it reported zero amounts of releases and waste management.

On- and Off-site Releases

As also shown in Table 3–7, the federal facilities reported on- and off-site releases totaling 63.1 million pounds. The great majority of releases, 62.0 million pounds, occurred on-site. Off-site releases totaled 1.0 million pounds.

TVA facilities dominated the federal agencies' release data, reporting 57.5 million pounds of on- and off-site releases in the new industries. This amount represented 91.1 percent of all releases by all federal facilities, and it included the largest amounts in all release types by both original and new industries (except for 505 pounds of underground injection by the

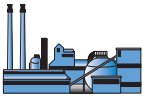


Table 3–7. TRI On-site and Off-site Releases, Federal Facilities, 1998

Federal Agency	Total Facilities Number	Total Forms Number	On-site Releases: Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II–V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Original Industries											
Department of Defense	68	210	1,958,940	878,148	0	0	0	11,762	2,848,850	322,197	3,171,047
Air Force	13	54	916,757	103,447	0	0	0	655	1,020,859	96,917	1,117,776
Army	28	85	516,372	688,253	0	0	0	2,307	1,206,932	101,578	1,308,510
Army Corps of Engineers	2	4	2,700	6	0	0	0	8,800	11,506	0	11,506
Defense Logistics	1	5	5,545	0	0	0	0	0	5,545	0	5,545
Marines	9	18	57,203	15	0	0	0	0	57,218	30,612	87,830
Navy	15	44	460,363	86,427	0	0	0	0	546,790	93,090	639,880
Department of Energy	12	44	302,186	87,300	0	505	14,069	125,081	529,141	17,156	546,297
Department of Interior	1	1	750	4,471	0	0	0	0	5,221	0	5,221
Department of Treasury	9	15	323	0	0	0	0	115,963	116,286	4,075	120,361
Environmental Protection Agency	1	2	0	0	0	0	0	0	0	0	0
Health and Human Services	1	1	0	0	0	0	0	0	0	250	250
National Aeronautics and Space Administration	8	18	168,077	0	0	0	0	0	168,077	2,451	170,528
Tennessee Valley Authority	1	3	30	2,255	0	0	0	15	2,300	1,255	3,555
U.S. Department of Agriculture	3	4	10	0	0	0	0	580,780	580,790	0	580,790
U.S. Enrichment Corporation	2	11	881,979	563	0	0	0	260	882,802	0	882,802
Subtotal for Original Industries	**106**	**309**	**3,312,295**	**972,737**	**0**	**505**	**14,069**	**833,861**	**5,133,467**	**410,700**	**5,544,167**
New Industries											
Department of Defense-Navy	1	1	0	0	0	0	0	0	0	0	0
Department of Energy	2	11	11,362	7,008	0	0	17,494	0	35,864	5,810	41,674
Tennessee Valley Authority	14	160	42,466,280	954,480	0	0	0	13,424,230	56,844,990	624,475	57,469,465
Subtotal for New Industries	**17**	**172**	**42,477,642**	**961,488**	**0**	**0**	**17,494**	**13,424,230**	**56,880,854**	**630,286**	**57,511,140**
Total for Federal Facilities	**123**	**481**	**45,789,937**	**1,934,225**	**0**	**505**	**31,563**	**14,258,091**	**62,014,321**	**1,040,986**	**63,055,307**

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

Energy Department). Notably, TVA's new-industry reporting included 42.5 million pounds of air emissions and 13.4 million pounds of other on-site land releases.

Together, the DOD agencies reported 3.2 million pounds of total releases, including 2.0 million pounds of air emissions. Army releases of 1.3 million pounds consisted of surface water discharges of 688,253 pounds and air emissions of 516,372 pounds. The Air Force's total of 1.1 million pounds consisted principally of air emissions (916,757 pounds).

Waste Management Data

Quantities of TRI Chemicals in Waste

Federal facilities reported managing 152.2 million pounds of TRI chemicals in waste in 1998, as shown in Table 3–8. Quantities released on- and off-site totaled 63.0 million pounds, and on-site treatment totaled 52.5 million pounds. These were the largest waste management types in federal facility reporting.

Approximately two-thirds (105.6 million pounds) of the total production-related waste came from new-industry reporting by TVA facilities. These facilities reported 57.5 million pounds in quantities released on-and off-site and 47.3 million pounds treated on-site.

DOD facilities in the original industries reported the second-largest total, 24.7 million pounds, including the Army's 20.0 million pounds. The Army recycled 13.3 million pounds on-site and 3.8 million pounds off-site. The Treasury Department ranked third among federal agencies for total production-related waste with 15.0 million pounds. Treasury facilities reported off-site recycling of 14.9 million pounds.

Transfers Off-site for Further Waste Management/Disposal

Table 3–9 summarizes federal facility reporting of transfers off-site for further waste management and disposal. Such transfers totaled 22.4 million pounds in 1998. The majority (20.4 million pounds) was transferred off-site to recycling.

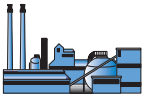
Federal facilities in original TRI industries reported the bulk of the total, with 21.0 million pounds sent off-site for further waste management and disposal. The Treasury Department reported the largest total, with 14.9 million pounds, and Treasury facilities transferred nearly all of this amount off-site to recycling.

Federal facilities reporting new-industry SIC codes reported a total of 1.4 million pounds transferred, consisting of 803,720 pounds sent to recycling, 630,286 pounds to disposal, and 670 pounds to treatment.

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

The federal facilities projected managing increasing quantities of TRI chemicals in waste through the year 2000, as shown in Table 3–10. They expected total production-related waste to increase from 152.2 million pounds in 1998 to 165.7 million pounds in 2000.

This increase was projected by federal facilities reporting in the original TRI industries. They estimated their total to increase from 46.4 million pounds in 1998 (30.5 percent of the total for all federal facilities) to



60.2 million pounds in 2000 (36.3 percent of the total).

Federal facilities in the new industries expected to reduce the production-related waste they managed from 105.7 million pounds in 1998 to 105.5 million pounds in 2000. This would decrease their proportion of total production-related waste reported by federal facilities from 69.5 percent to 63.7 percent of the total for all federal facilities.

These changes were basically projected for 1999, with very little change expected in 2000.

Table 3–8. Quantities of TRI Chemicals in Waste, Federal Facilities by Agency, 1998

	Recycled		Energy Recovery		Treated				
Federal Agency	**On-site** Pounds	**Off-site** Pounds	**On-site** Pounds	**Off-site** Pounds	**On-site** Pounds	**Off-site** Pounds	**Quantity Released On- and Off-site** Pounds	**Total Production-related Waste** Pounds	**Non-production-related Waste** Pounds
Original Industries									
Department of Defense	14,591,456	4,388,829	0	251,253	1,719,216	555,585	3,183,420	24,689,759	641
Air Force	12,093	81,430	0	63,050	186,171	195,641	1,134,993	1,673,378	**183**
Army	13,259,303	3,760,857	0	88,027	1,412,511	201,231	1,306,454	20,028,383	218
Army Corps of Engineers	0	0	0	0	300	5,700	11,510	17,510	0
Defense Logistics	1,300,285	0	0	0	0	0	5,545	1,305,830	0
Marines	17,575	157,882	0	24,012	1,300	18,291	89,016	308,076	34
Navy	2,200	388,660	0	76,164	118,934	134,722	635,902	1,356,582	206
Department of Energy	162,952	263,767	0	0	3,417,856	207,977	544,411	4,596,963	7,394
Department of Interior	0	0	0	0	0	0	5,130	5,130	0
Department of Treasury	0	14,908,898	0	0	31	0	125,282	15,034,211	0
Environmental Protection Agency	0	0	0	0	0	0	0	0	0
Health and Human Services	0	0	0	0	14,500	16	0	14,516	0
National Aeronautics and Space Administration	315,171	2,991	0	1,249	18,878	20,688	165,313	524,290	2,098
Tennessee Valley Authority	0	57,740	0	0	0	0	2,890	60,630	0
U.S. Department of Agriculture	0	0	0	0	0	0	580,550	580,550	20
U.S. Enrichment Corporation	0	0	0	0	56,500	0	882,796	939,296	0
Subtotal for Original Industries	**15,069,579**	**19,622,225**	**0**	**252,502**	**5,226,981**	**784,266**	**5,489,792**	**46,445,345**	**10,153**
New Industries									
Department of Defense — Navy	0	0	0	0	0	0	0	0	0
Department of Energy	9,555	3,535	0	0	70,301	0	10,496	93,887	31,594
Tennessee Valley Authority	0	901,586	0	0	47,251,000	670	57,473,437	105,626,693	0
Subtotal for New Industries	**9,555**	**905,121**	**0**	**0**	**47,321,301**	**670**	**57,483,933**	**105,720,580**	**31,594**
Total for Federal Facilities	**15,079,134**	**20,527,346**	**0**	**252,502**	**52,548,282**	**784,936**	**62,973,725**	**152,165,925**	**41,747**

Note: *Data are from Section 8 of Form R.*

Table 3–9. TRI Transfers Off-site for Further Waste Management/Disposal, Federal Facilities, 1998

Federal Agency	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs: Non-metal TRI Chemicals Pounds	Transfers to POTWs: Metals and Metal Compounds Pounds	Other Transfers Off-site to Disposal* Pounds	Total Transfers for Further Waste Management/ Disposal Pounds
Original Industries							
Department of Defense	4,382,361	218,541	398,580	112,273	1,714	363,998	5,477,467
Air Force	81,738	51,809	118,423	98,033	828	105,436	456,267
Army	3,765,095	70,814	137,715	928	806	134,188	4,109,546
Army Corps of Engineers	0	0	0	5,700	0	0	5,700
Defense Logistics	0	0	0	0	0	0	0
Marines	157,248	24,212	18,076	209	0	31,364	231,109
Navy	378,280	71,706	124,366	7,403	80	93,010	674,845
Department of Energy	262,623	0	4,637	202,000	7	20,716	489,983
Department of Interior	0	0	0	0	0	0	0
Department of Treasury	14,896,082	0	0	0	1,025	3,050	14,900,157
Environmental Protection Agency	0	0	0	0	0	0	0
Health and Human Services	0	0	0	0	0	250	250
National Aeronautics and Space Administration	2,957	1,000	6,347	0	0	18,685	28,989
Tennessee Valley Authority	57,550	0	0	0	0	1,255	58,805
U.S. Department of Agriculture	0	0	0	0	0	0	0
U.S. Enrichment Corporation	0	0	0	0	0	0	0
Subtotal for Original Industries	**19,601,573**	**219,541**	**409,564**	**314,273**	**2,746**	**407,954**	**20,955,651**
New Industries							
Department of Defense — Navy	0	0	0	0	0	0	0
Department of Energy	415	0	0	0	0	5,811	6,226
Tennessee Valley Authority	803,305	0	670	0	0	624,475	1,428,450
Subtotal for New Industries	**803,720**	**0**	**670**	**0**	**0**	**630,286**	**1,434,676**
Total for Federal Facilities	**20,405,293**	**219,541**	**410,234**	**314,273**	**2,746**	**1,038,240**	**22,390,327**

Note: *Data are from Section 8 of Form R.*

**Does not include transfers of metals and metal compounds to POTWs.*

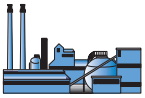
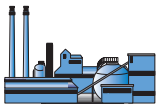


Table 3–10. Current Year and Projected Quantities of TRI Chemicals in Waste, Federal Facilities, 1998–2000

Federal Agency	Current Year 1998 Total Pounds	Current Year 1998 Percent of Total	Projected 1999 Total Pounds	Projected 1999 Percent of Total	Projected 2000 Total Pounds	Projected 2000 Percent of Total
Original Industries						
Department of Defense	24,689,759	16.2	24,271,175	14.6	24,409,447	14.7
Air Force	1,673,378	1.1	1,504,492	0.9	1,445,299	0.9
Army	20,028,383	13.2	19,929,557	12.0	19,833,779	12.0
Army Corps of Engineers	17,510	0.0	9,750	0.0	10,150	0.0
Defense Logistics	1,305,830	0.9	1,315,200	0.8	1,433,665	0.9
Marines	308,076	0.2	327,268	0.2	294,672	0.2
Navy	1,356,582	0.9	1,184,908	0.7	1,391,882	0.8
Department of Energy	4,596,963	3.0	4,994,014	3.0	4,906,409	3.0
Department of Interior	5,130	0.0	5,130	0.0	5,130	0.0
Department of Treasury	15,034,211	9.9	29,127,454	17.6	29,083,353	17.6
Environmental Protection Agency	0	0.0	0	0.0	0	0.0
Health and Human Services	14,516	0.0	14,500	0.0	14,500	0.0
National Aeronautics and Space Administration	524,290	0.3	370,563	0.2	296,476	0.2
Tennessee Valley Authority	60,630	0.0	60,630	0.0	60,630	0.0
U.S. Department of Agriculture	580,550	0.4	541,113	0.3	527,800	0.3
U.S. Enrichment Corporation	939,296	0.6	904,955	0.5	876,655	0.5
Subtotal for Original Industries	**46,445,345**	**30.5**	**60,289,534**	**36.4**	**60,180,400**	**36.3**
New Industries						
Department of Defense — Navy	0	0.0	0	0.0	0	0.0
Department of Energy	93,887	0.1	15,020	0.0	14,020	0.0
Tennessee Valley Authority	105,626,693	69.4	105,521,900	63.6	105,522,019	63.7
Subtotal for New Industries	**105,720,580**	**69.5**	**105,536,920**	**63.6**	**105,536,039**	**63.7**
Total for Federal Facilities	**152,165,925**	**100.0**	**165,826,454**	**100.0**	**165,716,439**	**100.0**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*



❖ Metal Mining (SIC Code 10) ❖

Introduction

Metal mining facilities in SIC code 10 explore for metallic minerals, develop mines, and conduct mining and milling operations for the production of metals, as listed in Box 3–3. These facilities also reclaim the lands mined. Ores recovered for extraction and beneficiation are valued for the metals they contain. Metals are used in consumer and industrial products such as metal alloys, chemicals, and electronics, various modes of transportation, and other products.

Products and Services

Mining operations are classified by the ores they extract. Facilities in six categories reported to TRI for the first time in the 1998 reporting year. These include copper (SIC code 1021), lead and zinc (SIC code 1031), gold (SIC code 1041), and silver (SIC code 1044). Also included are ferroalloy ores (SIC code 1061, alloys containing iron) such as chromium, manganese, molybdenum, nickel ore, and tungsten. The miscellaneous metal ores category (SIC code 1099) includes ores of aluminum, antimony,

Box 3–3. SIC Code 10, Metal Mining: Codes and Classifications Required to Report to TRI

SIC Code 10, Metal Mining: Codes and Classifications Required to Report to TRI

1021	Copper Ores	Mining, milling, or otherwise preparing copper ores. Recovery of copper concentrates by precipitation and leaching.
1031	Lead and Zinc Ores	Mining, milling or otherwise preparing lead ores, zinc ores, or lead-zinc ores.
1041	Gold Ores	Mining gold ores from lode deposits. Recovering gold from placer deposits. Includes amalgamation, cyanidation, and production of bullion at mine, mill, or dredge sites.
1044	Silver Ores	Mining, milling or otherwise preparing silver ores. Includes production of bullion at mine or mill sites.
1061	Ferroalloy Ores, Except Vanadium	Mining, milling or otherwise preparing ferroalloy ores, except vanadium. Includes chromium, cobalt, molybdenum, nickel, and others.
1099	Miscellaneous Metal Ores, Not Elsewhere Classified	Mining, milling or otherwise preparing miscellaneous metal ores, including aluminum, antimony, mercury, tin, and others.

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987.*

bauxite, beryllium, quicksilver (mercury), thorium, tin, and others. Three mining-related SIC codes are currently not subject to TRI reporting: iron ores (SIC code 1011), metal mining services (SIC code 1081), and uranium-radium-vanadium ores (SIC code 1094).

Metal mined by the metal mining sector are the primary raw materials used in many industrial applications and thus are essential to the U.S. and world economies. For example, copper is used in automobiles, household appliances, computers, residential plumbing and wiring, and industrial motors. Although used internationally primarily in investment, jewelry and the decorative arts, gold is also important particularly in the U.S. where the majority is used in electronics, architecture, space exploration, and communications and in medicine. The primary use of lead is in battery production. Lead is also used in radiation shielding and in fuel tanks, solder, seals and bearings. Photographic technologies represent the largest application of silver. Other silver applications occur in electronics, electroplated and sterling ware, and jewelry. The largest use of zinc is in galvanizing other metals, especially steel. Zinc is also used in alloys, such as brass and bronze. Molybdenum is used in metal alloys and lubricants.

Employment and Production

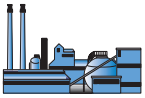
U.S. metal mining directly employed an estimated 37,900 employees in 1997. Mining employment has fluctuated around 40,000 through most of the 1990s; in 1995, the total was 41,000 production workers. Metals mined in 1997 were valued at $9.17 billion, down from $14.0 billion in 1995.

Some 180 metal ore mines operated in the United States in 1997 (the most recent year data are available). In 1998, U.S. mines extracted nearly 1.9 million tons of copper, 350,000 tons of gold, 460,000 tons of lead, 2.1 million tons of silver, and 655,000 tons of zinc (metric tons, preliminary data). Metals often occur together. Gold and silver, for example, may be byproducts of copper mining; molybdenum may also be recovered with copper.

Copper, gold and silver are principally mined in the Western states. Zinc mining occurs largely in Alaska and Tennessee, with additional mines operating in Missouri and New York. Mining of lead deposits occurs principally in Missouri and to a lesser extent in Alaska, Colorado, Idaho, and Montana. The 15 metals mines with the largest output of crude ore in 1996 included six copper mines in Arizona, three gold mines in Nevada, and one copper mine each in New Mexico and Utah.

General Environmental Issues

Hardrock mining is a large-scale industrial activity that takes place in the natural environment potentially disturbing large amounts of material and land area. Mining operations and the resulting pollutants can affect surface and ground water, decrease air quality, contaminate soils, and diminish ecosystem quality. Large amounts of mining waste are generated because of the high waste-to-product ratios associated with producing most ores. At mining sites, the major pollutant sources of concern include waste rock, tailings, heap leaches/dump leaches, and mine water. Environmental concerns have often focused on water pollution from acid rock drainage and mobilization of toxic metals, mine water, and leaching processes.



The formation of acid rock drainage (ARD) and the associated solubilization of toxic metals from waste rock is a major environmental problem facing the metal mining industry. Acid rock drainage primarily depends on the mineralogy of the rock material and the availability of water and oxygen. Although testing methods used to predict acid rock drainage have improved in recent years, there is often substantial uncertainty, and new mines can develop unpredicted acid rock drainage after only a few years of operation.

The potential for a mine or its associated waste rock to generate acid and solubilization of metals depends on many site-specific factors. Acid rock drainage occurs at mine sites when metal sulfide minerals are oxidized. Before mining commences, oxidation of these minerals and the formation of sulfuric acid is a slow function of the natural weathering process. Mining operations increase the rate of these same chemical reactions by moving sulfide-bearing waste rock material to the surface and thereby exposing the material to air and water. The previously buried metals in waste rock are exposed to the elements upon excavation and become susceptible to leaching by rain and snow. Unless carefully controlled and monitored, the leaching process can result in environmental transport and can lead to ground and surface water sources contaminated with heavy metals and other toxic chemical pollution that would not have occurred naturally.

Mine water from rain, from flows into surface or underground mines, or from groundwater tapped by mining may also carry dissolved pollutants (primarily metals, sulfates, and nitrates) to local ground and surface water. While acid rock drainage can enhance contaminant mobility by promoting leaching from exposed wastes and mine structures, solubilization of metals and other pollutants can also occur under neutral pH conditions. Primary sources of metals and other pollutants from metal mining operations include underground and surface mine workings, direct discharges from conventional milling/beneficiation operations, leach piles and processing facilities, chemical storage areas (runoff and spills), and reclamation activities. Mines opened since 1978 are required to treat their effluent water, but the need for such treatment can continue for decades after mining operations cease. Significant releases also occur with the disposal of waste rock.

Cyanide is used to extract gold and other metals. Continued improvements in cyanidation technology have allowed the economic mining of increasingly lower-grade ores. Overall, cyanide can cause three major types of environmental impacts: (1) cyanide-containing ponds and ditches can present an acute hazard to wildlife and birds; (2) spills can result in cyanide reaching surface water or ground water (fishkills and contamination of drinking water); and (3) cyanide in active heaps, ponds, and in mining wastes may be released and present hazards to surface or groundwater.

Environmental impacts continue when mines close. Mining operations close during temporary shutdowns (in response to economic conditions) or they may be permanently decommissioned. Permanent closure includes not only regrading and revegetation, but also removing or disposing of stored fuels and chemicals, tearing down structures, removing roadways and ditches, sealing adits (mine entrances), capping tailings, detoxifying waste, and mak-

ing final removal of sediment control structures and/or reestablishing drainage ways. Many closure situations require long-term maintenance, such as fueling and lubricating environmental control equipment as well as maintaining water diversions, dam stability, water treatment, and treatment sludge management. Substantial risk of inadequate attention to proper site closure exists when funding is not adequate for these expenses. Reclamation cost estimates—and bonds—are still sometimes based primarily on regrading and revegetation.

Processes Involving Toxic Chemicals

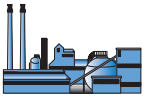
The extraction and beneficiation of metals necessarily leads to the generation of large quantities of waste. Because relatively large amounts of ore are handled to remove the small percentages of valuable minerals, this sector reports significantly larger amounts to TRI than the original industries.

Conventional underground and surface mining techniques are employed for mineral hardrock mining in the U.S. Underground mining involves sinking a shaft to the level of the ore and cutting passages from which the ore is removed. Surface mining involves removal of overlying materials to expose the ore for excavation. Underground mining generally requires higher ore grades because it is more expensive to mine by underground methods. Surface mining has increased over time as (1) the higher ore grades have been removed; and (2) higher productivity is achieved with the advent of large earth-moving equipment and more economical means of metal extraction.

Copper, lead, zinc, gold, and silver are mined from "lodes." Lodes are mineral deposits in rock that are found where they were originally deposited. Copper, gold, and silver are principally mined from surface or open-pit mines, where vegetation, soil, and rock are removed to expose the ore bearing metal. Lead and zinc, along with antimony, are extracted principally by underground mining. A small portion of U.S. gold and silver is mined from placer deposits. In contrast to lodes, placer deposits are minerals that have been eroded and transported from where they were originally deposited.

TRI regulations distinguish overburden, ore, and waste rock. *Overburden* is the unconsolidated material that overlies a deposit of useful materials or ores. It does not include any portion of ore or waste rock. Overburden is exempt from TRI reporting. A TRI chemical that is a constituent of overburden is not reportable even if the metal mining facility processes or otherwise uses the chemical. However, TRI chemicals used to remove overburden are counted toward the reporting threshold and in calculating releases and other waste management (for example, explosives used to remove overburden are counted while any TRI chemical contained in the overburden is not).

Waste rock is that portion of the ore body that consists of barren or submarginal rock or ore which has been mined but is not of sufficient value to warrant treatment and is, therefore, removed ahead of the beneficiation process. Waste rock varies in size from small particles to boulders. Removal of waste rock containing TRI chemicals to gain access to the target ore does not count toward TRI thresholds, but the releases of TRI chemicals in the waste rock and other waste management of the TRI chemicals are reportable if manufacturing, processing,



or otherwise use thresholds are met elsewhere at the facility. Overburden and waste rock are typically disposed of in piles at the mine site. Overburden often contains suitable plant growth material and is used in reclamation. Overburden and waste rock are often used on-site to backfill completed excavations or sent off-site for use in construction projects.

Mining facilities generally move extracted ores to mills for beneficiation, which concentrates the ore for further processing (smelting). Beneficiation includes reducing the size of the ore by crushing and grinding (also called comminution), sorting, sizing and washing. This is often the first step in beneficiation.

Flotation is the principal means of beneficiating copper, lead, and zinc ores. In flotation, crushed and ground ore is mixed with water and ground to the consistency of a powder. The resulting slurry is transferred to flotation cells where it is combined with reagents (frothers, collectors, such as pine oil) and aerated. The reagents coat the copper minerals causing them to adhere to the air bubbles and float to the surface of the cell for separation. The waste solids ("tailings") sink to the bottom of the flotation cell and are removed. Tailings, having the consistency of fine sand, contain trace amounts of minerals which cannot be recovered in the process. Tailings are released in on-site impoundments. At some facilities tailings are partially dewatered (containing 30 to 60 percent solids) prior to placement in the impoundment, thereby improving stability of the tailings. Tailings impoundments are often monitored for seepage as well as structural soundness. Mining facilities also remove water for reuse and stabilize tailings for long-term storage. Stabilized tailings are often planted with grass, trees, and other vegetation or are capped to prevent windblown emissions.

Other common beneficiation techniques include leaching, solvent extraction, electrowinning precipitation, amalgamation, carbon adsorption, and ion exchange. In dump leaching, the material is placed directly on the ground, often extending over hundreds of acres. A leaching solution is applied, which percolates through the ore, leaching out metals. The type of leaching solution used depends on the characteristics of the ore and the mineral. Sulfuric acid, for example, is used in dump leaching to recover copper ores from surface mining. Dump leaching may continue for years or decades, recovering economically viable quantities of metals. Heap leaching is used for more valuable ores, such as gold, which is typically dissolved using sodium cyanide. In heap leaching operations, one or more impermeable liners are placed under the material to contain the solution and maximize recovery. In addition to the target metal, cyanide solutions applied to heaps will also leach other metals from the ore, including arsenic and lead. Heap leaching often takes place over months rather than years. When leaching no longer produces sufficient mineral value, the spent ore is rinsed or otherwise detoxified and either reclaimed in place or nearby. In some cases, detoxified heap leach material is used for other purposes such as aggregate.

Management of Toxic Chemicals in Waste

The management of TRI chemicals can vary greatly from mine to mine, depending on target mineral(s), extraction methods, beneficiation techniques, and other factors.

The majority of releases reported by mining facilities include chemicals in waste rock and tailings that are released to land. However, there are also releases to surface waters and air.

Air emissions can occur during the extraction of ores. Most of these air emissions tend to be uncontrolled or fugitive air emissions, such as from equipment traffic at the mine site (e.g. in open-pit mining), from rock crushers in pits and mills, and from tailings ponds. Acid aerosols may be generated during leaching operations, wastewater treatment, and other mining activities.

Mining facilities also report releases to surface water and land. Many activities and sources associated with a mine site can release toxic chemicals to surface water. Open pits, tailings ponds, ore and subore stockpiles, heap and dump leach piles as well as waste rock are all potentially significant sources of toxic releases. The mobility of the releases from these sources are magnified by exposure to rainfall and snowfall, with the eventual discharge of surface runoff, produced from rainfall and snow melt, being one mechanism by which toxic metals are transported to surface waters. Seepage from impoundment areas and ground water originating from open pits and mine openings is another example by which toxic metals can be mobilized and eventually transported to surface waters. Transport of toxic chemicals to surface waters may also occur indirectly via ground water. Water control technologies are used to divert water (including rainfall) from exposure to waste rock, to contain contaminated water, to pump mine water and contaminated groundwater, to drain subsurface seepage, and to establish subsurface barriers.

Mining facilities often release large amounts of waste rock and other materials to land. Waste rock typically contains metals, such as lead, cadmium, manganese, zinc, copper, nickel, and arsenic, which have the potential to contaminate both surface waters (e.g., rivers and lakes) and ground waters. Once TRI chemicals in waste rock are released to land and exposed to rain and snow, mining operations can greatly increase the rate of acid rock drainage and the leaching of toxic metals. Unless carefully controlled and monitored, the leaching of waste rock can lead to the contamination of surface and groundwater with heavy metals and other toxic chemical pollution that would not have occurred naturally. Other processes, such as physical beneficiation, create waste that is often disposed of in on-site landfills. In addition, air control devices, such as baghouses designed to reduce particulate emissions from ore grinding activities, may collect solid wastes that require disposal to land. Tailings and spills may also be disposed of in landfills.

1998 TRI Data for Metal Mining

On- and Off-site Releases

Metal mining facilities required to report to TRI had total on- and off-site releases of 3.51 billion pounds in 1998, as shown in Table 3–11. The great majority, 3.47 billion pounds, was released on-site to land. This amounted to 98.9 percent of the industry's reported releases, as shown in Figure 3–1. Virtually all of the on-site land releases were released to land in other than RCRA subtitle C landfills (types of on-site land releases are described in Box 1–4 in Chapter 1).

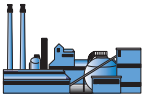
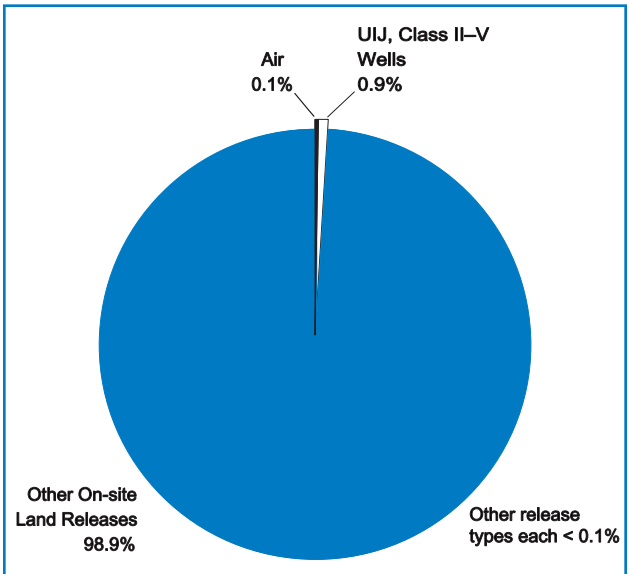


Table 3–11. TRI On-site and Off-site Releases by 4-digit SIC Code, 1998: Metal Mining

SIC Code	Inustry	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection: Class I Wells Pounds	On-site Releases: Underground Injection: Class II–V Wells Pounds	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Releases: On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
1021	Copper Ores	162	608,789	14,936	0	0	0	1,535,826,666	1,536,450,391	42,611	1,536,493,002
1031	Lead and Zinc Ores	86	880,987	52,405	0	32,999,708	54	343,616,758	377,549,912	21	377,549,933
1041	Gold Ores	340	1,850,981	446,739	0	1,404	0	1,072,493,27–	1,074,792,401	55	1,074,792,456
1044	Silver Ores	43	62,762	5,877	0	0	0	158,740,157	158,808,796	181	158,808,977
1061	Ferroalloy Ores, Except Vanadium	30	89,974	2,146	0	0	0	1,088,610	1,180,730	1,244,600	2,425,330
1099	Miscellaneous Metal Ores, *nec**	21	498,038	0	0	0	0	3,702,896	4,200,934	12,289	4,213,223
	Multiple within SIC 10	29	61,421	744	0	0	0	38,490,443	38,552,608	0	38,552,608
	SIC 1021 and SIC 33 (Primary Metals)	29	414,750	0	0	0	0	174,927,636	175,342,386	6,878	175,349,264
	SIC 1021 and SIC 4931 (Electric Utilities)	19	84,634	0	0	0	0	141,637,448	141,722,082	0	141,722,082
	Total	**759**	**4,552,336**	**522,847**	**0**	**33,001,112**	**54**	**3,470,523,891**	**3,508,600,240**	**1,306,635**	**3,509,906,875**

***Note: On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Forms that reported more than one 4-digit SIC code within SIC code 10 are assigned to the "multiple codes" category.
*nec: *not elsewhere classified.*



***Note: On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
UIJ = Underground injection.

Figure 3–1. Distribution of TRI On-site and Off-site Releases, 1998: Metal Mining

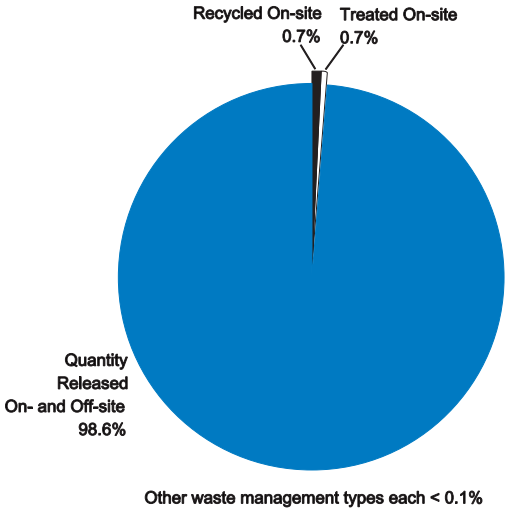
Metal mining facilities injected 33.0 million pounds to underground wells, the second-largest release type for this industry, but this amount represented just 0.9 percent of the total. All of the underground injection was to Class II–V wells (Box 1–4 in Chapter 1 also explains the types of wells).

Copper mining facilities reported 1.54 billion pounds of total releases, the largest total within the industry. Gold mining facilities ranked second with 1.07 billion pounds. Together, copper mining and gold mining accounted for three-quarters (74.4 percent) of the metal mining total for on- and off-site releases. Nearly all of their releases were on-site land releases (also 1.54 billion pounds and 1.07 billion pounds, respectively).

Facilities in the lead and zinc mining industry ranked third for total on- and off-site

releases with a total of 377.5 million pounds. This total included 343.6 million pounds of on-site land releases and virtually all (33.0 million pounds) of the underground injection reporting by metal mines.

Facilities mining ferroalloy ores (except vanadium) reported transfers to disposal of 1.2 million pounds, nearly all of the metal mining industry's 1.3 million pounds of off-site releases. Ferroalloy mining was the only type of metal mining that released a larger amount off-site than on-site.



Note: *Data are from Section 8 of Form R.*

Figure 3–2. TRI Waste Management, 1998: Metal Mining

Waste Management Data

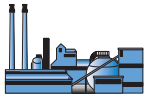
Quantities of TRI Chemicals in Waste

Metal mines reported total production-related waste of 3.72 billion pounds in 1998, including 3.67 billion pounds in quantities released on- and off-site (see Table 3–12). As shown in Figure 3–2, quantities released amounted to 98.6 percent of the industry's total. The next largest waste management types were on-site recycling with 26.3 mil-

Table 3–12. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1998: Metal Mining

SIC Code	Industry	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			
1021	Copper Ores	463,222	960,846	0	0	1,492,693	0	1,647,174,380	1,650,091,141	397,317
1031	Lead and Zinc Ores	8,520,404	0	0	0	0	0	378,264,477	386,784,881	8
1041	Gold Ores	11,291,817	171,279	0	0	19,972,361	16,555	1,123,130,616	1,154,582,628	69
1044	Silver Ores	12	628	0	0	2,003,800	0	158,951,198	160,955,638	22
1061	Ferroalloy Ores, Except Vanadium	0	2,000	0	0	0	0	2,477,452	2,479,452	23
1099	Miscellaneous Metal Ores, *nec**	6,048,108	41,436	0	0	1,131,107	12,670	3,127,675	10,360,996	0
	Multiple within SIC 10	0	47,400	0	0	140,000	0	38,548,427	38,735,827	10
	SIC 1021 and SIC 33 (Primary Metals)	0	0	0	0	6,329	5,466	175,303,816	175,315,611	2,015
	SIC 1021 and SIC 4931 (Electric Utilities)	0	0	0	0	0	0	141,291,913	141,291,913	0
	Total	**26,323,563**	**1,223,589**	**0**	**0**	**24,746,290**	**34,691**	**3,668,269,954**	**3,720,598,087**	**399,464**

Note: *Data are from Section 8 of Form R.*
Forms that reported more than one 4-digit SIC code within SIC code 10 are assigned to the "multiple codes" category.
*nec: *not elsewhere classified.*



lion pounds and on-site treatment with 24.7 million pounds.

Production-related waste totaled 1.65 billion pounds for copper mining and 1.15 billion pounds for gold mining, the largest totals in the metal mining industry. Quantities released were 1.65 billion pounds for copper mining and 1.12 billion pounds for gold mining. Ranking third among metal mining types, lead and zinc mining reported 386.8 million pounds of production-related waste, including 378.3 million pounds in quantities released.

Gold mining facilities reported 20.0 million pounds treated on-site and 11.3 million pounds recycled on-site, the largest amounts in those categories. Metal mines sent little of their TRI chemicals in waste off-site for recycling (1.2 million pounds) or treatment (34,691 pounds) and did not report energy recovery on- or off-site.

Transfers Off-site for Further Waste Management/Disposal

Transfers off-site for further waste management and disposal totaled 2.3 million pounds for the metal mining industry, as shown in Table 3–13. The 4-digit SIC code reporting the largest amount (1.2 million pounds) was mining of ferroalloy ores (except vanadium). Almost all of this amount was sent off-site to disposal. Figure 3–3 shows that other transfers to disposal accounted for 57.5 percent of the metal mining industry's transfers for further waste management and disposal. The industry's other transfers to disposal totaled 1.3 million pounds.

Table 3–13. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1998: Metal Mining

SIC Codes	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs: Non-metal TRI Chemicals Pounds	Transfers to POTWs: Metals and Metal Compounds Pounds	Other Off-site Transfers** Pounds	Other Transfers Off-site to Disposal*** Pounds	Total Transfers for Further Waste Management/ Disposal Pounds
1021	Copper Ores	623,488	0	250	0	0	0	45,990	669,728
1031	Lead and Zinc Ores	0	0	0	0	0	0	21	21
1041	Gold Ores	209,774	0	112	500	0	0	30,829	241,215
1044	Silver Ores	628	0	0	101,482	48	0	133	102,291
1061	Ferroalloy Ores, Except Vanadium	2,000	0	0	0	750	0	1,243,850	1,246,600
1099	Miscellaneous Metal Ores, *nec**	41,436	0	0	0	0	0	12,670	54,106
	Multiple within SIC 10	8,400	0	0	0	0	0	0	8,400
	SIC 1021 and SIC 33 (Primary Metals)	0	0	0	0	0	0	6,878	6,878
	SIC 1021 and SIC 4931 (Electric Utilities)	0	0	184	0	0	0	0	184
	Total	**885,726**	**0**	**546**	**101,982**	**798**	**0**	**1,340,371**	**2,329,423**

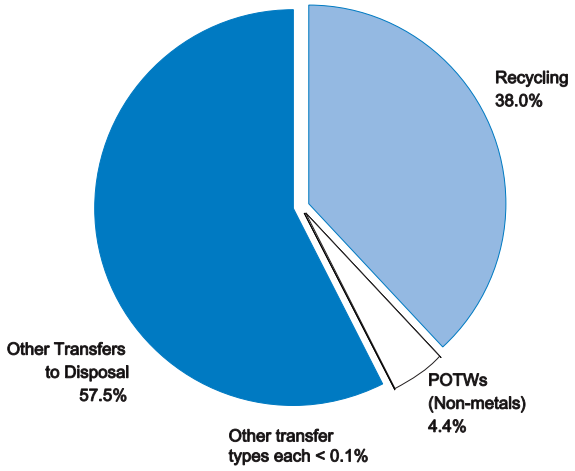
Note: *Data are from Section 6 of Form R.*
Forms that reported more than one 4-digit SIC code within SIC code 10 are assigned to the "multiple codes" category.
*nec: *not elsewhere classified.*
***Other Off-site Transfers reported without valid waste management code.*
****Does not include transfers of metals and metal compounds to POTWs.*

TRI Data by State

Nevada metal mining facilities submitted 273 forms, the largest number of any state, followed by Arizona with 109 forms. New Mexico ranked third with 55 forms.

On- and Off-site Releases

Metal mines in Nevada and Arizona reported total on- and off-site releases of 1.26 billion pounds and 1.01 billion pounds, respectively, as shown in Table 3–14 . Utah ranked third with 449.1 million pounds. As shown in Map 3–1, metal mines reported to TRI in 20 states, largely in the western United States.



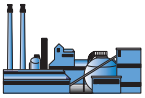
Note: *Data are from Section 8 of Form R.*

Figure 3–3. Distribution of TRI Transfers Off-site for Further Waste Management/Disposal, 1998: Metal Mining

Table 3–14. Summary of TRI Information by State, 1998: Metal Mining

		On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
State	Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Alaska	35	511,214	1,335	0	29,024,000	0	274,958,589	304,495,138	21	304,495,159
Arizona	109	584,912	193	0	0	0	1,005,141,555	1,005,726,660	46,908	1,005,773,568
California	45	362,004	5	0	0	0	8,373,318	8,735,327	12,289	8,747,616
Colorado	19	10,768	1,422	0	3,975,708	0	10,322,879	14,310,777	290,000	14,600,777
Delaware	4	11,963	0	0	0	0	0	11,963	750	12,713
Florida	1	0	0	0	0	0	0	0	0	0
Idaho	29	8,693	7,924	0	0	0	45,176,356	45,192,973	33	45,193,006
Illinois	8	16,521	0	0	0	0	0	16,521	593,396	609,917
Missouri	21	139,670	29,661	0	0	0	47,112,532	47,281,863	0	47,281,863
Montana	39	143,173	0	0	0	0	68,280,457	68,423,630	0	68,423,630
Nevada	273	1,453,263	236,050	0	1,404	0	1,261,552,860	1,263,243,577	38	1,263,243,615
New Mexico	55	332,059	8	0	0	0	221,846,712	222,178,779	0	222,178,779
New York	9	65,560	5,973	0	0	0	10,073,005	10,144,538	0	10,144,538
Oregon	12	10,460	0	0	0	0	18,179,396	18,189,856	0	18,189,856
South Carolina	10	24,000	0	0	0	0	22,993,000	23,017,000	0	23,017,000
South Dakota	15	85,608	210,595	0	0	0	16,851,505	17,147,708	15	17,147,723
Tennessee	26	177,725	14,939	0	0	54	10,560,032	10,752,750	0	10,752,750
Texas	4	54,030	0	0	0	0	0	54,030	360,600	414,630
Utah	38	533,668	14,742	0	0	0	448,554,670	449,103,080	2,581	449,105,661
Washington	7	27,045	0	0	0	0	547,025	574,070	4	574,074
Total	**759**	**4,552,336**	**522,847**	**0**	**33,001,112**	**54**	**3,470,523,891**	**3,508,600,240**	**1,306,635**	**3,509,906,875**

Note: ***On-site Releases*** *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*



Nevada, Arizona, and Utah also had the largest on-site land releases (99.9 percent of total releases in each of the three states): 1.26 billion pounds in Nevada, 1.01 billion pounds in Arizona, and 448.6 million pounds in Utah. On-site land releases amounted to more than 90 percent of total releases in 15 of the 20 states with reporting by metal mines.

Alaska's metal mining facilities reported the largest underground injection, 29.0 million pounds. Facilities in Colorado reported 4.0 million pounds of underground injection.

Metal mining facilities reported less than 5 million pounds each for the other release types.

Waste Management Data

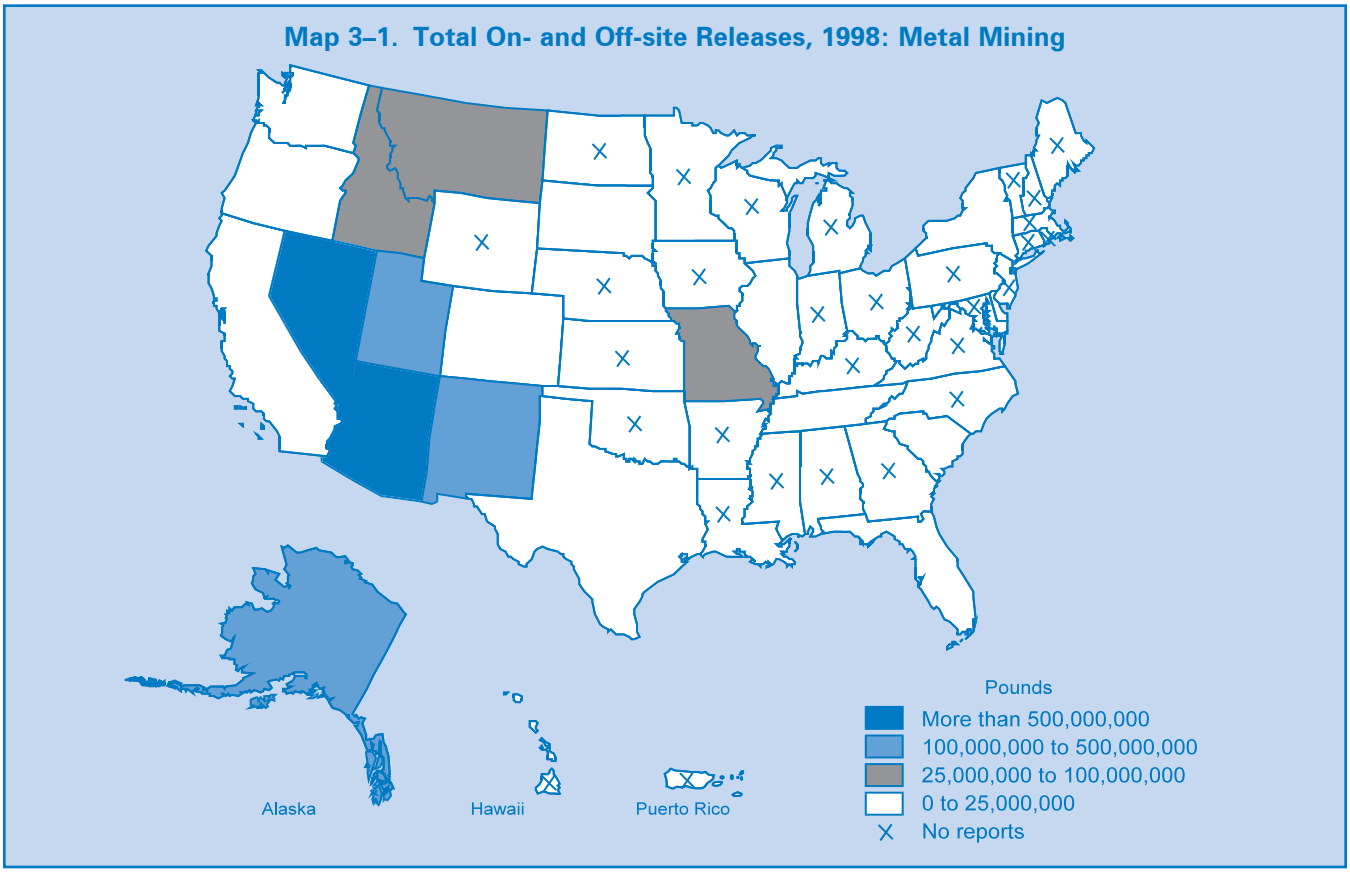
Nevada, Arizona, and Utah reported the largest total production-related waste in 1998. These were the same states that ranked highest for total releases. Nevada's production-related waste totaled 1.33 billion pounds. Arizona facilities reported 1.11 billion pounds, and Utah facilities reported 458.9 million pounds. These data also appear in Table 3–14.

Table 3–14. Summary of TRI Information by State, 1998: Metal Mining *(continued)*

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			
Alaska	520,404	0	0	0	41,631	9,330	305,216,317	305,787,682	11
Arizona	460,522	264,700	0	0	66,199	5,466	1,110,394,842	1,111,191,729	399,307
California	9,908	125,366	0	0	6,375,600	12,670	8,733,609	15,257,153	20
Colorado	0	2,000	0	0	0	0	14,600,497	14,602,497	6
Delaware	0	0	0	0	0	0	11,963	11,963	4
Florida	0	0	0	0	0	0	0	0	0
Idaho	1,730	610	0	0	0	0	45,241,768	45,244,108	7
Illinois	0	0	0	0	0	0	764,649	764,649	7
Missouri	0	0	0	0	0	0	47,280,463	47,280,463	0
Montana	0	39,000	0	0	1,045,707	0	68,809,534	69,894,241	13
Nevada	8,218,376	46,067	0	0	13,233,959	7,199	1,311,576,706	1,333,082,307	34
New Mexico	0	693,846	0	0	0	0	222,969,848	223,663,694	3
New York	0	0	0	0	0	0	10,144,432	10,144,432	0
Oregon	2,530,269	0	0	0	0	0	18,196,996	20,727,265	11
South Carolina	0	0	0	0	0	0	22,680,000	22,680,000	0
South Dakota	542,954	52,000	0	0	3,897,554	3	17,135,614	21,628,125	7
Tennessee	8,000,000	0	0	0	0	0	10,747,637	18,747,637	8
Texas	0	0	0	0	0	0	414,630	414,630	4
Utah	6,039,400	0	0	0	85,640	0	452,755,449	458,880,489	22
Washington	0	0	0	0	0	23	595,000	595,023	0
Total	**26,323,563**	**1,223,589**	**0**	**0**	**24,746,290**	**34,691**	**3,668,269,954**	**3,720,598,087**	**399,464**

Note: *Data are from Section 8 of Form R.*

Map 3–1. Total On- and Off-site Releases, 1998: Metal Mining



Quantities released on- and off-site accounted for more than 98 percent of total production-related waste in 15 states. These included Nevada, Arizona, and Utah which also reported the largest quantities: Nevada with 1.31 billion pounds, Arizona with 1.11 billion pounds, and Utah with 452.8 million pounds.

States with the largest on-site recycling were Nevada with 8.2 million pounds and Tennessee with 8.0 million pounds, followed by Utah with 6.0 million pounds. Nevada also reported the largest on-site treatment (13.2 million pounds), followed by California (6.4 million pounds) and South Dakota (3.9 million pounds).

Top 15 Chemicals for On- and Off-site Releases

The top 15 chemicals released by the metal mining industry were metals (largely in metal compounds). On- and off-site releases of the top 15 chemicals totaled 3.47 billion pounds in 1998 (see Table 3–15). These 15 metals and metal compounds amounted to 98.9 percent of the industries' total releases.

The metal mining industry released 1.21 billion pounds of copper compounds, which ranked first. On- and off-site releases of zinc compounds totaled 615.5 million pounds, the second-largest amount. Arsenic compounds ranked third with 513.4 million pounds.

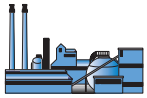


Table 3–15. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1998: Metal Mining

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
—	Copper compounds	292,772	68,406	0	1,195,884	0	1,211,494,611	1,213,051,673	41,475	1,213,093,148
—	Zinc compounds	175,309	49,498	0	21,391,870	54	593,925,427	615,542,158	4,480	615,546,638
—	Arsenic compounds	46,092	5,590	0	760,075	0	512,544,503	513,356,260	281	513,356,541
—	Manganese compounds	88,328	6,805	0	720,000	0	409,678,272	410,493,405	1,221,305	411,714,710
7440-50-8	Copper	8,312	0	0	0	0	276,482,439	276,490,751	0	276,490,751
—	Lead compounds	172,859	10,591	0	7,279,134	0	202,731,841	210,194,425	16,958	210,211,383
7440-38-2	Arsenic	36,121	1,027	0	0	0	74,436,144	74,473,292	0	74,473,292
—	Chromium compounds	23,299	257	0	0	0	44,157,907	44,181,463	412	44,181,875
—	Nickel compounds	10,103	5,080	0	22,008	0	35,959,117	35,996,308	47	35,996,355
—	Antimony compounds	1,348	6,995	0	170,062	0	22,121,777	22,300,182	0	22,300,182
—	Barium compounds	5,619	5	0	1,200,000	0	12,065,102	13,270,726	9,600	13,280,326
7440-47-3	Chromium	875	20	0	12,000	0	12,865,961	12,878,856	1	12,878,857
—	Thallium compounds	1,132	250	0	0	0	9,861,750	9,863,132	0	9,863,132
—	Mercury compounds	4,610	22	0	0	0	8,804,097	8,808,729	2	8,808,731
—	Cobalt compounds	886	1	0	12,001	0	8,615,276	8,628,164	45	8,628,209
	Subtotal	**867,665**	**154,547**	**0**	**32,763,034**	**54**	**3,435,744,224**	**3,469,529,524**	**1,294,606**	**3,470,824,130**
	Total	**4,552,336**	**522,847**	**0**	**33,001,112**	**54**	**3,470,523,891**	**3,508,600,240**	**1,306,635**	**3,509,906,875**

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

On-site land releases accounted for 90 percent to 100 percent of the releases of all 15 chemicals. A total of 3.44 billion pounds of the 15 chemicals was released on-site to land. Underground injection, the second-largest release type, totaled 32.8 million pounds, including 21.4 million pounds of zinc compounds.

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

Facilities in the metal mining industry expected to reduce their production-related waste 12.2 percent from 3.72 billion pounds in 1998 to 3.27 billion pounds in 2000. These projections are presented in Table 3–16. The projected overall reduction reflects the industry's projected decrease in quantities released on- and off-site, which dominated the industry's totals. Metal mining facilities expected to reduce their quantities released on- and off-site from 3.67 billion pounds in 1998 to 3.22 billion pounds in 2000. However, quantities released—the least desirable outcome under the waste management hierarchy (described in Waste Management in Chapter 1)—were expected to decrease only from 98.6 percent to 98.5 percent of the industry's production-related waste.

Source Reduction

The metal mining industry reported undertaking source reduction activity on 33 forms during 1998 (see Table 3–17). As noted in Waste Management in Chapter 1, source reduction—activity that prevents

the generation of waste—is the preferred waste management option.

Facilities mining lead and zinc ores submitted 16 of the forms reporting source reduction activity. The 16 forms amounted to 19.0 percent of the lead and zinc mining forms. The group of forms that reported both SIC code 1021 (copper ores) and SIC code 33 (primary metals products) included 12 forms indicating source reduction activity, which was 41.4 percent of all the forms in that group.

Spill and leak prevention was identified on 25 forms, making it the most frequent source reduction activity in the industry. Good operating practices was reported on 17 forms and process modifications on 13 forms.

Table 3–16. Current Year and Projected Quantities of TRI Chemicals in Waste, 1998–2000: Metal Mining

	Current Year 1998		Projected 1999		Projected 2000	
Waste Management Activity	**Total** Pounds	**Percent of Total**	**Total** Pounds	**Percent of Total**	**Total** Pounds	**Percent of Total**
Recycled On-site	26,323,563	0.7	23,835,165	0.7	23,902,226	0.7
Recycled Off-site	1,223,589	0.0	1,133,171	0.0	1,116,351	0.0
Energy Recovery On-site	0	0.0	0	0.0	0	0.0
Energy Recovery Off-site	0	0.0	0	0.0	0	0.0
Treated On-site	24,746,290	0.7	24,327,248	0.7	24,298,670	0.7
Treated Off-site	34,691	0.0	33,210	0.0	43,206	0.0
Quantity Released On- and Off-site	3,668,269,954	98.6	3,387,925,634	98.6	3,215,961,971	98.5
Total Production-related Waste	**3,720,598,087**	**100.0**	**3,437,254,428**	**100.0**	**3,265,322,424**	**100.0**

Waste Management Activity	**Projected Change 1998–1999** Percent	**Projected Change 1999–2000** Percent	**Projected Change 1998–2000** Percent
Recycled On-site	–9.5	0.3	–9.2
Recycled Off-site	–7.4	–1.5	–8.8
Energy Recovery On-site	—	—	—
Energy Recovery Off-site	—	—	—
Treated On-site	–1.7	–0.1	–1.8
Treated Off-site	–4.3	30.1	24.5
Quantity Released On- and Off-site	–7.6	–5.1	–12.3
Total Production-related Waste	**–7.6**	**–5.0**	**–12.2**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*

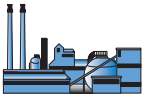


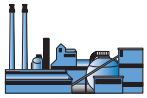
Table 3–17. Number of Forms Reporting Source Reduction Activity, 1998: Metal Mining

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
1021	Copper Ores	155	3	1.9	1	0	1	0	2	0	0	0
1031	Lead and Zinc Ores	84	16	19.0	3	0	22	0	11	0	0	0
1041	Gold Ores	335	2	0.6	1	1	2	0	0	0	0	0
1044	Silver Ores	43	0	0.0	0	0	0	0	0	0	0	0
1061	Ferroalloy Ores, Except Vanadium	30	0	0.0	0	0	0	0	0	0	0	0
1099	Miscellaneous Metal Ores, *nec**	20	0	0.0	0	0	0	0	0	0	0	0
	Multiple within SIC 10	21	0	0.0	0	0	0	0	0	0	0	0
	SIC 1021 and SIC 33 (Primary Metals)	29	12	41.4	12	0	0	0	0	0	0	0
	SIC 1021 and SIC 4931 (Electric Utilities)	16	0	0.0	0	0	0	0	0	0	0	0
	Total	**733**	**33**	**4.5**	**17**	**1**	**25**	**0**	**13**	**0**	**0**	**0**

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

Forms that reported more than one 4-digit SIC code within SIC code 10 are assigned to the "multiple codes" category.

*nec: *not elsewhere classified.*



❖ Coal Mining (SIC Code 12) ❖

Introduction

Coal mines in SIC code 12 include anthracite and bituminous mines, as listed in Box 3–4. They may be either surface or underground. Anthracite is a hard, compact coal differing from bituminous (or soft) coal in that it contains only a small amount of volatile matter and burns with a nearly smokeless flame. Most coal mined in the United States is bituminous. Coal extraction activities are exempt from TRI reporting. Other coal mining activities, such as beneficiation, must be reported.

Products and Services

Coal is primarily used by electric utilities to generate electricity or by industrial facilities to generate heat and electricity. Some steel mills also use coal to produce coke, which is combined with iron ore and limestone in a blast furnace to produce molten iron, the basic metal in steel. Some coal is burned in residential or commercial buildings to produce heat.

In 1998, electric utilities consumed approximately 90 percent of the coal used in the United States, with 3 percent consumed by coke plants and 6 percent consumed by other industrial facilities.

Employment and Production

Coal mining employment totaled 87,800 (i.e., this includes production, development, and office workers) in 1997, and production was valued at $23.38 billion. (These data approximately correlate to the SIC codes covered by TRI, but they include extraction activities that are excluded in TRI.)

Box 3–4. SIC Code 12, Coal Mining: Codes and Classifications Required to Report to TRI

SIC Code 12, Coal Mining: Codes and Classifications Required to Report to TRI

1221	Bituminous Coal and Lignite Surface Mining	Producing bituminous coal or lignite at surface mines or developing such surface mines. Includes coal preparation plants associated with a mine or operated independently of any mine.
1222	Bituminous Coal Underground Mining	Producing bituminous coal in underground mines or developing such mines. Includes coal preparation plants associated with a mine.
1231	Anthracite Mining	Producing anthracite or developing anthracite mines. Includes anthracite preparation plants.

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*.

Nearly 1.12 billion tons of coal was produced in the United States in 1998. Just over half (50.1 percent) of the coal is produced in states east of the Mississippi River, with West Virginia accounting for 31 percent and Kentucky for 27 percent of the Eastern total. Production in the eastern United States is primarily from underground operations and consists largely of coal with a high sulfur content. Anthracite is mined only in eastern Pennsylvania. Wyoming accounts for 57 percent of the total produced in the western United States and contains the largest surface mines in the world producing low-sulfur coal.

The 1998 production level represented an 8.2 increase over 1995. Regions west of the Mississippi River experienced the greatest increase throughout this period. In the last year, from 1997 to 1998, eastern coal production declined 3.2 percent, while in the west, coal output rose 7.2 percent. Western coal costs less and its lower sulfur content makes it more attractive to electric utilities (and others) responding to the sulfur emissions reduction requirements of the 1990 Clean Air Act Amendments. In the eastern United States, particularly in the Appalachian region, the secondary market for coal is coke plants. As steel mills turn to greater use of recycled scrap metals, the demand for coke has fallen.

There are about 1,750 coal mines in the United States, employing an estimated 80,000 miners. About half the mines are underground and half surface mines. These numbers steadily decreased in recent years. In 1995, some 2,100 coal mines employed more than 90,000 miners. While mines closed and employment fell, however, production rose from 1.03 billion tons in 1995 to an estimated 1.12 billion tons in 1998.

Coal production was valued at $20.0 billion in 1998, up from $19.5 billion in 1995.

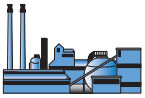
General Environmental Issues

Environmental concerns associated with coal mining have generally focused on water pollution from acid mine drainage and mine water. These concerns involve both active and closed mines. At active mine sites, release of pollutants to water, air, or both may occur during various operations of a coal preparation plant. Storage and transportation are both likely sources of air emissions.

As noted above, coal mine extraction activities are exempt from TRI reporting. However, coal mining operations also may crush or size coal or wash and/or dry the coal to improve its burning qualities before it is shipped to electric utilities. Impurities in the coal, such as metals and metal compounds and sulfur, may be released or generated as waste during a variety of coal mining activities:

- transportation of the coal (fugitive air emissions)
- coal preparation (fugitive air emissions and wastewater)
- coal cleaning (wastewater and on-site land disposal of tailings)
- coal drying (point source air emissions and on-site land disposal from coal combustion)
- storage (water run-off from rain)
- reclamation (on-site land disposal)
- recovery of fly-ash from plants burning the coal (on-site land disposal)

As with metal mining, environmental impacts continue when coal mines close.



Some coal-mining states began requiring reclamation efforts as early as the 1940s. However, the federal Surface Mining Control and Reclamation Act, passed in 1997, established stringent national standards. The Act addresses not only surface mining and reclamation, but also coal exploration and the surface effects of underground coal mining. Provisions are implemented by coal-mining states that have federally approved programs. Mining states have generally amended their mining laws or passed new legislation conforming to these provisions. When mines or portions of mines close, the federal and state laws require that the site be reclaimed. Reclamation involves regrading and revegetation as well as removing structures, removing stored fuels and chemicals, and capping tailings impoundments to maintain environmental controls and contain mine drainage. Coal mining facilities may use ash from on-site combustion (for example, during thermal drying) as well as ash returned by electric utilities that combust coal in reclamation activities.

Processes Involving Toxic Chemicals

Coal occurs in deposits, generally almost uniform, under the earth's surface. Mining operations obtain raw coal by surface mining (removing the material above the coal) or by underground mining (sinking shafts or driving adits and excavating corridors to gain access to the coal). Coal extraction activities are exempt from TRI reporting because they do not typically involve the use of listed toxic chemicals in reportable concentrations. Coal itself is generally expected to contain TRI chemicals in concentrations below the reporting requirements. Other activities, after extraction, may involve use of TRI chemicals. These activities may also result in releasing impurities from the coal, such as metals and metal compounds and sulfur, that may be reportable to TRI.

Once it has been extracted, coal is usually prepared for commercial use. Coal preparation (also known as beneficiation) involves size reduction, screening/classification, and cleaning and drying. Some plants only size and classify, while others also clean and dry the coal. While coal extraction activities are exempt from TRI reporting, coal preparation activities are not.

Size reduction involves crushing the coal so that it can be handled more easily. The coal is then screened to match size specifications of cleaning equipment as well as to meet market demand. These activities may be carried out in open or closed structures and either wet or dry.

Cleaning coal improves its energy value and removes impurities, such as sulfur and ash-forming elements. For coarse coal, gravity concentration or dense-medium separation may be used. Gravity concentration methods rely on water flow and the motion of the equipment to separate the more dense impurities from the lighter coal. Dense-medium separation uses a large, open tank and pulverized magnetite in water or other medium so that inorganic material sinks to the bottom of the tank and the organic coal floats to the top.

Fine coal cleaning involves chemical conditioning of the coal to adjust the pH (using lime, sodium carbonate, sodium hydroxide, or sulfuric acid) followed by flotation to recover clean coal. Froth flotation, commonly applied, uses air, water, coal slurry and flotation agents. Air bubbles rise through the coal-water slurry, and the fine coal particles adhere to their surfaces. The

coal particles thus rise to the surface and mechanical scrapers remove the flotation agents.

Drying methods complete the coal preparation process. Fine coal is dried using vacuum filtration (using vacuum pressure to force the coal-water mixture through a porous filtering medium which captures the coal) and thermal drying (using a furnace). Coarse coal usually does not require thermal drying, but excess moisture is removed with drying screens and centrifuge drying.

Coal mines transport and store coal before and after preparation. Extracted coal is often stored in large coal piles both during coal preparation and prior to distribution into commerce. Ethylene glycol may be sprayed on the coal to prevent freezing.

As noted, most of the coal mined in the United States is shipped to electric utilities for combustion in power generation. Coal mines may receive ash from the air pollution control equipment of the facilities to which they supply coal. The mines must report any quantities of toxic chemicals in the ash that are managed as waste, if thresholds are exceeded.

When mines or portions of a mine close, the coal operators may use a variety of chemicals during reclamation of the site. These reclamation activities are reportable so long as they are not part of the extraction activities and are above threshold limits.

Management of Toxic Chemicals in Waste

Air emissions primarily result from crushing and screening the coal and from transporting it. Coal may be moved by truck, rail, or conveyor belt to and from stockpiles, preparation plants, and finally, customers such as power plants and industrial facilities. These activities generate fugitive dust. Many facilities reduce the potential for fugitive air emissions by using wet processes or by enclosing the process area.

Depending on regional weather conditions, mining facilities may spray ethylene glycol on coal to prevent freezing during storage and transport. Fugitive air emissions from such applications are possible, but may be low given the low volatility of ethylene glycol.

Thermal drying, generally the final step in drying fine coal, may also result in air emissions of metals or acids. Other sources of stack or point source air emissions are tanks used to store materials containing volatile chemicals, such as flotation and conditioning agents.

Acidic leachate from coal stored in exposed sites may flow into underground streams or result in surface water discharges, when the coal piles are subject to rain or snow. Other sources of discharges to water include coal preparation and washing. Coal may be conveyed in a wet state (which reduces air emissions); subsequent dewatering can leave metal compounds in the wastewater. Metal compounds may also be present in wastewater from cleaning and rinsing the coal.

During thermal drying, some coal is combusted to provide the necessary heat. The waste ash that results from this process contains TRI chemicals. Electric plants may also return ash from combustion to the mine. Ash generated on-site or received from off-site and used for reclamation is

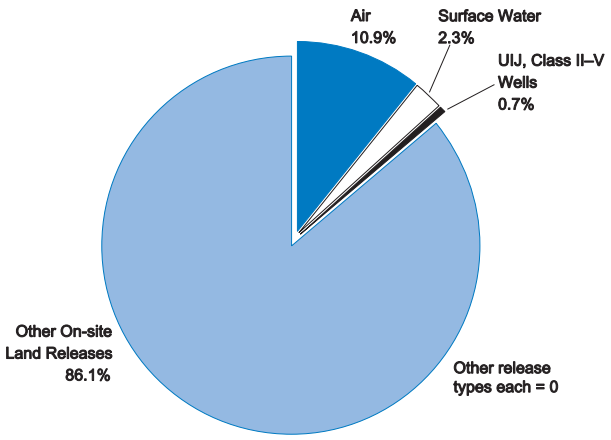
reportable as an on-site land release. Other on-site land releases include tailings from coal cleaning. After flotation during the cleaning of fine coal, wastewater slurry (called tailings) may be sent to a tailings impoundment. The tailings may include thickening agents and other chemicals used in froth flotation.

1998 TRI Data for Coal Mining

On- and Off-site Releases

Coal mining facilities required to report to TRI released 13.3 million pounds of TRI chemicals on- and off-site in 1998, as shown in Table 3–18. The majority, 11.5 million pounds, was released on-site to land in other than RCRA subtitle C landfills (types of on-site land releases are described in Box 1–4 in Chapter 1). Figure 3–4 shows that other on-site releases to land amounted to 86.1 percent of the industry's total releases.

Air emissions by coal mines totaled 1.5 million pounds, the industry's second-largest release type. The coal mining industry reported less than 350,000 pounds each of surface water discharges and underground injection. The industry reported no off-site releases.



*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
UIJ = Underground injection.

Figure 3–4. Distribution of TRI On-site and Off-site Releases, 1998: Coal Mining

Table 3–18. TRI On-site and Off-site Releases by 4-digit SIC Code, 1998: Coal Mining

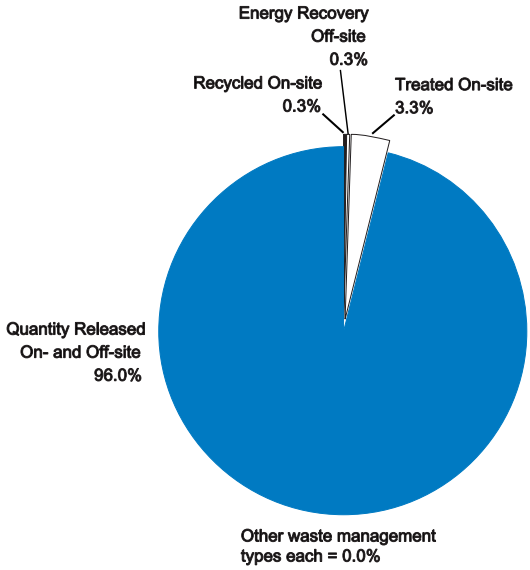
			On-site Releases							Off-site Releases	
					Underground Injection		On-site Land Releases				
SIC Code	Industry	Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
1221	Bituminous Coal and Lignite Surface Mining	101	385,728	173,251	0	480	0	9,162,145	9,721,604	0	9,721,604
1222	Bituminous Coal Underground Mining	80	61,290	17,102	0	90,000	0	2,304,578	2,472,970	0	2,472,970
	Multiple within SIC code 12	9	1,009,457	115,874	0	0	0	4,900	1,130,231	0	1,130,231
	Invalid within SIC code 12	2	1,239	0	0	0	0	0	1,239	0	1,239
	Total	**192**	**1,457,714**	**306,227**	**0**	**90,480**	**0**	**11,471,623**	**13,326,044**	**0**	**13,326,044**

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Forms that reported more than one 4-digit SIC code within the SIC code 12 are assigned to the "multiple codes" category.

Bituminous coal and lignite surface mines reported the largest total releases with 9.7 million pounds. Underground coal mining facilities reported 2.5 million pounds of total releases. These were largely on-site releases to land, 9.2 million pounds by surface mines and 2.3 million pounds by underground mines.

Surface and underground mining accounted for most of the forms submitted in the coal mining industry. Out of 192 forms, surface coal mines submitted 101 forms and underground coal mines submitted 80 forms. No reports were received from anthracite mines in 1998; as noted above, this type of coal is found only in eastern Pennsylvania.

Nine forms were submitted with multiple SIC codes in the SIC code 12 (coal mining). Releases reported by the multiple-codes group totaled 1.1 million pounds. They reported 1.0 million pounds of air emissions, the majority of the industry's releases to air.



Note: *Data are from Section 8 of Form R.*

Figure 3–5. TRI Waste Management, 1998: Coal Mining

Waste Management Data

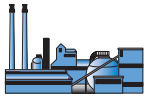
Quantities of TRI Chemicals in Waste

Coal mines reported managing 13.8 million pounds of total production-related waste in 1998, as shown in Table 3–19. Quantities released on- and off-site totaled 13.3 million pounds, or 96.0 percent of the industry's production-related waste (see Figure 3–5).

Table 3–19. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1998: Coal Mining

SIC Code	Industry	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			
1221	Bituminous Coal and Lignite Surface Mining	7,178	0	0	43,735	37,744	0	9,734,158	9,822,815	32
1222	Bituminous Coal Underground Mining	36,000	0	0	0	420,800	0	2,439,181	2,895,981	0
	Multiple within SIC code 12	0	0	0	0	0	0	1,115,575	1,115,575	2
	Invalid within SIC code 12	1,239	0	0	0	0	0	1,239	2,478	2
	Total	**44,417**	**0**	**0**	**43,735**	**458,544**	**0**	**13,290,153**	**13,836,849**	**36**

Note: *Data are from Section 8 of Form R.*
Forms that reported more than one 4-digit SIC code within SIC code 12 are assigned to the "multiple codes" category.



The industry's on-site treatment totaled 458,544 pounds. On-site recycling and off-site energy recovery amounted to approximately 44,000 pounds each.

Surface mines managed 9.8 million pounds of total production-related waste, including 9.7 million pounds of quantities released on- and off-site. Underground mines managed a total of 2.9 million pounds, including 2.4 million pounds in quantities released. All of the 1.1 million-pound total reported by the multiple-codes group was in quantities released on- and off-site.

Transfers Off-site for Further Waste Management

One type of coal mine reported one type of transfers off-site for further waste management in 1998. As shown in Table 3-20, bituminous coal and lignite surface mines transferred 43,735 pounds off-site to recycling.

TRI Data by State

Coal mines in a dozen states reported to TRI in 1998. The states with the largest number of forms from coal mining facilities were Illinois with 55 forms, Ohio with 41 forms, and West Virginia with 28 forms.

On- and Off-site Releases

Coal mining facilities in New Mexico reported the largest total on- and off-site releases in 1998, although New Mexico ranked fourth for number of forms (24 forms) behind Illinois, Ohio, and West Virginia. As shown in Table 3–21, New Mexico's mines reported total releases of 5.6 million pounds, all as on-site releases to land.

Illinois ranked second among coal-mining states with 2.7 million pounds of total releases. Nearly all of this amount was released on-site to land. Together, New Mexico and Illinois facilities reported 72.6 percent of the coal mining industry's on-site land releases.

Table 3–20. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1998: Coal Mining

SIC Codes	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs		Other Transfers Off-site to Disposal* Pounds	Total Transfers for Further Waste Management/ Disposal Pounds
					Non-metal TRI Chemicals Pounds	Metals and Metal Compounds Pounds		
1221	Bituminous Coal and Lignite Surface Mining	43,735	0	0	0	0	0	43,735
1222	Bituminous Coal Underground Mining	0	0	0	0	0	0	0
	Multiple within SIC code 12	0	0	0	0	0	0	0
	Invalid within SIC code 12	0	0	0	0	0	0	0
	Total	**43,735**	**0**	**0**	**0**	**0**	**0**	**43,735**

Note: *Data are from Section 6 of Form R.*
Forms that reported more than one 4-digit SIC code within the SIC code 12 are assigned to the "multiple codes" category.
**Does not include transfers of metals and metal compounds to POTWs.*

West Virginia ranked third among states for coal mining releases with 1.8 millon pounds, including 1.4 million pounds of air emissions. West Virginia facilities reported 93.9 percent of the industry's air emissions.

In two other states, coal mining releases exceeded 1 million pounds. Colorado mines reported 1.6 million pounds and Alabama mines reported 1.0 million pounds. In both of these states, the largest release type was also other on-site land releases (1.6 million pounds in Colorado and 975,000 pounds in Alabama).

Map 3–2 shows the geographic distribution of coal mining releases reported to TRI in 1998.

Waste Management Data

New Mexico, Illinois, and West Virginia also ranked highest among the states for total production-related waste reported by the coal mining industry. These data also appear in Table 3–21. New Mexico facilities managed 5.6 million pounds of production-related waste, the largest amount among the states. This consisted entirely of quantities released on- and off-site. Illinois ranked second, reporting 2.8 million pounds of production-related waste, including 2.7 million pounds in quantities released on- and off-site. West Virginia ranked third, reporting with 1.9 million pounds of total production related waste and 1.8 million pounds in quantities released on- and off-site.

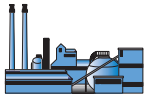
Quantities released on- and off-site amounted to more than 90 percent of production-related waste in nine of the 12 states (Alabama, Colorado, Illinois, Indiana, Kentucky, New Mexico, North Dakota, Virginia, and West Virginia).

Coal mines reported much smaller quantities in other waste management activities.

Table 3–21. Summary of TRI Information by State, 1998: Coal Mining

		On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
State	Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Alabama	1	87	10,000	0	45,000	0	975,000	1,030,087	0	1,030,087
Colorado	8	419	579	0	0	0	1,592,748	1,593,746	0	1,593,746
Illinois	55	1,780	4,843	0	0	0	2,708,418	2,715,041	0	2,715,041
Indiana	8	18,465	0	0	480	0	56,426	75,371	0	75,371
Kentucky	2	14,688	0	0	0	0	4,900	19,588	0	19,588
Maryland	3	13,313	1,450	0	45,000	0	260	60,023	0	60,023
New Mexico	24	0	0	0	0	0	5,620,000	5,620,000	0	5,620,000
North Dakota	2	0	0	0	0	0	96,707	96,707	0	96,707
Ohio	41	2,390	502	0	0	0	750	3,642	0	3,642
Pennsylvania	19	36,853	15	0	0	0	281,695	318,563	0	318,563
Virginia	1	1,630	0	0	0	0	180	1,810	0	1,810
West Virginia	28	1,368,089	288,838	0	0	0	134,539	1,791,466	0	1,791,466
Total	**192**	**1,457,714**	**306,227**	**0**	**90,480**	**0**	**11,471,623**	**13,326,044**	**0**	**13,326,044**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*



The largest was 158,100 pounds of on-site treatment in Pennsylvania.

