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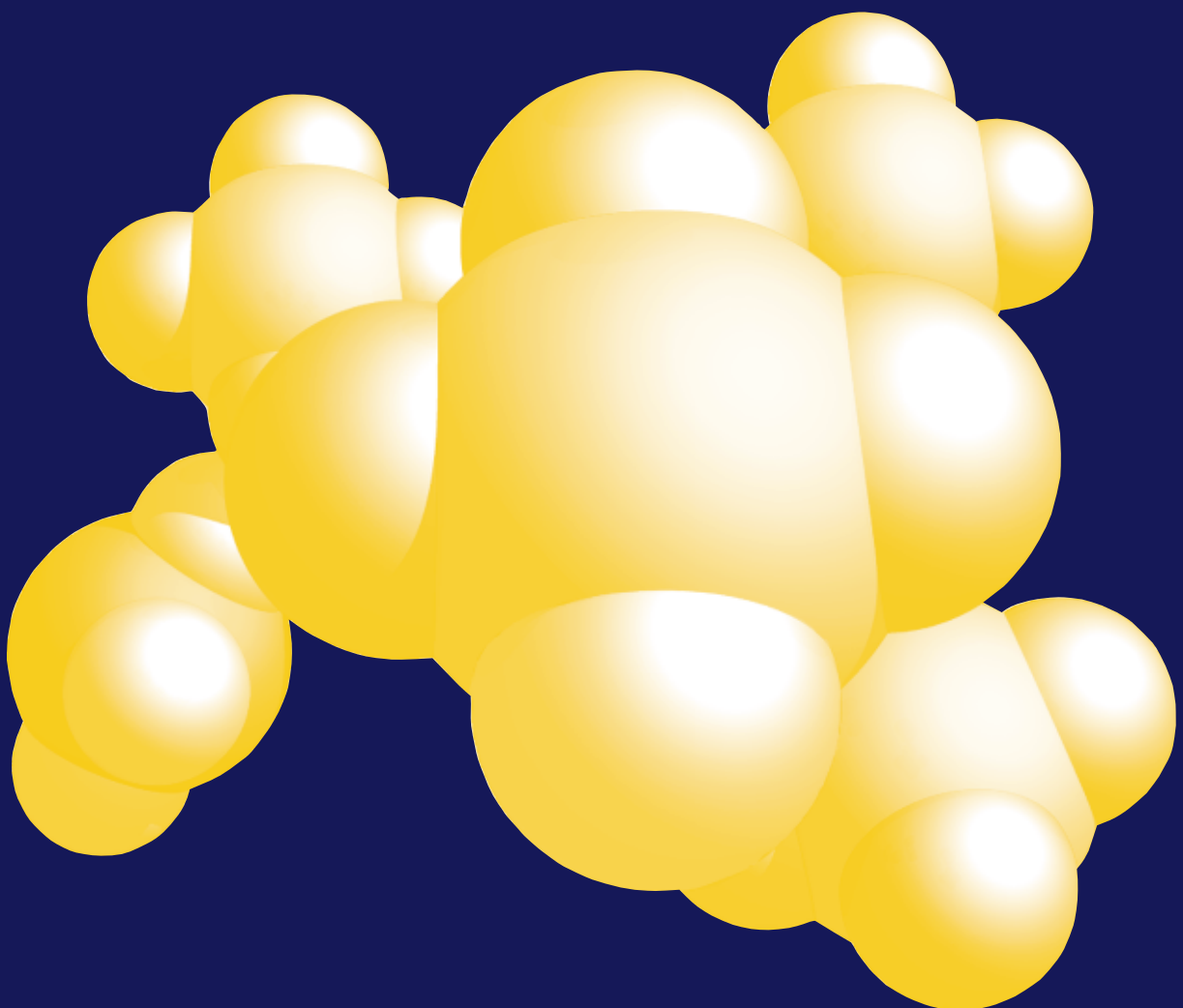
Chemical Industry National Environmental Baseline Report 1990 to 1994



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APPENDIX B — Glossary of Key Terms

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

CERCLA Information System (CERCLIS): CERCLIS is an information system for tracking and retrieving data relevant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program (for example, the number of hazardous waste sites in each EPA region).

Chemical Industry Branch (CIB): The CIB is an entity within EPA that is located in the Office of Enforcement and Compliance Assurance (OECA), Office of Compliance, in the Chemical, Commercial Services, and Municipal Division. The CIB develops and implements a national sector-based, multimedia program of compliance activities for the chemical industry, classified in the 2800 series of the Standard Industrial Classification (SIC) code system.

Chemical Industry: The chemical industry, classified in the 2800 series of the SIC code, includes facilities that manufacture predominantly: (1) inorganic chemicals; (2) plastic materials and synthetics; (3) drugs; (4) soaps, cleaners, and toilet goods; (5) paints and allied products; (6) organic chemicals; (7) agricultural chemicals; and (8) miscellaneous chemical products.

Inorganic Chemical Industry: This industry segment uses the earth's natural resources to produce a wide array of goods. The industry's primary focus is breaking down salt (NaCl) into its principal components, sodium (Na) and chlorine (Cl), which are used in a variety of chemical processes.

Integrated Data for Enforcement Analysis (IDEA): IDEA is a data integration system that can retrieve information from all major EPA program office databases. IDEA uses the Facilities Index System (FINDS) identification number to unite various records from EPA's databases to create a master list of records for any given facility. Some of the data systems accessible through IDEA are: AIRS (Aerometric Information Retrieval System, Office of Air and Radiation), PCS (Permit Compliance System, Office of Water), RCRIS (Resource Conservation and Recovery Information System, Office of Solid Waste), NCDB (National Compliance Database, Office of Pollution Prevention, Pesticides, and Toxic Substances), CERCLIS (Comprehensive Environmental Response, Compensation, and Liability Information System), and TRIS (Toxics Release Inventory System). IDEA also contains information from such outside sources as Dun and Bradstreet Information Services, Inc. and the Occupational Safety and Health Administration.

Land Release: Under Toxics Release Inventory (TRI), releases to land are those that 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 and farming applications (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 or settle waste materials), other land disposal methods (such waste piles), and certain other events (such as spills or leaks).

Off-Site Transfer: Under TRI, an off-site transfer is a shipment of a listed chemical in waste to a facility that is geographically or physically separate from the facility reporting to TRI. Such transfers represent a movement of the chemical away from the reporting facility.

Organic Chemical Industry: This chemical industry segment processes raw materials that have a carbon structure into primary products or building blocks, including ethylene, propylene, benzene, methanol, toluene, xylenes, butadiene, and butylene. Chemicals are added in subsequent phases to create the end product.

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

Release: Under TRI, a release is a discharge of a listed chemical to the environment. Releases include emissions to the air, discharges to bodies of water, releases to land from a facility (such as a landfill or surface impoundment), and contained disposal into underground injection wells.

RCRA Information System (RCRIS): RCRIS is a database that tracks information relevant to the RCRA program (for example, number of regulated facilities, inspections conducted, violations found, and enforcement actions taken at each facility).

Standard Industrial Classification (SIC) Code: The SIC code system is a statistical classification standard used prior to 1996 for all establishment-based federal economic statistics.

Stipulated Penalty: This is a fixed sum of money that a defendant agrees to pay for violating the terms of a judicial consent decree.

Surface-Water Release: Under the TRI, releases to surface water include discharges to streams, rivers, lakes, oceans, and other bodies of water. They include releases from contained sources, such as industrial process outflow pipes or open trenches. Releases from runoff, including stormwater runoff, also are reportable under TRI.

Toxics Release Inventory (TRI) Facilities: TRI facilities are those manufacturing facilities that have 10 or more full-time employees and whose operations create transfers and releases of listed chemicals that exceed established thresholds on chemical throughput. Such facilities must submit estimates of quantities released or transferred for all chemicals that are on EPA's defined list that the facility uses in quantities that exceed a specific threshold quantity.

Transfer: Under TRI, a transfer occurs when a listed waste is removed to a facility that is geographically or physically separate from the facility that is required to report under the TRI. Transfers include wastes sent to publicly-owned treatment works (POTW), sent off-site for recycling, combusted off-site for energy recovery, moved off-site for treatment, or taken to another facility for disposal.

Transfer to a Publicly-Owned Treatment Works (POTW): Under TRI, reported information includes wastewaters that are transferred through pipes or sewers to a POTW. A POTW is a wastewater treatment facility (sewage treatment plant) that is owned by a state or municipality.

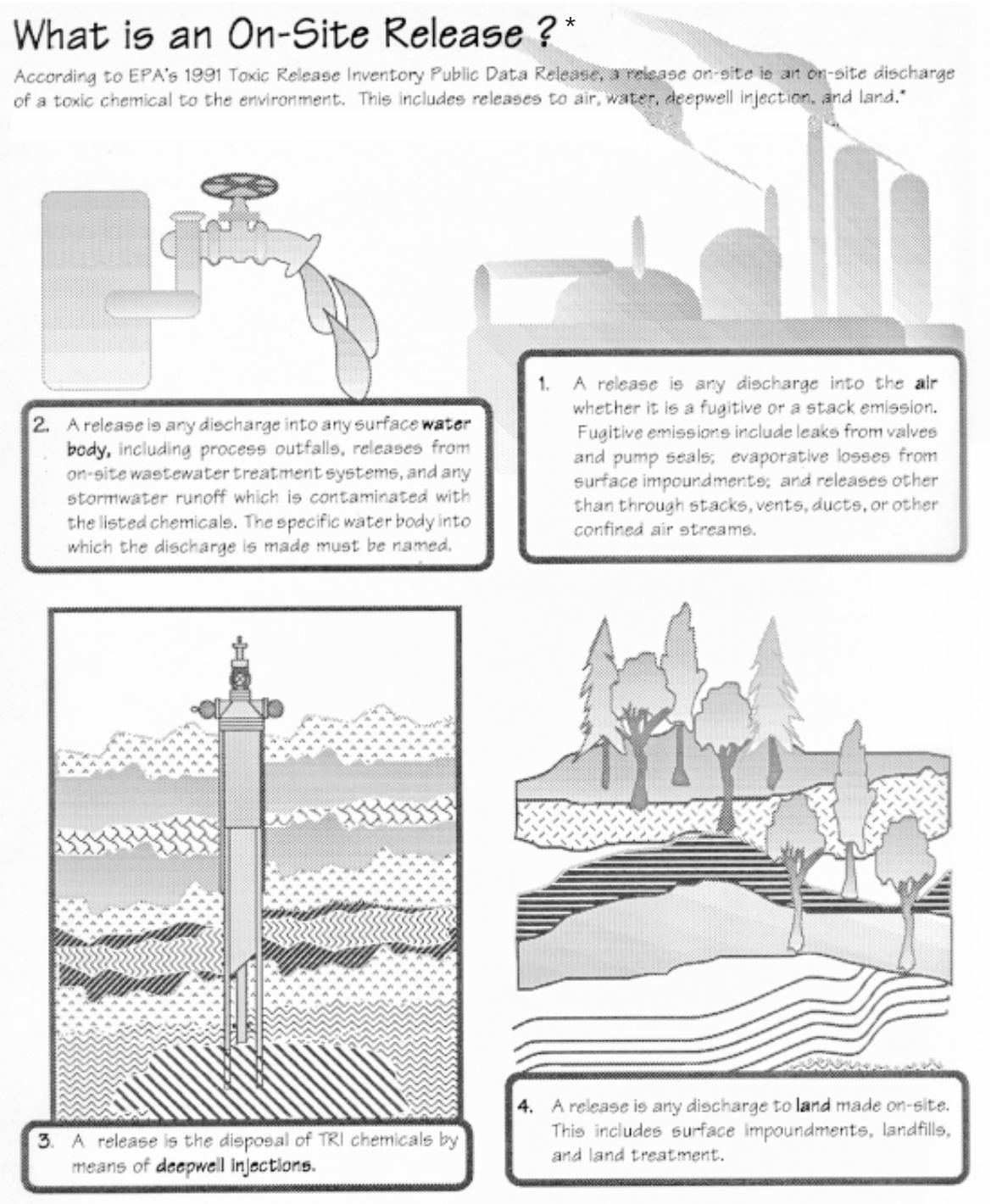
Transfer Off Site for Recycling: Under TRI, a transfer off site for recycling is the shipment of listed chemicals off site for recycling. The chemicals are subjected to solvent recovery, metals recovery, acid regeneration, or other processes. Once recycling has been accomplished, the chemicals may be returned to the originating facility or sold for further processing or use.

Transfer Off Site for Energy Recovery: Under TRI, such a transfer involves listed chemicals that are sent off site for energy recovery and are combusted off site in industrial furnaces (including kilns) or boilers that generate heat or energy for use at the off-site location. Treatment of a chemical by incineration is not considered energy recovery.

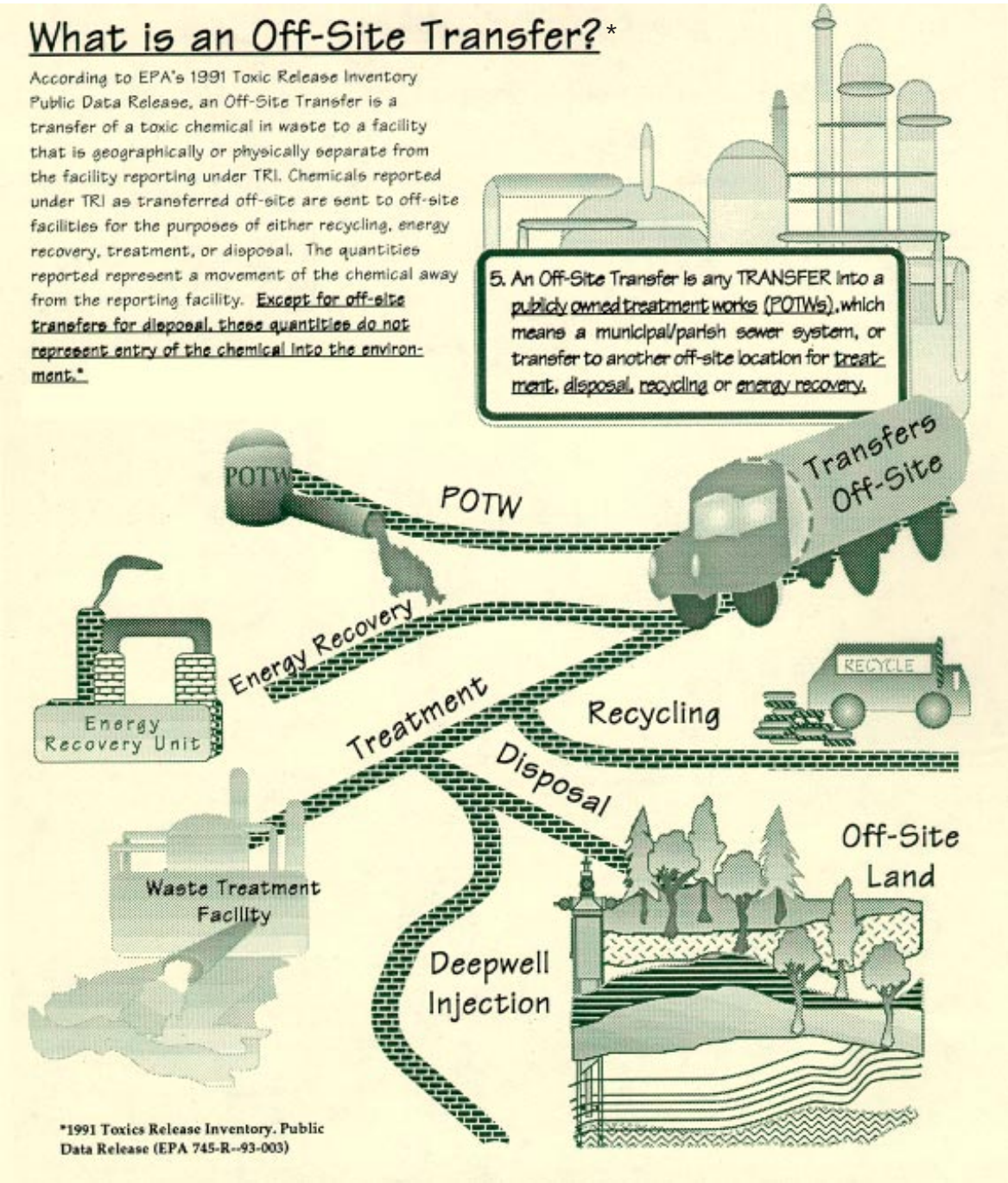
Transfer Off Site for Treatment: Under TRI, reported information includes listed chemicals that are sent off site and treated by such processes as biological treatment, neutralization, incineration, or physical separation. The methods achieve various degrees of destruction of the toxic chemical. In some cases (such as stabilization or solidification), the chemical is not destroyed but is prepared for further waste management, such as contained disposal.

Transfer Off Site for Disposal: Under TRI, listed chemicals sent off site to a facility for disposal usually are released to land or injected underground at the off -site location.

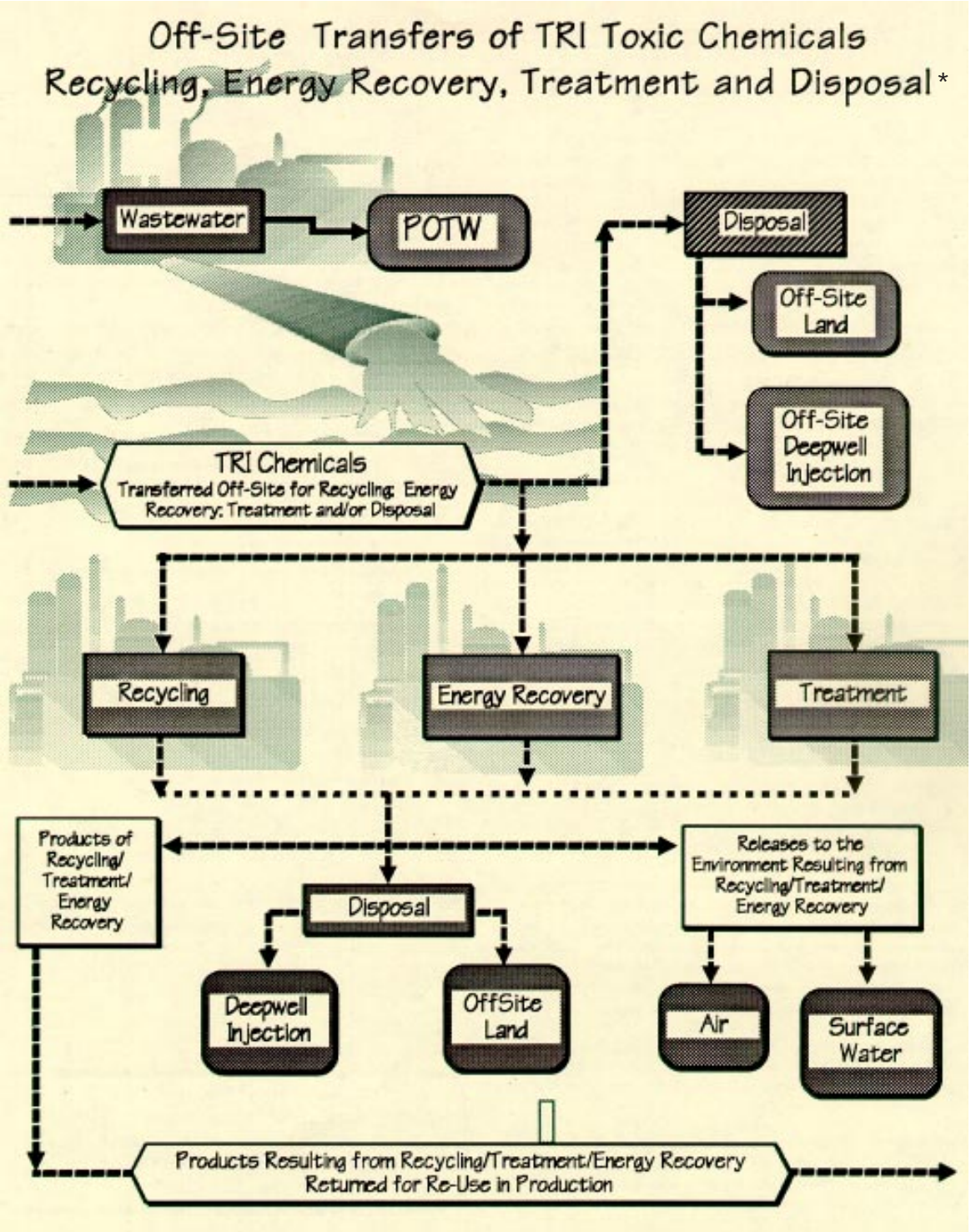
Underground Injection: Underground injection is a contained release of a fluid into a subsurface well for waste disposal. Most underground injection reported to TRI involves injection of waste into Class I or Class V wells. Class I wells are used to inject liquid hazardous wastes or industrial and municipal wastewaters beneath the lowermost underground source of drinking water. Class V wells usually are used to inject nonhazardous fluids into or above an underground source of drinking water. Beginning with 1996 data, reporting to TRI will distinguish between the two types of wells because they differ significantly in environmental effects.



* Copied from the Louisiana Toxics Release Inventory 1993



* Copied from the Louisiana Toxics Release Inventory 1993



* Copied from the Louisiana Toxics Release Inventory 1993

Executive Summary

EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) developed this report as a baseline against which to measure compliance trends among the various subsectors of the chemical manufacturing industry. Through an analysis of data related to economics, demographics, the Toxics Release Inventory (TRI), compliance monitoring actions, and violations and enforcement actions, the baseline report provides an overview of the U.S. chemical industry sector as a whole (Standard Industrial Classification [SIC] codes in the 2800 series) and its subsector components (SICs 281 to 289). It is intended for use by regulators, states, industry, and the public as a general profile of the chemical industry and its environmental performance from 1990 to 1994. The baseline report provides information that may serve as a catalyst for the development of innovative compliance initiatives and similar profiles for this and other sectors on a state or regional basis.

Data presented in this report also may be of use to EPA in evaluating environmental performance and identifying specific segments of the industry that might benefit from tighter enforcement and expanded compliance monitoring. It may be possible, through a comparison of environmental performance, risk-based criteria, and other factors, to select certain industrial sectors for special assistance and outreach efforts, maximize efficiency in the use of resources for traditional enforcement activities, and fashion custom compliance assistance programs to meet the unique needs of specific industry groups. Through such activities, the agency can promote efforts to achieve and maintain compliance, and industry can attain a higher level of environmental performance.

By presenting a national environmental compliance history for the first half of the decade (1990 through 1994), the baseline report provides information that begins to establish relative trends among the various four-digit SIC codes that make up the chemical industry. In addition, the number of facilities and chemicals included in TRI is to be expanded. When the report was drafted, complete data were available for all portions of the report, up to and including 1994. During summer 1997, TRI data for 1995 were released. Since the peer review process for this report started before the release of the 1995 TRI data, the baseline report does not include data for that year.

The baseline report is useful to help quantify historical compliance trends for the industry, as well as to focus future compliance efforts. The baseline report also can allow for enhanced sector-based compliance monitoring and will facilitate strategic planning for the various sectors. This strategic planning allows for in-depth analyses of compliance for the industry. The U.S. Environmental Protection Agency (EPA)/ Chemical Manufacturers Association (CMA) Root-Cause Analysis Project and sector-based EPA headquarters/regional office Memoranda of Agreement (MOA) are examples of such analyses.

In addition, the baseline report serves as a framework for implementing the Operating Principles for an Integrated EPA Enforcement and Compliance Assurance Program, published by the Office of Enforcement and Compliance Assurance (OECA) as an interim draft in November 1996.

Some of the areas in which the baseline report fulfills the objectives stated in OECA's operating principles are:

- It provides information on enforcement and compliance monitoring activities.
- It evaluates industry environmental performance through multi-year trend analysis.

- It provides information in the form of outreach to the public and the regulated community regarding environmental performance.

The information in the report is presented in four major areas: 1) an overview of the chemical industry, including the number, sizes, and types of chemical facilities located in the U.S.; 2) a summary of trends in releases and transfers reported to the TRI; 3) trends in compliance monitoring activities and violations, by statute and by SIC code, over time; and 4) trends in enforcement actions and descriptions of innovative approaches to enforcement that have been used to boost compliance.