Top 15 Chemicals for On- and Off-site Releases

Coal mines reported releasing more barium compounds, 7.0 million pounds, than any other chemical. They also reported releases of 1.8 million pounds each of zinc compounds and manganese compounds. Table 3–22 presents data for the 15 chemicals released in the largest amounts by the TRI coal mining facilities.

For barium compounds, ranked first, and manganese compounds, ranked third, the releases consisted almost entirely of on-site land releases. However, for zinc compounds, which ranked second, coal mines released 838,881 pounds to air, as well as 996,310 pounds to on-site releases to land.

Releases of the 15 chemicals totaled 13.26 million pounds, 99.5 percent of the industry's total of 13.33 million pounds of releases.

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

Coal mining facilities reporting to TRI expected to reduce their production-related waste by 7.9 percent from 1998 to 2000, reducing it from a total of 13.8 million pounds to 12.7 million pounds. The projected decrease represents a reduction of 8.8 percent in 1999 followed by an increase of 1.0 percent in 2000. These projections reflect the industry's expected changes in quantities released on- and off-site, as shown in Table 3–23.

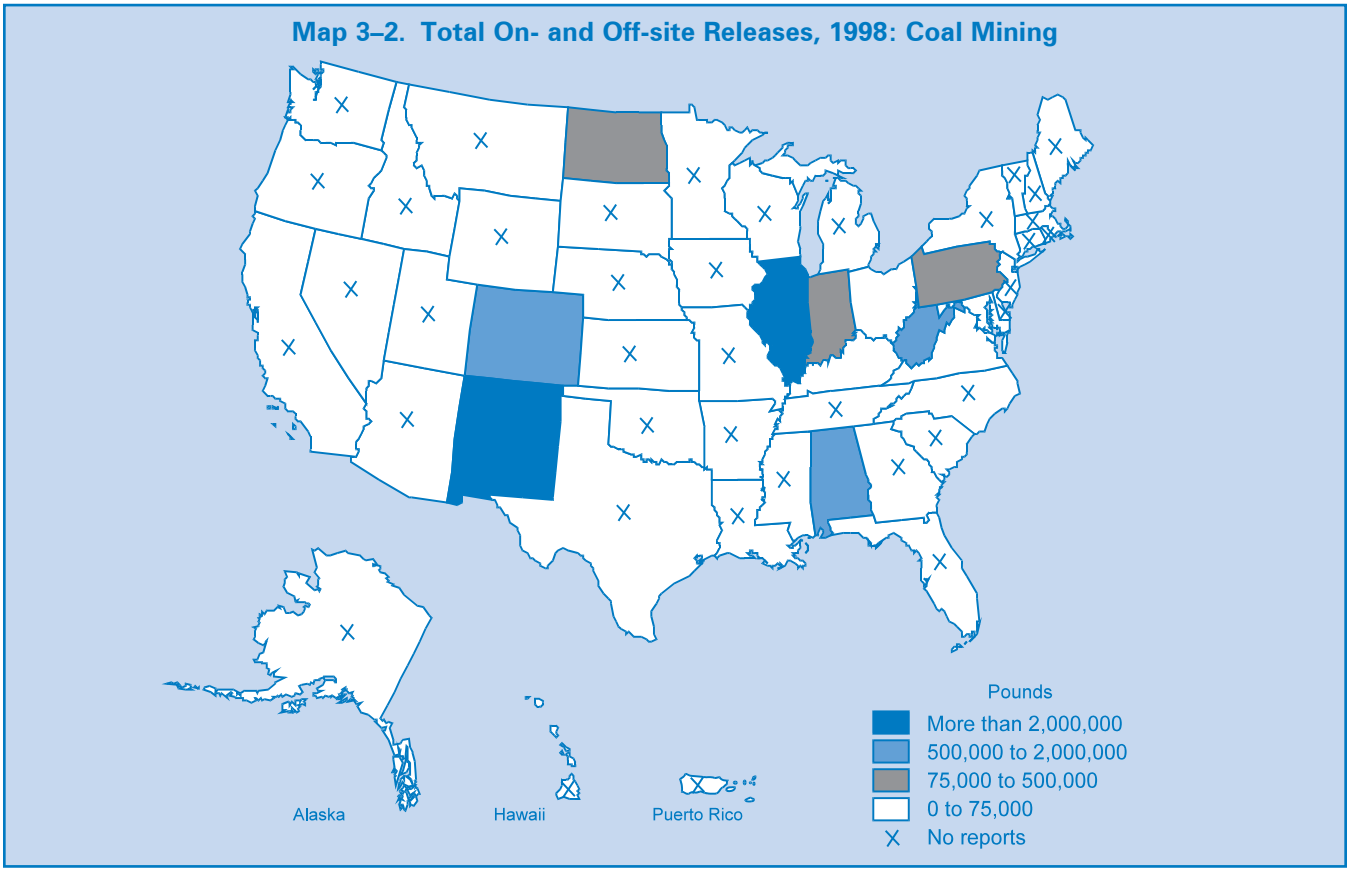
The projections indicate very little change in waste management practices. Quantities released on- and off-site, the least desirable

Table 3–21. Summary of TRI Information by State, 1998: Coal Mining *(continued)*

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	36,000	0	0	0	0	0	1,000,000	1,036,000	0
Colorado	0	0	0	43,735	0	0	1,591,774	1,635,509	0
Illinois	0	0	0	0	116,300	0	2,724,186	2,840,486	3
Indiana	7,513	0	0	0	0	0	75,371	82,884	5
Kentucky	0	0	0	0	0	0	4,932	4,932	0
Maryland	0	0	0	0	49,000	0	59,812	108,812	1
New Mexico	0	0	0	0	0	0	5,620,000	5,620,000	12
North Dakota	0	0	0	0	0	0	96,707	96,707	0
Ohio	904	0	0	0	5,500	0	3,775	10,179	0
Pennsylvania	0	0	0	0	158,100	0	322,845	480,945	13
Virginia	0	0	0	0	0	0	1,810	1,810	0
West Virginia	0	0	0	0	129,644	0	1,788,941	1,918,585	2
Total	**44,417**	**0**	**0**	**43,735**	**458,544**	**0**	**13,290,153**	**13,836,849**	**36**

Note: *Data are from Section 8 of Form R.*

Map 3–2. Total On- and Off-site Releases, 1998: Coal Mining



outcome under the waste management hierarchy (described in **Waste Management** in Chapter 1), would rise slightly, from 96.0 percent of total production-related waste in 1998 to 96.1 percent in 2000.

Source Reduction

One form was submitted by a coal mining facility in 1998 reporting source reduction activity undertaken during the year, as shown in Table 3–24. This form, from an underground mining facility, indicated improvements in spill and leak prevention, process modifications, and cleaning and degreasing. As noted in **Waste Management** in Chapter 1, source reduction is activity that prevents the generation of waste and is the preferred waste management option.

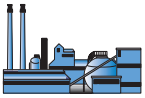


Table 3–22. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1998: Coal Mining

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II–V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
—	Barium compounds	253	10,154	0	45,000	0	6,982,890	7,038,297	0	7,038,297
—	Zinc compounds	838,881	86	0	0	0	996,310	1,835,277	0	1,835,277
—	Manganese compounds	344	12,225	0	45,000	0	1,772,013	1,829,582	0	1,829,582
7664-41-7	Ammonia	448,525	282,214	0	480	0	114,617	845,836	0	845,836
—	Copper compounds	12	17	0	0	0	412,474	412,503	0	412,503
—	Lead compounds	10	87	0	0	0	407,610	407,707	0	407,707
—	Chromium compounds	33	563	0	0	0	202,214	202,810	0	202,810
—	Nickel compounds	19	15	0	0	0	191,531	191,565	0	191,565
7647-01-0	Hydrochloric acid	138,417	0	0	0	0	0	138,417	0	138,417
—	Cobalt compounds	0	0	0	0	0	101,200	101,200	0	101,200
—	Arsenic compounds	0	864	0	0	0	69,892	70,756	0	70,756
—	Selenium compounds	0	0	0	0	0	56,552	56,552	0	56,552
—	Nitrate compounds	0	0	0	0	0	56,426	56,426	0	56,426
—	Beryllium compounds	0	0	0	0	0	41,000	41,000	0	41,000
—	Thallium compounds	0	0	0	0	0	37,000	37,000	0	37,000
	Subtotal	**1,426,494**	**306,225**	**0**	**90,480**	**0**	**11,441,729**	**13,264,928**	**0**	**13,264,928**
	Total	**1,457,714**	**306,227**	**0**	**90,480**	**0**	**11,471,623**	**13,326,044**	**0**	**13,326,044**

Note: ***On-site Releases*** *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

Table 3–23. Current Year and Projected Quantities of TRI Chemicals in Waste, 1998–2000: Coal Mining

Waste Management Activity	Current Year 1998: Total Pounds	Current Year 1998: Percent of Total	Projected 1999: Total Pounds	Projected 1999: Percent of Total	Projected 2000: Total Pounds	Projected 2000: Percent of Total
Recycled On-site	44,417	0.3	40,417	0.3	41,417	0.3
Recycled Off-site	0	0.0	0	0.0	0	0.0
Energy Recovery On-site	0	0.0	0	0.0	0	0.0
Energy Recovery Off-site	43,735	0.3	0	0.0	0	0.0
Treated On-site	458,544	3.3	452,544	3.6	455,544	3.6
Treated Off-site	0	0.0	0	0.0	0	0.0
Quantity Released On- and Off-site	13,290,153	96.0	12,126,775	96.1	12,245,066	96.1
Total Production-related Waste	**13,836,849**	**100.0**	**12,619,736**	**100.0**	**12,742,027**	**100.0**

Waste Management Activity	Projected Change 1998–1999 Percent	Projected Change 1999–2000 Percent	Projected Change 1998–2000 Percent
Recycled On-site	–9.0	2.5	–6.8
Recycled Off-site	—	—	—
Energy Recovery On-site	—	—	—
Energy Recovery Off-site	–100.0	—	–100.0
Treated On-site	–1.3	0.7	–0.7
Treated Off-site	—	—	—
Quantity Released On- and Off-site	–8.8	1.0	–7.9
Total Production-related Waste	**–8.8**	**1.0**	**–7.9**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*

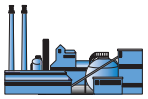
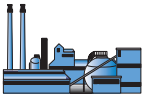


Table 3–24. Number of Forms Reporting Source Reduction Activity, 1998: Coal Mining

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
1221	Bituminous Coal and Lignite Surface Mining	82	0	0.0	0	0	0	0	0	0	0	0
1222	Bituminous Coal Underground Mining	26	1	3.8	0	0	1	0	1	2	0	0
	Multiple within SIC code 12	9	0	0.0	0	0	0	0	0	0	0	0
	Invalid within SIC code 12	2	0	0.0	0	0	0	0	0	0	0	0
	Total	**119**	**1**	**3.8**	**0**	**0**	**1**	**0**	**1**	**2**	**0**	**0**

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

Forms that reported more than one 4-digit SIC code within SIC code 12 are assigned to the "multiple codes" category.



❖ Electric Utilities that Combust Coal and/or Oil (SIC Codes 491 and 493) ❖

Introduction

Electric utilities may use a variety of fuels to generate electricity. Facilities that must report to TRI are limited to those that combust coal and/or oil for the purpose of generating power for distribution in commerce. These facilities report under SIC codes 4911, 4931 and 4939, as identified in Box 3–5. Other electric utilities in these SIC codes—those fueled by natural gas, nuclear, hydroelectric, or other sources—are not required to report.

Products and Services

Power generation facilities include traditional regulated utilities that produce electricity for public use, manufacturers that produce electricity for their own use, and, more recently, other industrial groups that provide electricity for their own use and/or for sale to others.

Employment and Production

Net generation of electricity (total electricity generated minus the electricity used by the facility itself) was 3.62 trillion megawatt

Box 3–5. SIC Code 491, Electric Services, and 493, Combination Electric and Gas, and Other Utility Services: Codes and Classifications Required to Report to TRI

SIC Code 491, Electric Services, and 493, Combination Electric and Gas, and Other Utility Services: Codes and Classifications Required to Report to TRI

TRI reporting in these SIC codes is limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce.

4911	Electric Services	Generation, transmission, and/or distribution of electric energy for sale.
4931	Electric and Other Services Combined	Providing electric services in combination with other services, including gas (electric services are the major part but less than 95% of the total).
4939	Combination Utilities, Not Elsewhere Classified	Providing combinations of electric, gas, and other services, not elsewhere classified.

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*.

hours in 1998. More than half (52 percent) was generated from coal and required the use of 915 million tons of coal. Four percent of the nation's power was produced from petroleum. In 1997, fossil fuel electric power generation employed 93,765, and the industry's revenue totaled $48.32 billion.

Electric power generation by utilities occurs across the United States. States with the highest utility net generation are those with the largest population densities and industrial centers: California, Texas, Illinois, Ohio, Pennsylvania and Florida. However, different areas of the country use different energy sources. For example, coal and petroleum-fired power plants are found in the east while gas-fired plants are in the coastal south.

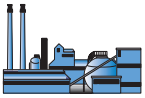
Utility power generation has traditionally been regulated in the United States. Recently, however, many states have begun to encourage competition in the wholesale distribution of electricity in response to the Federal Energy Regulatory Commission's Orders 888 and 889 (April 24, 1996). These orders deal with issues of open access to transmission networks and the requirement that utilities share information on the availability of transmission capacity. In this newly competitive industry structure, mergers and cost-cutting measures are leading to changes, including the emergence of new firms that buy electric energy for resale and an increase in the share of the market for nonutilities (industrial suppliers of electricity).

While demand for electricity grew by 7 percent annually in the 1960s, by the 1990s that growth had slowed to 2 percent per year. It is projected that 186,000 megawatts of new electric generation will be required by the United States and Canada by 2010. As demand grows, utilities must build more capacity or explore other alternatives to meet growth in demand. Of the new capacity expected, over 80 percent is projected to be fueled by natural gas or by both oil and gas. Alternatives to building capacity include demand-side management programs (encouraging conservation, rewarding the use of energy-efficient equipment and technologies, and shifting use to non-peak hours), purchases from cogenerators, and power imports from other countries.

General Environmental Issues

Fuel used by electric generating facilities is the major source of pollutants, including TRI chemicals. Air pollutants that may be released contribute to acid rain, smog, and soot. Impurities in coal or oil, used to fuel the generation of electricity, are a major health and environmental concern because they contribute to releases of metal compounds and sulfur (as well as nitrous oxides and particulates) during combustion.

The utility industry is regulated by a number of local, state and federal laws and regulations. Utility emissions are limited by state-issued operating permits that maintain compliance with state and federal air standards. The EPA also mandates certain emission limits on newer and modified plants. The utility industry has been mandated to substantially reduce emissions of SO_2 and NO_x. The typical methods used to accomplish these reductions also reduce reportable releases of TRI constituents such as hydrochloric and hydrofluoric acids.



Processes Involving Toxic Chemicals

The majority of the electricity generated in the United States is produced by steam turbine systems. Other technologies include gas turbines, internal combustion engines or some combination such as combined-cycle and cogeneration systems. Generating electricity from steam requires four components: fuel to produce the steam, a boiler, a steam turbine and a condenser (for condensation of used steam). The fuel is pumped into the boiler's furnace to produce high-pressure steam. Steam rushes from the high pressure boiler to the low pressure condenser, driving the turbine blades that power the electric generator. The steam is then cooled in the condenser and returned to the boiler system, where it is used again.

The fuel used for over half of the electricity generation in the United States is coal. A typical coal-fired power plant generating 800 megawatts of power will use two-to-four million tons of coal every year and provide enough power for approximately 200,000 homes. Because coal itself contains TRI chemicals, the burning of large quantities of coal to generate power results in large amounts of releases reported to TRI.

Coal used in power plants is transported from mines primarily by rail, but also by truck and barge. Coal may be unloaded into a storage area or directly onto conveyors leading to generation units.

Coal may be cleaned and prepared before being crushed or pulverized. Impurities in coal, such as ash, metals, silica and sulfur, can cause boiler fouling and may end up uncombusted in flue gas. Coal may be cleaned to reduce its sulfur content to meet sulfur dioxide emissions regulations. After cleaning, coal is dried before it is fired in the burner or combustion system. Increasing the coal's particle surface area (crushing) and decreasing its moisture content (drying) greatly increases its heating capacity. Although electric utilities may clean and crush coal at the site of their power plants, a significant percentage of bituminous coal from eastern and midwestern coal mines undergoes cleaning at the mines to meet customer specifications for heat, ash and sulfur content.

Once prepared, the coal is sent to the boiler. Devices at the bottom of the boilers catch the bottom ash or slag.

Most petroleum used for power generation is refined prior to use. The principal process in separating crude oil into useful products is fractional distillation. With high boiling points, fuel oils are among the first products of this process.

Management of Toxic Chemicals in Waste

Air emissions from stack gases from coal- and oil-fired boilers contain sulfur oxides and metal compounds. The sulfur oxides react with water in the air and in flue gases to form sulfuric acid mist. Other chemicals in flue gases include hydrochloric acid (acid aerosols), hydrogen fluoride and formaldehyde.

Scrubbers, or flue gas desulfurization systems, remove sulfur from the boiler flue gas. Wet scrubbers produce a slurry of ash, unreacted lime, calcium sulfate and calcium sulfite. Dry scrubbers produce a mixture of unreacted lime, or sodium or calcium carbonates, with sulfur salts and fly ash. Flue

gas desulfurization wastes may also contain metal compounds.

Ash is the product of combustion. Two types of ash are generated during combustion of fossil fuels: bottom ash and fly ash. Bottom ash collects at the bottom of the boiler, while fly ash is finer material that is borne by the flue gas and is collected by air pollution control equipment.

Ash characteristics depend on the content of the fuel burned. For coal, it depends on the type of coal burned, the extent to which the coal was cleaned and prepared and the operating conditions of the boiler. Typically, coal ash contains oxides of aluminum, calcium, iron and silicon plus magnesium, potassium, sodium, titanium, and small amounts of antimony, arsenic, barium, cadmium, chromium, lead, mercury, selenium, zinc and other metals. For oil, small amounts of sulfur oxides and metals may be present in the ash, although oil-fired power plants generate less than 0.1 percent of the ash on a per megawatt basis than the ash produced by coal-fired plants.

Electric utilities may dispose of ash on-site in landfills or wet surface impoundments. More often, it is sent off-site to landfills. Ash can also be returned to the coal mine for disposal. When economic conditions are favorable, ash may be sold to the construction industry for use as aggregate in concrete. Sludges produced by the flue gas desulfurization systems may also be disposed of in landfills or surface impoundments.

Reducing impurities in the fuel, particularly coal, before combustion can significantly reduce the generation of ash, small amounts of metals in the ash and sulfur wastes. Coal cleaning most often occurs at the coal mine.

Fuel storage is another source of releases. Air emissions may result when tanks are used to store materials containing volatile chemicals, such as Fuel Oil No. 2. Coal stored in exposed piles may be subject to rainfall or snowfall, and it may be sprayed for dust control or to prevent freezing. These events may create acidic leachate that flows in underground streams or collects under the piles forming run-off. The run-off may contain ethylene glycol, used as antifreeze, or metal compounds leached from the coal.

Coal pile run-off can be managed by storing the coal indoors. Outdoor piles can be covered to prevent contact with precipitation and to minimize dust. Storm water retention measures (e.g., dikes and levies) can also be used. These practices apply to fly ash storage as well. Coal piles can be sprayed with anionic detergents, to reduce the bacterial oxidation of sulfur compounds in the coal and thus reduce the acidic content of the pile.

Other substances used by such utilities, such as solvents and lubricants for equipment cleaning and maintenance, may also contain TRI chemicals. Waste generated during boiler cleaning, which removes scale from inside the boiler tubes, contains spent cleaning solution as well as components of the scale, such as copper, iron, zinc, nickel, magnesium and chromium. Monitoring the thickness of the scaling allows utilities to clean boilers only when necessary, reducing cleaning waste. Utilities can control the chemistry of the boiler feed water to reduce scaling. Feed water is most often treated with hydrazine and morpholine, but other methods such as elevated

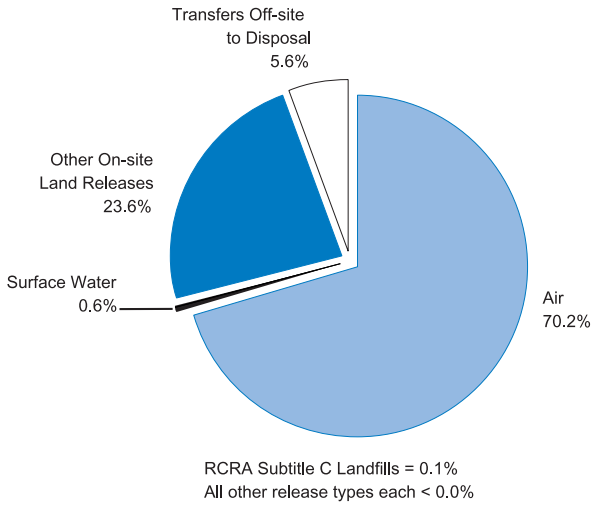
oxygen treatment can be effective.

1998 TRI Data for Electric Utilities

On- and Off-site Releases

Electric utilities required to report to TRI reported 1.12 billion pounds of TRI chemicals released on- and off-site in 1998, as shown in Table 3–25. The majority, 783.7 million pounds, was as air emissions. Figure 3–6 shows that air emissions amounted to 70.2 percent of the industry's total releases.

The electric utilities' second-largest release type was other on-site land releases, which totaled 263.2 million pounds, representing 23.6 percent of total releases. These are releases to land other than to RCRA subtitle C landfills (types of on-site land releases are described in Box 1–4 in Chapter 1). Electric utilities reported 62.5 million pounds released off-site as transfers to disposal and 6.5 million pounds of surface water discharges. Over 1.0 million pounds



***Note: On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

Figure 3–6. Distribution of TRI On-site and Off-site Releases, 1998: Electric Utilities

Table 3–25. TRI On-site and Off-site Releases by 4-digit SIC Code, 1998: Electric Utilities

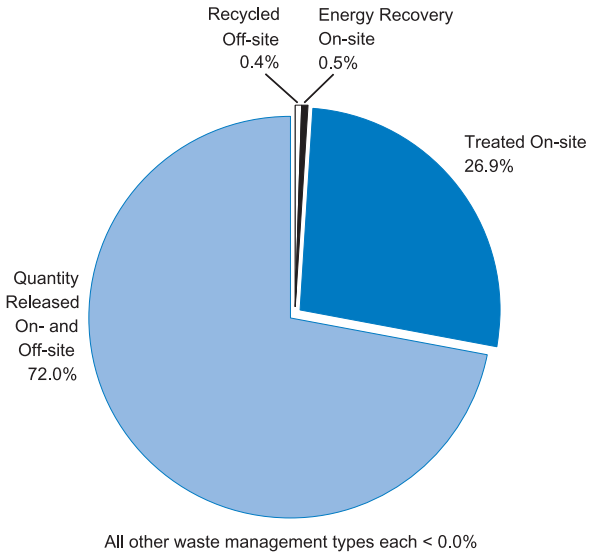
			On-site Releases								
					Underground Injection		On-site Land Releases			Off-site Releases	
SIC Code	Industry	Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
4911	Electric Services	4,019	750,103,646	6,464,045	18	160,800	1,033,076	239,395,225	997,156,810	59,470,805	1,056,627,615
4931	Electric and Other Services Combined	144	10,180,020	12,730	0	0	0	752,754	10,945,504	1,949,221	12,894,725
4939	Combination Utilities, *nec**	40	2,098,996	875	0	0	0	824,960	2,924,831	260,275	3,185,106
	Multiple within SIC code 49	10	86,596	505	0	0	0	0	87,101	0	87,101
	SIC code 4911 and SIC code 12 (Coal Mining)	142	21,076,642	36,980	0	0	0	22,237,483	43,351,105	87,550	43,438,655
	SIC code 4911 and SIC code 28 (Chemicals)	8	140,472	0	0	0	0	0	140,472	773,000	913,472
	Total	**4,363**	**783,686,372**	**6,515,135**	**18**	**160,800**	**1,033,076**	**263,210,422**	**1,054,605,823**	**62,540,851**	**1,117,146,674**

***Note: On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Forms that reported more than one 4-digit SIC code within SIC code 49 are assigned to the multiple category.
*nec: *not elsewhere classified.*

of on-site releases to RCRA subtitle C landfills and less than 200,000 pounds of underground injection was also reported.

Facilities providing only electric services reported the largest total releases in this industry, with 1.06 billion pounds, accounting for 94.6 percent of the electric utility industry total. Electric services facilities reported 997.2 million pounds of total on-site releases. These were largely air emissions of 750.1 million pounds, with 239.4 million pounds of other on-site land releases, and 6.5 million pounds of surface water discharges. They also reported 59.5 million pounds of off-site releases (transfers to disposal).

The second ranked group within the electric utility industry was facilities that generate electricity in combination with coal mining. These facilities accounted for 3.9 percent of total releases from electric utilities, with 43.4 million pounds. Their releases were divided between other on-site land releases of 22.2 million pounds and air emissions of 21.1 million pounds.



Note: *Data are from Section 8 of Form R.*

Figure 3–7. TRI Waste Management, 1998: Electric Utilities

Table 3–26. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1998: Electric Utilities

SIC Code	Industry	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			
4911	Electric Services	727,259	2,968,930	0	25,028	319,398,171	386,762	1,054,089,783	1,377,595,933	211,222
4931	Electric and Other Services Combined	0	479,791	0	0	4,977,868	0	12,819,618	18,277,277	12
4939	Combination Utilities, *nec**	0	6	8,057,169	0	5,074,000	0	3,246,652	16,377,827	0
	Multiple within SIC code 49	0	3,003,000	0	0	1,429,789	0	96,145	4,528,934	3
	SIC code 4911 and SIC code 12 (Coal Mining)	0	501,800	0	0	86,014,400	40	44,554,163	131,070,403	0
	SIC code 4911 and SIC code 28 (Chemicals)	0	0	0	0	0	0	914,000	914,000	0
	Total	**727,259**	**6,953,527**	**8,057,169**	**25,028**	**416,894,228**	**386,802**	**1,115,720,361**	**1,548,764,374**	**211,237**

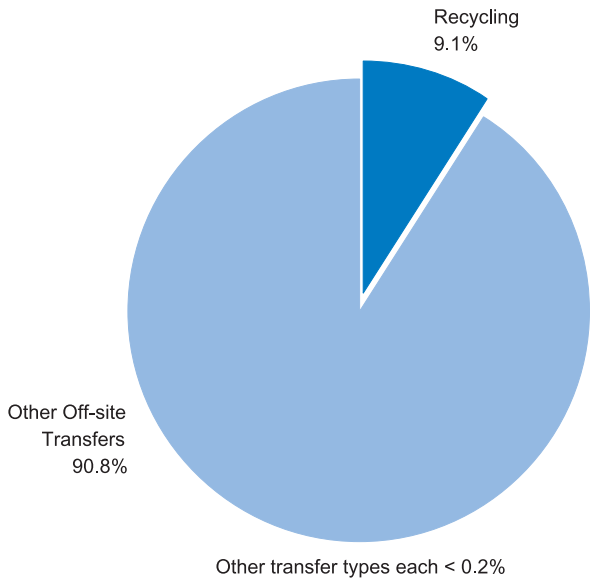
Note: *Data are from Section 8 of Form R.*
Forms that reported more than one 4-digit SIC code within SIC code 49 are assigned to the "multiple codes" category.
*nec: *not elsewhere classified.*

Waste Management Data

Quantities of TRI Chemicals in Waste

Electric utilities reported managing 1.55 billion pounds of total production-related waste in 1998, as shown in Table 3–26. Quantities released on- and off-site totaled 1.12 billion pounds, or 72.0 percent of the industry's production-related waste (see Figure 3–7). The industry's on-site treatment totaled 416.9 million pounds, or 26.9 percent of the total. On-site energy recovery and off-site recycling amounted to 8.1 million pounds and 7.0 million pounds, respectively.

Facilities providing only electric services managed 1.38 billion pounds of total production-related waste, including 1.05 billion pounds of quantities released on- and off-site. The facilities combining electric services and coal mining operations managed a total of 131.1 million pounds, including 86.0 million pounds treated on-site and 44.6 million pounds of quantities released on- and off-site.



Note: *Data are from Section 6 of Form R.*

Figure 3–8. Distribution of TRI Transfers Off-site for Further Waste Management/Disposal, 1998: Electric Utilities

Table 3–27. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1998: Electric Utilities

SIC Codes	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs: Non-metal TRI Chemicals Pounds	Transfers to POTWs: Metals and Metal Compounds Pounds	Other Transfers Off-site to Disposal* Pounds	Total Transfers for Further Waste Management/ Disposal Pounds
4911	Electric Services	2,264,800	25,037	40,983	24,809	5,076	59,915,780	62,276,485
4931	Electric and Other Services Combined	479,791	0	0	9,414	9	1,949,212	2,438,426
4939	Combination Utilities, *nec***	60,820	0	0	500	0	260,275	321,595
	Multiple within SIC code 49	3,003,000	0	0	0	0	0	3,003,000
	SIC code 4911 and SIC code 12 (Coal Mining)	499,200	0	15	0	0	87,560	586,775
	SIC code 4911 and SIC code 28 (Chemicals)	0	0	0	0	0	773,000	773,000
	Total	**6,307,611**	**25,037**	**40,998**	**34,723**	**5,085**	**62,985,827**	**69,399,281**

Note: *Data are from Section 6 of Form R.*
Forms that reported more than one 4-digit SIC code within SIC code 49 are assigned to the "multiple codes" category.
**Does not include transfers of metals and metal compounds to POTWs.*
***nec: *not elsewhere classified.*

Table 3–28. Summary of TRI Information by State, 1998: Electric Utilities

State	Total Forms Number	On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
		Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Alabama	122	28,660,982	211,735	0	0	0	16,841,649	45,714,366	366,780	46,081,146
Alaska	4	567,100	0	0	0	0	0	567,100	0	567,100
Arizona	56	3,531,238	955	0	0	0	5,994,157	9,526,350	6,708	9,533,058
Arkansas	27	1,248,681	20,329	0	0	0	2,028,613	3,297,623	912	3,298,535
California	44	385,620	17	0	0	0	147,300	532,937	45,823	578,760
Colorado	63	1,912,616	2,980	0	0	0	3,153,460	5,069,056	3,780,883	8,849,939
Connecticut	21	1,259,018	39	0	0	0	0	1,259,057	217,571	1,476,628
Delaware	27	6,818,633	59,740	0	0	0	590,579	7,468,952	263,696	7,732,648
District of Columbia	1	66,250	0	0	0	0	0	66,250	0	66,250
Florida	218	57,697,392	67,446	0	0	934,073	7,493,671	66,192,582	2,546,115	68,738,697
Georgia	114	47,191,872	137,364	0	0	0	11,136,522	58,465,758	10	58,465,768
Guam	1	0	0	0	0	0	0	0	0	0
Hawaii	17	3,133,022	0	0	0	0	0	3,133,022	4,500	3,137,522
Illinois	209	32,126,653	40,697	0	0	0	4,752,045	36,919,395	1,671,753	38,591,148
Indiana	253	44,326,731	312,566	0	0	5,000	16,405,667	61,049,964	838,007	61,887,971
Iowa	98	8,696,569	14,967	0	0	0	3,945,293	12,656,829	1,036,473	13,693,302
Kansas	72	5,113,220	6,515	0	0	0	5,772,385	10,892,120	100,464	10,992,584
Kentucky	196	44,786,767	788,373	0	0	3	12,744,988	58,320,131	493,973	58,814,104
Louisiana	37	4,197,816	79,231	0	0	0	4,520,798	8,797,845	2,149	8,799,994
Maine	3	43,001	0	0	0	0	0	43,001	0	43,001
Maryland	59	24,749,607	129,725	0	0	0	147,282	25,026,614	509,100	25,535,714
Massachusetts	60	5,639,923	531	0	0	0	39,335	5,679,789	442,449	6,122,238
Michigan	173	33,812,186	201,662	0	0	0	9,540,682	43,554,530	2,039,725	45,594,255
Minnesota	83	1,751,834	18,636	0	0	0	10,097,510	11,867,980	1,105,212	12,973,192
Mississippi	31	9,271,476	4,712	0	0	0	2,028,530	11,304,718	0	11,304,718
Missouri	118	12,983,638	130,117	0	0	0	19,316,590	32,430,345	290	32,430,635
Montana	32	950,655	10	0	0	0	6,830,111	7,780,776	159,400	7,940,176
Nebraska	42	4,086,255	120,760	0	0	0	3,611,307	7,818,322	165,200	7,983,522
Nevada	24	1,209,417	0	0	0	0	1,661,938	2,871,355	10,087	2,881,442
New Hampshire	19	4,026,179	0	0	0	0	21,700	4,047,879	49,870	4,097,749
New Jersey	67	7,529,062	36,569	0	0	0	311,900	7,877,531	177,887	8,055,418
New Mexico	26	711,363	8,468	0	0	0	1,177,689	1,897,520	5,546,000	7,443,520
New York	108	16,100,838	166,365	0	0	0	1,925,080	18,192,283	504,170	18,696,453

Note: ***On-site Releases*** *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

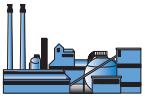


Table 3–28. Summary of TRI Information by State, 1998: Electric Utilities *(continued)*

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	0	8,700	8,057,169	0	6,458,000	670	46,084,997	60,609,536	0
Alaska	0	0	0	0	0	0	567,100	567,100	4
Arizona	0	848	0	0	2,220,160	0	9,675,610	11,896,618	21,009
Arkansas	0	0	0	0	72,900	0	3,307,911	3,380,811	120
California	0	0	0	0	0	395	308,069	308,464	365
Colorado	0	0	0	0	2,154,100	1,700	9,135,042	11,290,842	4,900
Connecticut	0	0	0	0	0	0	1,477,400	1,477,400	7
Delaware	0	0	0	0	926,667	300	7,732,664	8,659,631	2
District of Columbia	0	0	0	0	0	0	66,000	66,000	295
Florida	0	59	0	0	25,272,870	26,000	66,979,737	92,278,666	7,539
Georgia	0	0	0	0	0	0	58,466,081	58,466,081	0
Guam	0	0	0	0	0	0	0	0	0
Hawaii	0	0	0	0	0	0	3,137,487	3,137,487	0
Illinois	0	77,000	0	0	26,304,728	0	38,360,789	64,742,517	142,254
Indiana	0	331,532	0	28	39,829,342	38	61,877,943	102,038,883	12,067
Iowa	0	0	0	0	210,103	0	12,877,232	13,087,335	1,526
Kansas	0	475,991	0	0	1,179,500	414	11,081,439	12,737,344	2
Kentucky	0	32,800	0	0	21,517,400	3	58,990,240	80,540,443	39
Louisiana	0	0	0	0	1,058,750	0	8,921,510	9,980,260	10
Maine	0	0	0	0	0	0	43,002	43,002	0
Maryland	0	0	0	0	50,269,228	445	25,400,466	75,670,139	2
Massachusetts	0	560	0	0	62,497	30	6,210,056	6,273,143	91
Michigan	0	189,206	0	0	9,924,390	0	45,430,946	55,544,542	12
Minnesota	0	0	0	0	1,134,100	0	12,923,411	14,057,511	0
Mississippi	0	0	0	0	0	0	11,304,718	11,304,718	4
Missouri	656,527	656,527	0	0	7,078,716	0	31,898,437	40,290,207	0
Montana	0	0	0	0	3,473,960	0	7,948,592	11,422,552	0
Nebraska	70,732	0	0	0	0	0	7,918,735	7,989,467	20,000
Nevada	0	9,400	0	0	577,476	0	2,304,024	2,890,900	2
New Hampshire	0	30	0	0	110	0	4,114,210	4,114,350	0
New Jersey	0	14,506	0	0	3,683,265	481	8,049,512	11,747,764	242
New Mexico	0	0	0	0	3,350,000	0	7,392,310	10,742,310	0
New York	0	210,000	0	25,000	6,720,000	300	18,626,623	25,581,923	11

Note: *Data are from Section 8 of Form R.*

Table 3–28. Summary of TRI Information by State, 1998: Electric Utilities *(continued)*

State	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection: Class I Wells Pounds	On-site Releases: Underground Injection: Class II-V Wells Pounds	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Releases: On-site Land Releases: Other On-site Land Releases Pounds	On-site Releases: Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
North Carolina	157	48,387,026	99,731	0	0	0	8,304,875	56,791,632	157,242	56,948,874
North Dakota	83	1,404,407	59,011	0	0	0	8,069,360	9,532,778	11,302,469	20,835,247
Ohio	237	95,220,630	386,974	0	0	0	14,008,971	109,616,575	4,307,068	113,923,643
Oklahoma	52	6,178,303	61,874	0	0	0	1,839,091	8,079,268	1,628,650	9,707,918
Oregon	7	127,585	0	0	0	0	620,005	747,590	0	747,590
Pennsylvania	332	58,894,300	84,857	0	160,800	94,000	5,533,579	64,767,536	8,416,171	73,183,707
Puerto Rico	33	9,857,078	62,123	0	0	0	154,741	10,073,942	203,305	10,277,247
Rhode Island	3	455,002	5	0	0	0	0	455,007	0	455,007
South Carolina	116	13,713,725	7,925	0	0	0	2,387,888	16,109,538	20,623	16,130,161
South Dakota	14	189,732	56	0	0	0	1,625,000	1,814,788	96,990	1,911,778
Tennessee	101	26,657,215	332,655	0	0	0	7,794,265	34,784,135	515,065	35,299,200
Texas	185	8,138,409	33,911	0	0	0	25,280,363	33,452,683	7,800,256	41,252,939
Utah	59	2,981,457	198	0	0	0	6,031,746	9,013,401	211,971	9,225,372
Virgin Islands	8	81	26,832	0	0	0	0	26,913	0	26,913
Virginia	172	17,440,563	2,677,567	0	0	0	2,807,865	22,925,995	298,461	23,224,456
Washington	20	1,139,941	738	0	0	0	3,364,936	4,505,615	88,078	4,593,693
West Virginia	158	62,340,588	81,669	18	0	0	11,500,597	73,922,872	1,958,941	75,881,813
Wisconsin	124	13,704,098	25,853	0	0	0	1,758,842	15,488,793	2,280,962	17,769,755
Wyoming	77	2,270,618	12,647	0	0	0	9,891,517	12,174,782	1,169,392	13,344,174
Total	**4,363**	**783,686,372**	**6,515,135**	**18**	**160,800**	**1,033,076**	**263,210,422**	**1,054,605,823**	**62,540,851**	**1,117,146,674**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

Transfers Off-site for Further Waste Management/Disposal

Electric utilities reported 69.4 million pounds of transfers off-site for further waste management and disposal in 1998. As shown in Table 3–27, facilities providing only electric services reported 59.9 million pounds transferred off-site to disposal. Figure 3–8 shows that other transfers to disposal accounted for 90.8 percent of all transfers for further waste management and disposal for this industry. The industry's other transfers to disposal totaled 63.0 million pounds and total transfers to recycling were 6.3 million pounds or 9.1 percent of the total.

TRI Data by State

The states with the largest number of forms from electric utilities were Pennsylvania with 332 forms, Indiana with 253 forms, and Ohio with 237 forms. No reports were received from Idaho and Vermont in 1998.

On- and Off-site Releases

Electric utilities in Ohio reported the largest total on- and off-site releases in 1998. As shown in Table 3–28, Ohio's electric utilities reported total releases of 113.9 million pounds, primarily as air emissions. As shown in Map 3–3, the three contiguous states of Ohio, West Virginia and

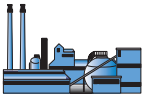


Table 3–28. Summary of TRI Information by State, 1998: Electric Utilities *(continued)*

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			
North Carolina	0	0	0	0	3,209,200	0	56,989,360	60,198,560	531
North Dakota	0	2,500	0	0	832,000	0	21,299,360	22,133,860	15
Ohio	0	309,000	0	0	62,611,060	0	114,379,417	177,299,477	101
Oklahoma	0	0	0	0	1,647,600	0	9,671,754	11,319,354	15
Oregon	0	0	0	0	0	0	747,560	747,560	1
Pennsylvania	0	185	0	0	24,393,772	0	73,701,915	98,095,872	30
Puerto Rico	0	0	0	0	0	0	10,277,208	10,277,208	2
Rhode Island	0	0	0	0	0	12	454,997	455,009	0
South Carolina	0	0	0	0	6,360,600	0	16,160,065	22,520,665	4
South Dakota	0	0	0	0	282,192	0	1,896,082	2,178,274	0
Tennessee	0	892,886	0	0	27,593,000	0	35,277,247	63,763,133	0
Texas	0	13,591	0	0	16,237,218	230	41,188,118	57,439,157	9
Utah	0	0	0	0	44,138,500	0	10,014,733	54,153,233	7
Virgin Islands	0	0	0	0	0	0	26,863	26,863	0
Virginia	0	3,096,700	0	0	5,750,091	1	23,035,825	31,882,617	13
Washington	0	0	0	0	83,365	0	4,647,336	4,730,701	0
West Virginia	0	324,506	0	0	6,510,000	0	75,860,713	82,695,219	0
Wisconsin	0	0	0	0	2,207,268	355,783	17,720,952	20,284,003	6
Wyoming	0	307,000	0	0	1,560,100	0	13,758,563	15,625,663	0
Total	**727,259**	**6,953,527**	**8,057,169**	**25,028**	**416,894,228**	**386,802**	**1,115,720,361**	**1,548,764,374**	**211,237**

Note: *Data are from Section 8 of Form R.*

Pennsylvania reported the largest amounts of total releases in 1998.

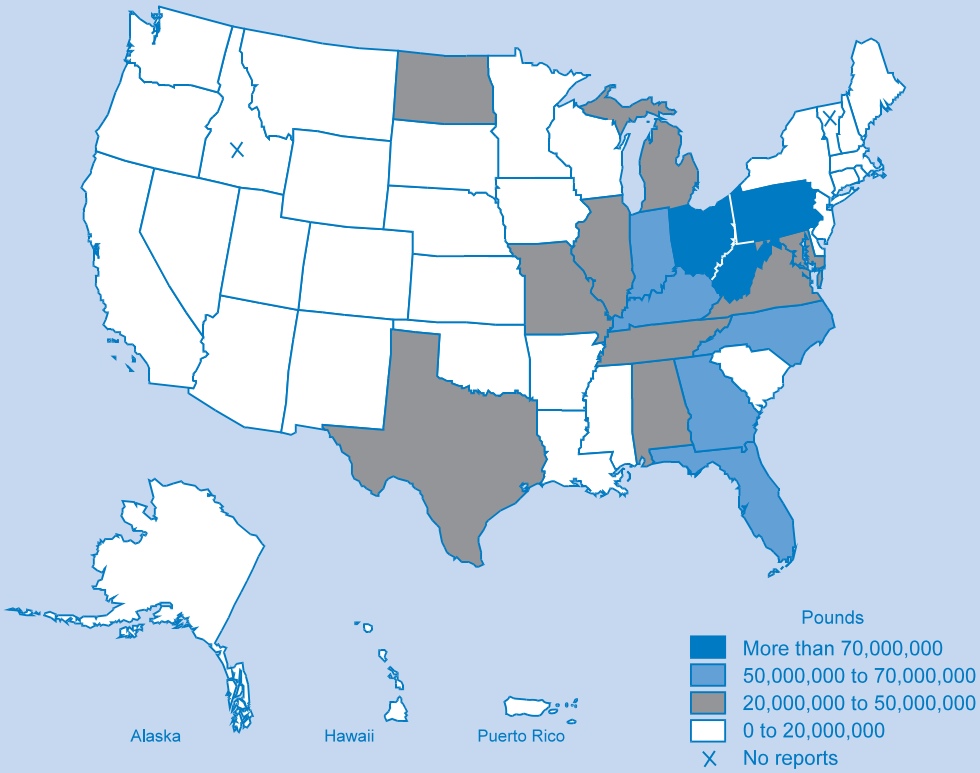
West Virginia ranked second with 75.9 million pounds of total releases, of which 62.3 million pounds were released to air. Pennsylvania ranked third among states for electric utility releases with 73.2 million pounds, including 58.9 million pounds of air emissions.

In five other states, electric utility releases exceeded 50 million pounds. Florida electric utilities reported 68.7 million pounds, Indiana reported 61.9 million pounds, Kentucky reported 58.8 million pounds, Georgia reported 58.5 million pounds, and North Carolina reported 56.9 million pounds. Electric utilities in all of the states with the largest on- and off-site releases reported more than 70 percent of total releases as air emissions.

Waste Management Data

Ohio also ranked highest among the states for total production-related waste reported by the electric utility industry. These data also appear in Table 3–28. Ohio facilities managed 177.3 million pounds of production-related waste. This consisted largely of 114.4 million pounds of quantities released on- and off-site, but also included 62.6 million pounds of waste treated on-site, the

Map 3–3. Total On- and Off-site Releases, 1998: Electric Utilities



largest of any state in both of these categories.

Indiana ranked second with total production-related waste of 102.0 million pounds. This consisted of 61.9 million pounds in quantities released on- and off-site (the fifth-largest amount of any state) and 39.8 million pounds treated on-site (the fourth-largest amount of any state). Pennsylvania ranked third for total production-related waste with 98.1 million pounds, consisting of 73.7 million pounds of quantities released on- and off-site (ranking third for this category) and 24.4 million pounds treated on-site (ranking eighth).

Electric utilities reported much smaller quantities in other waste management activities. The largest amount was 8.1 million pounds of on-site energy recovery in Alabama and 3.1 million pounds of off-site recycling reported by Virginia facilities.

Top 15 Chemicals for On- and Off-site Releases

Electric utilities reported releasing more hydrochloric acid, 535.9 million pounds, than any other chemical. Only aerosol forms of hydrochloric acid are reportable to TRI so air emissions of hydrochloric acid accounted for 99.9 percent of the total releases of this chemical. Table 3–29 presents data for the 15 chemicals released in the largest amounts by the TRI electric utilities.

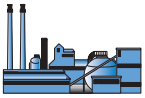


Table 3–29. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1998: Electric Utilities

		On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
7647-01-0	Hydrochloric acid	535,502,971	11	0	0	0	364,017	535,866,999	0	535,866,999
—	Barium compounds	2,188,624	978,745	0	82,000	438,000	140,501,453	144,188,822	35,907,811	180,096,633
7664-93-9	Sulfuric acid	166,354,057	2,400,001	0	0	0	20,000	168,774,058	20,000	168,794,058
7664-39-3	Hydrogen fluoride	64,849,987	636	0	0	0	543,642	65,394,265	13,101	65,407,366
—	Manganese compounds	440,232	988,125	0	17,400	87,161	31,735,695	33,268,613	6,108,684	39,377,297
—	Zinc compounds	883,781	503,210	11	19,200	152,589	27,179,647	28,738,438	4,094,960	32,833,398
—	Copper compounds	287,759	298,747	7	17,000	270,481	13,630,919	14,504,913	2,761,045	17,265,958
—	Nickel compounds	646,646	285,150	0	10,400	34,316	10,789,697	11,766,209	1,967,789	13,733,998
—	Chromium compounds	275,744	112,644	0	14,800	45,526	10,400,307	10,849,021	1,971,268	12,820,289
7440-39-3	Barium	220,764	141,458	0	0	0	7,278,423	7,640,645	1,840,275	9,480,920
—	Lead compounds	166,143	65,838	0	0	3	5,781,992	6,013,976	2,181,127	8,195,103
—	Arsenic compounds	152,021	153,124	0	0	0	5,230,393	5,535,538	989,388	6,524,926
7664-41-7	Ammonia	5,389,610	57,533	0	0	0	92,660	5,539,803	13,019	5,552,822
—	Cobalt compounds	53,195	24,031	0	0	0	3,635,345	3,712,571	432,716	4,145,287
7440-66-6	Zinc (fume or dust)	2,636,026	31,268	0	0	0	261,701	2,928,995	208,293	3,137,288
	Subtotal	**780,047,560**	**6,040,521**	**18**	**160,800**	**1,028,076**	**257,445,891**	**1,044,722,866**	**58,509,476**	**1,103,232,342**
	Total	**783,686,372**	**6,515,135**	**18**	**160,800**	**1,033,076**	**1,033,076**	**1,054,605,823**	**62,540,851**	**1,117,146,674**

*Note: **On-site Releases** are 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 do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

For barium compounds, ranked second with 180.1 million pounds, most of the releases were other on-site land releases, 140.5 million pounds or 78.0 percent of total releases for barium compounds. Sulfuric acid was the chemical with the third-largest total releases. Like hydrochloric acid, only aerosol forms are reportable to TRI and air emissions of sulfuric acid, 166.4 million pounds, were 98.6 percent of total releases for that chemical.

Releases of the 15 chemicals totaled 1.10 billion pounds, or 98.8 percent of the industry's total of 1.12 million pounds of releases.

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

Electric utility facilities reporting to TRI expected to reduce their production-related waste by 3.2 percent from 1998 to 2000, reducing it from a total of 1.55 billion pounds to 1.50 billion pounds. The projected decrease represents a reduction of 2.5 percent in 1999 followed by a decrease of 0.7 percent in 2000. These projections reflect the industry's expected reductions in quantities released on- and off-site of 3.4 percent and in treated on-site of 2.9 percent, since these two types of waste management accounted for over 98 percent of total production-related waste, as shown in Table 3–30.

Table 3–30. Current Year and Projected Quantities of TRI Chemicals in Waste, 1998–2000: Electric Utilities

Waste Management Activity	Current Year 1998 Total Pounds	Current Year 1998 Percent of Total	Projected 1999 Total Pounds	Projected 1999 Percent of Total	Projected 2000 Total Pounds	Projected 2000 Percent of Total
Recycled On-site	727,259	0.0	725,822	0.0	739,377	0.0
Recycled Off-site	6,953,527	0.4	6,684,737	0.4	6,883,008	0.5
Energy Recovery On-site	8,057,169	0.5	8,218,462	0.5	8,382,829	0.6
Energy Recovery Off-site	25,028	0.0	33,328	0.0	33,328	0.0
Treated On-site	416,894,228	26.9	408,975,357	27.1	404,827,828	27.0
Treated Off-site	386,802	0.0	4,787	0.0	3,725	0.0
Quantity Released On- and Off-site	1,115,720,361	72.0	1,084,911,988	71.9	1,078,176,656	71.9
Total Production-related Waste	**1,548,764,374**	**100.0**	**1,509,554,481**	**100.0**	**1,499,046,751**	**100.0**

Waste Management Activity	Projected Change 1998–1999 Percent	Projected Change 1999–2000 Percent	Projected Change 1998–2000 Percent
Recycled On-site	–0.2	1.9	1.7
Recycled Off-site	–3.9	3.0	–1.0
Energy Recovery On-site	2.0	2.0	4.0
Energy Recovery Off-site	33.2	0.0	33.2
Treated On-site	–1.9	–1.0	–2.9
Treated Off-site	–98.8	–22.2	–99.0
Quantity Released On- and Off-site	–2.8	–0.6	–3.4
Total Production-related Waste	**–2.5**	**–0.7**	**–3.2**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*

The projections indicate little change in waste management practices. Quantities released on- and off-site—the least desirable outcome under the waste management hierarchy (described in Waste Management in Chapter 1)—would remain about the same at 72.0 percent of total production-related waste in 1998 to 71.9 percent in 2000.

Source Reduction

Eleven percent of the Form Rs submitted by electric utility facilities in 1998 reported source reduction activity undertaken during the year (see Table 3–31). As noted in Waste Management in Chapter 1, source reduction is activity that prevents the generation of waste and is the preferred waste management option.

Facilities with the combination of electric services and coal mining operations reported source reduction activities on 21.9 percent of the Form Rs submitted (on 30 forms), and facilities providing only electric services reported source reduction activity on 416 forms, representing 10.8 percent of the Form Rs from these facilities.

Good operating practices were identified on 376 forms, making it the most frequent source reduction activity in the industry. Process modifications were reported on 59 forms and inventory control on 58 forms.

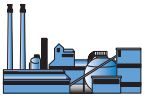


Table 3–31. Number of Forms Reporting Source Reduction Activity, 1998: Electric Utilities

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
4911	Electric Services	3,850	416	10.8	340	54	32	38	59	0	0	6
4931	Electric and Other Services Combined	137	11	8.0	6	0	1	9	0	0	0	0
4939	Combination Utilities, *nec**	38	1	2.6	0	4	0	0	0	0	0	0
	Multiple within SIC code 49	9	0	0.0	0	0	0	0	0	0	0	0
	SIC code 4911 and SIC code 12 (Coal Mining)	137	30	21.9	30	0	0	0	0	0	0	0
	SIC code 4911 and SIC code 28 (Chemicals)	8	0	0.0	0	0	0	0	0	0	0	0
	Total	**4,179**	**458**	**11.0**	**376**	**58**	**33**	**47**	**59**	**0**	**0**	**6**

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

Forms that reported more than one 4-digit SIC code within SIC code 49 are assigned to the "multiple codes" category.

*nec: *not elsewhere classified.*

❖ Chemical Wholesale Distributors ❖ (SIC Code 5169)

Introduction

Chemical wholesale distributors (SIC code 5169) package, blend or formulate chemicals for distribution into commerce, as shown in Box 3–6. Facilities that only store, relabel or redistribute chemicals are not included in this industry sector.

Products and Services

Chemical distribution facilities buy chemicals in bulk and blend and/or repackage them to customer specifications. For example, a facility may repackage xylene into various size containers for resale to customers, or it may blend chemicals to formulate lacquer thinner for autobody shops. Products include acids, industrial and heavy chemicals, dyes and substances used to make dyes, industrial salts, rosin, and turpentine. Also included are industrial gases (compressed and liquefied), such as oxygen and acetylene.

Employment and Production

There were 15,920 chemical wholesale distribution establishments with 165,768 employees and $128.92 billion in production value in 1997.

General Environmental Issues

Environmental concerns in chemical wholesale distribution arise from potential releases during repackaging and reformulating. These are similar to the environmen-

Box 3–6. SIC Code 516, Wholesale Trade—Chemicals and Allied Products: Codes and Classifications Required to Report to TRI

SIC Code 516, Wholesale Trade—Chemicals and Allied Products: Codes and Classifications Required to Report to TRI

5169	Chemicals and Allied Products, Not Elsewhere Classified	Wholesale distribution of chemicals and allied products, not elsewhere classified, such as acids, industrial and heavy chemicals, dyestuffs, industrial salts, rosin, turpentine, and others.

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*.

tal concerns from activities undertaken by chemical manufacturing facilities in SIC code 28, covered by TRI since its inception. In particular, releases may result as chemicals are transferred from one container to another—from receipt of the product to storage to processing equipment (as appropriate) to shipping containers.

Processes Involving Toxic Chemicals

Chemicals handled by wholesale distributors may be dry or liquid, and they may be brought on-site by rail, truck or pipeline. Chemicals may be stored on-site before and after packaging. Some chemicals must be refrigerated (for example, flammable materials) while they are stored. Wholesale distributors may also blend and mix chemicals before repackaging them.

Repackaging chemicals consists of transferring them to specified containers for distribution. Chemicals delivered to the facility by rail or truck are first stored in permanent containers or tanks on-site. In repackaging, these chemicals are transferred to other containers through pipes. Chemicals that enter the facility through pipelines do not require storage and can be repackaged directly into shipping containers. A third type of repackaging activity does not involve products for distribution. Because the wastes that chemical distributors send off-site for recycling or direct re-use first undergo a recovery step, they are also considered to be "repackaged."

Blending and mixing (i.e., formulation) of products involves mixing chemicals with additives and catalysts. They may also be diluted. Cleaning the equipment used in blending and mixing requires draining the tanks and blowing out the pipes. The resulting residue consists of wastewater with small amounts of product, which is either drained and discharged or directed to a tank for subsequent recovery. Cleaners, lubricants or degreasers are used in the maintenance of mixers, stationary cranes and other processing equipment.

Other sources of chemicals in waste include packaging residues and unsold products. Empty drums may contain residue, and empty bags may contain residues of dust and powder. Facilities must also dispose of chemicals that did not sell or that expired while in storage waiting for shipment, as well as damaged or contaminated product.

Management of Toxic Chemicals in Waste

Fugitive air emissions can occur during the loading, unloading, formulation and transfer of products. Emissions occur from leaks in valves, seals or connectors in fuel handling equipment. They may also result from losses during cylinder changeovers, tank cleanings, pipe flushing, and other cleaning operations. The types and amounts of the emissions depend on the concentrations of the chemicals in the products. Vapor recovery equipment used while loading and unloading products captures organic vapors that are displaced during loading operations and either pipes the recovered product to a storage unit or a thermal oxidation unit where the vapor is combusted.

Most chemical distribution facilities conduct formulation operations in enclosed systems that are vented to control devices to minimize fugitive air emissions.

Primary sources of point source air emissions include storage tanks containing volatile chemicals such as toluene, xylene and ethylbenzene.

Wastewater discharges include process wastewater and storm water. Process wastewater results mainly from storage tank clean-out and pipe blowout water. Chemical distribution facilities can reduce the wastewater they generate by monitoring the need for cleaning, so that cleaning occurs only when necessary, or by applying a protective coating to the surfaces of internal heater coils to prevent the accumulation of scale on coil surfaces. Storm water run-off at a chemical distribution facility may contain chemicals washed from raw materials or products or other wastes.

Empty drums, container residues, solids from product filtration, and expired chemicals may be disposed of in landfills on site or they may be transferred off-site for disposal.

1998 TRI Data for Chemical Wholesale Distributors

On- and Off-site Releases

Chemical wholesale distributors required to report to TRI reported 1.6 million pounds of TRI chemicals released on- and off-site in 1998, as shown in Table 3–32. The largest type of release was 1.3 million pounds of air emissions. Figure 3–9 shows that air emissions amounted to 79.8 percent of the industry's total releases.

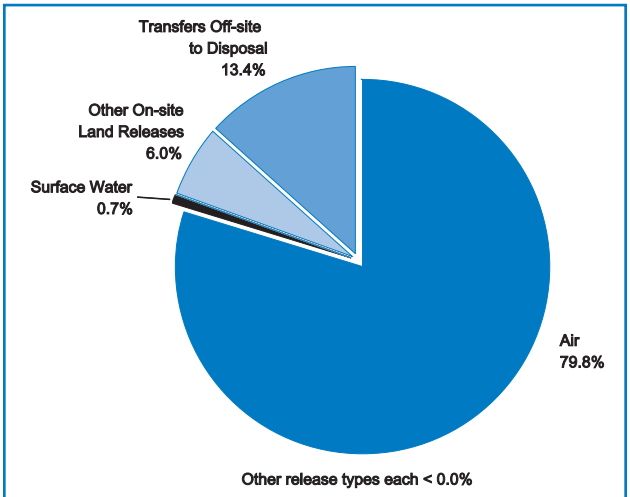
Off-site releases (transfers off-site to disposal) totaled 215,380 pounds, the industry's second-largest release type. Less than 100,000 pounds were released on-site to land and less than 12,000 pounds were discharged to surface waters. No underground injection was reported by chemical wholesale distributors.

Some forms indicated a combination of operations along with chemical wholesale

Table 3–32. TRI On-site and Off-site Releases by 4-digit SIC Code, 1998: Chemical Wholesalers

SIC Code	Industry	Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II–V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
5169	Chemical Wholesale Distributors	3,561	1,207,793	11,013	0	1	0	96,294	1,315,101	110,564	1,425,665
	SIC code 5169 and 5171 (Petroleum Bulk Terminals)	18	13,505	55	0	0	0	0	13,560	2,275	15,835
	SIC code 5169 and 7389 (Solvent Recovery Services)	62	42,793	0	0	0	0	700	43,493	102,489	145,982
	SIC code 5169 and SIC code 28 (Chemical Products)	54	19,941	535	0	0	0	260	20,736	52	20,788
	Total	**3,695**	**1,284,032**	**11,603**	**0**	**1**	**0**	**97,254**	**1,392,890**	**215,380**	**1,608,270**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*



Note: ***On-site Releases*** *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

Figure 3–9. Distribution of TRI On-site and Off-site Releases, 1998: Chemical Wholesalers

distribution, for example, solvent recovery services. However, those reporting only chemical wholesale distribution reported 1.4 million pounds of total releases, representing 88.6 percent of the total for this industry. These were largely air emissions, totaling 1.2 million pounds.

Facilities reporting both chemical wholesale distribution operations and solvent recovery operations reported the second largest amount, 145,982 pounds of total releases (9.1 percent of the total for the industry). Their releases consisted of 102,489 pounds of off-site releases and 42,793 pounds of air emissions.

Waste Management Data

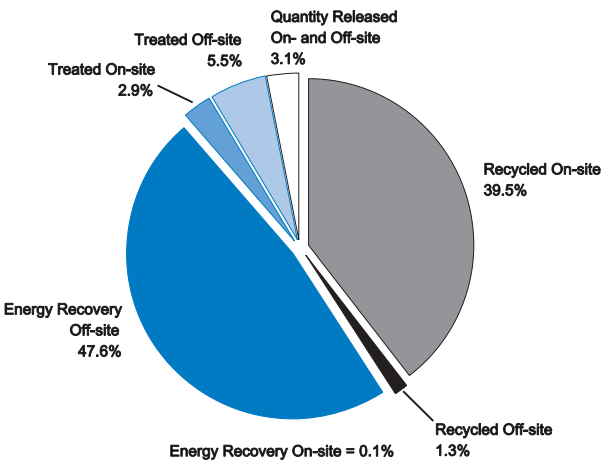
Quantities of TRI Chemicals in Waste

The chemical wholesale distribution industry reported managing 55.8 million pounds of total production-related waste in 1998, as shown in Table 3–33. Off-site energy recovery totaled 26.6 million pounds, or 47.6 percent of the industry's production-related waste (see Figure 3–10). The industry's on-site recycling totaled 22.0 million pounds, or 39.5 percent of the total. Off-site treatment amounted to 3.1 million pounds and on-site treatment amounted to 1.6 million pounds.

Table 3–33. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1998: Chemical Wholesalers

		Recycled		Energy Recovery		Treated				
SIC Code	Industry	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-production-related Waste Managed Pounds
5169	Chemical Wholesale Distributors	452,740	719,958	54,418	3,674,943	1,571,933	1,778,699	1,528,382	9,781,073	51,161
	SIC code 5169 and 5171 (Petroleum Bulk Terminals)	0	0	0	64,655	0	25,198	14,674	104,527	0
	SIC code 5169 and 7389 (Solvent Recovery Services)	21,336,738	0	0	22,809,790	4,900	1,221,432	149,027	45,521,887	220
	SIC code 5169 and SIC code 28 (Chemical Products)	233,712	10,356	0	2,980	14,000	60,843	40,753	362,644	1,156
	Total	**22,023,190**	**730,314**	**54,418**	**26,552,368**	**1,590,833**	**3,086,172**	**1,732,836**	**55,770,131**	**52,537**

Note: Data are from Section 8 of Form R.



Note: *Data are from Section 8 of Form R.*

Figure 3–10. TRI Waste Management, 1998: Chemical Wholesalers

Facilities with a combination of chemical wholesale distribution and solvent recovery services managed the largest quantities of TRI chemicals in waste, with 45.5 million pounds of total production-related waste, or 81.6 percent of the total for the industry. These facilities reported 22.8 million pounds of off-site energy recovery and 21.3 million pounds of on-site recycling.

Facilities reporting only chemical wholesale distribution operations reported 9.8 million pounds of total production-related waste managed, or 17.5 percent of the industry total. These facilities reported 3.7 million pounds of off-site energy recovery, 1.8 million pounds treated off-site and 1.6 million pounds treated on-site, and 1.5 million pounds of TRI chemicals released on- and off-site.

Transfers Off-site for Further Waste Management/Disposal

The chemical wholesale distribution industry reported 31.1 million pounds of transfers off-site for further waste management and disposal in 1998. As shown in Table 3–34, facilities with a combination of chemical wholesale distribution operations and solvent recovery services reported 24.5 million pounds, with 20.5 million pounds of

Table 3–34. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1998: Chemical Wholesalers

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs		Other Off-site Transfers* Pounds	Other Transfers Off-site to Disposal** Pounds	Total Transfers for Further Waste Management/ Disposal Pounds
					Non-metal TRI Chemicals Pounds	Metals and Metal Compounds Pounds			
5169	Chemical Wholesale Distributors	513,848	3,936,779	1,815,352	88,113	66	740	121,950	6,476,848
	SIC code 5169 and 5171 (Petroleum Bulk Terminals)	0	64,655	25,198	0	275	0	2,000	92,128
	SIC code 5169 and 7389 (Solvent Recovery Services)	2,616,878	20,473,854	1,264,663	2,134	10	0	107,821	24,465,360
	SIC code 5169 and SIC code 28 (Chemical Products)	8,661	1,280	1,891	60,075	0	0	52	71,959
	Total	**3,139,387**	**24,476,568**	**3,107,104**	**150,322**	**351**	**740**	**231,823**	**31,106,295**

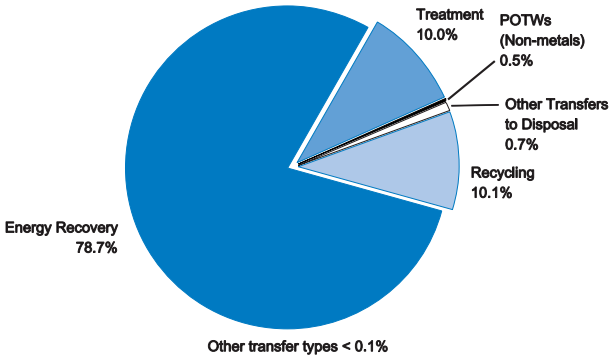
Note: *Data are from Section 6 of Form R.*
**Other Off-site Transfers reported without valid waste management code.*
***Does not include transfers of metals and metal compounds to POTWs.*

that transferred off-site to energy recovery. Facilities with only chemical distribution operations reported 6.5 million pounds of transfers off-site for further waste management and disposal. These facilities reported 3.9 million pounds of transfers to energy recovery and 1.8 million pounds of transfers to treatment.

Figure 3–11 shows that transfers off-site to energy recovery represented 78.7 percent of all transfers for further waste management and disposal. The industry also reported 3.1 million pounds sent off-site both to recycling and to treatment, accounting for approximately 10 percent for each of these types of transfers.

TRI Data by State

Facilities in the chemical wholesale distribution industry in Texas submitted the largest number of forms, 513 forms. Ohio and California were ranked second and third with 263 and 254 forms, respectively.



Note: *Data are from Section 6 of Form R.*
**Other Off-site Transfers reported without valid waste management code.*
***Does not include transfers of metals and metal compounds to POTWs.*

Figure 3–11. Distribution of TRI Transfers Off-site for Further Waste Management/Disposal, 1998: Chemical Wholesalers

On- and Off-site Releases

Chemical wholesale distributors in Texas also reported the largest total on- and off-site releases in 1998. As shown in Table 3–35, Texas facilities in this industry reported total releases of 240,952 pounds, primarily as air emissions. As shown in Map 3–4, the three states of Texas, Ohio, and New Jersey reported the largest amounts of total releases in 1998, over 150,000 pounds each.

Ohio ranked second behind Texas with 186,800 pounds of total releases, of which 103,697 pounds were transferred off-site to disposal and 83,073 pounds were released to air. Ohio's transfers to disposal were 48.1 percent of the total of such transfers for the entire industry. New Jersey ranked third among states for releases in this industry with 151,584 pounds, including 144,514 pounds of air emissions.

In two other states, California and North Carolina, releases exceeded 100,000 pounds. California reported 120,126 pounds with 108,745 pounds of air emissions. North Carolina reported 115,685 pounds, with 77,829 pounds of on-site land releases or 80.0 percent of total on-site land releases for this industry. Facilities in Puerto Rico reported the largest amounts of surface water discharges, 10,789 pounds.

Waste Management Data

Ohio was the only state with total production-related waste of more than 6.0 million pounds reported by the chemical wholesale distribution industry. These data also appear in Table 3–35. Ohio facilities in this industry managed 37.9 million pounds of production-related waste. Ohio's 19.2 million pounds of off-site energy recovery represents 72.2 percent of all of the industry's off-site energy recovery. Ohio's 17.2 million

pounds of on-site recycling represents 78.2 percent of the total on-site recycling reported by the chemical distribution industry.

Wisconsin ranked second with total production-related waste of 5.8 million pounds. This consisted of 3.2 million pounds of on-site recycling and 2.6 million pounds of off-site energy recovery. Texas ranked third with 2.7 million pounds of total production-related waste and reported the largest amount treated on-site, 1.3 million pounds.

Chemical wholesale distributors reported smaller quantities in other waste management activities. The largest amount of quantities released on- and off-site was 272,948 pounds in Texas. Iowa reported the largest amount of off-site recycling, 211,132 pounds.

Top 15 Chemicals for On- and Off-site Releases

Methanol was the chemical with the largest amount of on- and off-site releases in the chemical wholesale distribution industry. Chemical wholesale distributors reported releasing 225,651 pounds of methanol, largely as air emissions. Table 3–36 presents data for the 15 chemicals released in the largest amounts by TRI chemical wholesale distributors.

Toluene ranked second with 171,441 pounds, most of which was air releases. Three other chemicals had total on- and

Map 3–4. Total On- and Off-site Releases, 1998: Chemical Wholesalers

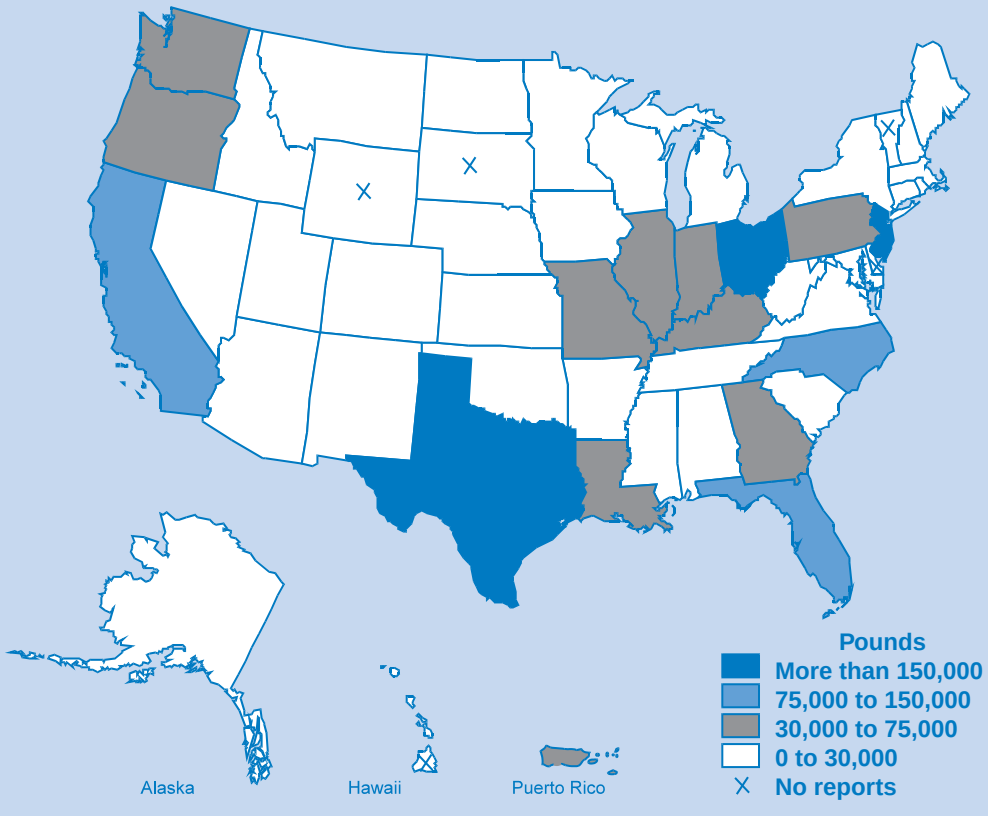


Table 3–35. Summary of TRI Information by State, 1998: Chemical Wholesalers

State	Total Forms Number	On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
		Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Alabama	74	25,916	0	0	0	0	0	25,916	0	25,916
Alaska	4	1,255	0	0	0	0	0	1,255	0	1,255
Arizona	43	12,249	0	0	0	0	0	12,249	0	12,249
Arkansas	6	985	0	0	0	0	0	985	0	985
California	254	108,745	536	0	0	0	0	109,281	10,845	120,126
Colorado	34	4,092	0	0	0	0	0	4,092	0	4,092
Connecticut	17	7,408	0	0	0	0	0	7,408	0	7,408
Florida	100	84,042	50	0	0	0	10	84,102	0	84,102
Georgia	120	35,448	0	0	0	0	0	35,448	2,250	37,698
Idaho	3	0	0	0	0	0	0	0	0	0
Illinois	123	36,143	36	0	0	0	0	36,179	17,200	53,379
Indiana	167	37,540	0	0	0	0	0	37,540	1,505	39,045
Iowa	72	13,902	0	0	0	0	2,219	16,121	4,440	20,561
Kansas	43	5,350	0	0	0	0	0	5,350	5,226	10,576
Kentucky	82	29,946	0	0	0	0	0	29,946	242	30,188
Louisiana	104	42,310	0	0	0	0	0	42,310	3,879	46,189
Maine	2	347	0	0	0	0	0	347	0	347
Maryland	17	260	0	0	0	0	0	260	0	260
Massachusetts	99	24,402	0	0	0	0	0	24,402	1,294	25,696
Michigan	104	28,177	0	0	0	0	0	28,177	0	28,177
Minnesota	89	17,798	5	0	0	0	5	17,808	20	17,828
Mississippi	25	7,961	0	0	0	0	0	7,961	0	7,961
Missouri	171	63,269	5	0	0	0	18	63,292	2,433	65,725
Montana	7	1,907	0	0	0	0	0	1,907	0	1,907
Nebraska	10	34	0	0	0	0	0	34	2,150	2,184
Nevada	1	475	0	0	0	0	0	475	0	475
New Hampshire	2	504	0	0	0	0	0	504	0	504
New Jersey	162	144,514	5	0	0	0	0	144,519	7,065	151,584
New Mexico	6	25	0	0	0	0	0	25	1,140	1,165
New York	100	16,473	0	0	0	0	0	16,473	0	16,473
North Carolina	129	26,311	0	0	0	0	77,829	104,140	11,545	115,685
North Dakota	5	772	0	0	0	0	0	772	0	772
Ohio	263	83,073	30	0	0	0	0	83,103	103,697	186,800

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

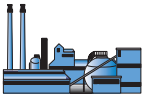


Table 3–35. Summary of TRI Information by State, 1998: Chemical Wholesalers *(continued)*

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	5,219	0	0	45,030	3	65	25,150	75,467	265
Alaska	0	0	0	0	0	0	580	580	0
Arizona	10,000	0	0	9,262	161,980	187	11,547	192,976	0
Arkansas	0	0	0	0	0	0	985	985	0
California	712	25,516	0	677,873	22,786	79,806	203,618	1,010,311	1,550
Colorado	0	0	0	878	0	56	3,828	4,762	0
Connecticut	0	0	0	0	0	0	7,402	7,402	1
Florida	500	0	0	58,753	1,171	910	80,369	141,703	3,961
Georgia	0	1,300	0	95,515	0	4,120	35,611	136,546	260
Idaho	0	0	0	0	0	0	0	0	0
Illinois	0	510	0	214,483	1,002	33,854	51,414	301,263	10
Indiana	58,500	19,133	0	305,458	39,875	128,801	33,290	585,057	3,080
Iowa	54,744	211,132	0	71,671	0	4,581	15,959	358,087	0
Kansas	19,185	0	0	44,326	0	6,466	5,333	75,310	0
Kentucky	0	0	0	8,310	2,143	279	27,718	38,450	167
Louisiana	0	4	54,418	110,272	2,277	5,297	127,282	299,550	199
Maine	0	0	0	0	4,940	0	347	5,287	2
Maryland	0	0	0	0	0	0	260	260	0
Massachusetts	233,000	18,506	0	33,396	2,806	9,658	27,980	325,346	1,323
Michigan	0	0	0	238,402	2,652	15,351	27,534	283,939	56
Minnesota	0	10,187	0	105,123	4,280	1,625	17,599	138,814	0
Mississippi	0	0	0	111,993	0	188,090	7,399	307,482	0
Missouri	0	0	0	254,293	2,545	71,136	64,048	392,022	64
Montana	0	0	0	0	0	0	1,907	1,907	0
Nebraska	0	0	0	0	2,500	2,160	34	4,694	0
Nevada	75	0	0	0	0	0	540	615	0
New Hampshire	0	0	0	0	0	18	504	522	0
New Jersey	0	4,120	0	59,736	6,354	32,083	196,448	298,741	3,042
New Mexico	0	0	0	0	0	0	1,160	1,160	0
New York	0	0	0	35,227	0	5,625	14,765	55,617	11
North Carolina	0	201,200	0	104,070	16,940	834,883	26,265	1,183,358	140
North Dakota	0	0	0	0	0	0	772	772	0
Ohio	17,218,400	23,887	0	19,168,062	6,241	1,235,900	204,667	37,857,157	6,182

Note: *Data are from Section 8 of Form R.*

Table 3–35. Summary of TRI Information by State, 1998: Chemical Wholesalers *(continued)*

State	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection: Class I Wells Pounds	On-site Releases: Underground Injection: Class II–V Wells Pounds	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Releases: On-site Land Releases: Other On-site Land Releases Pounds	On-site Releases: Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Oklahoma	68	11,281	0	0	0	0	0	11,281	0	11,281
Oregon	55	25,327	0	0	0	0	70	25,397	10,450	35,847
Pennsylvania	202	41,652	9	0	1	0	0	41,662	1,361	43,023
Puerto Rico	18	23,617	10,789	0	0	0	0	34,406	0	34,406
Rhode Island	5	250	0	0	0	0	0	250	0	250
South Carolina	33	12,990	0	0	0	0	1,493	14,483	500	14,983
Tennessee	116	28,104	0	0	0	0	310	28,414	0	28,414
Texas	513	214,272	13	0	0	0	0	214,285	26,667	240,952
Utah	47	4,718	0	0	0	0	0	4,718	0	4,718
Virginia	65	25,787	0	0	0	0	0	25,787	1,371	27,158
Washington	41	16,565	125	0	0	0	14,600	31,290	0	31,290
West Virginia	18	2,200	0	0	0	0	0	2,200	100	2,300
Wisconsin	76	15,636	0	0	0	0	700	16,336	0	16,336
Total	**3,695**	**1,284,032**	**11,603**	**0**	**1**	**0**	**97,254**	**1,392,890**	**215,380**	**1,608,270**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

off-site releases greater than 100,000 pounds each. They were methyl ethyl ketone with 159,181 pounds, dichloromethane with 158,185 pounds, and ammonia with 131,254 pounds. For all of these chemicals, air emissions accounted for more than 80 percent of total on- and off-site releases. Only two of the top 15 chemicals reported off-site transfers to disposal as the majority of their total releases. Both zinc compounds and chromium compounds had more than 98 percent of total releases reported as off-site releases (transfers to disposal).

Releases of the 15 chemicals totaled 1.3 million pounds, 82.7 percent of the industry's total releases of 1.6 million pounds.

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

Chemical wholesale distribution facilities reporting to TRI expected to reduce their production-related waste by 11.5 percent from 1998–2000, reducing it from a total of 55.8 million pounds to 49.4 million pounds, as shown in Table 3–37. The projected decrease represents a reduction of 16.4 percent in 1999 followed by an increase of 5.9 percent in 2000. The projected decrease from 1998 to 1999 is expected to come from decreases in on-site recycling and off-site energy recovery. The subsequent increase projected from 1999–2000 is expected to occur in on-site recycling.

The projections indicate a small change in waste management practices. On-site recycling would go from 39.5 percent of total production-related waste in 1998 to 41.2

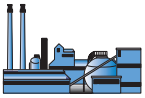


Table 3–35. Summary of TRI Information by State, 1998: Chemical Wholesalers *(continued)*

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			
Oklahoma	0	0	0	6,670	34	250	11,288	18,242	34
Oregon	0	0	0	26,045	9,704	1,151	36,974	73,874	1,095
Pennsylvania	100	1,218	0	67,644	0	67,045	39,589	175,596	4,845
Puerto Rico	0	0	0	0	2,979	0	24,635	27,614	4
Rhode Island	0	0	0	0	0	0	400	400	0
South Carolina	0	0	0	6,459	0	1,493	12,977	20,929	0
Tennessee	3,361	4,358	0	9,569	10,972	1,076	36,183	65,519	557
Texas	0	205,130	0	665,408	1,273,217	332,610	272,948	2,749,313	25,534
Utah	0	0	0	15,603	12,425	19,764	4,270	52,062	4
Virginia	1,219,208	243	0	1,378,381	180	0	24,045	2,622,057	18
Washington	0	0	0	35	0	580	29,075	29,690	0
West Virginia	0	3,200	0	0	0	100	1,725	5,025	0
Wisconsin	3,200,186	670	0	2,624,421	827	1,152	16,412	5,843,668	133
Total	**22,023,190**	**730,314**	**54,418**	**26,552,368**	**1,590,833**	**3,086,172**	**1,732,836**	**55,770,131**	**52,537**

Note: *Data are from Section 8 of Form R.*

percent in 2000 and off-site energy recovery would go from 47.6 percent to 46.0 percent. Quantities released on- and off-site—the least desirable outcome under the waste management hierarchy (described in **Waste Management** in Chapter 1)—would remain about the same at about 3 percent of total production-related waste.

Source Reduction

Twelve percent of the Form Rs submitted by the chemical wholesale distribution facilities in 1998 reported source reduction activity undertaken during the year (see Table 3–38). As noted in Waste Management in Chapter 1, source reduction is activity that prevents the generation of waste and is the preferred waste management option.

Facilities with only chemical wholesale distribution operations reported both the largest number of forms and the largest number with source reduction activities. These facilities identified spill and leak prevention on 119 forms and good operating practices on 111 forms, making them the most frequent source reduction activity in the industry. The facilities with combinations of chemical wholesale distribution and other operations reported smaller numbers of forms but reported source reduction activity on a greater percentage of forms. Facilities with the combination of chemical wholesale distribution with petroleum bulk terminals and with manufacture of chemical products reported source reduction activity on more than 50 percent of their Form Rs. They also identified spill and leak prevention and good operating practices most frequently.

Table 3–36. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1998: Chemical Wholesalers

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
67-56-1	Methanol	200,444	0	0	0	0	11,679	212,123	13,528	225,651
108-88-3	Toluene	135,048	17	0	0	0	22,874	157,939	13,502	171,441
78-93-3	Methyl ethyl ketone	140,791	7	0	0	0	12,460	153,258	5,923	159,181
75-09-2	Dichloromethane	152,935	1	0	1	0	450	153,387	4,798	158,185
7664-41-7	Ammonia	107,763	710	0	0	0	22,752	131,225	29	131,254
110-54-3	n-Hexane	78,761	0	0	0	0	840	79,601	1,504	81,105
1330-20-7	Xylene (mixed isomers)	70,926	11	0	0	0	50	70,987	2,112	73,099
75-45-6	Chlorodifluoro-methane (HCFC-22)	64,602	0	0	0	0	0	64,602	0	64,602
—	Zinc compounds	562	0	0	0	0	0	562	50,518	51,080
—	Chromium compounds	350	0	0	0	0	0	350	50,610	50,960
—	Glycol ethers	20,393	0	0	0	0	12,275	32,668	10,545	43,213
108-05-4	Vinyl acetate	34,370	0	0	0	0	0	34,370	6,440	40,810
96-33-3	Methyl acrylate	24,232	0	0	0	0	0	24,232	3,675	27,907
115-07-1	Propylene	26,294	0	0	0	0	0	26,294	0	26,294
7664-38-2	Phosphoric acid	6,552	10,807	0	0	0	4,828	22,187	3,150	25,337
	Subtotal	**1,064,023**	**11,553**	**0**	**1**	**0**	**88,208**	**1,163,785**	**166,334**	**1,330,119**
	Total	**1,284,032**	**11,603**	**0**	**1**	**0**	**97,254**	**1,392,890**	**215,380**	**1,608,270**

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

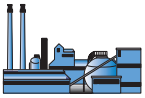


Table 3–37. Current Year and Projected Quantities of TRI Chemicals in Waste, 1998–2000: Chemical Wholesale Distributors

Waste Management Activity	Current Year 1998 Total Pounds	Current Year 1998 Percent of Total	Projected 1999 Total Pounds	Projected 1999 Percent of Total	Projected 2000 Total Pounds	Projected 2000 Percent of Total
Recycled On-site	22,023,190	39.5	17,425,942	37.4	20,358,880	41.2
Recycled Off-site	730,314	1.3	428,285	0.9	416,916	0.8
Energy Recovery On-site	54,418	0.1	80,000	0.2	80,000	0.2
Energy Recovery Off-site	26,552,368	47.6	22,791,390	48.9	22,692,883	46.0
Treated On-site	1,590,833	2.9	1,558,110	3.3	571,197	1.2
Treated Off-site	3,086,172	5.5	2,955,300	6.3	3,880,822	7.9
Quantity Released On- and Off-site	1,732,836	3.1	1,381,467	3.0	1,378,893	2.8
Total Production-related Waste	**55,770,131**	**100.0**	**46,620,494**	**100.0**	**49,379,591**	**100.0**

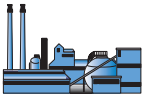
Waste Management Activity	Projected Change 1998–1999 Percent	Projected Change 1999–2000 Percent	Projected Change 1998–2000 Percent
Recycled On-site	–20.9	16.8	–7.6
Recycled Off-site	–41.4	–2.7	–42.9
Energy Recovery On-site	47.0	0.0	47.0
Energy Recovery Off-site	–14.2	–0.4	–14.5
Treated On-site	–2.1	–63.3	–64.1
Treated Off-site	–4.2	31.3	25.7
Quantity Released On- and Off-site	–20.3	–0.2	–20.4
Total Production-related Waste	**–16.4**	**5.9**	**–11.5**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*

Table 3–38. Number of Forms Reporting Source Reduction Activity, 1998: Chemical Wholesalers

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity: Number	Forms Reporting Source Reduction Activity: Percent of All Form Rs Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
5169	Chemical Wholesale Distributors	1,845	196	10.6	111	36	119	6	18	3	0	1
	SIC code 5169 and 5171 (Petroleum Bulk Terminals)	16	8	50.0	8	0	16	0	0	0	0	0
	SIC code 5169 and 7389 (Solvent Recovery Services)	58	9	15.5	0	5	0	6	8	0	0	0
	SIC code 5169 and SIC code 28 (Chemical Products)	31	18	58.1	17	0	4	0	2	1	0	0
	Total	**1,950**	**231**	**11.8**	**136**	**41**	**139**	**12**	**28**	**4**	**0**	**1**

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



❖ Petroleum Terminals and Bulk Storage Facilities (SIC Code 5171) ❖

Introduction

Petroleum terminals and bulk storage facilities (SIC code 5171) repackage or blend petroleum products for sale to gasoline stations and other retailers. Others may sell directly to end users such as farmers and construction companies. Box 3–7 describes the products of the wholesale petroleum industry

Products and Services

Petroleum bulk storage facilities buy petroleum products in bulk and blend and/or repackage them to customer specifications. The industry includes liquefied petroleum gases. These facilities sell to industrial, commercial, institutional, farm, construction or business users and to other wholesalers. They have a bulk liquid storage capacity of 10,000 gallons or more, and the quantities sold are large; retail gasoline stations are not included in this industry sector.

Employment and Production

There were 7,690 petroleum terminals and bulk storage facilities with 102,489 employees in 1997. Petroleum bulk terminals had sales valued at $176.72 billion that year.

General Environmental Issues

Petroleum terminals and bulk storage facilities transfer petroleum products from

Box 3–7. SIC Code 517, Wholesale Trade—Petroleum and Petroleum Products: Codes and Classifications Required to Report to TRI

SIC Code 517, Wholesale Trade—Petroleum and Petroleum Products: Codes and Classifications Required to Report to TRI

5171	Petroleum Terminals and Bulk Stations	Wholesale distribution of crude petroleum and petroleum products, including liquefied petroleum gas, from bulk liquid storage facilities.

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*.

pipelines to bulk storage to processing equipment (as appropriate) to tanker trucks for distribution. Releases may result as the petroleum products are transferred through these steps. Packaging and blending are similar to some activities performed by petroleum refineries (SIC code 27) and petrochemical facilities (SIC code 28), covered by TRI since its inception.

Processes Involving Toxic Chemicals

Fuel is stored in bulk storage tanks and transferred to tanker trucks for distribution. Blending and mixing of products by the facilities involves mixing additives or other agents into gasoline and aviation fuel. Other blending operations involve mixing refined motor fuel with oxygenated compounds such as methanol, ethanol or methyl tertiary butyl ether (MTBE). However, this type of blending is usually done at petroleum refineries rather than the petroleum bulk storage facility.

During cleaning operations, tanks are drained to remove and recover product. The wastewater may have small amounts of hydrocarbons including benzene, cyclohexane, ethylbenzene, toluene, 1,2,4-trimethylbenzene and xylene. The wastewater is either drained and discharged or directed to a tank for subsequent fuel recovery. Cleaners, lubricants and degreasers are used in the maintenance of pumps, valves and other processing equipment.

Precipitation often accumulates in the secondary containment area of the storage tanks and loading/unloading zones. This wastewater may be drained to water ditches or oil/water separators.

Management of Toxic Chemicals in Waste

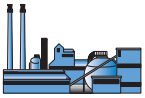
Fugitive air emissions can occur during the loading and unloading of petroleum products. Losses occur during loading as organic vapors in the empty storage tanks are displaced by the liquid being loaded into the tanks. The types and amounts of the emissions will depend on the physical and chemical characteristics of the previous fuel and new fuel being loaded. Vapor recovery equipment used while loading and unloading petroleum products captures organic vapors that are displaced during loading operations. This recovered product is then either piped to a storage unit or to a thermal oxidation unit for combustion.

Other fugitive air emissions can come from leaks in valves, seals or connectors in fuel handling equipment. They may also occur from losses during cylinder changeovers, tank cleanings, blowing out pipes and other cleaning operations.

Blending and mixing operations in most petroleum terminals and bulk storage facilities are conducted in enclosed systems that are vented to control devices to minimize fugitive air emissions.

Point source air emissions may come from storage tanks that store materials containing volatile chemicals, such as Fuel Oil No. 2.

Wastewater discharges include process wastewater and storm water. Process wastewater results mainly from storage tank clean-out. Eliminating unnecessary tank cleaning reduces the amount of wastewater generated. Petroleum bulk storage facilities can clean tanks less often if they



closely monitor the process chemistry and the need for cleaning. Applying a protective coating to internal heater coils, which reduces the accumulation of scale, also reduces the need for frequent cleanings.

Storm water run-off at a petroleum bulk storage facility may contain chemicals washed from raw materials or products or from other wastes. Secondary containment of the storage tanks and loading areas may be used to collect rainwater run-off contaminated with petroleum and other chemicals from equipment cleaning operations, leaks and spills.

Wastewater may be treated by neutralization, settling, filtration, chemical precipitation, dewatering, or evaporation. Sludge and other solid wastes may be treated on-site by filtration, sludge dewatering, settling and thermal drying.

Storage tank residue may be disposed of in on-site landfills or surface impoundments. These wastes may also be sent off-site for disposal or recycling.

1998 TRI Data for Petroleum Terminals and Bulk Storage Facilities

On- and Off-site Releases

Petroleum terminals and bulk storage facilities required to report to TRI reported 4.7 million pounds of TRI chemicals released on- and off-site in 1998, as shown in Table 3–39. The majority, 4.3 million pounds, was air emissions. Figure 3–12 shows that air emissions amounted to 90.9 percent of the industry's total releases.

Off-site releases (transfers off-site to disposal) totaled 233,487 pounds, the industry's second-largest release type, representing 5.0 percent of total releases. Petroleum terminals and bulk stations also reported 137,947 pounds discharged to surface waters and 53,692 pounds of on-site land releases. No underground injection was reported.

Fifteen of the 3,748 forms indicated a combination of operations covering terminals and bulk storage stations along with petroleum refining. However, those reporting only petroleum terminals and bulk storage stations represented 99.8 percent of the total forms submitted by this industry. Facilities reporting this combination of operations reported 8,010 pounds of total releases for 1998.

Waste Management Data

Quantities of TRI Chemicals in Waste

The petroleum terminals and bulk storage industry reported managing 60.0 million pounds of total production-related waste in 1998, as shown in Table 3–40. On-site recycling totaled 22.8 million pounds, or 38.0 percent of the industry's production-related waste (see Figure 3–13). The industry's quantities released on- and off-site totaled 14.7 million pounds, or 24.5 percent of the total. Off-site recycling amounted to 11.1 million pounds and on-site treatment amounted to 9.8 million pounds, each less than 20 percent of the total. Energy recovery both on- and off-site was less than 500,000 pounds.

Facilities reporting only petroleum terminals and bulk storage operations reported 59.9 million pounds of total production-related waste managed, representing more

Table 3–39. TRI On-site and Off-site Releases by 4-digit SIC Code, 1998: Petroleum Bulk Terminals

SIC Code	Industry	Total Forms (Number)	On-site Releases: Total Air Emissions (Pounds)	On-site Releases: Surface Water Discharges (Pounds)	On-site Releases: Underground Injection: Class I Wells (Pounds)	On-site Releases: Underground Injection: Class II–V Wells (Pounds)	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills (Pounds)	On-site Releases: On-site Land Releases: Other On-site Land Releases (Pounds)	On-site Releases: Total On-site Releases (Pounds)	Off-site Releases: Transfers Off-site to Disposal (Pounds)	Total On- and Off-site Releases (Pounds)
5171	Petroleum Terminals and Bulk Stations	3,733	4,258,610	137,909	0	0	0	53,692	4,450,211	230,652	4,680,863
	SIC code 5171 and SIC code 29 (Petroleum Refining)	15	5,137	38	0	0	0	0	5,175	2,835	8,010
	Total	**3,748**	**4,263,747**	**137,947**	**0**	**0**	**0**	**53,692**	**4,455,386**	**233,487**	**4,688,873**

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

than 99.9 percent of the industry's total. Facilities with a combination of petroleum terminals and bulk storage and petroleum refining reported 14,432 pounds of production-related waste managed, largely as quantities released on- and off-site.

Transfers Off-site for Further Waste Management/Disposal

The petroleum terminals and bulk storage industry reported 13.0 million pounds of transfers off-site for further waste management and disposal in 1998, as shown in Table 3–41. Figure 3–14 shows that transfers off-site to recycling, 11.4 million pounds, represented 87.4 percent of all transfers for further waste management and disposal. The industry also reported 1.0 million pounds sent off-site to treatment, accounting for 8.0 percent of the total.

These figures also represent reporting by facilities with only petroleum terminals and bulk storage operations. Facilities reporting a combination of petroleum terminals and bulk storage operations and petroleum refining reported just 6,166 pounds of transfers off-site for further waste management and disposal.

TRI Data by State

Facilities in the petroleum terminals and bulk storage industry in California submitted the largest number of forms, with 362 forms. New York and Pennsylvania were ranked second and third with 359 and 292 forms, respectively.

On- and Off-site Releases

Petroleum terminals and bulk storage facilities in Texas, however, reported the largest total on- and off-site releases in 1998. As shown in Table 3–42, Texas facilities in this industry reported total releases of 530,011 pounds, consisting primarily of 522,883 pounds of air emissions. As shown in Map 3–5, the four states of Texas, California, New York and New Jersey reported the largest amounts of total releases in 1998, over 300,000 pounds each.

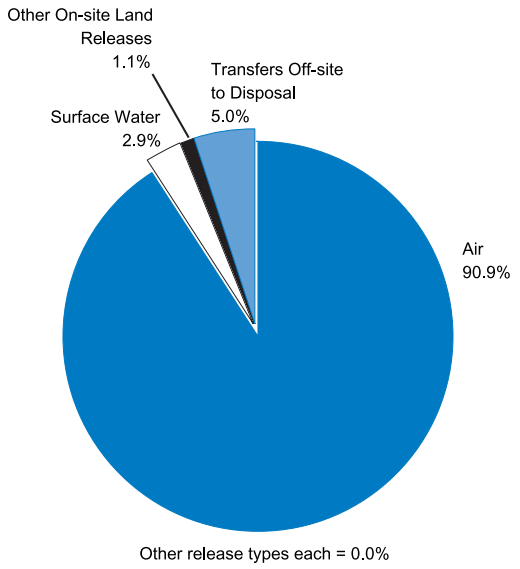
California ranked second with 496,843 pounds of total releases, of which 470,307 pounds were released to air. New York, ranked third, reported 325,122 pounds of total releases, with 302,030 pounds of air emissions. New Jersey ranked fourth among states for releases in this industry

with 310,138 pounds, including 296,064 pounds of air emissions.

Facilities in Virginia reported the largest amount of discharges to surface waters with 113,127 pounds, representing 82.0 percent of the total surface water discharges for this industry. Facilities in Massachusetts reported the largest off-site releases (off-site transfers to disposal) with 40,008 pounds.

Waste Management Data

Pennsylvania was the state with the largest total production-related waste in the petroleum terminals and bulk storage industry, with 20.0 million pounds. These data also appear in Table 3–42. Pennsylvania facilities in this industry reported 10.0 million pounds as quantities released on- and off-site, which represents 68.2 percent of all quantities released on- and off-site in this industry. Pennsylvania facilities also reported 9.8 million pounds of off-site recycling, representing 88.3 percent of total off-site recycling in this industry.



*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

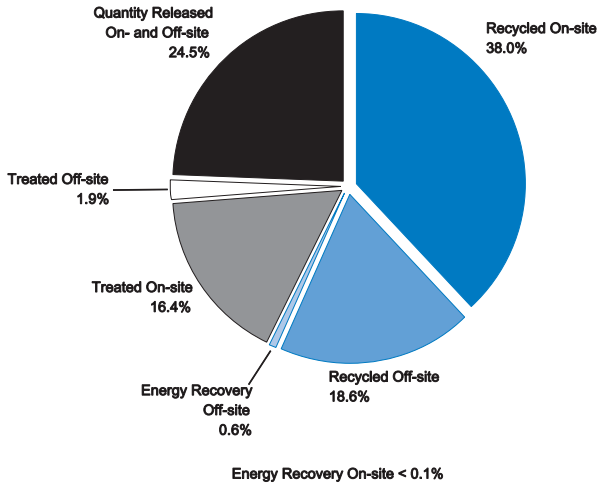
Figure 3–12. Distribution of TRI On-site and Off-site Releases, 1998: Petroleum Bulk Terminals

Texas ranked second with total production-related waste of 11.9 million pounds. This

Table 3–40. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1998: Petroleum Bulk Terminals

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
5171	Petroleum Terminals and Bulk Stations	22,796,695	11,134,868	6	337,216	9,808,300	1,165,737	14,704,353	59,947,175	942,486
	SIC code 5171 and SIC code 29 (Petroleum Refining)	2,613	2,118	0	0	0	744	8,957	14,432	0
	Total	**22,799,308**	**11,136,986**	**6**	**337,216**	**9,808,300**	**1,166,481**	**14,713,310**	**59,961,607**	**942,486**

***Note:** Data are from Section 8 of Form R.*



Note: *Data are from Section 8 of Form R.*

Figure 3–13. TRI Waste Management, 1998: Petroleum Bulk Terminals

consisted of 8.6 million pounds of on-site recycling, which was the largest amount of on-site recycling of any state in this industry and represented 37.7 percent of all on-site recycling in the industry.

Michigan ranked third with 4.4 million pounds of total production-related waste. Michigan facilities reported 3.0 million pounds recycled on-site and 1.3 million pounds treated on-site. California facilities reported 2.6 million pounds treated on-site, the largest amount treated on-site reported by any state in this industry.

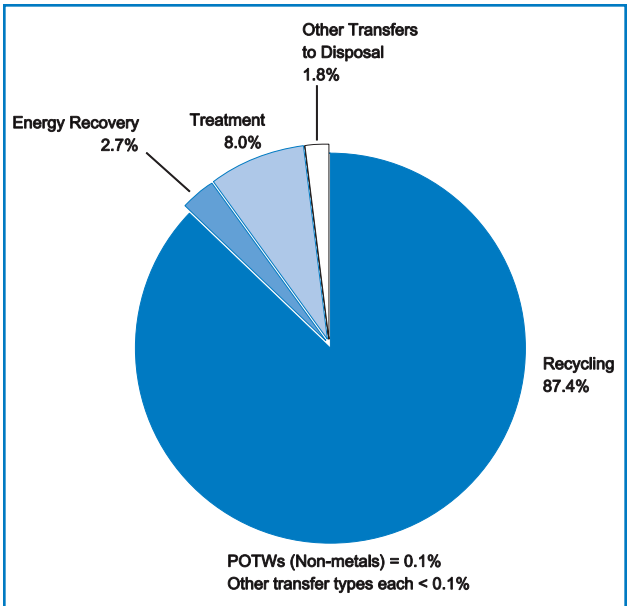
Top 15 Chemicals for On- and Off-site Releases

Methyl tert-butyl ether was the chemical with the largest amount of on- and off-site releases in the petroleum terminals and bulk storage industry. Petroleum terminals and bulk storage industry reported releasing 1.6 million pounds of methyl tert-butyl ether, primarily as air emissions. Table 3–43 presents data for the 15 chemicals released in the largest amounts by petroleum terminals and bulk storage facilities.

Toluene ranked second with 755,529 pounds, most of which was air releases. One other chemical, n-hexane, had total on- and off-site releases of greater than 500,000 pounds. Total releases of n-hexane were 715,851 pounds.

For all of the top 15 chemicals except one, air emissions accounted for more than 85 percent of total on- and off-site releases. Ethylene glycol discharges to surface water accounted for the majority of releases, 111,765 pounds, or 98.6 percent of the total releases for this chemical.

Releases of the 15 chemicals totaled 4.6 million pounds, 98.7 percent of the industry's total releases of 4.7 million pounds.



Note: *Data are from Section 6 of Form R.*

Figure 3–14. Distribution of TRI Transfers Off-site for Further Waste Management/Disposal, 1998: Petroleum Bulk Terminals

Table 3–41. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1998: Petroleum Bulk Terminals

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs: Non-metal TRI Chemicals Pounds	Transfers to POTWs: Metals and Compounds Pounds	Other Off-site Transfers* Pounds	Other Transfers Off-site to Disposal** Pounds	Total Transfers for Further Waste Management/ Disposal Pounds
5171	Petroleum Terminals and Bulk Stations	11,388,894	353,636	1,040,527	7,815	370	6,000	237,081	13,034,323
	SIC code 5171 and SIC code 29 (Petroleum Refining)	2,118	0	1,213	0	0	0	2,835	6,166
	Total	**11,391,012**	**353,636**	**1,041,740**	**7,815**	**370**	**6,000**	**239,916**	**13,040,489**

Note: *Data are from Section 6 of Form R.*
**Other Off-site Transfers reported without valid waste management code.*
***Does not include transfers of metals and metal compounds to POTWs.*

Map 3–5. Total On- and Off-site Releases, 1998: Petroleum Bulk Terminals

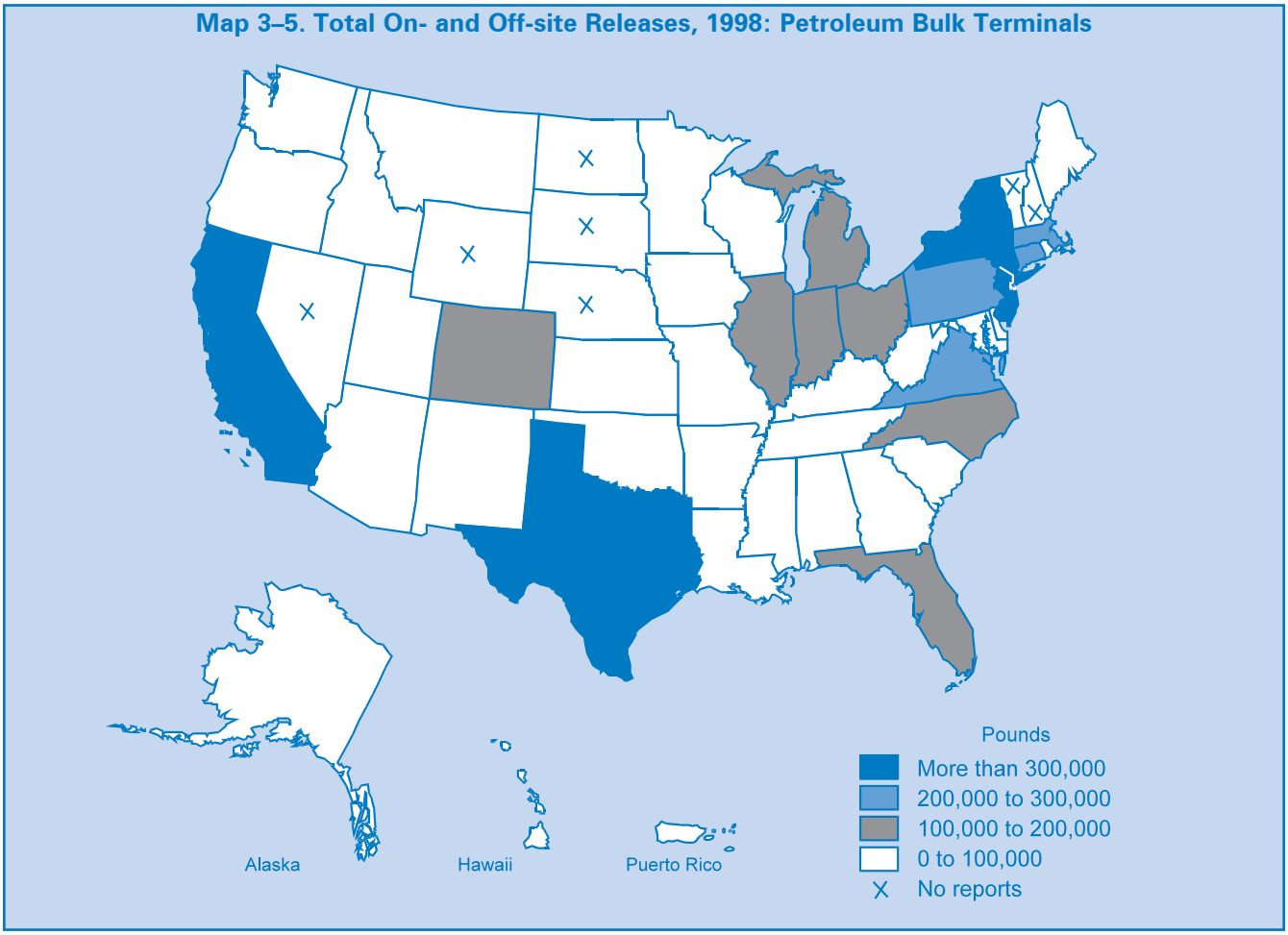


Table 3–42. Summary of TRI Information by State, 1998: Petroleum Bulk Terminals

State	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: SurfaceWater Discharges Pounds	On-site Releases: Underground Injection: Class I Wells Pounds	On-site Releases: Underground Injection: Class II–V Wells Pounds	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Releases: On-site Land Releases: Other On-site Land Releases Pounds	On-site Releases: Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Alabama	19	9,381	78	0	0	0	20	9,479	51	9,530
Alaska	40	17,503	0	0	0	0	38	17,541	325	17,866
American Samoa	6	5,146	1	0	0	0	0	5,147	0	5,147
Arizona	68	57,387	0	0	0	0	0	57,387	10	57,397
Arkansas	11	24,216	0	0	0	0	0	24,216	0	24,216
California	362	470,307	72	0	0	0	2,043	472,422	24,421	496,843
Colorado	39	79,668	515	0	0	0	34,390	114,573	0	114,573
Connecticut	52	177,468	45	0	0	0	0	177,513	25,880	203,393
Delaware	41	2,100	0	0	0	0	0	2,100	0	2,100
Florida	130	151,682	389	0	0	0	1,810	153,881	236	154,117
Georgia	72	34,607	545	0	0	0	0	35,152	516	35,668
Guam	5	9,783	1,275	0	0	0	0	11,058	0	11,058
Hawaii	34	56,407	0	0	0	0	0	56,407	0	56,407
Idaho	15	30,224	0	0	0	0	0	30,224	0	30,224
Illinois	81	108,246	120	0	0	0	1,609	109,975	4,514	114,489
Indiana	98	175,042	1,227	0	0	0	15	176,284	5,574	181,858
Iowa	12	9,935	0	0	0	0	0	9,935	43	9,978
Kansas	24	28,055	1,020	0	0	0	0	29,075	0	29,075
Kentucky	70	33,309	0	0	0	0	0	33,309	114	33,423
Louisiana	26	9,394	3	0	0	0	250	9,647	0	9,647
Maine	26	50,787	2	0	0	0	0	50,789	17,164	67,953
Maryland	51	89,175	1,600	0	0	0	116	90,891	226	91,117
Massachusetts	75	237,434	9,468	0	0	0	0	246,902	40,008	286,910
Michigan	126	130,038	31	0	0	0	0	130,069	0	130,069
Minnesota	12	3,110	0	0	0	0	0	3,110	707	3,817
Mississippi	76	28,585	36	0	0	0	0	28,621	751	29,372
Missouri	61	67,900	30	0	0	0	0	67,930	3,160	71,090
Montana	16	23,586	0	0	0	0	0	23,586	0	23,586
New Jersey	153	296,064	537	0	0	0	0	296,601	13,537	310,138
New Mexico	16	42,055	0	0	0	0	0	42,055	0	42,055
New York	359	302,030	658	0	0	0	169	302,857	22,265	325,122
North Carolina	146	153,474	1,048	0	0	0	0	154,522	1,287	155,809

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

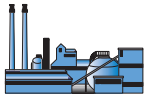


Table 3–42. Summary of TRI Information by State, 1998: Petroleum Bulk Terminals *(continued)*

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	0	634	0	0	1	0	7,074	7,709	0
Alaska	16,075	0	0	269	8,659	2,565	16,285	43,853	18
American Samoa	0	0	0	4,796	0	0	5,148	9,944	0
Arizona	0	202	0	0	0	2,135	55,673	58,010	23
Arkansas	17,780	0	0	0	0	0	24,216	41,996	0
California	0	45,457	6	0	2,645,538	392,328	482,305	3,565,634	100,969
Colorado	3,830	55	0	0	143,990	0	75,426	223,301	41,289
Connecticut	0	0	0	0	4,198	24,341	159,892	188,431	0
Delaware	0	210	0	0	0	0	2,100	2,310	1
Florida	1,144,000	33,043	0	12,178	84,901	154	148,194	1,422,470	175
Georgia	538,000	3,453	0	0	5	522	25,545	567,525	2,383
Guam	0	0	0	0	0	0	11,624	11,624	0
Hawaii	0	0	0	10	0	64	53,304	53,378	6
Idaho	0	0	0	0	157,400	699	30,240	188,339	99
Illinois	581,822	9,557	0	21	600,700	14,115	114,567	1,320,782	206,300
Indiana	1,319,937	12,013	0	727	223,046	1,290	175,881	1,732,894	1,211
Iowa	4,520	0	0	0	1	43	9,935	14,499	135,000
Kansas	16,503	5	0	0	43,937	5	27,519	87,969	0
Kentucky	1,093,674	0	0	2,974	0	2,228	33,276	1,132,152	0
Louisiana	2,770,000	610,000	0	0	0	0	9,401	3,389,401	0
Maine	0	0	0	0	0	23,972	59,961	83,933	0
Maryland	2,043	22,863	0	635	81,100	1,040	76,911	184,592	125
Massachusetts	427,375	0	0	0	1,000	97,041	361,177	886,593	5,715
Michigan	2,953,703	10,491	0	5,642	1,264,058	1,964	127,205	4,363,063	284
Minnesota	932	102	0	0	322,835	0	3,046	326,915	251
Mississippi	0	2	0	0	0	4	28,717	28,723	0
Missouri	930	24,400	0	51,698	705,355	4,325	103,225	889,933	10,927
Montana	0	0	0	0	0	45,566	20,752	66,318	0
New Jersey	1,307	6,028	0	35,068	46,395	12,937	346,800	448,535	4,284
New Mexico	0	0	0	0	0	0	39,605	39,605	0
New York	236,300	7,055	0	5,089	266,514	9,567	343,584	868,109	51,649
North Carolina	0	2,928	0	15,293	0	12,024	275,428	305,673	3,307

Note: *Data are from Section 8 of Form R.*

Table 3–42. Summary of TRI Information by State, 1998: Petroleum Bulk Terminals *(continued)*

State	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection: Class I Wells Pounds	On-site Releases: Underground Injection: Class II–V Wells Pounds	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Releases: On-site Land Releases: Other On-site Land Releases Pounds	On-site Releases: Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Northern Marianas	10	3,066	20	0	0	0	0	3,086	0	3,086
Ohio	213	107,514	709	0	0	0	3,164	111,387	10,454	121,841
Oklahoma	23	49,020	0	0	0	0	0	49,020	0	49,020
Oregon	46	60,199	38	0	0	0	0	60,237	1,370	61,607
Pennsylvania	292	216,632	2,149	0	0	0	0	218,781	3,242	222,023
Puerto Rico	32	21,796	0	0	0	0	0	21,796	555	22,351
Rhode Island	22	48,113	356	0	0	0	0	48,469	35,646	84,115
South Carolina	46	27,662	561	0	0	0	0	28,223	11	28,234
Tennessee	105	45,312	394	0	0	0	0	45,706	510	46,216
Texas	273	522,883	1,558	0	0	0	1,500	525,941	4,070	530,011
Utah	8	5,988	0	0	0	0	0	5,988	0	5,988
Virgin Islands	19	3,641	0	0	0	0	0	3,641	35	3,676
Virginia	184	127,367	113,127	0	0	0	0	240,494	4,062	244,556
Washington	57	73,452	0	0	0	0	7,063	80,515	11,653	92,168
West Virginia	24	12,119	280	0	0	0	1,505	13,904	0	13,904
Wisconsin	72	24,885	55	0	0	0	0	24,940	1,090	26,030
Total	**3,748**	**4,263,747**	**137,947**	**0**	**0**	**0**	**53,692**	**4,455,386**	**233,487**	**4,688,873**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

Petroleum terminals and bulk storage facilities reporting to TRI expected their production-related waste to increase by 17.3 percent from 1998–2000, from a total of 60.0 million pounds to 70.4 million pounds, as shown in Table 3–44. The projected increase represents an increase of 13.8 percent expected in 1999 followed by a smaller increase of 3.1 percent expected in 2000. The projected increase from 1998–2000 is expected to come from an increase of 49.5 percent in on-site recycling, as well as increases in on-site energy recovery and treatment.

Other types of waste management are expected to decrease. Quantities released on- and off-site—the least desirable outcome under the waste management hierarchy (described in **Waste Management** in Chapter 1)—are projected to decrease from 1998–2000 by 3.7 percent. Other types of off-site waste management are expected to decrease as well, off-site energy recovery by 75.0 percent, off-site treatment by 46.2 percent, and off-site recycling by 1.3 percent.

The projections indicate a change in waste management practices from these off-site waste management activities and quantities released on- and off-site towards on-site recycling. The percentage of waste managed through on-site recycling would rise

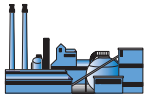


Table 3–42. Summary of TRI Information by State, 1998: Petroleum Bulk Terminals *(continued)*

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			
Northern Marianas	0	0	0	0	0	0	3,091	3,091	1
Ohio	2,905,029	39,930	0	326	516,483	3,416	104,671	3,569,855	3,898
Oklahoma	0	0	0	0	29,820	21	46,497	76,338	0
Oregon	0	29	0	8,239	1,455	401,774	59,447	470,944	1
Pennsylvania	153,713	9,829,142	0	1,612	18,955	1,327	10,038,394	20,043,143	1,346
Puerto Rico	0	0	0	15,577	0	2,061	20,448	38,086	0
Rhode Island	0	0	0	307	124,573	985	84,202	210,067	0
South Carolina	1,396	169	0	0	0	11	24,072	25,648	80
Tennessee	2,049	5,146	0	0	0	10,401	34,580	52,176	75
Texas	8,604,506	424,810	0	172,530	1,872,022	15,537	780,920	11,870,325	259,743
Utah	0	0	0	0	0	6,297	4,776	11,073	0
Virgin Islands	0	0	0	0	0	0	2,055	2,055	0
Virginia	2,952	45,321	0	1	197	4,563	133,488	186,522	111,913
Washington	0	425	0	397	645,162	70,164	90,699	806,847	0
West Virginia	0	0	0	3,417	0	129	6,861	10,407	40
Wisconsin	932	3,516	0	410	0	866	25,093	30,817	1,373
Total	**22,799,308**	**11,136,986**	**6**	**337,216**	**9,808,300**	**1,166,481**	**14,713,310**	**59,961,607**	**942,486**

Note: *Data are from Section 8 of Form R.*

from 38.0 percent of total production-related waste in 1998 to 48.4 percent in 2000. At the same time, the percentage of quantities released on- and off-site were expected to fall from 24.5 percent in 1998 to 20.1 percent in 2000, with similar reductions in percentage of off-site recycling, energy recovery and treatment.

Source Reduction

Sixteen percent of the Form Rs submitted by the petroleum terminals and bulk storage facilities in 1998 reported source reduction activity undertaken during the year (see Table 3–45). As noted in **Waste Management** in Chapter 1, source reduction is activity that prevents the generation of waste and is the preferred waste management option.

Facilities with only petroleum terminals and bulk storage operations reported the largest number of forms and reported source reduction activities on 16.2 percent of them. These facilities identified spill and leak prevention on 380 forms and good operating practices on 110 forms, making them the most frequent source reduction activities in the industry. The facilities with a combination of petroleum terminals and bulk storage and petroleum refining reported smaller numbers of forms but source reduction activity on a greater percentage of the forms. These facilities reported source reduction activity on 21.4 percent of the Form Rs. They also identified good operating practices as the source reduction activity undertaken.

Table 3–43. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1998: Petroleum Bulk Terminals

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
1634-04-4	Methyl tert-butyl ether	1,553,211	7,161	0	0	0	3,123	1,563,495	46,104	1,609,599
108-88-3	Toluene	682,054	5,292	0	0	0	17,959	705,305	50,224	755,529
110-54-3	n-Hexane	687,799	1,661	0	0	0	2,488	691,948	23,903	715,851
1330-20-7	Xylene (mixed isomers)	394,067	5,039	0	0	0	18,919	418,025	43,823	461,848
71-43-2	Benzene	348,185	3,683	0	0	0	2,727	354,595	15,679	370,274
95-63-6	1,2,4-Trimethylbenzene	130,767	686	0	0	0	3,045	134,498	12,859	147,357
100-41-4	Ethylbenzene	114,191	2,491	0	0	0	3,453	120,135	16,735	136,870
107-21-1	Ethylene glycol	1,072	111,765	0	0	0	500	113,337	0	113,337
91-20-3	Naphthalene	79,582	36	0	0	0	24	79,642	11,035	90,677
110-82-7	Cyclohexane	80,368	28	0	0	0	266	80,662	4,175	84,837
74-85-1	Ethylene	36,530	0	0	0	0	0	36,530	0	36,530
115-07-1	Propylene	30,490	0	0	0	0	0	30,490	0	30,490
78-93-3	Methyl ethyl ketone	27,163	0	0	0	0	0	27,163	0	27,163
75-65-0	tert-Butyl alcohol	22,995	21	0	0	0	10	23,026	3,225	26,251
7664-41-7	Ammonia	21,534	0	0	0	0	0	21,534	0	21,534
	Subtotal	**4,210,008**	**137,863**	**0**	**0**	**0**	**52,514**	**4,400,385**	**227,762**	**4,628,147**
	Total	**4,263,747**	**137,947**	**0**	**0**	**0**	**53,692**	**4,455,386**	**233,487**	**4,688,873**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

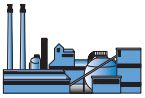


Table 3–44. Current Year and Projected Quantities of TRI Chemicals in Waste, 1998–2000: Petroleum Bulk Terminals

Waste Management Activity	Current Year 1998 Total Pounds	Current Year 1998 Percent of Total	Projected 1999 Total Pounds	Projected 1999 Percent of Total	Projected 2000 Total Pounds	Projected 2000 Percent of Total
Recycled On-site	22,799,308	38.0	32,352,179	47.4	34,075,627	48.4
Recycled Off-site	11,136,986	18.6	10,985,661	16.1	10,991,581	15.6
Energy Recovery On-site	6	0.0	21	0.0	25	0.0
Energy Recovery Off-site	337,216	0.6	82,666	0.1	84,284	0.1
Treated On-site	9,808,300	16.4	9,863,599	14.5	10,408,458	14.8
Treated Off-site	1,166,481	1.9	831,224	1.2	627,492	0.9
Quantity Released On- and Off-site	14,713,310	24.5	14,105,045	20.7	14,171,876	20.1
Total Production-related Waste	**59,961,607**	**100.0**	**68,220,395**	**100.0**	**70,359,343**	**100.0**

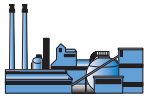
Waste Management Activity	Projected Change 1998–1999 Percent	Projected Change 1999–2000 Percent	Projected Change 1998–2000 Percent
Recycled On-site	41.9	5.3	49.5
Recycled Off-site	–1.4	0.1	–1.3
Energy Recovery On-site	250.0	19.0	316.7
Energy Recovery Off-site	–75.5	2.0	–75.0
Treated On-site	0.6	5.5	6.1
Treated Off-site	–28.7	–24.5	–46.2
Quantity Released On- and Off-site	–4.1	0.5	–3.7
Total Production-related Waste	**13.8**	**3.1**	**17.3**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*

Table 3–45. Number of Forms Reporting Source Reduction Activity, 1998: Petroleum Bulk Terminals

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity: Number	Forms Reporting Source Reduction Activity: Percent of All Form Rs Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
5171	Petroleum Terminals and Bulk Stations	3,244	527	16.2	110	0	380	1	21	3	0	11
	SIC code 5171 and SIC code 29 (Petroleum Refining)	14	3	21.4	3	0	0	0	0	0	0	0
	Total	**3,258**	**530**	**16.3**	**113**	**0**	**380**	**1**	**21**	**3**	**0**	**11**

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



❖ RCRA Subtitle C Treatment, ❖ Storage, and Disposal Facilities (in SIC Code 4953) and Solvent Recovery Facilities (in SIC Code 7389)

Introduction

Facilities regulated under the Resource Conservation and Recovery Act (RCRA), subtitle C, receive hazardous wastes from other facilities or from other operations at their own facilities and treat, store and dispose of the wastes. These treatment, storage and disposal (TSD) facilities are categorized among refuse systems in SIC code 4953, as shown in Box 3–8. This SIC code also includes many refuse facilities that collect and dispose of non-hazardous waste; they are not covered by RCRA subtitle C and are not required to report to TRI.

TSD facilities obtain RCRA subtitle C hazardous waste permits from EPA that regulate how they may treat, store, and dispose of the wastes. RCRA subtitle C establishes a federal program to manage hazardous wastes from cradle to grave to ensure that hazardous waste is handled in a manner that protects human health and the envi-

Box 3–8. SIC Codes 495, Sanitary Services, and 738, Miscellaneous Business Services: Codes and Classifications Required to Report to TRI

SIC Codes 495, Sanitary Services, and 738, Miscellaneous Business Services: Codes and Classifications Required to Report to TRI

4953	Refuse Systems	Collection and disposal of refuse by processing or destruction. Operation of incinerators, waste treatment plants, landfills, or other disposal sites.
	TRI reporting in SIC code 4953 is limited to facilities regulated under the Resource Conservation and Recovery Act, subtitle C, 42 U.S.C. section 6921 et seq.	
7389	Business Services, Not Elsewhere Classified	Furnishing business services, not elsewhere classified.
	TRI reporting in SIC code 7389 is limited to facilities primarily engaged in solvent recovery services on a contract or fee basis.	

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987.*

ronment. It regulates hazardous waste generators, transporters, and TSD facilities.

Solvent recovery facilities receive spent solvents and recover them for further use. Only facilities that recover solvents on a contract or fee basis are required to report to TRI. This business activity is one of many categorized in miscellaneous business services (SIC code 7389), also listed in Box 3–8.

Products and Services

TSD facilities treat hazardous wastes containing TRI chemicals by incineration and by various wastewater treatment methods. TSDs dispose of the wastes they receive in landfills and underground injection wells. Their activities also include recovery of solvents, metals and other TRI substances. TSDs receive hazardous waste for processing from a wide variety of industrial facilities and business, including manufacturers, hospitals, and universities. Small businesses and laboratories may also use TSD services to manage and dispose of their hazardous waste.

Solvent recovery facilities typically use a heat-based recovery system, such as distillation, to recover chemicals from waste that can then be sold for use as solvents again. Solvent recovery services receive spent solvents from industrial users such as chemical manufacturers, printers, electronic and photographic industries, textile plants and food processors. Other industrial processes that use organic solvents include painting and coating, metal degreasing and dry cleaning; spent solvents from these activities may also be sent to recovery services. Some TSDs send solvents to these recovery-services facilities as well.

In addition, some TSD and solvent recovery facilities may engage in fuel-blending to adjust the heat value of the waste for optimal energy recovery.

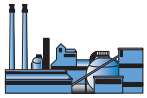
Employment and Production

In 1997, 2,025 TSDs subject to RCRA permitting managed 37.7 million tons of hazardous wastes. This represented an increase of 42 facilities and an apparent decrease of 170.5 million tons since 1995. The reduction in the amount of waste managed resulted largely from a change in reporting requirements for wastewater. When 1995 data are adjusted to the same reporting basis, the changes from 1995 to 1997 show increases of 43 facilities and 2.6 million tons. These amounts of hazardous waste include the total volume of the waste stream, both the hazardous constituents and the medium (water or soil). As explained in "General Environmental Issues" later in this chapter, these amounts also include corrosive and ignitable wastes, which may not contain toxic compounds.

Employment in the hazardous waste treatment and disposal industry totaled 17,816 in 1997, with receipts of $2.88 billion.

General Environmental Issues

While many industries and business activities generate hazardous waste as a result of their ongoing operations, TSD facilities and solvent recovery services are unique among TRI-covered entities in having hazardous waste as their principal input. They also use TRI chemicals in treating and processing the wastes and spent solvents. For example, they may use reactants or stabilizers in recovery processes. Similarly, TSDs



may use solvents to extract organic compounds from waste mixtures.

RCRA hazardous wastes include not only toxic compounds but also corrosive or ignitable wastes that may not include TRI chemicals and other toxic substances. Hazardous wastes generators, transporters, and TSD facilities report under RCRA's Biennial Reporting System (BRS). Reporting requirements in BRS do not allow for determination of amounts of particular chemicals in the wastes. One study of 1991 BRS data estimated that approximately 27 percent of the volume of hazardous waste generated consisted of TRI chemicals.

Many TSDs and solvent recovery services also package hazardous waste at the customer's site and transport the material to the TSD or recovery plant. Packaging and transportation activities are also regulated under RCRA.

Processes Involving Toxic Chemicals

TSDs and solvent recovery facilities receive both liquid and solid hazardous waste. Both types of facilities treat or recover spent solvents, which are also in liquid form. Some solvent waste streams are sent directly to treatment rather than to recovery operations.

TSDs and solvent recovery facilities receive liquid wastes in drums and other containers. They may store the containers as received, transfer the contents into holding tanks, or place the waste directly into pretreatment units. Storage tanks and pretreatment units consist of primary tanks, secondary containment, and associated equipment (such as piping, flanges and valves). Drums and other containers that are no longer in use may be washed and triple-rinsed. They are then returned to the generators for reuse or sent to a drum conditioner.

Pretreatment of liquid hazardous waste may include filtering to remove solids such as inert materials as well as removal of metals, acid/base neutralization, and other steps. Larger industrial customers of TSDs typically pre-treat wastewater before transferring waste to TSDs. Some TSD facilities operate hazardous waste incinerators that thermally decompose organic constituents of liquid waste. The four most common types of incineration are liquid injection, rotary kiln, fluidized bed and fixed hearth.

In solvent recovery, pretreatment processes include blending to stabilize the solvent, neutralization to adjust pH values, filtration and separation to remove debris and other organic compounds, decanting to separate and draw off the desirable solvent form and/or thermal drying to remove water and volatile organics. Most of these processes are tank-based.

The principal method of solvent recovery is distillation, in which heat is applied to liquid solvent waste to generate vapors. Differences in volatility of the components of the waste lead to separation. The heat may also convert compounds in the waste into other TRI chemicals, such as methyl ethyl ketone, trichloroethylene, 1,1,1-trichloroethane or toluene. These materials are recovered and sold or otherwise distributed into commerce. As with liquid hazardous waste, solvent recovery and treatment generates wastewater.

Treatment of liquid hazardous waste and treatment or recovery of solvents generates

wastewater from cleaning and other processes.

Treatment processes result in hazardous waste in solid form. Facilities stabilize the solid hazardous waste, including waste they receive directly from customers, by mixing it with binders or other materials and curing the resulting mixture. This stabilization is also referred to as waste fixation or solidification. The waste is then disposed of to land or in underground injection wells. On-site land disposal includes placing the waste in landfills regulated under RCRA subtitle C, other landfills, land treatment/application farming units, or surface impoundments.

Management of Toxic Chemicals in Waste

Releases may occur during storage and transport of wastes received, during pretreatment and treatment/recovery processes, during packaging of recovered products for distribution, and during (and after) disposal.

Storage and transport releases occur as air emissions, resulting from evaporative losses from storage tanks or during filling or emptying of tanks. A primary source of evaporative losses is displacement of vapors in partially filled tanks as more liquid enters. The use of vapor equalization or vapor recovery equipment can reduce evaporative losses from tanks. Vapor equalization equipment uses the gas being displaced from the tank being filled to provide the gas needed in the tank being emptied. Vapor recovery equipment captures organic vapors and pipes them to storage or to a thermal oxidation unit where the vapor is combusted.

Air emissions also come from distillation columns through vents or equipment leaks. Leaks from pipes, flanges and valves may occur as air emissions or in liquid form as wastewater. Storm water runoff may also contain TRI chemicals from spills during transfers to storage or treatment equipment.

Pretreatment and treatment processes generate wastewater. Other sources include washing and rinsing of drums and containers, tank washing, draining of secondary containment areas, oil-and-water separators, and spills or tank failures. In tanks, wastewater may also form as a separate layer that can be periodically drained and treated. Wastewaters at TSD and solvent recovery facilities are treated through such methods as chromium reduction, equalization, metals precipitation, flocculation (forming an aggregation material of fine suspended particles), filtration or settling, neutralization, wastewater air stripping, and biological treatment.

Sludge and semi-solid residuals may result as heavy compounds settle during storage or as a result of periodic cleaning of pretreatment equipment and distillation columns. Along with ash from incineration and sludge from dewatering, these materials are generally disposed of in landfills or underground injection wells.

Incineration typically produces bottom ash and fly ash. Bottom ash may require stabilization before disposal. Fly ash passes through air pollution control equipment (baghouses, scrubbers, and/or precipitators). Depending on the waste constituents entering the incinerators, ash and wastewater from scrubbers may contain metals (which do not combust), organic chemicals not completely combusted, and acids pro-

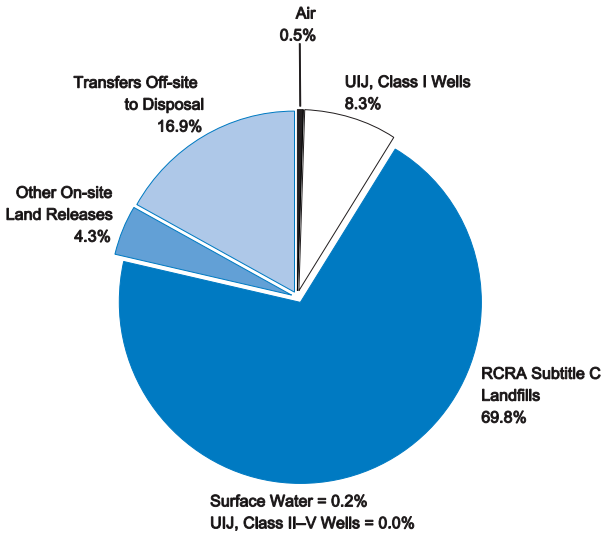
duced from chlorine, fluorine or sulfur during combustion.

1998 TRI Data for RCRA Subtitle C and Solvent Recovery Facilities

On- and Off-site Releases

RCRA subtitle C and solvent recovery facilities reported 281.8 million pounds of TRI chemicals released on- and off-site in 1998, as shown in Table 3–46. The majority of the releases, 196.6 million pounds, was to on-site RCRA subtitle C landfills. Figure 3–15 shows that releases to on-site RCRA subtitle C landfills amounted to 69.8 percent of the industry's total releases.

The industry's second-largest release type, off-site releases (transfers off-site to disposal), totaled 47.8 million pounds, representing 16.9 percent of total releases. The RCRA subtitle C and solvent recovery industry



*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
UIJ = Underground injection

Figure 3–15. Distribution of TRI On-site and Off-site Releases, 1998: RCRA Subtitle C and Solvent Recovery Facilities

Table 3–46. TRI On-site and Off-site Releases by 4-digit SIC Code, 1998: RCRA Subtitle C and Solvent Recovery Facilities

			On-site Releases							Off-site Releases	
					Underground Injection		On-site Land Releases				
SIC Code	Industry	Total Forms Number	Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
4953	RCRA Subtitle C Facilities	2,076	472,389	580,402	23,425,006	0	164,943,377	11,067,108	200,488,282	37,619,455	238,107,737
7389	Solvent Recovery Services	322	741,314	0	0	0	0	0	741,314	9,106,430	9,847,744
	SIC code 4953 and SIC code 7389	84	89,607	0	0	0	31,641,000	0	31,730,607	1,009,796	32,740,403
	SIC code 4953 and SIC code 5169 (Chemical Wholesalers)	5	2,480	0	0	0	0	0	2,480	0	2,480
	SIC code 4953 and SIC code 34 (Fabricated Metals)	11	15	0	0	0	0	1,100,084	1,100,099	16,956	1,117,055
	Total	**2,498**	**1,305,805**	**580,402**	**23,425,006**	**0**	**196,584,377**	**12,167,192**	**234,062,782**	**47,752,637**	**281,815,419**

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

also reported 23.4 million pounds injected underground into Class I wells, representing 8.3 percent of total releases for this industry, and 12.2 million pounds of other on-site land releases, for 4.3 percent of total releases (types of underground injection wells and on-site land releases are described in Box 1–4 in Chapter 1).

Facilities with RCRA subtitle C operations only reported the largest total releases with 238.1 million pounds, representing 84.5 percent of total releases for this industry. These facilities reported 164.9 million pounds of TRI chemicals released on-site to RCRA subtitle C landfills. Another 37.6 million pounds was transferred off-site for disposal and 23.4 million pounds was injected underground in Class I wells.

Facilities that had both RCRA subtitle C and solvent recovery operations reported the second-largest total releases for this industry. These facilities reported 32.7 million pounds of total releases with 31.6 million pounds going to RCRA subtitle C landfills on-site. Facilities with only solvent recovery operations had the third-largest total releases with 9.8 million pounds. Over 9.1 million pounds of this amount was transferred off-site for disposal.

Waste Management Data

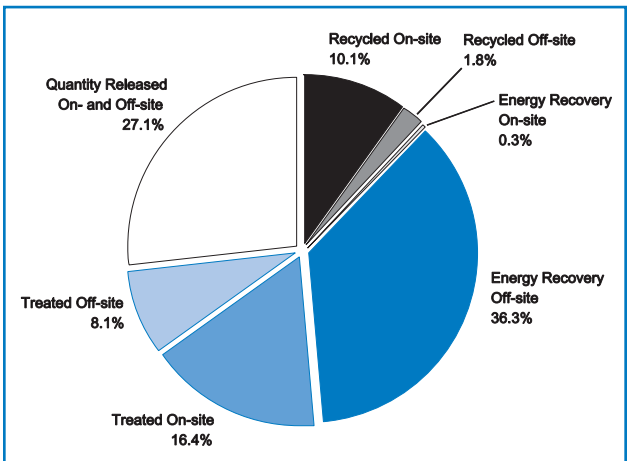
Quantities of TRI Chemicals in Waste

The RCRA subtitle C and solvent recovery industry reported managing 1.08 billion pounds of total production-related waste in 1998, as shown in Table 3–47. Off-site energy recovery totaled 392.7 million pounds, or 36.3 percent of the industry's production-related waste (see Figure 3–16). The industry's quantities released on- and off-site totaled 292.5 million pounds, or 27.1 percent of the total. On-site treatment amounted to 176.8 million pounds, representing 16.4 percent of the total, and on-site

Table 3–47. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1998: RCRA Subtitle C and Solvent Recovery Facilities

SIC Code	Industry	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			
4953	RCRA Subtitle C Facilities	39,634,508	5,855,777	3,287,608	203,190,698	173,594,286	38,805,738	248,516,533	712,885,148	125,028
7389	Solvent Recovery Services	35,169,201	13,155,647	0	63,697,071	3,179,486	5,930,050	10,364,184	131,495,639	153
	SIC code 4953 and SIC code 7389	34,133,345	845,526	0	125,821,088	18,907	42,413,971	32,554,043	235,786,880	0
	SIC code 4953 and SIC code 5169 (Chemical Wholesalers)	0	0	0	2,310	0	6,990	2,480	11,780	0
	SIC code 4953 and SIC code 34 (Fabricated Metals)	0	4,617	0	0	0	6,118	1,100,091	1,110,826	0
	Total	**108,937,054**	**19,861,567**	**3,287,608**	**392,711,167**	**176,792,679**	**87,162,867**	**292,537,331**	**1,081,290,273**	**125,181**

Note: Data are from Section 8 of Form R.



Note: *Data are from Section 8 of Form R.*

Figure 3–16. TRI Waste Management, 1998: RCRA Subtitle C and Solvent Recovery Facilities

recycling amounted to 108.9 million pounds, 10.1 percent of the total.

Facilities with RCRA subtitle C operations only reported 712.9 million pounds of total production-related waste managed, or 65.9 percent of the total for this industry. These facilities reported 248.5 million pounds of quantities released on- and off-site, 203.2 million pounds sent for energy recovery off-site, and 173.6 million pounds treated on-site.

Facilities reporting both RCRA subtitle C and solvent recovery operations reported 235.8 million pounds of total production-related waste managed, representing 21.8 percent of the total for this industry. These facilities reported 125.8 million pounds as off-site energy recovery. Facilities with only solvent recovery operations reported 131.5 million pounds of total production-related waste managed, or 12.2 percent of the total for this industry. These facilities reported 63.7 million pounds as off-site energy recovery.

Transfers Off-site for Further Waste Management/Disposal

The RCRA subtitle C and solvent recovery industry reported 553.8 million pounds of transfers off-site for further waste manage-

Table 3–48. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1998: RCRA Subtitle C and Solvent Recovery Facilities

SIC Codes	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs: Non-metal TRI Chemicals Pounds	Transfers to POTWs: Metals and Metal Compounds Pounds	Other Transfers Off-site to Disposal* Pounds	Total Transfers for Further Waste Management/ Disposal Pounds
4953	RCRA Subtitle C Facilities	6,874,556	217,250,305	19,084,165	1,057,666	486,585	42,100,135	286,853,412
7389	Solvent Recovery Services	11,404,651	63,686,599	7,483,142	154,765	0	9,127,825	91,856,982
	SIC code 4953 and SIC code 7389	845,531	130,389,114	42,640,968	1,291	0	1,168,594	175,045,498
	SIC code 4953 and SIC code 5169 (Chemical Wholesalers)	0	2,310	6,990	0	0	0	9,300
	SIC code 4953 and SIC code 34 (Fabricated Metals)	4,839	0	2,208	0	0	17,096	24,143
	Total	**19,129,577**	**411,328,328**	**69,217,473**	**1,213,722**	**486,585**	**52,413,650**	**553,789,335**

Note: *Data are from Section 6 of Form R.*
**Does not include transfers of metals and metal compounds to POTWs.*

ment and disposal in 1998, as shown in Table 3–48. Figure 3–17 shows that transfers off-site to energy recovery represented 74.3 percent of all transfers for further waste management and disposal. The industry also reported 69.2 million pounds sent off-site to treatment, accounting for 12.5 percent of the total.

Facilities with RCRA subtitle C operations only reported 51.8 percent of total transfers off-site for further waste management and disposal in this industry, a total of 286.9 million pounds, primarily as transfers sent off-site for energy recovery. These facilities sent 217.3 million pounds off-site for energy recovery and 42.1 million pounds of other transfers off-site for disposal.

Facilities with both RCRA subtitle C and solvent recovery operations reported 175.0 million pounds, or 31.6 percent of the total such transfers for this industry. These facilities reported 130.4 million pounds sent off-site for energy recovery and 42.6 million pounds sent off-site for treatment.

TRI Data by State

Facilities in the RCRA subtitle C and solvent recovery industry in Texas submitted the largest number of forms, with 388 forms. One other state, Ohio with 373 forms, also submitted more than 300 forms.

On- and Off-site Releases

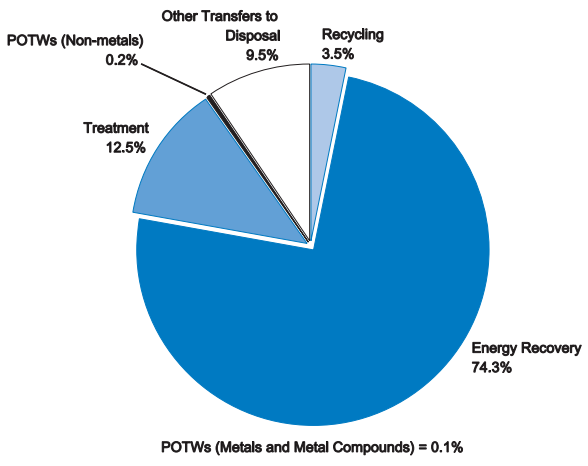
The RCRA subtitle C and solvent recovery industry in Ohio reported the largest total on- and off-site releases in 1998, as shown in Table 3–49. As shown in Map 3–6, the four states of Ohio, Idaho, Illinois, and California reported the largest amounts of total releases in 1998, over 20 million pounds each.

Ohio facilities in this industry reported total releases of 77.7 million pounds. These facilities reported 50.5 million pounds released on-site to RCRA subtitle C landfills, the largest such amount of any state. They also reported the largest amount injected underground in Class I wells, 17.8 million pounds.

Idaho ranked second with 31.7 million pounds of total releases, primarily as 31.6 million pounds released in on-site RCRA subtitle C landfills. Illinois ranked third with 24.8 million pounds of total releases, and California ranked fourth with 20.3 million pounds. Each of these states reported most of their total releases in on-site RCRA subtitle C landfills. Facilities in Indiana, ranked eighth overall, reported the largest amount of off-site releases, with 11.1 million pounds transferred off-site to disposal.

Waste Management Data

Michigan was the state with the largest total production-related waste managed in the RCRA subtitle C and solvent recovery



Note: *Data are from Section 6 of Form R.*

Figure 3–17. Distribution of TRI Transfers Off-site for Further Waste Management/ Disposal, 1998: RCRA Subtitle C and Solvent Recovery Facilities

industry, with 219.7 million pounds. These data also appear in Table 3–49. Michigan facilities in this industry reported 130.0 million pounds of off-site energy recovery, 44.0 million pounds treated off-site, and 32.5 million pounds of on-site recycling. These amounts are the largest of any state for those categories of waste management.

Ohio ranked second with total production-related waste managed of 152.2 million pounds. This consisted of 77.3 million pounds as quantities released on and off-site, which was the largest amount of quantities released on- and off-site of any state in this industry. Ohio also reported 26.3 million pounds treated off-site, the second-largest amount of any state for this waste management category.

Indiana ranked third with 107.1 million pounds of total production-related waste managed. This included 80.6 million pounds as off-site energy recovery, the second-largest amount of any state for off-site energy recovery for this industry.

Top 15 Chemicals for On- and Off-site Releases

Zinc (fume or dust) and zinc compounds were the two chemicals with the largest on- and off-site releases in the RCRA subtitle C and solvent recovery industry. The RCRA subtitle C and solvent recovery industry reported releasing 67.0 million pounds of zinc and 41.2 million pounds of zinc compounds. Table 3–50 presents data for the 15 chemicals released in the largest amounts by the TRI RCRA subtitle C and solvent recovery facilities.

Map 3–6. Total On- and Off-site Releases, 1998: RCRA Subtitle C and Solvent Recovery Facilities

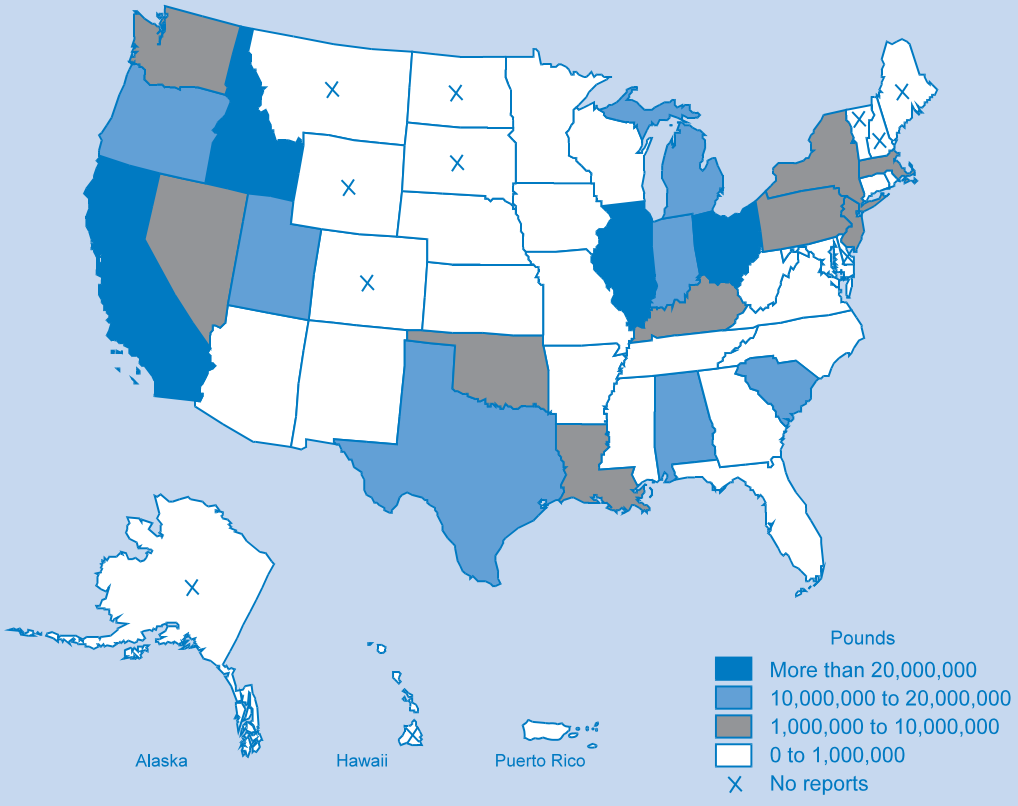


Table 3–49. Summary of TRI Information by State, 1998: RCRA Subtitle C and Solvent Recovery Facilities

State	Total Forms Number	On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
		Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Alabama	43	13,838	0	0	0	12,060,964	0	12,074,802	165,104	12,239,906
Arizona	6	997	0	0	0	0	0	997	5	1,002
Arkansas	140	22,492	49	0	0	22,800	0	45,341	212,836	258,177
California	158	53,196	0	0	0	19,813,437	308,756	20,175,389	155,642	20,331,031
Connecticut	16	0	0	0	0	0	0	0	739,191	739,191
Florida	6	18,109	0	0	0	0	9,840	27,949	0	27,949
Georgia	6	17,488	0	0	0	0	0	17,488	0	17,488
Idaho	17	12,465	0	0	0	31,641,000	0	31,653,465	40	31,653,505
Illinois	147	82,283	10	0	0	21,607,926	173,297	21,863,516	2,908,792	24,772,308
Indiana	127	38,667	1,345	0	0	1,257,263	0	1,297,275	11,103,121	12,400,396
Iowa	2	10	0	0	0	0	0	10	0	10
Kansas	13	17,113	0	0	0	0	0	17,113	7,564	24,677
Kentucky	88	41,604	15	0	0	0	1,100,084	1,141,703	1,573,146	2,714,849
Louisiana	51	1,583	2	530,351	0	3,803,510	0	4,335,446	122,371	4,457,817
Maryland	1	6	0	0	0	0	0	6	0	6
Massachusetts	12	4,986	5	0	0	0	0	4,991	1,231,461	1,236,452
Michigan	155	126,173	0	0	0	8,258,900	0	8,385,073	3,693,902	12,078,975
Minnesota	8	345	0	0	0	0	0	345	1,000	1,345
Mississippi	1	2	0	0	0	0	0	2	0	2
Missouri	11	11,552	75	0	0	17,494	0	29,121	0	29,121
Nebraska	56	16,003	0	0	0	0	168,694	184,697	25,034	209,731
Nevada	18	1,865	0	0	0	1,321,200	0	1,323,065	69,232	1,392,297
New Jersey	152	25,429	741	0	0	0	0	26,170	2,326,678	2,352,848
New Mexico	2	5,990	0	0	0	0	0	5,990	0	5,990
New York	22	922	816	0	0	6,231,080	0	6,232,818	50,822	6,283,640
North Carolina	15	66,755	43	0	0	0	0	66,798	480,157	546,955
Ohio	373	304,834	1,028	17,841,000	0	50,522,000	0	68,668,862	9,029,130	77,697,992
Oklahoma	21	1,737	0	1,109,751	0	6,642,012	0	7,753,500	130,236	7,883,736
Oregon	35	4,265	0	0	0	6,105,389	6,723,810	12,833,464	9,851	12,843,315
Pennsylvania	57	5,452	556,760	0	0	1,116,200	2,824,100	4,502,512	1,893,158	6,395,670
Puerto Rico	6	264,929	0	0	0	0	0	264,929	59,843	324,772
Rhode Island	4	422	0	0	0	0	0	422	863	1,285

Note: ***On-site Releases*** *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

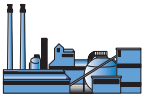


Table 3–49. Summary of TRI Information by State, 1998: RCRA Subtitle C and Solvent Recovery Facilities *(continued)*

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	4,153,054	252,789	0	29,555,869	3,873	214,508	12,359,925	46,540,018	282
Arizona	2,667,961	0	0	9,756	14,656	2	881	2,693,256	1
Arkansas	400,082	434,534	3,164,825	4,402,565	25,563,977	68,112	486,945	34,521,040	2
California	2,369,984	1,051,356	0	7,532,021	1,788,348	929,085	20,981,539	34,652,333	173
Connecticut	0	0	0	0	234,487	32,407	1,063,530	1,330,424	9
Florida	443,479	195,333	0	702,177	692,337	0	768,411	2,801,737	0
Georgia	0	180,764	0	0	354,728	0	16,928	552,420	0
Idaho	0	0	0	0	0	0	31,641,000	31,641,000	0
Illinois	7,687,441	874,085	0	13,345,080	15,714,874	3,310,657	25,051,641	65,983,778	0
Indiana	8,904,600	496,723	0	80,645,915	2,815,172	131,905	14,107,071	107,101,386	76
Iowa	0	309,122	0	0	0	0	10	309,132	0
Kansas	135,823	312,550	0	0	795,198	29,630	25,561	1,298,762	27
Kentucky	0	191,900	0	10,433,058	5,652,855	2,211,127	1,139,787	19,628,727	5
Louisiana	0	70,816	0	910	173,123	412,223	4,337,150	4,994,222	0
Maryland	0	192,574	0	0	0	0	6	192,580	0
Massachusetts	56,630	261,113	0	260,070	0	116,244	2,102,808	2,796,865	6
Michigan	32,450,995	587,155	0	130,002,805	1,300,655	43,963,197	11,415,455	219,720,262	17
Minnesota	4,030,989	1,152,410	0	0	78,543	11,698	969	5,274,609	0
Mississippi	0	78,962	0	0	0	0	2	78,964	0
Missouri	9,555	572,702	0	0	96,384	0	30,818	709,459	28,903
Nebraska	0	65,559	0	84,564	10,095,636	53,224	291,764	10,590,747	0
Nevada	0	1,290,407	0	0	1,571,156	420,409	1,323,054	4,605,026	0
New Jersey	8,210,631	389,444	0	22,213,059	19,852,587	628,929	2,480,949	53,775,599	42
New Mexico	0	0	0	0	440,000	0	6,000	446,000	0
New York	0	265,146	0	0	286,000	56,831	6,283,396	6,891,373	1
North Carolina	0	836,851	0	0	256,000	12,500	611,133	1,716,484	4
Ohio	5,776,849	1,719,734	0	23,890,411	17,253,160	26,325,028	77,250,474	152,215,656	83,025
Oklahoma	0	0	0	0	154,000	1,995	7,880,837	8,036,832	21
Oregon	0	56,569	0	0	364,676	559,298	23,928,531	24,909,074	47
Pennsylvania	0	1,182,151	0	0	4,288,778	358,704	6,392,516	12,222,149	0
Puerto Rico	3,860,419	1,875,384	0	8,545,872	114,191	2,068,828	332,578	16,797,272	1
Rhode Island	120,974	108,500	0	0	0	768,783	846	999,103	0

Note: *Data are from Section 8 of Form R.*

Table 3–49. Summary of TRI Information by State, 1998: RCRA Subtitle C and Solvent Recovery Facilities *(continued)*

State	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection: Class I Wells Pounds	On-site Releases: Underground Injection: Class II-V Wells Pounds	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Releases: On-site Land Releases: Other On-site Land Releases Pounds	On-site Releases: Total On-site Releases Pounds	Off-site Releases: Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
South Carolina	154	42,891	0	0	0	5,145,517	2	5,188,410	9,019,382	14,207,792
Tennessee	47	7,364	7,039	0	0	0	0	14,403	64,219	78,622
Texas	388	59,572	12,474	3,943,904	0	5,482,518	107	9,498,575	1,144,534	10,643,109
Utah	71	3,237	0	0	0	15,535,167	858,502	16,396,906	50,623	16,447,529
Virginia	6	4,937	0	0	0	0	0	4,937	0	4,937
Washington	37	0	0	0	0	0	0	0	1,469,733	1,469,733
West Virginia	1	6	0	0	0	0	0	6	0	6
Wisconsin	25	26,286	0	0	0	0	0	26,286	14,967	41,253
Total	**2,498**	**1,305,805**	**580,402**	**23,425,006**	**0**	**196,584,377**	**12,167,192**	**234,062,782**	**47,752,637**	**281,815,419**

Note: On-site Releases *are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

Most of the releases of zinc and zinc compounds consisted of releases on-site to RCRA subtitle C landfills, with 66.6 million pounds for zinc and 31.5 million pounds for zinc compounds. Also reported for zinc compounds were 8.1 million pounds of off-site transfers to disposal and 1.3 million pounds of other on-site land releases.