Summary of Findings

ES.A. Section 2 - Overview of the Chemical Industry

Section 2 of this report provides background information about the chemical industry. The chemical industry, which falls in the 2800 SIC code series, has eight industry groups:

281 - inorganic chemicals
282 - plastic materials and synthetics
283 - drugs
284 - soaps, cleaners, and toilet goods
285 - paints and allied products
286 - organic chemicals
287 - agricultural chemicals
289 - miscellaneous chemical products

Figure ES-1 shows the locations of chemical manufacturing facilities in the U.S.

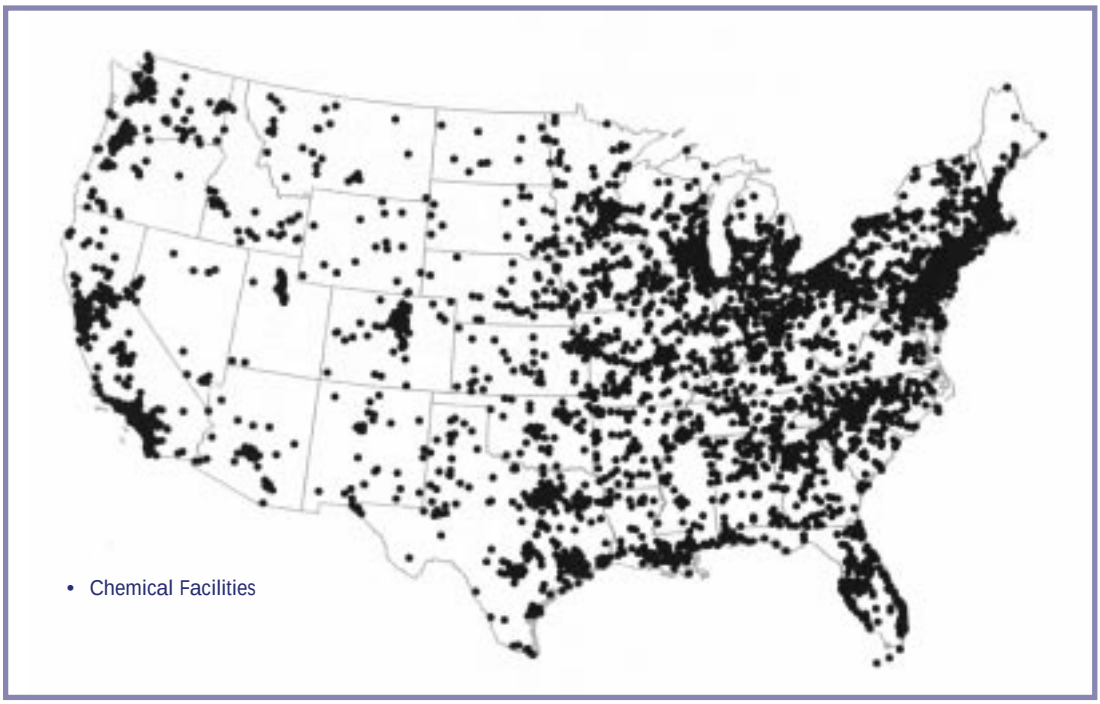
This section briefly defines the chemical industry's role in U.S. and world economies as a leading employer, producer, and exporter of goods. Section II also identifies the number, types, sizes, and geographical distribution of chemical facilities located in the U.S. and provides an overview of the major environmental statutes that affect the chemical industry.

Findings

Data presented in this section indicate that:

- The U.S. chemical industry is the largest producer of chemicals in the world, with approximately 2,800 affiliates abroad.
- The U.S. chemical industry is a leader in U.S. and world markets and is the largest U.S. export sector, providing one of every 10 dollars of U.S. export of goods. The U.S. chemical industry is surpassed in total world export of goods only by the automotive sector.
- Between 1981 and 1993, world trade in chemicals increased from $124 billion to $309 billion, or 149 percent. World production of chemicals rose only 67.3 percent in that period.
- Since 1984, the U.S. chemical industry has maintained a trade surplus totaling about $140 billion—$15 billion in 1993 alone.
- According to 1995 records provided by Dun and Bradstreet Information Services, Inc., 20,676 facilities declare that chemical processing is one of their top five operations.
- Of the 10 EPA regions in the U.S., EPA Region 5 (Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio) is the location of the largest number of chemical facilities (21 percent of total), as well as the largest number of industry employees (25 percent of total).

Figure ES-1.
Chemical Facilities in the United States, 1994[j]



- The chemical industry is characterized by a predominance of small facilities; more than 50 percent have fewer than 10 employees.
- Locations of chemical facilities generally are chosen because they offer access to raw materials, transportation routes, and markets.

ES.B. Section 3 - Trends in Releases and Transfers Reported by the Industry to the Toxics Release Inventory (TRI)

Section 3 of this report provides information about trends, both overall and for the chemical industry, associated with releases and transfers of listed chemicals as reported to the TRI, as mandated under the Superfund Amendments and Reauthorization Act (SARA) Title III, known as the Emergency Planning and Community Right-to-Know Act (EPCRA).

Findings

- As depicted in Table ES-1, the chemical industry has followed the national trends that demonstrate a reduction in the release of chemicals and carcinogenic chemicals over time (although to a lesser extent), notwithstanding an increase in production. Moreover, the chemical industry

Table ES-1.

Comparison of National and Chemical Industry TRI Trends, 1990 to 1994[h,i]

TRI Category	National Trend All Industries	Chemical Industry
Chemicals released	52.1 percent decrease	43.5 percent decrease
Carcinogenic chemicals released	16.9 percent decrease	15.9 percent decrease
Chemicals transferred*	4.1 percent increase	13.5 percent decrease

[h, i] Please see Endnotes Section.
* Trend reported is from 1991 to 1994 because of significant changes in the reporting requirements for TRI transfers.

reduced the quantity of chemicals transferred over time, while the national statistic for all industries showed a slight increase.

- In 1994, the chemical industry reported the largest quantities of carcinogens released, the largest quantities of total pounds released, and the largest quantities transferred each year, compared with all other industries that reported.

ES.C. Section 4 - Trends in Compliance Monitoring Activities and Violations

Section 4 of this report provides information about trends in compliance monitoring activities and violations for the chemical industry. Using data obtained from the EPA Integrated Data for Enforcement Analysis (IDEA) database, the report presents summaries of compliance monitoring activities conducted and violations identified at chemical facilities from 1990 through 1994. Raw numbers of violations were counted, but no attempt was made to characterize the magnitude of the violations.

Findings

- Nationwide, from 1990 through 1994, EPA and states conducted 48,037 compliance monitoring activities, identified 17,807 violations, and initiated 10,360 enforcement actions at chemical facilities.
- As Table ES-2 shows, the number of violations identified under all programs increased 37.6 percent between 1990 and 1994. Compliance monitoring activities decreased by 4.5 percent during the same time period. For specific changes in each of the industry groups in the 2800 SIC code series, please see Appendix F.

ES.D. Section 5 - Promoting Environmental Performance Through Compliance Promotion, Enforcement, and Compliance Assurance

Section 5 describes EPA's response to noncompliance, either through enforcement actions or through certain programs that EPA developed to assist in improving the compliance status of the regulated community. This section also provides some success stories about cases in which the chemical industry has participated in innovative approaches to ensure compliance.

Table ES-2.

Comparison of Compliance Monitoring Activities and Violations, 1990 and 1994 (all statutes)[i]

Category	1990	1994	1990 to 1994 Annual Average	1990 to 1994 Percent Change
Compliance Monitoring Activities	9,842	9,401	9,606	4.5 percent decrease
Violations	2,539	3,494	3,561	37.6 percent increase

In addition to the use of traditional compliance tools, EPA has developed incentives, assistance programs, and strategies to help ensure compliance. A strategic combination of traditional enforcement actions and other, more innovative activities allows EPA to best apportion and leverage its resources and promote the highest possible level of compliance with environmental requirements. The success stories illustrate ways in which EPA and the chemical industry have worked together to attain compliance in the following areas:

- Compliance assistance tools
- New incentive policies
- Supplemental environmental projects (SEP)
- Pollution prevention programs
- Environmental Leadership Program (ELP)

ES.E. Future Directions

This report provides information that can serve as a reference point for the following compliance monitoring and enforcement activities:

- Cooperative efforts and partnerships between EPA and the chemical industry continue to demonstrate the importance of compliance with environmental regulations.
- New agency initiatives to ensure compliance are moving beyond the traditional unilateral approach to enforcement to approaches that consider members of the chemical industry equal partners in the search for environmental excellence. Examples of such initiatives include the EPA/CMA Root-Cause Analysis Project, the Community-Based Environmental Protection (CBEP) initiative, and the development of additional compliance assistance tools.
- Promoting responsible management practices will require that components of traditional enforcement activity remain essential program activities.
- Baseline information presented in this report will provide a basis to chart progress and help to refine the focus of innovative approaches to compliance in the future.

Introduction

CHEMICAL INDUSTRY ENVIRONMENTAL BASELINE REPORT 1990 TO 1994

1. INTRODUCTION

This section provides background on the U.S. Environmental Protection Agency's (EPA) approach to compliance activities, the role of the Chemical Industry Branch (CIB) of the Office of Enforcement and Compliance Assurance (OECA) at EPA; current joint initiatives of EPA and the chemical industry; and descriptions of the purpose, scope, methodology used, data limitations, and organization of this report. All information for which references are provided is noted with a superscript letter; those references are provided in the endnotes.

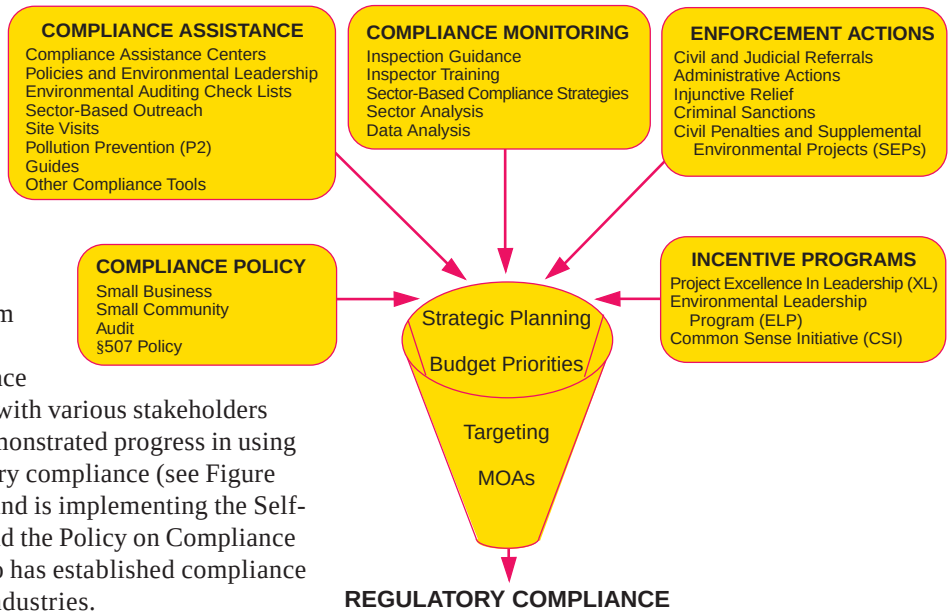
1.A. EPA's Approach to Compliance Assurance

For nearly 25 years, EPA relied on the use of enforcement authorities to ensure compliance with environmental statutes and regulations. However, while maintaining its enforcement efforts, EPA has developed new elements of its approach to compliance assurance. This new approach has five distinct elements[a]:

1. **A broader mission:** Fostering environmental accountability, that is, accountability for environmental results, rather than merely the fulfillment of regulatory obligations.
2. **A set of new relationships:** Developing partnerships with industry, states, and the public to ensure compliance and promote operating principles that go beyond compliance.
3. **A shift in strategic assumptions:** Recognizing constraints on resources and placing greater emphasis on setting priorities, directing government resources toward problems of greatest concern, and focusing on multi-media, sector, and geographic issues.
4. **A more diverse mix of tactics:** Using various techniques promoting compliance, recognizing excellence, and informing the public about companies' environmental performance.
5. **A more sophisticated method of measuring effectiveness:** Developing measures that reflect the levels of compliance of various sectors and characterizing the environmental improvements and benefits that result from compliance.

EPA reorganized its enforcement program in June 1994, when it consolidated the Agency's five enforcement and compliance programs into OECA. EPA has worked with various stakeholders to implement its new agenda and has demonstrated progress in using the mix of approaches to obtain regulatory compliance (see Figure 1-1). For example, EPA has developed and is implementing the Self-Disclosure Incentives Program Policy and the Policy on Compliance Incentives for Small Business. EPA also has established compliance assistance service centers for specific industries.

Figure 1-1. Utilizing the Mix.

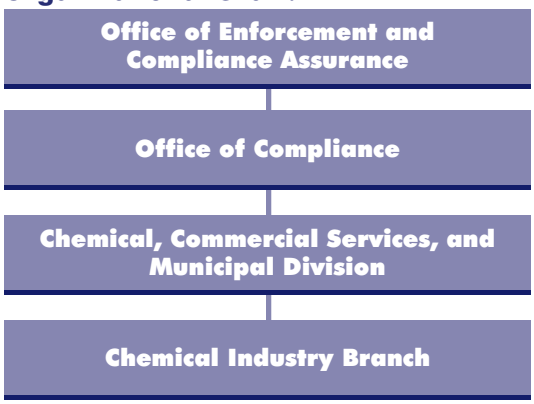


1.B. Role of the Chemical Industry Branch in EPA's Compliance Assurance Program

The CIB is located in OECA, under the Office of Compliance, within the Chemical, Commercial Services, and Municipal Division of EPA (see Figure 1-2).

The CIB assists OECA in developing and implementing a national, sector-based, multimedia program of compliance activities for the chemical industry in the 2800 series of the Standard Industrial Classification (SIC) system. To obtain a clearer picture of the compliance issues and problems confronting the chemical industry, as well as to obtain a better understanding of its own strengths and of potential areas for improvement, CIB periodically assesses the performance of chemical facilities with respect to environmental statutes and programs.

Figure 1-2. Organizational Chart.



Environmental requirements that may affect the chemical industry range from federal statutes and their implementing regulations to state and local laws and ordinances. Such legislation includes the Resource Conservation and Recovery Act (RCRA); the Clean Water Act (CWA); the Clean Air Act (CAA); the Safe Drinking Water Act (SDWA); the Toxic Substances Control Act (TSCA); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). EPA, in conjunction with the states, has oversight responsibility for facilities' environmental compliance. To fulfill the Agency's oversight responsibility, CIB and other offices of OECA conduct a broad range of activities, including:

- Development of policy and guidance
- Support for regional programs
- Support for interagency agreements (IAG)
- Support for national programs and dissemination of information
- Technical assistance and capacity building

Through EPA's network of regional offices and through state agencies, staff of the CIB and OECA monitor and respond to detected noncompliance.

1.C. Joint Initiatives of EPA and the Chemical Industry

The chemical industry is participating in several EPA initiatives, such as the Environmental Leadership Program, and Project XL. EPA currently is working closely with the CMA and its member companies to implement the EPA/CMA Root-Cause Analysis Project. The ultimate goals of the project are to:

- Verify currently available information and analyze compliance and enforcement trends from 1990 to 1995 for certain CMA member facilities
- Identify fundamental causes of violations
- Develop innovative prevention-oriented compliance management options to eliminate or reduce noncompliance.

The purpose for performing the EPA/CMA Root-Cause Analysis Project is to identify the underlying reasons for noncompliance and to use that information to assist in not only correcting the problem but also preventing repeat violations.

1.D. Purpose of the Report

The purpose of this report is to provide a general profile of the chemical industry. Because this is a baseline report, it establishes a point of reference for profiling the chemical industry. The report will be used as a benchmark to be compared with the future activities and accomplishments of the industry and EPA. The report also is intended to identify areas in which additional research could further focus CIB's compliance activities.

CIB's efforts include developing and providing information that assists the general public, regulators, and the industry in becoming more knowledgeable about EPA's responses to the environmental status of the chemical industry at large. This report, which is a central element of that understanding, is intended to assist in building effective partnerships with stakeholders to jointly develop solutions to compliance issues.

1.E. Scope of the Report

This report provides an overview of compliance trends and status by analyzing compliance and enforcement trends and environmental loadings from 1990 to 1994 for the 2800 SIC code series.

The report analyzes trends in environmental protection activities at chemical facilities and displays the following information by fiscal year (October 1 to September 30) by EPA region for all 2800 SIC code series:

- Number and location of facilities
- Number of employees
- Chemical emissions levels (TRI data)
- Frequency and types of compliance monitoring actions, violations, and enforcement actions, by statute

This report makes no attempt to assess the effectiveness or accomplishments of EPA and state programs or the overall effects on human health or the environment that result from activities of EPA or the chemical industry. Because this report focuses on the entire chemical industry, data are presented in the aggregate, rather than by individual facility or corporation. Raw numbers of violations were counted, but no attempt was made to characterize the magnitude of the violations.

This report also is consistent with the operating principles established to integrate EPA and state enforcement and compliance assurance efforts. Specifically, these principles obligate EPA to be accountable to the public and to report the enforcement and compliance rates for each industry to assess industry performance. In addition, EPA will report the enforcement and compliance rates to measure the environmental effects and results of these activities.

1.F. Methodology and Data Limitations

To establish the baseline, a relational database was used. The database was constructed from readily available data, such as data from Dun and Bradstreet Information Services, Inc. (D&B), information about environmental loadings from TRI reports provided to EPA by facilities, and environmental compliance histories from EPA's multi-media Integrated Data for Enforcement Analysis (IDEA) system, which includes data that reflect state and federal activities.

The baseline was established by conducting a series of queries. Three general areas were examined:

1. Establishing the size (both total number and sizes of individual facilities) and geographic location of the industry;
2. Gathering general information on chemical releases and transfers; and
3. Developing a compliance history for each environmental statute.

The baseline was constructed by conducting a review of the 2800 SIC code series by numbers of TRI releases and transfers reported and compliance monitoring activities, violations, and enforcement actions. The data were broken down further by number of employees per facility.

Industry overview data were drawn from a variety of sources. The demographic information presented in the report was drawn largely from information provided by the Bureau of the Census, U.S. Department of Commerce. Demographic information presented herein includes population and number of facilities, by state. The baseline uses Census data (for employment and economics) and not Bureau of Labor statistics because Census data more closely represents chemical manufacturing facilities which are the focus of the report (not corporate entities).

It bears mentioning that this report may have been affected by the quantity and quality of data available for use in preparing it. CIB has made no effort to modify raw data for quality assurance and quality control (QA/QC) or to normalize the data sets. EPA currently is conducting efforts to improve the quality of its existing data. Future baseline reports should benefit from those efforts. (See Section 4, Compliance Monitoring Activities and Violation Trends by Environmental Statute.)

In preparing this report, CIB consulted relevant EPA offices to ensure that the type of compliance data presented herein and the format in which they are presented are consistent with those used by the respective EPA programs.

1.G. Organization of the Report

The report has the following sections:

Section 1: Introduction

Section 2: Industry overview

Section 3: Toxics Release Inventory (TRI) data

Section 4: Compliance monitoring activities and violation trends by environmental statute

Section 5: Promoting environmental performance through compliance promotion, enforcement, and compliance assurance

Section 6: Future directions

Endnotes: Description of data sources used

Appendices: Appendices that present supplemental information, including a list of acronyms; a glossary of key terms used; summaries of some of the federal environmental statutes and regulations that affect this industry sector; location of facilities; TRI data; and compliance data.

Industry Overview

2. Industry Overview

This section provides general demographic and economic information about the chemical industry, the number of chemical facilities, and employment at individual facilities.

2.A. Industry Background

The following subsections provide a brief description of the chemical industry, including a discussion of the Standard Industrial Classification (SIC) code system; types of facilities that make up the chemical industry; products produced; the role of the chemical industry in the U.S. and world economies; the environmental regulatory context within which the chemical industry operates; distribution of facilities, as it is related to minority communities; and industry employment.

2.A.1. SIC Code Classification. For purposes of the analysis in this report, the chemical industry is described by SIC code. The Bureau of the Census uses the SIC code system to track the movement of goods and services within the U.S. economy. The chemical industry falls into the SIC major group 28, which is divided into the eight industry groups listed in Table 2-1.

Effective January 1, 1997, the SIC system changed to the North American Industry Classification System (NAICS) (see 61 Federal Register 57006, November 5, 1996). Data in the IDEA system for the trend period were not gathered according to the NAICS code because the IDEA database uses the SIC system for those years. For more information regarding NAICS, please visit the U.S. Bureau of Census website at *http://www.census.gov/epcd/www/*.

2.A.2. Types of Facilities That Make Up the Chemical Industry. The chemical industry is unique in that it encompasses numerous industries that use widely varying processes. Therefore, the eight categories listed above are subdivided further into 29 specific industry sectors at the four-digit level (see Table 2-2).

For this report, industry sectors will be referred to by their specific sector names and corresponding SIC codes. Database information is sorted by SIC code to allow consistent comparisons of data.

2.A.3. Chemical Industry Processes and Products. The discipline of chemistry is divided into two branches: organic and inorganic chemistry. Organic chemistry focuses on compounds of carbon which typically are derived from petroleum and natural gas sources. Inorganic chemistry covers all substances that are not compounds of carbon (with a few exceptions) and includes metals, salt, and other minerals.

Organic chemical production involves processing raw carbon-based materials into primary outputs or building blocks, including ethylene, propylene, benzene, methanol, toluene, xylenes, butadiene, and butylene. Chemicals are added in subsequent phases to create the final products, such as foams, resins, cements, adhesives, lubricants, floor coverings, paints, airplane parts, pharmaceuticals, tires, cosmetics, detergents, and soaps.[d] Inorganic chemical production uses the earth's natural resources to produce a wide array of goods. One of these processes involves breaking down salt (sodium chloride) into its principal components, sodium (Na) and chlorine (Cl), which are used in a variety of chemical processes; for example, chlorine is used to bleach items, such as cloth and paper, and is added to drinking water for purification.[d]

Table 2-1.

Major Chemical Industry Sectors.[b]

SIC	Industry Sector
281	Inorganic Chemicals
282	Plastic Materials and Synthetics
283	Drugs
284	Soaps, Cleaners, and Toilet Goods
285	Paints and Allied Products
286	Organic Chemicals
287	Agricultural Chemicals
289	Miscellaneous Chemical Products

Table 2-2.

Specific Chemical Industry Sectors.[b]

	[b]SIC	Industry Sector
281	2812	Alkalies
	2813	Gases
	2816	Pigments
	2819	Inorganics
282	2821	Plastics
	2822	Rubber
	2823	Cellulosics
	2824	Organic Fiber
283	2833	Medicinal
	2834	Pharmaceuticals
	2835	Diagnostic Substances
	2836	Biologic
284	2841	Soaps
	2842	Polishes
	2843	Surfactants
	2844	Cosmetics
285	2851	Paints
286	2861	Gums
	2865	Cyclic Crude
	2869	Organics
287	2873	Nitrogenous Fertilizer
	2874	Phosphatic Fertilizer
	2875	Mixed Fertilizer
	2879	Pesticides
289	2891	Adhesives
	2892	Explosives
	2893	Inks
	2895	Carbon Black
	2899	Chemical Preparation

The chemical industry produces more than 70,000 finished products from raw materials. Very few goods and services are produced without involving the chemical industry in at least one phase of the production process. Products made by the chemical industry include textiles, medicines, dyes and paints, and automobile parts. In addition, products of the chemical industry are crucial to the agricultural, construction, manufacturing, medical, and service industries.[d]

2.A.4. Role of the Chemical Industry in the U.S. and World Economies.