Eight of the 15 chemicals reported more than 75 percent of their total releases as releases on-site to RCRA subtitle C landfills. Two chemicals, ethylene glycol and nickel, had the majority of their releases as transfers off-site to disposal. Two, nitrate compounds and nitric acid, had the majority of their releases injected underground into Class I wells.

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

RCRA subtitle C and solvent recovery facilities reporting to TRI expected their production-related waste managed to decrease by 2.3 percent from 1998 to 2000, from a total of 1.08 billion pounds to 1.06 million pounds, as shown in Table 3–51. The projected decrease represents an expected decrease of 3.8 percent in 1999 followed by a small increase of 1.6 percent in 2000.

The projected decrease from 1998 to 2000 is expected to come from a decrease of 11.1 percent in on-site recycling and 9.9 percent in off-site energy recovery. Quantities released on- and off-site—the least desirable outcome under the waste management hierarchy (described in **Waste Management** in Chapter 1)—are projected to decrease slightly from 1998 to 2000 by 0.7 percent. The decreases are expected to offset an increase in on-site treatment of 13.5 percent and off-site treatment of 6.3 percent.

The projections indicate little change in waste management practices. Off-site energy recovery would fall to 33.5 percent of total production-related waste managed in

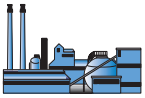


Table 3–49. Summary of TRI Information by State, 1998: RCRA Subtitle C and Solvent Recovery Facilities *(continued)*

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			
South Carolina	3,948,087	2,014,279	0	25,180,268	12,355,884	1,387,001	14,747,731	59,633,250	0
Tennessee	0	143,759	122,783	3,726,163	217,574	10	73,842	4,284,131	2,691
Texas	14,548,311	1,262,388	0	30,371,704	37,725,162	1,232,927	8,737,439	93,877,931	9,818
Utah	0	0	0	0	16,322,054	46,445	16,618,938	32,987,437	30
Virginia	0	768,195	0	0	216,611	0	4,937	989,743	0
Washington	0	0	0	0	0	0	338	338	0
West Virginia	0	200,269	0	0	0	0	6	200,275	0
Wisconsin	9,161,190	468,044	0	1,808,900	0	1,811,160	41,585	13,290,879	0
Total	**108,937,054**	**19,861,567**	**3,287,608**	**392,711,167**	**176,792,679**	**87,162,867**	**292,537,331**	**1,081,290,273**	**125,181**

Note: *Data are from Section 8 of Form R.*

2000 from 36.3 percent in 1998. On-site treatment would rise from 16.4 percent in 1998 to 19.0 percent in 2000. Quantities released on- and off-site would remain at about 27 percent of total production-related waste managed for this industry.

Source Reduction

About eleven percent of the Form Rs submitted by the RCRA subtitle C and solvent recovery industry in 1998 reported source reduction activity undertaken during the year (see Table 3–52). As noted in **Waste Management** in Chapter 1, source reduction is activity that prevents the generation of waste and is the preferred waste management option.

Facilities with a combination of RCRA subtitle C and solvent recovery operations had the largest percentage of forms reporting source reduction activities, with two-thirds of them reporting source reduction activities. These facilities identified two source reduction activities, spill and leak prevention on 82 forms and process modifications on 15 forms. Facilities with solvent recovery services only reported undertaking source reduction activities on 19.4 percent of their Form Rs. These facilities also identified spill and leak prevention and process modifications as the source reduction activities undertaken most often. Facilities with RCRA subtitle C operations only reported source reduction activity on 7.9 percent of their Form Rs, with good operating practices identified most often.

Table 3–50. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1998: RCRA Subtitle C and Solvent Recovery Facilities

CAS Number	Chemical	On-site Releases							Off-site Releases	Total On- and Off-site Releases
				Underground Injection		On-site Land Releases				
		Total Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds	Total On-site Releases Pounds	Transfers Off-site to Disposal Pounds	Pounds
7440-66-6	Zinc (fume or dust)	9,061	0	294,942	0	66,622,097	9,988	66,936,088	92,397	67,028,485
—	Zinc compounds	6,970	957	350,005	0	31,480,984	1,269,336	33,108,252	8,076,066	41,184,318
—	Lead compounds	9,264	563	1,005	0	14,889,426	462,175	15,362,433	3,042,822	18,405,255
1332-21-4	Asbestos (friable)	138	0	0	0	6,364,715	7,162,786	13,527,639	2,142,048	15,669,687
7439-92-1	Lead	3,305	86	23,068	0	11,949,854	230,734	12,207,047	1,060,449	13,267,496
107-21-1	Ethylene glycol	9,892	755	215,158	0	379,252	0	605,057	9,260,638	9,865,695
—	Copper compounds	6,976	838	170,255	0	7,020,760	678,315	7,877,144	1,189,391	9,066,535
—	Nitrate compounds	26	562,592	5,935,087	0	42,590	680,000	7,220,295	731,244	7,951,539
—	Nickel compounds	4,781	963	310,005	0	3,038,709	399,735	3,754,193	3,840,317	7,594,510
—	Chromium compounds	2,623	844	660,355	0	3,078,774	171,101	3,913,697	3,438,948	7,352,645
—	Barium compounds	2,792	369	250	0	5,010,059	88,593	5,102,063	774,918	5,876,981
7697-37-2	Nitric acid	1,623	5	5,300,750	0	63,501	43	5,365,922	194,034	5,559,956
—	Manganese compounds	656	854	85,000	0	4,571,328	83,283	4,741,121	81,073	4,822,194
1344-28-1	Aluminum oxide (fibrous forms)	25	0	0	0	4,451,550	407	4,451,982	141,030	4,593,012
7440-02-0	Nickel	671	916	110,158	0	615,825	35,929	763,499	3,802,723	4,566,222
	Subtotal	**58,803**	**569,742**	**13,456,038**	**0**	**159,579,424**	**11,272,425**	**184,936,432**	**37,868,098**	**222,804,530**
	Total	**1,305,805**	**580,402**	**23,425,006**	**0**	**196,584,377**	**12,167,192**	**234,062,782**	**47,752,637**	**281,815,419**

*Note: **On-site Releases** are 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** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*

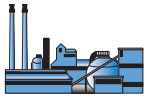


Table 3–51. Current Year and Projected Quantities of TRI Chemicals in Waste, 1998–2000: RCRA Subtitle C and Solvent Recovery Facilities

Waste Management Activity	Current Year 1998 Total Pounds	Current Year 1998 Percent of Total	Projected 1999 Total Pounds	Projected 1999 Percent of Total	Projected 2000 Total Pounds	Projected 2000 Percent of Total
Recycled On-site	108,937,054	10.1	93,238,352	9.0	96,842,845	9.2
Recycled Off-site	19,861,567	1.8	18,982,016	1.8	18,690,844	1.8
Energy Recovery On-site	3,287,608	0.3	3,341,825	0.3	3,385,825	0.3
Energy Recovery Off-site	392,711,167	36.3	353,183,735	34.0	353,974,532	33.5
Treated On-site	176,792,679	16.4	189,578,192	18.2	200,713,521	19.0
Treated Off-site	87,162,867	8.1	90,562,897	8.7	92,652,209	8.8
Quantity Released On- and Off-site	292,537,331	27.1	290,953,907	28.0	290,411,158	27.5
Total Production-related Waste	**1,081,290,273**	**100.0**	**1,039,840,924**	**100.0**	**1,056,670,934**	**100.0**

Waste Management Activity	Projected Change 1998–1999 Percent	Projected Change 1999–2000 Percent	Projected Change 1998–2000 Percent
Recycled On-site	–14.4	3.9	–11.1
Recycled Off-site	–4.4	–1.5	–5.9
Energy Recovery On-site	1.6	1.3	3.0
Energy Recovery Off-site	–10.1	0.2	–9.9
Treated On-site	7.2	5.9	13.5
Treated Off-site	3.9	2.3	6.3
Quantity Released On- and Off-site	–0.5	–0.2	–0.7
Total Production-related Waste	**–3.8**	**1.6**	**–2.3**

Note: *Current year and projected year amounts are all taken from Section 8 of Form R for 1998.*

Table 3–52. Number of Forms Reporting Source Reduction Activity, 1998: RCRA Subtitle C and Solvent Recovery Facilities

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity: Number	Forms Reporting Source Reduction Activity: Percent of All Form Rs Percent	Category of Source Reduction Activity: Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
4953	RCRA Subtitle C Facilities	1,919	152	7.9	135	0	74	0	27	0	0	0
7389	Solvent Recovery Services	309	60	19.4	29	0	47	0	34	0	0	3
	SIC code 4953 and SIC code 7389	84	56	66.7	0	0	82	0	15	0	0	0
	SIC code 4953 and SIC code 5169 (Chemical Wholesalers)	5	0	0.0	0	0	0	0	0	0	0	0
	SIC code 4953 and SIC code 34 (Fabricated Metals)	11	0	0.0	0	0	0	0	0	0	0	0
	Total	**2,328**	**268**	**11.5**	**164**	**0**	**203**	**0**	**76**	**0**	**0**	**3**

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

❖ Sources ❖

Information sources for the industry descriptions in this chapter include:

1997 Economic Census, U.S. Census Bureau
<www.census.gov/epcd/www/econ97.html>

Metal Mining

EPCRA Section 313 Industry Guidance: Metal Mining Facilities
<www.epa.gov/tri/industry.htm>

Mining and the Toxics Release Inventory, National Mining Association
<www.nma.org>

Profile of the Metal Mining Industry, EPA Office of Compliance Sector Notebook Project
<www.es.epa.gov/oeca/sector/>

The "**Processes Involving Toxic Chemicals**" section was reviewed by the Western Regional Council, National Mining Association and other groups for comments and suggestions.

Coal Mining

EPCRA Section 313 Industry Guidance: Coal Mining Facilities
<www.epa.gov/tri/industry.htm>

Mining and the Toxics Release Inventory, National Mining Association
<www.nma.org>

Salient Statistics of the Coal Mining Industry, National Mining Association
<www.nma.org>

U.S. Coal Supply and Demand: 1998 Review, Energy Information Administration,
<www.eia.doe.gov/cneaf/coal/cia/new_yr_revu/coalfeat.html>; see also
<www.eia.doe.gov/fuelcoal.html>

The "**Processes Involving Toxic Chemicals**" section was reviewed by the Western Regional Council, National Mining Association, Edison Electric Institute and other groups for comments and suggestions.

Electric Utilities

Electric Power Annual, 1998, US Department of Energy, Energy Information Administration,
<www.eia.doe.gov/cneaf/electricity/page/annual.html>; see also
<www.eia.doe.gov/fuelelectric.html>

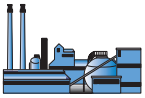
EPCRA Section 313 Industry Guidance: Electricity Generating Facilities
<www.epa.gov/tri/industry.htm>

Profile of the Fossil Fuel Electric Power Generation Industry, EPA Office of Compliance Sector Notebook Project
<www.es.epa.gov/oeca/sector/>

The "**Processes Involving Toxic Chemicals**" section was reviewed by the Edison Electric Institute, Western Regional Council, National Mining Association and other groups for comments and suggestions.

Chemical Wholesalers

EPCRA Section 313 Industry Guidance: Chemical Distribution Facilities
<www.epa.gov/tri/industry.htm>



EPCRA Section 313: Look-up Tables for Estimating Toxic Release Inventory Air Emissions from Chemical Distribution Facilities
<www.epa.gov/tri/industry.htm>

Petroleum Terminals and Bulk Stations

EPCRA Section 313 Industry Guidance: Petroleum terminals and bulk storage facilities
<www.epa.gov/tri/industry.htm>

RCRA Subtitle C/Solvent Recovery

EPCRA Section 313 Industry Guidance: RCRA Subtitle C TSD Facilities and Solvent Recovery Facilities
<www.epa.gov/tri/industry.htm>

National Biennial RCRA Hazardous Waste Report (Based on 1997 Data)
<www.epa.gov/epaoswer/hazwaste/data/br97/index.htm>

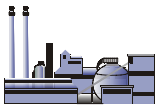
RCRA Orientation Manual, EPA Office of Solid Waste
<www.epa.gov/epaoswer/general/orientat/>

Toxics Watch 1995, INFORM, New York, NY

Chapter 4

Toxics Release Inventory Data for Original Reporting Industries

Chapter 4



Toxics Release Inventory Data for Original Reporting Industries

This chapter provides an overview of 1998 TRI data by industry sector for the 20 industries that have been required to report to TRI since the program began in 1987. Analyses of TRI reporting by the industries added in 1998 appear in Chapter 3.

This chapter summarizes release and waste management data by industry for 1998 and for 1995 to 1998. Change in on- and off-site releases is also measured since 1988, and waste management data are similarly reviewed for 1991 to 1998. The discussion in **Making Year-to-Year Comparisons of TRI Data** in Chapter 1 is important for accurate interpretation of these data because of the significant changes in TRI over time.

Box 4–1 lists the original TRI industries by Standard Industrial Classification (SIC) code. Tables in this chapter also present data submitted on TRI chemical forms that report more than one SIC code in the manufacturing sector. Box 4–2 explains EPA's method for analyzing this "multiple-codes" group, as well as the "no-codes" group.

Box 4–1. Standard Industrial Classification (SIC) Codes for the Original TRI Industries

Standard Industrial Classification (SIC) Codes for the Original TRI Industries

20 Food and kindred products

Manufacture or processing of foods and beverages for human consumption, and related products, such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowls.

21 Tobacco products

Manufacture of cigarettes, cigars, smoking and chewing tobacco, snuff, and reconstituted tobacco. Stemming and redrying of tobacco. Manufacture of non-tobacco cigarettes.

22 Textile mill products

Preparation of fiber and subsequent manufacture of yarn, thread, braids, twine, and cordage. Manufacture of broadwoven fabrics, narrow woven fabrics, knit fabrics, and carpets and rugs from yarn. Dyeing and finishing of fiber, yarn, fabrics, and knit apparel. Coating, waterproofing or otherwise treating fabrics. Integrated manufacture of knit apparel and other finished articles from yarn. Manufacture of felt goods, lace goods, nonwoven fabrics, and miscellaneous textiles.

(continued)

Box 4–1. Standard Industrial Classification (SIC) Codes for the Original TRI Industries *(continued)*

23 Apparel and other finished products made from fabrics and similar materials

Production of clothing. Fabrication of products by cutting and sewing purchased woven or knit textile fabrics and related materials, such as leather, rubberized fabrics, plastics, and furs. Manufacture of clothing by cutting and joining (e.g., by adhesives) material such as paper and nonwoven textiles.

24 Lumber and wood products, except furniture

Cutting timber and pulpwood. Also, merchant sawmills, lath mills, shingle mills, cooperage stock mills, planing mills, and plywood mills and veneer mills engaged in producing lumber and wood basic materials. Manufacture of finished articles made entirely or mainly of wood or related materials.

25 Furniture and fixtures

Manufacture of household, office, public building, and restaurant furniture, and office and store fixtures.

26 Paper and allied products

Manufacture of pulps from wood and other cellulose fibers and from rags. Manufacture of paper and paperboard. Manufacture of paper and paperboard into converted products, such as paper coated off the paper machine, paper bags, paper boxes, and envelopes. Manufacture of bags from plastics film and sheet.

27 Printing, publishing, and allied industries

Printing by one or more common processes, such as letterpress, lithography (including offset), gravure, or screen. Bookbinding, platemaking, and other services performed for the printing trade. Publishing newspapers, books, and periodicals (whether or not the establishment also prints them).

28 Chemicals and allied products

Production of basic chemicals. Manufacture of products by predominantly chemical processes. (Three general classes of products: 1) basic chemicals, such as acids, alkalis, salts, and organic chemicals; 2) chemical products to be used in further manufacture, such as synthetic fibers, plastics materials, dry colors, and pigments; 3) finished chemical products to be used for ultimate consumption, such as drugs, cosmetics, and soaps, or to be used as materials or supplies in other industries, such as paints, fertilizers, and explosives.)

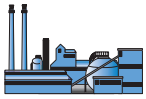
29 Petroleum refining and related industries

Production of gasoline, kerosene, distillate fuel oils, residual fuel oils, and lubricants, through fractionation or straight distillation of crude oil, redistillation of unfinished petroleum derivatives, cracking, or other processes. (Establishments also produce aliphatic and aromatic chemicals as byproducts.)

30 Rubber and miscellaneous plastics products

Manufacture of products, not elsewhere classified, from plastics resins and from natural, synthetic, or reclaimed rubber, gutta percha, balata, or gutta siak. Includes manufacture of tires.

(continued)



Box 4–1. Standard Industrial Classification (SIC) Codes for the Original TRI Industries *(continued)*

31 Leather and leather products

Tanning, currying, and finishing hides and skins. Converting leather. Manufacture of finished leather and artificial leather products and some similar products made of other materials.

32 Stone, clay, glass, and concrete products

Manufacture of flat glass and other glass products, cement, structural clay products, pottery, concrete and gypsum products, cut stone, abrasive and asbestos products, and other products from materials taken principally from the earth in the form of stone, clay, and sand. (May include mining and quarrying activities operated by manufacturing establishments in this group.)

33 Primary metal industries

Smelting and refining ferrous and nonferrous metals from ore, pig, or scrap. Rolling, drawing, and alloying metals. Manufacture of castings and other basic metal products. Manufacture of nails, spikes, and insulated wire and cable. Includes production of coke.

34 Fabricated metal products, except machinery and transportation equipment

Fabrication of ferrous and nonferrous metal products, such as metal cans, tinware, handtools, cutlery, general hardware, non-electric heating apparatus, fabricated structural metal products, metal forgings, metal stampings, ordnance (except vehicles and guided missiles), and a variety of metal and wire products, not elsewhere classified.

35 Industrial and commercial machinery and computer equipment

Manufacture of industrial and commercial machinery and equipment and computers. Manufacture of engines and turbines; farm and garden machinery; construction, mining, and oil field machinery; elevators and conveying equipment; hoists, cranes, monorails, and industrial trucks and tractors; metalworking machinery; special industry machinery; general industrial machinery; computer and peripheral equipment and office machinery; and refrigeration and service industry machinery.

36 Electronic and other electrical equipment and components, except computer equipment

Manufacture of machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy. Manufacture of electricity distribution equipment, electrical industrial apparatus, household appliances, electrical lighting and wiring equipment, radio and television receiving equipment, communications equipment, electronic components and accessories, and other electrical equipment and supplies.

37 Transportation equipment

Manufacture of equipment for transportation of passengers and cargo by land, air, and water. Includes motor vehicles, aircraft, guided missiles and space vehicles, ships, boats, railroad equipment, and miscellaneous transportation equipment, such as motorcycles, bicycles, and snowmobiles.

38 Measuring, analyzing and controlling instruments, photographic, medical, and optical goods; watches and clocks

Manufacture of instruments (including professional and scientific) for measuring, testing, analyzing, and controlling, and their associated sensors and accessories; optical instruments and

(continued)

Box 4–1. Standard Industrial Classification (SIC) Codes for the Original TRI Industries *(continued)*

lenses; surveying and drafting instruments; hydrological, hydrographic, meteorological, and geophysical equipment; search, detection, navigation, and guidance systems and equipment; surgical, medical, and dental instruments, equipment, and supplies; ophthalmic goods; photographic equipment and supplies; and watches and clocks.

39 Miscellaneous manufacturing industries

Manufacture of products not classified in any other major manufacturing group. Includes jewelry, silverware, and plated ware; musical instruments; dolls, toys, games, and sporting and athletic goods; pens, pencils, and artists' materials; buttons, costume novelties, and miscellaneous notions; brooms and brushes; caskets; and other miscellaneous products.

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual,* 1987.

Box 4–2. Multiple SIC Codes and No SIC Codes

Multiple SIC Codes and No SIC Codes

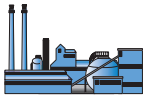
Multiple Codes 20–39. TRI facilities may report up to six four-digit SIC codes that describe their operations. They submit one Form R or Form A certification statement for each chemical they are reporting. If all the processes or operations that are associated with a facility's releases or other waste management of a TRI chemical can be described by one SIC code, then only one SIC code is reported on the form. If several economic activities, designated by different SIC codes, describe the specific operations at a facility that are associated with releases or other waste management of a TRI chemical, then the facility will report those SIC codes (up to six) on the form it submits for that chemical.

Industrial facilities often conduct inter-related operations. They may, for example, manufacture distinct products using common or related feedstocks. Such products may be classified in similar but separate categories in the Standard Industrial Classification (SIC) system. Thus, many forms submitted to TRI contain more than one industrial classification. When TRI data are analyzed by industry—that is, by SIC code—forms that report more than one SIC code must be categorized separately because they do not fall into the individual industry groups.

The multiple-codes category represents forms that report in more than one two-digit SIC code within the manufacturing sector (SIC codes 20–39). For example, a facility may refine petroleum (SIC code 29) and then use that feedstock in the manufacture of chemicals (SIC code 28); it will report SIC codes in both of these industries on its TRI forms (such as SIC codes 2911, petroleum refining, and 2869, industrial organic chemicals). On forms with more than one SIC code, any SIC code that is not within manufacturing (that is, not within the SIC code range 20 to 39) is ignored when assigning a form to an industry category. For example, a form with the SIC code 2642 (manufacture of envelopes) and SIC code 5112 (wholesale trade—stationery and office supplies) would be included in SIC code 26.

Forms that have a SIC code within the manufacturing sector as well as a SIC code within the new industry sectors are included in the manufacturing sector SIC code if the facility has reported to TRI before 1998. If

(continued)



Box 4–2. Multiple SIC Codes and No SIC Codes *(continued)*

the facility reported for the first time for 1998 with both original and new industry SIC codes, it is not included in the analyses in this chapter, but is included in the analyses in Chapter 3 under the new industry code.

No Codes 20–39. Forms that report no SIC code within the manufacturing sector and have no SIC code belonging to a new industry group are included in these tables under the No codes 20–39 category. Examples of such forms may be from federal facilities, all of which are required to report regardless of the SIC code covering their operations.

TRI Data by Industry, 1998

In 1998, a total of 21,517 facilities in the original TRI industries submitted 72,073 forms, as shown in Table 4–1. The chemical manufacturing industry submitted the largest number of forms, 21,111 forms. The fabricated metals industry ranked second with 7,507 forms, and the primary metals industry ranked third with 6,909 forms. Together, these three industries submitted half (49.3 percent) of the 1998 forms from the original industries covered by TRI.

On- and Off-site Releases, 1998

On- and off-site releases by the original industries totaled 2.50 billion pounds in 1998, and two industries reported more than half of that total. As shown in Table 4–2, the chemical manufacturing industry reported 741.8 million pounds of total releases, and the primary metals industry reported 718.3 million pounds. These amounts represented 29.7 percent and 28.8 percent, respectively, of all on- and off-site releases reported by the original industries, as illustrated in Figure 4–1. The paper products industry ranked third for total on- and off-site releases, behind chemicals and primary metals, with 229.9 million pounds, or 9.2 percent of the total.

Three other industry groups reported more than 100 million pounds each: the multiple-codes group ranked fourth among original industries with 118.9 million pounds. Plastics manufacture ranked fifth with 109.8 million pounds, and the transportation equipment industry ranked sixth with 103.4 million pounds. These amounted to approximately 4 percent each of the total.

Figure 4–2 displays on- and off-site releases for the industries with the largest total releases. As shown in this figure, air emissions were the largest release type for all of these industries except primary metals. In the primary metals industry, off-site releases (transfers off-site to disposal) and on-site land releases outweighed other release types.

On-site Releases

The chemicals, primary metals, and paper products industries, which reported the largest total on- and off-site releases in

Table 4–1. TRI Facilities and Forms, Original Industries, by Industry, 1998

SIC Code	Industry	Total Facilities Number	Total Forms Number	Form Rs Number	Form As Number
20	Food	1,995	3,711	2,492	1,219
21	Tobacco	21	65	64	1
22	Textiles	274	566	511	55
23	Apparel	19	37	32	5
24	Lumber	829	2,002	1,184	818
25	Furniture	377	907	840	67
26	Paper	474	2,597	2,439	158
27	Printing	227	446	434	12
28	Chemicals	3,847	21,111	17,151	3,960
29	Petroleum	414	3,489	3,078	411
30	Plastics	1,826	3,745	3,108	637
31	Leather	80	193	174	19
32	Stone/Clay/Glass	669	1,939	1,661	278
33	Primary Metals	1,926	6,909	6,121	788
34	Fabricated Metals	2,908	7,507	6,737	770
35	Machinery	1,119	2,915	2,544	371
36	Electrical Equip.	1,233	3,047	2,872	175
37	Transportation Equip.	1,301	4,580	4,246	334
38	Measure/Photo.	253	628	539	89
39	Miscellaneous	317	722	611	111
	Multiple codes 20–39	1,192	4,380	3,926	454
	No codes 20–39	216	577	469	108
	Total	**21,517**	**72,073**	**61,233**	**10,840**

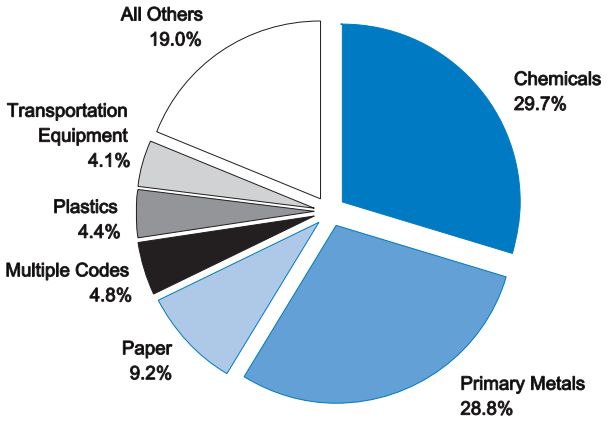
Note: *Facilities/forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category. Facilities/forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.*

1998, also reported the largest on-site releases. Table 4–2 presents on-site releases by industry for the original reporting industries.

The chemical manufacturing industry ranked first for on-site releases with 697.4 million pounds. Chemical industry releases included 321.9 million pounds of air emissions, 95.5 million pounds of surface water discharges, and 206.7 million pounds of underground injection — the largest amounts in these categories. The primary metals industry ranked second for on-site releases with 421.6 million pounds. The primary metals industry reported 224.5 million pounds of on-site land releases, more than any other industry. Most of the sector's on-site land releases consisted of other disposal (130.4 million pounds). The paper products sector ranked third for on-site releases with 225.0 million pounds, principally in air emissions (186.0 million pounds).

Top 20 Chemicals for On- and Off-site Releases

Table 4–3 lists the 20 TRI chemicals with the largest total releases in 1998 by the original industries. On- and off-site releases of these



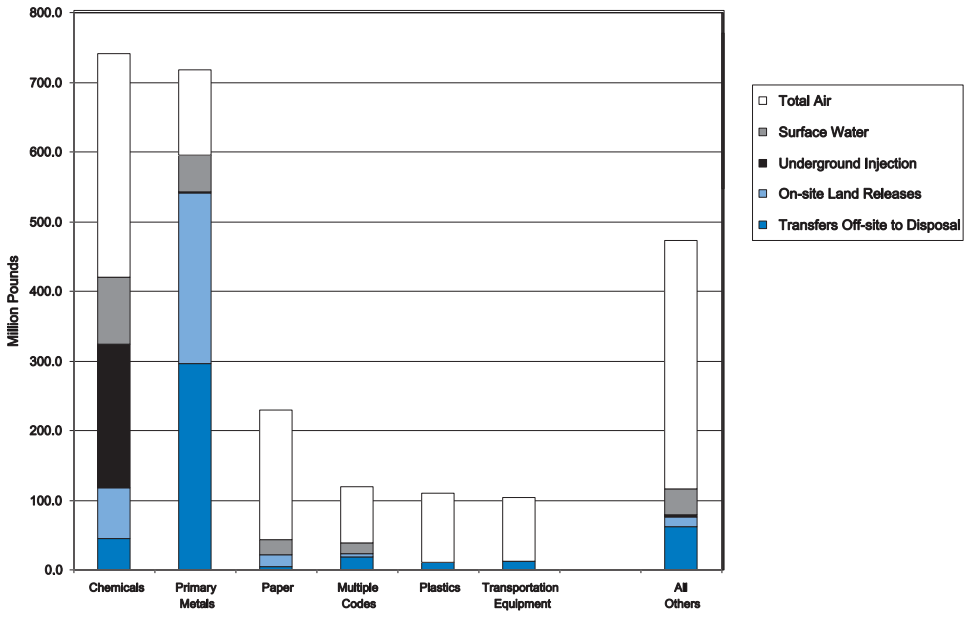
*Note: **On-site Releases** are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R.*
***Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.*
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.

Figure 4–1. TRI On-site and Off-site Releases, Original Industries, by Industry, 1998

chemicals totaled 1.87 billion pounds of the 2.50-billion-pound total.

Zinc compounds led all TRI chemicals with releases totaling 300.3 million pounds. Off-site releases (transfers to disposal) contributed the majority (175.6 million pounds) of this total. As explained in Chapter 1 (Box 1–5), off-site releases of metals and their compounds include transfers to solidification/stabilization and to wastewater treatment including POTWs. Zinc compounds also had the largest on-site land releases with 116.4 million pounds. This amount included 68.5 million pounds of other disposal and 29.9 million pounds in landfills other than the RCRA subtitle C landfills.

Nitrate compounds ranked second with total releases of 226.7 million pounds. More nitrate compounds were discharged to surface waters than any other chemical, with



*Note: **On-site Releases** are 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.*
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.

Figure 4–2. Distribution of TRI On-site and Off-site Releases, Industries with Largest Totals, 1998

Table 4–2. TRI On-site and Off-site Releases, Original Industries, by Industry, 1998

SIC Code	Industry	Air			Underground Injection	
		Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds
20	Food	21,998,818	41,630,139	17,136,151	760	5
21	Tobacco	38,215	3,089,853	160,366	0	0
22	Textiles	2,365,218	8,475,568	254,827	0	0
23	Apparel	59,919	401,589	0	0	0
24	Lumber	4,779,182	27,751,324	84,525	0	0
25	Furniture	2,662,837	14,487,390	797	0	0
26	Paper	14,164,613	171,816,757	21,880,578	29,100	0
27	Printing	10,506,657	11,794,936	598	0	0
28	Chemicals	79,723,668	242,221,900	95,452,686	206,649,154	8,256
29	Petroleum	25,215,032	28,764,125	13,554,646	2,827,139	85,754
30	Plastics	23,631,675	75,012,844	39,334	0	0
31	Leather	614,495	1,935,520	75,511	80	0
32	Stone/Clay/Glass	2,526,051	30,912,817	153,088	0	0
33	Primary Metals	28,000,851	94,149,928	53,924,429	1,022,076	0
34	Fabricated Metals	21,570,144	40,324,949	1,279,530	255	0
35	Machinery	5,058,020	9,524,672	51,939	0	0
36	Electrical Equip.	4,518,971	12,059,845	2,182,517	500	0
37	Transportation Equip.	19,152,445	71,360,783	168,114	0	0
38	Measure/Photo.	1,147,647	8,440,989	1,189,200	0	0
39	Miscellaneous	2,130,566	7,468,769	7,726	0	0
	Multiple codes 20–39	20,748,697	58,893,707	15,296,480	15,800	5
	No codes 20–39	1,889,238	3,928,448	472,719	0	505
	Total	**292,502,959**	**964,446,852**	**223,365,761**	**210,544,864**	**94,525**

*Note: **On-site Releases** are 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.
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.
Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

170.7 million pounds. TRI facilities in the original industries also injected 48.7 million pounds of nitrate compounds to underground wells on-site, the largest amount for that type of release.

Methanol releases totaled 214.9 million pounds, the third-largest total for on- and off-site releases. Methanol ranked first for air emissions with a total of 189.1 million pounds, including 165.2 million pounds in stack or point source air emissions.

Other chemicals with the largest amounts in particular release types included ammonia, which ranked fourth overall (with 185.9 million pounds) and ranked second for air emissions (147.7 million pounds) and for underground injection (25.3 million pounds). Although total releases of phosphoric acid (55.4 million pounds) ranked 13th, this chemical ranked second for surface water discharges with 27.7 million pounds. Manganese compounds had the second-highest on-site releases to land with 52.8 million pounds, and copper compounds followed closely with 52.0 million

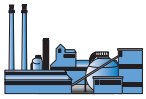


Table 4–2. TRI On-site and Off-site Releases, Original Industries, by Industry, 1998 *(continued)*

Industry	On-site Land Releases					Total On-site Releases	Off-site Releases	Total On- and Off-site Releases
	RCRA Subtitle C Landfills Pounds	Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds	Pounds	Transfers Off-site to Disposal Pounds	Pounds
Food	292	15,841	3,406,911	211,114	2,563,602	86,963,633	2,325,147	89,288,780
Tobacco	0	0	0	0	0	3,288,434	304,195	3,592,629
Textiles	0	3,361	136,210	74,553	2,430	11,312,167	698,071	12,010,238
Apparel	0	0	0	0	5	461,513	41,045	502,558
Lumber	29,013	39,244	23,677	88,387	212,458	33,007,810	1,464,145	34,471,955
Furniture	0	11,789	0	0	31,044	17,193,857	124,204	17,318,061
Paper	956,008	12,373,673	305,468	3,084,549	402,118	225,012,864	4,856,081	229,868,945
Printing	0	0	0	0	250	22,302,441	153,413	22,455,854
Chemicals	744,092	23,890,688	421,237	40,716,878	7,528,895	697,357,454	44,454,978	741,812,432
Petroleum	3,384	90,114	100,108	293,736	72,036	71,006,074	3,648,251	74,654,325
Plastics	31,983	802,319	0	7,181	52,301	99,577,637	10,256,737	109,834,374
Leather	0	250	0	2,952	5	2,628,813	2,196,077	4,824,890
Stone/Clay/Glass	47,576	3,606,307	1,013	88,939	144,697	37,480,488	7,676,996	45,157,484
Primary Metals	13,034,455	56,206,560	274	44,840,258	130,446,105	421,624,936	296,635,873	718,260,809
Fabricated Metals	84,285	334,303	15	3,879	405,592	64,002,952	24,229,275	88,232,227
Machinery	13,504	166,171	23,055	5	53,864	14,891,230	4,849,857	19,741,087
Electrical Equip.	64,789	167,961	10	1,355	160,983	19,156,931	11,747,921	30,904,852
Transportation Equip.	17,343	368,070	478	323	21,682	91,089,238	12,284,329	103,373,567
Measure/Photo.	18	74,058	643	8	556	10,853,119	1,343,057	12,196,176
Miscellaneous	21,961	9,150	0	0	199,892	9,838,064	790,753	10,628,817
Multiple codes 20–39	264,467	1,569,488	209,474	754,815	2,727,577	100,480,510	18,378,782	118,859,292
No codes 20–39	26,324	1,000	582,030	68,539	130,867	7,099,670	562,422	7,662,092
Total	**15,339,494**	**99,730,347**	**5,210,603**	**90,237,471**	**145,156,959**	**2,046,629,835**	**449,021,609**	**2,495,651,444**

*Note: **On-site Releases** are 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.
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.
Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

pounds. Off-site releases of manganese compounds ranked second at 45.3 million pounds, although this was considerably below the 175.6 million pounds of zinc compounds released off-site.

Waste Management Data, 1998

Facilities in the original TRI industries reported managing a total of 24.05 billion pounds of TRI chemicals in waste in 1998, as shown in Table 4–4. Figure 4–3 shows production-related waste reported by the industries with the largest totals. Generally, on-site recycling and on-site treatment were the most common waste management methods for the original industries.

The chemical manufacturing industry reported managing 11.95 billion pounds of total production-related waste in 1998. The chemical manufacturing industry reported the largest quantities in all waste management categories except off-site recycling. Nearly half of the chemical manufacturing industry's production-related waste was recycled on-site (5.62 billion pounds). On-

Table 4–3. Top 20 Chemicals with Largest Total On-site and Off-site Releases, Original Industries, 1998

CAS Number	Chemical	Air			Underground Injection	
		Fugitive or Nonpoint Air Emissions Pounds	Stack or Point Air Emissions Pounds	Surface Water Discharges Pounds	Class I Wells Pounds	Class II–V Wells Pounds
—	Zinc compounds	1,698,677	5,115,415	1,224,399	241,925	250
—	Nitrate compounds	354,145	284,299	170,668,882	48,677,319	250
67-56-1	Methanol	23,878,622	165,203,260	5,891,181	16,592,794	12,001
7664-41-7	Ammonia	33,281,613	114,422,916	7,136,859	25,247,154	40,854
—	Manganese compounds	606,797	959,555	4,471,582	7,755,610	0
108-88-3	Toluene	33,566,894	63,720,492	38,270	589,431	500
1330-20-7	Xylene (mixed isomers)	16,010,146	51,811,465	50,450	120,335	750
110-54-3	n-Hexane	24,005,960	42,859,301	13,904	26,006	500
—	Copper compounds	2,908,348	619,408	92,518	187,150	250
7782-50-5	Chlorine	1,051,794	58,698,778	232,817	61,632	5
100-42-5	Styrene	11,432,537	42,271,859	13,437	345,945	0
7647-01-0	Hydrochloric acid	2,300,649	51,679,491	2,575	100,099	0
7664-38-2	Phosphoric acid	240,649	979,865	27,703,308	14,201	0
—	Chromium compounds	96,025	255,813	112,325	874,795	0
78-93-3	Methyl ethyl ketone	19,112,003	27,252,257	54,800	343,413	5
—	Lead compounds	157,269	691,723	37,272	171,660	0
75-15-0	Carbon disulfide	951,859	42,490,604	4,687	16,599	0
75-09-2	Dichloromethane	13,230,726	26,698,144	15,489	456,962	0
—	Glycol ethers	8,713,977	28,543,883	192,191	1,370	0
7440-66-6	Zinc (fume or dust)	802,687	518,940	9,869	1	0
	Subtotal	**194,401,377**	**725,077,468**	**217,966,815**	**101,824,401**	**55,365**
	Total	**292,502,959**	**964,446,852**	**223,365,761**	**210,544,864**	**94,525**

Note: On-site Releases *are 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.*

site treatment by this industry totaled 3.34 billion pounds, and on-site energy recovery totaled 1.39 billion pounds. The chemical industry reported 730.2 million pounds released on- and off-site. The chemical industry's off-site energy recovery (385.9 million pounds) and off-site treatment (305.1 million pounds) were by far the largest quantities in these two categories.

The primary metals industry ranked second among original industries for total production-related waste managed with 3.64 billion pounds. On-site recycling accounted for the largest portion of this total, with 1.66 billion pounds (also ranking second). The primary metals industry reported the largest quantity of off-site recycling (714.3 million pounds) and the second-largest quantity released on- and off-site (685.3 million pounds).

The paper products industry reported the third-largest total production-related waste managed with 1.51 billion pounds, including 941.0 million pounds treated on-site.

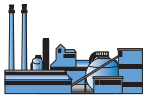


Table 4–3. Top 20 Chemicals with Largest Total On-site and Off-site Releases, Original Industries, 1998 *(continued)*

Chemical	On-site Land Releases					Total On-site Releases	Off-site Releases	Total On- and Off-site Releases
	RCRA Subtitle C Landfills Pounds	Other Landfills Pounds	Land Treatment Pounds	Surface Impoundments Pounds	Other Disposal Pounds	Pounds	Transfers Off-site to Disposal Pounds	Pounds
Zinc compounds	7,525,224	29,868,772	112,634	10,419,837	68,461,893	124,669,026	175,586,997	300,256,023
Nitrate compounds	5	17,627	1,777,531	1,317,970	158,043	223,256,071	3,406,604	226,662,675
Methanol	16,718	362,419	47,152	412,018	960,368	213,376,533	1,498,545	214,875,078
Ammonia	4,156	174,173	1,813,271	844,782	470,825	183,436,603	2,448,774	185,885,377
Manganese compounds	3,708,736	29,251,720	226,425	15,924,724	3,708,973	66,614,122	45,269,882	111,884,004
Toluene	13,525	7,330	1,967	1,620	47,028	97,987,057	1,411,118	99,398,175
Xylene (mixed isomers)	645	1,905	1,168	2,580	33,581	68,033,025	884,811	68,917,836
n-Hexane	287	991	3,250	251	15,058	66,925,508	92,914	67,018,422
Copper compounds	88,468	4,368,663	1,566	8,556,666	39,008,746	55,831,783	10,516,895	66,348,678
Chlorine	5	5	41,451	10	14,651	60,101,148	27,073	60,128,221
Styrene	64,668	254,900	0	509	2,659	54,386,514	2,000,396	56,386,910
Hydrochloric acid	0	0	0	0	21,860	54,104,674	1,314,169	55,418,843
Phosphoric acid	15,819	7,231,799	79,406	9,140,154	4,662,611	50,067,812	5,337,600	55,405,412
Chromium compounds	439,441	1,437,468	12,869	27,086,721	1,293,249	31,608,706	16,186,117	47,794,823
Methyl ethyl ketone	9,150	2,900	2,113	798	65,720	46,843,159	916,043	47,759,202
Lead compounds	610,217	2,800,381	2,400	4,307,663	8,523,124	17,301,709	28,302,900	45,604,609
Carbon disulfide	0	1	0	0	1,650	43,465,400	5,801	43,471,201
Dichloromethane	167,615	2,176	10	0	3,967	40,575,089	257,771	40,832,860
Glycol ethers	16,705	11,174	4,968	571	11,653	37,496,492	834,841	38,331,333
Zinc (fume or dust)	858,548	666,919	0	39,907	6,112,526	9,009,397	23,657,422	32,666,819
Subtotal	**13,539,932**	**76,461,323**	**4,128,181**	**78,056,781**	**133,578,185**	**1,545,089,828**	**319,956,673**	**1,865,046,501**
Total	**15,339,494**	**99,730,347**	**5,210,603**	**90,237,471**	**145,156,959**	**2,046,629,835**	**449,021,609**	**2,495,651,444**

***Note: On-site Releases** are 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.*

This was the second-largest quantity for on-site treatment.

Production-related waste exceeded 1 billion pounds in three other industry groups. The food processing industry reported a 1.16-billion-pound total, including 924.9 million pounds of on-site recycling. The multiple-codes group reported 1.07 billion pounds. On the multiple-codes reporting forms, on-site treatment totaled 365.7 million pounds and on-site recycling totaled 333.4 million pounds. The petroleum industry reported 1.06 billion pounds, of which 571.1 million pounds went to on-site energy recovery and 286.1 million pounds to on-site treatment.

Economic Overview, by Industry

Although TRI data present significant information about toxic chemicals that are released on- and off-site, managed in waste on- and off-site, and transferred off-site for further waste management, there are certain limitation that should be considered

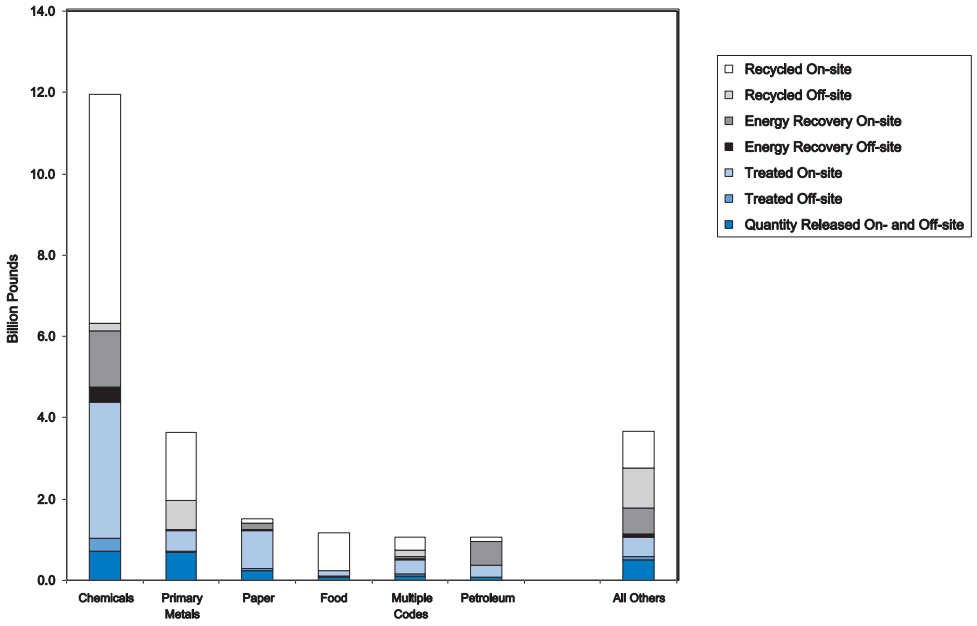
Table 4–4. Quantities of TRI Chemicals in Waste Managed, Original Industries, by Industry, 1998

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste	Non-production related Waste
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
20	Food	924,889,496	3,246,675	44,488	468,214	117,640,169	26,963,547	86,583,956	1,159,836,545	280,695
21	Tobacco	0	7,611	0	0	1,546,084	698,411	3,645,666	5,897,772	3,741
22	Textiles	14,366,930	1,760,722	5,608,790	1,892,379	12,605,895	2,184,621	11,741,109	50,160,446	1,597
23	Apparel	150,440	3,754	0	48,563	1,036,473	25,460	516,871	1,781,561	3
24	Lumber	11,652,645	1,456,547	4,060,356	2,219,236	7,175,142	1,213,855	33,698,999	61,476,780	565,624
25	Furniture	4,686,667	5,094,107	34,920	4,203,734	740,306	496,592	17,264,580	32,520,906	45,329
26	Paper	108,959,943	3,108,738	161,300,035	6,592,701	940,994,184	49,811,061	238,271,980	1,509,038,642	32,811
27	Printing	180,876,437	6,029,199	130,310	3,841,829	85,882,899	647,578	22,302,629	299,710,881	1,672
28	Chemicals	5,615,328,067	182,385,139	1,388,817,487	385,858,536	3,338,756,434	305,061,487	730,187,928	11,946,395,078	5,629,463
29	Petroleum	94,547,970	15,563,178	571,127,392	5,626,704	286,089,885	11,030,918	76,397,187	1,060,383,234	1,349,683
30	Plastics	51,031,835	19,308,408	19,129,042	8,312,457	45,436,655	9,117,925	109,915,575	262,251,897	85,569
31	Leather	1,440,875	304,702	0	69,734	3,742,712	695,249	4,912,715	11,165,987	904
32	Stone/Clay/ Glass	139,630,559	4,826,202	580,303,081	5,843,275	17,322,623	3,280,517	44,533,104	795,739,361	40,330
33	Primary Metals	1,661,434,365	714,346,560	43,671,802	3,603,057	489,307,819	38,487,375	685,323,872	3,636,174,850	16,885,502
34	Fabricated Metals	200,869,105	340,176,730	16,672,039	12,089,635	126,772,179	15,518,485	81,774,817	793,872,990	73,837
35	Machinery	20,442,315	85,050,621	240,579	2,445,835	6,403,449	3,932,915	19,629,189	138,144,903	61,786
36	Electrical Equip.	239,752,988	375,971,874	9,628,621	7,413,646	83,217,063	18,904,328	30,272,210	765,160,730	84,517
37	Transportation Equip.	18,861,958	113,089,470	872,110	12,164,513	31,445,550	15,895,482	104,454,711	296,783,794	51,395
38	Measure/ Photo.	2,921,762	12,024,579	800,535	1,785,886	41,202,519	4,321,567	11,411,247	74,468,095	7,949
39	Miscellaneous	9,263,725	14,391,490	4,189,482	3,383,848	4,966,507	2,161,788	10,792,040	49,148,880	778,154
	Multiple codes 20–39	333,432,473	158,091,791	43,950,494	17,233,696	365,672,898	34,968,822	117,008,661	1,070,358,835	680,408
	No codes 20–39	12,030,482	3,100,597	907,866	276,245	5,033,605	1,937,048	7,790,491	31,076,334	51,378
	Total	**9,646,571,037**	**2,059,338,694**	**2,851,489,429**	**485,373,723**	**6,012,991,050**	**547,355,031**	**2,448,429,537**	**24,051,548,501**	**26,712,347**

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

(as described in Chapter 1). One such limitation is that TRI data alone do not distinguish industry-specific factors that influence the chemicals, amounts, and types of releases and waste management facilities report. Table 4–5 presents two basic economic measures (employment and dollar value of sales, receipts, shipments, or revenue) that suggest the relative size of the original industries that report to TRI.

Economic analyses make use of data on the value of production (sales, receipts, shipments, or revenue) as one way to indicate the size of industrial sectors, because no direct comparison can be drawn among products of the sectors. Economic data in Table 4–5 are from the 1997 Economic Census, the latest consistent data available across all TRI industries, original and new.



Note: Data are from Section 8 of Form R.
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.

Figure 4–3. Distribution of Quantities of TRI Chemicals in Waste Managed, Original Industries, by Industry, 1998

Table 4–5 also includes total production-related waste managed by TRI facilities in 1998, with approximate comparisons to their economic activity. Percentages indicate the relative contribution of each industry to total employment and production and to the total quantity of TRI chemicals in production-related waste managed. The ratio of total production-related waste managed to production value (sales, receipts, shipments, or revenue), in the last column, compares the 1998 TRI quantities reported by each industry with that industry's production level for 1997. Many factors influence the differences in TRI reporting among industries. Relating TRI quantities to the dollar value of each industry's products creates a measure of waste managed that takes into account differences in size among industries.

As shown in Table 4–5, the chemical industry accounted for 4.8 percent of manufacturing employment in 1997, 10.2 percent of the value of manufacturing production (sales, receipts, shipments, or revenue) in 1997, and 52.1 percent of TRI total production-related waste managed in 1998. The chemical industry managed 29,541 pounds of total production-related waste for each $1 million value of shipments. This was the largest ratio among the original TRI industries. The primary metals industry ranked second with 18,848 pounds per $1 million value, and the paper products industry ranked third with 9,434 pounds per $1 million value. These three industries had the largest total production-related waste managed in 1998.

Table 4–5. Employees and Sales (1997) and Total Production-related Waste (1998), by Industry

SIC Code	Industry	Paid Employees, 1997 Number	Paid Employees, 1997 Percent	Sales, Receipts, Shipments, or Revenue, 1997 ($000)	Sales, Receipts, Shipments, or Revenue, 1997 Percent	TRI Total Production-related Waste Managed, 1998 Pounds	TRI Total Production-related Waste Managed, 1998 Percent	Production-related Waste Managed per Sales, Receipts, Shipments, or Revenue Pounds per $1,000,000
20	Food	1,567,155	8.9	480,299,707	12.1	1,159,836,545	5.1	2,415
21	Tobacco	34,464	0.2	36,328,974	0.9	5,897,772	0.0	162
22	Textiles	557,775	3.2	82,763,179	2.1	50,160,446	0.2	606
23	Apparel	840,498	4.8	81,023,419	2.0	1,781,561	0.0	22
24	Lumber	756,934	4.3	111,444,879	2.8	61,476,780	0.3	552
25	Furniture	522,893	3.0	62,388,884	1.6	32,520,906	0.1	521
26	Paper	623,799	3.5	159,954,824	4.0	1,509,038,642	6.6	9,434
27	Printing	1,519,824	8.6	206,396,046	5.2	299,710,881	1.3	1,452
28	Chemicals	843,469	4.8	404,400,164	10.2	11,946,395,078	52.1	29,541
29	Petroleum	106,863	0.6	173,414,651	4.4	1,060,383,234	4.6	6,115
30	Plastics	1,031,202	5.8	159,079,133	4.0	262,251,897	1.1	1,649
31	Leather	84,002	0.5	9,940,805	0.3	11,165,987	0.0	1,123
32	Stone/Clay/Glass	509,730	2.9	88,312,387	2.2	795,739,361	3.5	9,011
33	Primary Metals	692,943	3.9	192,924,973	4.9	3,636,174,850	15.8	18,848
34	Fabricated Metals	1,555,670	8.8	233,701,166	5.9	793,872,990	3.5	3,397
35	Machinery	2,001,684	11.4	407,720,628	10.3	138,144,903	0.6	339
36	Electrical Equip.	1,573,893	8.9	345,490,897	8.7	765,160,730	3.3	2,215
37	Transportation Equip.	1,587,091	9.0	520,505,442	13.1	296,783,794	1.3	570
38	Measure/Photo.	832,432	4.7	157,938,963	4.0	74,468,095	0.3	471
39	Miscellaneous	391,656	2.2	50,759,871	1.3	49,148,880	0.2	968
	Total	**17,633,977**	**100.0**	**3,964,788,992**	**100.0**	**22,950,113,332**	**100.0**	**5,788**

Note: Paid Employees and Sales, Receipts, Shipments or Revenue *are from U.S. Census Bureau, 1997 Economic Census. http://www.census.gov/epcd/www/econ97.html [accessed June 4, 2000]. These data are preliminary and are subject to change; includes only establishments with payroll. Data are in current dollars and have not been adjusted for inflation.*
Total Production-related Waste Managed *is from Section 8 (total of 8.1 through 8.7, Column B) of TRI Form for 1998.*
Total Production-related Waste Managed *in this table does not include forms reporting more than one 2-digit SIC code within SIC code 20–39 and forms reporting SIC codes outside the 20–39 range.*

Year-by-Year Comparisons, by Industry

Comparisons of TRI data across reporting years are made on the basis of chemicals that were reportable in all years with the same reporting definitions. This assures that apparent increases or decreases from one year to another are not the result of changes in the list of TRI chemicals. **Making Year-to-Year Comparisons of TRI Data** in Chapter 1 explains these multi-year analyses; an understanding of these issues is essential for accurate interpretation of the multi-year data presented in this chapter.

Progress in reducing releases and quantities of TRI chemicals in wastes in recent years is measured from 1995. Waste management data authorized under the federal Pollution Prevention Act of 1990, have been collected since 1991 and can be compared from that baseline. Comparisons of on-site and off-site releases can also be measured

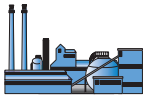


Table 4–6. Change in Total On-site and Off-site Releases, Original Industries, by Industry, 1995–1998

SIC Code	Industry	Total On-site and Off-site Releases					
						Change	
		1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	1997–1998 Percent	1995–1998 Percent
20	Food	104,744,079	94,523,382	95,923,602	89,288,780	–6.9	–14.8
21	Tobacco	2,047,068	4,202,622	4,278,228	3,592,629	–16.0	75.5
22	Textiles	18,798,686	17,120,644	16,894,313	12,010,238	–28.9	–36.1
23	Apparel	1,287,784	1,318,935	907,084	502,558	–44.6	–61.0
24	Lumber	35,739,782	38,074,789	30,100,193	34,471,955	14.5	–3.5
25	Furniture	42,674,795	36,351,768	25,428,924	17,318,061	–31.9	–59.4
26	Paper	239,708,477	233,552,271	233,141,147	229,868,945	–1.4	–4.1
27	Printing	31,289,653	27,497,915	24,755,525	22,455,854	–9.3	–28.2
28	Chemicals	852,333,037	798,206,110	795,399,063	741,812,432	–6.7	–13.0
29	Petroleum	65,698,942	69,379,692	70,180,443	74,654,325	6.4	13.6
30	Plastics	127,475,721	117,934,935	110,074,022	109,834,374	–0.2	–13.8
31	Leather	4,851,494	4,734,739	4,903,031	4,824,890	–1.6	–0.5
32	Stone/Clay/Glass	37,700,962	45,264,816	44,619,139	45,157,484	1.2	19.8
33	Primary Metals	567,143,497	622,212,203	695,334,469	718,260,809	3.3	26.6
34	Fabricated Metals	104,357,338	91,703,004	90,927,273	88,232,227	–3.0	–15.5
35	Machinery	27,494,817	23,742,158	22,723,291	19,741,087	–13.1	–28.2
36	Electrical Equip.	41,841,436	38,130,216	35,028,711	30,904,852	–11.8	–26.1
37	Transportation Equip.	122,906,775	108,426,979	102,256,155	103,373,567	1.1	–15.9
38	Measure/Photo.	17,701,666	15,663,670	13,735,884	12,196,176	–11.2	–31.1
39	Miscellaneous	13,942,012	10,530,765	10,333,656	10,628,817	2.9	–23.8
	Multiple codes 20–39	162,279,567	131,079,129	138,817,252	118,859,292	–14.4	–26.8
	No codes 20–39	15,515,498	15,632,705	21,210,779	7,662,092	–63.9	–50.6
	Total	**2,637,533,086**	**2,545,283,447**	**2,586,972,184**	**2,495,651,444**	**–3.5**	**–5.4**

Note: ***On-site Releases*** *are 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.*
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.
Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

for chemicals that were reportable in all years from 1988 to 1998.

On- and Off-site Releases, 1995–1998

Table 4–6 summarizes on- and off-site releases by TRI's original industries for 1995 through 1998. In this period, total on- and off-site releases decreased from 2.64 billion pounds to 2.50 billion pounds, a reduction of 5.4 percent.

The two industries with the largest 1998 total releases, the chemical manufacturing and primary metals industries, have exhibited contrasting trends since 1995. Although the chemical manufacturing industry has consistently ranked first for releases, this industry's total decreased steadily from 852.3 million pounds in 1995 to 741.8 million pounds in 1998. This was the largest reduction by any original industry, a decrease of 110.5 million pounds, or 13.0 percent.

At the same time, the primary metals industry, with the second-largest total each year, recorded annual increases amounting to 151.1 million pounds. The primary metals industry reported 567.1 million pounds of on- and off-site releases in 1995 and 718.3 million pounds in 1998. This increase amounted to 26.6 percent.

No other original TRI industry reported a reduction or an increase of comparable size from 1995 to 1998. The second-largest absolute reduction occurred in the multiple-codes group, from 162.3 million pounds to 118.9 million pounds. The furniture industry ranked third with a reduction from 42.7 million pounds to 17.3 million pounds. In percentage terms, these represented decreases of 26.8 percent and 59.4 percent, respectively. In addition to the primary metals industry, three industries showed increases: petroleum refining, from

Table 4–7. Change in Total TRI On–site and Off–site Releases, Original Industries, by Industry, 1988 and 1995–1998

SIC Code	Industry	Total On–site and Off-site Releases					Change	
		1988 Pounds	1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	1997–1998 Percent	1988–1998 Percent
20	Food	8,530,020	6,459,514	6,331,133	5,397,858	9,960,469	84.5	16.8
21	Tobacco	214,464	103,526	82,315	202,380	159,062	–21.4	–25.8
22	Textiles	36,801,004	16,010,269	15,099,099	14,625,492	10,266,524	–29.8	–72.1
23	Apparel	952,162	1,260,746	1,198,516	819,881	385,716	–53.0	–59.5
24	Lumber	32,916,416	31,143,449	28,661,790	25,550,786	31,401,763	22.9	–4.6
25	Furniture	62,187,189	42,414,206	36,102,365	25,206,404	16,993,306	–32.6	–72.7
26	Paper	205,229,477	180,608,750	179,415,100	181,202,195	176,051,839	–2.8	–14.2
27	Printing	56,539,627	31,029,174	27,325,251	24,596,240	22,246,252	–9.6	–60.7
28	Chemicals	1,053,173,774	551,042,019	523,169,308	519,481,906	455,485,840	–12.3	–56.8
29	Petroleum	74,471,749	42,924,695	43,961,872	43,269,664	42,072,240	–2.8	–43.5
30	Plastics	160,554,575	113,997,864	105,577,730	96,757,391	97,422,580	0.7	–39.3
31	Leather	10,089,024	4,418,342	4,305,621	4,377,171	4,256,040	–2.8	–57.8
32	Stone/Clay/Glass	38,002,387	22,107,137	27,905,101	28,645,653	28,843,406	0.7	–24.1
33	Primary Metals	647,573,699	496,510,139	553,079,505	616,902,761	635,893,287	3.1	–1.8
34	Fabricated Metals	162,792,170	95,089,498	82,879,982	82,397,303	80,231,371	–2.6	–50.7
35	Machinery	70,884,423	23,874,319	20,325,927	19,300,688	16,378,422	–15.1	–76.9
36	Electrical Equip.	128,928,366	31,502,040	28,576,164	26,260,453	23,483,358	–10.6	–81.8
37	Transportation Equip.	213,860,324	116,567,103	102,218,434	97,005,694	96,815,723	–0.2	–54.7
38	Measure/Photo.	56,806,089	12,821,184	10,500,815	8,015,417	6,803,147	–15.1	–88.0
39	Miscellaneous	31,804,682	13,358,780	10,103,591	9,860,932	10,115,466	2.6	–68.2
	Multiple codes 20–39	304,120,277	130,983,020	99,513,855	105,910,873	85,174,819	–19.6	–72.0
	No codes 20–39	39,951,585	12,946,706	12,187,960	18,192,112	5,386,140	–70.4	–86.5
	Total	**3,396,383,483**	**1,977,172,480**	**1,918,521,434**	**1,953,979,254**	**1,855,826,770**	**–5.0**	**–45.4**

Note: *Does not include delisted chemicals, chemicals added in 1990, 1991, 1994 and 1995, aluminum oxide, ammonia, hydrochloric acid and sulfuric acid.*
On-site Releases *are 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.*
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.
Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.

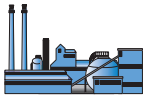


Table 4–8. Current Year and Projected Quantities of TRI Chemicals in Waste, Original Industries, by Industry 1998–2000

SIC Code	Industry	Current Year 1998 Pounds	Total Production-related Waste: Projected 1999 Pounds	Total Production-related Waste: Projected 2000 Pounds	Change 1998–1999 Percent	Change 1998–2000 Percent
20	Food	1,159,836,545	1,229,005,689	1,233,137,516	6.0	6.3
21	Tobacco	5,897,772	6,193,086	6,425,352	5.0	8.9
22	Textiles	50,160,446	45,586,824	45,346,848	–9.1	–9.6
23	Apparel	1,781,561	1,785,538	1,791,242	0.2	0.5
24	Lumber	61,476,780	59,328,380	59,429,530	–3.5	–3.3
25	Furniture	32,520,906	30,603,637	31,268,680	–5.9	–3.9
26	Paper	1,509,038,642	1,529,065,406	1,444,389,852	1.3	–4.3
27	Printing	299,710,881	307,998,222	325,317,469	2.8	8.5
28	Chemicals	11,946,395,078	11,143,156,835	11,148,484,363	–6.7	–6.7
29	Petroleum	1,060,383,234	1,026,997,848	1,117,610,625	–3.1	5.4
30	Plastics	262,251,897	251,516,631	263,687,625	–4.1	0.5
31	Leather	11,165,987	10,573,142	10,435,337	–5.3	–6.5
32	Stone/Clay/Glass	795,739,361	774,293,001	806,214,746	–2.7	1.3
33	Primary Metals	3,636,174,850	3,566,837,679	3,558,317,270	–1.9	–2.1
34	Fabricated Metals	793,872,990	770,803,987	777,512,804	–2.9	–2.1
35	Machinery	138,144,903	132,453,279	135,836,373	–4.1	–1.7
36	Electrical Equip.	765,160,730	750,523,961	752,900,831	–1.9	–1.6
37	Transportation Equip.	296,783,794	297,922,865	296,534,596	0.4	–0.1
38	Measure/Photo.	74,468,095	74,493,295	74,425,020	0.0	–0.1
39	Miscellaneous	49,148,880	45,723,026	45,061,141	–7.0	–8.3
	Multiple codes 20–39	1,070,358,835	1,056,560,053	1,105,505,899	–1.3	3.3
	No codes 20–39	31,076,334	23,924,904	24,010,142	–23.0	–22.7
	Total	**24,051,548,501**	**23,135,347,288**	**23,263,643,261**	**–3.8**	**–3.3**

Note: *Data are from Section 8 (Total of 8.1 through 8.7) of Form R for 1998. Current Year is Column B, 1999 is Column C and 2000 is Column D. Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category. Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.*

65.7 million pounds to 74.7 million pounds (13.6 percent); stone, clay, glass and concrete products, from 37.7 million pounds to 45.2 million pounds (19.8 percent); and tobacco products, from 2.0 million pounds to 3.6 million pounds (75.5 percent).

On- and Off-site Releases, 1988 and 1995–1998

Table 4–7 summarizes original-industry data for the chemicals that have been reportable since 1988. From 1988 to 1998, total on- and off-site releases decreased from 3.40 billion pounds to 1.86 billion pounds, or 45.4 percent. Again, the chemical manufacturing industry showed the largest absolute reduction, from 1.05 billion pounds in 1988 to 455.5 million pounds in 1998. This amounted to a 56.8 percent reduction. Three other industry groups had reductions of more than 100 million pounds each: the multiple-codes group, from 304.1 million pounds to 85.2 million pounds; transportation equipment from

213.9 million pounds to 96.8 million pounds, and electrical equipment from 128.9 million pounds to 23.5 million pounds. These industry groups reduced their releases by substantial percentages — 72.0 percent, 54.7 percent, and 81.8 percent respectively.

All but one industry recorded a reduction over the 1988–1998 period. Total releases in the food products industry declined from 8.5 million pounds in 1988 to 5.4 million pounds in 1997, but rose to 10.0 million pounds in the last year.

TRI Chemicals Managed in Waste, 1998–2000 Projected, 1995–1998, and 1991–1998

Projected Quantities of TRI Chemicals Managed in Waste, 1998–2000

TRI facilities projected a 3.3 percent decrease from 24.05 billion pounds of total production-related waste managed in 1998 to 23.26 billion pounds in 2000, as shown in Table 4–8. (As described in **Waste Management** in Chapter 1, on each Form R that it submits, a facility reports actual waste management quantities for the current and prior years and projected quantities for the next two years.) The three industries with the largest 1998 totals projected the largest absolute reductions by 2000.

The chemical manufacturing industry, reporting 11.95 billion pounds of production-related waste in 1998, projected the largest absolute reduction. By 2000, the chemical manufacturing industry expected to manage 11.15 billion pounds of production-related waste. This would amount to a 6.7 percent decrease. The industry expects to achieve this projected reduction in 1999 with essentially no change in 2000.

The primary metals industry projected the second-largest absolute reduction, from 3.64 billion pounds in 1998 to 3.56 billion pounds in 2000. The paper products industry ranked third with a projected decrease from 1.51 billion pounds to 1.44 billion pounds. These expected reductions (less than 80 million pounds each) represented 2.1 percent and 4.3 percent projected decreases for the primary metals and paper products industries, respectively.

The food products industry projected the largest absolute increase in production-related waste managed, from 1.16 billion pounds in 1998 to 1.23 billion pounds in 2000, or 6.3 percent. The petroleum industry projected an increase from 1.06 billion pounds to 1.12 billion pounds, or 5.4 percent. Six other industry groups projected increases, all less than 40 million pounds.

In percentage terms, projected changes between 1998 and 2000 by the original industries in the quantities of production-related waste they manage ranged from decreases of as much as 10 percent (textiles) to increases of up to 9 percent (tobacco products and printing). The textiles industry projected a decrease from 50.2 million pounds to 45.3 million pounds. The tobacco industry's projected increase was from 5.9 million pounds reported in 1998 to 6.4 million pounds. For the printing industry, the projected increase was from 299.7 million pounds to 325.3 million pounds.

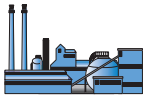


Table 4–9. Total Production-related Waste Managed, Original Industries, by Industry, 1995–1998

Code	Industry	Total Production-related Waste Managed				Change	
		1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	1997–1998 Percent	1995–1998 Percent
20	Food*	4,105,102,832	382,100,369	739,663,713	1,159,836,545	56.8	–71.7
21	Tobacco	2,815,101	5,826,328	6,036,774	5,897,772	–2.3	109.5
22	Textiles	57,443,512	49,705,357	67,208,810	50,160,446	–25.4	–12.7
23	Apparel	2,149,244	2,345,386	1,971,867	1,781,561	–9.7	–17.1
24	Lumber	112,151,149	93,193,491	207,606,428	61,476,780	–70.4	–45.2
25	Furniture	60,878,419	53,471,035	41,301,690	32,520,906	–21.3	–46.6
26	Paper	1,759,242,941	1,597,758,714	1,501,626,290	1,509,038,642	0.5	–14.2
27	Printing	294,277,269	265,817,477	289,221,266	299,710,881	3.6	1.8
28	Chemicals	10,034,828,325	10,001,972,021	10,851,877,342	11,946,395,078	10.1	19.0
29	Petroleum	946,918,911	1,102,723,724	913,110,704	1,060,383,234	16.1	12.0
30	Plastics	541,523,893	373,615,199	293,876,022	262,251,897	–10.8	–51.6
31	Leather	10,477,994	10,566,828	10,969,844	11,165,987	1.8	6.6
32	Stone/Clay/Glass	863,382,343	678,363,126	754,664,579	795,739,361	5.4	–7.8
33	Primary Metals	4,164,293,524	3,718,806,367	3,532,309,926	3,636,174,850	2.9	–12.7
34	Fabricated Metals	783,217,306	796,189,055	822,188,062	793,872,990	–3.4	1.4
35	Machinery	169,608,079	160,733,828	156,826,069	138,144,903	–11.9	–18.6
36	Electrical Equip.	693,988,984	684,008,353	658,304,629	765,160,730	16.2	10.3
37	Transportation Equip.	410,055,374	365,155,686	319,460,816	296,783,794	–7.1	–27.6
38	Measure/Photo.	81,848,614	79,414,662	79,789,553	74,468,095	–6.7	–9.0
39	Miscellaneous	51,730,378	49,177,183	50,419,563	49,148,880	–2.5	–5.0
	Multiple codes 20–39	1,917,753,275	1,375,488,740	1,385,759,846	1,070,358,835	–22.8	–44.2
	No codes 20–39	115,684,605	95,718,398	115,113,396	31,076,334	–73.0	–73.1
	Total	**27,179,372,072**	**21,942,151,327**	**22,799,307,189**	**24,051,548,501**	**5.5**	**–11.5**

Note: *Data are from Section 8 (Total of 8.1 through 8.7) of Form R of year indicated.*
Forms that reported more than one 2-digit SIC code within the range 20 to 39 are assigned to the "multiple codes" category.
Forms with no 2-digit SIC code within the range 20 to 39 are assigned to the "no codes" category.
**Seven facilities in the food processing industry (SIC code 20) reported from 500 million pounds to 1 billion pounds each in on-site recycling of n-hexane in 1995, for a total of 4.00 billion pounds. In 1996 these facilities reported no on-site recycling of n-hexane. On their 1996 Form Rs, these facilities also reported zero for on-site recycling of n-hexane for the prior year (1995). However, they have not revised their 1995 Form Rs.*
The percentage change for 1995 to 1998 for SIC code 20 changes to +1005.5 percent and for total production-related waste changes to +3.8 percent.

Quantities of TRI Chemicals in Waste, 1995–1998

As shown in Table 4–9, facilities in the original TRI industries managed 27.18 billion pounds of production-related waste in 1995 and 24.05 billion pounds in 1998. However, in 1995, seven facilities in the food processing industry reported from 500 million pounds to 1 billion pounds each in on-site recycling of n-hexane, for a total of 4.00 billion pounds. In 1996 these facilities reported no on-site recycling of n-hexane. On their 1996 Form Rs, these facilities also reported zero for on-site recycling of n-hexane for the prior year (1995). However, they have not revised their 1995 Form Rs. Removing their 1995 forms for n-hexane for purposes of this analysis would mean that the food industry's production-related waste totaled 104.9 million pounds in 1995,

giving the industry an increase of more than 1,000 percent to its 1998 level of 1.16 billion pounds. Total production-related waste for all original industries would show an increase from 23.18 billion pounds in 1995 to 24.05 billion pounds in 1998, an increase of 3.8 percent.

Disregarding the apparent errors by the seven food industry facilities, the multiple-codes group (forms reporting more than one 2-digit SIC code) recorded the largest absolute reduction in total production-related waste from 1995 to 1998. The multiple-codes forms reported 1.92 billion pounds in 1995 and 1.07 billion pounds in 1998. The primary metals industry ranked second, reporting 4.16 billion pounds in 1995 and 3.63 billion pounds in 1998. In percentage terms, these represented decreases of 44.2 percent and 12.7 percent respectively. The plastics industry ranked third for absolute reductions in total production-related waste managed, with 541.5 million pounds in 1995 and 262.3 million pounds in 1998 (a 51.6 percent reduction).

The chemical manufacturing industry reported the largest absolute increase, from 10.03 billion pounds in 1995 to 11.95 billion pounds in 1998 (a 19.0 percent increase). The second-largest absolute increase occurred in the petroleum industry, from 946.9 million pounds in 1995 to 1.06 million pounds in 1998 (a 12.0 percent increase), although the petroleum industry's production-related waste varied considerably year-by-year. The electrical equipment industry managed 694.0 million pounds of production-related waste in 1995 and 765.2 million pounds in 1998, the third largest increase. This increase occurred in 1998 after two years of reductions. In percentage terms, the electrical equipment industry's increase from 1995 to 1998 was 10.3 percent.

Quantities of TRI Chemicals in Waste, 1991 and 1995–1998

As shown in Table 4–10, total production-related waste managed rose from 18.52 billion pounds in 1991 to 19.60 billion pounds in 1998, a 5.8 percent increase. This analysis addresses only the chemicals that were reportable in all years, 1991 to 1998. Apparent errors in reporting of n-hexane by facilities in the food industry do not affect data presented in Table 4–10 because n-hexane was added to TRI in 1995.

The multiple-codes group reported the largest absolute reduction in total production-related waste managed. These forms totaled 1.95 billion pounds of production-related waste in 1991 and 881.4 million pounds in 1998. In percentage terms, this represented a decrease of more than half (54.9 percent). The petroleum industry ranked second, decreasing from 1.17 billion pounds in 1991 to 874.4 million pounds in 1998. This amounted to a 25.2 percent reduction, despite a 15.2 percent increase in the last year. The plastics industry ranked third for absolute reductions, decreasing its production-related waste by half (50.4 percent) from 471.7 million pounds to 234.1 million pounds.

The largest absolute increase in production-related waste from 1991 to 1998 was reported by the chemical manufacturing industry, from 7.33 billion pounds to 9.76 billion pounds. The percentage increase was 33.1 percent The primary metals industry had the second-largest increase, from 2.33 billion pounds to 3.30 billion pounds, or 41.8 percent. Notably, the bulk of the primary metals industry's increase occurred in the early 1990s. The fabricated metals industry reported 602.2 million pounds in 1991 and 753.4 million pounds in 1998, the third-

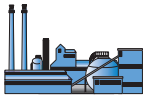


Table 4–10. Total Production-related Waste Managed, Original Industries, by Industry, 1991 and 1995–1998

SIC Code	Industry	Total Production-related Waste Managed					Change	
		1991 Pounds	1995 Pounds	1996 Pounds	1997 Pounds	1998 Pounds	1997–1998 Percent	1991–1998 Percent
20	Food	64,717,565	75,339,454	73,716,447	73,335,891	87,227,489	18.9	34.8
21	Tobacco	51,405,093	158,896	116,515	216,179	193,470	–10.5	–99.6
22	Textiles	51,508,161	46,480,740	42,775,915	52,347,891	43,517,975	–16.9	–15.5
23	Apparel	2,284,692	2,118,876	2,168,256	1,773,358	1,612,483	–9.1	–29.4
24	Lumber	60,025,678	109,084,526	89,880,440	204,142,970	59,435,166	–70.9	–1.0
25	Furniture	61,302,804	60,162,585	52,714,236	40,596,305	32,008,109	–21.2	–47.8
26	Paper	1,405,002,221	1,318,407,149	1,326,793,507	1,298,000,628	1,291,376,038	–0.5	–8.1
27	Printing	258,847,784	291,345,177	264,883,857	288,456,100	299,081,460	3.7	15.5
28	Chemicals	7,333,148,227	7,821,512,739	7,939,516,510	8,672,349,114	9,763,121,108	12.6	33.1
29	Petroleum	1,169,176,762	816,039,129	888,501,391	759,030,413	874,407,025	15.2	–25.2
30	Plastics	471,727,442	497,711,730	339,165,715	265,260,236	234,125,718	–11.7	–50.4
31	Leather	17,963,968	7,171,578	6,402,629	6,551,846	6,786,724	3.6	–62.2
32	Stone/Clay/Glass	973,839,214	840,031,575	650,636,848	721,852,346	758,841,042	5.1	–22.1
33	Primary Metals	2,326,548,770	3,239,436,645	3,276,875,402	3,182,224,148	3,299,322,616	3.7	41.8
34	Fabricated Metals	602,245,039	704,343,010	753,459,547	783,746,726	753,419,634	–3.9	25.1
35	Machinery	262,640,696	156,788,904	150,296,904	146,381,892	128,133,382	–12.5	–51.2
36	Electrical Equip.	680,930,374	595,452,487	611,821,788	562,587,318	668,026,565	18.7	–1.9
37	Transportation Equip.	382,349,642	386,638,401	346,169,541	302,556,963	279,046,986	–7.8	–27.0
38	Measure/Photo.	117,543,840	72,704,206	69,850,508	69,877,443	62,938,286	–9.9	–46.5
39	Miscellaneous	67,933,418	49,698,748	47,503,843	48,710,447	46,859,949	–3.8	–31.0
	Multiple codes 20–39	1,954,619,963	1,368,128,547	1,184,646,914	1,188,684,158	881,418,778	–25.8	–54.9
	No codes 20–39	209,011,887	107,832,014	84,194,980	109,979,251	26,919,499	–75.5	–87.1
	Total	**18,524,773,240**	**18,566,587,116**	**18,202,091,693**	**18,778,661,623**	**19,597,819,502**	**4.4**	**5.8**

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

largest absolute increase. This amounted to a 25.1 percent increase.

Economic Overview, by Industry, Multi-Year Comparisons

U.S. economic expansion continued in 1998 with 4.6 percent real growth (adjusted for inflation) in gross domestic product (*Economic Report of the President*, February 2000). As shown in Table 4–11, manufacturing production also continued to increase.

Table 4–11 presents production indexes for each industrial sector from 1991 to 1998. During this period, production increased 40.4 percent for U.S. manufacturing overall. Table 4–12 compares the change in manufacturing production since 1991 with the change in TRI quantity released on- and off-site and in TRI total production-related

waste managed. As shown in Table 4–12, the quantity released on- and off-site steadily decreased, even as manufacturing production expanded. Overall, while production rose 40.4 percent, TRI facilities reported a decrease of 27.6 percent in quantity released on- and off-site. Although the total quantity of production-related waste that facilities managed rose, the overall increase was considerably smaller than the nation's increase in manufacturing production. TRI production-related waste increased by 5.8 percent, compared to the 40.4 percent increase in manufacturing production over the same period. While manufacturing production steadily increased from 1991 to 1998, TRI production-related waste decreased in about half of the years. However, increases in 1994, 1997, and 1998 resulted in the overall increase for the period.

Table 4–11. Industrial Production Indexes by Industry, 1991–1998

		1991	1992	1993	1994	1995	1996	1997	1998
Total Index		100	103.1	106.7	112.5	117.9	123.2	130.7	135.5
Manufacturing		100	104.0	107.8	114.2	120.2	126.2	134.8	140.4
SIC Code	**Industry**								
20	Food	100	101.6	103.7	105.4	107.5	107.1	109.8	111.3
21	Tobacco	100	101.1	85.0	105.6	113.0	114.8	112.1	107.2
22	Textiles	100	107.9	113.6	119.3	118.9	115.3	121.0	121.6
24	Lumber	100	105.8	106.7	112.1	114.2	116.8	120.8	123.7
25	Furniture	100	105.5	110.7	114.0	117.5	119.4	124.2	128.2
26	Paper	100	103.3	107.4	112.0	113.2	112.4	118.2	119.0
27	Printing	100	100.9	101.6	101.6	102.3	102.5	106.2	106.2
28	Chemicals	100	103.7	105.3	108.6	111.3	114.1	119.2	119.8
29	Petroleum	100	100.9	103.8	103.6	105.4	107.8	110.8	113.2
30	Plastics	100	110.3	117.9	128.4	132.0	135.9	141.3	146.2
31	Leather	100	101.6	102.6	95.1	88.3	88.7	83.2	76.5
32	Stone/clay/glass	100	102.9	105.0	110.9	114.1	121.7	125.8	129.5
33	Primary metals	100	103.4	109.3	117.3	120.8	123.9	129.6	128.0
34	Fabricated metals	100	104.0	108.5	116.6	121.0	124.9	129.6	132.2
35	Machinery	100	104.8	115.2	130.9	150.8	167.5	188.1	213.5
36	Electrical Equip.	100	111.6	122.3	146.7	185.6	229.9	282.8	325.3
37	Transportation Equip.	100	103.6	107.6	111.0	110.3	110.3	121.3	127.6
38	Measure/Photo.	100	100.2	101.0	100.0	103.8	107.9	110.5	113.3

Note: *1991=100. Data are not provided for apparel industry (SIC code 23) or Misc. Manufacturing (SIC code 39).*
From: 1999 Statistical Abstract of the United States, No. 1240 Industrial Production Indexes, by Industry
(Source: Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, *monthly, and* Industrial Production Capacity Utilization, Statistical Release G.17, *monthly.)*

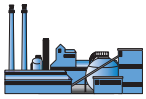


Table 4–12. Cumulative Change in Manufacturing Production and in TRI Quantities in Waste Managed, 1991–1998

	1991–1992 Percent	1991–1993 Percent	1991–1994 Percent	1991–1995 Percent	1991–1996 Percent	1991–1997 Percent	1991–1998 Percent
Manufacturing Production	4.0	7.8	14.2	20.2	26.2	34.8	40.4
TRI Quantity Released On- and Off-site	–6.7	–12.5	–19.7	–23.7	–26.2	–25.4	–27.6
TRI Total Production-related Waste Managed	–2.0	–2.5	3.4	0.2	–1.7	1.4	5.8

Note: *Cumulative manufacturing production is based on* 1999 Statistical Abstract of the United States, No. 1240 Industrial Production Indexes, by Industry
(Source: Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, *monthly, and* Industrial Production Capacity Utilization, Statistical Release G.17, *monthly.)*
TRI quantities do not include delisted chemicals, chemicals added in 1994 and 1995, aluminum oxide, ammonia, hydrochloric acid and sulfuric acid.
TRI data are taken from Section 8 (Total of 8.1 through 8.7) of Form R (current year) of year indicated.

Appendix A

Chemical-specific TRI Release and Waste Management Data, 1988, 1995 and 1998

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries)

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
71751-41-2	*	Abamectin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	16	0	0	16	0	16
			98o	2	0	12	0	0	12	0	12
			98n	No reports							
30560-19-1	*	Acephate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	2,250	0	0	0	2,250	1,000	3,250
			98o	7	1,775	0	0	0	1,775	0	1,775
			98n	No reports							
75-07-0	*,‡	Acetaldehyde	88	66	6,949,249	98,236	2,219,105	194,958	9,461,548	24,930	9,486,478
			95	236	13,370,984	227,091	605,886	155,360	14,359,321	1,099	14,360,420
			98o	270	12,602,135	191,219	412,152	21,533	13,227,039	5,676	13,232,715
			98n	5	2,233	0	0	0	2,233	7	2,240
60-35-5	‡	Acetamide	88	1	0	0	0	0	0	250	250
			95	4	8	0	920,000	0	920,008	0	920,008
			98o	8	106	1	2,157,694	0	2,157,801	0	2,157,801
			98n	3	63	0	0	25,474	25,537	10	25,547
75-05-8		Acetonitrile	88	67	2,194,739	42,223	16,739,010	1,790	18,977,762	416,333	19,394,095
			95	89	1,020,917	7,474	30,336,181	12	31,364,584	10,892	31,375,476
			98o	111	1,027,512	28,862	20,733,190	33	21,789,597	1,155,984	22,945,581
			98n	20	3,251	0	0	0	3,251	31,825	35,076
98-86-2	*	Acetophenone	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	39	205,888	971	629,201	3,369	839,429	19,427	858,856
			98o	46	138,515	655	732,358	0	871,528	49,744	921,272
			98n	6	33,106	0	1,649	0	34,755	0	34,755
53-96-3	‡	2-Acetylaminofluorene	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	110	0	0	8,500	8,610	1,205	9,815
62476-59-9	*	Acifluorfen, sodium salt	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	60	5	0	5	70	0	70
			98o	4	476	2,193	0	0	2,669	421,514	424,183
			98n	No reports							
107-02-8	*	Acrolein	88	12	33,652	0	68,950	500	103,102	0	103,102
			95	21	71,302	4	83,465	0	154,771	0	154,771
			98o	29	184,134	270	95,900	1,351	281,655	665	282,320
			98n	No reports							
79-06-1	*,‡	Acrylamide	88	59	26,019	3,124	2,198,000	756	2,227,899	97,582	2,325,481
			95	80	19,077	1,801	6,120,154	235	6,141,267	3,083	6,144,350
			98o	77	23,349	2,272	6,333,564	0	6,359,185	6,789	6,365,974
			98n	8	17,129	0	0	0	17,129	922	18,051

Note: On-site Releases are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Abamectin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	106	5,582	16	5,704	0
		98o	0	0	0	0	2,561	122	12	2,695	0
		98n	No reports								
*	Acephate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	10	0	0	0	183,000	15,728	1,409	200,147	0
		98o	90	0	0	0	9,800	12,683	2,186	24,759	0
		98n	No reports								
*,‡	Acetaldehyde	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	10,000	32,190	9,238,985	358,459	14,509,704	1,755,026	14,377,294	40,281,658	1,689
		98o	14,000	694	10,275,584	266,784	16,875,294	1,672,903	13,295,228	42,400,487	1,171
		98n	0	0	0	12,964,868	166,000	45	2,281	13,133,194	1
‡	Acetamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	1,000	0	0	88	920,000	921,088	0
		98o	0	0	81,220	40,954	2	294	2,157,761	2,280,231	0
		98n	0	0	0	21,133	90,561	0	25,547	137,241	1
	Acetonitrile	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,309,962	2,071,150	23,162,787	4,704,330	11,104,608	5,742,679	31,916,551	82,012,067	1,076
		98o	12,941,704	1,880,831	20,414,930	7,024,953	19,270,706	7,630,788	22,919,628	92,083,540	1,030
		98n	158,085	0	5,904	4,349,055	1,973,227	368,264	33,506	6,888,041	1
*	Acetophenone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	920,000	9,710	24,949,642	1,171,212	1,313,510	185,062	886,541	29,435,677	519
		98o	0	3,448	32,071,882	1,355,425	719,096	161,672	929,213	35,240,736	0
		98n	0	0	0	59,772	137,644	0	34,752	232,168	1
‡	2-Acetylaminofluorene	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	310	41	9,800	10,151	0
*	Acifluorfen, sodium salt	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	600	1,272	65	1,937	0
		98o	0	0	0	0	13,105	3,237	423,965	440,307	0
		98n	No reports								
*	Acrolein	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,800	0	3,752,847	43,323	5,168,260	11,361	154,579	9,135,170	86
		98o	0	0	3,712,551	38,933	16,385,121	12	278,469	20,415,086	194
		98n	No reports								
*,‡	Acrylamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,037	0	820	43,304	187,170	210,283	6,146,092	6,591,706	3,985
		98o	162	144	90,200	6,627	160,009	311,265	6,363,850	6,932,257	49,724
		98n	0	0	0	228,142	62,489	0	17,291	307,922	1

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
79-10-7		Acrylic acid	88	158	800,046	16,646	22,262,010	15,950	23,094,652	134,139	23,228,791
			95	189	527,544	2,648	7,840,000	47	8,370,239	35,421	8,405,660
			98o	195	322,046	6,973	4,499,600	79	4,828,698	72,698	4,901,396
			98n	15	368	0	44	48,617	49,029	13,772	62,801
107-13-1	*,‡	Acrylonitrile	88	113	4,796,161	6,531	4,562,713	2,150	9,367,555	151,450	9,519,005
			95	105	1,525,446	7,137	5,193,028	618	6,726,229	4,917	6,731,146
			98o	103	1,145,380	1,100	4,005,290	321	5,152,091	8,156	5,160,247
			98n	11	1,264	0	0	0	1,264	3,635	4,899
15972-60-8	*	Alachlor	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	756	280	0	0	1,036	2,940	3,976
			98o	2	1,510	220	0	0	1,730	9,100	10,830
			98n	3	54	0	0	0	54	613	667
116-06-3	*	Aldicarb	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	3,477	0	0	6	3,483	0	3,483
			98o	3	154	0	0	15	169	0	169
			98n	2	1	0	0	0	1	0	1
309-00-2	*	Aldrin	88	No reports							
			95	No reports							
			98o	No reports							
			98n	3	307	7	0	22,000	22,314	3,308	25,622
28057-48-9		d-trans-Allethrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
107-18-6	*	Allyl alcohol	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	31	168,141	6,519	298,801	1,100	474,561	11,296	485,857
			98o	32	256,587	7,931	424,120	0	688,638	10,569	699,207
			98n	3	34	0	0	0	34	0	34
107-11-9		Allylamine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	2	951	40	0	0	991	0	991
			98n	1	0	0	0	0	0	0	0
107-05-1		Allyl chloride	88	20	149,369	430	250	200	150,249	747	150,996
			95	21	52,698	95	0	481	53,274	13	53,287
			98o	23	70,809	5	0	2	70,816	860	71,676
			98n	2	91	0	0	0	91	864	955
7429-90-5	*	Aluminum (fume or dust)	88	357	3,681,998	91,518	250	3,177,625	6,951,391	14,482,254	21,433,645
			95	324	1,981,874	36,949	250	1,872,483	3,891,556	6,329,533	10,221,089
			98o	314	1,301,497	3,818	0	1,906,677	3,211,992	6,720,761	9,932,753
			98n	18	109,949	0	5	3,752,538	3,862,492	52,889	3,915,381

Note: On-site Releases are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-production-related Waste Managed Pounds
	Acrylic acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,339,863	34,800	26,544,419	5,033,613	26,801,759	471,790	8,396,927	70,623,171	3,411
		98o	4,863,156	0	31,350,455	5,605,884	24,168,363	1,069,991	4,891,791	71,949,640	6,994
		98n	0	101,540	1,605	659,051	452,945	9,417	63,584	1,288,142	1
*,‡	Acrylonitrile	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	12,408,043	69,716	3,326,652	666,245	10,649,989	1,125,461	6,765,974	35,012,080	8,110
		98o	12,827,695	190	4,841,082	158,067	10,879,297	867,233	5,130,060	34,703,624	1,573
		98n	0	0	0	24,762	433,873	1,519,681	2,043	1,980,359	0
*	Alachlor	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	5,481	120,000	217,179	3,930	346,590	30,000
		98o	0	0	0	0	17,300	181,800	10,830	209,930	0
		98n	0	0	0	0	64,944	0	183	65,127	0
*	Aldicarb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	580	20,011	3,472	24,063	1
		98o	0	0	0	0	502	40,611	149	41,262	10
		98n	0	0	0	0	16,633	0	1	16,634	0
*	Aldrin	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	1	77,986	110	26,045	104,142	0
	d-trans-Allethrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Allyl alcohol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	189,517	0	1,531,138	363,377	1,414,321	422,499	486,288	4,407,140	133
		98o	248,764	0	1,413,165	1,168,713	1,157,533	173,575	646,116	4,807,866	0
		98n	0	0	0	0	76,299	0	30	76,329	0
	Allylamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	360	0	991	1,351	0
		98n	0	0	0	5	20	0	0	25	0
	Allyl chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	520,000	0	186,000	1,756	750,979	412,357	52,568	1,923,660	65
		98o	780,000	68,000	5,349,016	321,228	243,860	194,934	70,054	7,027,092	1
		98n	0	0	0	0	127,076	282	955	128,313	0
*	Aluminum (fume or dust)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	15,378,165	24,132,767	0	164,604	15,628,491	332,192	8,094,462	63,730,681	712
		98o	15,726,418	29,110,094	0	4,289	18,291,037	173,519	9,857,954	73,163,311	29,063
		98n	0	210,000	0	76	226,635	550	3,781,933	4,219,194	10,984

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
1344-28-1		Aluminum oxide (fibrous forms)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	60	133,416	2,805	0	593,000	729,221	4,499,941	5,229,162
			98o	55	26,672	750	0	46,575	73,997	2,952,419	3,026,416
			98n	12	35	0	0	4,451,957	4,451,992	141,030	4,593,022
20859-73-8	*	Aluminum phosphide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
834-12-8	*	Ametryn	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	836	83	0	5	924	250	1,174
			98o	5	1,168	51	0	0	1,219	0	1,219
			98n	No reports							
60-09-3	‡	4-Aminoazobenzene	88	1	0	0	537	0	537	0	537
			95	1	0	0	64	0	64	0	64
			98o	2	0	0	124	0	124	0	124
			98n	No reports							
92-67-1	‡	4-Aminobiphenyl	88	1	10	0	4	0	14	0	14
			95	1	0	0	2	0	2	0	2
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
61-82-5	*,‡	Amitrole	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	No reports							
			98n	2	1	0	0	0	1	0	1
7664-41-7	*	Ammonia	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2,930	157,664,129	9,212,903	23,959,031	5,585,753	196,421,816	1,551,715	197,973,531
			98o	2,705	147,704,529	7,136,859	25,288,008	3,307,207	183,436,603	1,990,966	185,427,569
			98n	264	7,564,659	359,178	502,580	1,341,465	9,767,882	17,649	9,785,531
62-53-3	*	Aniline	88	68	712,769	16,105	3,582,975	12,822	4,324,671	346,206	4,670,877
			95	66	200,570	8,943	1,221,381	4,193	1,435,087	21,546	1,456,633
			98o	69	216,502	19,549	1,076,445	252	1,312,748	25,340	1,338,088
			98n	13	721	0	85,466	0	86,187	1,479	87,666
90-04-0	‡	o-Anisidine	88	6	2,293	285	0	250	2,828	3	2,831
			95	7	1,031	74	0	0	1,105	3	1,108
			98o	7	1,373	39	0	0	1,412	2	1,414
			98n	No reports							
104-94-9		p-Anisidine	88	2	10	250	0	250	510	0	510
			95	2	5	0	0	0	5	0	5
			98o	1	45	0	0	0	45	0	45
			98n	No reports							

Note: On-site Releases are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Aluminum oxide (fibrous forms)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	25,100	15,627	0	9,991	21,448	2,986,600	2,315,726	5,374,492	7
		98o	7,716,545	254,780	0	0	0	1,147,081	1,800,089	10,918,495	3
		98n	0	12,691	0	0	46,453	524,087	15,713,418	16,296,649	0
*	Aluminum phosphide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Ametryn	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	108,500	12,502	256	121,258	1
		98o	25	0	0	0	120,083	85,000	592	205,700	0
		98n	No reports								
‡	4-Aminoazobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	3	0	64	67	0
		98o	0	0	0	0	0	74	124	198	0
		98n	No reports								
‡	4-Aminobiphenyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	91,000	0	2	91,002	0
		98o	0	0	0	0	98,000	810	0	98,810	0
		98n	No reports								
*‡	Amitrole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	22,788	0	1	22,789	0
*	Ammonia	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	191,242,857	12,098,036	44,141,891	72,879	305,738,363	18,623,826	196,506,159	768,424,011	1,096,459
		98o	347,738,402	10,366,466	103,213,467	111,893	266,286,067	17,095,486	185,565,166	930,376,947	525,742
		98n	7,934,375	1,883	0	97,656	5,093,864	91,284	9,730,879	22,949,941	61,159
*	Aniline	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	7,243,251	0	7,419,516	354,598	3,748,063	1,257,647	1,454,979	21,478,054	1,148
		98o	7,549,987	2	8,579,301	2,940,299	3,611,723	3,537,666	1,358,789	27,577,767	6,698
		98n	0	0	0	42,378	837,519	305,977	86,811	1,272,685	0
‡	o-Anisidine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	143	0	14,704	5,100	1,061	21,008	0
		98o	0	0	2,756	0	991	5,176	1,413	10,336	0
		98n	No reports								
	p-Anisidine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	9	9	18	0
		98o	0	0	0	0	61	0	45	106	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
120-12-7		Anthracene	88	139	199,823	4,382	0	10,905	215,110	204,665	419,775
			95	70	81,471	4,943	0	939	87,353	48,140	135,493
			98o	69	56,059	580	0	3,564	60,203	69,966	130,169
			98n	3	15	0	0	0	15	0	15
7440-36-0		Antimony	88	152	69,916	11,114	2,100	903,916	987,046	625,682	1,612,728
			95	135	34,418	6,592	0	18,786	59,796	122,672	182,468
			98o	113	6,299	14,466	0	30,292	51,057	322,128	373,185
			98n	13	83	47	18,994	1,226,450	1,245,574	91,613	1,337,187
—		Antimony compounds	88	272	166,290	31,178	9,200	1,935,018	2,141,686	2,281,080	4,422,766
			95	556	104,692	33,705	11,332	1,600,694	1,750,423	3,391,623	5,142,046
			98o	578	74,785	33,660	11,298	1,242,265	1,362,008	3,307,602	4,669,610
			98n	56	11,854	22,136	170,062	23,471,944	23,675,996	150,536	23,826,532
7440-38-2	‡	Arsenic	88	78	7,687	1,282	0	181,267	190,236	65,342	255,578
			95	93	129,252	363	0	27,351	156,966	80,802	237,768
			98o	50	16,672	533	0	5,065	22,270	112,462	134,732
			98n	39	40,471	1,340	269,393	76,526,637	76,837,841	304,021	77,141,862
—		Arsenic compounds	88	274	268,528	6,243	27,400	4,946,184	5,248,355	1,407,110	6,655,465
			95	304	83,495	4,825	55,000	1,723,347	1,866,667	1,556,059	3,422,726
			98o	342	106,413	6,052	169,000	7,126,553	7,408,018	670,192	8,078,210
			98n	201	199,163	159,587	760,075	520,840,853	521,959,678	1,336,267	523,295,945
1332-21-4	*,‡	Asbestos (friable)	88	146	48,496	10,699	0	2,111,880	2,171,075	12,135,707	14,306,782
			95	74	5,950	1	0	131,404	137,355	4,860,165	4,997,520
			98o	66	2,592	1	0	610,554	613,147	8,320,051	8,933,198
			98n	17	138	0	0	13,527,506	13,527,644	2,142,048	15,669,692
1912-24-9	*,‡	Atrazine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	20	22,689	1,656	0	637,036	661,381	101,631	763,012
			98o	23	30,971	2,756	336	554,456	588,519	15,780	604,299
			98n	5	12	0	0	73,687	73,699	3,690	77,389
7440-39-3		Barium	88	142	266,811	18,650	0	6,721,686	7,007,147	1,883,903	8,891,050
			95	76	96,117	6,279	0	227,523	329,919	492,999	822,918
			98o	69	54,419	7,807	0	285,353	347,579	638,554	986,133
			98n	70	224,161	141,463	25,000	9,593,162	9,983,786	2,156,311	12,140,097
—		Barium compounds	88	629	1,027,722	104,302	2,773	5,791,655	6,926,452	17,532,268	24,458,720
			95	580	235,169	106,467	0	1,606,522	1,948,158	6,285,522	8,233,680
			98o	684	675,163	1,031,379	29,000	6,902,956	8,638,498	5,857,687	14,496,185
			98n	421	2,197,288	989,273	1,327,250	165,086,097	169,599,908	36,692,329	206,292,237
22781-23-3	*	Bendiocarb	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	555	0	0	0	555	0	555
			98o	3	2	0	0	0	2	0	2
			98n	1	3	0	0	0	3	10	13

Note: On-site Releases are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Anthracene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	176,705	20,744	183,121	200,541	1,693,357	5,084	115,722	2,395,274	34,354
		98o	244,557	33,782	333,554	97,248	100,138	63,167	130,316	1,002,762	2
		98n	0	0	0	0	4,354	37	8	4,399	1
	Antimony	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,831,021	5,481,500	0	1,730	818,680	95,894	126,888	10,355,713	463
		98o	4,433,693	723,479	30,405	66,732	308,925	52,560	321,513	5,937,307	10
		98n	0	0	0	0	0	38,018	1,303,760	1,341,778	2
	Antimony compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,394,153	3,185,356	0	50,997	79,188	939,944	4,030,568	13,680,206	27,841
		98o	4,668,214	3,968,438	6,820	17,049	566,510	521,072	4,309,432	14,057,535	142,991
		98n	10,441	0	0	0	16,484	8	23,924,190	23,951,123	158
‡	Arsenic	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,349,279	157,586	7,700	496	13,030	45,969	65,627	1,639,687	749
		98o	3,403,468	205,974	0	0	64,685	3,058	223,391	3,900,576	2,534
		98n	542,954	1	0	0	60,800	52,222	76,953,343	77,609,320	5
	Arsenic compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,445,203	294,539	0	231	227,628	1,302,052	2,883,454	7,153,107	93,392
		98o	2,476,096	828,492	0	0	68,898	120,598	7,019,410	10,513,494	2,154,034
		98n	58,677	12	0	1	43,270	7,039	552,208,840	552,317,839	39
*,‡	Asbestos (friable)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	398,800	0	0	0	1,548,870	1,102	4,280,979	6,229,751	176,200
		98o	375,107	0	0	0	1,207,292	362	6,740,743	8,323,504	2,206,599
		98n	0	0	0	0	0	0	15,514,537	15,514,537	4
*,‡	Atrazine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	73	0	0	0	556,057	180,643	685,144	1,421,917	17,002
		98o	250	0	0	0	654,669	213,479	612,381	1,480,779	254
		98n	0	0	0	0	268,583	10	77,389	345,982	0
	Barium	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	14,719	448,944	0	102	43,195	37,552	695,339	1,239,851	4
		98o	159,389	413,535	601,788	418	399,046	120,846	1,010,948	2,705,970	651
		98n	4,992	547,318	0	0	431,304	289,982	11,865,389	13,138,985	9
	Barium compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	26,551,789	1,892,515	200	70,062	6,364,467	3,496,403	7,589,652	45,965,088	33,067
		98o	34,371,224	5,648,698	110,288	117,770	5,804,593	780,863	14,546,025	61,379,461	534
		98n	563,428	648,952	0	0	146,646	170,748	206,339,838	207,869,612	24,189
*	Bendiocarb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	560	0	0	0	0	0	560	1,120	0
		98o	0	0	0	0	0	580	0	580	0
		98n	0	0	0	0	0	0	30	30	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
1861-40-1	*	Benfluralin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	8	2,977	0	0	0	2,977	14,000	16,977
			98o	8	1,564	0	0	0	1,564	3	1,567
			98n	No reports							
17804-35-2	*	Benomyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	0	0	0	0	0
			98o	3	1	0	0	0	1	0	1
			98n	1	10	0	0	0	10	5	15
98-87-3		Benzal chloride	88	3	5,258	0	0	0	5,258	7,308	12,566
			95	4	1,112	0	0	0	1,112	0	1,112
			98o	3	398	0	0	0	398	0	398
			98n	3	20	0	0	0	20	0	20
55-21-0		Benzamide	88	1	500	250	250	0	1,000	750	1,750
			95	No reports							
			98o	No reports							
			98n	No reports							
71-43-2	*,‡	Benzene	88	483	32,341,184	46,732	825,035	126,728	33,339,679	396,880	33,736,559
			95	474	9,405,593	21,290	282,642	18,583	9,728,108	71,391	9,799,499
			98o	482	7,342,652	15,648	504,109	50,489	7,912,898	130,454	8,043,352
			98n	517	363,403	3,938	71,697	2,727	441,765	404,906	846,671
92-87-5	‡	Benzidine	88	No reports							
			95	No reports							
			98o	No reports							
			98n	4	38	0	0	0	38	0	38
98-07-7	‡	Benzoic trichloride	88	4	24,963	0	0	0	24,963	9,777	34,740
			95	7	6,496	0	0	0	6,496	250	6,746
			98o	6	2,253	0	0	0	2,253	330	2,583
			98n	2	2	0	0	0	2	110	112
98-88-4		Benzoyl chloride	88	22	33,014	0	130,000	250	163,264	2,399	165,663
			95	22	16,749	0	0	0	16,749	1,460	18,209
			98o	25	11,905	0	0	0	11,905	0	11,905
			98n	1	88	0	0	0	88	3,980	4,068
94-36-0	*	Benzoyl peroxide	88	50	6,294	0	5,350	36,050	47,694	23,954	71,648
			95	64	2,043	255	0	10,345	12,643	4,760	17,403
			98o	58	803	250	0	736	1,789	5,540	7,329
			98n	5	0	0	0	0	0	0	0
100-44-7		Benzyl chloride	88	51	43,329	640	0	500	44,469	9,687	54,156
			95	48	19,664	40	0	247	19,951	3,870	23,821
			98o	45	26,872	347	150	261	27,630	4,506	32,136
			98n	3	41	250	0	0	291	1	292

Note: On-site Releases are 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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Benfluralin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,205	0	0	0	6,200	175	16,910	27,490	4
		98o	79,000	0	0	0	31	897	1,347	81,275	1
		98n	No reports								
*	Benomyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	482,000	122,000	0	604,000	0
		98o	0	0	45,000	65,600	20,000	20,375	1	150,976	0
		98n	0	0	0	0	95,374	0	20	95,394	0
	Benzal chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	260,000	2,800	0	1,105	263,905	0
		98o	0	0	0	120,000	84,000	200	400	204,600	0
		98n	0	0	0	0	235,247	0	20	235,267	0
	Benzamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	No reports								
*,‡	Benzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	47,987,022	420,034	20,222,877	1,579,955	54,065,446	1,974,430	9,791,019	136,040,783	65,959
		98o	36,113,652	638,832	16,882,843	1,086,690	47,608,850	3,811,272	8,019,782	114,161,921	51,762
		98n	911,783	502,103	569,513	8,720,615	3,949,506	337,845	917,936	15,909,301	35,014
‡	Benzidine	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	101,123	58	34	101,215	1
‡	Benzoic trichloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	3,001	150,000	32	6,242	159,275	0
		98o	0	0	0	20,000	160,000	34,870	2,557	217,427	0
		98n	0	0	0	0	15,768	0	112	15,880	0
	Benzoyl chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	80	1,676,545	615,127	18,213	2,309,965	0
		98o	0	0	0	0	2,011,461	498,362	11,903	2,521,726	0
		98n	0	0	0	0	570,508	0	4,068	574,576	0
*	Benzoyl peroxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,600	10,800	863	1,520	57,214	42,461	16,769	134,227	1
		98o	10,364	0	0	1,191	81,890	48,890	7,429	149,764	0
		98n	0	0	0	0	12,360	18	0	12,378	0
	Benzyl chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,000	0	25,481	430,300	256,947	10,947	21,501	746,176	81
		98o	4,800	0	17,000	420,878	250,883	76,610	31,342	801,513	1
		98n	0	0	0	0	483,947	0	66	484,013	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
7440-41-7	‡	Beryllium	88	12	2,763	74	0	37,000	39,837	3,160	42,997
			95	9	832	26	0	21,250	22,108	7,340	29,448
			98o	13	792	26	0	57,750	58,568	20,404	78,972
			98n	5	0	0	0	0	0	0	0
—	‡	Beryllium compounds	88	5	862	17	0	12,000	12,879	8,261	21,140
			95	7	360	2	0	23,000	23,362	2,391	25,753
			98o	8	383	6	0	0	389	2,804	3,193
			98n	54	20,999	1,859	0	733,229	756,087	91,126	847,213
82657-04-3	*	Bifenthrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	10	0	0	5	15	0	15
			98o	5	760	5	0	0	765	0	765
			98n	1	0	0	0	0	0	19	19
92-52-4	*	Biphenyl	88	181	1,211,292	88,197	82,760	222,297	1,604,546	227,492	1,832,038
			95	135	744,535	6,242	30,337	71,864	852,978	38,088	891,066
			98o	122	537,849	2,768	29,574	1,159	571,350	49,880	621,230
			98n	10	36	0	0	0	36	305	341
111-91-1		Bis(2-chloroethoxy) methane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	12,510	0	250	0	12,760	0	12,760
			98o	1	1,434	0	930	1,024	3,388	0	3,388
			98n	1	0	0	0	0	0	0	0
111-44-4	*	Bis(2-chloroethyl) ether	88	8	4,922	1,351	0	0	6,273	0	6,273
			95	11	564	3	0	0	567	0	567
			98o	11	850	4	0	0	854	8	862
			98n	3	0	0	0	0	0	0	0
542-88-1	‡	Bis(chloromethyl) ether	88	2	1	0	0	0	1	0	1
			95	2	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
108-60-1		Bis(2-chloro-1-methylethyl) ether	88	2	7,959	30,000	0	0	37,959	0	37,959
			95	2	6,130	0	0	0	6,130	0	6,130
			98o	2	3,360	46	0	2	3,408	0	3,408
			98n	No reports							
56-35-9	*	Bis(tributyltin) oxide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	32	0	0	32	13,873	13,905
			98o	3	0	6	0	2	8	3,372	3,380
			98n	No reports							
10294-34-5		Boron trichloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	5	0	0	0	5	0	5
			98o	5	750	0	0	0	750	0	750
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	Beryllium	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	39,689	11,363	0	0	780	423	27,079	79,334	0
		98o	160,399	80,546	0	0	10	8	63,281	304,244	1
		98n	0	0	0	0	0	0	0	0	0
‡	Beryllium compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	7	23,880	0	0	0	1,011	24,661	49,559	0
		98o	0	26,450	0	0	0	1,090	1,833	29,373	1
		98n	9,700	0	0	0	194	0	849,871	859,765	308
*	Bifenthrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	10	10	20	0
		98o	0	0	0	0	0	402	230	632	0
		98n	0	0	0	0	11,275	0	19	11,294	0
*	Biphenyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	268,053	156,081	1,088,381	346,055	963,993	600,999	904,287	4,327,849	11,639
		98o	306,564	260,334	1,209,699	131,946	485,153	761,284	626,667	3,781,647	3,939
		98n	0	0	0	12,840	279,525	263	89	292,717	0
	Bis(2-chloroethoxy) methane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	12,796	12,796	0
		98o	0	0	0	0	0	15	3,388	3,403	0
		98n	0	0	0	0	0	0	0	0	0
*	Bis(2-chloroethyl) ether	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	146,118	302,700	203,775	0	88,893	570	742,056	0
		98o	0	159,909	426,404	9,541	540,375	349,619	859	1,486,707	0
		98n	0	0	0	0	10,234	0	0	10,234	0
‡	Bis(chloromethyl) ether	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	13,000	0	0	13,000	0
		98o	0	0	0	0	36,500	0	0	36,500	0
		98n	No reports								
	Bis(2-chloro-1-methylethyl) ether	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,200,000	0	8,540,000	0	10,840,000	0	6,100	24,586,100	1
		98o	8,900,000	0	6,000,000	0	1,410,000	0	3,500	16,313,500	0
		98n	No reports								
*	Bis(tributyltin) oxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	39,840	0	0	336	0	13,903	54,079	0
		98o	0	58,478	0	0	336	0	3,380	62,194	0
		98n	No reports								
	Boron trichloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,000	0	0	0	200	0	1	5,201	0
		98o	6,700	0	0	0	53,000	0	335	60,035	2
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
7637-07-2		Boron trifluoride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	23	18,569	0	0	0	18,569	929	19,498
			98o	23	38,142	5	0	0	38,147	0	38,147
			98n	No reports							
314-40-9	*	Bromacil	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	500	27,897	0	0	28,397	0	28,397
			98o	1	10	0	0	0	10	0	10
			98n	1	25	0	0	0	25	0	25
7726-95-6	*	Bromine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	44	112,466	880	7	10	113,363	250	113,613
			98o	52	104,083	7,110	7	7,705	118,905	0	118,905
			98n	4	84	0	0	0	84	2	86
35691-65-7	*	1-Bromo-1-(bromo-methyl)-1,3-propane-dicarbonitrile	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
353-59-3		Bromochlorodifluoro-methane (Halon 1211)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	4,811	0	0	0	4,811	0	4,811
			98o	4	3,673	0	0	0	3,673	0	3,673
			98n	No reports							
75-25-2		Bromoform	88	2	0	8,600	0	0	8,600	0	8,600
			95	No reports							
			98o	No reports							
			98n	3	3	0	0	0	3	0	3
74-83-9	*	Bromomethane	88	36	2,784,795	0	1,546	0	2,786,341	0	2,786,341
			95	42	2,601,734	14	3,817	0	2,605,565	0	2,605,565
			98o	46	1,559,127	30	230	11	1,559,398	0	1,559,398
			98n	2	5	0	0	0	5	0	5
75-63-8		Bromotrifluoromethane (Halon 1301)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	8	33,632	0	0	0	33,632	0	33,632
			98o	6	26,842	0	0	0	26,842	0	26,842
			98n	1	0	0	0	0	0	0	0
1689-84-5	*	Bromoxynil	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	6	0	0	0	6	990	996
			98o	2	506	0	0	0	506	1,483	1,989
			98n	No reports							
1689-99-2	*	Bromoxynil octanoate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	500	0	0	0	500	13,569	14,069
			98o	5	1,566	0	0	0	1,566	14,420	15,986
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Boron trifluoride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	425,701	1,027	17,919	444,647	5
		98o	0	0	0	35	462,635	15,255	35,396	513,321	449
		98n	No reports								
*	Bromacil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5	0	0	0	30,687	27,829	27,947	86,468	0
		98o	0	0	0	0	0	0	1,192	1,192	0
		98n	0	0	0	0	32,434	0	25	32,459	0
*	Bromine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,960,000	740	0	0	14,808,669	283,435	112,386	20,165,230	29
		98o	5,670,000	230	0	0	18,611,926	20,778	121,930	24,424,864	195
		98n	0	0	0	162,356	12,791	0	86	175,233	1
*	1-Bromo-1-(bromo-methyl)-1,3-propane-dicarbonitrile	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	10,957	0	10,957	0
		98o	0	0	0	0	12,000	9,824	0	21,824	0
		98n	No reports								
	Bromochlorodifluoro-methane (Halon 1211)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	282,800	0	0	0	0	0	4,832	287,632	2
		98o	501,947	0	0	0	0	0	3,673	505,620	175
		98n	No reports								
	Bromoform	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	10,594	2	3	10,599	1
*	Bromomethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	165,182	0	101,000	380	4,876,073	0	2,578,001	7,720,636	5
		98o	12,780	0	222,300	280	488,585	0	1,561,274	2,285,219	14,072
		98n	0	0	0	0	3,007	30	1	3,038	1
	Bromotrifluoromethane (Halon 1301)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	200,661	0	0	0	0	0	36,155	236,816	806
		98o	583,803	0	0	0	0	0	26,592	610,395	6,468
		98n	0	0	0	0	0	0	0	0	0
*	Bromoxynil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	996	996	0
		98o	0	0	0	0	0	0	1,244	1,244	0
		98n	No reports								
*	Bromoxynil octanoate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	173	13,689	13,862	0
		98o	0	0	0	0	0	40	21,215	21,255	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
357-57-3		Brucine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
106-99-0	‡	1,3-Butadiene	88	157	7,004,622	522,504	1,500	7,817	7,536,443	185,398	7,721,841
			95	185	3,048,679	5,393	0	277	3,054,349	4,892	3,059,241
			98o	187	2,738,079	8,834	732	7,998	2,755,643	2,067	2,757,710
			98n	6	1,035	0	0	0	1,035	500	1,535
141-32-2		Butyl acrylate	88	166	411,862	3,528	0	602	415,992	18,766	434,758
			95	164	228,768	2,919	0	559	232,246	73,301	305,547
			98o	157	205,717	7,790	0	546	214,053	24,983	239,036
			98n	13	6,009	0	0	0	6,009	22,581	28,590
71-36-3		n-Butyl alcohol	88	1,109	37,715,221	128,130	3,006,660	175,819	41,025,830	924,519	41,950,349
			95	1,122	26,074,428	115,353	2,263,357	4,631	28,457,769	286,766	28,744,535
			98o	1,015	21,389,243	94,529	3,169,538	5,209	24,658,519	494,854	25,153,373
			98n	179	27,549	5	0	1,279	28,833	62,002	90,835
78-92-2	*	sec-Butyl alcohol	88	92	1,097,163	122,291	0	2,600	1,222,054	21,351	1,243,405
			95	113	898,282	6,782	136,172	2,805	1,044,041	18,376	1,062,417
			98o	115	959,272	3,950	169,243	7	1,132,472	16,535	1,149,007
			98n	36	2,526	0	0	13,000	15,526	23,670	39,196
75-65-0	*	tert-Butyl alcohol	88	54	1,574,137	14,989	674,798	818	2,264,742	56,502	2,321,244
			95	91	657,818	20,183	1,082,071	751	1,760,823	30,783	1,791,606
			98o	83	420,574	30,330	861,956	7,352	1,320,212	178,217	1,498,429
			98n	27	25,805	21	0	1,089	26,915	27,728	54,643
106-88-7		1,2-Butylene oxide	88	18	99,931	3,500	0	250	103,681	898	104,579
			95	15	11,083	1	0	0	11,084	5	11,089
			98o	13	10,781	8,401	0	0	19,182	0	19,182
			98n	1	1	0	0	0	1	0	1
123-72-8	*	Butyraldehyde	88	26	2,218,692	3,812	1,997	31	2,224,532	117,741	2,342,273
			95	28	291,440	821	149,783	10	442,054	41	442,095
			98o	32	289,796	618	29,000	1,478	320,892	1,530	322,422
			98n	1	122	0	0	0	122	3	125
7440-43-9	‡	Cadmium	88	90	22,430	2,598	0	94,602	119,630	155,313	274,943
			95	47	11,941	458	0	19,856	32,255	90,264	122,519
			98o	49	2,102	542	0	158,602	161,246	100,907	262,153
			98n	20	1,318	0	166,607	2,282,416	2,450,341	60,410	2,510,751
—	‡	Cadmium compounds	88	116	118,728	1,549	2,409	294,877	417,563	1,066,648	1,484,211
			95	118	55,060	880	109	797,776	853,825	1,739,506	2,593,331
			98o	93	69,390	873	130,033	851,468	1,051,764	1,309,414	2,361,178
			98n	40	16,676	1,218	96,875	7,920,029	8,034,798	291,937	8,326,735

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Brucine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	1
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
‡	1,3-Butadiene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,513,939	13,652,736	31,663,920	34,519	58,474,775	96,310	2,877,482	112,313,681	200,548
		98o	5,428,029	15,574,853	15,171,040	260,947	52,970,163	3,918,622	2,721,067	96,044,721	776,816
		98n	0	0	0	218,662	130,866	9,120	1,035	359,683	1
	Butyl acrylate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	173,995	207,325	4,059,201	1,143,139	4,173,410	228,382	299,618	10,285,070	5,271
		98o	270,060	950	3,912,069	932,014	11,725,663	90,747	223,544	17,155,047	6,129
		98n	0	0	0	91,548	178,664	18,241	7,554	296,007	1
	n-Butyl alcohol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	8,438,990	3,351,225	24,665,663	8,571,718	37,978,683	3,346,704	28,813,584	115,166,567	52,340
		98o	8,305,734	2,561,478	29,184,143	8,317,124	42,767,511	5,215,984	25,387,873	121,739,847	58,887
		98n	1,680,333	8,376	32,154	11,311,419	1,740,894	997,335	34,580	15,805,091	22
*	sec-Butyl alcohol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	748,440	24,774	13,041,102	6,275,927	2,249,797	99,596	1,079,508	23,519,144	2,810
		98o	171,903	9,319	10,701,253	1,012,818	1,532,676	204,123	1,159,021	14,791,113	8
		98n	220	0	0	1,813,002	49	267,862	15,367	2,096,500	1
*	tert-Butyl alcohol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	466,023	2,256	64,310,733	27,469,833	2,447,778	1,794,551	2,230,055	98,721,229	2,078
		98o	662,776	231,209	37,637,302	7,506,442	2,331,750	1,841,732	1,494,052	51,705,263	61
		98n	31,188	200	0	5,408,737	129,572	42,110	24,190	5,635,997	16
	1,2-Butylene oxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	990	0	330,194	329,270	93	10,804	671,351	0
		98o	1	0	0	275,443	498,660	307	19,015	793,426	0
		98n	0	0	0	50	0	35	1	86	0
*	Butyraldehyde	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	1,300	2,545,861	22,000	1,982,004	169,714	440,778	5,161,657	10
		98o	0	31,000	2,136,982	20,760	1,928,392	651,126	317,546	5,085,806	5,207
		98n	0	0	0	19,950	392	409	122	20,873	0
‡	Cadmium	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,471,697	538,690	29,191	633	91,725	53,384	74,015	2,259,335	3,918
		98o	1,101,823	316,539	0	0	27,779	52,294	276,597	1,775,032	9,411
		98n	0	8,110	0	0	914,735	21,317	1,538,429	2,482,591	1
‡	Cadmium compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	8,221,108	1,482,852	0	1,082	86,561	141,412	2,468,201	12,401,216	11,698
		98o	2,561,776	643,605	0	5,236	24,555	47,350	3,198,248	6,480,770	59,620
		98n	4,137	71,989	0	0	3,000	4,771	8,333,611	8,417,508	93

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
156-62-7	*	Calcium cyanamide	88	3	12,600	0	0	66,000	78,600	0	78,600
			95	5	10	0	0	0	10	0	10
			98o	4	134	0	0	0	134	0	134
			98n	No reports							
133-06-2	*	Captan	88	18	14,869	750	5,100	1,000	21,719	12,434	34,153
			95	15	7,280	5	0	5	7,290	3,868	11,158
			98o	11	9,211	5	0	0	9,216	1,761	10,977
			98n	4	2	0	0	0	2	138	140
63-25-2	*	Carbaryl	88	23	7,923	877	0	500	9,300	6,198	15,498
			95	21	7,824	10	0	1,060	8,894	26,861	35,755
			98o	22	7,824	10	0	100	7,934	9,156	17,090
			98n	3	7	0	0	0	7	132	139
1563-66-2	*	Carbofuran	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	7	4,187	2	0	250	4,439	250	4,689
			98o	4	2,921	1	0	0	2,922	0	2,922
			98n	3	16	0	0	0	16	5,181	5,197
75-15-0	*	Carbon disulfide	88	88	124,109,904	39,501	13,400	43,436	124,206,241	58,473	124,264,714
			95	91	84,120,292	39,864	3,985	265	84,164,406	2,949	84,167,355
			98o	93	43,442,463	4,687	16,599	1,651	43,465,400	5,801	43,471,201
			98n	7	924	1	0	0	925	24	949
56-23-5	*,‡	Carbon tetrachloride	88	95	3,795,248	15,627	98,050	14,759	3,923,684	49,703	3,973,387
			95	71	420,756	717	53,966	0	475,439	7,735	483,174
			98o	54	275,192	2,586	23,163	1,679	302,620	9,956	312,576
			98n	17	1,061	250	5	0	1,316	17,336	18,652
463-58-1		Carbonyl sulfide	88	38	25,954,103	0	0	0	25,954,103	0	25,954,103
			95	63	17,933,774	0	0	0	17,933,774	0	17,933,774
			98o	80	19,356,525	0	0	0	19,356,525	0	19,356,525
			98n	1	0	0	0	0	0	0	0
5234-68-4	*	Carboxin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	8	0	0	0	8	428	436
			98o	3	5	0	0	0	5	17	22
			98n	No reports							
120-80-9		Catechol	88	113	3,789	320,546	0	84,332	408,667	89,474	498,141
			95	127	3,457	24,747	0	3,729	31,933	563	32,496
			98o	137	5,095	23,865	0	1,021	29,981	907	30,888
			98n	4	3	0	0	0	3	24	27
133-90-4	*	Chloramben	88	1	1,418	250	0	0	1,668	1,159	2,827
			95	No reports							
			98o	No reports							
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Calcium cyanamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	6	6	0
		98o	0	0	0	0	0	0	130	130	0
		98n	No reports								
*	Captan	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,070	0	0	0	9,834	1,072	7,479	23,455	2
		98o	2,697	0	0	0	9,000	3,944	11,297	26,938	1
		98n	0	0	0	0	68,416	0	140	68,556	0
*	Carbaryl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	36,618	0	0	0	467,593	7,885	32,697	544,793	1
		98o	80,456	0	79,931	0	365,862	24,121	14,478	564,848	101
		98n	0	0	0	0	77,947	0	139	78,086	0
*	Carbofuran	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	1	3	47,158	5,422	52,584	1
		98o	0	0	0	0	3	35,601	2,922	38,526	275
		98n	0	0	0	0	243,290	0	15	243,305	1
*	Carbon disulfide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	20,874,450	18	5,775,132	368,509	16,592,770	361,938	84,767,916	128,740,733	
		98o	30,024,800	1,985	10,070,374	216,999	30,170,826	239,776	43,255,494	113,980,254	24,335
		98n	0	0	0	25,038	779,188	13,888	849	818,963	0
*,‡	Carbon tetrachloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,677,422	365,067	317,149	50,068	52,784,536	733,254	463,276	56,390,772	34,525
		98o	2,038,866	2,075,495	808,627	43,116	14,046,412	462,232	300,036	19,774,784	4,829
		98n	4,399	0	468,751	396,805	985,513	2,582,828	4,842	4,443,138	1
	Carbonyl sulfide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	1,508,252	0	14,242,854	16,000	18,778,129	34,545,235	1
		98o	207,700	2,800	2,403,251	0	17,446,371	180	19,106,792	39,167,094	5
		98n	0	0	0	0	0	0	0	0	0
*	Carboxin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,817	0	0	0	0	402	436	3,655	0
		98o	1,110	0	0	0	0	218	22	1,350	0
		98n	No reports								
	Catechol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	7,329,290	94,995	1,481,057	54,221	68,220	9,027,783	2,774
		98o	0	0	9,747,608	105,259	3,936,863	50,634	34,743	13,875,107	1
		98n	0	0	3,384	0	9,997	0	27	13,408	0
*	Chloramben	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
57-74-9	*,‡	Chlordane	88	2	2,698	4	4,262	0	6,964	0	6,964
			95	1	823	22	0	0	845	0	845
			98o	No reports							
			98n	7	45	0	20,106	25,548	45,699	22	45,721
115-28-6	‡	Chlorendic acid	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	6	0	0	0	6	0	6
			98o	2	30	0	0	0	30	0	30
			98n	No reports							
90982-32-4	*	Chlorimuron ethyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	1	0	0	0	1	0	1
			98o	2	3	0	0	0	3	0	3
			98n	No reports							
7782-50-5	*	Chlorine	88	1,800	133,085,601	6,622,187	107,624	439,547	140,254,959	1,003,531	141,258,490
			95	1,377	65,769,700	413,446	74,124	13,095	66,270,365	40,771	66,311,136
			98o	1,183	59,750,572	232,817	61,637	56,122	60,101,148	26,435	60,127,583
			98n	150	86,002	195,579	27,639	274,480	583,700	3,000	586,700
10049-04-4	*	Chlorine dioxide	88	122	12,251,050	2,350	0	41,000	12,294,400	41,750	12,336,150
			95	127	1,304,926	5	0	0	1,304,931	0	1,304,931
			98o	117	1,020,827	71	0	0	1,020,898	0	1,020,898
			98n	4	13,000	510	0	0	13,510	0	13,510
79-11-8	*	Chloroacetic acid	88	37	26,819	850	10	0	27,679	2,506	30,185
			95	31	6,474	16	0	0	6,490	600	7,090
			98o	25	3,585	16	0	0	3,601	500	4,101
			98n	1	0	0	0	0	0	0	0
4080-31-3	*	1-(3-Chloroallyl)-3,5,7-triaza-1-azoniaada-mantane chloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	7	93	10	0	521	624	2,514	3,138
			98o	16	437	11	0	653	1,101	5,138	6,239
			98n	No reports							
106-47-8	*,‡	p-Chloroaniline	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	267	827	0	0	1,094	11	1,105
			98o	4	6,181	12	0	0	6,193	0	6,193
			98n	1	20	0	0	0	20	0	20
108-90-7	*	Chlorobenzene	88	66	4,375,887	98,354	84,457	4,127	4,562,825	117,624	4,680,449
			95	62	1,132,073	1,850	27,405	5	1,161,333	92,582	1,253,915
			98o	74	774,104	662	184,106	16	958,888	19,488	978,376
			98n	19	1,137	250	250	0	1,637	5,881	7,518
510-15-6	*	Chlorobenzilate	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	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.*
Off-site Releases *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
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**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*,‡	Chlordane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	5,150	95	845	6,090	0
		98o	No reports								
		98n	0	0	0	25,778	187,264	35	45,721	258,798	1
‡	Chlorendic acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	488	6	494	0
		98o	0	0	0	0	0	567	30	597	0
		98n	No reports								
*	Chlorimuron ethyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	5,838	1	5,839	0
		98o	0	0	0	0	0	33,861	3	33,864	0
		98n	No reports								
*	Chlorine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	84,997,609	1,791,968	499	1,585	220,645,991	1,179,749	66,292,262	374,909,663	13,373
		98o	71,150,772	64,394	0	50,291	249,828,594	945,830	60,158,549	382,198,430	9,243
		98n	760,238	0	0	0	4,501,103	26,089	443,435	5,730,865	629
*	Chlorine dioxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,446,060	0	0	0	40,533,897	0	1,326,611	44,306,568	3,933
		98o	2,858,988	0	0	0	48,655,136	6,000	1,074,116	52,594,240	862
		98n	0	0	0	0	0	0	13,510	13,510	0
*	Chloroacetic acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	25,013	0	0	0	1,342,493	2,726	6,607	1,376,839	0
		98o	85,721	0	0	0	1,209,175	568	3,250	1,298,714	0
		98n	0	0	0	0	10,132	0	0	10,132	0
*	1-(3-Chloroallyl)-3,5,7-triaza-1-azoniaada-mantane chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,700	0	0	0	720	4,700	3,570	11,690	0
		98o	78,111	0	0	0	2,310	12,150	6,753	99,324	0
		98n	No reports								
*,‡	p-Chloroaniline	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	540	0	120,301	940	121,781	0
		98o	0	0	46,000	520	0	6,424	16,097	69,041	0
		98n	0	0	0	0	25,861	0	20	25,881	0
*	Chlorobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	9,123,869	1,016,982	2,099,757	1,366,145	11,231,684	1,503,368	1,242,678	27,584,483	20,613
		98o	1,107,325	976,071	5,510,105	3,476,264	10,333,365	4,804,121	983,533	27,190,784	831
		98n	260,432	0	20,907	89,425	1,819,899	1,460	2,047	2,194,170	3
*	Chlorobenzilate	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
75-68-3		1-Chloro-1,1-difluoro-ethane (HCFC-142b)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	25	6,954,443	771	6	0	6,955,220	21,600	6,976,820
			98o	28	5,529,844	40	0	0	5,529,884	4,979	5,534,863
			98n	3	11	0	0	0	11	4,833	4,844
75-45-6	*	Chlorodifluoromethane (HCFC-22)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	242	12,558,571	2,279	22	1	12,560,873	55,084	12,615,957
			98o	237	8,885,070	3,652	0	1	8,888,723	50,648	8,939,371
			98n	1	64,602	0	0	0	64,602	0	64,602
75-00-3		Chloroethane	88	50	4,907,292	27,448	1,510	1	4,936,251	32,260	4,968,511
			95	55	2,890,354	2,320	0	116	2,892,790	4,400	2,897,190
			98o	57	2,171,417	1,024	67	50	2,172,558	3,900	2,176,458
			98n	2	16	0	0	0	16	3	19
67-66-3	*,‡	Chloroform	88	169	25,988,609	1,114,965	36,000	68,647	27,208,221	143,124	27,351,345
			95	161	10,275,919	330,352	33,276	4,297	10,643,844	6,636	10,650,480
			98o	139	6,389,594	135,414	44,102	12,335	6,581,445	42,857	6,624,302
			98n	21	1,909	5	5	0	1,919	11,313	13,232
74-87-3	*	Chloromethane	88	81	11,567,647	115,985	165,250	0	11,848,882	59,140	11,908,022
			95	111	4,394,298	57,430	50,198	35	4,501,961	1,557	4,503,518
			98o	100	2,638,494	1,742	323,201	57	2,963,494	952	2,964,446
			98n	9	2,812	0	0	0	2,812	7	2,819
107-30-2	‡	Chloromethyl methyl ether	88	4	3,033	0	0	0	3,033	0	3,033
			95	3	2,865	10	0	0	2,875	70	2,945
			98o	2	1,000	0	0	0	1,000	0	1,000
			98n	1	0	0	0	0	0	0	0
563-47-3	‡	3-Chloro-2-methyl-1-propene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	19,859	0	0	0	19,859	0	19,859
			98o	3	7,353	0	0	0	7,353	0	7,353
			98n	No reports							
—	‡	Chlorophenols	88	9	2,573	272	71,554	0	74,399	2	74,401
			95	9	4,997	30	105,687	0	110,714	940	111,654
			98o	6	4,864	36	73,548	0	78,448	8,000	86,448
			98n	5	16	0	0	0	16	4,175	4,191
76-06-2	*	Chloropicrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	15	11,229	0	0	0	11,229	36	11,265
			98o	16	7,176	0	0	0	7,176	27,000	34,176
			98n	1	4	0	0	0	4	0	4
126-99-8		Chloroprene	88	13	1,948,008	287	68,792	0	2,017,087	0	2,017,087
			95	15	983,932	0	60,000	5,104	1,049,036	7,102	1,056,138
			98o	11	977,626	0	100,000	0	1,077,626	0	1,077,626
			98n	2	528	0	0	0	528	1	529

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	1-Chloro-1,1-difluoro-ethane (HCFC-142b)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	52,560	0	0	320	304,070	26,330	6,933,797	7,317,077	459
		98o	67	0	0	5,400	534,586	165,589	5,537,482	6,243,124	103
		98n	0	0	0	0	136,697	0	625	137,322	0
*	Chlorodifluoromethane (HCFC-22)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,374,126	242,386	0	27,002	401,771	258,992	12,447,343	15,751,620	196,364
		98o	698,765	168,042	0	237	505,214	291,198	9,035,247	10,698,703	125,565
		98n	0	0	0	0	0	0	63,090	63,090	1,512
	Chloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,321,094	155,726	13,500,359	45,855	28,074,197	492,722	2,896,879	47,486,832	8,570
		98o	5,135,802	175,104	11,263,574	17,934	35,309,891	332,191	2,179,178	54,413,674	135
		98n	0	0	0	0	48,025	14	15	48,054	1
*,‡	Chloroform	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,138,816	175,713	17,199,219	103,558	17,351,138	2,061,635	10,608,515	52,638,594	27,208
		98o	6,749,489	1,871,565	5,133,726	164,858	16,308,023	1,721,899	6,615,517	38,565,077	21,625
		98n	35,795	0	1,650	495,666	1,473,283	2,410,324	3,296	4,420,014	6
*	Chloromethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,803,788	650	4,517,896	4,505	14,364,276	240,406	4,521,719	26,453,240	7,918
		98o	3,447,064	23,740	4,341,426	17,950	8,368,819	292,447	2,918,607	19,410,053	12,983
		98n	0	0	0	0	342,535	1,997,213	2,861	2,342,609	1
‡	Chloromethyl methyl ether	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	15,900	0	2,909	18,809	0
		98o	0	0	0	0	280	0	1,000	1,280	0
		98n	0	0	0	0	0	0	0	0	0
‡	3-Chloro-2-methyl-1-propene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	544,134	14,819	19,859	578,812	10
		98o	0	0	0	0	637,973	344	7,353	645,670	0
		98n	No reports								
‡	Chlorophenols	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,919,075	0	0	6,400	237,484	26,212	109,847	3,299,018	1,776
		98o	2,737,000	0	0	0	297,377	7,807	85,720	3,127,904	725
		98n	0	0	1,009	62,967	281,511	9,645	3,940	359,072	0
*	Chloropicrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	9,981	0	0	54	441	34,387	10,434	55,297	0
		98o	2,250	0	0	0	1,110	14,705	33,890	51,955	0
		98n	0	0	0	0	0	0	4	4	0
	Chloroprene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	480,972	466,280	9,105	4,233,572	138,421	1,051,019	6,379,369	518
		98o	0	306,514	1,200,000	66,206	8,827,286	209,184	1,077,630	11,686,820	10
		98n	0	0	0	13,385	102,414	173	299	116,271	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
63938-10-3		Chlorotetrafluoroethane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
354-25-6		1-Chloro-1,1,2,2-tetra-fluoroethane (HCFC-124a)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	504,553	0	0	0	504,553	0	504,553
			98o	3	23,336	0	0	0	23,336	0	23,336
			98n	No reports							
2837-89-0		2-Chloro-1,1,1,2-tetra-fluoroethane (HCFC-124)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	11	752,215	1,255	0	0	753,470	0	753,470
			98o	23	750,474	5	0	0	750,479	0	750,479
			98n	1	852	0	0	0	852	0	852
1897-45-6	*	Chlorothalonil	88	10	28,476	250	0	0	28,726	396,274	425,000
			95	25	7,440	35	0	750	8,225	97,420	105,645
			98o	25	9,236	35	0	0	9,271	301,801	311,072
			98n	1	0	0	5	32,000	32,005	5	32,010
75-88-7		2-Chloro-1,1,1-tri-fluroethane (HCFC-133a)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	35,523	0	0	0	35,523	0	35,523
			98o	4	162,775	52	0	0	162,827	0	162,827
			98n	No reports							
75-72-9		Chlorotrifluoromethane (CFC-13)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	250	0	0	0	250	0	250
			98o	1	14,700	5	0	0	14,705	0	14,705
			98n	No reports							
5598-13-0	*	Chlorpyrifos methyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	510	0	0	6,000	6,510	0	6,510
			98o	5	500	0	0	0	500	0	500
			98n	No reports							
64902-72-3	*	Chlorsulfuron	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	1	0	0	0	1	0	1
			98o	1	1	0	0	0	1	0	1
			98n	No reports							
7440-47-3		Chromium	88	1,255	566,459	75,442	2,249	9,282,766	9,926,916	11,710,612	21,637,528
			95	1,962	420,975	17,279	33	1,106,303	1,544,590	5,656,611	7,201,201
			98o	1,892	476,661	13,096	9	546,965	1,036,731	11,988,859	13,025,590
			98n	67	7,755	25,225	260,448	14,883,133	15,176,561	1,915,109	17,091,670
—		Chromium compounds	88	1,214	764,851	326,027	52,653	30,938,106	32,081,637	14,898,699	46,980,336
			95	1,458	649,335	137,834	60,747	22,181,150	23,029,066	19,985,397	43,014,463
			98o	1,467	351,838	112,325	874,795	30,269,748	31,608,706	14,024,492	45,633,198
			98n	314	302,049	114,308	675,155	58,055,829	59,147,341	5,461,238	64,608,579

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Chlorotetrafluoroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n		0	0	0	29,571	0	0	29,571	0
	1-Chloro-1,1,2,2-tetra-fluoroethane (HCFC-124a)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,725	0	504,011	505,736	0
		98o	0	0	0	0	165,890	0	23,136	189,026	0
		98n	No reports								
	2-Chloro-1,1,1,2-tetra-fluoroethane (HCFC-124)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	239,200	0	0	193,194	35,816	753,296	1,221,506	401
		98o	44,530	282,345	0	0	501,437	0	749,963	1,578,275	32
		98n	0	0	0	0	0	0	852	852	0
*	Chlorothalonil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,339	0	0	2,294	24,716	139,966	102,279	274,594	5
		98o	4,726	0	0	0	65,406	195,241	311,120	576,493	419
		98n	0	0	0	0	0	0	32,000	32,000	0
	2-Chloro-1,1,1-tri-fluroethane (HCFC-133a)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	35,608	35,608	0
		98o	0	0	0	0	33,000	0	162,925	195,925	4
		98n	No reports								
	Chlorotrifluoromethane (CFC-13)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	30	30	0
		98o	0	0	0	0	0	0	14,705	14,705	0
		98n	No reports								
*	Chlorpyrifos methyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	400	0	0	0	0	6,095	6,402	12,897	0
		98o	2,000	0	0	0	0	4,990	285	7,275	0
		98n	No reports								
*	Chlorsulfuron	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	3,444	1	3,445	0
		98o	0	0	0	0	0	10,508	1	10,509	0
		98n	No reports								
	Chromium	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	29,727,918	102,392,594	9,781,278	51,738	404,205	1,659,401	8,055,909	152,073,043	41,527
		98o	86,824,937	84,606,063	86,318	16,249	844,605	1,159,177	14,861,891	188,399,240	44,774
		98n	1	197,601	0	0	135,406	258,068	16,546,875	17,137,951	10
	Chromium compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	36,654,183	42,918,151	44,280	67,119	94,214,040	3,530,577	38,880,906	216,309,256	1,658,998
		98o	37,971,016	33,139,466	63,846	33,652	9,408,815	2,620,215	44,594,582	127,831,592	175,629
		98n	55,057	868,937	0	2	476,627	129,755	64,355,367	65,885,745	2,857

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
6459-94-5	‡	C.I. Acid Red 114	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
569-64-2	*	C.I. Basic Green 4	88	6	750	0	0	0	750	250	1,000
			95	2	5	0	0	0	5	0	5
			98o	3	5	0	0	0	5	750	755
			98n	1	0	0	0	0	0	0	0
989-38-8		C.I. Basic Red 1	88	No reports							
			95	2	0	0	0	0	0	668	668
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
28407-37-6		C.I. Direct Blue 218	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	6	10	6	0	0	16	1,400	1,416
			98o	6	0	10	0	5	15	2,142	2,157
			98n	No reports							
16071-86-6	‡	C.I. Direct Brown 95	88	No reports							
			95	1	0	0	0	0	0	0	0
			98o	No reports							
			98n	No reports							
2832-40-8		C.I. Disperse Yellow 3	88	1	398	302	0	0	700	899	1,599
			95	3	450	27	0	0	477	1,061	1,538
			98o	3	205	25	0	0	230	876	1,106
			98n	No reports							
81-88-9		C.I. Food Red 15	88	2	250	0	0	0	250	0	250
			95	2	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
97-56-3		C.I. Solvent Yellow 3	88	1	250	0	0	0	250	0	250
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
842-07-9		C.I. Solvent Yellow 14	88	2	0	0	0	0	0	0	0
			95	No reports							
			98o	No reports							
			98n	No reports							
492-80-8	*,‡	C.I. Solvent Yellow 34	88	No reports							
			95	No reports							
			98o	1	0	0	0	0	0	0	0
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	C.I. Acid Red 114	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	C.I. Basic Green 4	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	110	499	10	619	0
		98o	0	0	0	0	0	998	20	1,018	0
		98n	0	0	0	0	0	0	0	0	0
	C.I. Basic Red 1	88	No reports								
		95	0	0	0	54	0	289	668	1,011	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
	C.I. Direct Blue 218	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5	0	0	0	619	5,151	1,411	7,186	0
		98o	0	260	0	0	312	1,417	2,144	4,133	0
		98n	No reports								
‡	C.I. Direct Brown 95	88	No reports								
		95	0	0	0	0	0	0	0	0	0
		98o	No reports								
		98n	No reports								
	C.I. Disperse Yellow 3	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,061	5,189	1,410	7,660	0
		98o	0	0	0	0	0	1,882	1,106	2,988	1
		98n	No reports								
	C.I. Food Red 15	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
	C.I. Solvent Yellow 3	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
	C.I. Solvent Yellow 14	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	No reports								
*‡	C.I. Solvent Yellow 34	88	No reports								
		95	No reports								
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
7440-48-4	‡	Cobalt	88	177	44,005	16,744	0	213,204	273,953	248,089	522,042
			95	257	50,168	17,055	0	46,482	113,705	222,100	335,805
			98o	265	40,392	3,603	0	85,060	129,055	411,658	540,713
			98n	9	504	7	0	133,731	134,242	35,143	169,385
—	‡	Cobalt compounds	88	150	56,410	63,662	18,500	38,960	177,532	300,641	478,173
			95	225	29,093	70,392	22,657	505,624	627,766	304,508	932,274
			98o	279	31,816	34,860	32,950	499,891	599,517	310,159	909,676
			98n	154	54,897	24,067	12,006	12,516,853	12,607,823	443,633	13,051,456
7440-50-8	*	Copper	88	1,975	1,525,310	117,147	15,646	10,466,155	12,124,258	17,233,013	29,357,271
			95	2,769	1,217,758	50,340	29,787	1,658,394	2,956,279	14,952,264	17,908,543
			98o	2,731	722,229	39,500	56,634	1,527,548	2,345,911	17,899,250	20,245,161
			98n	65	118,502	17,215	23,211	278,555,543	278,714,471	2,997,467	281,711,938
—		Copper compounds	88	1,045	3,158,742	185,292	165,957	29,683,607	33,193,598	14,135,121	47,328,719
			95	1,431	2,021,700	91,125	264,852	40,760,958	43,138,635	9,100,518	52,239,153
			98o	1,520	3,527,756	92,518	187,400	52,024,109	55,831,783	8,389,933	64,221,716
			98n	370	587,519	368,012	1,383,146	1,233,507,560	1,235,846,237	3,991,921	1,239,838,158
8001-58-9	*,‡	Creosote	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	85	928,376	8,427	0	500	937,303	2,595,570	3,532,873
			98o	78	857,442	24,842	0	12,275	894,559	1,204,510	2,099,069
			98n	14	1,142	0	0	2,176,468	2,177,610	59,022	2,236,632
120-71-8	‡	p-Cresidine	88	6	7,080	250	0	750	8,080	4,700	12,780
			95	5	4,606	0	0	0	4,606	2,200	6,806
			98o	4	2,400	0	0	0	2,400	0	2,400
			98n	No reports							
108-39-4	*	m-Cresol	88	15	18,432	283	0	455	19,170	13,503	32,673
			95	29	48,000	1,675	680,000	0	729,675	3,218	732,893
			98o	26	44,999	141	502,670	4,655	552,465	502	552,967
			98n	4	9	0	0	0	9	0	9
95-48-7		o-Cresol	88	28	89,793	448	0	1,667	91,908	12,458	104,366
			95	23	12,425	82	590,000	0	602,507	5,257	607,764
			98o	21	9,270	16	466,578	20	475,884	39,525	515,409
			98n	6	12	0	0	0	12	0	12
106-44-5		p-Cresol	88	18	640,703	1,143	152,000	62,291	856,137	643	856,780
			95	30	44,901	1,066	342,500	0	388,467	3,168	391,635
			98o	30	57,003	43	299,485	0	356,531	50,556	407,087
			98n	5	13	0	0	0	13	0	13
1319-77-3	*	Cresol (mixed isomers)	88	111	787,305	6,811	1,804,060	4,516	2,602,692	483,488	3,086,180
			95	154	1,606,566	15,011	648,882	2,350	2,272,809	47,059	2,319,868
			98o	147	1,655,565	8,641	489,033	12,273	2,165,512	17,710	2,183,222
			98n	22	2,506	251	750	12,984	16,491	86,726	103,217