The chemical industry is a leader in world export markets, surpassed only by the automotive industry (see Figure 2-1). The U.S. chemical industry is the leading sector in U.S. goods exports; in 1994, chemical manufacturers accounted for 10 cents of every dollar in exports and 1.9 percent of the national gross domestic product (GDP) and employed approximately one million people. Cumulative exports from 1970 to 1989 totaled $66 billion and $223 billion in the following five years, from 1990 to 1994. Since 1984, the U.S. chemical industry has maintained a trade surplus totaling about $140 billion—$17 billion in 1993 alone. However, although the U.S. chemical industry is the largest producer in the world, Germany is the leading exporter of chemicals.[e] U.S. chemical manufacturers have approximately 2,800 affiliates abroad, while foreign chemical manufacturers have 1,700 affiliates in the U.S.

Figure 2-1.
Leading Exports in the World Manufacturers Market, 1993.[d]

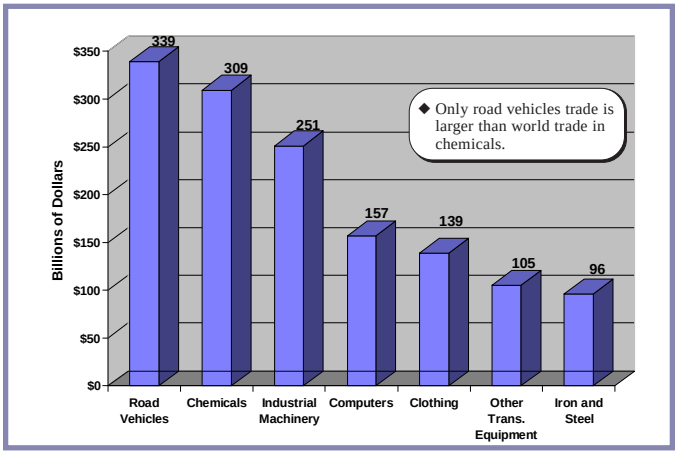
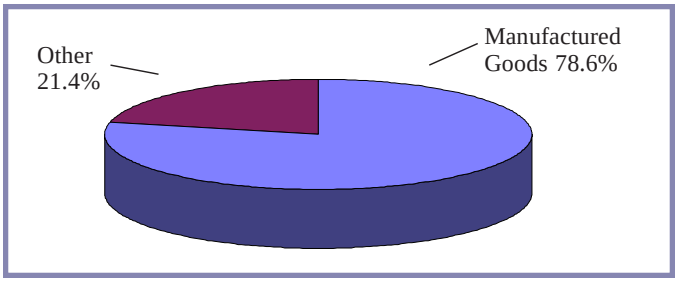


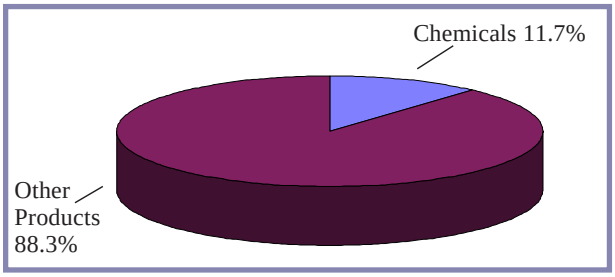
Figure 2-2.
Composition of World Goods Trade, 1994.[e]



The majority of items on the world trade market are manufactured goods.

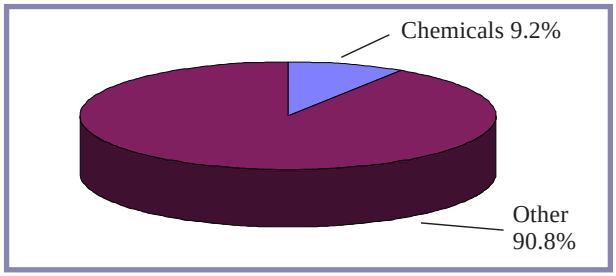
Most items traded on the world market are manufactured products; that sector has shown consistent growth in exports. In 1981, manufactured goods accounted for 60.9 percent of world exports of goods. By 1994, the percentage of manufactured goods in world exports had risen to 78.6 percent (see Figure 2-2).[e] Chemicals account for about 11.7 percent of all manufactured products traded and 9.2 percent of all goods traded on the world market (see Figures 2-3 and 2-4). Major growth is expected in the Asian and Pacific Rim markets, with some growth expected for agricultural products in Latin America. World chemical trade has grown more rapidly than world chemical production. Between 1981 and 1993, world trade in chemicals increased from

Figure 2-3.
Chemicals Traded on the Manufacturers Market, 1994.[e]



Chemicals account for 11.7% of all goods traded on the manufacturers market.

Figure 2-4.
Chemicals Traded on the World Goods Market, 1994.[e]



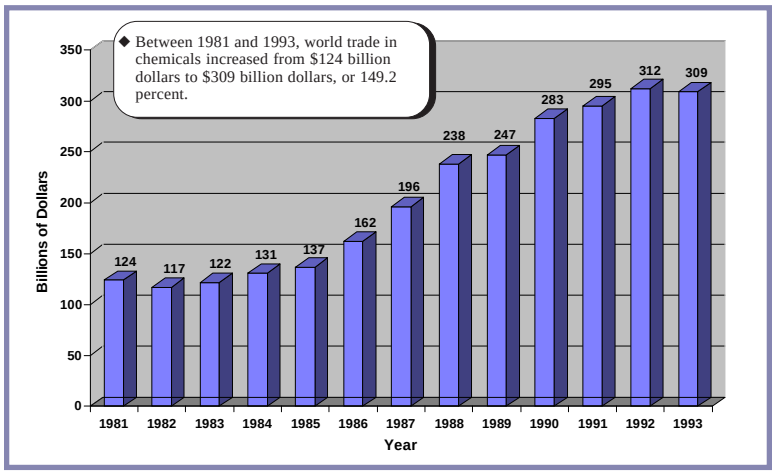
Chemicals account for 9.2% of all goods traded on the world market.

$124 billion dollars to $309 billion dollars, or 149.2 percent (see Figure 2-5). However, world production of chemicals increased 67.3 percent in that same period.[e]

Figure 2-6 depicts the composition of world chemical industry exports by sector. In 1993, organic and inorganic chemicals accounted for nearly one-third of the world chemical trade. Over time, the sectors that have the highest growth rates in the world market include inks, medicinals, pharmaceuticals, cosmetics, soaps, and plastics.

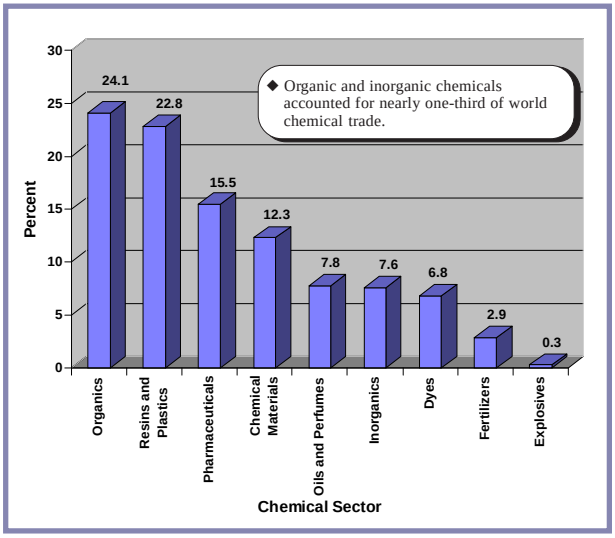
Current trends indicate an oversupply in the next decade and perhaps beyond. As developing countries enter the market, the number of producers will increase, thereby increasing competition. Rates of return therefore could decline, and U.S. production could decrease, compared with total world production.[e]

Figure 2-5.
Chemical Industry World Trade Growth, 1993.[e]



Another important trend in the chemical industry is the rising cost of pollution abatement. In 1993, cost of pollution abatement totaled $5.4 billion, or 3.3 cents per dollar of sales (capital expenditures and operating costs). That number is up from 1.9 cents per dollar of sales in 1984. In addition, one-sixth of all new capital expenditures is allocated to pollution abatement measures, exceeding the investment in plant and equipment needed to start up new manufacturing operations. (These figures do not include other costs of pollution abatement, such as the cost of process modification and site remediation, and instead focus on end-of-pipe costs.)

Figure 2-6.
Composition of World Chemical Exports, 1993.[e]



To obtain additional general information on the chemical industry, refer to such resources as:

- Profile of the Organic Chemical Industry. EPA, OECA. September 1995.
- Profile of the Inorganic Chemical Industry. EPA, OECA. September 1995.
- U.S. Chemical Industry Statistical Handbook. CMA. 1994.
- The U.S. Chemical Industry Performance in 1994 and Outlook. CMA. February 1995.

2.A.5. Legal and Regulatory Environment. Many compliance assurance and enforcement actions are carried out by states. EPA and the states are partners in enforcing environmental statutes and regulations.

Although the programs described below are federal programs, most federal environmental programs are implemented and enforced by the states. States usually have the option to develop environmental programs and implement them, once EPA has approved them. Although the states have primary responsibility for implementing these programs once they have been approved, state programs are subject to EPA oversight. States also may

develop their own programs that may establish more stringent requirements than those established under federal law. In general, chemical facilities must comply with environmental regulations under both federal and state programs.

The chemical industry has been and continues to be one of the most stringently regulated industries in the U.S. The industry is regulated under a variety of federal, state, and local environmental statutes and regulations. This section provides a broad overview of the environmental regulations and their enabling legislation that affect the chemical industry. A more detailed description may be found in Appendix C. The major applicable federal environmental statutes are:

- The Resource Conservation and Recovery Act (RCRA)
- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- SARA Title III, the Emergency Planning and Community Right-to-Know Act (EPCRA)
- The Clean Air Act (CAA)
- The Clean Water Act (CWA)
- The Safe Drinking Water Act (SDWA)
- The Toxic Substances Control Act (TSCA)
- The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

RCRA

Under RCRA, three major regulatory programs affect the chemical industry: one developed under the authority of Subtitle C for hazardous waste management, the second developed under the authority of Subtitle D for solid waste management, and the third developed under Subtitle I for the storage of regulated substances in underground storage tanks (UST). The hazardous waste management program requires the industry to characterize the wastes that it generates and establishes management standards for the treatment, storage, and disposal of hazardous wastes. When contamination from hazardous waste elevates the risk to human health or the environment, the corrective action program requires facilities to clean up contaminants and mitigate risks. Subtitle D sets forth guidelines for the management of municipal and industrial solid waste. It also provides that states may develop and implement their own regulatory programs for solid waste management, including landfills. The UST program establishes design and operating requirements for the underground storage of petroleum products and certain hazardous substances.

CERCLA

CERCLA affects the day-to-day operations of chemical facilities through its requirements for reporting releases of hazardous substances and extremely hazardous substances above those threshold quantities established under the legislation. CERCLA also imposes liability on those facilities for releases of hazardous substances into the environment. CERCLA provides EPA with the authority to: (1) require facilities to remediate releases of hazardous substances, or (2) conduct the cleanup and seek reimbursement from responsible parties to recover the costs of cleanup. CERCLA has a significant effect on chemical facilities because the liability is strict, joint, and several – that is, a facility can be held liable for the cost of cleanup at a site, regardless of its relative contribution to the overall problem.

EPCRA

EPCRA establishes a program that requires chemical facilities to prepare reports that document: (1) the quantities of chemicals they are storing, and (2) the quantities of chemicals they are transferring or releasing into the environment. Under EPCRA, facilities are required to report certain transfers and releases to the environment of extremely hazardous substances. Facilities that store more than specified threshold amounts of hazardous chemicals must report to local authorities information about the quantities of those chemicals in storage; that information is used in preparing regional emergency response plans. Finally, certain chemical facilities that have 10 or more employees must estimate transfers and releases of about 600 toxic chemicals to the air and water and in solid wastes and complete and submit forms that document those transfers and releases.

CAA

The CAA requires that chemical facilities obtain preconstruction and operating permits, primarily for major stationary sources of air pollutants. Regulations under the Clean Air Act Amendments of 1990 require certain facilities to submit permit applications and obtain permits under Title V of that legislation. Such permits establish permit conditions designed to control both point-source and fugitive emissions of hazardous air pollutants. Finally, the act subjects many facilities to industry-specific emissions standards and requires many chemical facilities to evaluate air pollution control alternatives and select and install the best available air pollution control equipment.

CWA

The CWA establishes two programs that regulate discharges of pollutants to the surface water and groundwater of the U.S. First, facilities are required to prepare permit applications and obtain permits to control point-source discharges of toxic pollutants and stormwater runoff. The permits require facilities to monitor discharges and prepare and submit reports that document the results of monitoring. Regulations under the act also establish industry-specific discharge limits for certain chemical facilities. Second, chemical facilities are subject to effluent limits for wastewater that is being discharged to publicly-owned treatment works (POTW), including prohibition of discharges that will adversely affect the operation of the POTW.

SDWA

The SDWA sets forth provisions designed to protect the nation's public drinking-water supplies. Most important to certain members of the chemical industry, the act, which was reauthorized in 1996, requires facilities to submit permit applications and obtain permits to control the underground injection of contaminants. The permits establish general conditions governing design, operation, and monitoring, as well as chemical-specific discharge limits.

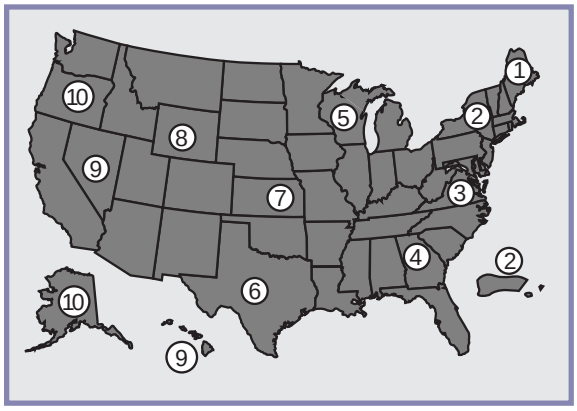
TSCA

Two major environmental programs control the manufacture, distribution, and use of chemicals. TSCA includes provisions that require chemical facilities to submit information to EPA about new and existing chemicals so that EPA can determine whether those chemicals are safe for distribution and use in commerce. TSCA also includes provisions that regulate the management and disposal of certain chemicals, such as polychlorinated biphenyls (PCB) and asbestos.

FIFRA

FIFRA regulates the manufacture, distribution, and use of pesticides. The original FIFRA, passed in 1947, monitored the use and sale of pesticides in the U.S., and was under the purview of the U.S. Department of Agriculture. The Federal Environmental Pesticide Control Act (FEPCA), passed in 1972, mandated that EPA regulate the use and sale of

Figure 2-7.
EPA Regions.



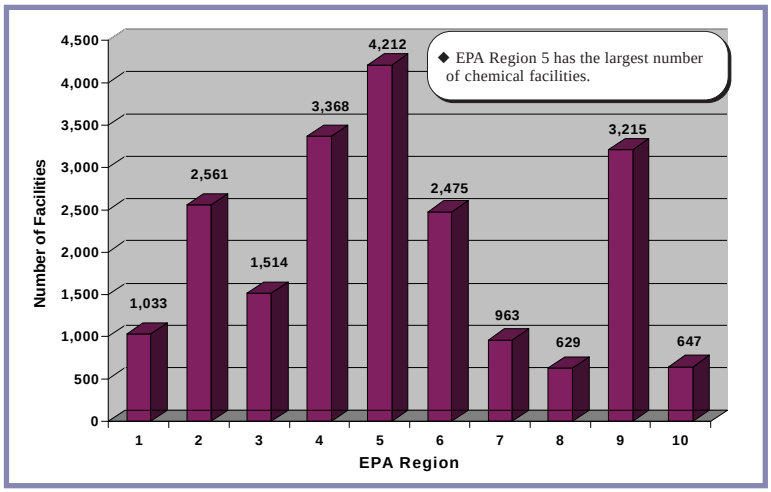
pesticides to protect human health and preserve the environment. Specifically, EPA is authorized to: (1) strengthen the registration process by shifting the burden of proof to the chemical manufacturer, (2) enforce compliance with requirements governing against banned and unregistered products, and (3) promulgate the regulatory framework that had been missing from FIFRA.

2.B. Number of Chemical Facilities

The following sections provide information about the distribution of chemical facilities throughout the U.S. and by EPA region, as well as the number of facilities in each industry sector or SIC code.

2.B.1. Distribution of Chemical Facilities Throughout the U.S. Locations of facilities generally are chosen because they offer access to: (1) raw materials, (2) transportation routes, and (3) end users and consumers. Therefore, most wood and gum chemical facilities are located in Florida, Missouri, and Virginia. Facilities that produce cyclic crudes and intermediates, as well as unclassified organic chemicals, typically are located in Illinois, Louisiana, New Jersey, Ohio, Texas, and West Virginia.[b] Inorganic chemical facilities are concentrated in the heavily industrialized regions of the Great Lakes and the Gulf Coast.[c]

Figure 2-8.
Number of Chemical Facilities by EPA Region, 1995.[f]

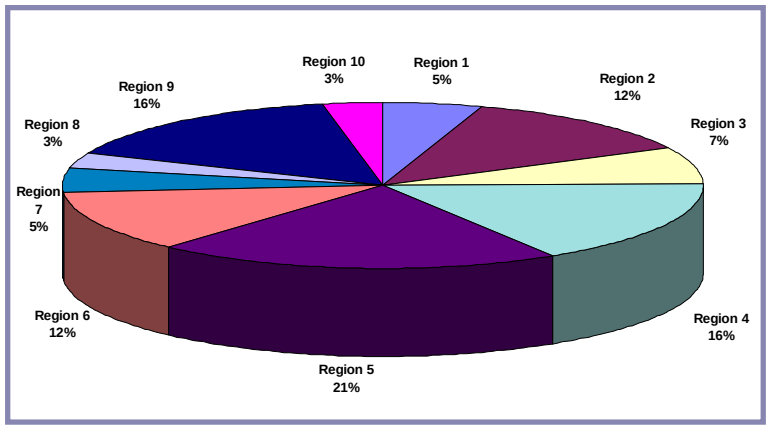


According to 1995 records provided by Dun and Bradstreet Information Services, Inc., [f] which sorts data according to facilities' top five SIC codes, 20,676 facilities declare that chemical processing is one of their primary operations. Figure 2-7 shows the location of EPA regions in the U.S. Figure 2-8 shows the number of such chemical facilities in each EPA region. Figure 2-9 shows the percentage of chemical facilities by EPA region.

Region 5, with the largest number of facilities nationwide, has 4,212 facilities, or 21 percent of all facilities. Regions 4 and 9 follow, with 3,368 and 3,215 facilities, or 16 percent respectively. The regions that have the smallest number of facilities are 7, 10, and 8, with 963, 647, and 629 facilities, or 5 percent, 3 percent, and 3 percent, respectively.

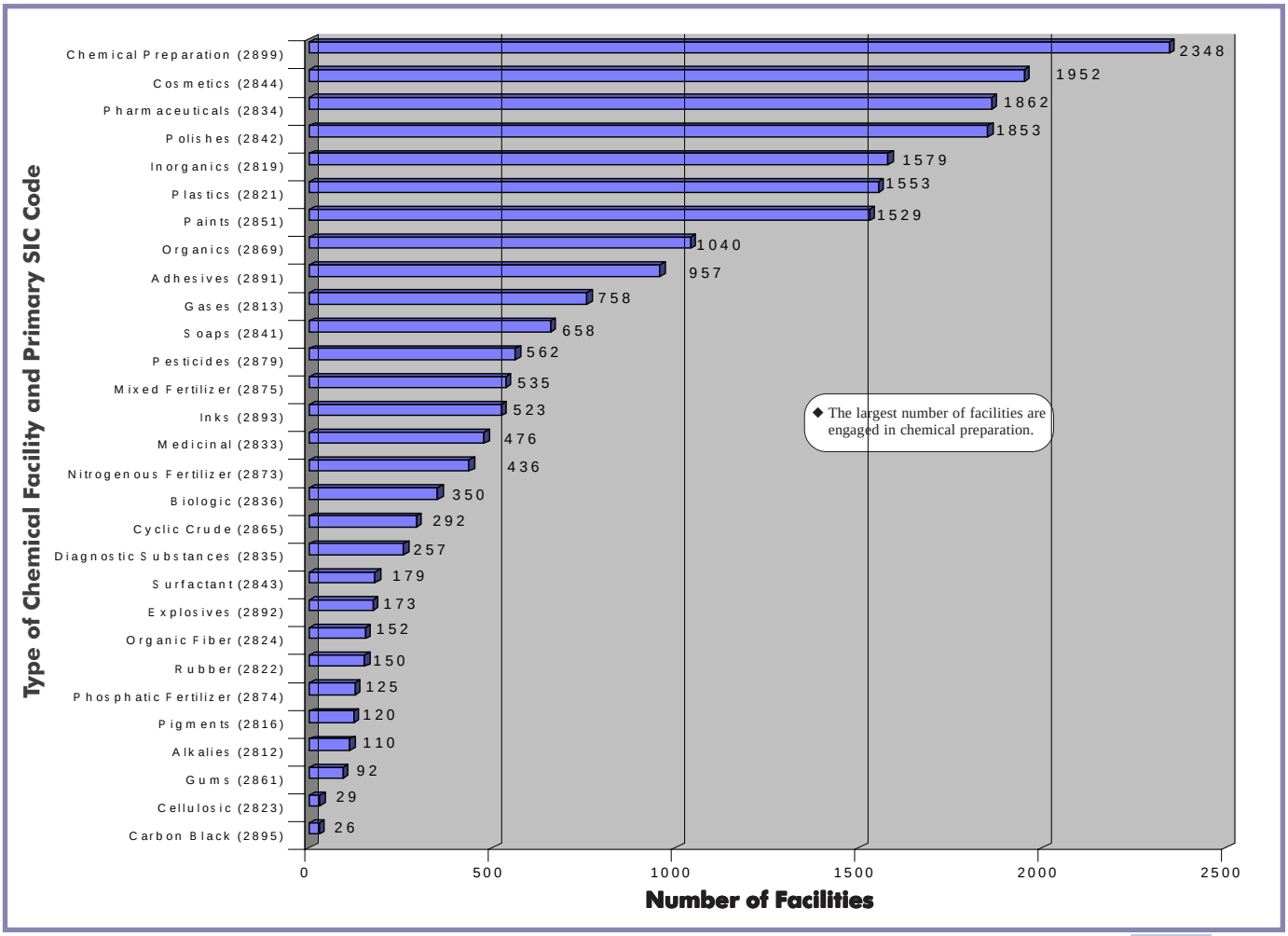
According to 1995 records of the Bureau of the Census, which sorts data according to each facility's primary SIC code, 12,001 facilities declared that chemical processing is their primary operation.

Figure 2-9.
Percentage of Chemical Facilities by EPA Region, 1995.[f]



More than half of all chemical facilities in the U.S. are located in EPA Regions 4, 5, and 9.

Figure 2-10.
National Summary of Chemical Facilities by Primary SIC Code, 1995.[f]



2.B.2. Numbers of Facilities in Each SIC Code. Another important element of information about the chemical industry is the distribution of facilities among the various SIC codes or industry sectors. As Figure 2-10 shows, the largest number of facilities are engaged in:

- Chemical preparation (SIC 2899)
- Cosmetics (SIC 2844)
- Pharmaceuticals (SIC 2834)
- Polishes (SIC 2842)

Together, these four sectors account for 39 percent of all chemical facilities in the nation.

Industry sectors in which the smallest number of facilities nationwide (fewer than 100 facilities per sector) are engaged include:

- Gums (SIC 2861)
- Cellulosics (SIC 2823)
- Carbon black (SIC 2895)

Figure 2-11.
National Summary of Chemical Facilities by Number of Employees, 1995.[f]

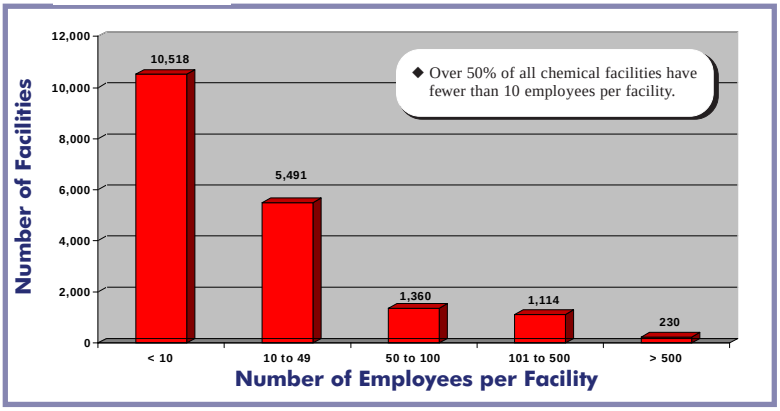
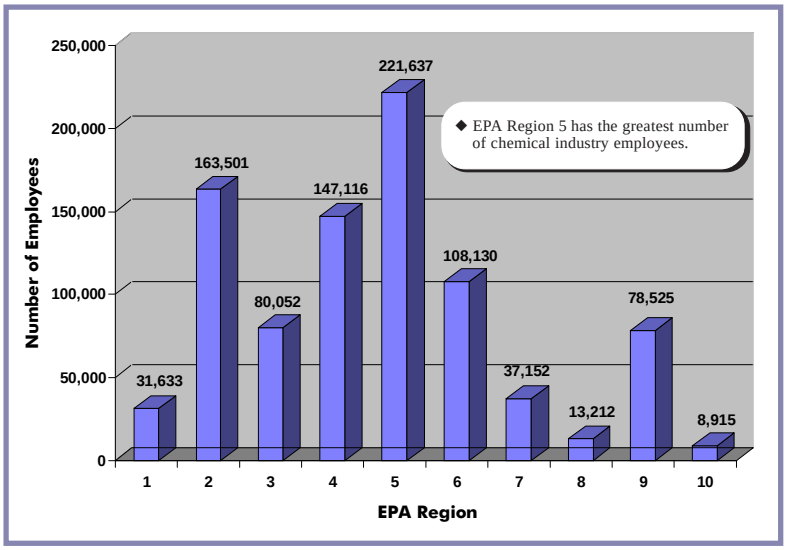


Figure 2-12.
Number of Chemical Industry Employees by EPA Region, 1995.[g]



2.C. Chemical Facilities and Low-Income and Minority Communities

Over the past decade, attention to the effects of environmental pollution on particular segments of U.S. society has increased steadily. At issue specifically is the potential that disproportionately high adverse effects on human health and the environment from pollution may be borne by minority populations and low-income populations. This concern has sparked a movement to ensure environmental justice for all segments of our society.

On February 11, 1994, President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which focused the attention of federal agencies on the environmental and human health conditions of minority communities and low-income communities. The Executive Order directed federal agencies to develop environmental justice strategies by February 11, 1995 that identify and address disproportionately high exposure and adverse effects on human health or the environment that their programs, policies, and activities impose on minority populations and low-income populations.

Early in her tenure as Administrator of EPA, Carol Browner identified the pursuit of environmental justice as a priority of the agency. OECA is dedicated to resolving issues related to environmental justice. To that end, OECA is interested in determining whether chemical facilities are concentrated disproportionately in areas in which low-income populations and minority populations reside.

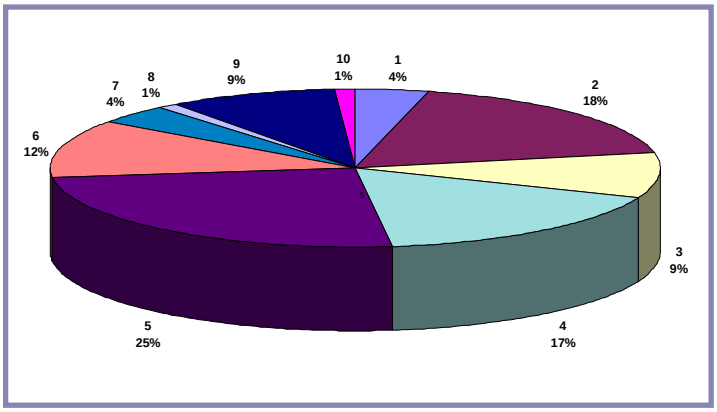
Appendix D identifies counties that have primarily low-income populations and minority populations, as well as the number of chemical facilities in each such county. The designation of low-income or minority population is not established by statistical definition but by a decision based on language developed by the Interagency Working Group on Environmental Justice. For this report, the terms are defined as follows:

- Low-income counties: Counties in which the average income is less than $15,000 per year
- Minority counties: Counties having a nonwhite population equal to or greater than 25 percent

As can be seen from the maps in Appendix D, some facilities are located in minority or low-income counties while some are not. Data at this level of detail does not lend itself to making any specific conclusions.

In response to Executive Order 12898 and EPA's commitment to environmental justice, the Chemical Manufacturers Association (CMA) through their Responsible Care® Initiative developed "A Plant Managers Introduction to Environmental Justice," dated 1995. This document establishes a framework for facility-based activities to proactively address environmental justice issues. In this document, the hallmarks of a strong community outreach program are presented and draw upon CMA's Community Outreach Manual and Community Awareness and Emergency Response (CAER) Core Resource Guide. The CAER Core Resource Guide is a part of CMA's Responsible Care® Initiative (see Responsible Care® Initiative, Page 58).

Figure 2-13.
Percentage of Chemical Industry Employees by EPA Region, 1995.[f]

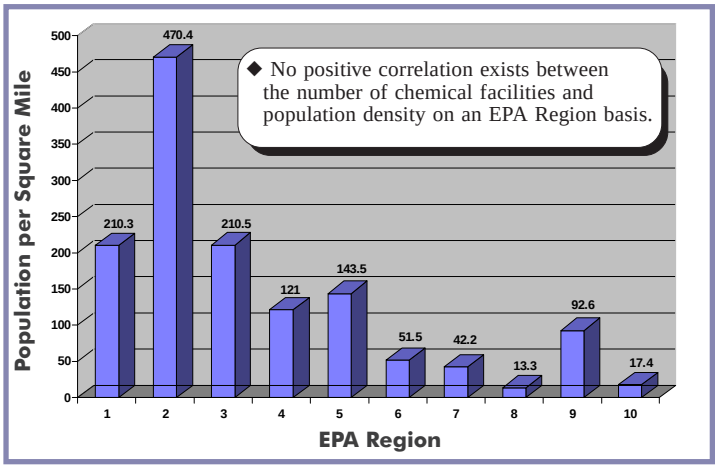


43 percent of all chemical industry employees are located in EPA Regions 2 and 5.

2.D. Facility Employment

The chemical industry is characterized by a predominance of small facilities, generally having fewer than 10 employees.[b,c] Facility employment numbers are important to note, because facilities that have fewer than 10 employees are not required to report releases of toxic chemicals under the reporting requirements for the TRI. Based on available employment data, Figure 2-11 shows more than 56 percent of all facilities have fewer than 10 employees. Therefore, fewer than 44 percent of facilities report releases and transfers of toxic chemicals. This trend is consistent among the EPA regions.

Figure 2-14.
Average Population per Square Mile by EPA Region, 1995.[f]



According to 1995 records of the Bureau of the Census[g], the number of chemical industry employees is greatest in EPA Region 5, where there are approximately 220,000 employees, or 25 percent of all chemical industry employees in the nation (see Table 2-3 and Figures 2-12 and 2-13). EPA Regions 2 and 4 follow, with 163,501 and 147,116 employees, or 18 and 17 percent, respectively, of all chemical industry employees in the nation. The EPA regions in which the fewest number of chemical industry employees are located are 10, 8, and 1, with 8,915, 13,212, and 31,633 employees, or 1 percent, 1 percent, and 4 percent of all chemical industry employees in the nation, respectively. This trend is consistent with the trend in number of facilities per region.

As a comparison of Figures 2-8, 2-9, 2-12, 2-13, and 2-14 shows, there is no correlation between the number of facilities or employees in an EPA region and the EPA region's population per square mile. Region 5, in which the largest number of facilities and employees are found, has the fourth highest population density among the regions.

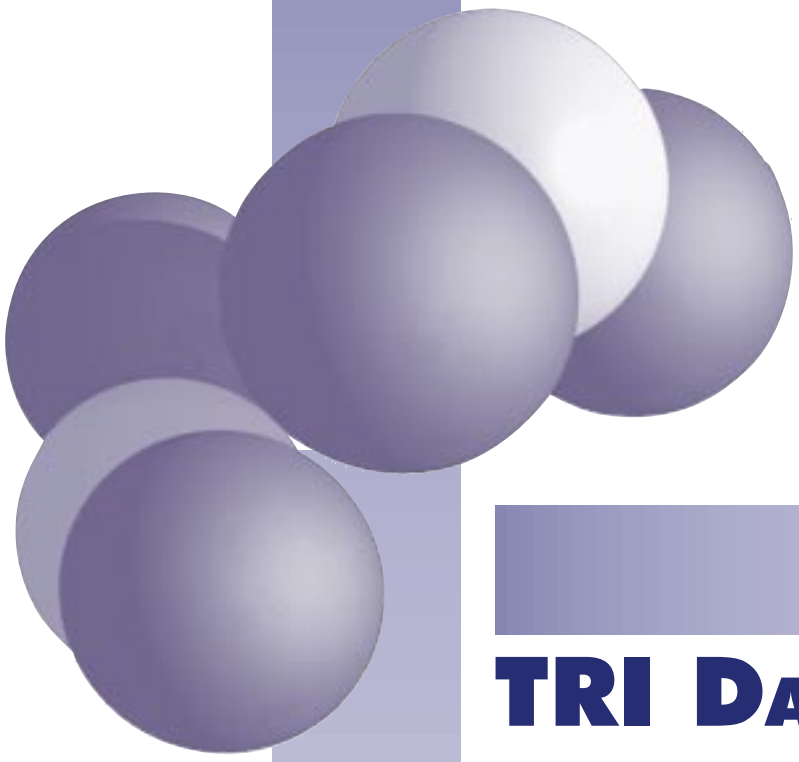
Table 2-3.

State and Regional Information, 1995.[9]

EPA Region	State	Number of Facilities	Population per Sq Mile	Chemical Industry Employees
Region 1	Connecticut	282	678.4	12,353
	Maine	64	39.8	834
	Massachusetts	472	767.6	14,004
	New Hampshire	87	123.7	1,716
	Rhode Island	88	370.3	1,633
	Vermont	40	60.8	1,093
	Region 1 Totals	**1,033**		**31,633**
Region 2	New Jersey	1,300	1042	92,520
	New York	1,261	381	70,981
	Puerto Rico	59	*	*
	Region 2 Totals	**2,620**		**163,501**
Region 3	Delaware	119	340.8	15,021
	Maryland	224	489.2	7,231
	Pennsylvania	925	265.1	38,469
	Virginia	130	156.3	3,999
	Washington, DC	22	9882.6	83
	West Virginia	94	74.5	15,249
	Region 3 Totals	**1,514**		**80,052**
Region 4	Alabama	199	79.6	5,113
	Florida	1,049	239.6	22,585
	Georgia	641	111.9	20,986
	Kentucky	209	92.8	11,326
	Mississippi	129	54.9	4,487
	North Carolina	510	136.1	34,648
	South Carolina	281	115.8	12,513
	Tennessee	350	118.3	35,458
	Region 4 Totals	**3,368**		**147,116**
Region 5	Illinois	1,210	205.6	69,383
	Indiana	410	154.6	25,430
	Michigan	769	163.6	45,574
	Minnesota	422	55.0	12,106
	Ohio	1,030	264.9	61,923
	Wisconsin	371	90.1	7,221
	Region 5 Totals	**4,212**		**221,637**
Region 6	Arkansas	169	45.1	4,285
	Louisiana	336	96.9	16,519
	New Mexico	89	12.5	1,681
	Oklahoma	195	45.8	4,555
	Texas	1,686	64.9	81,090
	Region 6 Totals	**2,475**		**108,130**
Region 7	Iowa	205	49.7	5,547
	Kansas	183	30.3	4,310
	Missouri	485	74.3	24,898
	Nebraska	90	20.5	2,397
	Region 7 Totals	**963**		**37,152**
Region 8	Colorado	279	31.8	3,172
	Montana	55	5.5	404
	North Dakota	31	9.3	230
	South Dakota	39	9.2	342
	Utah	187	21.0	6,801
	Wyoming	38	4.7	2,263
	Region 8 Totals	**629**		**13,212**
Region 9	Arizona	294	32.3	6,271
	California	2,763	190.8	70,620
	Hawaii	44	172.5	527
	Nevada	114	10.9	1,107
	Region 9 Totals	**3,215**		**78,525**
Region 10	Alaska	11	1.0	361
	Idaho	76	12.2	1,247
	Oregon	230	29.6	2,561
	Washington	330	73.1	4,746
	Region 10 Totals	**647**		**8,915**
	Grand Total	**20,676**		**889,873**

* Information not available

In contrast, Region 1, in which only 4 percent of employees and 5 percent of facilities are located, has the third highest population density. Chemical facilities, therefore, are not necessarily located in densely populated areas. However, there are pockets of facilities in areas of high population density, such as those in the Port of New York and New Jersey; Gary, Indiana; and Chicago, Illinois areas. Those areas are the exception, rather than the norm.



TRI Data

3. TRI Data

Reporting under the Toxics Release Inventory (TRI) is mandated under the Emergency Planning and Community Right-to-Know Act (EPCRA), Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986. Manufacturing facilities that have the equivalent of 10 or more full-time employees and manufacture, process, or otherwise use listed chemicals in quantities that meet the established thresholds must report their releases and transfers. Manufacturing facilities are defined as facilities in SIC major groups 20 through 39, which include, among others, chemicals, petroleum refining, primary metals, fabricated metals, paper, plastics, and transportation equipment. Facilities that manufacture or process more than 25,000 pounds or otherwise use more than 10,000 pounds of any listed chemical during the calendar year must submit to EPA a Form R for each listed chemical. Reports for each calendar year are due to EPA by July 1 of the following year.[h]

EPA has created a database to track national trends in releases and transfers, known as the Toxics Release Inventory System (TRIS). The database contains information about releases, transfers, and waste management activities. The database tracks information about the amounts of chemicals released to the environment, transferred, or otherwise managed either on site or off site. The TRI database primarily reflects lawful, permitted releases and transfers. Broad categories tracked in the TRI database are: (1) facility identification, (2) substance identification, (3) environmental releases of TRI chemicals, (4) waste treatment, (5) transfer of waste off site, and (6) source reduction and recycling. The inventory contains data dating from 1987; however, 1988 is considered the inventory's baseline year, because of concerns about the quality of the data submitted by industry during the first year such submittals were required. Transfers for treatment and disposal have been reported since 1987. Transfers for recycling and energy recovery have been reported since 1991.

Beginning with reporting year 1994, federal facilities are required to report to TRI. For reporting purposes, TRI designates 118 chemicals as carcinogens on the basis of criteria set forth in the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standards. Some of those chemicals, such as benzene and asbestos, are known to cause cancer in humans. Others are suspected to cause cancer in humans because they have been shown to cause cancer in laboratory animals. For more information regarding chemicals tracked in TRI, please visit EPA's website at *http://www.epa.gov/opptintr/chemfact/* or the Agency for Toxic Substances and Disease Registry website at *http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html*.

A final rule adding 286 chemicals to the TRI was published on November 30, 1994. The first reports that included those chemicals were due August 1, 1996. Other industry groups were added in 1997. Currently under consideration is the future expansion of the reporting requirements to include accounting for use of materials.

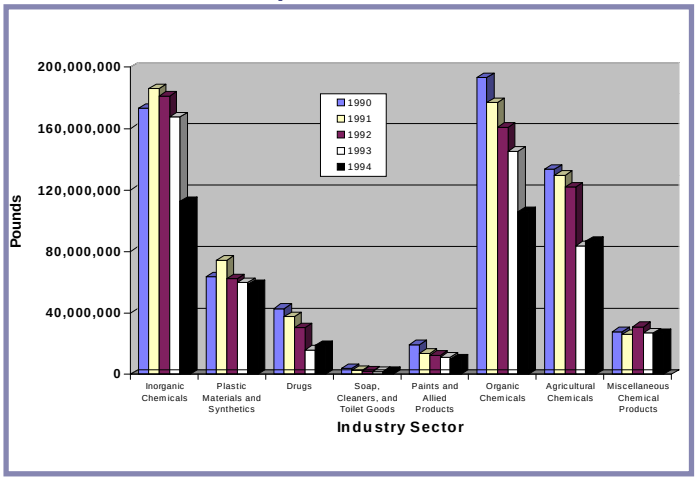
It is important to note the following data limitations:

- TRI data should be adjusted for production to obtain a more accurate accounting of industry activities.
- The congressional Office of Technology Assessment estimates that releases reported to TRI represent only five percent of all chemical releases.
- Changes in reporting thresholds and TRI obligations occurred throughout the baseline period.
- The database contains information about only a portion of the toxic chemicals released nationwide, because facilities that have fewer than 10 full-time employees and that do not meet or exceed threshold amounts established for the various chemicals are not required to file TRI reports.
- Facilities not included in SIC major groups 20 to 39 were not required to report to TRI.

- Not all toxic chemicals are listed under the TRI.
- The TRI requires the reporting of estimated data and does not mandate that facilities monitor their releases.
- TRI data reflect releases and transfers of chemicals, not exposure of the public to those chemicals.
- Since 1987, EPA has deleted a number of chemicals from the TRI reporting list, added other chemicals, and modified the reporting requirements for still others.
- EPA does not have a national database that tracks indirect discharges to surface water. That information exists at the local level only. Therefore, data on surface water discharges includes only direct discharges.
- Data were extracted from the EPA TRI Public Data Releases for all TRI industry trends.
- Data were extracted from the EPA TRI Data CD-ROM, 1990 to 1994, for all industries that reported under 2800 SIC code.

The following sections describe trends from 1990 to 1994, including national trends for all industries and trends within the chemical industry. National trends for all industries are provided to aid the reader in placing the chemical industry in the context of all releases and transfers of toxic chemicals reported nationwide under the TRI.

Figure 3-1.
Total Release Trends, 1990 to 1994.



3.A. Chemical Industry Trends (1990 to 1994)

Figure 3-1 shows the trend in total releases for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in total releases reportable under TRI during this period, except for slight increases in some sectors for the period between 1990 and 1991, attributable at least in part, to expansion of reporting requirements for the chemical industry. However, the data from 1991 to 1994 show an overall decrease of 43.5 percent in total releases reportable under TRI. During that time, production increased by 8.6 percent.[d]

Figure 3-2.
Carcinogenic Release Trends for Chemical Industry, 1990 to 1994.

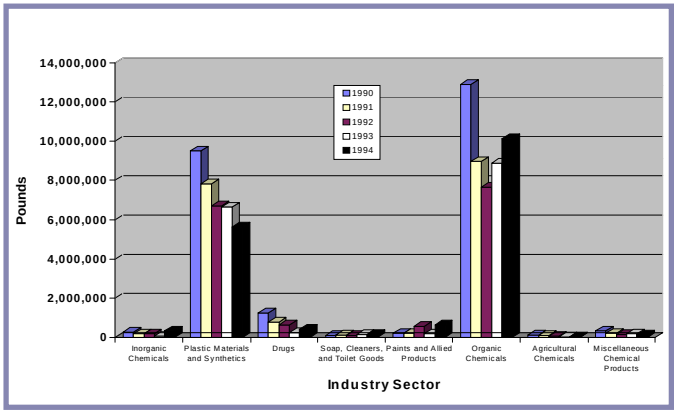


Figure 3-3.
Transfer Trends for Chemical Industry, 1990 to 1994.

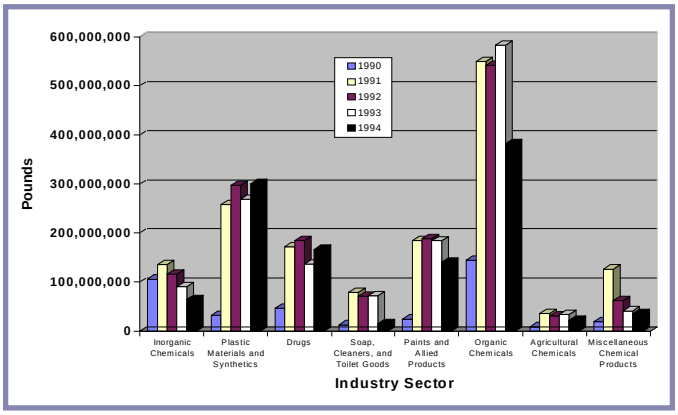


Figure 3-2 shows the trend in releases of carcinogenic chemicals for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in such releases, except for a slight increase in 1994 in some sectors, again a circumstance that may be attributable to a change in reporting requirements for the chemical industry. However, an overall decrease of 15.9 percent in total releases of carcinogens reportable to TRI occurred from 1990 to 1994.

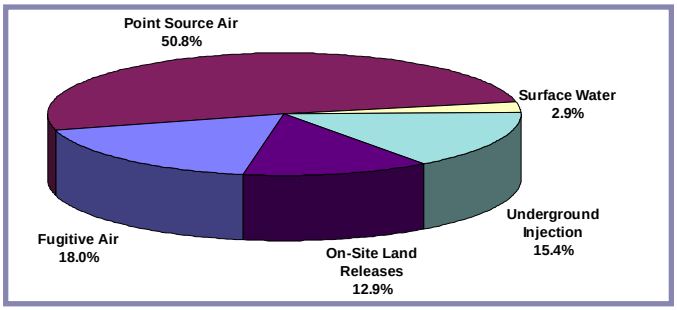
Figure 3-3 shows the trend in total transfers for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in total transfers of chemicals reportable under TRI in most sectors, during that period, except for the period between 1990 and 1991, a circumstance that can be attributed to changes in requirements for reporting of transfers for recycling and energy recovery. However, an overall decrease of 13.5 percent in total transfers reportable to TRI occurred from 1991 to 1994.

A comparison among the chemical industry sectors shows that, in 1990, the organic chemical sector reported the greatest number of transfers reportable to TRI, followed by the inorganic chemical, drug, plastic material, and synthetic sectors, respectively. The organic chemical sector reported the largest quantity of toxic chemicals released, followed by inorganic chemicals, agricultural chemicals, and plastic materials and synthetics, respectively. Releases of carcinogenic chemicals were highest for the organic chemicals and plastic materials and synthetics sectors.

In 1991 and 1992, the organic chemicals sector again reported the largest number of transfers reportable to TRI, followed by the plastic materials and synthetics sector. The inorganic chemicals sector reported the largest quantity of toxic chemicals released, followed by the organic chemicals and agricultural chemicals sector, respectively. Releases of carcinogenic chemicals decreased from the levels reported in 1990, but the same sectors reported the largest quantities of carcinogenic chemicals released.

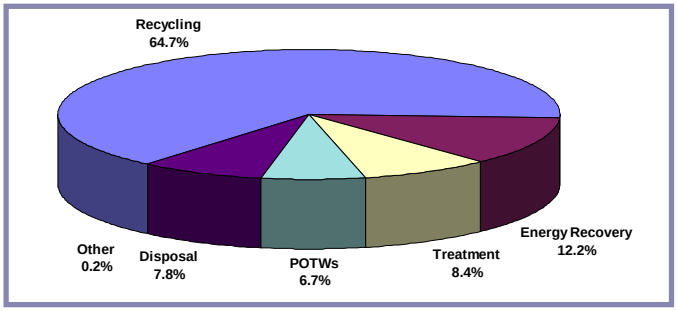
In 1993 and 1994, the organic chemical sector led the other sectors in the transfer of TRI chemicals, followed by the plastic materials and synthetics sector. The inorganic chemicals sector reported the greatest number of pounds released, followed by the organic chemicals and agricultural sectors, respectively. Releases of carcinogenic chemicals decreased from the levels reported in 1990, but the same sectors reported the largest quantities of carcinogenic chemicals released.

Figure 3-4.
Distribution of TRI Releases for All Industries, 1994.[h]



Half of all 1994 TRI releases were those to air from point sources.

Figure 3-5.
Distribution of TRI Transfers for All Industries, 1994.[h]



Over 64 percent of all 1994 TRI transfers were attributed to recycling.