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	Cobalt	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,853,817	12,021,673	0	1	379,265	85,327	250,162	16,590,245	20
		98o	4,229,534	7,367,509	0	10,000	14,257	32,815	324,305	11,978,420	309
		98n	0	0	0	0	0	0	180,156	180,156	1
‡	Cobalt compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	222,882	1,573,341	0	847	1,394,877	92,172	865,222	4,149,341	4,239
		98o	153,821	1,642,060	0	10,105	1,459,617	64,757	888,637	4,218,997	1,600
		98n	40,259	1,600	0	0	11,009	15	13,107,389	13,160,272	4,019
*	Copper	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	611,330,987	566,940,502	506	43,366	41,198,595	1,800,543	11,412,658	1,232,727,157	92,242
		98o	590,689,257	557,219,409	189,372	499,055	45,069,194	1,500,744	8,694,278	1,203,861,309	952,130
		98n	2,708,008	960,711	0	0	87,176	53,655	281,556,220	285,365,770	5
	Copper compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	215,002,488	190,203,455	0	31,078	60,463,597	2,453,764	49,560,560	517,714,942	1,323,182
		98o	186,530,689	158,679,945	0	23,314	2,731,081	1,871,198	61,082,321	410,918,548	4,149,252
		98n	5,146,951	1,690,317	0	0	483,340	121,343	1,349,400,312	1,356,842,263	297,953
*,‡	Creosote	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	64,447,471	2,180	6,100	94,871	163,131	298,027	3,208,184	68,219,964	322,992
		98o	11,514,469	717,808	2,626,352	81,103	842,960	902,470	1,891,484	18,576,646	541,707
		98n	0	0	10	49,454	523,727	41,936	2,177,407	2,792,534	3
‡	p-Cresidine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	51,611	6,806	58,417	3,400
		98o	0	0	0	0	0	29,000	2,400	31,400	0
		98n	No reports								
*	m-Cresol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,309,373	1,500,001	615,425	17,910	329,024	91,159	737,708	5,600,600	151
		98o	1,769,226	1,064,540	649,489	18,878	240,659	8,216	554,441	4,305,449	719
		98n	0	0	0	45,524	40,473	0	9	86,006	0
	o-Cresol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	171,098	76	304,801	321	184,032	125,072	606,682	1,392,082	117
		98o	95,701	0	339,395	1,218	206,884	17,724	516,766	1,177,688	376
		98n	0	0	0	45,524	58,649	0	12	104,185	0
	p-Cresol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	137,136	900,001	454,288	58,641	239,766	989,315	392,942	3,172,089	100
		98o	83,138	654,268	449,080	76,711	1,156,104	54,263	387,019	2,860,583	280
		98n	0	0	0	45,524	58,586	0	13	104,123	0
*	Cresol (mixed isomers)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,052,270	187,427	5,107,270	637,169	8,558,967	1,143,472	2,203,531	18,890,106	6,814
		98o	125,717	645,573	7,311,004	434,321	12,194,972	313,764	2,189,512	23,214,863	8
		98n	0	0	0	3,040,937	1,748,792	111,942	17,223	4,918,894	2

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
4170-30-3		Crotonaldehyde	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	7	101,579	680	391,500	0	493,759	0	493,759
			98o	6	29,584	3,800	1,300	0	34,684	0	34,684
			98n	1	0	0	0	0	0	0	0
98-82-8		Cumene	88	118	5,239,958	3,201	30,165	8,591	5,281,915	83,287	5,365,202
			95	239	1,876,790	1,490	9,403	1,102	1,888,785	70,457	1,959,242
			98o	241	1,346,368	660	1,040	9,537	1,357,605	32,676	1,390,281
			98n	161	11,839	10	0	928	12,777	1,220	13,997
80-15-9		Cumene hydroperoxide	88	40	192,523	1,784	371,000	250	565,557	22,944	588,501
			95	43	72,898	68	280,000	3,400	356,366	9,725	366,091
			98o	45	75,036	79	210,000	11,000	296,115	10,492	306,607
			98n	1	0	0	0	0	0	0	0
135-20-6	‡	Cupferron	88	4	920	0	0	0	920	0	920
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
21725-46-2	*	Cyanazine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	991	492	0	0	1,483	2,527	4,010
			98o	6	193	0	0	0	193	0	193
			98n	1	9	0	0	12,000	12,009	0	12,009
—		Cyanide compounds	88	393	1,248,012	195,244	3,707,326	107,208	5,257,790	581,408	5,839,198
			95	242	1,074,879	89,725	4,429,640	18,580	5,612,824	149,457	5,762,281
			98o	233	692,029	54,638	3,762,384	16,809	4,525,860	138,788	4,664,648
			98n	86	62,250	2,996	18,750	3,882,176	3,966,172	45,428	4,011,600
1134-23-2	*	Cycloate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	26	1,108	16	0	1,150	242	1,392
			98o	3	97	113	77	0	287	4	291
			98n	No reports							
110-82-7	*	Cyclohexane	88	303	13,984,542	20,071	334,471	38,190	14,377,274	211,575	14,588,849
			95	364	8,086,260	18,908	238,200	10,809	8,354,177	105,429	8,459,606
			98o	374	5,989,227	13,718	310,589	1,602	6,315,136	55,782	6,370,918
			98n	195	89,349	28	8,430	266	98,073	39,560	137,633
108-93-0	*	Cyclohexanol	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	24	167,949	154	3,623,000	0	3,791,103	70	3,791,173
			98o	25	300,614	298	4,307,800	0	4,608,712	740	4,609,452
			98n	3	43	0	0	0	43	13	56
68359-37-5	*	Cyfluthrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	10	0	0	0	10	0	10
			98o	2	4	1	0	0	5	0	5
			98n	1	0	0	0	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.*
Off-site Releases *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Crotonaldehyde	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	202,400	0	498,820	701,220	0
		98o	0	0	1,837,500	0	569,220	16	34,884	2,441,620	0
		98n	0	0	0	0	0	0	0	0	0
	Cumene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	17,285,493	60,160	7,052,013	1,380,577	6,411,952	169,307	2,048,371	34,407,873	2,276
		98o	19,165,910	145,837	9,226,663	623,049	16,050,026	187,394	1,502,656	46,901,535	916
		98n	161,872	512	14,642	617,688	75,400	27,918	10,201	908,233	877
	Cumene hydroperoxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	6	482,755	21,434	375,758	879,953	1
		98o	0	0	0	1,066	399,343	264,990	304,590	969,989	1
		98n	0	0	0	0	0	0	0	0	0
‡	Cupferron	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	5,648	0	5,648	0
		98o	0	0	13,228	659	0	0	0	13,887	0
		98n	No reports								
*	Cyanazine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	545,000	8,100	3,887	556,987	0
		98o	0	0	0	0	43,000	27,576	453	71,029	0
		98n	0	0	0	0	0	0	12,000	12,000	1
	Cyanide compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	664,976	32,526	19,000	3,523	9,276,391	713,925	5,684,723	16,395,064	6,221
		98o	1,692,214	65,263	7,028,885	2,185	11,836,917	715,201	4,564,176	25,904,841	2,493
		98n	4,803,744	0	143	195	22,335,888	55,905	3,886,986	31,082,861	23
*	Cycloate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	2,000	6,001	1,346	9,347	0
		98o	0	0	0	0	1,148	3,574	289	5,011	0
		98n	No reports								
*	Cyclohexane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	54,644,021	1,585,367	10,345,060	5,145,025	23,741,493	1,250,210	8,406,837	105,118,013	123,188
		98o	67,097,911	638,827	18,411,353	3,403,978	21,853,521	4,398,320	6,176,460	121,980,370	9,056
		98n	404,236	1,685	3,156	4,891,082	3,431,997	248,265	105,048	9,085,469	357
*	Cyclohexanol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	677,199	9,673	154,921	19,284	3,836,677	4,697,754	1
		98o	0	0	3,040,709	61,661	150,421	100,440	4,648,301	8,001,532	0
		98n	0	0	29	144	12,360	0	33	12,566	0
*	Cyfluthrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	989	890	20	1,899	0
		98o	0	0	0	0	3,496	964	5	4,465	0
		98n	0	0	0	0	15,916	0	0	15,916	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
94-75-7	*,‡	2,4-D (acetic acid)	88	28	7,020	549	3,789	38,000	49,358	68,422	117,780
			95	27	6,888	1,083	250	4,325	12,546	17,430	29,976
			98o	28	3,970	88	1,300	1,798	7,156	2,887	10,043
			98n	6	18	0	29,909	0	29,927	2,557	32,484
533-74-4	*	Dazomet	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	11	1,042	230	0	0	1,272	2,578	3,850
			98o	15	0	0	0	0	0	1,274	1,274
			98n	No reports							
53404-60-7	*	Dazomet, sodium salt	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	0	0	0	250	250
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
94-82-6	*	2,4-DB	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	750	0	0	0	750	0	750
			98o	2	7	0	0	0	7	0	7
			98n	1	10	0	0	0	10	0	10
1929-73-3	*,‡	2,4-D butoxyethyl ester	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	510	0	0	0	510	0	510
			98o	2	255	0	0	0	255	0	255
			98n	1	0	0	0	0	0	0	0
94-80-4	*,‡	2,4-D butyl ester	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	3	0	0	0	3	0	3
			98o	2	1	0	0	0	1	0	1
			98n	No reports							
1163-19-5		Decabromodiphenyl oxide	88	58	29,604	500	292	21,450	51,846	555,181	607,027
			95	138	39,283	3,846	11	204,248	247,388	715,731	963,119
			98o	136	29,464	3,168	0	191,253	223,885	701,419	925,304
			98n	1	0	0	0	310,000	310,000	0	310,000
13684-56-5	*	Desmedipham	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	94	0	0	0	94	0	94
			98n	No reports							
1928-43-4	*,‡	2,4-D 2-Ethylhexyl ester	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	11	2,765	250	0	0	3,015	3,131	6,146
			98o	10	4,722	5	0	0	4,727	1,735	6,462
			98n	No reports							
2303-16-4	*	Diallate	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	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.*
Off-site Releases *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	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			
*,‡	2,4-D (acetic acid)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	29,200	0	0	0	23,780	24,490	27,595	105,065	6,192
		98o	87,757	0	0	11	111,450	59,436	9,964	268,618	1
		98n	0	0	0	0	125,425	0	30,192	155,617	0
*	Dazomet	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	20,110	1,178	3,542	24,830	0
		98o	0	0	0	0	100	2,100	1,400	3,600	0
		98n	No reports								
*	Dazomet, sodium salt	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	56	7,807	0	7,863	0
		98o	0	0	0	0	73	12,620	90	12,783	0
		98n	No reports								
*	2,4-DB	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	217	290	507	0
		98o	0	0	0	0	0	14	7	21	0
		98n	0	0	0	21,140	0	0	10	21,150	1
*,‡	2,4-D butoxyethyl ester	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	1,600	318	1,918	0
		98o	0	0	0	0	0	0	76	76	0
		98n	0	0	0	0	0	0	0	0	0
*,‡	2,4-D butyl ester	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	600	0	3	603	0
		98o	0	0	0	0	9,400	0	1	9,401	0
		98n	No reports								
	Decabromodiphenyl oxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	992,673	144,205	0	18,686	32,138	322,935	946,822	2,457,459	3,804
		98o	265,331	86,343	385	3,214	43,588	257,123	895,739	1,551,723	4
		98n	0	0	0	0	0	0	310,000	310,000	0
*	Desmedipham	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	1,150	94	1,244	0
		98n	No reports								
*,‡	2,4-D 2-Ethylhexyl ester	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	36,531	0	0	0	0	10,318	5,468	52,317	0
		98o	7,870	0	0	0	0	14,179	6,334	28,383	0
		98n	No reports								
*	Diallate	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
615-05-4	‡	2,4-Diaminoanisole	88	1	0	0	0	0	0	0	0
			95	No reports							
			98o	No reports							
			98n	No reports							
39156-41-7	‡	2,4-Diaminoanisole sulfate	88	1	0	0	0	0	0	0	0
			95	No reports							
			98o	No reports							
			98n	No reports							
101-80-4	‡	4,4'-Diaminodiphenyl ether	88	5	216	585	0	0	801	142	943
			95	3	23	359	0	0	382	120	502
			98o	3	22	340	0	0	362	55	417
			98n	No reports							
95-80-7	‡	2,4-Diaminotoluene	88	2	2,988	250	0	0	3,238	0	3,238
			95	5	500	0	0	0	500	0	500
			98o	2	1,573	0	0	0	1,573	0	1,573
			98n	2	5	0	0	0	5	84,276	84,281
25376-45-8	‡	Diaminotoluene (mixed isomers)	88	13	21,097	3,288	174,000	295	198,680	289,591	488,271
			95	11	9,594	5,522	7,050	55	22,221	28,625	50,846
			98o	13	13,523	5,785	13,000	205	32,513	12,531	45,044
			98n	2	10	0	0	0	10	1,014	1,024
333-41-5	*	Diazinon	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	31	3,245	8	0	0	3,253	1,560	4,813
			98o	29	13,564	11	0	0	13,575	1,955	15,530
			98n	5	15	0	0	0	15	157	172
132-64-9		Dibenzofuran	88	110	71,093	1,510	0	9,929	82,532	181,799	264,331
			95	37	18,704	2,843	0	220	21,767	19,824	41,591
			98o	39	93,615	29	0	56,670	150,314	13,304	163,618
			98n	3	615	0	0	0	615	0	615
96-12-8	*,‡	1,2-Dibromo-3-chloro-propane	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
106-93-4	*,‡	1,2-Dibromoethane	88	34	63,342	1,011	6,882	259	71,494	27,924	99,418
			95	19	12,372	306	0	256	12,934	3	12,937
			98o	11	10,045	6	0	1	10,052	0	10,052
			98n	1	0	0	0	0	0	0	0
124-73-2		Dibromotetrafluoro-ethane (Halon 2402)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	10	0	0	0	10	0	10
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-production-related Waste Managed Pounds
‡	2,4-Diaminoanisole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	No reports								
‡	2,4-Diaminoanisole sulfate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	No reports								
‡	4,4'-Diaminodiphenyl ether	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	4,929	380,289	377	385,595	0
		98o	0	0	0	0	140	4,483	357	4,980	0
		98n	No reports								
‡	2,4-Diaminotoluene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	7,192	29,774	655	37,621	0
		98o	0	0	0	0	67,000	360	1,573	68,933	0
		98n	0	0	0	0	40,920	216,249	3	257,172	0
‡	Diaminotoluen (mixed isomers)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	755,917	386,996	362,357	1,923,183	48,109	3,476,562	3,550
		98o	0	0	2,714,193	4,287,968	669,862	1,072,322	44,224	8,788,569	255
		98n	0	0	0	10,092	961,202	0	13	971,307	0
*	Diazinon	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	21,330	0	0	1	66,150	7,596	4,355	99,432	5
		98o	53,095	0	0	0	37,803	33,649	15,018	139,565	3
		98n	0	0	0	0	180,882	4	162	181,048	0
	Dibenzofuran	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	70,546	25,036	113	176	405,125	1,471	37,508	539,975	13,220
		98o	131,734	4,920	230,475	92,830	26,678	5,981	119,032	611,650	1,302
		98n	0	0	0	1,352,711	32,439	0	615	1,385,765	1
*,‡	1,2-Dibromo-3-chloro-propane	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
*,‡	1,2-Dibromoethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	60	17	34,174	72,467	11,740	118,458	0
		98o	0	0	0	1	17,054	863	9,897	27,815	0
		98n	0	0	0	0	0	0	0	0	0
	Dibromotetrafluoro-ethane (Halon 2402)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	127,308	0	0	0	0	0	10	127,318	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
84-74-2	*	Dibutyl phthalate	88	126	204,058	14,339	350,000	6,395	574,792	113,068	687,860
			95	125	104,501	3,981	390,000	1,402	499,884	25,920	525,804
			98o	108	33,434	206	210,000	5,480	249,120	25,602	274,722
			98n	64	834	5	0	0	839	1,410	2,249
1918-00-9	*	Dicamba	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	6	12,580	250	113,600	0	126,430	0	126,430
			98o	9	1,207	59	32,000	0	33,266	2,100	35,366
			98n	2	10	0	0	0	10	77	87
99-30-9	*	Dichloran	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	10	0	0	0	10	0	10
			98o	3	0	0	0	0	0	0	0
			98n	1	0	0	0	0	0	0	0
95-50-1	*	1,2-Dichlorobenzene	88	45	530,535	11,624	20,000	13,354	575,513	38,266	613,779
			95	28	271,539	3,789	26,000	11,521	312,849	28,228	341,077
			98o	36	208,463	2,352	3,800	1,245	215,860	6,076	221,936
			98n	10	1,036	5	5	0	1,046	610	1,656
541-73-1		1,3-Dichlorobenzene	88	6	15,282	1,281	0	0	16,563	290	16,853
			95	6	7,528	526	0	0	8,054	0	8,054
			98o	6	4,018	203	0	0	4,221	0	4,221
			98n	2	5	0	0	0	5	0	5
106-46-7	*,‡	1,4-Dichlorobenzene	88	24	1,891,419	6,153	4,000	1,300	1,902,872	750	1,903,622
			95	24	242,372	1,287	0	3,100	246,759	3,328	250,087
			98o	19	181,899	1,706	3,100	460	187,165	0	187,165
			98n	12	417	0	0	0	417	81	498
25321-22-6	‡	Dichlorobenzene (mixed isomers)	88	15	163,684	40	0	0	163,724	19,672	183,396
			95	9	5,443	0	0	0	5,443	9	5,452
			98o	6	14,236	0	0	0	14,236	8	14,244
			98n	8	319	250	0	0	569	11,691	12,260
91-94-1	‡	3,3'-Dichlorobenzidine	88	14	255	752	0	0	1,007	209,785	210,792
			95	3	11	0	0	0	11	2,400	2,411
			98o	1	255	0	0	0	255	41,600	41,855
			98n	3	6	0	0	0	6	0	6
612-83-9	‡	3,3'-Dichlorobenzidine dihydrochloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	13	0	0	0	0	0	0	0
			98o	16	250	5	0	0	255	6,790	7,045
			98n	No reports							
64969-34-2	‡	3,3'-Dichlorobenzidine sulfate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	260	260
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Dibutyl phthalate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	51,458	26,123	1,086,538	172,397	314,761	115,184	385,724	2,152,185	173,706
		98o	30,100	12,207	1,028,453	215,856	173,861	89,617	279,673	1,829,767	3
		98n	0	0	0	288,896	92,847	52,697	3,668	438,108	5
*	Dicamba	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	510	0	0	0	0	29	126,662	127,201	0
		98o	0	0	0	0	37,557	65,900	35,366	138,823	0
		98n	0	0	0	0	22,223	0	87	22,310	0
*	Dichloran	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	50	25	10	85	0
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	39,948	0	0	39,948	0
*	1,2-Dichlorobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,527,161	3,626,496	354,610	763,438	172,717	1,999,033	340,963	12,784,418	153
		98o	11,995,819	2,222,086	1,395,535	513,369	374,719	973,511	224,789	17,699,828	62
		98n	2,230,878	0	159	42,595	653,679	4,239,558	1,443	7,168,312	3
	1,3-Dichlorobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,068	1,291	0	0	10	3,989	8,079	18,437	36
		98o	1,988	950	0	0	10	2,555	4,260	9,763	1
		98n	0	0	0	0	20,077	202	1	20,280	1
*‡	1,4-Dichlorobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	705,345	34,882	42,157	11,053	73,030	621,194	248,721	1,736,382	1,609
		98o	2,602,061	0	134,272	6,691	1,766	299,525	185,980	3,230,295	109
		98n	36,560	0	1	149,250	376,335	1,715	256	564,117	2
‡	Dichlorobenzene (mixed isomers)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	266,997	5,165	79,032	3,684	5,452	360,330	0
		98o	0	0	191,010	611	246,100	6,720	14,244	458,685	0
		98n	0	4,724	2,147	712,291	321,134	328	1,849	1,042,473	1
‡	3,3'-Dichlorobenzidine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	22,000	14,000	1,600	2,701	40,301	1
		98o	0	0	0	0	10,000	45,000	42,000	97,000	0
		98n	0	0	0	0	65,021	63	2	65,086	1
‡	3,3'-Dichlorobenzidine dihydrochloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	12,797	22,000	0	34,797	0
		98o	0	0	0	0	6,712	48,000	6,801	61,513	0
		98n	No reports								
‡	3,3'-Dichlorobenzidine sulfate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,300	2,400	0	3,700	0
		98o	0	0	0	0	0	6,000	260	6,260	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
75-27-4		Dichlorobromomethane	88	1	13,440	0	0	0	13,440	0	13,440
			95	1	2,300	0	0	50	2,350	0	2,350
			98o	1	2,370	0	0	90	2,460	0	2,460
			98n	No reports							
764-41-0		1,4-Dichloro-2-butene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	3,950	0	4,500	0	8,450	0	8,450
			98o	3	1,713	0	5,700	0	7,413	0	7,413
			98n	1	0	0	0	0	0	0	0
110-57-6		trans-1,4-Dichloro-2-butene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	137	0	0	0	137	0	137
			98o	1	1	0	0	0	1	0	1
			98n	No reports							
1649-08-7		1,2-Dichloro-1,1-di-fluoroethane (HCFC-132b)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	890	20	0	0	910	89	999
			98o	2	837	48	0	0	885	0	885
			98n	1	5	0	0	0	5	24,214	24,219
75-71-8	*	Dichlorodifluoro-methane (CFC-12)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	137	3,249,946	17,172	89	0	3,267,207	320	3,267,527
			98o	54	676,105	13,005	0	0	689,110	0	689,110
			98n	6	24,612	0	250	0	24,862	107	24,969
107-06-2	*,‡	1,2-Dichloroethane	88	110	4,615,179	40,527	1,452,084	2,166	6,109,956	166,131	6,276,087
			95	83	1,292,842	5,194	24,339	256	1,322,631	23,671	1,346,302
			98o	71	732,773	2,337	2,178	886	738,174	105,862	844,036
			98n	19	284	271	56,816	0	57,371	39,486	96,857
540-59-0		1,2-Dichloroethylene	88	10	126,478	95	0	1	126,574	87,614	214,188
			95	10	8,527	270	0	0	8,797	0	8,797
			98o	11	6,063	44	0	0	6,107	0	6,107
			98n	7	533	0	0	0	533	387	920
1717-00-6		1,1-Dichloro-1-fluoro ethane (HCFC-141b)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	295	11,663,354	580	26	35,767	11,699,727	165,777	11,865,504
			98o	229	8,799,904	54	0	30,936	8,830,894	230,925	9,061,819
			98n	11	31,419	0	0	0	31,419	14,554	45,973
75-43-4		Dichlorofluoromethane (HCFC-21)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	173,117	2	0	0	173,119	31,000	204,119
			98o	3	129,467	0	0	0	129,467	8,975	138,442
			98n	4	4	0	0	0	4	9	13
75-09-2	*,‡	Dichloromethane	88	1,675	129,124,529	349,960	1,478,833	157,156	131,110,478	7,806,328	138,916,806
			95	1,007	58,207,428	28,620	1,140,335	2,064	59,378,447	176,467	59,554,914
			98o	633	39,928,870	15,489	456,962	173,768	40,575,089	253,059	40,828,148
			98n	197	458,432	267	33,702	10,582	502,983	103,120	606,103

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	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			
	Dichlorobromomethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	2,300	2,300	0
		98o	0	0	0	0	0	0	2,400	2,400	0
		98n	No reports								
	1,4-Dichloro-2-butene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	13,000	3,300,000	312,500	8,450	3,633,950	0
		98o	1,800,000	0	0	0	3,753,000	124,000	7,413	5,684,413	0
		98n	0	0	0	0	0	0	0	0	0
	trans-1,4-Dichloro-2-butene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	137	137	0
		98o	0	0	0	0	12,000	0	1	12,001	0
		98n	No reports								
	1,2-Dichloro-1,1-di-fluoroethane (HCFC-132b)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	98,000	22,000	1,000	121,000	0
		98o	0	0	0	0	320,000	61,573	880	382,453	0
		98n	0	0	0	0	39,584	0	3	39,587	0
*	Dichlorodifluoro-methane (CFC-12)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	552,377	466,714	408,747	225	126,167	114,628	3,241,865	4,910,723	18,435
		98o	80,253	252,664	0	461	38,976	66,575	691,728	1,130,657	4
		98n	0	0	0	0	199,704	8	24,723	224,435	1
*,‡	1,2-Dichloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	59,314,824	16,921,135	32,535,232	787,622	74,650,467	1,630,158	1,325,188	187,164,626	23,301
		98o	435,903,074	11,215,900	49,197,699	194,842	59,612,529	1,892,410	857,746	558,874,200	69,870
		98n	0	0	2,617	338	1,389,729	53	63,443	1,456,180	7
	1,2-Dichloroethylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	310,000	6,100	2,871,400	0	4,680,089	1,984	8,761	7,878,334	122
		98o	1,560,000	1,617,199	621,000	0	3,946,600	2,803	5,984	7,753,586	143
		98n	0	0	0	0	1,163,150	0	631	1,163,781	0
	1,1-Dichloro-1-fluoro ethane (HCFC-141b)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,429,772	381,393	0	99,548	2,018,829	846,290	11,804,532	20,580,364	38,962
		98o	155,007	147,221	0	647,826	801,429	416,274	8,851,678	11,019,435	75,874
		98n	357,028	3,660	0	148	271,622	4,671	32,162	669,291	0
	Dichlorofluoromethane (HCFC-21)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	7,200	1,586	23,800	204,492	237,078	0
		98o	0	0	0	0	0	5,487	138,067	143,554	0
		98n	0	0	0	0	288,607	183	13	288,803	1
*,‡	Dichloromethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	84,802,552	14,092,786	5,240,223	3,382,204	25,614,607	11,833,725	59,453,552	204,419,649	72,750
		98o	136,282,089	15,126,910	12,050,392	3,047,691	23,620,654	14,234,077	40,715,516	245,077,329	102,527
		98n	17,461,054	2,100,136	728	5,160,175	2,624,744	7,312,409	605,269	35,264,515	271

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
127564-92-5		Dichloropentafluoro-propane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	6,520	0	0	0	6,520	8,900	15,420
			98n	No reports							
507-55-1		1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	255	0	0	0	255	0	255
			98o	3	69,043	0	0	0	69,043	0	69,043
			98n	1	1,000	0	0	0	1,000	0	1,000
422-56-0		3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	255	0	0	0	255	0	255
			98o	3	56,258	0	0	0	56,258	0	56,258
			98n	1	1,000	0	0	0	1,000	0	1,000
120-83-2		2,4-Dichlorophenol	88	8	1,403	107	17,700	2	19,212	350	19,562
			95	3	3,580	245	15,900	0	19,725	0	19,725
			98o	5	490	0	9,000	0	9,490	0	9,490
			98n	3	108	0	0	0	108	0	108
78-87-5	*	1,2-Dichloropropane	88	12	1,395,304	23,785	0	3,400	1,422,489	1,131	1,423,620
			95	11	616,470	4,344	0	20	620,834	1,364	622,198
			98o	11	298,150	1,122	0	32	299,304	260	299,564
			98n	4	8	0	0	0	8	0	8
10061-02-6	‡	trans-1,3-Dichloro-propene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	256	0	0	0	256	0	256
			98o	3	1,670	0	0	1	1,671	0	1,671
			98n	1	70	0	0	0	70	0	70
78-88-6	*	2,3-Dichloropropene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	4,253	0	0	0	4,253	0	4,253
			98o	5	612	490	0	0	1,102	1,200	2,302
			98n	1	32	0	0	0	32	0	32
542-75-6	*,‡	1,3-Dichloropropylene	88	8	54,590	250	0	0	54,840	0	54,840
			95	11	31,267	193	0	0	31,460	0	31,460
			98o	12	9,566	61	0	1	9,628	0	9,628
			98n	6	427	0	0	0	427	0	427
76-14-2	*	Dichlorotetrafluoro-ethane (CFC-114)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	20	1,017,652	4,936	0	0	1,022,588	136	1,022,724
			98o	14	827,438	5	0	0	827,443	1	827,444
			98n	No reports							
34077-87-7		Dichlorotrifluoroethane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	1,000	0	0	0	1,000	0	1,000
			98o	1	1,699	0	0	0	1,699	0	1,699
			98n	1	5	0	0	0	5	2	7

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Dichloropentafluoro-propane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	8,900	6,500	15,400	0
		98n	No reports								
	1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	100	0	0	0	0	0	400	500	0
		98o	4,747	0	0	0	0	0	69,043	73,790	7,000
		98n	0	500	0	0	0	0	1,275	1,775	0
	3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	60	0	0	0	0	0	300	360	0
		98o	3,851	0	0	0	0	0	56,558	60,409	5,700
		98n	0	410	0	0	0	0	1,040	1,450	0
	2,4-Dichlorophenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,460	0	3	0	336,936	0	19,720	358,119	0
		98o	1,400	0	3	0	190,400	600	9,435	201,838	0
		98n	0	0	0	48,026	25,817	0	108	73,951	0
*	1,2-Dichloropropane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	56,000,000	0	28,380,000	0	11,573,182	7,768	620,353	96,581,303	1,200
		98o	26,800,000	0	10,700,000	0	15,610,350	1,161,416	300,901	54,572,667	10
		98n	0	0	0	0	689,377	22	4	689,403	1
‡	trans-1,3-Dichloro-propene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	11,000,000	0	0	0	250	11,000,250	1
		98o	7,900	0	5,210,238	9	20,505	430	1,640	5,240,722	0
		98n	0	0	0	0	0	0	70	70	0
*	2,3-Dichloropropene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	6,100,000	1	4,200,000	0	1,960,000	510,000	4,253	12,774,254	0
		98o	960,000	0	1,100,000	0	639,000	1,086,000	1,102	3,786,102	0
		98n	0	0	0	0	73,306	0	32	73,338	0
*,‡	1,3-Dichloropropylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,892,986	470	11,930,000	123	969,916	2,481	31,694	17,827,670	241
		98o	1,932,000	0	6,000,000	16,645	1,084,262	42,734	9,227	9,084,868	1
		98n	0	0	0	14,109	89,306	80	427	103,922	0
*	Dichlorotetrafluoro-ethane (CFC-114)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	19,819	14,634	0	0	1,608,479	38,271	1,018,687	2,699,890	1
		98o	231,484	34,598	0	0	1,022,895	34,717	827,445	2,151,139	0
		98n	No reports								
	Dichlorotrifluoroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	716,409	0	968	717,377	0
		98o	0	0	0	0	35,000	0	1,699	36,699	0
		98n	0	0	0	0	29,974	0	7	29,981	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
354-23-4		1,2-Dichloro-1,1,2-trifloroethane (HCFC-123a)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	101,118	5	0	0	101,123	0	101,123
			98n	No reports							
306-83-2		2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	12	155,006	251	0	0	155,257	0	155,257
			98o	13	206,073	10	0	0	206,083	0	206,083
			98n	3	457	0	0	0	457	226	683
62-73-7	*,‡	Dichlorvos	88	7	1,050	0	0	0	1,050	505	1,555
			95	4	255	5	0	0	260	250	510
			98o	4	255	5	0	0	260	0	260
			98n	1	0	0	0	0	0	9	9
115-32-2	*	Dicofol	88	8	1,343	0	0	0	1,343	15,786	17,129
			95	4	750	0	0	0	750	250	1,000
			98o	4	1,000	0	0	0	1,000	0	1,000
			98n	No reports							
77-73-6		Dicyclopentadiene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	70	340,455	5,464	0	475	346,394	6,888	353,282
			98o	83	350,061	14,943	0	597	365,601	6,162	371,763
			98n	3	15	0	1,081,201	0	1,081,216	250	1,081,466
1464-53-5	‡	Diepoxybutane	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	70	0	0	0	70	0	70
111-42-2		Diethanolamine	88	333	642,418	438,213	238,317	133,456	1,452,404	376,037	1,828,441
			95	349	360,255	287,582	18,502	40,399	706,738	456,391	1,163,129
			98o	326	432,327	63,117	24,000	113,340	632,784	208,528	841,312
			98n	98	970	0	316,517	169,345	486,832	3,653	490,485
117-81-7	*,‡	Di(2-ethylhexyl) phthalate	88	304	1,217,329	2,781	3,091	20,748	1,243,949	3,630,612	4,874,561
			95	316	504,167	921	0	19,705	524,793	3,041,389	3,566,182
			98o	299	209,533	669	0	24,184	234,386	953,306	1,187,692
			98n	58	1,986	0	0	0	1,986	1,798	3,784
64-67-5	‡	Diethyl sulfate	88	24	10,627	0	0	250	10,877	0	10,877
			95	31	6,978	0	0	0	6,978	250	7,228
			98o	33	6,188	0	0	0	6,188	177	6,365
			98n	2	0	0	0	0	0	0	0
35367-38-5	*	Diflubenzuron	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	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			
	1,2-Dichloro-1,1,2-trifloroethane (HCFC-123a)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	0	101,123	101,123	0
		98n	No reports								
	2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	253,000	1,304	0	0	18,400	24,465	155,218	452,387	0
		98o	0	0	0	0	38,337	4,901	204,475	247,713	955
		98n	0	0	0	0	32,848	0	683	33,531	0
*,‡	Dichlorvos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	33	0	0	297	10	536	550	1,426	24
		98o	0	0	0	0	11	1,130	508	1,649	0
		98n	0	0	0	0	14,957	0	9	14,966	0
*	Dicofol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	150	0	0	0	0	95	282	527	0
		98o	0	0	0	0	0	895	229	1,124	0
		98n	No reports								
	Dicyclopentadiene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	514,277	128,273	1,782,272	635,023	471,016	201,368	348,235	4,080,464	309
		98o	457,481	43,182	1,055,862	790,262	541,870	226,565	401,576	3,516,798	7,572
		98n	0	0	0	0	22,604	0	1,081,217	1,103,821	0
‡	Diepoxybutane	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	148,733	0	0	70	148,803	1
	Diethanolamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	27,718	160,987	102,766	732,863	2,828,593	1,628,096	1,126,236	6,607,259	25,356
		98o	3	289,382	280,874	119,918	2,935,175	2,551,162	2,584,851	8,761,365	83
		98n	0	0	0	623,412	21,411	4,019	476,716	1,125,558	4
*,‡	Di(2-ethylhexyl) phthalate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,644,796	4,019,467	116,013	258,725	557,557	357,115	3,676,763	11,630,436	365
		98o	4,854,032	1,847,674	464,843	222,093	403,536	254,475	1,067,955	9,114,608	572
		98n	0	0	0	1,452,492	0	2,318	1,614	1,456,424	1
‡	Diethyl sulfate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	6,400,000	0	415	3,370	4,702	7,131	6,415,618	2
		98o	0	0	0	6,887,586	4,488	2,460	6,508	6,901,042	5
		98n	0	0	0	50	1	50	1	102	0
*	Diflubenzuron	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
101-90-6	‡	Diglycidyl resorcinol ether	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	2	20	0	0	0	20	0	20
			98n	1	0	0	0	0	0	0	0
94-58-6	‡	Dihydrosafrole	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	255	0	0	0	255	0	255
			98o	4	12,018	0	0	0	12,018	0	12,018
			98n	1	0	0	0	0	0	0	0
—		Diisocyanates	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1,080	516,168	1,370	0	31,933	549,471	597,745	1,147,216
			98o	1,314	735,348	23	0	149,397	884,768	1,221,241	2,106,009
			98n	18	600	5	0	900,000	900,605	7,810	908,415
55290-64-7	*	Dimethipin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
60-51-5	*	Dimethoate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	270	5	0	250	525	1,500	2,025
			98o	6	42	5	0	19,975	20,022	0	20,022
			98n	2	15	0	0	0	15	69	84
119-90-4	‡	3,3'-Dimethoxy benzidine	88	No reports							
			95	3	0	0	0	0	0	0	0
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
20325-40-0	‡	3,3'-Dimethoxy benzidine dihydro-chloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	10	0	0	0	10	0	10
			98o	6	0	0	0	0	0	0	0
			98n	No reports							
124-40-3		Dimethylamine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	71	453,915	26,490	45,250	3,140	528,795	38,137	566,932
			98o	74	443,982	35,629	11,250	3,788	494,649	100	494,749
			98n	6	892	0	0	0	892	8	900
2300-66-5	*	Dimethylamine dicamba	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	505	0	0	0	505	154	659
			98o	3	250	0	0	0	250	0	250
			98n	No reports							
121-69-7		N,N-Dimethylaniline	88	20	98,905	19,967	0	250	119,122	772	119,894
			95	21	36,932	388	0	0	37,320	435	37,755
			98o	21	32,383	850	0	0	33,233	7,501	40,734
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	Diglycidyl resorcinol ether	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	300	0	0	6	306	0
		98n	0	0	0	0	0	0	0	0	0
‡	Dihydrosafrole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	10	999	0	1,009	0
		98o	0	0	0	0	0	10	12,028	12,038	0
		98n	0	0	0	0	0	0	0	0	0
	Diisocyanates	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	816,798	343,867	143,840	339,058	710,457	1,180,316	1,101,682	4,636,018	4,203
		98o	1,352,830	448,865	573,125	574,455	1,919,545	1,549,719	1,695,292	8,113,831	9,942
		98n	0	0	0	1,353,136	1,250,748	5,782	905,678	3,515,344	1
*	Dimethipin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Dimethoate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	200	0	0	0	0	242	1,900	2,342	0
		98o	433	0	0	0	0	4,105	27,957	32,495	0
		98n	0	0	0	0	63,138	0	84	63,222	0
‡	3,3'-Dimethoxy-benzidine	88	No reports								
		95	0	0	0	0	0	0	0	0	0
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
‡	3,3'-Dimethoxy benzidine dihydro-chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	50	1	10	61	0
		98o	0	0	0	0	15	0	0	15	0
		98n	No reports								
	Dimethylamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,095,202	0	21,170	1,800	2,112,575	224,513	564,655	4,019,915	4
		98o	574,603	0	28,500	1,600	3,699,186	450,423	493,548	5,247,860	66
		98n	0	0	0	149,823	231,726	50	1,199	382,798	1
*	Dimethylamine dicamba	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	7,981	0	0	0	0	0	803	8,784	0
		98o	0	0	0	0	0	0	88	88	0
		98n	No reports								
	N,N-Dimethylaniline	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	50,535	0	0	745,242	2,768	201,372	107,702	1,107,619	2
		98o	46,000	21,000	0	807,093	19,620	166,340	31,119	1,091,172	2
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
119-93-7	‡	3,3'-Dimethylbenzidine	88	No reports							
			95	No reports							
			98o	No reports							
			98n	2	10	0	0	0	10	250	260
79-44-7	‡	Dimethylcarbamyl chloride	88	No reports							
			95	No reports							
			98o	1	98	0	0	0	98	0	98
			98n	1	0	0	0	0	0	0	0
2524-03-0		Dimethyl chlorothio-phosphate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	10	0	51,677	20	51,707	0	51,707
			98o	3	77	0	4,300	0	4,377	0	4,377
			98n	No reports							
68-12-2	*,‡	N,N-Dimethyl-formamide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	143	2,352,993	73,106	1,099,000	1,710	3,526,809	286,316	3,813,125
			98o	169	999,781	43,057	272,325	31,907	1,347,070	693,400	2,040,470
			98n	45	2,267	5	11,857	0	14,129	1,470	15,599
57-14-7	*,‡	1,1-Dimethyl hydrazine	88	4	4,323	10	0	0	4,333	8,855	13,188
			95	4	299	0	0	0	299	5	304
			98o	4	496	0	0	0	496	0	496
			98n	1	0	0	0	0	0	0	0
105-67-9	*	2,4-Dimethylphenol	88	13	11,588	484	24,703	399	37,174	1,500	38,674
			95	19	52,797	33	79,000	5	131,835	17	131,852
			98o	25	36,023	56	187,076	0	223,155	1,177	224,332
			98n	3	2	0	0	0	2	0	2
131-11-3	*	Dimethyl phthalate	88	57	535,056	4,335	390	504	540,285	93,358	633,643
			95	86	361,287	275	1,000	5	362,567	2,524	365,091
			98o	96	250,701	627	2,950	825	255,103	34,961	290,064
			98n	25	259	0	0	670	929	1,827	2,756
77-78-1	‡	Dimethyl sulfate	88	33	10,806	610	0	50	11,466	0	11,466
			95	40	6,712	1	0	0	6,713	0	6,713
			98o	35	10,831	46	0	0	10,877	1,010	11,887
			98n	1	0	0	0	0	0	0	0
99-65-0		m-Dinitrobenzene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	547	849	0	1,066	2,462	0	2,462
			98o	1	383	517	0	516	1,416	0	1,416
			98n	No reports							
528-29-0		o-Dinitrobenzene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	65	109	0	136	310	0	310
			98o	2	49	66	0	66	181	0	181
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	3,3'-Dimethylbenzidine	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	505	48,005	0	5	48,515	0
‡	Dimethylcarbamyl chloride	88	No reports								
		95	No reports								
		98o	0	0	0	0	27,113	0	98	27,211	0
		98n	0	0	0	0	0	0	0	0	0
	Dimethyl chlorothio-phosphate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	51,727	51,727	0
		98o	0	0	0	0	1,960	0	4,331	6,291	0
		98n	No reports								
*,‡	N,N-Dimethyl-formamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,738,418	389,337	8,565,430	3,642,854	14,698,078	3,084,481	3,689,071	38,807,669	246
		98o	9,700,653	183,669	9,778,803	7,651,442	13,673,406	5,223,010	2,192,997	48,403,980	1,454
		98n	78,590	91	0	577,285	345,236	32,918	19,179	1,053,299	2
*,‡	1,1-Dimethyl hydrazine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	57	0	0	3,639	10	302	4,008	0
		98o	0	0	0	300	1,218	3,913	493	5,924	0
		98n	0	0	0	0	0	0	0	0	0
*	2,4-Dimethylphenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	37,140	30,368	1,573,273	50,362	397,965	75,967	131,351	2,296,426	24
		98o	6,240	93,314	1,491,389	42,851	530,961	29,711	224,073	2,418,539	193
		98n	0	0	0	0	18,158	0	2	18,160	0
*	Dimethyl phthalate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,288	800	253,605	69,549	356,058	221,729	364,780	1,270,809	3
		98o	1,300	11	401,458	83,861	976,252	23,677	307,454	1,794,013	264
		98n	0	0	0	152,247	104,268	1,810	267	258,592	1
‡	Dimethyl sulfate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	171,230	1	0	352,841	3	5,815	529,890	0
		98o	0	260,865	32,693	0	171,289	861	10,613	476,321	0
		98n	0	0	0	0	0	0	0	0	0
	m-Dinitrobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	848,213	0	2,462	850,675	0
		98o	0	0	0	0	516,692	0	1,416	518,108	0
		98n	No reports								
	o-Dinitrobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	445,133	0	310	445,443	0
		98o	0	0	0	0	66,089	0	181	66,270	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
100-25-4		p-Dinitrobenzene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	16	30	0	37	83	0	83
			98o	1	13	18	0	18	49	0	49
			98n	No reports							
88-85-7	*	Dinitrobutyl phenol	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	879	2	0	0	881	0	881
			98o	5	1,051	0	0	0	1,051	6,843	7,894
			98n	2	6	0	0	0	6	45	51
534-52-1	*	4,6-Dinitro-o-cresol	88	10	274	266	0	2	542	46,648	47,190
			95	5	130	0	4,649	0	4,779	7,220	11,999
			98o	7	104	0	0	1,101	1,205	123,944	125,149
			98n	1	130	0	0	9,700	9,830	1,388	11,218
51-28-5	*	2,4-Dinitrophenol	88	11	20,825	98,692	86,200	257	205,974	110,285	316,259
			95	4	112	2,000	0	0	2,112	0	2,112
			98o	6	183	23,617	0	0	23,800	0	23,800
			98n	2	341	0	0	11,000	11,341	1,632	12,973
121-14-2	‡	2,4-Dinitrotoluene	88	13	93,257	12,055	106,400	14,961	226,673	124,281	350,954
			95	4	1,874	231	0	0	2,105	94	2,199
			98o	5	1,829	187	0	0	2,016	0	2,016
			98n	8	166	0	0	10,000	10,166	8,741	18,907
606-20-2	‡	2,6-Dinitrotoluene	88	7	87,597	957	27,000	0	115,554	30,882	146,436
			95	1	469	126	0	0	595	0	595
			98o	1	467	62	0	0	529	0	529
			98n	2	5	0	0	0	5	0	5
25321-14-6		Dinitrotoluene (mixed isomers)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	6	14,811	284	17,000	0	32,095	6	32,101
			98o	8	26,639	1	36,000	0	62,640	1,402	64,042
			98n	4	0	0	5	0	5	1	6
39300-45-3	*	Dinocap	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	255	0	0	0	255	0	255
			98n	No reports							
123-91-1	‡	1,4-Dioxane	88	73	612,633	203,320	0	11,702	827,655	10,954	838,609
			95	54	223,144	160,666	0	5,736	389,546	352,996	742,542
			98o	47	121,316	144,534	0	22,121	287,971	476,531	764,502
			98n	8	836	0	250	10,000	11,086	1,608	12,694
122-39-4	*	Diphenylamine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	23	50,706	200	9,060	65	60,031	34,727	94,758
			98o	26	61,012	25	9,665	250	70,952	43,509	114,461
			98n	4	20	0	0	0	20	46,693	46,713

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	p-Dinitrobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	29,589	0	83	29,672	0
		98o	0	0	0	0	18,024	0	49	18,073	0
		98n	No reports								
*	Dinitrobutyl phenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	263,629	0	34,226	110	881	298,846	0
		98o	0	0	310,000	0	12,003	0	7,891	329,894	0
		98n	0	0	0	0	47,850	0	51	47,901	0
*	4,6-Dinitro-o-cresol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	844,907	410	18,000	13,950	7,365	884,632	0
		98o	0	0	1,466,262	10,696	31,000	6,029	123,791	1,637,778	0
		98n	0	0	0	0	360	46	11,000	11,406	0
*	2,4-Dinitrophenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	556,712	9	1,160,000	220	2,103	1,719,044	0
		98o	0	0	562,709	29,118	1,770,236	0	23,800	2,385,863	1
		98n	0	0	0	0	246,877	53	13,191	260,121	0
‡	2,4-Dinitrotoluene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	42,345	9	27,115	1,381	2,200	73,050	0
		98o	0	0	41,135	9,706	53,539	1,100	2,059	107,539	0
		98n	0	0	0	0	107,067	685	12,031	119,783	1
‡	2,6-Dinitrotoluene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	6,160	1	9,180	118	595	16,054	0
		98o	0	0	0	0	44,509	118	529	45,156	0
		98n	0	0	0	0	3,755	37	1	3,793	1
	Dinitrotoluene (mixed isomers)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	9,100	181,321	882,089	32,321	1,104,831	2,500
		98o	0	202,569	0	6	114,686	587,330	63,375	967,966	8,700
		98n	0	0	0	6	86,495	0	4	86,505	0
*	Dinocap	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	109	8	117	0
		98n	No reports								
‡	1,4-Dioxane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	74,293	11,324	1,975,960	1,196,352	1,019,104	305,315	790,118	5,372,466	232
		98o	1,120,000	4,101	595,806	680,377	1,800,876	415,211	832,719	5,449,090	20
		98n	0	0	0	454,236	26,614	3,549	12,814	497,213	1
*	Diphenylamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	976,755	11,600	1,100,115	264,471	46,428	722,296	95,833	3,217,498	0
		98o	199,400	35,131	4,769,102	823,607	21,971	77,905	85,306	6,012,422	5,700
		98n	0	0	0	0	224,324	0	104	224,428	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
122-66-7	‡	1,2-Diphenylhydrazine	88	No reports							
			95	No reports							
			98o	No reports							
			98n	2	5	0	0	0	5	0	5
2164-07-0	*	Dipotassium endothall	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	2	20	0	0	0	20	0	20
			98n	No reports							
136-45-8	*	Dipropyl isocinchomeronate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
138-93-2	*	Disodium cyanodithio-imidocarbonate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	0	0	0	0	0	0	0
			98o	5	0	0	0	0	0	0	0
			98n	No reports							
330-54-1	*	Diuron	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	8	2,765	10	0	5	2,780	1,950	4,730
			98o	11	3,323	260	0	0	3,583	14,100	17,683
			98n	2	0	5	0	35,756	35,761	0	35,761
2439-10-3	*	Dodine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	10	0	0	0	10	0	10
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
120-36-5	*‡	2,4-DP	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	260	0	0	0	260	17	277
			98o	3	0	0	0	0	0	0	0
			98n	No reports							
2702-72-9	*,‡	2,4-D sodium salt	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
106-89-8	*,‡	Epichlorohydrin	88	78	707,107	4,917	68,750	2,524	783,298	307	783,605
			95	69	321,450	26,937	0	18,874	367,261	893	368,154
			98o	73	198,144	434	0	2,063	200,641	7,751	208,392
			98n	8	45	0	12,162	0	12,207	8,852	21,059
13194-48-4	*	Ethoprop	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	6	506	0	0	174,290	174,796	0	174,796
			98o	6	34	0	0	116,444	116,478	0	116,478
			98n	1	0	0	0	0	0	6	6

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	1,2-Diphenylhydrazine	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	5,485	55	1	5,541	1
*	Dipotassium endothall	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	1,900	5,400	201	7,501	0
		98n	No reports								
*	Dipropyl isocinchomeronate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Disodium cyaodithio-imidocarbonate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Diuron	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	300	0	0	2	0	5,711	6,568	12,581	0
		98o	250	0	0	0	0	20,767	7,292	28,309	126
		98n	0	0	0	0	0	0	35,761	35,761	5
*	Dodine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	270	5	275	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*,‡	2,4-DP	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,633	0	0	0	0	11	536	6,180	1
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*,‡	2,4-D sodium salt	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	5,139	0	0	5,139	0
		98o	0	0	0	0	4,600	0	0	4,600	0
		98n	No reports								
*,‡	Epichlorohydrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	13,263,282	0	4,331,319	171,461	4,191,554	952,542	343,603	23,253,761	20,516
		98o	10,499,178	17,715	4,809,942	77,141	24,705,838	953,525	200,226	41,263,565	2
		98n	0	0	49,900	8,069	546,631	0	23,091	627,691	0
*	Ethoprop	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	9	0	0	0	0	9,404	174,442	183,855	2
		98o	95	0	0	0	0	4,943	116,478	121,516	2
		98n	0	0	0	0	12,176	0	6	12,182	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
110-80-5		2-Ethoxyethanol	88	110	2,431,310	120,164	0	52	2,551,526	71,142	2,622,668
			95	40	222,940	891	0	0	223,831	12,595	236,426
			98o	26	88,215	1	0	0	88,216	2,013	90,229
			98n	14	550	0	0	0	550	976	1,526
140-88-5	‡	Ethyl acrylate	88	105	245,982	1,211	0	265	247,458	7,110	254,568
			95	106	207,444	542	0	523	208,509	10,182	218,691
			98o	100	122,775	110	0	524	123,409	12,016	135,425
			98n	10	3,372	0	0	0	3,372	22,464	25,836
100-41-4		Ethylbenzene	88	564	7,718,781	15,970	72,914	175,180	7,982,845	421,334	8,404,179
			95	1,028	10,236,713	9,343	475,234	19,174	10,740,464	164,501	10,904,965
			98o	1,016	8,370,121	7,657	763,279	18,637	9,159,694	146,456	9,306,150
			98n	612	129,026	2,751	913	14,226	146,916	89,156	236,072
541-41-3		Ethyl chloroformate	88	5	13,903	0	0	0	13,903	0	13,903
			95	3	2,020	5	0	5	2,030	0	2,030
			98o	5	3,599	5	0	5	3,609	0	3,609
			98n	No reports							
759-94-4	*	Ethyl dipropylthio-carbamate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	2,363	291	373	0	3,027	9,366	12,393
			98o	5	2,008	115	2,088	0	4,211	4,565	8,776
			98n	1	0	0	0	0	0	0	0
74-85-1	*	Ethylene	88	274	50,503,039	15,214	17,203	13,250	50,548,706	11,432	50,560,138
			95	289	35,261,213	27,574	0	16	35,288,803	1,771	35,290,574
			98o	312	30,716,905	3,059	4,217	83	30,724,264	1,815	30,726,079
			98n	9	46,345	0	0	0	46,345	0	46,345
—		Ethylenebisdithio-carbamic acid, salts and esters	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	1,630	0	0	0	1,630	0	1,630
			98o	4	164	0	0	0	164	513	677
			98n	1	0	0	0	0	0	0	0
107-21-1	*	Ethylene glycol	88	1,455	13,218,339	3,747,561	7,927,570	736,344	25,629,814	2,595,276	28,225,090
			95	1,308	7,233,091	843,748	12,554,675	853,545	21,485,059	1,469,704	22,954,763
			98o	1,258	5,997,735	818,962	327,030	460,017	7,603,744	1,182,583	8,786,327
			98n	389	26,050	112,980	215,158	443,268	797,456	9,274,038	10,071,494
151-56-4	‡	Ethyleneimine	88	1	500	0	0	0	500	0	500
			95	1	3	0	0	0	3	0	3
			98o	1	21	0	0	0	21	0	21
			98n	1	13	0	0	0	13	0	13
75-21-8	*,‡	Ethylene oxide	88	203	4,640,310	44,851	11,125	54,700	4,750,986	20,663	4,771,649
			95	168	868,631	5,230	130,000	2,208	1,006,069	8,663	1,014,732
			98o	135	519,818	372	22,561	1,751	544,502	1,860	546,362
			98n	20	105,764	0	0	0	105,764	0	105,764

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	2-Ethoxyethanol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,300	1,720	434,164	142,160	1,332,131	438,878	222,188	2,573,541	36,529
		98o	1,400	0	584,971	93,670	507,214	847,586	112,491	2,147,332	10,517
		98n	0	26,052	0	2,939,348	77,858	15,458	1,509	3,060,225	0
‡	Ethyl acrylate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	79	32,449	8,159,780	1,356,212	487,840	96,769	217,434	10,350,563	24,065
		98o	381,888	191	8,430,355	1,517,504	1,178,663	353,939	137,213	11,999,753	4,154
		98n	0	9,269	0	887,313	252,221	45	3,633	1,152,481	1
	Ethylbenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	24,893,644	6,757,634	40,925,948	11,300,047	19,263,964	1,785,143	10,807,395	115,733,775	13,361
		98o	28,506,895	6,050,715	36,727,663	9,898,383	15,620,261	2,283,188	9,300,657	108,387,762	53,196
		98n	2,438,424	382,491	42,357	18,853,610	2,412,294	1,404,905	581,622	26,115,703	101,977
	Ethyl chloroformate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	3,300	0	1,980	5,280	10
		98o	0	0	0	0	53,660	0	3,375	57,035	0
		98n	No reports								
*	Ethyl dipropylthio-carbamate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	6,500	33,010	12,476	51,986	0
		98o	0	0	0	0	70,619	33,089	8,528	112,236	524
		98n	0	0	0	0	11,716	0	0	11,716	0
*	Ethylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	196,803,539	3	403,745,755	10,615,177	495,602,266	2,116,568	34,809,790	1,143,693,098	765,804
		98o	123,871,793	0	631,048,101	12,978,078	509,119,560	3,013,379	29,003,012	1,309,033,923	1,428,760
		98n	0	0	0	0	540	0	46,087	46,627	0
	Ethylenebisdithio-carbamic acid, salts and esters	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	7,250	1,500	8,750	1
		98o	0	0	0	0	0	3,329	672	4,001	0
		98n	0	0	0	0	0	0	0	0	0
*	Ethylene glycol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	366,424,640	101,754,650	5,926,147	13,162,886	65,627,898	34,340,979	22,570,467	609,807,667	305,207
		98o	461,196,215	49,551,219	6,683,532	18,791,819	64,458,609	28,712,462	9,701,069	639,094,925	809,151
		98n	3,014,678	10,218,622	12,386	3,496,861	1,922,467	541,185	9,317,035	28,523,234	124,390
‡	Ethyleneimine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	34,000	0	3	34,003	0
		98o	0	0	0	0	24,000	0	21	24,021	0
		98n	0	0	0	31,069	0	0	13	31,082	1
*,‡	Ethylene oxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	127,110	307	16,940	0	9,974,486	70,255	1,002,603	11,191,701	15,974
		98o	20,146	1,140	13,121	10	7,992,815	179,219	493,897	8,700,348	54,313
		98n	0	0	0	1,043,180	2,998,788	10,810	105,044	4,157,822	108

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
96-45-7	*,‡	Ethylene thiourea	88	6	500	0	0	0	500	2,250	2,750
			95	11	775	0	0	0	775	19,665	20,440
			98o	14	299	5	0	0	304	6,387	6,691
			98n	2	0	0	0	0	0	0	0
75-34-3		Ethylidene dichloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	40,471	16	0	0	40,487	0	40,487
			98o	7	22,388	0	0	0	22,388	0	22,388
			98n	6	393	0	0	0	393	8	401
52-85-7	*	Famphur	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	9,200	9,200
			98n	1	5	0	0	0	5	0	5
60168-88-9	*	Fenarimol	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	1,000	0	0	0	1,000	0	1,000
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
13356-08-6	*	Fenbutatin oxide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	2	664	0	660	0	1,324	0	1,324
			98n	No reports							
72490-01-8	*	Fenoxycarb	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	1	1
			98n	No reports							
39515-41-8	*	Fenpropathrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
55-38-9	*	Fenthion	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	1	0	0	0	1	0	1
			98n	No reports							
51630-58-1	*	Fenvalerate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	No reports							
			98n	No reports							
69806-50-4	*	Fluazifop butyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	0	0	0	0	0	0	0
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
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Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*,‡	Ethylene thiourea	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1	840	0	0	1	6,282	19,877	27,001	1
		98o	430	565	0	0	0	8,632	6,635	16,262	1
		98n	0	0	0	0	0	0	0	0	0
	Ethylidene dichloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,300,000	0	92,000	0	1,532,000	19,149	40,156	2,983,305	15,005
		98o	1,600,000	0	1,431,278	0	2,332,070	23,768	22,248	5,409,364	89
		98n	0	0	0	10,275	35,933	4,528,132	395	4,574,735	1
*	Famphur	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	3,758	0	3,758	0
		98o	0	0	0	0	0	46,000	0	46,000	9
		98n	0	0	0	0	25,761	0	7	25,768	0
*	Fenarimol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	310	650	960	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Fenbutatin oxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	1,324	1,324	0
		98n	No reports								
*	Fenoxycarb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	40,000	0	1	40,001	0
		98n	No reports								
*	Fenpropathrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Fenthion	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	960	1	961	0
		98n	No reports								
*	Fenvalerate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	No reports								
		98n	No reports								
*	Fluazifop butyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
2164-17-2	*	Fluometuron	88	2	500	0	0	0	500	3,700	4,200
			95	6	796	0	0	0	796	2,355	3,151
			98o	5	782	0	0	0	782	745	1,527
			98n	No reports							
7782-41-4		Fluorine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	7	18,319	15,000	0	0	33,319	0	33,319
			98o	10	81,938	49,857	0	0	131,795	0	131,795
			98n	2	39,082	0	0	90,778	129,860	0	129,860
51-21-8		Fluorouracil	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	0	0	0	250	250	250	500
			98n	No reports							
69409-94-5	*	Fluvalinate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
133-07-3	*	Folpet	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	16	5	0	0	21	1,941	1,962
			98o	8	56	10	0	0	66	4,103	4,169
			98n	No reports							
72178-02-0		Fomesafen	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	10	0	0	0	10	750	760
			98o	2	884	1,532	0	0	2,416	9,191	11,607
			98n	1	0	0	0	0	0	0	0
50-00-0	*,‡	Formaldehyde	88	823	12,459,138	904,547	9,608,524	494,111	23,466,320	1,409,999	24,876,319
			95	796	11,711,482	274,717	7,313,034	132,453	19,431,686	211,126	19,642,812
			98o	818	11,648,245	296,570	9,648,556	203,948	21,797,319	358,660	22,155,979
			98n	41	1,791,552	250	76,238	83,859	1,951,899	8,909	1,960,808
64-18-6	*	Formic acid	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	261	592,387	15,759	11,492,418	3,205	12,103,769	26,357	12,130,126
			98o	267	955,557	95,918	10,842,580	3,294	11,897,349	47,909	11,945,258
			98n	50	3,053	19	326,344	66,252	395,668	3,175	398,843
76-13-1		Freon 113	88	1,438	70,382,591	32,894	5,965	27,799	70,449,249	1,924,043	72,373,292
			95	137	2,594,436	3,829	6	0	2,598,271	2,560	2,600,831
			98o	31	921,571	1,627	0	0	923,198	4,287	927,485
			98n	18	1,007	0	0	0	1,007	746	1,753
—		Glycol ethers	88	1,628	48,881,581	285,937	362,198	105,185	49,634,901	1,547,840	51,182,741
			95	2,166	45,051,120	183,996	132,064	24,895	45,392,075	771,952	46,164,027
			98o	1,998	37,257,860	192,191	1,370	45,071	37,496,492	834,835	38,331,327
			98n	255	30,539	5	0	28,925	59,469	26,542	86,011

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
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98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
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.
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Fluometuron	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	2	0	16,900	5,646	22,548	13,000
		98o	0	0	0	0	25,000	8,541	1,385	34,926	0
		98n	No reports								
	Fluorine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	15,000	0	33,300	48,300	0
		98o	0	0	0	0	17,450	36,510	131,795	185,755	3
		98n	0	0	0	0	0	0	129,859	129,859	0
	Fluorouracil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	964	0	0	0	0	0	0	964	0
		98n	No reports								
*	Fluvalinate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Folpet	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	80	0	0	801	290	1,962	3,133	0
		98o	2	0	0	0	2,100	0	4,121	6,223	0
		98n	No reports								
	Fomesafen	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	200	200	0
		98o	0	0	0	0	56,080	8,845	12,776	77,701	0
		98n	0	0	0	0	12,741	0	0	12,741	0
*,‡	Formaldehyde	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	76,061,072	56,999	6,758,262	423,718	68,648,246	2,907,320	19,502,149	174,357,766	268,363
		98o	101,303,291	591,297	14,704,847	369,863	92,388,474	3,661,485	21,617,549	234,636,806	16,037
		98n	189	0	5,866	1,605,980	531,568	15,276	1,954,562	4,113,441	2
*	Formic acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	95,200	28	7,215,445	236,018	104,948,398	3,705,608	12,253,610	128,454,307	15
		98o	808,843	14	5,818,086	1,774,563	180,458,105	6,145,205	12,185,949	207,190,765	6
		98n	0	0	0	1,973,764	242,561	10,654	395,995	2,622,974	4
	Freon 113	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,355,210	913,898	0	103,937	260,926	582,454	2,599,238	6,815,663	30,141
		98o	407,512	73,959	39,916	12,608	3,372	139,670	917,464	1,594,501	6,307
		98n	38,879	67	0	106,221	1,167,895	5,160,551	1,769	6,475,382	3
	Glycol ethers	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	197,122,089	3,674,881	42,690,470	13,397,657	30,673,841	10,274,521	47,132,123	344,965,582	35,387
		98o	141,400,516	3,886,489	32,790,636	13,048,502	32,407,307	10,640,412	39,505,070	273,678,932	377,224
		98n	533,705	164,569	135,664	1,801,564	842,302	207,384	79,064	3,764,252	5,273

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
76-44-8	*,‡	Heptachlor	88	2	54,295	2	0	0	54,297	0	54,297
			95	1	203	6	0	0	209	0	209
			98o	No reports							
			98n	6	137	0	5	0	142	12	154
118-74-1	*,‡	Hexachlorobenzene	88	9	4,045	4	410	0	4,459	443,541	448,000
			95	9	566	6,458	480	0	7,504	6,975	14,479
			98o	12	375	4	0	96	475	13,251	13,726
			98n	5	15	0	0	0	15	77	92
87-68-3		Hexachloro-1,3-butadiene	88	9	2,508	153	220	0	2,881	19,640	22,521
			95	7	3,310	661	434	0	4,405	252	4,657
			98o	7	2,421	5	0	0	2,426	510	2,936
			98n	7	280	250	5	0	535	480	1,015
77-47-4	*	Hexachlorocyclopentadiene	88	5	78,317	6	2,131	0	80,454	28,470	108,924
			95	4	8,311	6	250	0	8,567	2,600	11,167
			98o	4	5,791	0	250	5,520	11,561	200	11,761
			98n	4	10	0	0	0	10	500	510
67-72-1	*	Hexachloroethane	88	22	19,077	11	520	1	19,609	128,504	148,113
			95	21	14,551	3,330	1,378	0	19,259	1,208	20,467
			98o	14	2,240	0	295	0	2,535	696	3,231
			98n	7	862	0	0	0	862	628	1,490
70-30-4	*	Hexachlorophene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
110-54-3		n-Hexane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	722	81,904,154	46,402	5,380	11,559	81,967,495	120,069	82,087,564
			98o	802	66,865,261	13,904	26,506	19,837	66,925,508	88,903	67,014,411
			98n	648	955,042	1,667	0	3,328	960,037	44,759	1,004,796
51235-04-2	*	Hexazinone	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	760	6,322	0	0	7,082	2,973	10,055
			98o	5	266	2,215	0	0	2,481	750	3,231
			98n	No reports							
67485-29-4	*	Hydramethylnon	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	20	0	0	0	20	0	20
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
302-01-2	‡	Hydrazine	88	55	35,199	2,149	0	29	37,377	24,522	61,899
			95	47	13,945	3	0	5	13,953	23,504	37,457
			98o	45	10,908	188	695	251	12,042	336	12,378
			98n	19	290	0	26,116	120	26,526	824	27,350

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*,‡	Heptachlor	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	3,850	851	209	4,910	0
		98o	No reports								
		98n	0	0	0	0	443,474	35	153	443,662	0
*,‡	Hexachlorobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	6,200	1	0	0	2,865,008	428,747	18,549	3,318,505	19
		98o	8,100	1	114,000	3,769	1,577,157	18,214	13,640	1,734,881	0
		98n	0	0	0	0	86,605	38	88	86,731	1
	Hexachloro-1,3-butadiene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	13	133,000	0	6,778,662	164,970	4,444	7,081,089	660,211
		98o	0	0	15,200	0	4,289,000	162,314	2,691	4,469,205	410
		98n	0	0	0	0	283,141	40	363	283,544	1
*	Hexachlorocyclopentadiene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	272,865	24,908	11,083	308,856	76
		98o	0	0	0	552	882,835	100,678	6,244	990,309	4,800
		98n	0	0	0	0	21,880	2,695,206	151	2,717,237	1
*	Hexachloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,800	0	1,232,400	75,132	4,875,108	109,188	30,153	6,326,781	129,205
		98o	1,100,000	0	1,134,700	85,401	3,887,000	52,877	2,496	6,262,474	36
		98n	0	0	0	2,214	543,137	2	1,138	546,491	0
*	Hexachlorophene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
	n-Hexane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,125,732,524	7,007,918	25,411,631	14,617,991	50,038,583	8,044,247	81,960,875	4,312,813,769	80,384
		98o	985,816,389	13,489,065	42,791,587	19,200,647	65,074,198	5,166,441	66,058,668	1,197,596,995	71,056
		98n	4,628,004	392,647	79,618	11,017,946	5,885,735	1,126,869	1,331,954	24,462,773	28,170
*	Hexazinone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	50	0	0	0	6,954	216,172	9,410	232,586	0
		98o	0	0	0	0	110,000	201,891	8,580	320,471	0
		98n	No reports								
*	Hydramethylnon	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	3	17	20	0
		98o	0	0	0	0	0	0	24	24	0
		98n	No reports								
‡	Hydrazine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	300	452	0	0	42,705	8,747	37,231	89,435	1
		98o	25	0	0	297	99,831	302,455	37,526	440,134	1
		98n	0	0	0	1,762	179,583	0	27,126	208,471	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
10034-93-2	‡	Hydrazine sulfate	88	4	1,172	0	355,000	0	356,172	0	356,172
			95	3	0	0	260,000	0	260,000	0	260,000
			98o	1	0	0	200,000	0	200,000	0	200,000
			98n	No reports							
7647-01-0	*	Hydrochloric acid	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1,951	70,035,129	6,871	788,214	394,091	71,224,305	2,369,337	73,593,642
			98o	956	53,980,140	2,575	100,099	21,860	54,104,674	1,313,970	55,418,644
			98n	528	535,682,717	11	0	364,418	536,047,146	510	536,047,656
74-90-8	*	Hydrogen cyanide	88	35	1,109,277	2,300	1,737,850	1,761	2,851,188	1,001	2,852,189
			95	51	2,481,956	763	683,154	3	3,165,876	326	3,166,202
			98o	49	1,455,153	308	590,597	13	2,046,071	2,729	2,048,800
			98n	27	612,155	0	0	112,505	724,660	0	724,660
7664-39-3	*	Hydrogen fluoride	88	536	14,732,294	189,928	250	13,002	14,935,474	3,467,471	18,402,945
			95	570	11,924,646	8,702	3,845	24,078	11,961,271	1,019,993	12,981,264
			98o	618	15,507,558	23,194	0	12,740	15,543,492	55,434	15,598,926
			98n	403	64,851,687	636	2,900,000	589,242	68,341,565	55,247	68,396,812
123-31-9		Hydroquinone	88	61	10,334	7,211	375,400	530	393,475	6,835	400,310
			95	64	17,450	5,093	340,005	43	362,591	4,406	366,997
			98o	58	13,867	1,558	332,000	0	347,425	27,893	375,318
			98n	5	2	0	15,309	0	15,311	178	15,489
35554-44-0	*	Imazalil	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	0	0	0	0	0	10	10
			98n	No reports							
55406-53-6	*	3-Iodo-2-propynyl butyl-carbamate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	11	3,959	10	0	265	4,234	12,763	16,997
			98o	21	3,393	10	0	291	3,694	7,352	11,046
			98n	No reports							
13463-40-6		Iron pentacarbonyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	1,530	0	0	0	1,530	0	1,530
			98o	1	1,475	0	0	0	1,475	0	1,475
			98n	No reports							
78-84-2		Isobutyraldehyde	88	15	685,918	773	60	1	686,752	0	686,752
			95	24	256,279	752	44,075	47	301,153	0	301,153
			98o	20	254,460	1,182	0	0	255,642	172,233	427,875
			98n	2	165	0	0	0	165	5	170
25311-71-1	*	Isofenphos	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	2,907	0	0	9,000	11,907	11,300	23,207
			98o	2	10	0	0	0	10	0	10
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	Hydrazine sulfate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,900	1,900	260,000	263,800	0
		98o	0	0	0	0	0	0	200,000	200,000	0
		98n	No reports								
*	Hydrochloric acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	195,177,825	15,863,343	100,650	1,510	1,039,336,992	26,017,023	71,537,844	1,348,035,187	89,902
		98o	85,368,494	2,738,128	190,000	12,782	720,545,660	6,621,713	54,377,284	869,854,061	53,085
		98n	0	0	0	231,145	194,330,284	1,567	536,103,880	730,666,876	120,519
*	Hydrogen cyanide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	72,134	0	33,141,239	70	25,143,135	10,443	3,141,004	61,508,025	27,155
		98o	57,228	0	24,442,117	0	21,192,963	465	2,042,973	47,735,746	288
		98n	53,473	0	0	0	42,101	0	728,335	823,909	6
*	Hydrogen fluoride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	92,471,855	223,187	0	9,201	103,247,769	2,551,491	12,739,021	211,242,524	11,497
		98o	134,349,442	147,393	0	4,910	112,787,654	2,357,993	15,412,306	265,059,698	11,213
		98n	0	8,858	0	0	32,514,601	28,456	68,475,133	101,027,048	53
	Hydroquinone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	960	0	986,933	37,786	412,185	86,342	363,320	1,887,526	45
		98o	3,200	0	848,845	10,066	400,144	126,922	359,750	1,748,927	1
		98n	0	0	0	11,765	85,610	231	15,311	112,917	0
*	Imazalil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	15	0	15	15
		98n	No reports								
*	3-Iodo-2-propynyl butyl-carbamate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,755	2	0	1	300	62,552	5,151	69,761	2
		98o	30,906	0	400	5,561	334	123,399	6,271	166,871	1
		98n	No reports								
	Iron pentacarbonyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	1,379	1,379	0
		98o	0	0	0	0	0	0	1,475	1,475	0
		98n	No reports								
	Isobutyraldehyde	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	9,647	1,193,119	567,515	609,409	76,894	300,129	2,756,713	4
		98o	0	48,000	1,509,037	550,059	1,118,885	118,174	429,051	3,773,206	221
		98n	0	0	0	32,119	15,206	659	165	48,149	0
*	Isofenphos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	690	0	0	0	0	20,300	11,612	32,602	1
		98o	2,000	0	0	0	0	114	10	2,124	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
67-63-0	*	Isopropyl alcohol (manufacturing)	88	91	2,001,397	1,900	0	14	2,003,311	247,039	2,250,350
			95	72	937,246	0	0	0	937,246	2,577	939,823
			98o	68	586,639	250	0	10	586,899	16,101	603,000
			98n	12	1,952	750	198,023	0	200,725	43,548	244,273
80-05-7		4,4'-Isopropylidene-diphenol	88	79	226,926	126,385	0	424,117	777,428	444,560	1,221,988
			95	113	155,599	5,809	82,000	86,697	330,105	425,671	755,776
			98o	121	187,470	7,658	0	66,737	261,865	581,324	843,189
			98n	6	262	0	0	56,423	56,685	1,559	58,244
120-58-1		Isosafrole	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
77501-63-4	*	Lactofen	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	787	0	0	0	787	250	1,037
			98o	1	3	0	0	0	3	0	3
			98n	No reports							
7439-92-1	‡	Lead	88	865	1,128,042	61,776	0	6,648,926	7,838,744	12,274,686	20,113,430
			95	852	850,408	11,403	0	2,361,320	3,223,131	2,568,634	5,791,765
			98o	796	330,447	13,128	0	3,294,660	3,638,235	5,695,962	9,334,197
			98n	55	4,837	139	23,068	12,705,039	12,733,083	1,158,533	13,891,616
—		Lead compounds	88	736	1,555,082	180,368	2,755	20,035,359	21,773,564	15,929,201	37,702,765
			95	848	1,227,418	53,617	912	13,486,182	14,768,129	19,131,070	33,899,199
			98o	833	848,992	37,272	171,660	16,243,785	17,301,709	16,910,175	34,211,884
			98n	253	348,276	77,079	7,280,139	224,273,047	231,978,541	5,242,672	237,221,213
58-89-9	*,‡	Lindane	88	3	258	0	0	0	258	56	314
			95	10	510	0	0	0	510	20	530
			98o	10	26	5	0	0	31	3	34
			98n	6	53	0	0	25,654	25,707	126	25,833
330-55-2	*	Linuron	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	270	5	0	5	280	1,250	1,530
			98o	2	1,010	5	0	0	1,015	750	1,765
			98n	1	5	0	0	0	5	0	5
554-13-2		Lithium carbonate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	27	14,977	0	0	0	14,977	601,200	616,177
			98o	40	7,297	255	114	32,284	39,950	292,657	332,607
			98n	No reports							
121-75-5	*	Malathion	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	21	2,512	0	0	0	2,512	31	2,543
			98o	17	2,017	255	0	0	2,272	1,004	3,276
			98n	6	10	0	0	20,222	20,232	159	20,391