3.B. TRI Data for All Industries (1994)

In 1994, 22,744 facilities filed 75,332 TRI reporting forms, or an average of 3.3 forms per facility. The facilities reported releasing approximately 2.26 billion pounds of listed chemicals into the environment.[h] Table 3-1 and Figure 3-4 show the total releases to various media.

Facilities sent almost 3.8 billion pounds of listed chemicals to off-site locations for treatment, disposal, energy recovery, or recycling in 1994. Table 3-2 and Figure 3-5 show the total transfers by source.

Table 3-1.[h]

Total Quantities of TRI Releases for All Industries, 1994.

Source	Pounds	Percent
Fugitive Air	407,515,304	18.0
Point Source Air	1,148,492,781	50.8
Surface Water	66,083,288	2.9
Underground Injection	348,968,226	15.4
On-Site Land Releases	289,151,126	12.9

Figure 3-6.
Industry Categories that Reported the Largest Quantities of On-Site TRI Releases for All Industries, 1994.[h]

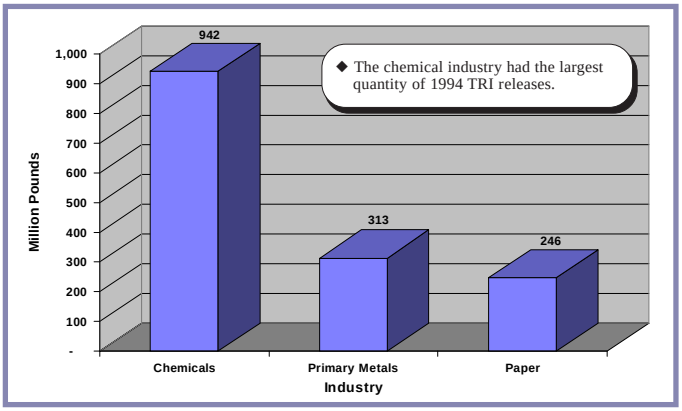


Table 3-2.[h]

Total Quantities of TRI Transfers for All Industries, 1994.

Source	Pounds	Percent
Recycling	2,456,120,948	64.7
Energy Recovery	464,206,483	12.2
Treatment	318,810,333	8.4
POTWs	254,688,836	6.7
Disposal	297,600,462	7.8
Other	3,602,423	0.2

Figure 3-7.
Industry Categories that Reported the Largest Quantities of TRI Transfers, 1994.[h]

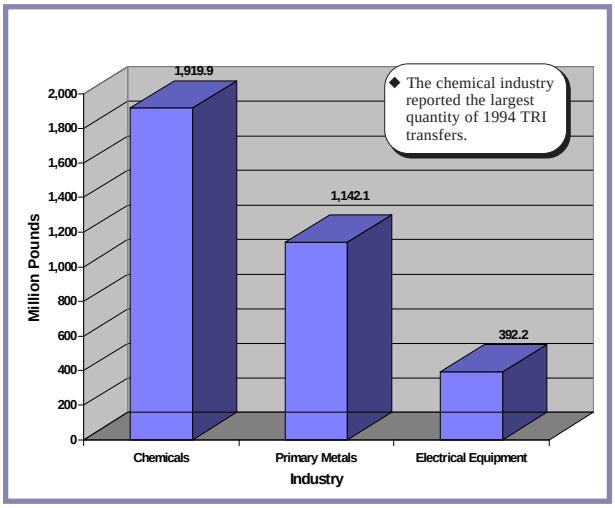


Figure 3-6 shows the industry categories that reported the largest quantities of on-site TRI releases in 1994. The chemical industry had the largest quantity of releases (942 million pounds), followed by the primary metals (313 million pounds) and paper (246 million pounds) industries.

It is important to note that, while the 50 facilities reporting the largest total amounts of listed TRI chemicals released represent just 0.2 percent of all facilities reporting to the TRI, they accounted for 26.1 percent of all releases reported to TRI in 1994. The facilities submitted an average of 14.9 reports each. More than one-half (31) of those facilities were chemical facilities.[h]

Figure 3-7 shows the industry categories in which facilities reported the largest quantities of transfers of TRI chemicals. The chemical industry reported the largest quantities transferred (1,920 million pounds), followed by the primary metals (1,142 million pounds) and electrical equipment (392.2 million pounds) industries. However, most of the transfers reported by primary metals and electrical equipment industries were transfers to recycling (79.4 percent and 90.9 percent, respectively). In contrast, only 15.6 percent of the chemical industry's transfers were to recycling, although the chemical industry accounted for 75.3 percent of all transfers to energy recovery.

Figure 3-8 shows the industry categories in which facilities reported the largest quantities of releases of carcinogenic chemicals as identified under TRI reporting requirements. The chemical industry reported the largest quantity of releases (54.8 million pounds), followed by the plastics industry (43.5 million pounds), and paper (18.2 million pounds).

Figure 3-8.
Industry Categories that Reported the Largest Quantities of Releases of Carcinogens, 1994.[h]

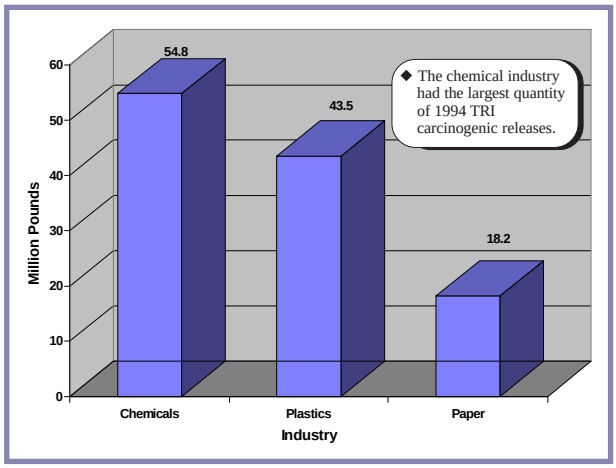


Table 3-3.

Total Quantities of TRI Releases, 1994.[h]

SIC Code	Industry	Number of Facilities	Number of Forms	Total Air Emissions (Pounds)	Surface Water Discharges (Pounds)	Underground Injection (Pounds)	Releases to Land (Pounds)	Total Releases (Pounds)
281	Inorganic Chemicals	366	1,377	21,534,987	1,215,939	72,349,069	17,467,785	112,567,780
282	Plastic Materials and Synthetics	323	1,956	57,534,842	935,114	84,050	65,397	58,619,403
283	Drugs	175	601	10,966,354	912,144	6,826,250	175,154	18,879,902
284	Soaps, Cleaners, and Toilet Goods	233	1,070	1,735,522	2,737	15,431	35,514	1,789,204
285	Paints and Allied Products	536	3,123	9,828,250	3,828	0	13,909	9,845,987
286	Organic Chemicals	384	3,111	50,841,160	1,009,047	52,661,370	1,149,816	105,661,393
287	Agricultural Chemicals	163	1,039	57,536,662	5,576,521	2,391,288	21,218,843	86,723,314
289	Miscellaneous Chemicals	527	2,245	25,897,822	243,027	0	255,621	26,396,470
*	Multiple SIC with 2800	1,024	8,396	232,011,012	32,682,782	201,036,145	55,852,811	521,582,750
	TOTAL	**3,731**	**22,918**	**467,886,611**	**42,581,139**	**335,363,603**	**96,234,850**	**942,066,203**

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

3.C. TRI Data for the Chemical Industry (1994)

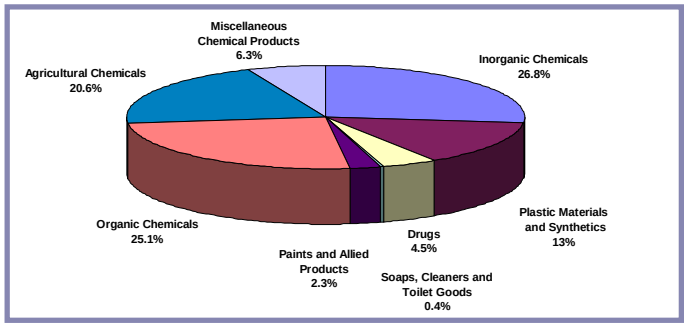
In 1994, facilities in the chemical industry submitted 22,918 TRI forms, or 30.4 percent of all forms submitted to the TRI, filing an average of 6.2 forms per facility (see Table 3-3). Chemical facilities reported an average of 255,372 pounds released, second only to primary metals. The chemical industry accounted for almost all reported underground injection of waste (96.0 percent) and a majority of surface-water discharges (64.4 percent).

Table 3-3 and Figure 3-9 break down the total quantity of TRI releases for the chemical industry. The inorganic chemicals segment of the industry reported the largest quantity of releases (27 percent), followed by the organic chemicals (25 percent) and agricultural chemicals (21 percent) segments.

Figure 3-10 shows the breakdown of air emissions for the chemical industry. The plastic materials and synthetics segments of the industry reported the largest quantity of air releases (25 percent), followed by the agricultural chemicals (24 percent) and organic chemicals (22 percent) segments.

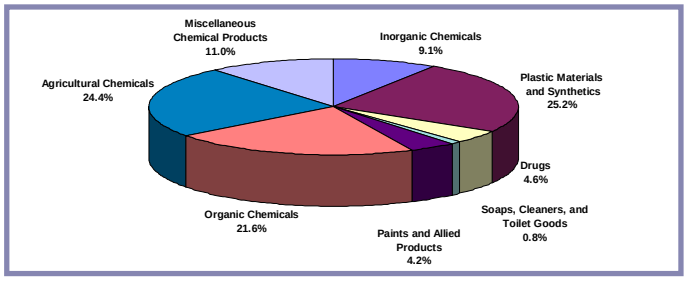
Figure 3-11 breaks down the total surface-water discharges for the chemical industry. The agricultural chemicals segment of the industry reported the largest quantity of surface-water

Figure 3-9.
Total TRI Releases for Chemical Industry, 1994.[h]



The inorganic chemicals segment reported the largest quantity of releases.

Figure 3-10.
Total Air Emissions for Chemical Industry, 1994.[h]



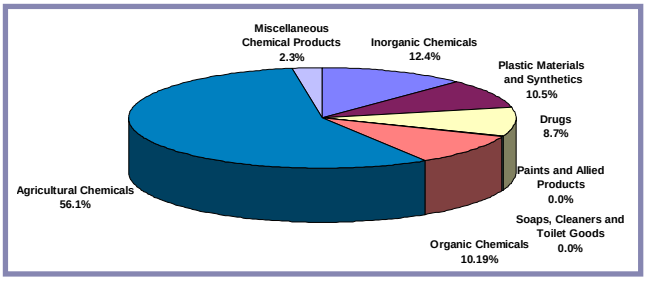
The plastics and synthetics segment reported the largest quantity of air releases.

discharges (56 percent), followed by the inorganic chemicals (12 percent) and the plastic materials and synthetics (11 percent) segments.

Figure 3-12 breaks down the total releases by underground injection for the chemical industry. The inorganic chemicals segment of the industry reported the largest quantity of underground injection releases (66 percent), followed by the organic chemicals (29 percent) and drug (4 percent) segments.

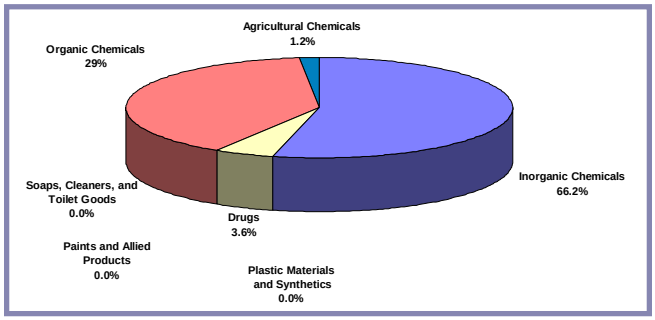
Figure 3-13 breaks down the total releases to land for the chemical industry. The agricultural chemicals segment of the industry reported the largest quantity of releases to land (53 percent), followed by the inorganic chemicals (43 percent) and organic chemicals (3 percent) segments.

**Figure 3-11.
Surface-Water Discharges for Chemical Industry, 1994.[h]**



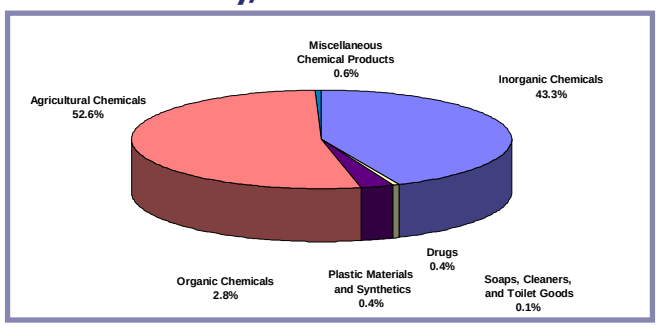
The agricultural chemicals segment reported the largest surface-water discharges.

**Figure 3-12.
Underground Injection Releases for Chemical Industry, 1994.[h]**



The inorganic chemicals segment reported the largest quantity of underground injection releases.

**Figure 3-13.
Releases to Land for Chemical Industry, 1994.[h]**



The agricultural chemicals segment reported the largest quantity of releases to land.

3.D. National Trends for All Industries (1990 to 1994)

The number of all facilities reporting to TRI increased slightly between 1990 and 1991, but the general trend is a steady decline in the number of facilities reporting to TRI (see Table 3-4). Following that trend, the number of TRI reports submitted declined gradually from 1990 to 1994.

Reported releases of listed chemicals decreased by 500 million pounds between 1993 and 1994. That figure represents a decline of nearly 18 percent. Reports of releases of listed chemicals decreased by 13 percent between 1992 and 1993, at more than double the rate of decline between 1991 and 1992. The quantity of TRI chemicals released decreased from 3.6 billion pounds in 1990 to 2.3 billion pounds in 1994, a decrease of 36.1 percent.

Amounts of carcinogenic chemicals released dropped from 236 million pounds in 1990 to 177 million pounds in 1994, a 25 percent decrease. The quantity of TRI chemicals transferred increased from 3.9 billion pounds in 1991 to 4.8 billion pounds in 1993. The increase of 23 percent is primarily the result of increased transfers for recycling. Reports of TRI chemicals transferred show a decrease between 1993 and 1994, from 4.8 billion pounds, to 3.8 billion pounds, a 21 percent decrease. Table 3-5 summarizes national TRI trends for all industries.

3.E. National Trends for the Chemical Industry (1990 to 1994)

Throughout the period from 1990 to 1994, the chemical industry as a whole generally reported the largest quantities of carcinogens released, followed by the plastics products (SIC 3000) and transportation equipment (SIC 3700) industries. The chemical industry consistently has reported the largest quantities of total pounds released, followed by the primary metals and paper industries. In addition, the chemical industry has reported the largest quantities transferred, followed by the primary metals and paper industries.

Table 3-4.

TRI Trends For All Industries, 1990 to 1994.[i]

Year	1990	1991	1992	1993	1994
Number of Facilities Reporting to TRI	23,638	23,719	23,630	23,321	22,744
Number of Forms Submitted to TRI	83,387	82,293	81,016	79,987	75,332
Average Number of Forms per Facility	3.5	3.5	3.4	3.4	3.3
Total Pounds Released	3.6 billion	3.4 billion	3.2 billion	2.8 billion	2.3 billion
Total Pounds of Carcinogens Released	236 million[1]	212 million	197 million	180 million	177 million
Total Pounds Transferred	1.3 billion[2]	3.9 billion	4.4 billion	4.8 billion	3.8 billion

[1] Does not include releases to land.
[2] Transfers include only those to POTWs and off-site locations. Transfers to energy recovery and recycling were not reported.

It is important to note that, for the 1990 to 1994 period, the chemical industry as a whole reported more than half the total quantity of production-related waste reported by all industries and more than four times the amount reported by the second-ranked industry, primary metals. Table 3-6 summarizes national TRI trends for the chemical industry.

3.F. Five Chemicals Released in the Greatest Quantities by the Chemical Industry (1990 to 1994)

From 1990 to 1993, ammonia was the TRI chemical released into the environment in the largest quantity (see Table 3-7). However, the amount reported decreased steadily from approximately 404.6 million pounds in 1990 to 126.7 million pounds in 1994. Those figures represent a decrease of 277.9 million pounds, or 68.7 percent. The TRI chemicals released in the second, third, fourth, and fifth largest quantities show a generally downward trend in the releases of phosphoric acid, sulfuric acid, and methanol. The reporting requirements for ammonia and sulfuric acid were revised during that period.

Releases of carcinogenic chemicals from 1990 to 1994 are shown in Table 3-8. Styrene is the TRI carcinogenic chemical released to the environment in the largest quantity, followed by acetonitrile, and formaldehyde.

The TRI chemicals transferred in the largest quantities from 1990 to 1994 are not the same chemicals from one year to the next (see Table 3-9). However, the TRI chemical transferred in the greatest quantity shows a trend towards accounting for more than half of all TRI transfers.

In 1990, the top five chemicals released accounted for 56.8 percent of all chemicals released. This percentage rose to 59.6 and 63.3 percent in 1991 and 1992, respectively. In 1993, it decreased to 60.9 percent and then to 53.2 percent in 1994.

Table 3-5.

TRI Trends for All Industries, Summary of 1990 to 1994[h]

TRI Category	Trend
Chemicals released	36.1 percent decrease
Carcinogenic chemicals released	25 percent decrease
Chemicals transferred	292 percent increase

Table 3-6.

TRI Trends for Chemical Industry, Summary of 1990 to 1994[i]

TRI Category	Trend
Chemicals released	43.5 percent decrease
Carcinogenic chemicals released	15.9 percent decrease
Chemicals transferred	13.5 percent decrease

Table 3-7.

Top Five Chemicals Released in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Ammonia	404,608,062	24.2
	1991	Ammonia	366,126,752	22.7
	1992	Ammonia	365,374,868	22.9
	1993	Ammonia	255,719,521	18.9
	1994	Hydrochloric acid	150,824,955	16.0
Second	1990	Hydrochloric acid	188,082,470	11.3
	1991	Hydrochloric acid	216,287,343	13.4
	1992	Hydrochloric acid	217,970,514	13.7
	1993	Phosphoric acid	211,252,927	15.6
	1994	Ammonia	126,778,226	13.5
Third	1990	Phosphoric acid	136,784,943	8.2
	1991	Phosphoric acid	161,636,911	10.0
	1992	Phosphoric acid	205,183,078	12.9
	1993	Hydrochloric acid	151,586,039	11.2
	1994	Phosphoric acid	77,649,114	8.2
Fourth	1990	Sulfuric acid	121,472,207	7.3
	1991	Sulfuric acid	122,521,308	7.6
	1992	Sulfuric acid	122,423,015	7.7
	1993	Sulfuric acid	124,690,389	9.2
	1994	Methanol	74,561,119	7.9
Fifth	1990	Methanol	96,488,265	5.8
	1991	Methanol	95,135,510	5.9
	1992	Methanol	97,452,887	6.1
	1993	Carbon Disulfide	81,284,733	6.0
	1994	Carbon Disulfide	71,795,989	7.6

Table 3-8.

Top Five Carcinogenic Chemicals Released in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Styrene	14,371,179	37.1
	1991	Styrene	21,573,455	21.6
	1992	Styrene	23,853,716	28.1
	1993	Acetonitrile	23,349,289	22.5
	1994	Acetonitrile	22,581,548	20.6
Second	1990	Formaldehyde	7,558,513	19.5
	1991	Acetonitrile	20,246,192	20.3
	1992	Acetonitrile	19,791,225	23.3
	1993	Styrene	16,457,053	15.9
	1994	Styrene	18,850,062	17.2
Third	1990	Acetonitrile	3,953,185	10.2
	1991	Diethyl Sulfate	14,276,861	14.3
	1992	Formaldehyde	5,867,222	6.9
	1993	1,3-Butadiene	15,167,497	14.6
	1994	1,3-Butadiene	15,801,079	14.4
Fourth	1990	Diaminotoluene (Mixed Isomers)	2,416,480	6.2
	1991	Formaldehyde	6,329,773	6.3
	1992	Di(2-Ethylyexyl)	5,778,997	6.8
	1993	Diethyl Sulfate	10,744,465	10.4
	1994	Diethyl Sulfate	12,368,251	11.3
Fifth	1990	Asbestos (Friable)	2,084,026	5.4
	1991	Di(2-Ethylyexyl) Phthalate	5,708,647	5.7
	1992	1,3-Butadiene	4,965,581	5.9
	1993	Di(2-Ethylyexyl) Phthalate (DEHP)	5,357,730	5.2
	1994	Di(2-Ethylyexyl) Phthalate (DEHP)	5,728,831	5.23.5

Table 3-9.

Top Five Chemicals Transferred in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Methanol	153,139,319	19.0
	1991	Sulfuric acid	352,611,719	15.9
	1992	Sulfuric acid	369,047,778	16.4
	1993	Sulfuric acid	360,165,712	16.4
	1994	Methanol	267,397,243	13.9
Second	1990	Ammonia	71,660,866	8.9
	1991	Methanol	278,678,189	12.6
	1992	Methanol	284,529,890	12.6
	1993	Methanol	268,881,669	12.3
	1994	Ethylene Glycol	237,064,296	12.3
Third	1990	Hydrochloric acid	70,729,618	8.8
	1991	Ethylene Glycol	196,755,104	8.9
	1992	Ethylene Glycol	215,926,458	9.6
	1993	Ethylene Glycol	209,156,217	9.5
	1994	Toluene	174,790,497	9.1
Fourth	1990	Toluene	46,593,137	5.8
	1991	Xylene (Mixed Isomers)	166,345,343	7.5
	1992	Toluene	169,273,165	7.5
	1993	Toluene	182,327,913	8.3
	1994	Xylene (Mixed Isomers)	160,010,711	8.3
Fifth	1990	Sulfuric acid	43,583,277	5.4
	1991	Toluene	164,122,956	7.4
	1992	Xylene (Mixed Isomers)	129,305,610	5.7
	1993	Xylene (Mixed Isomers)	140,004,661	6.4
	1994	Hydrochloric acid	85,067,427	4.4

Compliance Monitoring Activities and Violation Trends by Environmental Statute

4. Compliance Monitoring Activities and Violation Trends by Environmental Statute

This section provides information about compliance monitoring activities and violation trends for the chemical industry under the CWA, CAA, RCRA, TSCA, FIFRA, and EPCRA. This baseline report focuses on the period from 1990 to 1994, at the conclusion of which OECA was established and EPA adopted a sector-based approach to compliance and enforcement. The data presented below have been compiled from the EPA IDEA database. The following limitations associated with IDEA data are pertinent to this report:

- The standard method of retrieving data on chemical facilities is to sort the data by 2800 SIC code series. However, only one-third of all facility records have SIC codes. Therefore, to retrieve all records related to chemical facilities, a modified method was used that consisted of: (1) running an initial sort, using SIC codes; (2) searching records, using key words, such as "chemical"; and (3) pulling records of known chemical facilities by facility or company name. Therefore, IDEA data queries do not capture all of the data elements in each program.
- The IDEA database retrieves and unites information from numerous databases, including the RCRA Information System (RCRIS), the CERCLA Information System (CERCLIS), the National Compliance Database (NCDB), the Aerometric Information Retrieval System (AIRS), and the Permit Compliance System (PCS). The IDEA database reflects the current data quality and quantity of those agency systems. Data gaps within the IDEA database are difficult to quantify and are beyond the scope of this report.
- The IDEA database does not capture differences in programmatic activities (for example, compliance monitoring activities performed under TSCA differ from those performed under the CAA). All statutory programs were subject to changes during reauthorization and subsequent rulemaking efforts. Regions and states vary somewhat in how they implement programs.

It is important to note the following:

- The data on compliance monitoring activities and violations are sorted by fiscal, not calendar, year. Therefore, each year starts on October 1 and ends on the following September 30.
- There is no correction in the data for repeated compliance monitoring activities at a single facility or multiple violations at a single facility.
- The report does not distinguish among the magnitude of violations; it merely presents the raw numbers of violations, which may be misleading to the reader.
- It has been assumed that there has been no significant increase or decrease over time in the number of chemical facilities regulated under each of the statutes listed above or in the number of applicable compliance obligations. It should be recognized that none of these factors was static during the trend period and that those factors might have had an effect on a change in the number of violations.
- Databases for tracking compliance with several environmental statutes lack complete data on compliance monitoring activities and violations.

To facilitate accurate comparison, the following subsections present numbers of compliance monitoring activities and trends in violations by environmental statute. Comparisons among environmental statutes have not been made because of differences

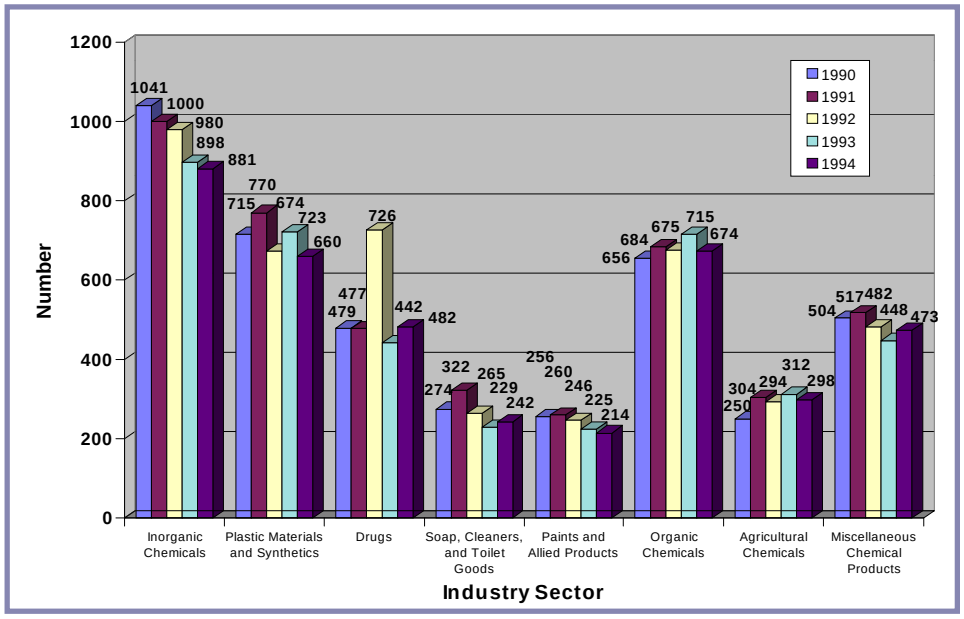
in inception dates of the statutes and database tracking methods. The tables in Appendix F are intended to give the reader an overview of enforcement and compliance history by four-digit SIC code. Chemical facilities that have been identified, but for which no four-digit SIC code is recorded in the database, are excluded from Appendix F but are included in the overall industry analysis presented in sections IV and V of this report. Further, Appendix F does not include every compliance monitoring activity–for example, it does not track review of self-monitoring reporting. The totals of compliance monitoring activities and violations shown in Section IV on a three-digit SIC code therefore are higher than the totals shown in Appendix F for specific statutes in individual years. However, the relative differences among the three-digit SIC codes reported in Section IV are approximately the same as the relative differences among four-digit SIC codes, as shown in Appendix F.

4.A. Definition of Terms: Compliance Monitoring and Violations

The following subsections provide brief definitions of the terms "compliance monitoring" and "violation" as well as the method used to present the data.

4.A.1. Compliance Monitoring. EPA and states (under cooperative agreements or their delegated programs) perform compliance monitoring activities to determine whether facilities are in compliance with regulatory requirements. Compliance monitoring can take any of several forms, which include a simple review of records on site, review of self-monitoring reports, compliance monitoring of operations and equipment, sampling of waste or environmental media, or compliance monitoring to determine progress in correcting deficiencies or performing corrective action. Compliance monitoring is performed under a variety of regulations and statutory authorities, including the CWA, CAA, RCRA, TSCA, FIFRA, and EPCRA. The following subsections provide data on the number of compliance monitoring activities for the five-year period from 1990 through 1994 and the change in the number of compliance monitoring activities during that time period.

Figure 4-1.
Compliance Monitoring Activities Trends by Three-Digit SIC Code, 1990 to 1994.[j]

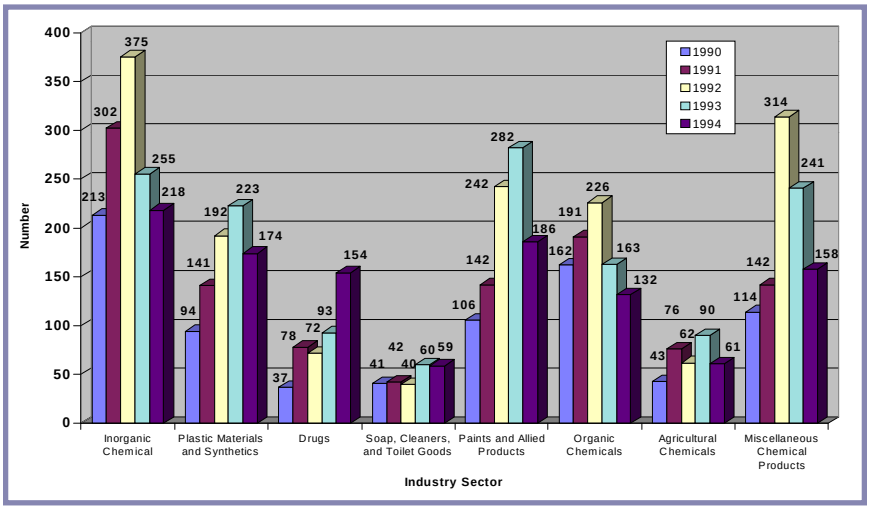


IV.A.2. Violations. Violations are identified when compliance monitoring is conducted by a regulator or identified by self-reporting under a Discharge Monitoring Report (DMR) for the CWA, for example. Numbers reported include violations of orders administered under a statute, as well as violations of laws or regulations. All violations are included in the report, not just those above a certain threshold. The report does not distinguish among the magnitude of violations, for instance, a record-keeping violation versus a toxic spill. The following subsections provide data on the number of violations for the five-year period from 1990 to 1994 and the change in the number of violations over that time period.

4.B. Chemical Industry Sector Multi-Media Compliance Trends

From 1990 to 1994, the inorganic chemicals sector was subjected to compliance monitoring activities more often than any other chemical industry sector (see Figure 4-1), followed by the organic chemicals and plastic materials and synthetics sectors. During that period, compliance monitoring activities of the inorganic chemicals sector identified the largest number of violations (see Figure 4-2); however, the second and third largest number of violations occurred in the miscellaneous chemical products and the paints and allied products sectors, respectively.

Figure 4-2.
Violation Trends by Three-Digit SIC Code, 1990 to 1994.[j]



The number of compliance monitoring activities performed and violations identified at chemical facilities based on applicable statutes and regulations showed a decreasing trend in many sectors from 1990 to 1994, following the national trend towards decreases in the number of compliance monitoring activities.

4.C. Clean Water Act (CWA)

Table 4-1 presents compliance monitoring activities and violations for 1990 to 1994. Over that period, 9,466 compliance monitoring activities were performed under the CWA, with 1,371 violations identified. The average numbers of compliance monitoring activities and violations annually over the five-year period are 1,893 and 274, respectively.

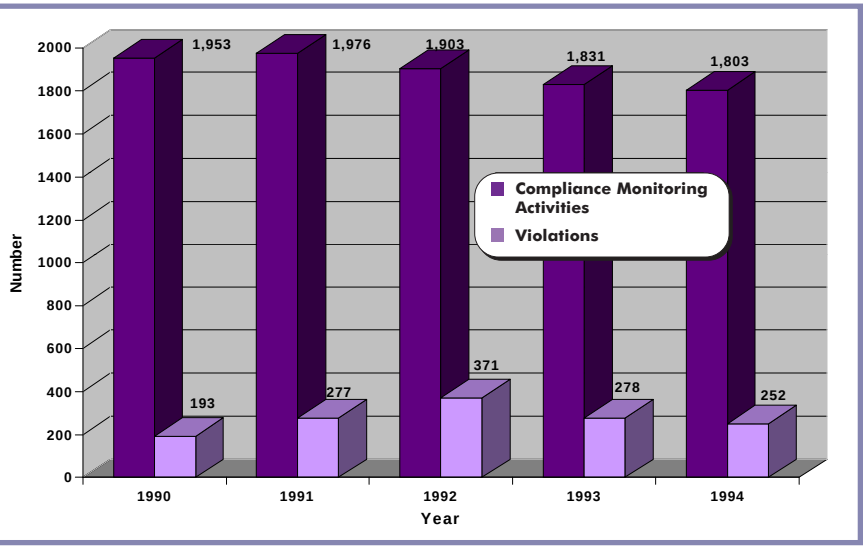
Table 4-1.
CWA Data, 1990 to 1994[j]

	Compliance Monitoring Activities	Violations
1990	1,953	193
1991	1,976	277
1992	1,903	371
1993	1,831	278
1994	1,803	252
Total	**9,466**	**1,371**
Average	1,893	274

Compliance Monitoring Activities

As shown in Figure 4-3, the number of compliance monitoring activities per year between 1990 and 1994 has decreased slightly. Although there was a 7.7 percent decrease in compliance monitoring activities from 1990 to 1994, the average annual decrease is only 1.5 percent.

Figure 4-3.
CWA Compliance Monitoring Activities and Violation Trends, 1990 to 1994.[j]



Violations

The number of violations varied more than the number of compliance monitoring activities during the same time period, with an increase of 30.6 percent, or an average yearly increase of 6.1 percent. However, from 1992 to 1994, the number of violations identified annually declined each year.

4.D. Clean Air Act (CAA)

Table 4-2 presents compliance monitoring numbers for 1990 to 1994 for the CAA. Over that period, 15,948 compliance monitoring activities were performed under the CAA, identifying 981 violations. The average numbers of compliance monitoring activities and violations annually over the five-year period are 3,190 and 196, respectively.

Table 4-2.

CAA Data, 1990 to 1994.[j]

	Compliance Monitoring Activities	Violations
1990	3,141	154
1991	3,086	196
1992	3,233	187
1993	3,182	187
1994	3,306	257
Total	**15,948**	**981**
Average	3,190	196

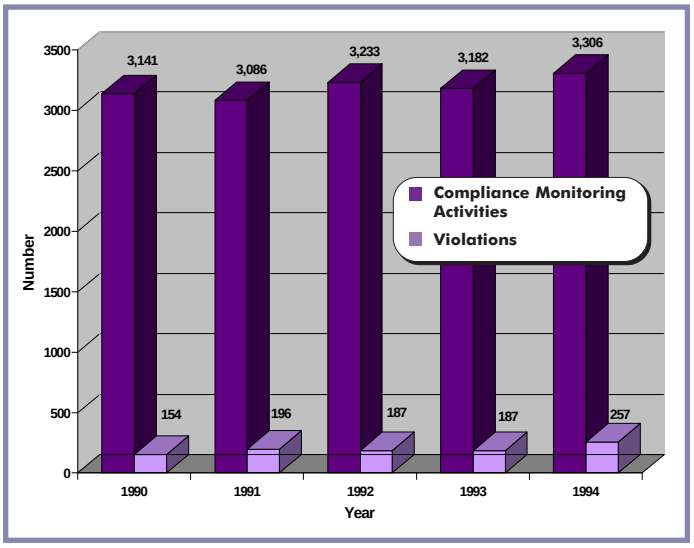
Compliance Monitoring Activities

As shown in Figure 4-4, the number of compliance monitoring activities per year between 1990 and 1994 varied slightly. Although there was a slight increase, 5.3 percent, in compliance monitoring activities from 1990 to 1994, the average annual increase is only 1.05 percent.

Violations

The number of violations varied more than the number of compliance monitoring activities conducted during the same time period, with an increase of 66.9 percent between 1990 and 1994.

Figure 4-4.
CAA Compliance Monitoring Activities and Violation Trends, 1990 to 1994.[j]



4.E. Resource Conservation and Recovery Act (RCRA)

Table 4-3 presents numbers of compliance monitoring activities and violations under RCRA for 1990 to 1994. Over that period, 19,962 compliance monitoring activities were performed under RCRA, with 14,705 violations identified. The average annual numbers of compliance monitoring activities and violations over the five-year period are 3,992 compliance monitoring activities and 2,941 violations.

Compliance Monitoring Activities

As shown in Figure 4-5, the number of compliance monitoring activities per year between 1990 and 1994 has remained relatively constant. Although there was a decrease of 7.1 percent in compliance monitoring activities from 1990 to 1994, the average annual decrease is only 1.4 percent.

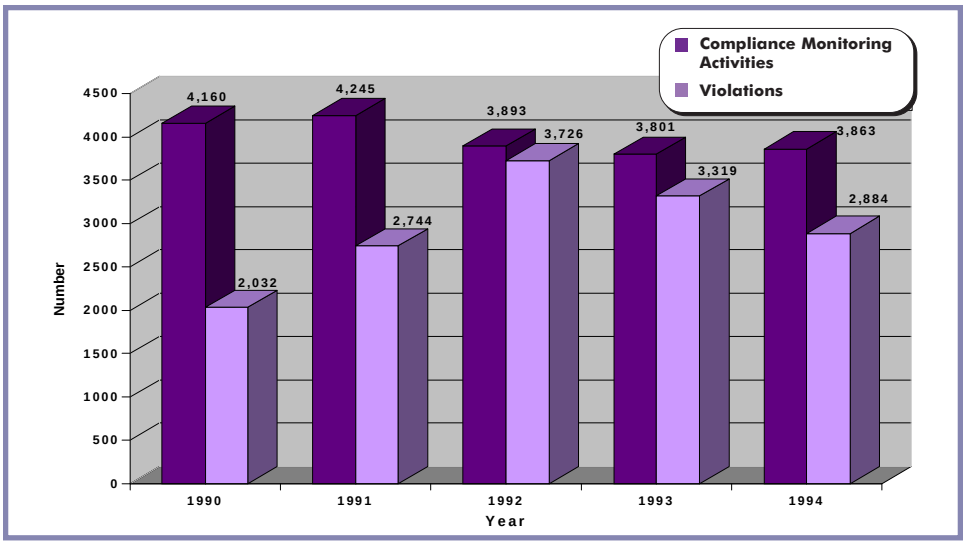
Violations

The number of violations varied more than the number of compliance monitoring activities during the same time period, with an increase of 41.9 percent, or an average annual increase of 8.4 percent. As in the case of the CWA, violations decreased annually from 1992 to 1994.

Table 4-3.
RCRA Data, 1990 to 1994.[j]

	Compliance Monitoring Activities	Violations
1990	4,160	2,032
1991	4,245	2,744
1992	3,893	3,726
1993	3,801	3,319
1994	3,863	2,884
Total	**19,962**	**14,705**
Average	3,992	2,941

Figure 4-5.
RCRA Compliance Monitoring Activities and Violation Trends, 1990 to 1994.[j]



4.F. Toxic Substances Control Act (TSCA)

Table 4-4 presents numbers of compliance monitoring activities and violations under TSCA for 1990 to 1994. Over that period, 1,552 compliance monitoring activities were performed under TSCA, with 326 violations identified. The average annual numbers of compliance monitoring activities and violations over the five-year period are 310 compliance monitoring activities and 65 violations.

Table 4-4.

TSCA Data, 1990 to 1994.[j]

	Compliance Monitoring Activities	Violations
1990	332	56
1991	360	71
1992	328	71
1993	272	84
1994	260	44
Total	**1,552**	**326**
Average	310	65

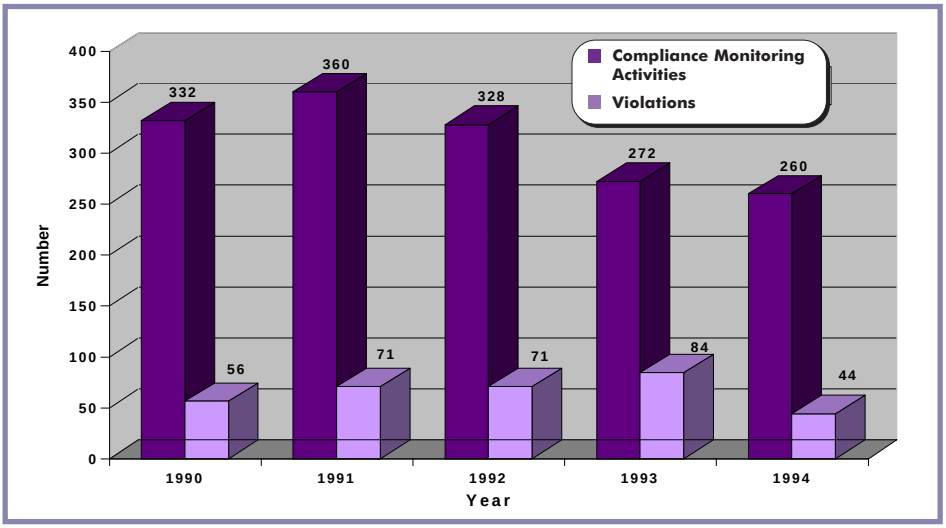
Compliance Monitoring Activities

As shown in Figure 4-6, the number of compliance monitoring activities between 1990 and 1994 has decreased by 21.7 percent, or an annual decrease of 4.3 percent.

Violations

The number of violations increased 50 percent from 1990 to 1993 and decreased 48 percent between 1993 and 1994. The net result is a 21.4 percent decrease in violations between 1990 and 1994.

Figure 4-6.
TSCA Compliance Monitoring Activities and Violation Trends, 1990 to 1994.[j]



4.G. Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

Table 4-5 presents numbers of compliance monitoring activities and violations for the period from 1990 to 1994. Over that period, 547 compliance monitoring activities were performed under FIFRA, with 318 violations identified. The average numbers of compliance monitoring activities per year over the five-year period are 109 compliance monitoring activities and 64 violations.

Compliance Monitoring Activities

As shown in Figure 4-7, the number of compliance monitoring activities between 1990 and 1994 decreased 48.9 percent between 1990 to 1994, or an average annual decrease of 9.8 percent.

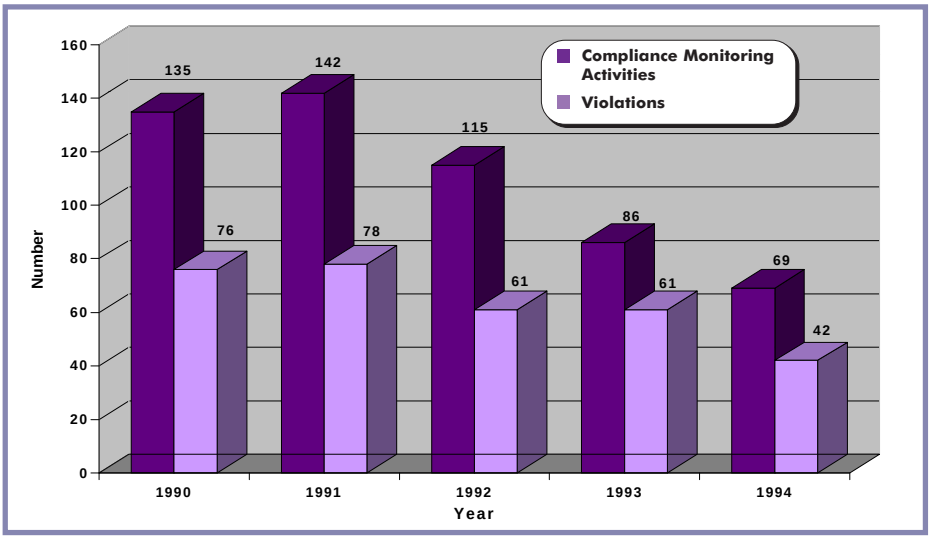
Violations

During the same time period, the number of violations also decreased 44.7 percent, or an average yearly decrease of 8.9 percent.

Table 4-5.
FIFRA Data, 1990 to 1994.[j]

	Compliance Monitoring Activities	Violations
1990	135	76
1991	142	78
1992	115	61
1993	86	61
1994	69	42
Total	**547**	**318**
Average	109	64

Figure 4-7.
FIFRA Compliance Monitoring Activities and Violation Trends, 1990 to 1994.[j]



4.H. Emergency Planning and Community Right-to-Know Act (EPCRA)

Table 4-6.

EPCRA Data, 1990 to 1994.[j]

	Compliance Monitoring Activities	Violations
1990	121	28
1991	98	27
1992	123	17
1993	120	19
1994	100	15
Total	**562**	**106**
Average	112	21

Table 4-6 presents numbers of compliance monitoring activities for the period from 1990 to 1994. Over that period, 562 compliance monitoring activities were performed and 106 violations were identified under EPCRA. The average number of compliance monitoring activities per year over the five-year period is 112, and the average number of violations identified per year is 21.

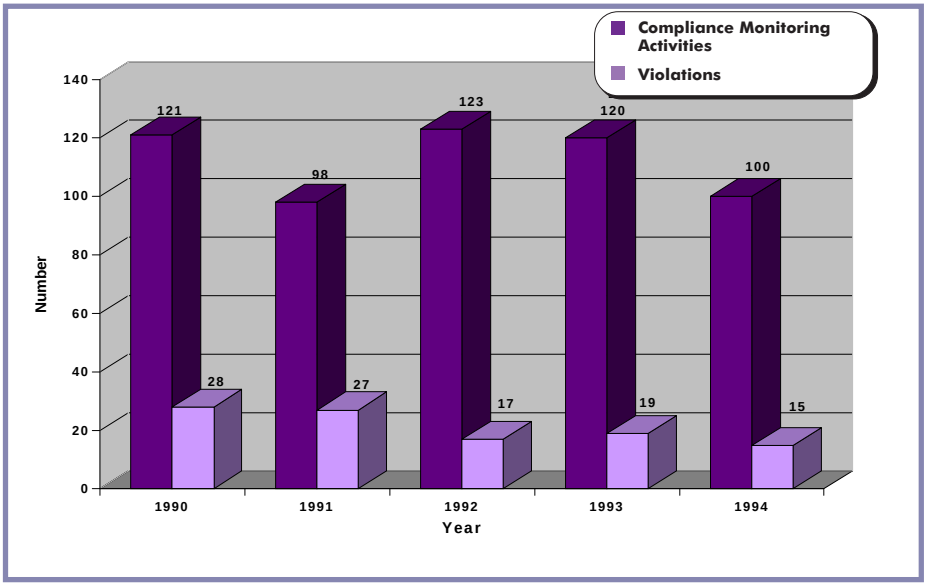
Compliance Monitoring Activities

As shown in Figure 4-8, the number of compliance monitoring activities per year between 1990 and 1994 has decreased 17.3 percent, or an average annual decrease of 3.5 percent.

Violations

During the same time period, the number of violations decreased 46.4 percent, or an average annual decrease of 9.3 percent.

Figure 4-8.
EPCRA Compliance Monitoring Activities and Violation Trends, 1990 to 1994.[j]



Promoting Environmental Performance Through Compliance Promotion, Enforcement, and Compliance Assurance

5. Promoting Environmental Performance Through Compliance Promotion, Enforcement, and Compliance Assurance

Traditional administrative and judicial enforcement actions, brought at both the state and the federal levels, allow authorities to take immediate action when noncompliance is detected, impose penalties when appropriate, and prevent noncompliance, thereby fostering competitive advantages. The continued use of traditional types of enforcement actions, however, also has limitations that can be alleviated by the development of other incentives, assistance programs, and strategies to help ensure compliance. A strategic combination of traditional enforcement actions and other, more innovative compliance-related activities allows EPA to best apportion its resources and to achieve the highest possible level of compliance with environmental requirements. OECA was established to perform both traditional enforcement activities and compliance assistance functions.

Although EPA will continue pursuing traditional enforcement actions, EPA also actively seeks to introduce and develop nontraditional compliance initiatives. Such initiatives can be used to create opportunities for industry and regulators to work together to find innovative and equitable solutions to difficult environmental issues, provide significant benefits in protecting the environment (especially through pollution prevention), deliver the information and tools industry needs to prevent instances of noncompliance, and assist EPA and states in training their personnel. Innovative initiatives that OECA has developed or participated in to assist in improving the compliance status of the regulated community include:

- Compliance assistance
  - *Compliance assistance centers*
  - *Sector-specific compliance assistance*
- New incentive policies
  - *Environmental audit policy*
  - *Small business incentives policy*
- Supplemental environmental projects (SEP)
- Pollution prevention (P2) program
- Environmental Leadership Program (ELP)

This section describes trends in traditional enforcement approaches under each of the initiatives listed above and presents some examples of success stories that illustrate how the chemical industry has participated in innovative approaches to compliance.