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Isopropyl alcohol (manufacturing)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	62,894	48,179	2,684,671	93,871	178,156	232,658	743,206	4,043,635	9
		98o	11,355	146,022	3,683,269	123,138	148,574	63,213	627,993	4,803,564	8
		98n	67,931	0	0	829,567	3,408	0	199,048	1,099,954	1
	4,4'-Isopropylidene-diphenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	56,348	2,377	5,024,865	28,758	824,095	127,796	646,822	6,711,061	121,312
		98o	104,158	71,832	9,043,549	87,999	1,636,775	175,248	842,492	11,962,053	3,477
		98n	0	0	0	0	137,341	2,035	56,554	195,930	0
	Isosafrole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
*	Lactofen	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	100	0	0	0	0	1	520	621	1,044
		98o	0	0	0	0	0	89	3	92	0
		98n	No reports								
‡	Lead	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	211,549,623	60,181,154	49,836	5,677	1,631,276	1,927,983	4,417,252	279,762,801	36,143
		98o	243,747,586	37,411,722	242,740	6,659	1,666,184	762,363	8,151,248	291,988,502	424,978
		98n	414	32,644	0	12,582	1,293,653	136,143	12,687,327	14,162,763	2,669
	Lead compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	501,667,398	297,134,586	0	64,595	28,891,307	7,389,216	26,859,464	862,006,566	3,696,932
		98o	419,782,695	288,540,293	33,631	25,013	92,646	3,107,015	42,282,215	753,863,508	1,499,013
		98n	8,436,286	1,140,645	0	25	149,746	37,291	251,863,784	261,627,777	62,558
*,‡	Lindane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	326	0	0	0	0	3,206	272	3,804	0
		98o	168	0	0	0	0	8,164	126	8,458	1
		98n	0	0	0	100,903	118,134	222	25,833	245,092	1
*	Linuron	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	1	0	734	797	1,532	0
		98o	25	0	0	0	0	500	550	1,075	0
		98n	0	0	0	2,214	14,516	0	4	16,734	0
	Lithium carbonate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	18,000	0	0	0	2,200	690	168,400	189,290	446,000
		98o	50,759	0	0	0	1,400	3,080	300,884	356,123	0
		98n	No reports								
*	Malathion	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	197	0	0	0	0	819	1,073	2,089	1
		98o	1,187	0	0	0	0	1,841	1,649	4,677	1
		98n	0	0	0	0	180,176	0	20,390	200,566	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
108-31-6		Maleic anhydride	88	199	676,778	12,580	240,000	250	929,608	132,148	1,061,756
			95	209	347,391	18	5	1,406	348,820	14,429	363,249
			98o	208	356,998	11	0	4,430	361,439	35,131	396,570
			98n	8	35	0	0	150,000	150,035	28,609	178,644
109-77-3		Malononitrile	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	432,956	0	432,956	0	432,956
			98o	4	510	0	111,100	0	111,610	0	111,610
			98n	1	0	0	0	0	0	0	0
12427-38-2	*	Maneb	88	6	2,265	250	0	0	2,515	5,285	7,800
			95	6	273	0	0	0	273	2,461	2,734
			98o	7	5	0	0	0	5	2,288	2,293
			98n	No reports							
7439-96-5		Manganese	88	950	1,586,675	321,993	255	20,229,826	22,138,749	20,087,660	42,226,409
			95	1,574	699,897	117,277	17	8,279,054	9,096,245	12,753,204	21,849,449
			98o	1,751	970,658	260,403	3	9,995,895	11,226,959	15,033,357	26,260,316
			98n	70	31,064	147,437	0	10,898,943	11,077,444	1,354,432	12,431,876
—		Manganese compounds	88	545	1,801,463	681,469	6,816,070	84,227,842	93,526,844	20,670,921	114,197,765
			95	1,033	2,928,644	1,627,184	3,590	41,832,058	46,391,476	25,994,951	72,386,427
			98o	1,207	1,566,352	4,471,582	7,755,610	52,820,578	66,614,122	39,350,264	105,964,386
			98n	362	529,560	1,008,009	867,400	447,927,752	450,332,721	7,411,062	457,743,783
93-65-2	‡	Mecoprop	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	9	1,816	0	0	0	1,816	2,304	4,120
			98o	10	1,150	0	0	250	1,400	3,968	5,368
			98n	No reports							
149-30-4	*	2-Mercaptobenzo-thiazole	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	28	34,857	5	97,000	260	132,122	376,420	508,542
			98o	36	5,404	6,692	45,000	250	57,346	131,778	189,124
			98n	1	0	0	0	250,000	250,000	0	250,000
7439-97-6	*	Mercury	88	37	22,905	1,397	0	13,279	37,581	258,718	296,299
			95	24	13,262	192	0	1,016	14,470	14,228	28,698
			98o	24	12,591	134	0	3,069	15,794	14,827	30,621
			98n	11	9,416	0	0	236,003	245,419	14,418	259,837
—		Mercury compounds	88	15	2,376	9	27	0	2,412	17,916	20,328
			95	10	3,156	136	6	0	3,298	207,097	210,395
			98o	11	2,372	34	0	2,550	4,956	19,848	24,804
			98n	12	5,277	22	0	8,969,201	8,974,500	72,913	9,047,413
150-50-5	*	Merphos	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	186	0	0	0	186	0	186
			98o	1	0	0	0	0	0	0	0
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Maleic anhydride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,940	0	3,222,121	102,238	38,356,328	1,154,816	355,070	43,195,513	22,344
		98o	7,607	0	3,494,300	163,967	51,608,701	1,404,534	387,604	57,066,713	12,601
		98n	0	0	0	55,466	79,450	0	150,041	284,957	0
	Malononitrile	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	432,956	432,956	0
		98o	0	0	0	0	336,000	0	111,214	447,214	0
		98n	0	0	0	0	0	0	0	0	0
*	Maneb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	525	0	0	3	0	8,800	7,861	17,189	0
		98o	35	0	0	0	0	8,521	2,058	10,614	0
		98n	No reports								
	Manganese	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	40,683,309	73,869,285	0	141	173,632	1,781,616	20,973,185	137,481,168	709
		98o	39,088,597	49,254,611	0	543	540,544	660,084	23,889,936	113,434,315	623,860
		98n	1,150	125,963	0	0	113,857	0	12,406,958	12,647,928	7
	Manganese compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	145,348,527	87,413,189	0	199,783	1,023,502	5,906,367	66,220,898	306,112,266	1,350,557
		98o	22,641,871	47,254,605	22,153	35,980	1,884,784	5,375,594	110,516,713	187,731,700	332,373
		98n	85,140	153,515	0	0	3,909	73,171	457,683,762	457,999,497	70,959
‡	Mecoprop	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	15,614	0	0	0	940	1,037	3,659	21,250	1
		98o	872	0	0	1,000	500	451	4,887	7,710	0
		98n	No reports								
*	2-Mercaptobenzo-thiazole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	5,405	104,645	0	931,100	128,323	136,948	516,905	1,823,326	632
		98o	1,780	8,475	0	800,961	232,770	76,774	188,830	1,309,590	0
		98n	0	0	0	0	0	0	250,000	250,000	0
*	Mercury	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	413,832	58,151	0	0	6,307	11,009	17,996	507,295	2
		98o	455,629	34,068	0	0	4,315	1,165	20,609	515,786	1
		98n	0	0	0	0	0	0	260,436	260,436	0
	Mercury compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	125,287	0	0	61	0	4,597	25,638	155,583	179,000
		98o	573,026	5	0	0	0	5,411	18,413	596,855	860
		98n	65,400	114,138	0	0	0	236	9,054,650	9,234,424	2
*	Merphos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	186	186	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
126-98-7		Methacrylonitrile	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	945	0	555,265	0	556,210	0	556,210
			98o	5	900	0	54,730	0	55,630	0	55,630
			98n	2	800	0	0	0	800	0	800
137-42-8	*	Metham sodium	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	11	4,387	1	0	252	4,640	13,050	17,690
			98o	9	5,714	40	0	110	5,864	800	6,664
			98n	2	824	0	0	22,248	23,072	0	23,072
67-56-1	*	Methanol	88	2,507	259,691,589	17,139,114	26,587,686	11,911,136	315,329,525	15,290,643	330,620,168
			95	2,473	216,401,485	9,189,485	27,692,653	1,784,656	255,068,279	1,952,085	257,020,364
			98o	2,221	189,081,882	5,891,181	16,604,795	1,798,675	213,376,533	1,408,331	214,784,864
			98n	365	915,673	5,149	60,943	615,697	1,597,462	187,858	1,785,320
2032-65-7	*	Methiocarb	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
94-74-6	*,‡	Methoxone	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	1,261	0	0	0	1,261	1,810	3,071
			98o	6	1,255	0	0	250	1,505	3,749	5,254
			98n	No reports							
72-43-5	*	Methoxychlor	88	12	131,031	252	0	258	131,541	8	131,549
			95	2	0	0	0	0	0	0	0
			98o	4	0	0	0	0	0	0	0
			98n	4	12	0	0	25,474	25,486	0	25,486
109-86-4	*	2-Methoxyethanol	88	95	5,899,669	40,520	750	7	5,940,946	57,362	5,998,308
			95	47	897,628	12,407	0	5	910,040	535	910,575
			98o	51	1,011,484	16,882	0	23,500	1,051,866	83	1,051,949
			98n	14	329	0	51,963	0	52,292	884	53,176
96-33-3		Methyl acrylate	88	61	443,496	1,687	200	30,260	475,643	4,765	480,408
			95	71	325,454	5,962	159	0	331,575	865	332,440
			98o	64	245,029	761	53,244	0	299,034	50,575	349,609
			98n	8	24,273	0	0	14,000	38,273	3,680	41,953
1634-04-4		Methyl tert-butyl ether	88	90	2,588,247	21,499	14,400	370	2,624,516	4,602	2,629,118
			95	184	3,295,852	78,555	15,238	3,800	3,393,445	47,841	3,441,286
			98o	207	2,623,301	60,650	47,357	325	2,731,633	216,966	2,948,599
			98n	326	1,556,535	7,161	250	3,123	1,567,069	46,503	1,613,572
79-22-1		Methyl chlorocarbonate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	2,595	5	0	5	2,605	0	2,605
			98o	4	2,052	5	0	5	2,062	0	2,062
			98n	1	0	0	0	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.*
Off-site Releases *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Methacrylonitrile	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	3,189	0	556,210	559,399	0
		98o	0	0	0	0	500	0	55,630	56,130	0
		98n	0	0	0	1,891,340	0	0	800	1,892,140	1
*	Metham sodium	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	33,520	0	0	0	102	362	15,378	49,362	0
		98o	100	0	0	0	355	3,324	6,354	10,133	1,000
		98n	0	0	0	0	0	0	24,392	24,392	0
*	Methanol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	484,783,260	28,204,451	375,962,417	94,128,236	955,340,231	119,784,443	261,341,052	2,319,544,090	295,169
		98o	660,031,001	11,983,910	297,334,992	92,993,730	1,064,169,398	124,791,598	224,372,227	2,475,676,856	91,180
		98n	3,151,305	71,890	8,256,769	34,612,792	15,713,032	2,748,283	1,861,565	66,415,636	1,953
*	Methiocarb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*‡	Methoxone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	19,510	0	0	0	58	27	3,144	22,739	0
		98o	6,670	0	0	0	0	1,301	5,417	13,388	0
		98n	No reports								
*	Methoxychlor	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	30,194	0	25,486	55,680	0
*	2-Methoxyethanol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,925,200	74,000	240,658	1,885,948	3,357,857	1,228,013	904,103	11,615,779	2
		98o	279,700	151,007	742,247	1,678,839	2,867,676	470,587	1,085,153	7,275,209	403
		98n	137	0	0	1,275,726	150,702	0	53,249	1,479,814	1
	Methyl acrylate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	910,001	40,769	736,924	249,260	2,132,688	51,535	336,269	4,457,446	249
		98o	1,067,301	0	702,681	458,653	3,323,941	75,466	420,496	6,048,538	3
		98n	0	0	0	291,314	88,974	163	18,343	398,794	25,189
	Methyl tert-butyl ether	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	847,069	32,815	228,033	1,360,276	3,020,518	522,838	3,425,508	9,437,057	117,497
		98o	2,207,480	170,245	1,798,359	3,330,091	6,337,391	1,233,832	2,983,272	18,060,670	1,770
		98n	2,041,528	1,800,430	0	188,042	2,623,052	193,178	3,455,494	10,301,724	32,737
	Methyl chlorocarbonate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	3,610	0	2,597	6,207	0
		98o	0	0	0	0	51,910	0	2,730	54,640	0
		98n	0	0	0	0	0	0	0	0	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
101-14-4	‡	4,4'-Methylenebis (2-chloroaniline)	88	8	250	0	0	0	250	0	250
			95	23	260	0	0	0	260	5	265
			98o	22	15	0	0	0	15	0	15
			98n	1	0	0	0	0	0	0	0
101-61-1	‡	4,4'-Methylenebis (N,N-dimethyl) benzeneamine	88	1	250	0	0	7,000	7,250	1,150	8,400
			95	2	10	0	0	0	10	0	10
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
74-95-3		Methylene bromide	88	9	57,723	0	0	0	57,723	0	57,723
			95	5	63,091	0	0	0	63,091	0	63,091
			98o	5	46,153	0	0	0	46,153	0	46,153
			98n	3	160	0	0	0	160	0	160
101-77-9	‡	4,4'-Methylenedianiline	88	31	130,265	2,599	460,250	1,140	594,254	141,538	735,792
			95	25	10,337	63	23,110	0	33,510	9,423	42,933
			98o	25	9,073	5,041	51,200	0	65,314	6,867	72,181
			98n	1	0	0	0	0	0	0	0
78-93-3	*	Methyl ethyl ketone	88	2,534	141,566,241	92,216	255,955	166,688	142,081,100	5,014,726	147,095,826
			95	2,313	70,230,822	67,320	581,632	177,059	71,056,833	258,523	71,315,356
			98o	1,885	46,364,260	54,800	343,418	80,681	46,843,159	899,080	47,742,239
			98n	285	213,433	12	52,251	12,460	278,156	251,842	529,998
60-34-4		Methyl hydrazine	88	3	2,927	1	0	0	2,928	1,450	4,378
			95	3	500	0	0	0	500	0	500
			98o	3	265	0	0	0	265	0	265
			98n	No reports							
74-88-4		Methyl iodide	88	3	8,944	5	250	0	9,199	250	9,449
			95	6	21,618	0	10,000	0	31,618	8,600	40,218
			98o	10	65,167	45	131	1,357	66,700	329	67,029
			98n	2	0	0	0	0	0	0	0
108-10-1	*	Methyl isobutyl ketone	88	1,011	32,035,833	762,108	116,650	31,770	32,946,361	1,966,488	34,912,849
			95	1,021	21,929,203	51,292	158,600	7,041	22,146,136	86,316	22,232,452
			98o	824	14,845,145	17,655	75,950	13,846	14,952,596	171,700	15,124,296
			98n	205	33,594	5	250	45	33,894	68,578	102,472
624-83-9		Methyl isocyanate	88	12	10,235	0	0	64	10,299	8,400	18,699
			95	5	1,658	0	0	0	1,658	0	1,658
			98o	5	507	0	0	5	512	0	512
			98n	No reports							
556-61-6	*	Methyl isothiocyanate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	72	0	0	0	72	0	72
			98o	3	66	0	0	0	66	0	66
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	4,4'-Methylenebis (2-chloro-aniline)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	720	0	0	1,872	36	10,345	37	13,010	0
		98o	0	0	0	2,925	0	9,787	3	12,715	1
		98n	0	0	0	0	0	0	0	0	0
‡	4,4'-Methylenebis (N,N-dimethyl) benzeneamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	10	10	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
	Methylene bromide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	677,059	0	0	0	51,903	979	62,284	792,225	0
		98o	1,500,000	0	0	0	0	0	46,135	1,546,135	0
		98n	0	0	0	64,300	354,774	0	160	419,234	1
‡	4,4'-Methylenedianiline	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,300	0	17,801	17,405	87,919	94,872	35,337	255,634	10
		98o	2,830	0	311,271	11,793	407,691	56,581	66,591	856,757	1
		98n	0	0	0	0	11,263	0	0	11,263	0
*	Methyl ethyl ketone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	66,104,904	21,169,467	112,532,715	43,628,942	69,392,991	6,369,850	70,261,131	389,460,000	229,658
		98o	55,742,721	19,108,392	79,875,297	33,715,218	78,423,932	7,464,933	48,298,544	322,629,037	174,243
		98n	14,984,601	1,888,930	119,057	41,008,510	4,959,691	5,029,537	444,296	68,434,622	12,264
	Methyl hydrazine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	20	5	400	425	0
		98o	0	0	0	0	6,508	192	370	7,070	0
		98n	No reports								
	Methyl iodide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	140	0	19,376	760	40,187	60,463	59
		98o	0	0	0	24	188,142	31,143	66,328	285,637	421
		98n	0	0	0	0	0	0	0	0	0
*	Methyl isobutyl ketone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	52,705,598	16,392,205	27,176,664	18,128,793	17,796,398	1,902,661	22,186,837	156,289,156	50,004
		98o	59,106,704	10,535,323	28,648,094	10,683,877	14,213,362	2,703,067	14,889,564	140,779,991	166,713
		98n	4,764,550	110,732	21,764	16,262,086	1,875,403	1,678,672	50,958	24,764,165	1,753
	Methyl isocyanate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	66,939	0	1,658	68,597	0
		98o	0	0	0	3,450	90,771	0	497	94,718	5
		98n	No reports								
*	Methyl isothiocyanate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	62	0	82	72	216	0
		98o	0	0	0	0	0	120	66	186	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
75-86-5		2-Methyllactonitrile	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	3,854	0	0	0	3,854	0	3,854
			98o	7	3,973	0	56,698	0	60,671	0	60,671
			98n	2	10	0	24,000	0	24,010	147	24,157
80-62-6		Methyl methacrylate	88	218	3,630,569	28,437	327,220	8,119	3,994,345	276,567	4,270,912
			95	267	2,012,874	1,672	120,000	1,056	2,135,602	124,867	2,260,469
			98o	281	2,189,356	437,470	150,000	1,872	2,778,698	177,549	2,956,247
			98n	16	7,407	5	17,206	9,700	34,318	2,168	36,486
924-42-5		N-Methylolacrylamide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	29	2,835	1,166	0	34	4,035	13	4,048
			98o	35	5,416	1,245	0	45	6,706	24,987	31,693
			98n	No reports							
298-00-0	*	Methyl parathion	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	1,442	0	0	0	1,442	2,684	4,126
			98o	5	189	0	0	0	189	0	189
			98n	No reports							
109-06-8		2-Methylpyridine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	8	89,938	0	61,720	0	151,658	40	151,698
			98o	7	2,934	0	38,900	0	41,834	813	42,647
			98n	1	0	0	0	0	0	0	0
872-50-4		N-Methyl-2-pyrrolidone	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	272	2,693,692	201,221	779,477	135,050	3,809,440	367,099	4,176,539
			98o	390	2,997,001	42,711	2,865,692	103,901	6,009,305	493,993	6,503,298
			98n	77	17,687	0	0	0	17,687	10,946	28,633
21087-64-9	*	Metribuzin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	1,936	9	0	0	1,945	0	1,945
			98o	8	339	26	0	0	365	255	620
			98n	No reports							
7786-34-7	*	Mevinphos	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
90-94-8	‡	Michler's ketone	88	4	1,100	0	0	0	1,100	0	1,100
			95	1	1,577	0	0	0	1,577	0	1,577
			98o	1	511	0	0	0	511	0	511
			98n	No reports							
2212-67-1	*	Molinate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	695	502	0	0	1,197	6,363	7,560
			98o	3	1,063	113	0	0	1,176	8,305	9,481
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	2-Methyllactonitrile	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	19,317	0	3,855	23,172	0
		98o	0	0	0	0	4,268	0	61,231	65,499	1
		98n	0	0	0	0	0	6	24,010	24,016	1
	Methyl methacrylate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,665,497	20,746	2,050,094	1,396,720	5,131,171	696,546	2,162,227	16,123,001	3,255
		98o	1,483,426	58,753	2,254,625	1,873,042	3,999,779	570,720	2,543,376	12,783,721	8,254
		98n	63,000	0	0	948,771	962,474	25,412	35,153	2,034,810	1
	N-Methylolacrylamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	360	0	0	294	14,240	4,373	3,087	22,354	4
		98o	0	0	0	0	12,400	7,401	31,702	51,503	99
		98n	No reports								
*	Methyl parathion	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	29	0	0	0	0	0	3,664	3,693	1
		98o	0	0	0	0	0	47,000	8,531	55,531	0
		98n	No reports								
	2-Methylpyridine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	57,000	19,000	470	37,000	98,212	150,962	362,644	930
		98o	0	140,000	42,139	12	3	330	42,674	225,158	0
		98n	0	0	0	0	0	0	0	0	0
	N-Methyl-2-pyrrolidone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,477,378	6,538,234	182,638	2,441,136	5,112,812	3,412,702	4,427,626	23,592,526	994
		98o	404,233	7,393,897	2,802,735	3,525,069	5,241,223	3,763,836	6,616,287	29,747,280	4,496
		98n	6,425,191	6	391	2,117,231	874,778	122,256	20,610	9,560,463	3
*	Metribuzin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	3,502	5,423	3,519	12,444	0
		98o	0	0	0	0	4,596	48,209	140	52,945	0
		98n	No reports								
*	Mevinphos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
‡	Michler's ketone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	436	0	0	1,577	2,013	0
		98o	0	0	0	305	14,098	0	511	14,914	0
		98n	No reports								
*	Molinate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	3,312	128,004	6,450	137,766	0
		98o	0	0	0	0	9,646	67,166	10,483	87,295	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
1313-27-5		Molybdenum trioxide	88	102	111,195	139,021	197,115	97,238	544,569	573,624	1,118,193
			95	160	178,292	27,305	333,730	77,594	616,921	1,013,388	1,630,309
			98o	168	198,164	36,018	302,000	48,878	585,060	579,617	1,164,677
			98n	21	22,317	312	5	960,506	983,140	148,188	1,131,328
76-15-3		Monochloropentafluoro-ethane (CFC-115)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	14	275,259	2,854	3	0	278,116	7	278,123
			98o	7	76,256	5	0	0	76,261	0	76,261
			98n	1	6,852	0	0	0	6,852	0	6,852
88671-89-0	*	Myclobutanil	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	0	0	0	0	0
			98o	3	1,000	0	0	0	1,000	0	1,000
			98n	No reports							
142-59-6	*	Nabam	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	0	0	0	0	0	0	0
			98o	5	0	4,864	0	0	4,864	0	4,864
			98n	1	0	0	0	0	0	0	0
300-76-5	*	Naled	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	50	0	0	0	50	2,200	2,250
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
91-20-3	*	Naphthalene	88	420	5,165,426	22,518	50,946	123,697	5,362,587	1,359,184	6,721,771
			95	533	2,690,669	43,311	44,318	32,085	2,810,383	474,106	3,284,489
			98o	530	3,374,439	34,148	191,677	1,251,040	4,851,304	827,657	5,678,961
			98n	223	95,243	17,296	5	11,031	123,575	126,485	250,060
134-32-7	‡	alpha-Naphthylamine	88	3	590	101	0	0	691	0	691
			95	1	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	1	0	0	0	0	0	0	0
91-59-8	‡	beta-Naphthylamine	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
7440-02-0	‡	Nickel	88	1,180	452,626	90,636	14,295	1,225,251	1,782,808	7,661,144	9,443,952
			95	1,961	322,454	26,352	6,370	371,016	726,192	3,954,139	4,680,331
			98o	2,120	418,546	27,217	19,654	262,244	727,661	3,223,866	3,951,527
			98n	69	107,420	3,982	110,158	4,802,201	5,023,761	4,708,777	9,732,538
—	‡	Nickel compounds	88	580	274,176	132,233	224,968	2,384,594	3,015,971	6,210,073	9,226,044
			95	903	266,282	58,948	107,886	2,482,245	2,915,361	5,868,811	8,784,172
			98o	1,025	388,847	121,537	146,481	5,704,584	6,361,449	4,627,489	10,988,938
			98n	308	661,549	291,208	342,413	50,413,105	51,708,275	5,808,154	57,516,429

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Molybdenum trioxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	6,210,774	2,453,023	0	3,530	19,964	346,571	1,598,949	10,632,811	21,640
		98o	3,589,437	2,951,024	0	0	70,746	465,518	1,724,990	8,801,715	110
		98n	0	0	0	0	42,786	0	1,618,562	1,661,348	5
	Monochloropentafluoro-ethane (CFC-115)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	8,600	2,200	0	0	257,501	24,651	278,151	571,103	2
		98o	2,000	36,230	0	0	3,137	258	76,257	117,882	1
		98n	0	0	0	0	0	0	5,340	5,340	1,512
*	Myclobutanil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	794	243	1,037	0
		98n	No reports								
*	Nabam	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	14,218	253	0	14,471	1
		98o	0	0	192	0	7,352	0	4,864	12,408	1
		98n	0	0	0	0	0	0	0	0	0
*	Naled	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,000	2,600	0	3,600	9
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Naphthalene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	10,707,785	290,167	5,301,914	1,882,043	8,469,326	1,219,590	3,047,384	30,918,209	351,893
		98o	5,092,370	474,482	6,773,098	1,678,031	4,635,656	1,009,963	4,778,618	24,442,218	81,867
		98n	1,175,362	33,496	5,104	22,730,399	846,977	94,154	113,477	24,998,969	57,943
‡	alpha-Naphthylamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	0	0	0	0	0
‡	beta-Naphthylamine	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
‡	Nickel	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	38,181,558	80,727,355	127	768	1,554,902	1,059,498	3,380,578	124,904,786	19,224
		98o	36,392,102	77,344,692	38,720	1,259	341,481	469,290	4,079,558	118,667,102	7,364
		98n	18,430	402,923	0	0	580,877	36,129	9,794,969	10,833,328	4
‡	Nickel compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	14,059,031	34,198,682	0	2,808	5,627,356	1,310,285	7,223,058	62,421,220	332,618
		98o	7,676,918	28,927,555	28,119	417	549,189	723,917	11,453,589	49,359,704	710,336
		98n	238,047	732,625	0	0	207,697	77,924	57,630,076	58,886,369	4,750

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
—		Nicotine and salts	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	22	365,639	755	0	135	366,529	288,712	655,241
			98o	31	325,882	706	0	0	326,588	287,471	614,059
			98n	2	3	0	0	0	3	250	253
1929-82-4	*	Nitrapyrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	7	119,451	0	0	119,458	0	119,458
			98o	3	1	0	0	0	1	0	1
			98n	No reports							
—		Nitrate compounds	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	862	417,052	132,835,151	47,589,521	4,696,275	185,537,999	5,622,041	191,160,040
			98o	1,079	638,444	170,668,882	48,677,569	3,271,176	223,256,071	3,353,061	226,609,132
			98n	96	5,995	907,006	5,936,287	6,130,953	12,980,241	732,694	13,712,935
7697-37-2	*	Nitric acid	88	1,920	8,277,993	1,380,565	25,485,680	1,330,695	36,474,933	7,929,318	44,404,251
			95	1,832	2,361,092	46,596	18,755,717	291,656	21,455,061	4,818,756	26,273,817
			98o	1,795	2,185,697	88,862	18,869,510	179,047	21,323,116	911,998	22,235,114
			98n	149	370,527	13,006	5,300,750	66,566	5,750,849	194,284	5,945,133
139-13-9	‡	Nitrilotriacetic acid	88	14	2,500	5,100	0	5,100	12,700	250	12,950
			95	7	1	34	2,900	0	2,935	0	2,935
			98o	14	1,407	10,202	2,400	0	14,009	0	14,009
			98n	1	0	0	0	11,617	11,617	0	11,617
100-01-6		p-Nitroaniline	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	11,205	2	0	0	11,207	0	11,207
			98o	4	12,053	0	0	0	12,053	0	12,053
			98n	1	5	0	0	0	5	500	505
99-59-2		5-Nitro-o-anisidine	88	No reports							
			95	1	10	0	0	0	10	0	10
			98o	1	10	5	0	0	15	0	15
			98n	No reports							
98-95-3	*,‡	Nitrobenzene	88	19	41,279	7,283	819,000	3,538	871,100	69,570	940,670
			95	17	25,529	874	330,344	43	356,790	961	357,751
			98o	17	79,943	902	407,090	62	487,997	11,324	499,321
			98n	10	504	250	15,529	0	16,283	1,059	17,342
55-63-0		Nitroglycerin	88	22	52,383	2,746	0	11,640	66,769	2	66,771
			95	20	26,077	13,300	0	0	39,377	0	39,377
			98o	24	52,478	4,713	0	0	57,191	266	57,457
			98n	1	0	0	0	0	0	0	0
88-75-5		2-Nitrophenol	88	4	33,689	1	0	2	33,692	13,100	46,792
			95	4	38	50	0	0	88	0	88
			98o	4	45	35	0	0	80	0	80
			98n	1	129	0	0	0	129	0	129

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Nicotine and salts	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	34,602	0	0	275,790	297,376	652,796	1,260,564	0
		98o	0	7,611	0	0	827,884	645,409	621,865	2,102,769	8,449
		98n	0	0	0	0	148,971	0	54	149,025	0
*	Nitrapyrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	7,100	0	380	128,628	136,108	0
		98o	0	0	0	0	0	140	1	141	0
		98n	No reports								
	Nitrate compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	95,661,989	2,427,371	0	0	27,432,147	63,985,239	195,954,753	385,461,499	110,041
		98o	113,971,212	1,853,401	0	59,241	54,200,091	85,444,237	230,820,696	486,348,878	124,346
		98n	4,003,825	8,473	0	0	628,676	850,288	15,018,890	20,510,152	876
*	Nitric acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	28,230,334	3,666,454	250,245	255	240,917,797	15,928,402	27,302,289	316,295,776	119,047
		98o	40,685,750	4,445,797	0	9,671	294,687,638	15,657,147	22,138,254	377,624,257	27,585
		98n	0	370	0	13,530	9,456,090	412,727	6,282,206	16,164,923	10
‡	Nitrilotriacetic acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,500	0	0	0	969,141	1,872	2,935	976,448	0
		98o	0	0	0	0	1,070,287	27,440	14,009	1,111,736	0
		98n	0	0	0	0	0	0	11,617	11,617	0
	p-Nitroaniline	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	7	0	266	93,016	12,007	105,296	0
		98o	0	0	0	0	0	169,426	12,253	181,679	0
		98n	0	0	0	0	28,500	1	150	28,651	0
	5-Nitro-o-anisidine	88	No reports								
		95	0	0	0	0	0	0	5	5	0
		98o	0	0	0	0	0	0	1	1	0
		98n	No reports								
*,‡	Nitrobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,277,200	0	1,554,583	79,781	1,297,305	639,061	354,552	5,202,482	649
		98o	419,863	0	1,847,505	590,234	1,743,632	1,056,242	497,174	6,154,650	7,024
		98n	0	0	0	663,888	778,054	0	16,670	1,458,612	1
	Nitroglycerin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	24,151	0	0	0	428,538	59,598	39,387	551,674	6
		98o	18,000	16,269	0	22,328	270,856	135,468	60,289	523,210	0
		98n	0	0	0	0	0	0	0	0	0
	2-Nitrophenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	28,000	6	120,000	23,311	83	171,400	0
		98o	0	0	82,000	0	61,000	24,000	85	167,085	0
		98n	0	0	0	0	352,946	0	129	353,075	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
100-02-7	*,‡	4-Nitrophenol	88	7	7,855	0	6,300	7	14,162	70	14,232
			95	6	945	0	0	0	945	0	945
			98o	5	855	0	0	0	855	0	855
			98n	3	35	0	0	0	35	500	535
79-46-9	*,‡	2-Nitropropane	88	15	389,385	4,300	257,000	0	650,685	4,785	655,470
			95	5	31,265	3,000	0	0	34,265	0	34,265
			98o	3	23,479	558	0	0	24,037	0	24,037
			98n	6	359	0	0	0	359	192	551
924-16-3	‡	N-Nitrosodi-n-butyl-amine	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
55-18-5	‡	N-Nitrosodiethylamine	88	No reports							
			95	No reports							
			98o	No reports							
			98n	2	2	0	0	0	2	0	2
62-75-9	‡	N-Nitrosodimethyl-amine	88	1	0	0	0	0	0	0	0
			95	No reports							
			98o	No reports							
			98n	1	129	0	0	0	129	0	129
86-30-6		N-Nitrosodiphenyl-amine	88	2	0	27	34,000	0	34,027	0	34,027
			95	2	10	0	0	0	10	0	10
			98o	3	10	0	0	0	10	0	10
			98n	1	63	0	0	0	63	0	63
156-10-5		p-Nitrosodiphenylamine	88	2	15	0	2,000	0	2,015	180	2,195
			95	2	24	0	0	0	24	520	544
			98o	2	24	0	0	0	24	0	24
			98n	No reports							
621-64-7	‡	N-Nitrosodi-n-propyl-amine	88	No reports							
			95	No reports							
			98o	1	750	0	0	0	750	1,500	2,250
			98n	1	129	0	0	0	129	0	129
759-73-9	‡	N-Nitroso-N-ethylurea	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
684-93-5	*,‡	N-Nitroso-N-methyl-urea	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	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.*
Off-site Releases *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*,‡	4-Nitrophenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	10,469	3	65,000	574,800	950	651,222	0
		98o	0	0	0	0	139,944	633,083	860	773,887	0
		98n	0	0	0	591,228	31,000	1	180	622,409	1
*,‡	2-Nitropropane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	520	140,000	81	63,028	0	34,023	237,652	0
		98o	0	0	9,835	23	10,598	31,114	24,037	75,607	0
		98n	0	0	0	519,228	203,826	11,854	551	735,459	1
‡	N-Nitrosodi-n-butyl-amine	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
‡	N-Nitrosodiethylamine	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	23,708	0	2	23,710	0
‡	N-Nitrosodimethyl-amine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	352,946	0	129	353,075	0
	N-Nitrosodiphenyl-amine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	340,000	10	340,010	0
		98o	0	0	0	340,000	43,702	34,298	10	418,010	0
		98n	0	0	0	0	80,769	0	63	80,832	0
	p-Nitrosodiphenylamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	8,600	15,000	0	65	544	24,209	0
		98o	0	0	9,300	16,500	0	0	24	25,824	0
		98n	No reports								
‡	N-Nitrosodi-n-propyl-amine	88	No reports								
		95	No reports								
		98o	0	0	25,000	1,500	25,000	0	600	52,100	0
		98n	0	0	0	0	352,946	0	129	353,075	0
‡	N-Nitroso-N-ethylurea	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
*,‡	N-Nitroso-N-methyl-urea	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
59-89-2	‡	N-Nitrosomorpholine	88	No reports							
			95	1	0	0	0	0	0	0	0
			98o	No reports							
			98n	No reports							
100-75-4	‡	N-Nitrosopiperidine	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
99-55-8		5-Nitro-o-toluidine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	5	0	0	0	5	30	35
			98o	2	0	0	0	0	0	0	0
			98n	1	0	0	0	0	0	0	0
27314-13-2	*	Norflurazon	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	5	0	0	0	5	54,000	54,005
			98o	4	15	76	0	229	320	14,850	15,170
			98n	No reports							
19044-88-3	*	Oryzalin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	5	0	0	0	5	0	5
			98o	3	98	0	0	0	98	0	98
			98n	1	5	0	0	0	5	0	5
301-12-2	*	Oxydemeton methyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
19666-30-9	*	Oxydiazon	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	665	0	0	0	665	0	665
			98o	5	1,160	0	0	0	1,160	750	1,910
			98n	No reports							
42874-03-3	*	Oxyfluorfen	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	87	3	0	0	90	0	90
			98o	2	10	0	0	0	10	0	10
			98n	No reports							
10028-15-6		Ozone	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	29	571,182	0	0	0	571,182	0	571,182
			98o	35	563,184	0	0	0	563,184	0	563,184
			98n	2	3	0	0	0	3	0	3
123-63-7		Paraldehyde	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	33	0	0	0	33	0	33
			98o	3	26	0	0	0	26	0	26
			98n	1	0	0	0	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.*
Off-site Releases *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	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			
‡	N-Nitrosomorpholine	88	No reports								
		95	0	0	0	0	0	0	0	0	0
		98o	No reports								
		98n	No reports								
‡	N-Nitrosopiperidine	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
	5-Nitro-o-toluidine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	35	35	0
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	0	0	0	0	0
*	Norflurazon	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	1,000	54,010	55,010	0
		98o	0	0	0	0	12,700	59,780	340	72,820	0
		98n	No reports								
*	Oryzalin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	40,000	2	40,002	0
		98o	0	0	0	0	3,500	42,000	93	45,593	0
		98n	0	0	0	0	19,472	0	5	19,477	0
*	Oxydemeton methyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Oxydiazon	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,012	0	0	0	2,400	100	611	6,123	0
		98o	28,500	0	0	0	960	287	900	30,647	0
		98n	No reports								
*	Oxyfluorfen	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	130	15,093	90	15,313	0
		98o	0	0	0	0	2,800	33,865	1	36,666	0
		98n	No reports								
	Ozone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	2,402,564	0	569,989	2,972,553	2
		98o	0	0	0	0	2,940,204	0	562,837	3,503,041	0
		98n	0	0	0	0	0	0	3	3	0
	Paraldehyde	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	47,460	11	250,000	0	33	297,504	1
		98o	0	0	18,414	7	140,002	0	26	158,449	0
		98n	0	0	0	0	0	0	0	0	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
1910-42-5	*	Paraquat dichloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	1,000	0	0	0	1,000	0	1,000
			98o	3	500	0	0	0	500	0	500
			98n	No reports							
56-38-2	*	Parathion	88	13	3,265	750	0	250	4,265	3,959	8,224
			95	2	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	1	0	0	0	0	0	85	85
1114-71-2	*	Pebulate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	507	122	0	0	629	811	1,440
			98o	2	520	98	0	0	618	1,501	2,119
			98n	No reports							
40487-42-1	*	Pendimethalin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	1,250	250	0	500	2,000	0	2,000
			98o	6	3,000	15	0	5	3,020	560	3,580
			98n	3	3	0	0	0	3	123	126
76-01-7	*	Pentachloroethane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	1,534	22	0	0	1,556	0	1,556
			98o	7	1,558	0	0	0	1,558	0	1,558
			98n	3	60	0	0	0	60	0	60
87-86-5	*,‡	Pentachlorophenol	88	55	14,029	2,465	20,000	3,717	40,211	518,105	558,316
			95	37	6,266	3,146	0	250	9,662	23,942	33,604
			98o	35	5,108	1,067	0	250	6,425	23,128	29,553
			98n	9	283	250	250	240,000	240,783	11,879	252,662
57-33-0		Pentobarbital sodium	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
79-21-0	*	Peracetic acid	88	8	5,453	55	0	0	5,508	0	5,508
			95	24	7,847	15	0	1,144	9,006	0	9,006
			98o	28	8,330	5	0	1,150	9,485	0	9,485
			98n	No reports							
594-42-3	*	Perchloromethyl mercaptan	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	541	0	0	0	541	0	541
			98o	3	894	0	0	0	894	0	894
			98n	No reports							
52645-53-1	*	Permethrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	13	1,299	37	0	250	1,586	751	2,337
			98o	18	4,435	7	0	0	4,442	17,549	21,991
			98n	2	0	0	0	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.*
Off-site Releases *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Paraquat dichloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	68	0	0	0	0	170	206	444	0
		98o	0	0	0	0	0	6	112	118	0
		98n	No reports								
*	Parathion	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	32,638	0	85	32,723	0
*	Pebulate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	600	4,600	270	5,470	0
		98o	0	0	0	0	89	2,809	1,523	4,421	0
		98n	No reports								
*	Pendimethalin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	300	0	0	0	190,000	6,774	1,498	198,572	56
		98o	2,000	0	0	0	160,000	104,946	2,532	269,478	0
		98n	0	0	0	0	86,483	0	126	86,609	0
*	Pentachloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	220,000	0	5,972,374	75,431	1,552	6,269,357	0
		98o	620,000	0	0	0	5,007,683	107,405	1,559	5,736,647	0
		98n	0	0	0	134,821	47,064	0	60	181,945	1
*,‡	Pentachlorophenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,888,603	334	9,151	14,951	6,780	87,462	25,614	2,032,895	9
		98o	76,838	227,808	1,680	4,416	4,790	128,117	26,357	470,006	5,815
		98n	0	0	1,002	0	105,151	5	242,089	348,247	0
	Pentobarbital sodium	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Peracetic acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	13,833	0	0	0	12,884	12,396	8,889	48,002	3
		98o	0	0	0	0	47,536	17,732	9,971	75,239	1
		98n	No reports								
*	Perchloromethyl mercaptan	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	540	0	541	1,081	0
		98o	0	0	0	0	28,000	92,000	891	120,891	0
		98n	No reports								
*	Permethrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	5	651	665	543	1,864	0
		98o	0	0	0	0	277	22,529	5,379	28,185	0
		98n	0	0	0	0	10,538	0	0	10,538	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A-1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
85-01-8		Phenanthrene	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	34	72,383	19	0	4,008	76,410	72,491	148,901
			98o	62	238,785	214	0	77,577	316,576	76,779	393,355
			98n	10	26,008	0	0	0	26,008	606	26,614
108-95-2	*	Phenol	88	635	10,712,736	259,230	4,661,319	1,882,485	17,515,770	2,536,030	20,051,800
			95	757	9,315,297	70,308	3,823,235	171,997	13,380,837	1,280,535	14,661,372
			98o	775	8,902,291	60,731	1,648,446	436,306	11,047,774	1,143,497	12,191,271
			98n	32	1,627	1,277	432,901	67,000	502,805	22,556	525,361
26002-80-2	*	Phenothrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
95-54-5		1,2-Phenylenediamine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	7	962	41,100	0	2,176	44,238	31	44,269
			98o	7	528	51	0	0	579	1,631	2,210
			98n	1	37	0	0	0	37	10	47
108-45-2		1,3-Phenylenediamine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	18	6,621	43,343	0	63,153	113,117	80	113,197
			98o	20	8,932	727	0	18,668	28,327	20,559	48,886
			98n	2	37	0	0	0	37	10	47
106-50-3		p-Phenylenediamine	88	13	113,890	826	4,716	0	119,432	64,452	183,884
			95	10	4,440	856	0	653	5,949	0	5,949
			98o	11	1,516	114	0	0	1,630	1,816	3,446
			98n	No reports							
90-43-7	*	2-Phenylphenol	88	15	10,630	480	0	0	11,110	250	11,360
			95	17	27,063	10	0	5	27,078	5,656	32,734
			98o	14	23	20	0	250	293	1,363	1,656
			98n	1	0	0	0	0	0	0	0
57-41-0	‡	Phenytoin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	19,300	19,300
			98o	1	1	0	0	0	1	7,510	7,511
			98n	1	3	0	0	0	3	143	146
75-44-5		Phosgene	88	37	21,603	500	250	0	22,353	480	22,833
			95	29	15,894	0	5	0	15,899	0	15,899
			98o	33	15,247	0	0	3	15,250	0	15,250
			98n	No reports							
7803-51-2	*	Phosphine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	1,491	0	0	0	1,491	0	1,491
			98o	5	38,368	0	0	0	38,368	0	38,368
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Phenanthrene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	162,334	1,190	35,001	197,312	1,107,863	2,410	151,354	1,657,464	42,529
		98o	328,384	98,267	53,336	165,155	612,747	170,536	339,661	1,768,086	7,313
		98n	0	0	0	32,000	234,397	0	27,212	293,609	1
*	Phenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	41,673,425	556,968	28,791,114	3,685,797	34,793,176	6,363,143	14,468,241	130,331,864	72,200
		98o	42,468,389	133,291	30,778,066	3,923,101	25,817,756	5,208,605	11,740,573	120,069,781	32,711
		98n	0	0	0	4,914,898	4,715,702	1,557	571,501	10,203,658	9
*	Phenothrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
	1,2-Phenylenediamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	499,896	7,316	44,037	551,249	320
		98o	0	0	0	0	171,437	50,690	2,208	224,335	0
		98n	0	0	0	0	0	0	37	37	0
	1,3-Phenylenediamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	493	617,879	134,176	112,936	865,484	1
		98o	650	114,558	20	2,300	529,484	1,667,563	46,443	2,361,018	1,520
		98n	0	0	0	0	12,604	0	37	12,641	0
	p-Phenylenediamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	364,868	20,082	5,757	390,707	1
		98o	0	0	0	111	310,520	66,661	3,044	380,336	0
		98n	No reports								
*	2-Phenylphenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	530	0	1,027,544	2,065	32,590	1,062,729	1
		98o	197	0	300	0	120,000	332	456	121,285	0
		98n	0	0	0	0	0	0	0	0	0
‡	Phenytoin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	19,000	19,000	0
		98o	0	0	0	0	140	15,000	7,500	22,640	0
		98n	0	0	0	0	20,629	0	146	20,775	0
	Phosgene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	430,034	0	15,138,316	2,414	15,867	15,586,631	7
		98o	3,023,304	0	0	330	7,386,424	735	15,288	10,426,081	43
		98n	No reports								
*	Phosphine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	2,491	2,491	10
		98o	0	0	0	0	328,000	0	38,368	366,368	135
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
7664-38-2	*	Phosphoric acid	88	2,535	1,963,090	122,647,164	53,711	52,615,971	177,279,936	5,303,543	182,583,479
			95	2,817	1,256,244	20,402,951	7,340	35,955,568	57,622,103	2,066,261	59,688,364
			98o	2,738	1,220,514	27,703,308	14,201	21,129,789	50,067,812	4,899,557	54,967,369
			98n	187	8,221	11,647	2,400,750	270,048	2,690,666	125,569	2,816,235
7723-14-0	*	Phosphorus (yellow or white)	88	73	20,608	11,322	0	3,893,674	3,925,604	195,013	4,120,617
			95	53	28,621	3,661	0	1,871,801	1,904,083	23,650	1,927,733
			98o	51	23,589	3,761	0	2,273,070	2,300,420	7,637	2,308,057
			98n	3	14	0	0	0	14	568	582
85-44-9		Phthalic anhydride	88	180	549,909	1,040	0	1,265	552,214	3,976,682	4,528,896
			95	184	604,993	711	0	674	606,378	76,916	683,294
			98o	160	303,577	193	0	0	303,770	3,827,768	4,131,538
			98n	6	21	0	31,039	0	31,060	386	31,446
1918-02-1	*	Picloram	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	220	1	0	0	221	0	221
			98o	2	460	6	0	0	466	0	466
			98n	No reports							
88-89-1		Picric acid	88	5	252	251	1,362,180	250	1,362,933	0	1,362,933
			95	9	221	0	49,256	0	49,477	0	49,477
			98o	8	0	1	63,950	0	63,951	0	63,951
			98n	No reports							
51-03-6	*	Piperonyl butoxide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	12	775	0	0	0	775	750	1,525
			98o	12	501	0	0	0	501	0	501
			98n	No reports							
—	‡	Polybrominated biphenyls	88	1	250	0	0	0	250	0	250
			95	2	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
—		Polychlorinated alkanes	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	69	20,945	6,206	0	0	27,151	197,580	224,731
			98o	66	4,075	31	0	0	4,106	109,661	113,767
			98n	2	0	0	0	0	0	0	0
1336-36-3	*,‡	Polychlorinated biphenyls (PCBs)	88	120	6	10	0	752	768	410,996	411,764
			95	9	0	0	0	0	0	34,432	34,432
			98o	6	0	0	0	134,160	134,160	135	134,295
			98n	15	446	251	5	3,607,976	3,608,678	4,193	3,612,871
—	‡	Polycyclic aromatic compounds	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	146	425,730	4,995	0	32,887	463,612	1,219,471	1,683,083
			98o	175	1,475,089	1,987	0	167,260	1,644,336	1,752,734	3,397,070
			98n	76	1,368	21	0	115,530	116,919	3,206	120,125

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Phosphoric acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	216,227,959	11,790,110	14,792	56,635	348,504,971	5,409,508	55,670,985	637,674,960	3,978,845
		98o	1,126,467,141	2,889,573	5,500	66,811	168,603,390	9,130,157	52,958,665	1,360,121,237	445,302
		98n	0	63	0	13,452	2,397,494	581,401	2,817,944	5,810,354	2,854
*	Phosphorus (yellow or white)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,091	26,089	0	0	5,052	147,342	1,929,173	2,108,747	1,080
		98o	1	236,289	0	0	900,878	1,235	2,306,946	3,445,349	4,401
		98n	0	0	0	0	80,274	0	576	80,850	0
	Phthalic anhydride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	421,574	1,317	2,420,922	4,951,573	18,689,501	444,135	670,336	27,599,358	26,167
		98o	169,533	49,603	3,110,037	2,975,259	16,603,795	503,613	4,128,842	27,540,682	15,049
		98n	0	0	0	13,502	177,000	0	31,446	221,948	1
*	Picloram	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	23,208	0	221	23,429	0
		98o	0	0	0	0	439,000	0	466	439,466	0
		98n	No reports								
	Picric acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	53,393	2	1,261,618	0	49,477	1,364,490	0
		98o	0	0	129,412	12,941	1,627,444	0	63,951	1,833,748	0
		98n	No reports								
*	Piperonyl butoxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	5	0	16,290	1,099	17,394	1
		98o	0	0	0	0	0	3,412	426	3,838	0
		98n	No reports								
‡	Polybrominated biphenyls	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	2,720	0	0	0	0	0	2,720	0
		98o	0	1,000	0	0	0	0	0	1,000	0
		98n	No reports								
	Polychlorinated alkanes	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	79,803	175,674	0	135,332	313,520	478,797	239,681	1,422,807	6
		98o	0	444,915	32,400	77,993	201	338,168	140,983	1,034,660	631
		98n	0	0	0	0	11,325	846	0	12,171	0
*,‡	Polychlorinated biphenyls (PCBs)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	64,494	8,242	72,736	1
		98o	0	0	0	0	0	261,714	0	261,714	1
		98n	0	140,018	0	0	8,446,718	428,219	3,610,080	12,625,035	2
‡	Polycyclic aromatic compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,473,048	115,771	10,281,825	58,948	1,471,546	6,061	1,719,901	15,127,100	22,298
		98o	1,738,975	244,544	3,634,434	259,696	4,180,566	27,033	3,291,909	13,377,157	43,942
		98n	312	216	0	0	48,107,002	1,345	120,485	48,229,360	109

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
7758-01-2	‡	Potassium bromate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	5	0	0	0	5	0	5
			98o	4	10	0	0	0	10	0	10
			98n	No reports							
128-03-0	*	Potassium dimethyl-dithiocarbamate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	10	206	5	0	0	211	0	211
			98o	19	500	24,760	0	5	25,265	5	25,270
			98n	No reports							
137-41-7	*	Potassium N-methyl-dithiocarbamate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	35	0	0	0	35	0	35
			98o	5	0	0	0	0	0	0	0
			98n	No reports							
41198-08-7	*	Profenofos	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	10	0	0	0	10	0	10
			98n	No reports							
7287-19-6	*	Prometryn	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	6	1,481	159	0	0	1,640	890	2,530
			98o	5	725	8	0	0	733	1,047	1,780
			98n	No reports							
23950-58-5	*	Pronamide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	255	0	0	0	255	0	255
			98o	2	255	0	0	0	255	0	255
			98n	2	110	0	0	0	110	0	110
1918-16-7	*	Propachlor	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	331	0	0	0	331	777	1,108
			98o	4	62	0	0	0	62	600	662
			98n	No reports							
1120-71-4	‡	Propane sultone	88	2	0	0	0	0	0	0	0
			95	1	0	0	0	0	0	0	0
			98o	No reports							
			98n	No reports							
709-98-8	*	Propanil	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	4	2,357	250	0	0	2,607	3,723	6,330
			98o	5	2,505	750	0	0	3,255	11,250	14,505
			98n	1	2	0	0	0	2	270	272
2312-35-8	*	Propargite	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	426	0	0	0	426	0	426
			98o	3	525	0	0	0	525	3,546	4,071
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	Potassium bromate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	51,447	1	0	0	13	51,461	0
		98n	No reports								
*	Potassium dimethyl-dithiocarbamate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	11,000	161,362	211	172,573	0
		98o	0	0	0	0	8,600	120,325	36,527	165,452	1
		98n	No reports								
*	Potassium N-methyl-dithiocarbamate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	35	35	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Profenofos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	109	0	0	109	0
		98o	0	0	0	0	0	0	7,270	7,270	0
		98n	No reports								
*	Prometryn	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	1	1,314	7,603	4,028	12,946	0
		98o	0	0	0	0	30,035	38,455	789	69,279	0
		98n	No reports								
*	Pronamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,700	0	0	0	0	1,200	260	5,160	0
		98o	5,500	0	0	0	0	2,095	290	7,885	0
		98n	0	0	0	234,265	0	0	110	234,375	1
*	Propachlor	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	7,270	1,237	8,507	14,000
		98o	0	0	0	0	0	91,800	662	92,462	0
		98n	No reports								
‡	Propane sultone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	16	0	0	16	0
		98o	No reports								
		98n	No reports								
*	Propanil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	402	4,468	4,870	0
		98o	200,000	0	0	0	0	86,745	12,552	299,297	50
		98n	0	0	0	0	202,192	0	272	202,464	0
*	Propargite	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	544	0	4,365	426	5,335	0
		98o	0	0	0	2,216	0	76,189	3,896	82,301	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
107-19-7	*	Propargyl alcohol	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	11	10,245	0	290,680	0	300,925	936	301,861
			98o	14	15,675	0	418,223	7,620	441,518	253	441,771
			98n	2	5	0	0	0	5	0	5
31218-83-4	*	Propetamphos	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	500	0	0	0	500	750	1,250
			98o	1	10	0	0	0	10	250	260
			98n	No reports							
60207-90-1	*	Propiconazole	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	0	0	0	0	0	0	0
			98o	5	10	0	0	0	10	0	10
			98n	No reports							
123-38-6	*	Propionaldehyde	88	15	1,267,839	1,156	930	0	1,269,925	0	1,269,925
			95	24	263,349	27,012	101,432	0	391,793	0	391,793
			98o	26	311,153	6,017	92,183	78	409,431	14	409,445
			98n	3	192	0	0	0	192	0	192
114-26-1	*	Propoxur	88	5	250	0	0	0	250	250	500
			95	5	5	0	0	0	5	0	5
			98o	2	0	0	0	0	0	0	0
			98n	1	0	0	0	0	0	10	10
115-07-1		Propylene	88	334	32,200,231	10,003	0	0	32,210,234	3,320	32,213,554
			95	351	27,575,681	4,047	0	169	27,579,897	298	27,580,195
			98o	365	16,383,072	3,104	2,870	389	16,389,435	897	16,390,332
			98n	39	79,265	0	0	0	79,265	0	79,265
75-55-8	‡	Propyleneimine	88	1	500	0	0	0	500	0	500
			95	7	600	0	0	0	600	0	600
			98o	4	385	5	0	0	390	5	395
			98n	No reports							
75-56-9	*,‡	Propylene oxide	88	128	3,680,215	112,503	1,113,780	11,630	4,918,128	16,626	4,934,754
			95	135	837,394	29,934	22,577	4,403	894,308	8,633	902,941
			98o	114	739,940	1,124	1,923	691	743,678	5,687	749,365
			98n	8	34	0	13,380	0	13,414	178	13,592
110-86-1	*	Pyridine	88	31	251,799	2,158	491,775	1,125	746,857	40,699	787,556
			95	41	100,190	830	532,497	4	633,521	321	633,842
			98o	49	70,262	1,056	593,199	0	664,517	13,594	678,111
			98n	17	697	0	5	0	702	6,203	6,905
91-22-5		Quinoline	88	34	49,350	502	0	896	50,748	6,242	56,990
			95	23	11,412	20	13,000	405	24,837	3,744	28,581
			98o	21	15,415	32	29,350	265	45,062	2,553	47,615
			98n	1	1	0	0	0	1	73	74

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Propargyl alcohol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	198,867	344,704	56,027	78,003	301,422	979,023	0
		98o	0	0	60,400	520,327	109,142	41,800	444,545	1,176,214	1
		98n	0	0	0	909	13,178	1,000	2	15,089	0
*	Propetamphos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	1,067	1,067	1
		98o	0	0	0	0	0	0	482	482	0
		98n	No reports								
*	Propiconazole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	1,026	0	1,026	0
		98o	0	0	0	0	25,000	0	2,943	27,943	0
		98n	No reports								
*	Propionaldehyde	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	898,697	5,565	2,348,820	79,790	387,308	3,720,180	24
		98o	0	0	2,021,614	4,648	5,082,153	46,283	411,365	7,566,063	402
		98n	0	0	0	442,609	3	15	192	442,819	1
*	Propoxur	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	1,081	4	1,085	0
		98o	0	0	0	0	0	435	0	435	0
		98n	0	0	0	0	0	0	25	25	0
	Propylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	6,713,304	0	463,253,246	3,132,285	254,254,014	80,239	26,886,366	754,319,454	1,008,723
		98o	74,791,416	23,152	457,768,564	2,218	299,247,194	2,896,808	14,982,963	849,712,315	1,239,987
		98n	0	0	0	0	440	0	79,264	79,704	12
‡	Propyleneimine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,433	0	600	2,033	3
		98o	0	0	0	0	2,788	6	680	3,474	0
		98n	No reports								
*,‡	Propylene oxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	3,091	0	17,981,778	281,155	14,373,959	192,373	1,135,037	33,967,393	20,210
		98o	1,081,157	0	13,924,312	79,248	14,370,438	475,463	757,381	30,687,999	1,416
		98n	0	0	0	30,399	40,509	231	13,414	84,553	0
*	Pyridine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	4,074,830	14,008	1,713,719	186,855	348,378	483,295	630,885	7,451,970	1,077
		98o	616,015	0	1,756,718	470,128	765,210	719,928	689,279	5,017,278	1,111
		98n	0	0	16,073	620,143	1,333,326	30,052	2,577	2,002,171	1
	Quinoline	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,750	2,243	302,003	22	222,705	16,120	27,181	572,024	253
		98o	27,147	1,713	122,038	11,582	109,680	961	47,741	320,862	300
		98n	0	0	0	0	10,461	0	74	10,535	0

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
106-51-4	*	Quinone	88	5	11,300	140	0	0	11,440	0	11,440
			95	4	7,101	1,500	0	0	8,601	0	8,601
			98o	5	481	1,600	0	0	2,081	0	2,081
			98n	1	0	0	0	0	0	0	0
82-68-8	*	Quintozene	88	6	1,064	0	0	0	1,064	12,625	13,689
			95	10	1,424	0	0	800	2,224	192	2,416
			98o	11	1,790	0	0	0	1,790	2	1,792
			98n	2	10	0	0	0	10	12,152	12,162
76578-14-8	*	Quizalofop-ethyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	6	0	0	0	6	0	6
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
10453-86-8	*	Resmethrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
81-07-2	‡	Saccharin (manufacturing)	88	4	750	0	0	0	750	750	1,500
			95	1	99	0	0	0	99	1,500	1,599
			98o	2	160	0	0	0	160	940	1,100
			98n	1	0	0	0	0	0	0	0
94-59-7	*,‡	Safrole	88	2	500	0	0	0	500	0	500
			95	1	255	0	0	0	255	0	255
			98o	2	10	0	0	0	10	0	10
			98n	1	0	0	0	0	0	0	0
7782-49-2	*	Selenium	88	24	16,282	1,168	0	127,508	144,958	4,367	149,325
			95	15	1,450	92	0	23	1,565	3,501	5,066
			98o	14	791	58	0	2,010	2,859	15,798	18,657
			98n	13	814	0	17,937	254,259	273,010	208,135	481,145
—		Selenium compounds	88	18	14,506	250	3,400	45,750	63,906	63,226	127,132
			95	40	61,946	2,184	3,640	264,759	332,529	108,874	441,403
			98o	52	78,518	3,373	38,030	361,204	481,125	70,580	551,705
			98n	80	527,764	32,727	8	4,641,085	5,201,584	362,356	5,563,940
74051-80-2	*	Sethoxydim	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	2	10	0	0	0	10	0	10
			98n	1	0	0	0	0	0	0	0
7440-22-4	*	Silver	88	72	47,988	1,654	0	39,510	89,152	8,482	97,634
			95	74	9,297	161	0	250	9,708	14,871	24,579
			98o	82	11,418	171	2	2,026	13,617	68,790	82,407
			98n	15	60	0	15,380	400,306	415,746	111,084	526,830

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Quinone	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	179,870	1,328	130,500	30,173	8,601	350,472	0
		98o	0	0	1,400	17,747	556,300	10,917	2,100	588,464	0
		98n	0	0	0	0	0	0	0	0	0
*	Quintozene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	863	0	0	0	0	759,587	2,251	762,701	110
		98o	515	0	0	376,866	0	13,168	1,792	392,341	10
		98n	0	0	0	0	44,515	0	3	44,518	0
*	Quizalofop-ethyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	5	5	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Resmethrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
‡	Saccharin (manufacturing)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	9,700	10	1,600	11,310	74
		98o	0	0	0	0	7,300	7	1,100	8,407	0
		98n	0	0	0	0	0	0	0	0	0
*,‡	Safrole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1	5	0	6	0
		98o	0	0	0	0	0	10	30	40	0
		98n	0	0	0	0	0	0	0	0	0
*	Selenium	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,604	4,604	0	0	23	2,271	1,524	10,026	1
		98o	0	0	86,174	3,902	156	920	11,283	102,435	0
		98n	0	0	0	0	0	185,504	295,578	481,082	0
	Selenium compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	590,805	158,278	0	10	2	48,520	355,030	1,152,645	49,259
		98o	595,899	68,632	0	0	2,040	7,685	544,374	1,218,630	76,445
		98n	53,228	9	0	0	4	23	5,731,317	5,784,581	11
*	Sethoxydim	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	293	20	313	0
		98n	0	0	0	0	17,391	0	0	17,391	0
*	Silver	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	563,590	1,251,487	0	1	87,462	531	17,608	1,920,679	619
		98o	597,281	1,197,977	0	32	4,917	44,958	235,355	2,080,520	4
		98n	400	0	0	0	0	17	490,979	491,396	1

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
—		Silver compounds	88	46	15,406	8,684	250	11,550	35,890	15,803	51,693
			95	59	15,582	6,284	380	35,325	57,571	7,549	65,120
			98o	64	6,636	5,704	109	76,755	89,204	194,891	284,095
			98n	21	847	676	140,000	4,087,351	4,228,874	88,912	4,317,786
122-34-9	*	Simazine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	7	4,990	232	0	5	5,227	26,231	31,458
			98o	7	3,321	332	0	0	3,653	4,497	8,150
			98n	1	0	0	0	0	0	0	0
26628-22-8	*	Sodium azide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	14	35,575	200	0	255	36,030	133,837	169,867
			98o	11	15,408	20	0	250	15,678	10,891	26,569
			98n	3	14	0	0	190,646	190,660	180	190,840
1982-69-0	*	Sodium dicamba	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	14,350	0	750	0	15,100	0	15,100
			98o	2	8,560	0	750	0	9,310	0	9,310
			98n	No reports							
128-04-1	*	Sodium dimethyldithio-carbamate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	61	2,746	20	0	0	2,766	152,357	155,123
			98o	80	21,924	4,868	0	13,367	40,159	316,977	357,136
			98n	10	7	0	0	482,268	482,275	12,561	494,836
7632-00-0	*	Sodium nitrite	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	322	301,410	546,938	1,004,363	81,948	1,934,659	293,970	2,228,629
			98o	379	139,416	429,631	841,400	538,533	1,948,980	465,973	2,414,953
			98n	23	766	500	27,801	14,910	43,977	78	44,055
—		Strychnine and salts	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
100-42-5	‡	Styrene	88	1,259	34,309,811	59,069	165	242,941	34,611,986	2,013,696	36,625,682
			95	1,563	41,543,298	4,570	209,945	96,078	41,853,891	2,724,361	44,578,252
			98o	1,534	53,704,396	13,437	345,945	322,736	54,386,514	1,998,942	56,385,456
			98n	107	22,189	10	161,738	14,929	198,866	30,283	229,149
96-09-3	‡	Styrene oxide	88	6	2,314	0	0	0	2,314	750	3,064
			95	5	13	0	0	0	13	0	13
			98o	2	9	0	0	0	9	0	9
			98n	No reports							
7664-93-9	*	Sulfuric acid	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1,592	21,672,183	5,363	30,035	134,812	21,842,393	4,733,342	26,575,735
			98o	822	26,620,367	22,608	690,900	55,837	27,389,712	1,131,423	28,521,135
			98n	481	167,137,095	2,400,001	0	85,501	169,622,597	20,000	169,642,597

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Silver compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	327,846	1,064,906	0	0	3,966,504	23,221	56,205	5,438,682	272
		98o	236,220	1,053,421	0	0	52,854	2,251	444,514	1,789,260	5,417
		98n	2,532	251	0	0	0	2,396	4,379,284	4,384,463	5
*	Simazine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	150,000	24,000	4,970	178,970	0
		98o	50	0	0	0	68,000	1,500	6,294	75,844	0
		98n	0	0	0	0	0	0	0	0	0
*	Sodium azide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	190,310	556,000	0	0	93,341	3,906,934	166,060	4,912,645	112
		98o	34,600	439,942	0	0	11,732	628,125	26,202	1,140,601	6
		98n	0	0	0	0	36,074	0	191,601	227,675	1
*	Sodium dicamba	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	800	15,200	16,000	0
		98o	0	0	0	0	414,800	46,680	9,546	471,026	0
		98n	No reports								
*	Sodium dimethyldithio-carbamate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	250	199,200	0	0	467,228	510,003	27,474	1,204,155	5,006
		98o	250	183,221	192	0	655,471	662,384	201,467	1,702,985	1
		98n	0	1	0	3	0	430	497,268	497,702	2
*	Sodium nitrite	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	374,426	4,657	0	0	7,287,854	2,774,201	2,829,724	13,270,862	278
		98o	391,745	34,041	0	1,117	15,840,859	3,180,881	2,352,246	21,800,889	8,406
		98n	0	0	0	0	664,173	173,681	44,290	882,144	2
	Strychnine and salts	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	31,974	0	0	31,974	0
‡	Styrene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	9,297,615	636,377	20,677,599	9,228,145	14,069,376	4,184,773	43,776,208	101,870,093	171,054
		98o	14,406,909	1,417,181	28,288,840	8,505,880	9,253,589	4,953,314	55,304,778	122,130,491	181,604
		98n	163,600	482,410	0	2,900,712	1,307,660	163,801	676,629	5,694,812	966
‡	Styrene oxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	35,337	0	0	0	13	35,350	0
		98o	0	0	30,000	0	0	0	9	30,009	0
		98n	No reports								
*	Sulfuric acid	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	686,624,536	5,892,020	66,777	24,524	655,860,878	11,581,301	23,125,457	1,383,175,493	86,021
		98o	242,521,471	1,193,466	43,000	41	163,703,014	4,533,258	27,395,926	439,390,176	42,080
		98n	1	15	0	17,184	156,274,080	327	168,632,533	324,924,140	1,886

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
2699-79-8	*	Sulfuryl fluoride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	355,007	0	0	0	355,007	0	355,007
			98o	3	466,000	0	0	0	466,000	0	466,000
			98n	No reports							
35400-43-2	*	Sulprofos	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	247	0	0	0	247	0	247
			98o	No reports							
			98n	No reports							
34014-18-1	*	Tebuthiuron	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	5	0	0	0	5	0	5
			98o	1	10	0	0	0	10	750	760
			98n	No reports							
3383-96-8	*	Temephos	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	1	7	0	0	0	7	0	7
5902-51-2	*	Terbacil	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	4,608	0	0	4,608	0	4,608
			98o	No reports							
			98n	No reports							
630-20-6		1,1,1,2-Tetrachloroethane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	8	7,011	0	0	0	7,011	2	7,013
			98o	7	8,732	5	0	0	8,737	2	8,739
			98n	5	952	0	0	0	952	67	1,019
79-34-5	*	1,1,2,2-Tetrachloroethane	88	13	43,865	1,903	0	29	45,797	128,750	174,547
			95	16	8,275	2,222	0	0	10,497	7	10,504
			98o	15	7,287	19	0	0	7,306	6,458	13,764
			98n	7	52	250	5	0	307	45	352
127-18-4	*,‡	Tetrachloroethylene	88	748	36,142,591	33,314	72,250	82,144	36,330,299	1,385,378	37,715,677
			95	442	9,646,764	2,407	20,481	6	9,669,658	78,221	9,747,879
			98o	362	5,378,267	1,490	5,916	2,992	5,388,665	127,744	5,516,409
			98n	158	203,750	250	644	18,986	223,630	46,646	270,276
354-11-0		1,1,1,2-Tetrachloro-2-fluoroethane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	23,275	1	0	0	23,276	0	23,276
			98n	No reports							
354-14-3		1,1,2,2-Tetrachloro-1-fluoroethane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	10	0	0	0	10	0	10
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Sulfuryl fluoride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	371,500	371,500	0
		98o	0	0	0	0	0	0	461,000	461,000	5,700
		98n	No reports								
*	Sulprofos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,137	0	249	1,386	0
		98o	No reports								
		98n	No reports								
*	Tebuthiuron	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1	0	0	0	1,000	1,100	1	2,102	0
		98o	4	0	0	0	860	870	1	1,735	0
		98n	No reports								
*	Temephos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	31,269	0	7	31,276	0
*	Terbacil	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	5,070	7,558	4,608	17,236	0
		98o	No reports								
		98n	No reports								
	1,1,1,2-Tetrachloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,600,000	0	0	0	4,234,676	379,203	8,341	7,222,220	40
		98o	6,600,180	0	0	120,700	2,930,017	43,074	8,655	9,702,626	18
		98n	0	0	0	0	158,326	2,580,168	1,015	2,739,509	1
*	1,1,2,2-Tetrachloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	6,200,000	2,233,342	846,600	880	13,754,898	150,324	10,503	23,196,547	40
		98o	6,692,000	223,548	597,000	0	10,254,173	119,300	8,887	17,894,908	803
		98n	0	0	0	2,214	479,168	2,571,170	125	3,052,677	0
*,‡	Tetrachloroethylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	46,323,123	6,821,607	8,865,647	781,602	26,279,022	2,315,753	9,637,247	101,024,001	14,474
		98o	127,776,623	14,221,195	6,567,399	622,782	22,292,456	1,066,482	5,387,673	177,934,610	36,280
		98n	4,546,323	975,944	434	2,807,835	1,453,568	4,577,503	281,180	14,642,787	128
	1,1,1,2-Tetrachloro-2-fluoroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	6,600	270	0	0	0	0	21,000	27,870	0
		98n	No reports								
	1,1,2,2-Tetrachloro-1-fluoroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	0	26,387	15	26,402	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
961-11-5	*	Tetrachlorvinphos	88	6	251	0	0	0	251	9,270	9,521
			95	5	626	5	0	0	631	4,200	4,831
			98o	4	360	5	0	0	365	0	365
			98n	No reports							
64-75-5	*	Tetracycline hydro-chloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	754	0	0	0	754	112	866
			98o	2	525	0	0	0	525	1,800	2,325
			98n	No reports							
7696-12-0	*	Tetramethrin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	0	0	0	0	0
			98o	2	0	0	0	0	0	0	0
			98n	1	0	0	0	0	0	0	0
7440-28-0		Thallium	88	No reports							
			95	1	255	0	0	755	1,010	195	1,205
			98o	5	15	0	0	3,400	3,415	3,650	7,065
			98n	5	533	65	0	96,339	96,937	5	96,942
—		Thallium compounds	88	4	253	0	0	250	503	1,256	1,759
			95	No reports							
			98o	4	1,060	250	0	409,000	410,310	259	410,569
			98n	29	35,325	729	0	10,791,508	10,827,562	2,554	10,830,116
148-79-8	*	Thiabendazole	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	3,929	0	0	0	3,929	0	3,929
			98o	3	0	0	0	0	0	0	0
			98n	No reports							
62-55-5	‡	Thioacetamide	88	1	500	0	0	0	500	0	500
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
28249-77-6	*	Thiobencarb	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	510	0	0	0	510	3,032	3,542
			98o	2	286	0	0	0	286	760	1,046
			98n	No reports							
59669-26-0	*	Thiodicarb	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	376	0	0	0	376	500	876
			98o	3	359	0	0	0	359	5,966	6,325
			98n	No reports							
23564-05-8	*	Thiophanate-methyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	502	0	0	0	502	0	502
			98o	7	431	0	0	0	431	442	873
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A-1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
*	Tetrachlorvinphos	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	330	0	17,000	47,000	1,020	4,244	4,395	73,989	0
		98o	350	0	44,000	26,700	870	11,640	211	83,771	0
		98n	No reports								
*	Tetracycline hydro-chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	1,736	677	2,413	0
		98o	0	0	0	0	0	700	2,160	2,860	0
		98n	No reports								
*	Tetramethrin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	437	0	437	0
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	0	0	0	0	0
	Thallium	88	No reports								
		95	688,093	3,852	0	0	0	190	31	692,166	0
		98o	0	0	52,353	1	0	9	3,406	55,769	0
		98n	0	0	0	0	21,600	1	96,826	118,427	0
	Thallium compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	250	310,000	310,250	100,000
		98n	2,133	0	0	0	0	1	10,861,194	10,863,328	653
*	Thiabendazole	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1	0	0	2,160	1,200	1,931	3,740	9,032	0
		98o	0	0	0	0	0	747	0	747	0
		98n	No reports								
‡	Thioacetamide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
*	Thiobencarb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	620	3,162	3,782	0
		98o	747	0	0	0	0	198	1,772	2,717	1
		98n	No reports								
*	Thiodicarb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,500	0	0	0	41,139	160	180	42,979	1
		98o	108,880	0	0	0	34,243	19,476	362	162,961	0
		98n	No reports								
*	Thiophanate-methyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	320	0	0	0	0	2,677	507	3,504	0
		98o	10,000	0	0	0	0	3,431	436	13,867	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
79-19-6		Thiosemicarbazide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	No reports							
			98n	No reports							
62-56-6	*,‡	Thiourea	88	26	2,004	16,951	5,940	750	25,645	2,303	27,948
			95	26	1,630	1,487	5,000	250	8,367	4,269	12,636
			98o	28	1,672	358	1,250	250	3,530	5,895	9,425
			98n	4	0	0	0	0	0	0	0
137-26-8	*	Thiram	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	61	2,856	50	0	0	2,906	98,617	101,523
			98o	64	3,279	22	0	1,751	5,052	81,375	86,427
			98n	3	15	0	0	0	15	25	40
1314-20-1		Thorium dioxide	88	3	1,580	0	0	0	1,580	677,549	679,129
			95	1	1	0	0	0	1	0	1
			98o	2	0	0	0	0	0	0	0
			98n	No reports							
7550-45-0		Titanium tetrachloride	88	41	78,668	0	0	1,400	80,068	0	80,068
			95	33	20,299	0	0	0	20,299	32,282	52,581
			98o	34	31,991	0	0	0	31,991	380	32,371
			98n	3	0	0	0	0	0	0	0
108-88-3	*	Toluene	88	4,006	299,954,882	196,957	1,473,666	644,168	302,269,673	9,615,791	311,885,464
			95	3,470	147,530,281	53,263	310,643	177,343	148,071,530	881,153	148,952,683
			98o	3,002	97,287,386	38,270	589,931	71,470	97,987,057	1,340,500	99,327,557
			98n	813	962,248	5,572	21,671	51,883	1,041,374	492,065	1,533,439
584-84-9	‡	Toluene-2,4-diisocyanate	88	257	165,062	0	0	1,040	166,102	36,178	202,280
			95	64	7,805	0	0	0	7,805	611	8,416
			98o	54	6,853	5	0	0	6,858	4,402	11,260
			98n	6	2	0	0	0	2	0	2
91-08-7	‡	Toluene-2,6-diisocyanate	88	189	492,192	0	0	510	492,702	9,444	502,146
			95	40	3,044	0	0	0	3,044	153	3,197
			98o	24	1,561	0	0	0	1,561	1,079	2,640
			98n	1	0	0	0	0	0	0	0
26471-62-5	‡	Toluenediisocyanate (mixed isomers)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	196	48,856	105	0	275	49,236	26,263	75,499
			98o	176	55,406	0	0	534	55,940	32,450	88,390
			98n	4	0	0	0	0	0	0	0
95-53-4	‡	o-Toluidine	88	18	46,922	1,902	250	5,024	54,098	670	54,768
			95	23	12,826	256	22,140	12	35,234	55	35,289
			98o	19	7,606	5	17,020	5	24,636	11	24,647
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
	Thiosemicarbazide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	No reports								
		98n	No reports								
*,‡	Thiourea	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	7,082	0	0	0	18,535	11,867	10,652	48,136	1
		98o	0	245	0	0	55,223	16,049	8,760	80,277	1
		98n	0	0	0	0	0	0	0	0	1
*	Thiram	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	18,712	31,501	0	5	407	10,622	101,354	162,601	6
		98o	25,341	31,339	0	870	0	19,988	84,505	162,043	3
		98n	0	0	0	0	42,192	0	40	42,232	0
	Thorium dioxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	26,000	0	0	0	0	2,600	1	28,601	0
		98o	3,100	0	0	0	0	0	330	3,430	0
		98n	No reports								
	Titanium tetrachloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	129,787	0	0	23,836,598	2,928	52,646	24,021,959	13
		98o	0	196,905	0	1	27,810,226	142,054	32,619	28,181,805	266
		98n	0	0	0	0	122,039	0	0	122,039	0
*	Toluene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,003,669,151	25,263,068	214,670,916	78,591,424	192,091,541	19,520,426	144,748,460	1,678,554,986	370,435
		98o	1,062,792,815	24,149,114	237,136,803	76,695,979	244,897,497	23,568,744	99,294,597	1,768,535,549	622,564
		98n	27,683,388	3,612,535	303,316	76,552,013	19,825,779	11,390,895	5,024,861	144,392,787	350,324
‡	Toluene-2,4-diisocyanate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	427	0	37,664	16,408	3,311	20,201	6,227	84,238	13
		98o	393	0	1,410	9,546	13,193	23,162	9,402	57,106	389
		98n	0	0	0	40	8,723	0	302	9,065	300
‡	Toluene-2,6-diisocyanate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	107	0	9,416	3,705	652	1,542	7,511	22,933	7
		98o	98	0	0	1,276	501	2,613	1,547	6,035	0
		98n	0	0	0	0	0	0	0	0	0
‡	Toluenediisocyanate (mixed isomers)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	15,224	2,784	5,800,065	60,045	2,876,258	195,978	60,100	9,010,454	11,617
		98o	7,260	1,996	7,812,428	2,054,210	1,029,937	299,050	71,319	11,276,200	17,918
		98n	0	0	0	40	188,824	0	1	188,865	0
‡	o-Toluidine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	49	0	95,623	139,297	94,846	127,937	34,825	492,577	0
		98o	220	0	303,180	120,352	150,729	105,563	24,656	704,700	460
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
636-21-5	‡	o-Toluidine hydrochloride	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
8001-35-2	*,‡	Toxaphene	88	No reports							
			95	No reports							
			98o	No reports							
			98n	5	13	0	0	25,476	25,489	113	25,602
43121-43-3	*	Triadimefon	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	4	3	0	0	1	4	0	4
			98n	No reports							
2303-17-5	*	Triallate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	588	0	0	0	588	24,076	24,664
			98o	2	519	0	0	0	519	21,640	22,159
			98n	No reports							
101200-48-0	*	Tribenuron methyl	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	1	0	0	0	1	0	1
			98o	1	1	0	0	0	1	0	1
			98n	No reports							
1983-10-4	*	Tributyltin fluoride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	23	0	0	23	0	23
			98o	No reports							
			98n	No reports							
2155-70-6	*	Tributyltin methacrylate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	25	23	0	0	48	0	48
			98o	2	14	10	0	0	24	0	24
			98n	No reports							
78-48-8	*	S,S,S-Tributyltrithiophosphate	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	1,730	2	0	0	1,732	0	1,732
			98o	2	250	36	0	0	286	0	286
			98n	No reports							
52-68-6	*	Trichlorfon	88	5	253	0	0	0	253	487	740
			95	2	0	0	0	0	0	0	0
			98o	5	2	0	0	0	2	0	2
			98n	No reports							
76-02-8		Trichloroacetyl chloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	1	0	0	0	1	0	1
			98o	1	1	0	0	0	1	0	1
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	o-Toluidine hydro-chloride	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
*,‡	Toxaphene	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	103,929	1	25,602	129,532	0
*	Triadimefon	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	280	1,984	4	2,268	0
		98n	No reports								
*	Triallate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	19,838	0	0	0	93,000	52,830	24,149	189,817	0
		98o	0	0	0	0	6,480	97,751	22,410	126,641	0
		98n	No reports								
*	Tribenuron methyl	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	5,144	1	5,145	0
		98o	0	0	0	0	0	13,016	1	13,017	0
		98n	No reports								
*	Tributyltin fluoride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	250	0	23	273	0
		98o	No reports								
		98n	No reports								
*	Tributyltin methacrylate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	25	9,096	4,320	48	13,489	0
		98o	253	0	0	419	0	0	34	706	0
		98n	No reports								
*	S,S,S-Tributyltrithio-phosphate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	2,541	316	1,717	4,574	0
		98o	0	0	0	0	10,276	691	367	11,334	0
		98n	No reports								
*	Trichlorfon	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	213	2,831	2	3,046	0
		98n	No reports								
	Trichloroacetyl chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	1	1	0
		98o	0	0	0	0	0	0	1	1	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
120-82-1	*	1,2,4-Trichlorobenzene	88	57	1,532,913	31,628	7,408	3,073	1,575,022	164,144	1,739,166
			95	31	168,490	259	12,500	0	181,249	41,648	222,897
			98o	25	141,284	151	8,960	0	150,395	1,651	152,046
			98n	7	765	250	5	0	1,020	507	1,527
71-55-6	*	1,1,1-Trichloroethane	88	3,921	180,841,849	95,624	1,000	204,923	181,143,396	5,947,625	187,091,021
			95	809	23,558,488	1,118	126	38,690	23,598,422	124,583	23,723,005
			98o	129	837,784	417	0	5,195	843,396	11,301	854,697
			98n	38	26,362	250	0	0	26,612	63,768	90,380
79-00-5	*	1,1,2-Trichloroethane	88	29	1,741,442	5,303	0	89	1,746,834	19,810	1,766,644
			95	22	280,352	870	0	0	281,222	84	281,306
			98o	22	280,070	540	0	1	280,611	1,173	281,784
			98n	14	750	250	5	0	1,005	3,666	4,671
79-01-6	*,‡	Trichloroethylene	88	953	55,943,736	13,801	390	21,186	55,979,113	1,466,469	57,445,582
			95	744	26,182,808	1,477	550	3,577	26,188,412	74,145	26,262,557
			98o	568	13,024,108	867	588	800	13,026,363	92,774	13,119,137
			98n	149	30,688	10	5	0	30,703	40,767	71,470
75-69-4	*	Trichlorofluoromethane (CFC-11)	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	54	957,461	410	22	0	957,893	4,149	962,042
			98o	29	461,502	1,484	0	0	462,986	1	462,987
			98n	16	2,292	250	250	0	2,792	108	2,900
95-95-4	*	2,4,5-Trichlorophenol	88	1	91	0	0	0	91	20	111
			95	No reports							
			98o	1	198	36	0	69	303	0	303
			98n	2	3	0	0	0	3	0	3
88-06-2	*,‡	2,4,6-Trichlorophenol	88	3	250	50	12,000	0	12,300	10	12,310
			95	1	161	210	0	0	371	0	371
			98o	1	114	26	0	0	140	0	140
			98n	3	4	0	0	0	4	10	14
96-18-4	‡	1,2,3-Trichloropropane	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	5	11,081	1,600	0	0	12,681	0	12,681
			98o	8	13,889	300	0	0	14,189	6,758	20,947
			98n	No reports							
57213-69-1	*	Triclopyr triethyl-ammonium salt	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	3	0	0	0	3	0	3
			98o	3	6	0	0	0	6	0	6
			98n	No reports							
121-44-8		Triethylamine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	152	2,138,352	27,705	309,512	14,010	2,489,579	17,180	2,506,759
			98o	173	1,580,026	26,046	186,190	23,755	1,816,017	56,292	1,872,309
			98n	23	1,645	0	0	0	1,645	627	2,272