5.A. Definition of Enforcement Actions

The following subsections define the term "enforcement actions;" describe the relationships among compliance monitoring activities, violations, and enforcement actions; and summarize trends in enforcement by environmental statute. Because the IDEA database is a compilation of program databases related to individual statutes, it may or may not capture the data for all facilities. The body of the report therefore does not present data on EPCRA and FIFRA enforcement actions. However, Appendix F does provide data for EPCRA and FIFRA.

5.A.1. Enforcement Actions. An enforcement action is an administrative, civil, or criminal proceeding carried out by EPA or its delegated representatives in response to a state of noncompliance with regulatory requirements. Formal enforcement actions can be taken against facilities at which one or more violations have been identified. Enforcement actions may be taken for repeated or continuing violations or for only one occurrence, depending on the circumstances to which the enforcement response policy is applied. The following subsections provide data on the number of enforcement actions for the five-year period from 1990 to 1994 and the change in the number of enforcement actions over that time period.

Table 5-1.

Ratio of Enforcement Actions to Compliance Monitoring Activities, 1990 to 1994.[j]

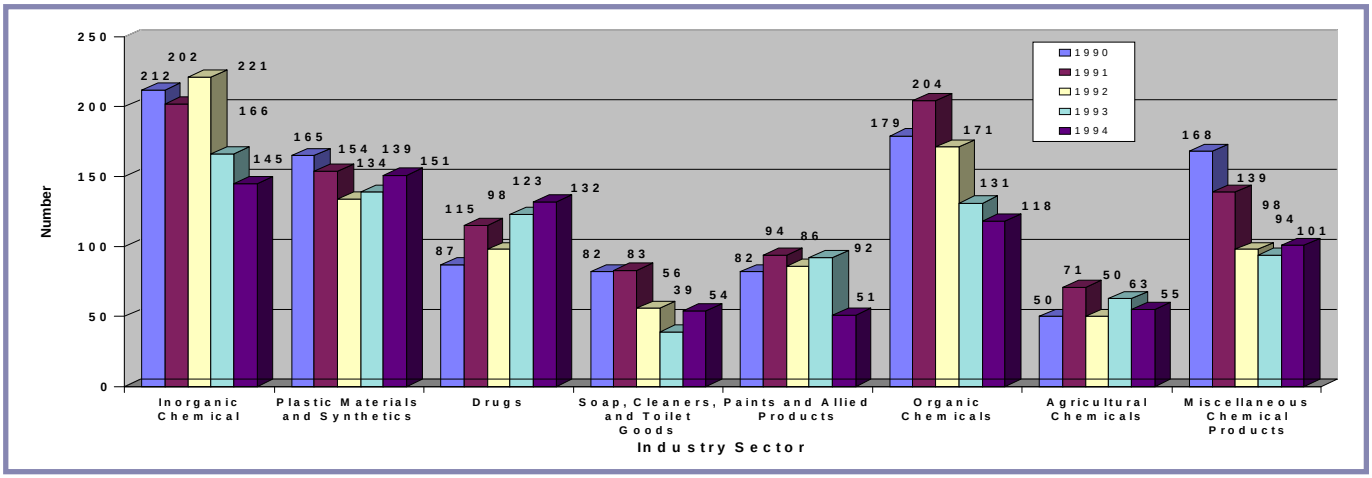
SIC Code	1990	1991	1992	1993	1994	Average
	Enforcement Actions/Compliance Monitoring Activities (%)					
281 Inorganics	20	20	23	18	16	19
282 Plastics	23	20	20	19	23	21
283 Drugs	18	24	23	28	27	24
284 Soaps	30	26	21	17	22	23
285 Paints	32	36	35	41	24	34
286 Organics	27	30	25	18	18	24
287 Agricultural	20	23	17	20	18	20
289 Miscellaneous	33	27	20	21	21	24

5.A.2. Relationship Between Compliance Monitoring Activities, Violations, and Enforcement Actions. There have been efforts in the past to determine compliance levels by examining various elements of compliance. Following is a brief discussion of possible methodologies. Trends for conducting such examinations can be measured by analyzing the number of compliance monitoring activities and violations. The first measure is the ratio of enforcement actions compared with the number of compliance monitoring activities. Table 5-1 shows the results of a comparison of enforcement actions and compliance monitoring activities. This ratio expresses how often enforcement actions result from compliance monitoring activities. This value is a ratio of enforcement actions to compliance monitoring activities, and is presented for comparative purposes only. This ratio is a rough indicator of the relationship between compliance monitoring activities and enforcement actions. This measure simply indicates historically how many enforcement actions can be attributed to compliance monitoring activities across the eight three-digit SIC codes during 1990 to 1994. From 1990 to 1994, this ratio increased by 50 percent in the drugs sector, remained constant in the plastics sector, and declined in all other sectors from 9 to 33 percent. Also of note during this 5 year time period, the number of violations per enforcement action doubled.

5.B. Chemical Industry Sector Multi-Media Enforcement Trends

From 1990 to 1994, the inorganic chemicals sector experienced the largest number of enforcement actions, followed by the organic chemicals and the miscellaneous chemical products sectors (see Figure 5-1).

Figure 5-1.
Enforcement Actions by Industry Sector, 1990 to 1994.[j]



5.C. Clean Water Act (CWA)

Table 5-2 presents the numbers of enforcement actions for 1990 to 1994. Over that period, 1,070 enforcement actions were taken under the CWA. The average number of enforcement actions per year over that period is 214. Although the number of enforcement actions decreased between 1991 and 1993, the number of such actions actually increased over the full five-year period from 1990 to 1994 (see Figure 5-2).

5.D. Clean Air Act (CAA)

Table 5-3 presents the number of enforcement actions for the period from 1990 to 1994. Over that period, 1,380 enforcement actions were taken. The average number of enforcement actions per year over that five-year period is 276. The number of enforcement actions consistently decreased from 1991 to 1994 (see Figure 5-3).

Table 5-2.
CWA Data, 1990 to 1994.[j]

Year	Number of Enforcement Actions
1990	186
1991	253
1992	230
1993	174
1994	227
Total	**1,070**
Average	214

Table 5-3.
CAA Data, 1990 to 1994.[j]

Year	Number of Enforcement Actions
1990	282
1991	302
1992	298
1993	266
1994	232
Total	**1,380**
Average	276

Figure 5-2.
CWA Enforcement Actions, 1990 to 1994.[j]

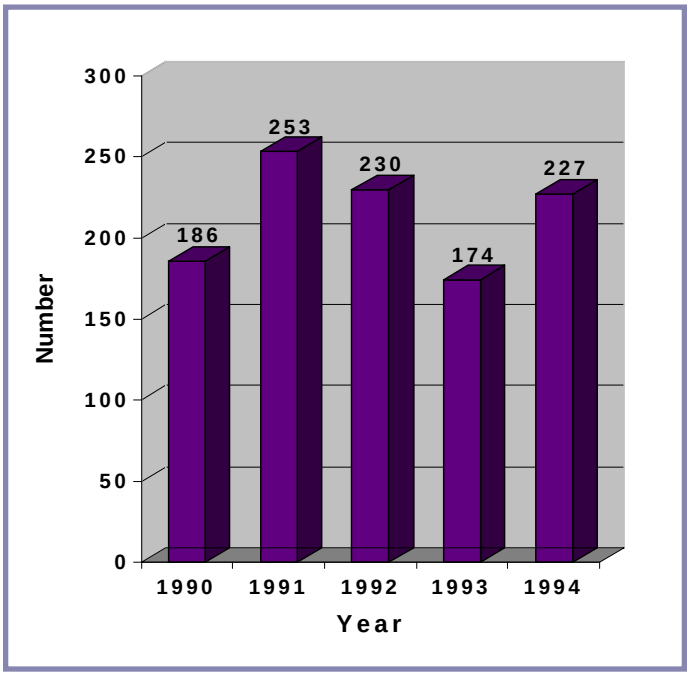


Figure 5-3.
CAA Enforcement Actions, 1990 to 1994.[j]

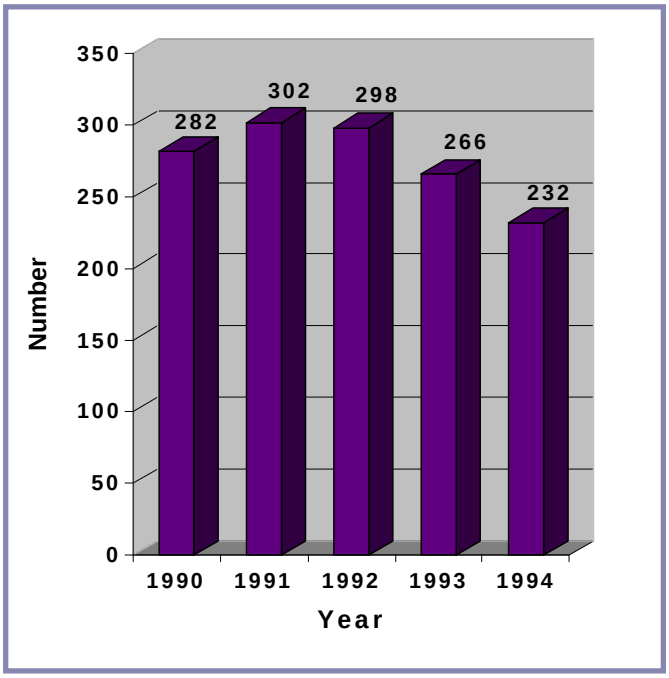
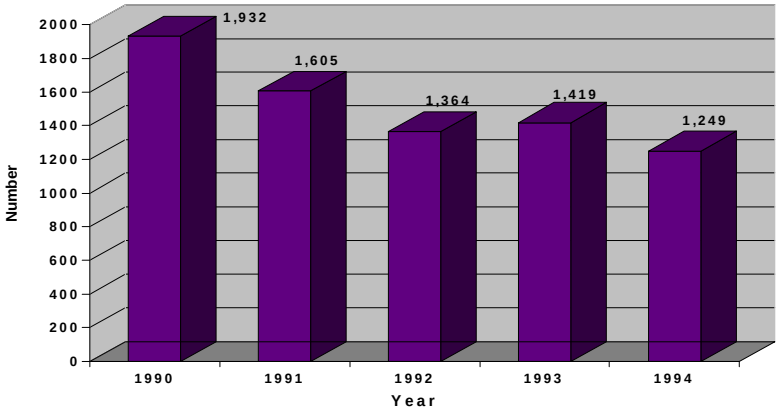


Table 5-4.

RCRA Data, 1990 to 1994.[j]

Year	Number of Enforcement Actions
1990	1,932
1991	1,605
1992	1,364
1993	1,419
1994	1,249
Total	**7,569**
Average	1,514

Figure 5-4.
RCRA Enforcement Actions, 1990 to 1994.[j]



5.E. Resource Conservation and Recovery Act (RCRA)

Table 5-4 presents the numbers of enforcement actions for the period from 1990 to 1994. During that period, 7,569 enforcement actions were taken. The average number of enforcement actions taken per year over the five-year period is 1,514. The number of enforcement actions generally decreased over the five-year period (see Figure 5-4).

Table 5-5.

TSCA Data, 1990 to 1994.[j]

Year	Number of Enforcement Actions
1990	125
1991	129
1992	115
1993	104
1994	65
Total	**538**
Average	108

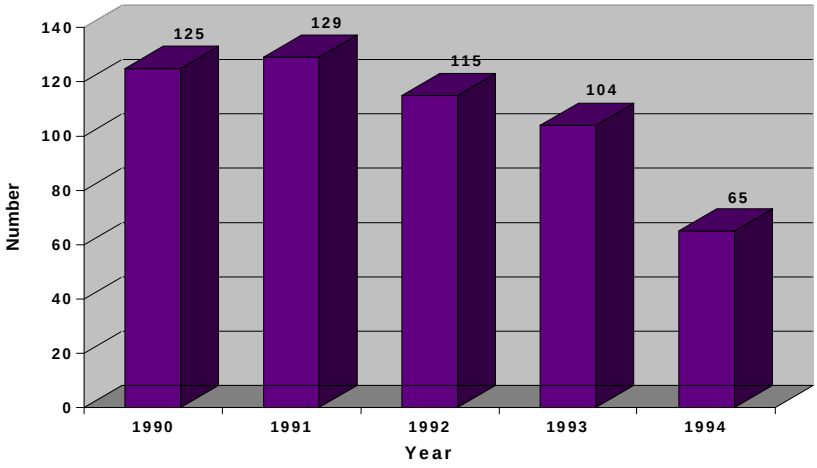
5.F. Toxic Substances Control Act (TSCA)

Table 5-5 presents the number of enforcement actions for the period from 1990 to 1994. Over that period, 538 enforcement actions have been taken under TSCA. The number of enforcement actions consistently decreased from 1991 to 1994 and the average number of enforcement actions taken per year over the five-year period is 108 (see Figure 5-5).

5.G. Compliance Assurance

Compliance information and assistance are provided to the regulated community to help that community understand and fully comply with the requirements of various environmental laws. Compliance assistance activities, which take place at both state and federal levels, are targeted primarily at small businesses that make up most of the facilities governed by environmental regulations. Many of EPA's compliance assistance activities involve partnerships with states and industry associations. The participation of states and industry partners in the development of such compliance assistance programs has enabled EPA to tailor its assistance to those areas in which it can provide the most benefits and to benefit itself from the products of those programs.

Figure 5-5.
TSCA Enforcement Actions, 1990 to 1994.[j]



EPA offers three distinct types of compliance assistance: 1) compliance assistance centers, 2) sector-specific compliance assistance, and 3) hotline assistance.

1 **Compliance assistance centers** - In 1995 and 1996, EPA, in partnership with industry, academic institutions, environmental groups, and other federal and state agencies, established five national compliance assistance centers. The centers, which are located throughout the country, were established specifically to serve the following industrial sectors: printing, agriculture, metal finishing, and auto repair. Those industrial sectors were targeted for special assistance in part because they are heavily populated with small businesses and are subject to substantial regulation. The ultimate goal of the centers is to improve small businesses' understanding of environmental requirements that affect them and to encourage them to take the next steps to improve compliance. The five centers are:

- Chemical Manufacturers Compliance Assistance Center (CMCAC)
- The Printers' National Compliance Assistance Center
- Agricultural Services Compliance Assistance Center
- National Metal Finishers Resource Center
- GREENLINK™ (Automotive Service and Repair Compliance Assistance Center)

CMCAC is responsible for disseminating compliance assistance tools quickly and widely, while minimizing their cost. The center is a PC-based information clearinghouse for plain-English guides and user-friendly materials that promote compliance. The center is in the final implementation phase and will be operational in FY 1998. OECA is also planning to open a transportation center, printed wire board manufacturing center, and a local government compliance assistance centers.

2 **Sector-specific compliance assistance** - In recognition of the unique needs of certain industries, EPA has established custom compliance assistance programs to reach out to specific industry sectors. Such programs heighten awareness of the environmental regulations that apply to certain types of industrial operations and provide information about pollution prevention opportunities that may be available. Of greatest relevance to the chemical industry are the compliance assistance tools that the industry and EPA have developed collaboratively for several new rules. Other industry sectors and other groups to which EPA has offered specific assistance include:

- Wood finishers
- Dry cleaners
- Auto services industry
- Printing facilities
- Metal finishing manufacturers
- Public water supply systems

3 **Hotline assistance** - Under a variety of programs, EPA has established a network of telephone and electronic hotlines to help the regulated community and the public achieve compliance. The hotlines (see Table 5-6) are intended to answer individual questions about regulatory compliance in a timely and efficient manner. EPA's main home page on the World Wide Web provides electronic access to much of the same information about compliance assistance. The home page can be found at *http://www.epa.gov.*

Table 5-6.

Hotline Assistance

Hotline Name	Phone Number
Acid Rain Hotline	(202) 233-9620
Air RISC Hotline	(919) 541-0888
Asbestos and Lead Program Hotline	(301) 530-5603 * (800) 462-6706 **
Asbestos Ombudsman Clearinghouse/Hotline	(703) 305-5938 * (800) 368-5888 **
Automotive Imports Automated Faxback System	(202) 233-9660
CleanLAN/ WasteLAN Hotline	(703) 908-2066
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Helpline	(703) 908-2066
Control Technology Center (CTC)	(919) 541-0800
Customer Call Center/National Computer Center	(919) 541-7862 From all government locations and Research Triangle Park local calling area (800) 334-2405 From all non-government locations outside Research Triangle Park local area
Data Processing Support Services National Computer Center	(919) 541-2385 From all government locations and Research Triangle Park local calling area
EMF (Electromagnetic Field) Infoline	(800) 363-2383 **
Emergency Response Section Notification Line	(415) 744-2000 (For states or territories of AZ, CA, HI, NV, AS, and GU)
Environmental Financial Information Network (EFIN)	(202) 260-0420
Environmental Justice Information Line	(800) 962-6215**
EPA Action Line Region 7	(913) 551-7122 From all local calls in Kansas City calling area (800) 223-0425 From all locations outside Kansas City (including IA, MO, NE, and KS)
EPA Human Resources Hotline	(202) 260-8836
Ethics Program Advice	(202) 260-4550
Facility Index System (FINDS)	(703) 908-2493
Green Lights and Energy Star Programs	(202) 775-6650
Greenlink	(202) 564-7032
Hazardous Waste Ombudsman	(202) 260-9361 * (800) 262-7937 **
Indoor Air Quality Information Clearinghouse	(202) 484-1307 * (800) 438-4318 **
Information Clearinghouse for Information and Environmental Factors (CHIEF)	(919) 541-5285
Integrated Data for Enforcement Analysis (IDEA) System	(202) 564-2475 *
Method Information Communications Exchange (MICE)	(703) 821-4690

* From all government locations and the Washington, DC metropolitan local calling area
** From all nongovernment locations outside Washington, DC metropolitan local calling area

Table 5-6 (continued).

Hotline Assistance

Hotline Name	Phone Number
Mobile Sources Region 1 Air Quality Information for New England	(617) 565-9145 From all government locations and the Massachusetts local calling area
EPA Small Business Ombudsman Office	(800) 368-5888 From all nongovernment locations outside Massachusetts (including CT, ME, NH, RI, and VT)
National Lead Information Center Hotline	(800) 532-3394 **
National Metal Finishing Resource Center	(202) 564-7013
National Pesticides Telecommunications Network (NPTN)	(800) 858-7378 **
National Radon Hotline	(800) 767-7236 **
National Response Center- U.S. Coast Guard	(800) 424-8802 **
National Small Flows Clearinghouse	(800) 624-8301 **
Office of Inspector General Whistle-Blower Hotline	(202) 260-4977
Oil and Hazardous Material Spills	(800) 424-8802 **
Office of Environmental Justice (OEJ)	(202) 260-6359 * (800) 962-6215 **
Pay-As-You-Throw Helpline	(888) 372-7298
Permit Compliance System (PCS) Hotline	(202) 564-5036
Pollution Prevention Information Clearinghouse (PPIC) Envirosense	(202) 260-1023
Public Information Center (PIC)	(202) 260-9388
Radon and Indoor Air Helpline	(800) 557-2366 **
Radon-Fix-It-Line	(202) 233-9454
RCRA/Superfund and EPCRA Hotline	(800) 424-9346 **
Region 1 (888) EPA-Tips	(888) 372-8477
Region 1 General Information	(617) 565-3420
Region 1 Small Parties Hotline	(800) 762-5727
Region 1 Superfund Small Parties Hotline	(800) 762-5727 From all nongovernment locations in the New England calling area
Region 2 Emergency Notification Spill Reporting Hotline	(908) 548-8730
Region 2 Potentially Responsible Party Hotline	(212) 637-4290 From all government locations and New York local calling area (800) 245-2738 All nongovernment locations outside the New York calling area
Region 2 Superfund Hazardous Waste Hotline	(800) 346-5009
Region 2 Superfund Investigators Hotline	(800) 245-2738
Region 2 Superfund Ombudsman	(888) 283-7626
Region 3 Customer Service Hotline	(800) 483-2474
Region 4 Helpline	(800) 241-1754

* From all government locations and the Washington, DC metropolitan local calling area
** From all nongovernment locations outside Washington, DC metropolitan local calling area

Table 5-6 (continued).

Hotline Assistance	
Hotline Name	**Phone Number**
Region 4 ERRB Community Hotline (Removal)	(404) 562-8724
Region 4 Job Information Line	(404) 562-9945
Region 4 South Superfund Community Relations Toll-Free Number	(800) 435-9234
Region 5 Hotline	(312) 353-9798
Region 6 Public Information	(800) 887-6063
Region 7 Action Line	(800) 223-0425
Region 7 Spill Emergency Line	(913) 281-0991
Region 8 Environmental Information Service Center (EISC)	(800) 227-8917 All non-government locations outside the Colorado local calling area
Region 9 Asbestos Line	(415) 744-1122
Region 9 Emergency Resource Center Notification Line	(415) 744-2000
Region 9 Lead Information Line	(415) 744-1124
Region 9 Public Information Center	(415) 744-1505
Region 9 RCRA Hotline/Information Line	(415) 744-2074
Region 9 Stratospheric Ozone Information Hotline	(415) 711-1141
Resource Conservation and Recovery Act/ Underground Storage Tanks (RCRA/UST), Superfund, and Emergency Planning and Community Right-to-Know-Act (EPCRA) Hotline	(703) 412-9810 * (800) 424-9346 **
Risk Communication Information Line	(202) 260-5606
Safe Drinking Water Hotline	(703) 285-1093 * (800) 426-4791 **
Small Business Ombudsman Clearinghouse/ Hotline	(800) 368-5888 **
Storage and Retrieval of U.S. Waterways Parametric Data (STORET)	(202) 260-8161 * (800) 424-9067 **
Stratospheric Protection Division Ozone Information Hotline	(800) 296-1996 **
Superfund DeMinimis	(202) 564-4292
Region 9 Superfund/Resource Conservation and Recovery Act (RCRA) Community Relations Office Information Line	(415) 744-2423 (800) 231-3075 ** (including area codes 415, 707, 512 and Northern portion only of 408)
Region 1 Superfund Small-Parties Hotline	(617) 565-3464 From all government locations and nongovernment locations outside the New England area (800) 762-5727 From all nongovernment locations in New England area
Transportation Partners Hotlines	(202) 260-3729
TSCA Assistance Information Service	(202) 554-1404

* From all government locations and the Washington, DC metropolitan local calling area
** From all nongovernment locations outside Washington, DC metropolitan local calling area

Table 5-6 (continued).

Hotline Assistance

Hotline Name	Phone Number
Waste Isolation Pilot Plant (WIPP) Information Line and Yucca Mountain Information Line	(800) 331-WIPP
WASTEWI$E Helpline	(800) EPA-WISE **
Wetlands Information Hotline	(800) 832-7828 **

** From all nongovernment locations outside Washington, DC metropolitan local calling area

5.H. New Incentive Policies

EPA has two major compliance incentive policies that have application in the chemical industry:

Environmental audit policy - On December 22, 1995, EPA issued the Voluntary Environmental Self-Policing and Self-Disclosure Policy, which offers new incentives for companies to evaluate their own operations for compliance and voluntarily disclose and correct any violations. The policy provides incentives, such as reduced penalties for noncompliance, for companies that meet established conditions for finding, disclosing, and addressing violations. It does not apply to parties engaging in recurring violations or in violations that result in serious harm or imminent and substantial endangerment, nor does it apply to criminal conduct by individuals. In addition, while the punitive component of the penalty may be reduced, EPA will continue to recover from companies any significant economic advantage the companies may have gained through noncompliance.