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	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			
*	1,2,4-Trichlorobenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	40,745	10,541	2,400	108,129	1,137,925	393,319	183,352	1,876,411	6,387
		98o	1,115,301	22,393	66,119	15,718	564,003	199,720	151,560	2,134,814	35
		98n	0	0	0	9,500	88,370	216	697	98,783	3
*	1,1,1-Trichloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	60,033,102	3,742,428	3,718,698	1,054,160	1,108,250	1,338,872	23,347,887	94,343,397	14,198
		98o	1,173,558	157,496	2,532,293	489,686	455,010	236,114	801,370	5,845,527	19,819
		98n	462,904	7,057	474,196	2,195,731	1,410,300	645,034	69,771	5,264,993	35
*	1,1,2-Trichloroethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	18,699,000	11,817,647	12,091,000	200,596	24,559,416	3,265,021	275,059	70,907,739	482
		98o	55,855,000	10,382,145	4,986,912	225	43,261,411	2,016,996	284,696	116,787,385	48
		98n	0	0	0	41,005	1,166,146	38,648	27,547	1,273,346	1
*,‡	Trichloroethylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	154,217,925	8,493,087	2,624,155	1,121,208	5,218,927	2,309,091	25,899,233	199,883,626	221,357
		98o	133,031,389	4,723,797	3,027,541	663,417	5,461,498	1,196,775	12,967,461	161,071,878	123,613
		98n	3,551,973	3,302	3,559	774,817	1,321,535	6,233,648	42,058	11,930,892	381
*	Trichlorofluoromethane (CFC-11)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	138,712	227,287	618,422	170,699	4,200	291,955	961,314	2,412,589	1,038
		98o	0	200,242	210,039	10,519	63,784	280,199	462,899	1,227,682	27
		98n	0	0	0	117,603	569,323	45,338	2,169	734,433	1
*	2,4,5-Trichlorophenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	23,152	5	303	23,460	0
		98n	0	0	0	0	28,000	0	3	28,003	0
*,‡	2,4,6-Trichlorophenol	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	1,294,115	0	371	1,294,486	0
		98o	0	0	0	0	1,100,000	0	140	1,100,140	0
		98n	0	0	0	0	28,000	0	10	28,010	0
‡	1,2,3-Trichloropropane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	88,000	9	460,000	0	1,330,000	10,000,000	12,551	11,890,560	0
		98o	7,100,000	0	870,000	0	2,553,000	5,949,995	14,239	16,487,234	0
		98n	No reports								
*	Triclopyr triethyl-ammonium salt	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	4	110	3	117	0
		98o	0	0	0	0	0	70	6	76	0
		98n	No reports								
	Triethylamine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	488,423	428,122	34,114	531,959	1,615,455	1,035,880	2,618,959	6,752,912	12
		98o	332,653	670,856	380,472	406,920	4,290,600	870,481	2,144,448	9,096,430	123
		98n	0	0	0	36,112	112,632	4,293	1,752	154,789	1

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
1582-09-8	*	Trifluralin	88	17	3,277	601	0	0	3,878	40,557	44,435
			95	23	17,144	92	0	8,250	25,486	24,490	49,976
			98o	17	9,180	250	0	5	9,435	29,888	39,323
			98n	2	13	0	0	0	13	0	13
26644-46-2	*	Triforine	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	755	0	0	0	755	0	755
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
95-63-6		1,2,4-Trimethylbenzene	88	293	4,265,650	10,088	7,964	61,583	4,345,285	200,616	4,545,901
			95	808	7,700,983	8,434	2,886	43,921	7,756,224	52,201	7,808,425
			98o	874	7,731,719	7,464	6,650	14,784	7,760,617	172,162	7,932,779
			98n	626	141,660	695	0	3,045	145,400	16,605	162,005
639-58-7	*	Triphenyltin chloride	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	1	0	0	0	0	0	0	0
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
76-87-9	*	Triphenyltin hydroxide	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	3	21	0	0	0	21	250	271
			98o	3	7	0	0	0	7	235	242
			98n	No reports							
126-72-7	‡	Tris(2,3-dibromopropyl) phosphate	88	No reports							
			95	No reports							
			98o	No reports							
			98n	1	0	0	0	0	0	0	0
72-57-1	‡	Trypan blue	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	No reports							
			98o	1	0	0	0	0	0	0	0
			98n	1	0	0	0	0	0	0	0
51-79-6	‡	Urethane	88	11	145,123	0	0	0	145,123	1,350	146,473
			95	4	124	0	0	0	124	3,750	3,874
			98o	2	1,413	22	0	0	1,435	0	1,435
			98n	1	4	0	0	0	4	2,224	2,228
7440-62-2		Vanadium (fume or dust)	88	33	17,178	4,704	0	87,296	109,178	93,417	202,595
			95	19	14,649	5	0	144,086	158,740	28,780	187,520
			98o	20	16,018	16	0	128,809	144,843	4,749	149,592
			98n	15	38,782	600	0	681,263	720,645	115,226	835,871
50471-44-8	*	Vinclozolin	88	NR	NR	NR	NR	NR	NR	NR	NR
			95	2	0	0	0	0	0	0	0
			98o	2	10	0	0	0	10	750	760
			98n	No reports							

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled On-site Pounds	Recycled Off-site Pounds	Energy Recovery On-site Pounds	Energy Recovery Off-site Pounds	Treated On-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Managed Pounds	Non-production-related Waste Managed Pounds
*	Trifluralin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	2,107	0	0	3	99,980	76,583	54,675	233,348	9,313
		98o	80,000	0	0	0	6,880	75,025	30,415	192,320	0
		98n	0	0	0	0	29,827	0	10	29,837	0
*	Triforine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	300	890	1,190	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
	1,2,4-Trimethylbenzene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	13,740,574	1,473,196	5,036,750	3,031,941	9,491,985	470,849	7,924,141	41,169,436	11,099
		98o	12,771,902	1,823,286	8,111,150	3,658,955	10,349,448	668,368	7,972,229	45,355,338	3,612
		98n	1,648,852	614,294	12,446	214,721	627,785	109,757	861,473	4,089,328	149,368
*	Triphenyltin chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	2,555	0	0	2,555	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
*	Triphenyltin hydroxide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	1	109,816	390	401	110,608	0
		98o	0	0	0	0	16,465	1,273	237	17,975	0
		98n	No reports								
‡	Tris(2,3-dibromopropyl) phosphate	88	No reports								
		95	No reports								
		98o	No reports								
		98n	0	0	0	0	0	0	0	0	0
‡	Trypan blue	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	No reports								
		98o	0	0	0	0	0	0	0	0	0
		98n	0	0	0	0	0	0	0	0	0
‡	Urethane	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	1,165	4,742	5,907	2,500
		98o	0	0	0	0	26,432	0	1,435	27,867	0
		98n	0	0	0	0	142,049	0	2,228	144,277	0
	Vanadium (fume or dust)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	191,454	54,731	217	0	0	820	188,573	435,795	0
		98o	29,920	44,826	0	0	0	0	146,404	221,150	0
		98n	0	0	0	0	0	0	817,787	817,787	0
*	Vinclozolin	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	1,030	0	1,030	0
		98o	0	0	0	0	650	660	1	1,311	0
		98n	No reports								

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
108-05-4	‡	Vinyl acetate	88	146	6,087,497	10,021	2,109,851	18,889	8,226,258	21,811	8,248,069
			95	155	4,105,652	8,269	783,829	1,717	4,899,467	41,783	4,941,250
			98o	195	3,327,064	3,665	285,141	1,125	3,616,995	172,610	3,789,605
			98n	14	35,950	0	0	55,000	90,950	22,422	113,372
593-60-2	‡	Vinyl bromide	88	2	4,950	400	0	0	5,350	0	5,350
			95	2	54,930	0	0	0	54,930	0	54,930
			98o	1	0	0	0	0	0	0	0
			98n	No reports							
75-01-4	‡	Vinyl chloride	88	53	1,439,189	2,051	53	4,409	1,445,702	4,555	1,450,257
			95	48	1,044,665	525	33	1	1,045,224	15,645	1,060,869
			98o	46	884,724	78	149	0	884,951	68,039	952,990
			98n	9	1,473	0	5	0	1,478	1,175	2,653
75-35-4	*	Vinylidene chloride	88	21	296,353	3,462	170	429	300,414	44,281	344,695
			95	24	177,557	392	0	0	177,949	260	178,209
			98o	25	166,203	61	218	0	166,482	3	166,485
			98n	8	1,903	250	45,812	82,000	129,965	19,139	149,104
108-38-3		m-Xylene	88	68	2,463,043	2,566	0	18,045	2,483,654	107,746	2,591,400
			95	61	1,151,489	892	569	13,838	1,166,788	8,650	1,175,438
			98o	75	1,231,376	1,065	4,199	860	1,237,500	29,929	1,267,429
			98n	12	4,315	5	0	0	4,320	10	4,330
95-47-6		o-Xylene	88	66	2,241,814	2,786	250	22,461	2,267,311	52,881	2,320,192
			95	67	1,384,483	869	569	485	1,386,406	1,152	1,387,558
			98o	81	1,345,001	960	3,088	41,350	1,390,399	52,330	1,442,729
			98n	22	1,885	5	0	0	1,890	779	2,669
106-42-3		p-Xylene	88	48	5,992,743	3,200	0	49,226	6,045,169	31,108	6,076,277
			95	39	2,937,312	532	569	29,401	2,967,814	1,261	2,969,075
			98o	51	1,840,514	725	3,227	55	1,844,521	18,212	1,862,733
			98n	8	13,773	5	0	0	13,778	0	13,778
1330-20-7	*	Xylene (mixed isomers)	88	3,468	158,986,408	204,480	144,728	558,257	159,893,873	6,455,911	166,349,784
			95	3,309	97,407,228	33,834	123,396	99,856	97,664,314	573,672	98,237,986
			98o	2,828	67,821,611	50,450	121,085	39,879	68,033,025	874,303	68,907,328
			98n	807	583,188	5,061	2,788	70,750	661,787	886,816	1,548,603
87-62-7	*,‡	2,6-Xylidine	88	2	337	1,537	0	0	1,874	0	1,874
			95	4	275	0	0	0	275	0	275
			98o	2	453	0	0	0	453	0	453
			98n	1	0	0	0	0	0	0	0
7440-66-6	*	Zinc (fume or dust)	88	644	3,455,937	849,544	140,010	25,617,365	30,062,856	31,450,587	61,513,443
			95	434	2,018,030	45,165	0	6,402,741	8,465,936	9,630,055	18,095,991
			98o	421	1,321,627	9,869	1	7,677,900	9,009,397	8,178,683	17,188,080
			98n	42	2,673,274	31,273	294,942	66,893,786	69,893,275	300,945	70,194,220

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (chemicals added to the TRI list after 1988 or whose reporting definition has changed since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
			On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
‡	Vinyl acetate	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	311,385	533,356	15,379,353	6,544,593	19,205,133	9,194,987	5,194,288	56,363,095	14,797
		98o	993,710	86,990	18,113,523	14,361,541	27,428,956	1,452,870	3,558,001	65,995,591	62,310
		98n	0	1	0	2,467,985	741,302	64,434	109,107	3,382,829	1
‡	Vinyl bromide	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	36	0	54,910	54,946	0
		98o	0	0	0	0	0	0	0	0	0
		98n	No reports								
‡	Vinyl chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	318,121,038	90,685	23,368,507	20,853	40,034,145	55,842	1,051,733	382,742,803	31,509
		98o	377,999,298	857,715	40,383,408	14,028	36,705,295	275,230	873,905	457,108,879	19,820
		98n	0	0	0	6,752	320,294	315,826	1,421	644,293	1
*	Vinylidene chloride	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,438,000	55	190,253	102,442	6,754,873	85,282	161,401	8,732,306	16,577
		98o	1,830,000	8,605	125,000	82,946	3,494,987	15,029	167,190	5,723,757	82
		98n	0	1	0	8,069	799,244	2,116	142,052	951,482	1
	m-Xylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	1,917,515	27,006	4,141,480	245,136	3,100,716	131,806	1,160,477	10,724,136	1,434
		98o	1,891,441	163,888	9,462,285	239,498	1,087,152	126,807	1,265,761	14,236,832	19,072
		98n	2,913	80	0	194,683	0	1,045	4,129	202,850	0
	o-Xylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	317,695	59,486	15,563,897	1,859,258	2,219,346	814,980	1,448,714	22,283,376	11,493
		98o	102,107	14,743	6,965,568	1,756,281	2,049,794	815,174	1,399,902	13,103,569	14,901
		98n	1,260	475	0	192,004	49,441	552	1,999	245,731	2
	p-Xylene	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	468,689	8,192	2,168,729	3,563	645,579	8,722	2,958,765	6,262,239	17,281
		98o	165,168	395	4,670,124	7,322	2,936,767	156,678	1,860,536	9,796,990	10,987
		98n	870	0	0	182,126	0	0	15,372	198,368	3,192
*	Xylene (mixed isomers)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	135,128,333	41,448,000	141,797,405	70,096,844	55,510,070	9,887,922	96,742,119	550,610,693	238,872
		98o	100,170,197	34,580,802	140,741,580	58,552,768	63,117,684	13,557,039	69,968,877	480,688,947	179,195
		98n	27,282,338	3,668,826	730,790	87,511,050	10,026,587	9,219,271	3,993,137	142,431,999	75,781
*,‡	2,6-Xylidine	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	8,000	0	303	258	225	8,786	0
		98o	0	0	22,235	0	0	0	453	22,688	0
		98n	0	4	0	0	0	0	0	4	0
*	Zinc (fume or dust)	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	27,847,425	78,612,040	0	53,501	3,815,022	6,476,942	10,720,889	127,525,819	35,492
		98o	28,264,015	49,724,579	0	121,438	654,672	739,677	29,388,494	108,892,875	2,282,686
		98n	393,004	69,000	0	0	0	0	70,098,287	70,560,291	3

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Table A–1A. TRI On-site and Off-site Releases, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

CAS Number		Chemical	Year	Total Forms Number	On-site Releases: Total Air Emissions Pounds	On-site Releases: Surface Water Discharges Pounds	On-site Releases: Underground Injection Pounds	On-site Releases: Releases to Land Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On-and Off-site Releases Pounds
--		Zinc compounds	88	1,665	7,265,579	1,201,109	109,555	113,361,611	121,937,854	84,387,363	206,325,217
			95	2,636	4,778,881	1,076,450	212,844	113,909,668	119,977,843	106,486,385	226,464,228
			98o	2,815	6,814,092	1,224,399	242,175	116,388,360	124,669,026	109,306,567	233,975,593
			98n	447	1,905,903	553,785	21,761,086	655,004,597	679,225,371	12,226,422	691,451,793
12122-67-7	*	Zineb	88	2	1,250	0	0	0	1,250	2,600	3,850
			95	1	0	0	0	0	0	0	0
			98o	1	100	0	0	0	100	0	100
			98n	1	1	0	0	0	1	1	2
--		Mixtures and other trade name products	88	176	3,450,870	59,460	0	18,699	3,529,029	10,662,177	14,191,206
			95	30	334,194	3,171	0	0	337,365	4,400	341,765
			98o	51	215,185	0	0	250	215,435	86,089	301,524
			98n	7	7,550	0	0	0	7,550	0	7,550
--		Trade secrets	88	5	0	0	0	0	0	0	0
			95	12	0	0	0	0	0	0	0
			98o	11	30	0	0	0	30	0	30
			98n	No reports							
		Total	88	NA	NA	NA	NA	NA	NA	NA	NA
			95	76,139	1,585,156,840	180,516,139	236,194,397	319,250,562	2,321,117,938	316,415,148	2,637,533,086
			98o	72,073	1,256,949,811	223,365,761	210,639,389	355,674,874	2,046,629,835	332,152,673	2,378,782,508
			98n	15,255	796,550,006	8,074,161	56,677,417	3,955,141,581	4,816,443,165	112,049,461	4,928,492,626

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 *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in the 1996 reporting year.
98o is data from original industries, 98n is data from new industries.
NR: not reportable (totals for 1988 are not comparable to those for 1995 and 1998 because of the changes in the TRI list of chemicals since 1988).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡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%.*

Table A–1B. Quantities of TRI Chemicals in Waste, by Chemical, 1988, 1995 and 1998 (Original and New Industries) *(continued)*

	Chemical	Year	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			
	Zinc compounds	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	130,344,787	252,896,744	446,100	392,444	4,137,758	26,642,410	201,640,027	616,500,270	11,143,285
		98o	104,608,978	281,287,343	715,632	406,075	3,703,768	12,529,162	293,743,139	696,994,097	1,360,351
		98n	8,597,707	4,568,067	0	4,057	3,384,594	141,757	699,761,369	716,457,551	48,585
*	Zineb	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	100	0	0	100	200	0
		98n	0	0	0	0	11,715	0	2	11,717	0
	Mixtures and other trade name products	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	8,025	19,282	96,280,793	375,381	72,738,249	294,743	384,186	170,100,659	1
		98o	6,588,400	8,852	1,369,961	15,955	23,587	67,846	242,389	8,316,990	14
		98n	3,775,989	0	0	0	0	0	7,392	3,783,381	1
	Trade secrets	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	0	0	0	0	0	0	0	0	0
		98o	0	0	0	0	2,700	0	30	2,730	0
		98n	No reports								
	Total	88	NA	NA	NA	NA	NA	NA	NA	NA	NA
		95	11,663,554,919		2,740,388,125	503,968,089	6,794,862,115	569,710,695	2,556,354,462	27,179,372,072	34,060,993
		98o	9,646,571,037	2,059,338,694	2,851,489,429	485,373,723	6,012,991,050	547,355,031	2,448,429,537	24,051,548,501	26,712,347
		98n	180,854,791	39,905,983	11,399,201	419,669,514	630,290,874	91,837,013	5,106,263,945	6,480,221,321	1,730,941

Note: *Data from Section 8 (Current Year) of Form R.*
98o is data from original industries, 98n is data from new industries
NA: not applicable (waste management data not required for 1988 reporting year).
No reports: No reports received for the chemical in that reporting year.
**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.*
‡*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%.*

Appendix B

TRI Release and Waste Management Data for Metals and Metal Compounds, 1998

Table B–1. TRI On-site and Off-site Releases of Metals and Metal Compounds, Original and New Industries, 1998

Chemical		On-site Releases: Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other Landfills Pounds	On-site Land Releases: Land Treatment Pounds	On-site Land Releases: Surface Impound–ments Pounds	On-site Land Releases: Other Disposal Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Aluminum (fume or dust)* (CAS Number 7429-90-5)	O	1,301,497	3,818	0	0	0	1,893,866	0	0	12,811	3,211,992	6,720,761	9,932,753
	N	109,949	0	5	0	3,642,599	0	0	52	109,887	3,862,492	52,889	3,915,381
Antimony and antimony compounds	O	81,084	48,126	11,298	0	41,578	267,661	614	420,820	541,884	1,413,065	3,629,730	5,042,795
	N	11,937	22,183	18,994	170,062	685,475	460,238	1,102	9,695,252	13,856,327	24,921,570	242,149	25,163,719
Arsenic and arsenic compounds	O	123,085	6,585	169,000	0	13,496	2,101,627	5	4,411,586	604,904	7,430,288	782,654	8,212,942
	N	239,634	160,927	269,393	760,075	4,952,950	3,177,687	20,562	149,342,039	439,874,252	598,797,519	1,640,288	600,437,807
Barium and barium compounds	O	729,582	1,039,186	29,000	0	220,163	4,431,691	82,598	1,003,034	1,450,823	8,986,077	6,496,241	15,482,318
	N	2,421,449	1,130,736	25,250	1,327,000	7,634,121	78,188,281	584,924	77,565,801	10,706,132	179,583,694	38,848,640	218,432,334
Beryllium and beryllium compounds	O	1,175	32	0	0	2,000	55,680	5	55	10	58,957	23,208	82,165
	N	20,999	1,859	0	0	34,980	270,117	310	416,553	11,269	756,087	91,126	847,213
Cadmium and cadmium compounds	O	71,492	1,415	130,033	0	217,686	57,006	5	460,417	274,956	1,213,010	1,410,321	2,623,331
	N	17,994	1,218	166,612	96,870	5,436,727	30,164	0	2,213,720	2,521,834	10,485,139	352,347	10,837,486
Chromium and chromium compounds	O	828,499	125,421	874,804	0	506,300	1,693,166	12,884	27,116,404	1,487,959	32,645,437	26,013,351	58,658,788
	N	309,804	139,533	908,803	26,800	4,688,643	5,091,697	70,612	13,314,578	49,773,432	74,323,902	7,376,347	81,700,249
Cobalt and cobalt compounds	O	72,208	38,463	32,950	0	19,729	27,463	7,525	140,271	389,963	728,572	721,817	1,450,389
	N	55,401	24,074	5	12,001	214,772	1,376,697	24,825	3,840,107	7,194,183	12,742,065	478,776	13,220,841
Copper and copper compounds	O	4,249,985	132,018	243,784	250	241,709	5,018,984	82,579	8,564,902	39,643,483	58,177,694	26,289,183	84,466,877
	N	706,021	385,227	193,473	1,212,884	8,856,870	8,596,713	31,763	562,051,115	932,526,642	1,514,560,708	6,989,388	1,521,550,096
Lead and lead compounds	O	1,179,439	50,400	171,660	0	805,970	2,974,534	2,455	4,367,684	11,387,802	20,939,944	22,606,137	43,546,081
	N	353,113	77,218	24,073	7,279,134	26,839,283	10,231,802	26,904	118,448,188	81,431,909	244,711,624	6,401,205	251,112,829
Manganese and Manganese compounds	O	2,537,010	4,731,985	7,755,613	0	4,238,256	38,518,929	228,830	15,981,109	3,849,349	77,841,081	54,383,621	132,224,702
	N	560,624	1,155,446	85,000	782,400	8,768,090	21,057,817	215,314	36,984,760	391,800,714	461,410,165	8,765,494	470,175,659
Mercury and mercury compounds	O	14,963	168	0	0	1,910	1,904	5	1,800	0	20,750	34,675	55,425
	N	14,693	22	0	0	186,116	92	0	2,411,111	6,607,885	9,219,919	87,331	9,307,250
Nickel and nickel compounds	O	807,393	148,754	166,130	5	54,984	1,334,785	8,880	2,543,221	2,024,958	7,089,110	7,851,355	14,940,465
	N	768,969	295,190	420,163	32,408	3,688,850	4,725,015	64,894	11,786,661	34,949,886	56,732,036	10,516,931	67,248,967

Note: On-site Releases *are 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*** *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
O: *Original Industries.*
N: *New Industries.*
**Only fume or dust forms are reportable.*

Table B–1. TRI On-site and Off-site Releases of Metals and Metal Compounds, Original and New Industries, 1998 *(continued)*

Chemical		On-site Releases: Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other Landfills Pounds	On-site Land Releases: Land Treatment Pounds	On-site Land Releases: Surface Impound–ments Pounds	On-site Land Releases: Other Disposal Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
Selenium and	O	79,309	3,431	38,030	0	2,485	86,663	5	142,426	131,635	483,984	86,378	570,362
selenium compounds	N	528,578	32,727	17,937	8	1,209,021	614,570	372	485,424	2,585,957	5,474,594	570,491	6,045,085
Silver and	O	18,054	5,875	111	0	2,021	3,810	640	25,000	47,310	102,821	263,681	366,502
silver compounds	N	907	676	15,380	140,000	408,110	250	3	596,451	3,482,843	4,644,620	199,996	4,844,616
Thallium and	O	1,075	250	0	0	3,400	119,000	0	290,000	0	413,725	3,909	417,634
thallium compounds	N	35,858	794	0	0	51,377	729,100	0	967,266	9,140,104	10,924,499	2,559	10,927,058
Vanadium (fume or dust)*	O	16,018	16	0	0	3,400	125,400	9	0	0	144,843	4,749	149,592
(CAS Number '7440-62-2)	N	38,782	600	0	0	254,587	62,812	0	363,864	0	720,645	115,226	835,871
Zinc and	O	8,135,719	1,234,268	241,926	250	8,383,772	30,535,691	112,634	10,459,744	74,574,419	133,678,423	117,485,250	251,163,673
zinc compounds*	N	4,579,177	585,058	644,958	21,411,070	98,255,724	19,422,598	50,206	287,724,107	316,445,748	749,118,646	12,527,367	761,646,013
Total	O	**20,247,587**	**7,570,211**	**9,864,339**	**505**	**14,758,859**	**89,247,860**	**539,673**	**75,928,473**	**136,422,266**	**354,579,773**	**274,807,021**	**629,386,794**
	N	**10,773,889**	**4,013,488**	**2,790,046**	**33,250,712**	**175,808,295**	**154,035,650**	**1,091,791**	**1,278,207,049**	**2,303,019,004**	**3,962,989,924**	**95,258,550**	**4,058,248,474**

Note:* *On-site Releases *are 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*** *do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.*
O: *Original Industries.*
N: *New Industries.*
**Only fume or dust forms are reportable.*

Table B-2. TRI Off-site Releases of Metals and Metal Compounds, Original and New Industries, 1998

Chemical		Storage Only[a] Pounds	Solidification/ Stabilization Metals Only[b] Pounds	Wastewater Treatment (Excluding POTWs) Metals Only[c] Pounds	Transfers to POTWs Metals Only[d] Pounds	Underground Injection Pounds	Landfills/ Disposal Surface Impound-ments Pounds	Land Treatment Pounds	Other Land Disposal Pounds	Other Off-site Manage-ment Pounds	Transfers to Waste Broker for Disposal Pounds	Unknown[e] Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds
Aluminum (fume or dust)* (CAS Number 7429-90-5)	O	1,460,271	137,616	9,905	3,881	0	5,263,780	0	5,275	24,069	18,642	4,715	6,928,154
	N	0	38,261	100	250	5	4,803	0	0	12,089	1	43	55,552
Antimony and antimony compounds	O	595	753,000	18,640	76,785	8,555	2,841,664	9,656	49,808	83,098	67,234	56,167	3,965,202
	N	1,604	89,654	1,229	490	750	147,302	0	510	19,059	1,946	184	262,728
Arsenic and arsenic compounds	O	15,490	307,955	56	785	350,179	942,927	500	216	87,602	104,832	4,073	1,814,615
	N	39,000	224,367	5,682	2,256	16,500	1,100,354	49,010	66,200	189,154	6,342	14	1,698,879
Barium and barium compounds	O	377,718	1,305,170	53,462	281,568	21,561	4,621,632	99,118	463,555	129,364	114,651	114,793	7,582,592
	N	296,352	1,469,376	22,120	68,788	48,760	23,874,244	180,050	7,523,742	5,578,256	273,620	4,278	39,339,586
Beryllium and beryllium compounds	O	0	2,317	220	15	0	20,646	0	10	0	0	0	23,208
	N	0	0	0	0	0	68,081	0	23,000	45	0	0	91,126
Cadmium and cadmium compounds	O	1	424,310	478	3,006	0	2,028,622	12,612	59,492	22,928	30,097	291	2,581,837
	N	0	32,406	687	64,479	28	111,589	0	0	147,718	1,083	1	357,991
Chromium and chromium compounds	O	385,530	4,247,373	533,172	238,037	476,589	15,186,288	18,837	6,578,158	247,019	441,997	441,182	28,794,182
	N	64,469	884,038	54,487	66,794	31,386	5,659,782	48,003	472,056	271,340	35,398	46,207	7,633,960
Cobalt and cobalt compounds	O	28,378	35,679	25,366	15,895	0	484,213	162	221	13,534	34,315	133,473	771,236
	N	0	27,916	0	13	9,205	318,067	13,919	102,876	6,777	0	3	478,776
Copper and copper compounds	O	6,454,772	4,038,632	613,508	343,167	26,557	12,290,150	20,330	928,093	3,367,525	695,728	340,906	29,119,368
	N	52,749	450,969	5,194	69,925	9,905	5,602,375	11,743	537,448	705,296	24,673	21,532	7,491,809
Lead and lead compounds	O	61,430	13,441,288	972,283	97,760	14,030	20,751,045	12,003	324,722	252,008	827,486	81,751	36,835,806
	N	284,306	643,954	10,791	67,915	22,094	5,745,757	0	342,783	817,514	25,170	112,617	8,072,901

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

**Only fume or dust forms are reportable*

O: *Original Industries.*

N: *New Industries.*

[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 1-5.*

[b] *Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment 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 1-6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.*

[c] *Beginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste treatment code M61) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste treatment code M60). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 1-6. Transfers of metals and metal compounds reported under code M60 have been included in transfers of metals metal compounds to wastewater treatment.*

[d] *Reported 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).*

Table B-2. TRI Off-site Releases of Metals and Metal Compounds, Original and New Industries, 1998 *(continued)*

Chemical		Storage Only[a] Pounds	Solidification/ Stabilization Metals Only[b] Pounds	Wastewater Treatment (Excluding POTWs) Metals Only[c] Pounds	Transfers to POTWs Metals Only[d] Pounds	Underground Injection Pounds	Landfills/ Disposal Surface Impound-ments Pounds	Land Treatment Pounds	Other Land Disposal Pounds	Other Off-site Manage-ment Pounds	Transfers to Waste Broker for Disposal Pounds	Unknown[e] Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds
Manganese and manganese compounds	O	768,304	14,933,396	439,865	1,260,413	7,319	36,935,657	167,355	3,123,737	2,956,587	619,129	25,665	61,237,427
	N	75,679	548,629	0	5,620	21,000	6,511,632	118,248	1,111,995	350,878	50,252	67	8,794,000
Mercury and mercury compounds	O	0	20,729	253	10	88	5,627	0	11	3,852	5,004	5	35,579
	N	0	16,353	1	64,212	0	2	0	0	5,914	849	0	87,331
Nickel and nickel compounds	O	116,395	1,610,189	234,459	186,197	78,025	6,385,175	9,642	164,321	101,357	256,085	156,926	9,298,771
	N	54,372	1,751,396	6,192	6,820	10,831	8,941,364	31,031	369,735	227,827	23,369	7,388	11,430,325
Selenium and selenium compounds	O	0	107,203	1,807	451	0	14,084	485	5,247	5,269	5	467	135,018
	N	0	223,280	4,011	4,037	9,910	220,371	0	26,616	99,068	268	0	587,561
Silver and silver compounds	O	5,470	1,161	15	2,498	0	245,880	0	6	0	12,382	0	267,412
	N	0	768	135	64,212	0	39,755	0	0	94,108	1,024	0	200,002
Thallium and thallium compounds	O	0	754	5	0	0	3,650	0	0	0	0	0	4,409
	N	0	0	465	0	0	1,624	0	0	470	0	0	2,559
Vanadium (fume or dust)* (CAS Number '7440-62-2)	O	0	83	0	0	0	8,066	0	0	0	0	0	8,149
	N	0	17,000	0	5	0	98,471	0	0	0	0	0	115,476
Zinc and zinc compounds*	O	163,696	94,395,044	810,599	535,506	2,699,755	94,373,275	46,443	1,156,319	385,757	3,970,789	707,236	199,244,419
	N	51,170	849,814	6,964	7,373	7	11,605,767	42,289	687,208	254,960	160,373	168,822	13,834,747
Total	O	**9,838,050**	**135,761,899**	**3,714,093**	**3,045,974**	**3,682,658**	**202,402,381**	**397,143**	**12,859,191**	**7,679,969**	**7,198,376**	**2,067,650**	**388,647,384**
	N	**919,701**	**7,268,181**	**118,058**	**493,189**	**180,381**	**70,051,340**	**494,293**	**11,264,169**	**8,780,473**	**604,368**	**361,156**	**100,535,309**

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

**Only fume or dust forms are reportable*

O: *Original Industries.*

N: *New Industries.*

[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 1-5.*

[b] *Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment 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 1-6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.*

[c] *Beginning in reporting year 1997, transfers to wastewater treatment (excluding POTWs) of metals and metal compounds (waste treatment code M61) are reported separately from transfers to wastewater treatment of non-metal TRI chemicals (waste treatment code M60). Because wastewater treatment does not destroy metals, such transfers are included as a form of disposal (off-site release). See Box 1-6. Transfers of metals and metal compounds reported under code M60 have been included in transfers of metals metal compounds to wastewater treatment.*

[d] *Reported 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).*

Table B-3. Quantities of TRI Metals and Metal Compounds in Waste, Original and New Industries, 1998

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			
Aluminum (fume or dust)*	O	15,726,418	29,110,094	0	4,289	18,291,037	173,519	9,857,954	73,163,311	29,063
(CAS Number 7429-90-5)	N	0	210,000	0	76	226,635	550	3,781,933	4,219,194	10,984
Antimony and	O	9,101,907	4,691,917	37,225	83,781	875,435	573,632	4,630,945	19,994,842	143,001
antimony compounds	N	10,441	0	0	0	16,484	38,026	25,227,950	25,292,901	160
Arsenic and	O	5,879,564	1,034,466	0	0	133,583	123,656	7,242,801	14,414,070	2,156,568
arsenic compounds	N	601,631	13	0	1	104,070	59,261	629,162,183	629,927,159	44
Barium and	O	34,530,613	6,062,233	712,076	118,188	6,203,639	901,709	15,556,973	64,085,431	1,185
barium compounds	N	568,420	1,196,270	0	0	577,950	460,730	218,205,227	221,008,597	24,198
Beryllium and	O	160,399	106,996	0	0	10	1,098	65,114	333,617	2
beryllium compounds	N	9,700	0	0	0	194	0	849,871	859,765	308
Cadmium and	O	3,663,599	960,144	0	5,236	52,334	99,644	3,474,845	8,255,802	69,031
cadmium compounds	N	4,137	80,099	0	0	917,735	26,088	9,872,040	10,900,099	94
Chromium and	O	124,795,953	117,745,529	150,164	49,901	10,253,420	3,779,392	59,456,473	316,230,832	220,403
chromium compounds	N	55,058	1,066,538	0	2	612,033	387,823	80,902,242	83,023,696	2,867
Cobalt and	O	4,383,355	9,009,569	0	20,105	1,473,874	97,572	1,212,942	16,197,417	1,909
cobalt compounds	N	40,259	1,600	0	0	11,009	15	13,287,545	13,340,428	4,020
Copper and	O	777,219,946	715,899,354	189,372	522,369	47,800,275	3,371,942	69,776,599	1,614,779,857	5,101,382
copper compounds	N	7,854,959	2,651,028	0	0	570,516	174,998	1,630,956,532	1,642,208,033	297,958
Lead and	O	663,530,281	325,952,015	276,371	31,672	1,758,830	3,869,378	50,433,463	1,045,852,010	1,923,991
lead compounds	N	8,436,700	1,173,289	0	12,607	1,443,399	173,434	264,551,111	275,790,540	65,227
Manganese and	O	61,730,468	96,509,216	22,153	36,523	2,425,328	6,035,678	134,406,649	301,166,015	956,233
manganese compounds	N	86,290	279,478	0	0	117,766	73,171	470,090,720	470,647,425	70,966
Mercury and	O	1,028,655	34,073	0	0	4,315	6,576	39,022	1,112,641	861
mercury compounds	N	65,400	114,138	0	0	0	236	9,315,086	9,494,860	2
Nickel and	O	44,069,020	106,272,247	66,839	1,676	890,670	1,193,207	15,533,147	168,026,806	717,700
nickel compounds	N	256,477	1,135,548	0	0	788,574	114,053	67,425,045	69,719,697	4,754

Note: Data from Section 8 of Form R.
*Only fume or dust forms are reportable.
O: *Original Industries.*
N: *New Industries.*

Table B-3. Quantities of TRI Metals and Metal Compounds in Waste, Original and New Industries, 1998 *(continued)*

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 and selenium compounds	O	595,899	68,632	86,174	3,902	2,196	8,605	555,657	1,321,065	76,445
	N	53,228	9	0	0	4	185,527	6,026,895	6,265,663	11
Silver and silver compounds	O	833,501	2,251,398	0	32	57,771	47,209	679,869	3,869,780	5,421
	N	2,932	251	0	0	0	2,413	4,870,263	4,875,859	6
Thallium and thallium compounds	O	0	0	52,353	1	0	259	313,406	366,019	100,000
	N	2,133	0	0	0	21,600	2	10,958,020	10,981,755	653
Vanadium (fume or dust)* (CAS Number '7440-62-2)	O	29,920	44,826	0	0	0	0	146,404	221,150	0
	N	0	0	0	0	0	0	817,787	817,787	0
Zinc and zinc compounds*	O	132,872,993	331,011,922	715,632	527,513	4,358,440	13,268,839	323,131,633	805,886,972	3,643,037
	N	8,990,711	4,637,067	0	4,057	3,384,594	141,757	769,859,656	787,017,842	48,588
Total	O	**1,880,152,491**	**1,746,764,631**	**2,308,359**	**1,405,188**	**94,581,157**	**33,551,915**	**696,513,896**	**4,455,277,637**	**15,146,232**
	N	**27,038,476**	**12,545,328**	**0**	**16,743**	**8,792,563**	**1,838,084**	**4,216,160,106**	**4,266,391,300**	**530,840**

Note: Data from Section 8 of Form R.
*Only fume or dust forms are reportable.
O: *Original Industries.*
N: *New Industries.*

Appendix C

Basis of OSHA Carcinogen Listing for Individual Chemicals

Table C-1. Basis of OSHA Carcinogen Listing for Individual Chemicals

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

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).*

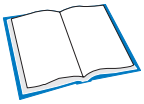


Table C–1. Basis of OSHA Carcinogen Listing for Individual Chemicals *(continued)*

Chemical	IARC	NTP	OSHA-Z	Chemical	IARC	NTP	OSHA-Z
trans-1,3-Dichloropropene	2B	–	–	Ethylene oxide	1	P	Z
1,3-Dichloropropylene	2B	P	–	Ethylene thiourea	2B	P	–
Dichlorvos	2B	–	–	Formaldehyde	2A	P	Z
Diepoxybutane	2B	P	–	Heptachlor	2B	–	–
Di-(2-ethylhexyl)phthalate	2B	P	–	Hexachlorobenzene	2B	P	–
Diethyl sulfate	2A	P	–	Hexamethylphosphoramide	2B	P	–
Diglycidyl resorcinol ether	2B	p	–	Hydrazine	2B	P	–
Dihydrosafrole	2B	–	–	Hydrazine sulfate	–	P	–
3,3'-Dimethoxybenzidine	2B	P	–	Lead and inorganic lead compounds	2B	–	Z
3,3'-Dimethoxybenzidine dihydrochloride	2B	P	–	Lindane	2B	P	–
3,3'-Dimethoxybenzidine hydrochloride	2B	P	–	Mecoprop‡	2B	–	–
4-Dimethylaminoazobenzene	2B	P	Z	Methoxone‡	2B	–	–
3,3'-Dimethylbenzidine	2B	P	–	Methoxone sodium salt‡	2B	–	–
3,3'-Dimethylbenzidine dihydrochloride	2B	P	–	4,4-Methylenebis (2-chloroaniline)	2A	P	–
3,3'-Dimethylbenzidine dihydrofluoride	2B	P	–	4,4'-Methylenebis (N,N-dimethyl) benzeneamine	2B	P	–
Dimethylcarbamyl chloride	2A	P	–	4,4'-Methylenedianiline	2B	P	Z
N,N-Dimethylformamide	2B	–	–	Michler's ketone	–	P	–
1,1-Dimethylhydrazine	2B	P	–	Mustard gas	1	K	–
Dimethyl sulfate	2A	P	–	alpha-Naphthylamine	–	–	Z
2,4-Dinitrotoluene	2B	–	–	beta-Naphthylamine	1	K	Z
2,6-Dinitrotoluene	2B	–	–	Nickel	2B	P	–
1,4-Dioxane	2B	P	–	Nickel compounds	1	P†	–
1,2-Diphenylhydrazine	–	P	–	Nitrilotriacetic acid	–	P	–
2,4-D isopropyl ester‡	2B	–	–	Nitrobenzene	2B	–	–
2,4-DP‡	2B	–	–	4-Nitrobiphenyl	–	–	Z
2,4-D propylene glycol butyl ether ester‡	2B	–	–	Nitrofen	2B	P	–
2,4-D sodium salt‡	2B	–	–	Nitrogen mustard	2A	–	–
Epichlorohydrin	2A	P	–	2-Nitropropane	2B	P	–
Ethyl acrylate	2B	P	–	N-Nitrosodi-n-butylamine	2B	P	–
Ethyleneimine	–	–	Z	N-Nitrosodiethylamine	2A	P	–

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 C–1. Basis of OSHA Carcinogen Listing for Individual Chemicals *(continued)*

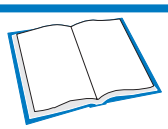
Chemical	IARC	NTP	OSHA-Z	Chemical	IARC	NTP	OSHA-Z
N-Nitrosodimethylamine	2A	P	Z	Potassium bromate	2B	–	–
N-Nitrosodi-n-propylamine	2B	P	–	Propane sultone	2B	P	–
N-Nitroso-N-ethylurea	2A	P	–	beta-Propiolactone	2B	P	Z
N-Nitroso-N-methylurea	2A	P	–	Propyleneimine	2B	P	–
N-Nitrosomethylvinylamine	2B	P	–	Propylene oxide	2B	P	–
N-Nitrosomorpholine	2B	P	–	Saccharin (manufacturing)	2B	P	–
N-Nitrosonornicotine	2B	P	–	Safrole	2B	P	–
N-Nitrosopiperidine	2B	P	–	Sodium o-phenylphenoxide	2B	–	–
Pentachlorophenol	2B	–	–	Styrene	2B	–	–
Phenytoin	2B	P	–	Styrene oxide	2A	–	–
Polybrominated biphenyls (PBBs)	2B	P	–	Tetrachloroethylene	2B	P	–
Polychlorinated biphenyls (PCBs)	2A	P	–	Thioacetamide	2B	P	–
Polycyclic aromatic compounds (PACs):				4,4'-Thiodianiline	2B	P	–
Benz(a)anthracene	2A	P	–	Thiourea	2B	P	–
Benzo(b)fluoranthene	2B	P	–	Toluene-2,4-diisocyanate	2B	P	–
Benzo(j)fluoranthene	2B	P	–	Toluene-2,6-diisocyanate	2B	P	–
Benzo(k)fluoranthene	2B	–	–	Toluene diisocyanate (mixed isomers)	2B	P	–
Benzo(rst)pentaphene	2B	–	–	o-Toluidine	2B	P	–
Benzo(a)pyrene	2A	P	–	o-Toluidine hydrochloride	–	P	–
Dibenz(a,h)acridine	2A	P	–	Toxaphene	2B	P	–
Dibenz(a,j)acridine	2B	P	–	Trichloroethylene	2A	–	–
Dibenzo(a,h)anthracene	2B	P	–	2,4,6-Trichlorophenol	2B	P	–
7H–Dibenzo(c,g)carbazole	2B	P	–	1,2,3-Trichloropropane	2A	–	–
Dibenzo(a,e)pyrene	2B	P	–	Tris(2,3-dibromopropyl) phosphate	2A	P	–
Dibenzo(a,h)pyrene	2B	P	–	Trypan blue	2B	–	–
Dibenzo(a,l)pyrene	2B	P	–	Urethane	2B	P	–
7,12–Dimethylbenz(a) anthracene	2B	–	–	Vinyl acetate	2B	–	–
Indeno[1,2,3–cd]pyrene	2B	P	–	Vinyl bromide	2A	–	–
5–Methylchrysene	2B	P	–	Vinyl chloride	1	K	Z
1–Nitropyrene	2B	–	–	2,6-Xylidine	2B	–	–

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).*

Appendix D

Public Access to the Toxics Release Inventory and Related Information

Appendix D



Public Access to the Toxics Release Inventory and Related Information

EPA makes its Toxic Releases Inventory (TRI) and other related information available to the public both electronically and in hard copy. Every year, EPA enhances its databases to make the data easier to access and search and expands its outreach activities to include new potential users of the data. In May 2000, EPA released a new TRI tool—the TRI Explorer. The TRI Explorer provides access to TRI data that is both easy to understand and flexible to use. In addition to this new tool, the data are available in a wide variety of computer and hard copy formats to meet most user's needs. TRI publications can be obtained from EPA's National Service Center for Environmental Publications (NSCEP). TRI data can also be accessed online at EPA's web site, http://www.epa.gov/tri.

In addition, state officials may receive TRI reports from facilities in their jurisdiction, and many states publish reports highlighting state and local trends. Tables D–1 through D–3 highlight the products and services available from the above mentioned resources and several others.

National Service Center for Environmental Publications (NSCEP) P.O. Box 42419 Cincinnati, OH 45242-2419 Call: (800) 490-9198 (513) 489-8190 Fax: (513) 489-8695 Hours: 7:30 a.m. – 5:30 p.m., est. Order online: http://www.epa.gov/ncepihom	**TRI User Support Service (TRI-US)** U.S. EPA Ariel Rios Building 1200 Pennsylvania Avenue, NW (MC-2844) Washington, DC 20460 Call: (202) 260-1531 Fax: (202) 401-2347 Email: tri.us@epamail.epa.gov
U.S. EPA EPCRA Hotline (800) 424-9346 (703) 412-9810 Hours: 9:00 a.m. – 6:00 p.m., est.	**U.S. EPA TRI Website** http://www.epa.gov/tri http://www.epa.gov/tri/tri98

Table D–1. Toxics Release Inventory Products

Product	Supplier	Order Information
1998 TRI Public Data Release Report The 1998 TRI Public Data Release Report is the TRI annual report that provides a general overview of the TRI data and information on trends.The State Fact Sheets are released with the Public Data Release Report and provide a brief summary of the TRI data by State. ◆ 1998 TRI Public Data Release Report ◆ 1998 TRI State Fact Sheets	**NSCEP** **TRI-US**	Free while supplies last Free while supplies last EPA 745-R-00-007 EPA 745-F-00-003
	These documents can be viewed, printed, or downloaded on the Internet at http://www.epa.gov/tri/tri98	
Chemicals in the Environment This pamphlet summarizes the information the public can obtain under EPCRA and CAA; how to obtain such information; other information that may also be useful; and how to use these various sources of information to build a snapshot of chemicals stored and released in your community.	**NSCEP**	Free EPA 749-R-97-001B
Act Locally: Preventing Pollution at the Community Level with Resources that Control Pesticide and Toxic Chemical Use This catalogue describes tools, resources, and programs of EPA's Office of Prevention, Pesticides and Toxic Substances (OPPTS). It provides information on the characteristics and effects of pesticides and industrial chemicals. These "tools" include databases, computer programs for chemical screening, funding resources, access to information hotlines, and descriptions of programs and initiatives that may be useful in protecting local environments.	The catalogue can be viewed, printed, or downloaded on the Internet at http://www.epa.gov/opptintr/cbep/actlocal	Free
Chemical Fact Sheets EPA is continuing to develop Chemical Fact Sheets as part of its effort to provide the public with information on chemicals. Two types of summaries are available for each chemical. One is a two-page document providing a non-technical summary of chemical information. The other is a longer, referenced presentation of information that provides the basis for statements included in the shorter summary.	**TSCA Assistance Information Services Hotline** (202) 554-1404 TDD: (202) 554-0551	Free
	The Chemical Fact Sheets can be downloaded from the Internet at http://www.epa.gov/chemfact	

Table D–2. Toxics Release Inventory Assistance Services

Assistance Service	Contact Information
TRI User Support Service (TRI-US) The TRI-US Service provides general information about the TRI and support for access to any of the data formats. TRI specialists can help determine the data product best suited for an individual user's needs.	**TRI User Support Service (TRI-US)** U.S. EPA Ariel Rios Building 1200 Pennsylvania Avenue, NW (MC–2844) Washington, DC 20460 (202) 260-1531
EPCRA Hotline The Emergency Planning and Community Right-to-Know (EPCRA) Hotline provides regulatory, policy, and technical assistance to the regulated community, federal agencies, local and state governments, the public, and other interested parties in response to questions related to EPCRA. The Hotline provides information on the availability of documents related to EPCRA and copies of selected EPCRA documents on a limited basis. For more information about the EPCRA Hotline, visit their Internet Web site at: http://www.epa.gov/epaoswer/hotline.	**EPCRA Hotline** (800) 424-9346 (703) 412-9810 TDD: (800) 553-7672

Table D–3. Toxics Release Inventory On-line Services

On-line Services	Web Address/Contact Information
U.S. Environmental Protection Agency (EPA)	
◆ EPA Home Page	http://www.epa.gov
◆ Toxics Release Inventory (TRI) Home Page	http://www.epa.gov/tri/
◆ TRI Explorer—provides access EPA created the TRI Explorer to provide access to TRI data that is both easy to understand and flexible to use. The TRI Explorer will generate on- and off-site release reports for facilities, chemicals, geographic areas, or industry type (SIC code) at the county, state, and national level.	http://www.epa.gov/triexplorer/
◆ TRI 1998 Data Release Page—provides access to information relating to the 1998 TRI data release. Includes press materials, data summary information, questions and answers, and other information about 1998 TRI data.	http://www.epa.gov/tri/tri98/index.htm
◆ EPA Envirofacts—provides access to TRI data. Provides user defined searches of the TRI database by facility name, geographic location, SIC Code, or chemical name and produces reports on the facilities and maps their locations. A variety of user specified parameters let users point and click to customize their searches.	http://www.epa.gov/enviro/html/toxic_releases.html
TOXNET®, the National Library of Medicine's (NLM) Toxicology Data Network, provides free access to TRI data. Users can search by chemical or other name, chemical name fragment, or Chemical Abstracts Service Registry Number. Also searchable are facility or parent company name, state, city, county, or zip code. Search results can be limited to releases greater than a specified number of pounds, and individual releases can be summed together to display a total amount.	http://toxnet.nlm.nih.gov/

Table D–3. Toxics Release Inventory On-line Services *(continued)*

On-line Services	Web Address/Contact Information
Right-to-Know Network is operated by two nonprofit organizations (OMB Watch and the Center for Public Data Access). RTK Net provides free access to TRI data and enables users to search by geographic area, facility, industry, parent company, or off-site waste transfer.	http://www.rtknet.org/trisearch.html
EPA's Integrated Risk Information System (IRIS) is an electronic database containing information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences.	http://www.epa.gov/iris

Appendix E

EPA Regional Office and State TRI Contacts

EPA Regional Section 313 Coordinators

USEPA Region 1

Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Dwight Peavey (SPT)
Assistance and Pollution Prevention Office
1 Congress Street, Suite 1100
Boston, MA 02114-2023
(617) 918-1829
Fax (617) 918-1810
peavey.dwight@epa.gov

USEPA Region 2

New Jersey, New York, Puerto Rico, Virgin Islands

Nora Lopez (MS-105)
Pesticides and Toxics Branch
2890 Woodbridge Ave., Bldg. 10
Edison, NJ 08837-3679
(732) 908-6890
Fax (732) 321-6788
lopez.nora@epa.gov

USEPA Region 3

Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia

Bill Reilly (3WC33)
Toxics Program and Enforcement Branch
1650 Arch St.
Philadelphia, PA 19103-2029
(215) 814-2072
Fax (215) 814-3114
reilly.william@epa.gov

USEPA Region 4

Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

Ezequiel Velez
EPCRA Information Center
Atlanta Federal Center
61 Forsyth St., S.W.
Atlanta, GA 30303
(404) 562-9191
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Please note that a few states and territories have two TRI contacts. An asterisk (*) identifies the technical contact who provides assistance to industries on TRI reporting and receives the TRI reporting forms. The public contact provides assistance to the public in using TRI data.

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Please note that a few states and territories have two TRI contacts. An asterisk (*) identifies the technical contact who provides assistance to industries on TRI reporting and receives the TRI reporting forms. The public contact provides assistance to the public in using TRI data.

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Please note that a few states and territories have two TRI contacts. An asterisk (*) identifies the technical contact who provides assistance to industries on TRI reporting and receives the TRI reporting forms. The public contact provides assistance to the public in using TRI data.

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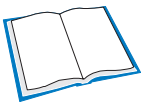

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Please note that a few states and territories have two TRI contacts. An asterisk (*) identifies the technical contact who provides assistance to industries on TRI reporting and receives the TRI reporting forms. The public contact provides assistance to the public in using TRI data.

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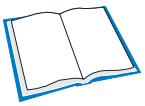

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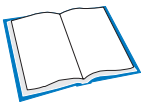

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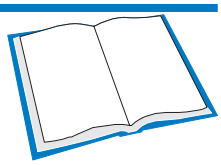
Appendix F

TRI Form R and Form A for 1998

Appendix F

TRI Form R and Form A for 1998



Facilities reporting to the Toxics Release Inventory submit their information on TRI's Form R. If a facility's total annual reportable amount of a chemical does not exceed 500 pounds, and the facility does not manufacture, process, or otherwise use more than 1 million pounds of the chemical, it may submit a Form A certification statement. (Form A certification statement reporting is further explained in Chapter 1.) This appendix supplies copies of the Form R and Form A certification statement for the 1998 reporting year.

FORM R

The 1998 Form R is divided into two parts:

Part I, Facility Identification Information, contains information on such matters as name, address, parent company information, and contact names and phone numbers for the facility.

Part II, Chemical-Specific Information, contains information such as chemical identity, facility activities and uses of the chemical, amounts of on- and off-site releases and transfers off-site for further waste management, on-site waste treatment methods and efficiencies, on- and off-site waste management quantities, and information on source reduction and recycling activities.

FORM A Certification Statement

The 1998 Form A certification statement consists of facility identification information and chemical identification, as in Form R. Facilities do not report on the Form A certification statement amounts or other information about their use, releases, or waste management of the chemical.

Readers who are interested in a more in-depth understanding of who is required to report to TRI and how to fill out the forms, should refer to the EPCRA Information Hotline at 1-800-424-9346. Reporting software, forms, and instructions for the current reporting year are available from EPA's Web site at http://www.epa.gov/tri/report.htm.

Form Approved OMB Number: 2070-0093
Approval Expires: 04/2000

(IMPORTANT: Type or print; read instructions before completing form)

EPA

United States Environmental Protection Agency

FORM R

TOXIC CHEMICAL RELEASE INVENTORY REPORTING FORM

Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986, also known as Title III of the Superfund Amendments and Reauthorization Act

WHERE TO SEND COMPLETED FORMS: 1. EPCRA Reporting Center, P.O Box 3348, Merrifield, VA 22116-3348, ATTN: TOXIC CHEMICAL RELEASE INVENTORY
2. APPROPRIATE STATE OFFICE (See instructions in Appendix F)

Enter "X" here if this is a revision ☐

For EPA use only

Important: See instructions to determine when "Not Applicable (NA)" boxes should be checked.

PART I. FACILITY IDENTIFICATION INFORMATION

SECTION 1. REPORTING YEAR _____

SECTION 2. TRADE SECRET INFORMATION

2.1 Are you claiming the toxic chemical identified on page 2 trade secret?
☐ Yes (Answer question 2.2; Attach substantiation forms) ☐ No (Do not answer 2.2; Go to Section 3)

2.2 Is this copy ☐ Sanitized ☐ Unsanitized
(Answer only if "YES" in 2.1)

SECTION 3. CERTIFICATION (Important: Read and sign after completing all form sections.)

I hereby certify that I have reviewed the attached documents and that, to the best of my knowledge and belief, the submitted information is true and complete and that the amounts and values in this report are accurate based on reasonable estimates using data available to the preparers of this report.

Name and official title of owner/operator or senior management official:	Signature:	Date Signed:

SECTION 4. FACILITY IDENTIFICATION

4.1 _____ TRI Facility ID Number _____

Facility or Establishment Name	Facility or Establishment Name or Mailing Address(if different from street address)
Street	Mailing Address
City/County/State/Zip Code	City/County/State/Zip Code

4.2 This report contains information for: (Important : check a or b; check c if applicable)
a. ☐ An entire facility b. ☐ Part of a facility c. ☐ A Federal facility

4.3 Technical Contact Name _____ Telephone Number (include area code) _____

4.4 Public Contact Name _____ Telephone Number (include area code) _____

4.5 SIC Code (s) (4 digits)	a.	b.	c.	d.	e.	f.

4.6	Degrees	Minutes	Seconds		Degrees	Minutes	Seconds
Latitude				Longitude			

4.7 Dun & Bradstreet Number(s) (9 digits)	4.8 EPA Identification Number (RCRA I.D. No.) (12 characters)	4.9 Facility NPDES Permit Number(s) (9 characters)	4.10 Underground Injection Well Code (UIC) I.D. Number(s) (12 digits)
a.	a.	a.	a.
b.	b.	b.	b.

SECTION 5. PARENT COMPANY INFORMATION

5.1 Name of Parent Company NA ☐ _____

5.2 Parent Company's Dun & Bradstreet Number NA ☐ _____

EPA FORM R
PART II. CHEMICAL-SPECIFIC INFORMATION

TRI Facility ID Number

Toxic Chemical, Category or Generic Name

SECTION 1. TOXIC CHEMICAL IDENTITY (Important: DO NOT complete this section if you completed Section 2 below.)

1.1	CAS Number (Important: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)
1.2	Toxic Chemical or Chemical Category Name (Important: Enter only one name exactly as it appears on the Section 313 list.)
1.3	Generic Chemical Name (Important: Complete **only** if Part 1, Section 2.1 is checked "yes". Generic Name must be structurally descriptive.)

SECTION 2. MIXTURE COMPONENT IDENTITY (Important: DO NOT complete this section if you completed Section 1 above.)

2.1	Generic Chemical Name Provided by Supplier (Important: Maximum of 70 characters, including numbers, letters, spaces, and punctuation.)

SECTION 3. ACTIVITIES AND USES OF THE TOXIC CHEMICAL AT THE FACILITY

(Important: Check all that apply.)

3.1 Manufacture the toxic chemical:	3.2 Process the toxic chemical:	3.3 Otherwise use the toxic chemical:
a. ☐ Produce **b.** ☐ Import		
If produce or import:		
c. ☐ For on-site use/processing	**a.** ☐ As a reactant	**a.** ☐ As a chemical processing aid
d. ☐ For sale/distribution	**b.** ☐ As a formulation component	**b.** ☐ As a manufacturing aid
e. ☐ As a byproduct	**c.** ☐ As an article component	**c.** ☐ Ancillary or other use
f. ☐ As an impurity	**d.** ☐ Repackaging	

SECTION 4. MAXIMUM AMOUNT OF THE TOXIC CHEMICAL ONSITE AT ANY TIME DURING THE CALENDAR YEAR

4.1	☐ (Enter two-digit code from instruction package.)	

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM ONSITE

			A. Total Release (pounds/year) (Enter range code or estimate*)	B. Basis of Estimate (enter code)	C. % From Stormwater
5.1	Fugitive or non-point air emissions	NA ☐			
5.2	Stack or point air emissions	NA ☐			
5.3	Discharges to receiving streams or water bodies (enter one name per box)				
	Stream or Water Body Name				
5.3.1					
5.3.2					
5.3.3					
5.4.1	Underground Injection onsite to Class I Wells	NA ☐			
5.4.2	Underground Injection onsite to Class II-V Wells	NA ☐			

If additional pages of Part II, Section 5.3 are attached, indicate the total number of pages in this box ☐
and indicate the Part II, Section 5.3 page number in this box. ☐ **(example: 1,2,3, etc)**

* Range Codes: A= 1 - 10 pounds; B= 11- 499 pounds; C= 500 - 999 pounds.

EPA FORM R

PART II. CHEMICAL - SPECIFIC INFORMATION (CONTINUED)

TRI Facility ID Number

Toxic Chemical, Category, or Generic Name

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM ONSITE (Continued)

		NA	A. Total Release (pounds/year) (enter range code* or estimate)	B. Basis of Estimate (enter code)
5.5	Disposal to land onsite			
5.5.1A	RCRA Subtitle C landfills	☐		
5.5.1B	Other landfills	☐		
5.5.2	Land treatment/application farming	☐		
5.5.3	Surface Impoundment	☐		
5.5.4	Other disposal	☐		

SECTION 6. TRANSFERS OF THE TOXIC CHEMICAL IN WASTES TO OFF-SITE LOCATIONS

6.1 DISCHARGES TO PUBLICLY OWNED TREATMENT WORKS (POTWs)

6.1.A Total Quantity Transferred to POTWs and Basis of Estimate

6.1.A.1. Total Transfers (pounds/year) (enter range code* or estimate)	**6.1.A.2 Basis of Estimate** (enter code)

6.1.B. __ POTW Name

POTW Address

City | State | County | Zip

6.1.B. __ POTW Name

POTW Address

City | State | County | Zip

If additional pages of Part II, Section 6.1 are attached, indicate the total number of pages in this box ☐ **and indicate the Part II, Section 6.1 page number in this box** ☐ **(example: 1,2,3, etc.)**

SECTION 6.2 TRANSFERS TO OTHER OFF-SITE LOCATIONS

6.2. __ Off-Site EPA Identification Number (RCRA ID No.)

Off-Site Location Name

Off-Site Address

City | State | County | Zip

Is location under control of reporting facility or parent company? ☐ Yes ☐ No

* Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

EPA FORM R

PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI Facility ID Number

Toxic Chemical, Category or Generic Name

SECTION 6.2 TRANSFERS TO OTHER OFF-SITE LOCATIONS (Continued)

A. Total Transfers (pounds/year) (enter range code* or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1. M
2.	2.	2. M
3.	3.	3. M
4.	4.	4. M

6.2. __ Off-Site EPA Identification Number (RCRA ID No.)

Off-Site location Name

Off-Site Address

City | State | County | Zip

Is location under control of reporting facility or parent company? ☐ Yes ☐ No

A. Total Transfers (pounds/year) (enter range code* or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1. M
2.	2.	2. M
3.	3.	3. M
4.	4.	4. M

SECTION 7A. ON-SITE WASTE TREATMENT METHODS AND EFFICIENCY

☐ Not Applicable (NA) - Check here if no on-site waste treatment is applied to any waste stream containing the toxic chemical or chemical category.

a. General Waste Stream (enter code)	b. Waste Treatment Method(s) Sequence [enter 3-character code(s)]	c. Range of Influent Concentration	d. Waste Treatment Efficiency Estimate	e. Based on Operating Data ?
7A.1a	7A.1b: 1 2 3 4 5 6 7 8	7A.1c	7A.1d	7A.1e
			%	Yes ☐ No ☐
7A.2a	7A.2b: 1 2 3 4 5 6 7 8	7A.2c	7A.2d	7A.2e
			%	Yes ☐ No ☐
7A.3a	7A.3b: 1 2 3 4 5 6 7 8	7A.3c	7A.3d	7A.3e
			%	Yes ☐ No ☐
7A.4a	7A.4b: 1 2 3 4 5 6 7 8	7A.4c	7A.4d	7A.4e
			%	Yes ☐ No ☐
7A.5a	7A.5b: 1 2 3 4 5 6 7 8	7A.5c	7A.5d	7A.5e
			%	Yes ☐ No ☐

If additional pages of Part II, Section 6.2/7A are attached, indicate the total number of pages in this box ☐
and indicate the Part II, Section 6.2/7A page number in this box : ☐ (example: 1,2,3, etc)

* Range Codes: A = 1 - 10 pounds; B = 11 - 499 pounds; C = 500 - 999 pounds.

EPA FORM R
PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI Facility ID Number

Toxic Chemical, Category or Generic Name

SECTION 7B. ON-SITE ENERGY RECOVERY PROCESSES

☐ Not Applicable (NA) - Check here if no on-site energy recovery is applied to any waste stream containing the toxic chemical or chemical category.

Energy Recovery Methods [enter 3-character code(s)]

1 **2** **3** **4**

SECTION 7C. ON-SITE RECYCLING PROCESSES

☐ Not Applicable (NA) - Check here if no on-site recycling is applied to any waste stream containing the toxic chemical or chemical category.

Recycling Methods [enter 3-character code(s)]

1. **2.** **3.** **4.** **5.**

6. **7.** **8.** **9.** **10.**

SECTION 8. SOURCE REDUCTION AND RECYCLING ACTIVITIES

		Column A Prior Year (pounds/year)	Column B Current Reporting Year (pounds/year)	Column C Following Year (pounds/year)	Column D Second Following Year (pounds/year)
8.1	Quantity released **				
8.2	Quantity used for energy recovery onsite				
8.3	Quantity used for energy recovery offsite				
8.4	Quantity recycled onsite				
8.5	Quantity recycled offsite				
8.6	Quantity treated onsite				
8.7	Quantity treated offsite				
8.8	Quantity released to the environment as a result of remedial actions, catastrophic events, or one-time events not associated with production processes (pounds/year)				
8.9	Production ratio or activity index				

8.10 Did your facility engage in any source reduction activities for this chemical during the reporting year? If not, enter "NA" in Section 8.10.1 and answer Section 8.11.

	Source Reduction Activities [enter code(s)]	Methods to Identify Activity (enter codes)		
8.10.1		**a.**	**b.**	**c.**
8.10.2		**a.**	**b.**	**c.**
8.10.3		**a.**	**b.**	**c.**
8.10.4		**a.**	**b.**	**c.**

8.11 Is additional information on source reduction, recycling, or pollution control activities included with this report ? (Check one box) YES ☐ NO ☐

** Report releases pursuant to EPCRA Section 329(8) including "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment." Do not include any quantity treated onsite or offsite.

United States Environmental Protection Agency

TOXIC CHEMICAL RELEASE INVENTORY

FORM A

WHERE TO SEND COMPLETED FORMS: 1. EPCRA Reporting Center, P.O Box 3348, Merrifield, VA 22116-3348, ATTN: TOXIC CHEMICAL RELEASE INVENTORY 2. APPROPRIATE STATE OFFICE (See instructions in Appendix F)

Enter "X" here if this is a revision ☐

For EPA use only

Important: See instructions to determine when "Not Applicable (NA)" boxes should be checked.

PART I. FACILITY IDENTIFICATION INFORMATION

SECTION 1. REPORTING YEAR _____

SECTION 2. TRADE SECRET INFORMATION

2.1 Are you claiming the toxic chemical identified on page 2 trade secret? ☐ Yes (Answer question 2.2; Attach substantiation forms) ☐ No (Do not answer 2.2; Go to Section 3)

2.2 Is this copy ☐ Sanitized ☐ Unsanitized (Answer only if "YES" in 2.1)

SECTION 3. CERTIFICATION (Important: Read and sign after completing all form sections.)

I hereby certify that to the best of my knowledge and belief, for each toxic chemical listed in the statement, the annual reportable amount as defined in 40 CFR 372.27 (a), did not exceed 500 pounds for this reporting year and that the chemical was manufactured, processed, or otherwise used in an amount not exceeding 1 million pounds during this reporting year.

Name and official title of owner/operator or senior management official:	Signature:	Date Signed:

SECTION 4. FACILITY IDENTIFICATION

4.1 TRI Facility ID Number

Facility or Establishment Name	Facility or Establishment Name or Mailing Address(if different from street address)
Street	Mailing Address
City/County/State/Zip Code	City/County/State/Zip Code

4.2 This report contains information for: (Important : check c if applicable) c. ☐ A Federal facility

4.3 Technical Contact Name ____ Telephone Number (include area code)

4.4 Intentionally left blank

4.5 SIC Code (s) (4 digits)	**a.**	**b.**	**c.**	**d.**	**e.**	**f.**

4.6	Latitude	Degrees	Minutes	Seconds	Longitude	Degrees	Minutes	Seconds

4.7 Dun & Bradstreet Number(s) (9 digits)	**4.8** EPA Identification Number (RCRA I.D. No.) (12 characters)	**4.9** Facility NPDES Permit Number(s) (9 characters)	**4.10** Underground Injection Well Code (UIC) I.D. Number(s) (12 digits)
a.	**a.**	**a.**	**a.**
b.	**b.**	**b.**	**b.**

SECTION 5. PARENT COMPANY INFORMATION

5.1 Name of Parent Company NA ☐

5.2 Parent Company's Dun & Bradstreet Number NA ☐

EPA FORM A
PART II. CHEMICAL IDENTIFICATION TRIFID:

SECTION 1. TOXIC CHEMICAL IDENTITY	**Report ___ of ___**
1.1	CAS Number (Important: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)
1.2	Toxic Chemical or Chemical Category Name (Important: Enter only one name exactly as it appears on the Section 313 list.)
1.3	Generic Chemical Name (Important: Complete only if Part I, Section 2.1 is checked "yes". Generic Name must be structurally descriptive).
SECTION 2. MIXTURE COMPONENT IDENTITY	**(Important: DO NOT complete this section if you completed Section 1 above.)**
2.1	Generic Chemical Name Provided by Supplier (Important: Maximum of 70 characters, including numbers, letters, spaces, and punctuation.)

SECTION 1. TOXIC CHEMICAL IDENTITY	**Report ___ of ___**
1.1	CAS Number (Important: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)
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1.1	CAS Number (Important: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)
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United States
Environmental Protection Agency
(2844)
Washington, DC 20460

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