Small business incentives policy - On June 3, 1996, EPA announced the implementation of the new Policy on Compliance Incentives for Small Businesses. The policy is intended to promote environmental compliance among small businesses by providing incentives for participation in compliance assistance programs, for auditing and disclosure of violations, and for prompt correction of violations. Under the policy, EPA will eliminate or reduce civil penalties in cases in which small businesses have made good-faith efforts to comply with applicable environmental requirements by obtaining compliance assistance or auditing and disclosing violations. The policy does not apply if a violation is caused by criminal conduct or has caused serious harm or imminent and substantial endangerment of public health or the environment.

5.I. Supplemental Environmental Projects (SEP)

EPA uses SEPs to gain significant environmental benefits in conjunction with the settlement of enforcement cases. Usually, SEPs are those projects that are undertaken voluntarily by members of the regulated community in conjunction with case settlements to provide some level of environmental benefit, in addition to returning to compliance. In exchange for performing the SEP, the facility is granted relief equaling some fraction of the total value of the stipulated penalty. Once applied predominantly in cases of violations of reporting requirements, SEPs are becoming a more versatile tool. SEPs now are used frequently to negotiate settlements for violations under the CAA, CWA, RCRA, and other regulatory programs.

5.J. Pollution Prevention Program

OECA has issued a policy statement that encourages compliance and enforcement programs to use the settlement process to identify and implement pollution prevention activities that are consistent with the agency's overall approach to enforcement. By incorporating elements of pollution prevention into its traditional enforcement efforts, EPA encourages companies to conduct projects that benefit both industry and the environment, as well as promote improved environmental performance. For example, EPA may use the conditions of the settlement to specify the use of pollution prevention methods to redress the original violation and achieve compliance. EPA also may reduce penalties when industries agree to conduct pollution prevention activities that are considered SEPs.

5.K. Environmental Leadership Program

The ELP is a national program that was pilot-tested by EPA and the states in 1995 and 1996. Under the program, facilities volunteered to demonstrate innovative approaches to environmental management and compliance. The ELP is intended to recognize and reward companies that develop and implement comprehensive environmental management systems that result in significant environmental improvements and outstanding compliance records. ELP pilot projects focused on such issues as development of innovative environmental management systems, creation of mentoring programs, testing of third-party auditing and self-certification protocols, and enhancement of community involvement policies.

5.L. Success Stories

Not all innovative compliance-related activities EPA has undertaken have direct application to the chemical industry. EPA, however, continues to work to build better relationships with chemical manufacturers and to jointly develop the tools needed to maximize compliance in the industry. Although there are many success stories at the state and regional levels that are not discussed in this report, the following success stories illustrate how EPA and the chemical industry have worked to attain compliance through the development and implementation of innovative approaches to enforcement in the following areas:

- Compliance assistance tools
- SEPs
- Pollution prevention program
- Environmental audit policy
- ELP

COMPLIANCE ASSISTANCE TOOLS

Program Description

The Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) requires all federal agencies to prepare "small entity compliance assistance guides" for rules that trigger a regulatory flexibility analysis. Such guides are to explain the actions an entity must take to come into compliance and are to be written in plain language likely to be understood by personnel of small entities. Agencies are encouraged to cooperate with associations of small entities in developing and distributing guides.

EPA's Approach

When OECA was reorganized two years before SBREFA was enacted, EPA recognized that an important part of compliance assistance would be "plain English guides" to compliance with selected rules. The agency also identified the value of promoting self-auditing for compliance and improving compliance training. Finally, OECA saw the benefits to all concerned of genuine partnerships between EPA and industry in developing and disseminating guides and audit training materials.

Chemical Industry Approach

CMA and Synthetic Organic Chemical Manufacturers Association (SOCMA) independently have recognized the value to their membership of producing compliance assistance tools that draw on their members' collective expertise and that minimize redundancy. CMA's membership identified key needs for compliance assistance guides, self-audit check lists and training materials. In 1994, CMA proposed to EPA that the two organizations cooperate with each other and with other interested groups in developing effective compliance assistance tools. This cooperative effort has produced valuable sets of tools for several new rules:

> EPA and CMA jointly developed a compliance guide, a self-audit check list, and a training module for 1995 rules governing repair of industrial process refrigeration leaks. Those publications marked the first time that OECA and industry had jointly produced a compliance tool for a new rule. Plant refrigeration technicians and the EPA rule writer participated in the process, and the tools ultimately were issued as EPA guidance. OECA Assistant Administrator Steve Herman called them "an excellent example of how government and industry can work together to protect the health of the American public and the environment." EPA and CMA have distributed more than 800 of these tools, and EPA has used the self-audit check list as its own inspection check list.
>
> CMA and the American Petroleum Institute (API) jointly developed a compliance guideline for EPA's risk management program rule, which then was revised to reflect the comments of the Agency's Chemical Emergency Preparedness and Prevention Office, which noted that, "it provides practical advice and insights for clearer understanding of the rules' requirements."
>
> CMA and SOCMA jointly prepared a compliance assistance tool and a training module for the RCRA subpart CC rule that addresses air emission of violate organic compounds in tanks, containers, surface impoundments, and landfills. The Agency is now reviewing the rule. Agency contractors currently are using the training module to train regional and state personnel, as well as members of the public.
>
> CMA is currently developing compliance assistance tools for the Hazardous Organic NESHAP and the off-site waste and recovery operations rule for review by EPA.

SUPPLEMENTAL ENVIRONMENTAL PROJECTS

Program Description

SEPs are projects voluntarily undertaken by members of the regulated community in conjunction with settlements for regulatory violations. Such projects often prove to be valuable tools for negotiating settlements with the regulated community and provide more tangible benefits to the environment than could be achieved through the payment of fines alone. In exchange for performance of a SEP, a facility is granted relief equaling some fraction of the total stipulated penalty assessed for the violation.

EPA's Approach

Because SEPs can provide substantial benefits to the environment, EPA has allowed an increasing number of companies to conduct SEPs as part of settlements for regulatory violations. In 1995, EPA negotiated with numerous companies the conduct of almost 350 SEPs, valued at $103 million. More than one-half of all SEPs negotiated in 1995 were categorized as pollution prevention or pollution reduction initiatives. Environmental benefits anticipated from the use of SEPs include: 1) reduction of 637,000 pounds of nonhalogenated organics, including toluene and xylene; 2) reduction of 483,000 pounds of halogenated organics, including solvents; 3) reduction of 4,000 tons per year of sulfur dioxide emissions; and 4) reduction of 104,000 pounds per year of volatile organic compounds. EPA continues to provide to industry many different types of assistance to prevent noncompliance. When it is necessary to correct existing violations, however, EPA expects the increased use of SEPs to facilitate the negotiation of more equitable settlements with the regulated community, encourage industry to conduct projects that are truly beneficial to the environment, and provide a punitive element that motivates companies to avoid future violations.

Chemical Industry Approach

Because SEPs frequently benefit facilities by improving the efficiency and cost-effectiveness of industrial operations, many members of the chemical industry have welcomed the opportunity to conduct SEPs as part of settlements with EPA. A few examples of settlements with members of the chemical industry that include SEPs are:

Under a settlement with EPA Region 2, **Eastman Kodak Corporation** agreed to conduct several projects at its facility in Rochester, New York. The projects involved elimination of the use of CFCs from large process refrigeration units and several chemical substitutions designed to reduce the volume or toxicity of raw materials and emissions. The combined projects are expected to reduce the aggregate volume of pollutants released by the facility by 2.3 million pounds by the year 2001. In consideration of those SEPs, EPA reduced the civil penalty assessed against **Kodak** by $3 million.

In a settlement with EPA, **Anzon, Inc.** agreed to pay a civil penalty of $57,000 for certain inventory violations, $43,620 of which may be remitted by EPA upon completion of SEPs to be performed at the company's facilities in Philadelphia, Pennsylvania and Laredo, Texas. The Philadelphia project involves the early removal and disposal of four transformers that contain PCBs. The Laredo project requires the installation of controls that will enable the facility to capture an increased volume of antimony oxide emitted from the facility.

In a settlement with EPA Region 6, **E.I. Du Pont De Nemours and Company** agreed to pay a civil penalty and conduct a pollution prevention SEP worth an estimated $3.2 million. The SEP requires the replacement of steam-powered vacuum jets in adiponitrile process units with mechanical vacuum pumps. The steam, contaminated with waste materials from the adiponitrile process, previously was condensed as water and became a waste stream. Replacing the pumps will eliminate that waste stream and effectively save the costs of handling, treating, and disposing of the waste.

POLLUTION PREVENTION PROGRAM

Program Description

Congress passed the Pollution Prevention Act of 1990 to move government and industry toward strategies for environmental protection that emphasize the prevention of pollution, rather than the more traditional methods of controlling and cleaning up waste once it has been generated. While the traditional "end-of-pipe" approach has done much to clean up and protect the environment, it has become increasingly clear that to truly solve environmental problems, generation of pollution must be reduced.

EPA's Approach

EPA has promoted the use of pollution prevention as a means of protecting the environment and helping industry minimize the costs of managing waste. As one of many efforts to promote that initiative, EPA may reduce penalties when industries that have not met regulatory requirements agree to conduct pollution prevention activities. In addition, much of the compliance assistance that EPA offers to industry involves the provision of information about implementing pollution prevention and waste minimization activities and training in those areas.

Chemical Industry Approach

With the support of EPA, the chemical industry has undertaken significant efforts to reduce generation of waste and emissions of pollution and encourage sound waste management practices. In fact, members of CMA and SOCMA adhere to a formal Pollution Prevention Code–part of the Responsible Care® Initiative–that sets forth three far-reaching goals: 1) long-term reduction in the amount of pollution released to the air, water, and land; 2) continuous reductions in the amount of waste generated at facilities; and 3) responsible management of any remaining wastes and releases. The code establishes a comprehensive set of guiding principles and an ethical framework for industry operations. The following examples illustrate how some manufacturers have incorporated the concepts of pollution prevention into their day-to-day operations:

A new dewatering system installed at **Occidental Chemical Corporation's** Delaware City, Delaware plant removes solids from tank car wash water for reuse. The system reduces discharges of water from the plant by 5 million gallons per year and wastewater treatment sludge by 70 tons per year.

Recently, **Amoco Chemical Company's** Marietta, Ohio plant received the Governor's Award for Outstanding Achievements in Pollution Prevention. The plant reduced air emissions by 38 percent during a two-week period, cut solid and hazardous waste by nearly 45 percent, and halved the amount of wastewater it treats and discharges each day.

At its Baltimore, Maryland facility, **Reichhold Chemicals** reduced waste from product sampling by designing and installing special canisters that are attached to the production tanks. The canisters capture a product sample from which a smaller test sample is drawn. The remaining product sample is returned to the tank. Using smaller samples cuts waste by 95 percent.

ENVIRONMENTAL AUDIT POLICY

Program Description

Given the size and scope of the chemical industry nationwide; the variety of environmental media affected by the industry's operations; and the finite resources available at the federal, state, and local levels to conduct enforcement actions, responsible members of the regulated community should become more involved in voluntarily finding, disclosing, and correcting instances of noncompliance at their own operations. By empowering responsible companies to police their own operations, environmental regulators can: 1) involve companies actively in the compliance assurance process, 2) build trust and establish better relationships with such companies, and 3) reallocate limited resources to address other high-priority enforcement needs.

EPA's Approach

EPA issued the Voluntary Environmental Self-Policing and Self-Disclosure Policy, which offers dramatic new incentives for companies that evaluate their own operations for compliance and voluntarily disclose and correct violations. The policy provides incentives, such as reduced penalties and reduced criminal liability, for companies that meet established conditions for finding, disclosing, and addressing violations. It does not apply to parties engaging in recurring violations, or in violations that involve criminal conduct or result in serious harm or imminent and substantial endangerment. Further, while the "punitive" component of penalties may be reduced, EPA will continue to recover from companies any economic advantage the companies may have gained from noncompliance.

Chemical Industry Approach

Recognizing the many advantages of voluntary disclosure as a means of negotiating more equitable settlements for certain environmental violations, members of the chemical industry voluntarily have disclosed noncompliance to EPA, both before and after EPA announced its new self-policing initiative. A few examples of the ways in which EPA and chemical companies are working together to use voluntary disclosure to improve the regulatory compliance process are:

Polaroid Corporation notified EPA in October 1994 that an internal audit had revealed the manufacture and use of a new chemical for several years without compliance with requirements for premanufacture notice under TSCA. **Polaroid** paid a penalty of $80,000, reduced from $160,000 in light of the prompt and voluntary disclosure of the violations.

After a voluntary disclosure made by **Eastman Kodak Company** on July 1, 1993, EPA charged the company with one count of unauthorized disposal of PCBs. Because the violation had been disclosed voluntarily, the penalty that **Kodak** was required to pay to EPA was reduced to $13,750, pursuant to the 1986 audit policy then in effect.

After a voluntary disclosure made by **Ciba-Geigy Corporation**, **Ciba-Geigy** was required to pay to EPA a penalty of $182,550 for violations of sections 5, 8, and 13 of TSCA. When determining the amount of the penalty, EPA considered **Ciba-Geigy's** voluntary disclosure of those violations a mitigating circumstance.

EPA settled two enforcement actions brought against **Glidden Company** for importing and distributing an unregistered pesticide. The enforcement actions, which cited violations under both TSCA and FIFRA, came about as a result of a series of disclosures made by **Glidden** to EPA regarding violations of sections 5, 8, 12, and 13 of TSCA. Because the violations were disclosed voluntarily, **Glidden** paid a reduced penalty of $290,100.

ENVIRONMENTAL LEADERSHIP PROGRAM

Program Description

The Environmental Leadership Program (ELP) is a national program currently being pilot-tested by EPA and the states, under which certain facilities have been selected to demonstrate innovative approaches to environmental management and compliance. The ELP recognizes and rewards companies that develop and implement comprehensive environmental management systems that result in significant environmental improvements and outstanding compliance records. ELP projects focus on such issues as development of innovative environmental management systems, creation of monitoring programs, testing of third-party auditing and self-certification protocols, and enhancement of community involvement policies.

EPA's Approach

On April 7, 1995, EPA announced that it had selected 12 facilities to participate in the ELP. The 12 facilities (10 private-sector firms and 2 federal facilities) were selected from a field of more than 40 applicants. EPA selected **Ciba-Geigy Corporation's** plant in St. Gabriel, Louisiana as one of the 12 facilities that would participate in the pioneering effort. The ELP affords EPA a unique opportunity to establish meaningful partnerships with members of the chemical industry and to help showcase innovative approaches to protecting the environment.

Chemical Industry Approach

Ciba-Geigy was selected for the program in part because of an innovative waste minimization project undertaken by its St. Gabriel facility to reuse calcium carbonate waste as a lime substitute for farming. Excessive acidity poses major problems to farmers in Louisiana. It binds nutrients in the soil, making fertilizers less efficient, and limits crop production. Soil pH levels can be raised with the application of lime but, at $20 to $30 per ton, lime can be a costly remedy. **Ciba-Geigy's** project involves strengthening and purifying calcium carbonate so that it can be used as a lime substitute to raise the pH level of soil and improve crop yields in Louisiana. Calcium carbonate solids are produced when waste hydrochloric acid, a by-product of the production of herbicides at the St. Gabriel facility, is neutralized with lime. For many years, the solids — approximately 3,721 tons per year — were disposed of in an industrial waste landfill, consuming large quantities of the state's limited landfill capacity. To address this concern, **Ciba-Geigy** modified its filtration process to dewater the calcium carbonate solids, strengthening and purifying them for reuse. From 1989 to 1990, 2,900 tons of calcium carbonate were donated to 15 farmers, saving them approximately $75,000 in the cost of lime and significantly improving crop yields. In 1991, **Ciba-Geigy** received the state's first beneficial reuse permit from the Louisiana Department of Environmental Quality (DEQ). **Ciba-Geigy's** project represents a win-win situation for all involved — **Ciba-Geigy**, local farmers, and the environmental community. The project has three distinct benefits:

Ciba-Geigy saves more than $595,000 per year in disposal costs, with an investment of $115,000 per year for program implementation.

Approximately 14,882 tons of calcium carbonate were distributed to farmers from 1989 to 1993, saving more than $417,000 in the cost of lime and improving crop yields substantially.

Limited landfill capacity in Louisiana is preserved. Through active participation in the ELP, **Ciba-Geigy** works in partnership with EPA and state staff to help demonstrate and promote the use of such innovative reuse technologies to other members of the chemical industry and to assist in the development of other innovative systems that promote responsible environmental management.

5.M. Trade Associations/Industry Sponsored Activities

The Global Environmental Management Initiative (GEMI) is made up of a group of leading companies dedicated to fostering environmental excellence by business. GEMI promotes a worldwide business ethic for environmental management and sustainable development, to improve the environmental performance of business through example and leadership. In 1994, GEMI's membership consisted of about 30 major corporations including Union Carbide Corporation and Dow Chemical.

The Center for Waste Reduction Technologies under the aegis of the American Institute of Chemical Engineers sponsors research on innovative technologies to reduce waste in the chemical processing industries. The primary mechanism is through funding of academic research.

The National Science Foundation and the EPA's Office of Pollution Prevention and Toxics signed an agreement in January of 1994 to coordinate the two agencies' programs of **basic research related to pollution prevention.** The collaboration will stress research in the use of less toxic chemical and synthetic feedstocks, use of photochemical processes instead of traditional ones that employ toxic reagents, use of recyclable catalysts to reduce metal contamination, and use of natural feedstocks when synthesizing chemicals in large quantities.

The Chemical Manufacturers Association funds research on issues of interest to their members particularly in support of their positions on proposed or possible legislation. They recently funded a study to characterize the environmental fate of organochlorine compounds.

ISO 9000 is a series of international total quality management guidelines. After a successful independent audit of their management plans, firms are qualified to be ISO 9000 registered. In June 1993, the International Standards Organization created a technical committee to work on new standards for environmental management systems.

The Responsible Care® Initiative of the Chemical Manufacturers Association requires all members and partners to continuously improve their health, safety, and environmental performance in a manner that is responsive to the public. The concepts of the program, launched in 1988, are now being applied in countries around the world. The program is a comprehensive, performance-oriented initiative composed of 10 progressive guiding principles and six codes of management practices. The management practices cover all aspects of the chemical products. Pollution prevention is addressed by the Pollution Prevention Code, which requires companies to make a clear commitment to ongoing reductions, at each of a company's facilities, in releases to the air, water, or land and in the generation of wastes. The program also requires a commitment to compliance with applicable regulatory requirements and requires further that members of CMA audit or review their regulatory compliance.

Through the program, CMA members and partners gain insight from the public through, among other means, a national public advisory panel and more than 250 local community advisory panels. Participation in the program is an obligation of membership in the CMA.

The Synthetic Organic Chemical Manufacturers Association (SOCMA), whose membership consists of small-batch and custom chemical manufacturers that typically have fewer than 50 employees and less than $50 million in annual sales, encourages its members to achieve continuous improvement in the performance of their health, safety, and environmental programs through implementation of the chemical industry's Responsible Care® Initiative. SOCMA is a partner in that program.

Future Directions

6. Future Directions

While the use of traditional enforcement actions undeniably remains an essential component of its contemporary compliance strategy, EPA now believes that other, more innovative activities and programs also must be introduced if we are to achieve the highest possible level of compliance with environmental requirements. The challenge at hand is great. EPA, however, remains confident in and committed to its efforts to continue to reach out to members of the chemical industry to promote responsible management practices and move forward into a new era of environmental compliance.

Recognizing that a unilateral approach to enforcement no longer may be the most effective strategy for ensuring compliance with environmental regulations, EPA has taken action to develop new programs that encourage companies to engage in environmental audits or conduct other proactive environmental management efforts. By introducing nontraditional compliance initiatives that foster environmental accountability and promote responsible management practices, EPA has provided unique opportunities for the chemical industry to reach new heights in environmental management and performance.

By preparing this baseline report, which provides an overview of compliance trends and a profile of the chemical industry, EPA has taken an important step toward defining future objectives. A variety of approaches are being developed to address enforcement and compliance issues and the identification of opportunities to build innovative partnerships with industry and the public. Future baseline reports will permit EPA to assess progress and will help stimulate the development of additional compliance initiatives. Through an ongoing analysis of the chemical industry, EPA will continue to refine its efforts to work together with industry to achieve its primary goal — environmental protection through compliance with the law.

Because EPA is accountable to its constituents, the amount and types of compliance activities and the industry's compliance level must be reported, in addition to reporting of EPA program activities. Through a more comprehensive and sophisticated reporting system, EPA will strive to measure and report the effectiveness and successes of innovative approaches to enforcement and compliance. In that way, EPA can fulfill its mission to the public by addressing environmental problems in the broadest sense, working in partnership with industry, integrating innovative and traditional approaches to enforcement, and reporting the results of compliance and enforcement activities to measure success.

EPA's future directions include:

- Establishing the Chemical Industry Compliance Assistance Center
- Expanding its participation in, development of, or review of industry compliance assistance tools
- Tailoring compliance assistance and enforcement activities so that they will have the greatest effect
- Supporting regional compliance activities through the MOA process
- Providing compliance data to support the EPA/CMA Root-Cause Analysis Project and similar projects
- Providing compliance data for analysis of the chemical sector
- Providing benchmarks for measuring success
- Providing a platform for future QA/QC initiatives and sustained public access

Endnotes

ENDNOTES

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f Dun and Bradstreet Information Services, Inc. 1994. Database of Information on U.S. Companies.

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h EPA. 1995. Toxics Release Inventory (TRI): Database on TRI Releases and Transfers. (CD-ROM)

i EPA. Toxics Release Inventory: Public Data Release, for each year from 1990 through 1994.

j EPA. 1995. Integrated Data for Enforcement Analysis (IDEA) Database. August.

Appendices A-F

APPENDIX A — Acronyms

AIRS	Aerometric Information Retrieval System
API	American Petroleum Institute
ARAR	Applicable or Relevant and Appropriate Requirements
CAA	Clean Air Act
CBEP	Community Based Environmental Protection
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulations
CIB	Chemical Industry Branch
CMA	Chemical Manufacturers Association
CMCAC	Chemical Manufacturers Compliance Assistance Center
CWA	Clean Water Act
DOC	Department of Commerce
DMR	Discharge Monitoring Report
ELP	Environmental Leadership Program
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FEPCA	Federal Environmental Pesticide Control Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FINDS	Facilities Index System
GDP	Gross Domestic Product
HAP	Hazardous Air Pollutants
HSWA	Hazardous and Solid Waste Amendments
IDEA	Integrated Data for Enforcement Analysis
LDR	Land Disposal Restrictions
LEPC	Local Emergency Planning Committee
MACT	Maximum Available Control Technology
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NAICS	North American Industry Classification System
NCDB	National Compliance Database
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
OECA	Office of Enforcement and Compliance Assurance
OSHA	Occupational Safety and Health Act
PA/SI	Preliminary Assessment and Site Inspection
PCB	Polychlorinated Biphenyl
PCS	Permit Compliance System
PMN	Premanufacture Notice
POTW	Publicly-Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
RCRIS	RCRA Information System
SARA	Superfund Amendments and Reauthorization Act
SEP	Supplemental Environmental Projects
SIC	Standard Industrial Classification

SDWA	Safe Drinking Water Act
SOCMA	Synthetic Organic Chemical Manufacturers Association
TSCA	Toxic Substances Control Act
TRI	Toxics Release Inventory
TSDF	Treatment, Storage, and Disposal Facility
UIC	Underground Injection Control
UST	Underground Storage Tank

APPENDIX B — Glossary of Key Terms

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

CERCLA Information System (CERCLIS): CERCLIS is an information system for tracking and retrieving data relevant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program (for example, the number of hazardous waste sites in each EPA region).

Chemical Industry Branch (CIB): The CIB is an entity within EPA that is located in the Office of Enforcement and Compliance Assurance (OECA), Office of Compliance, in the Chemical, Commercial Services, and Municipal Division. The CIB develops and implements a national sector-based, multimedia program of compliance activities for the chemical industry, classified in the 2800 series of the Standard Industrial Classification (SIC) code system.

Chemical Industry: The chemical industry, classified in the 2800 series of the SIC code, includes facilities that manufacture predominantly: (1) inorganic chemicals; (2) plastic materials and synthetics; (3) drugs; (4) soaps, cleaners, and toilet goods; (5) paints and allied products; (6) organic chemicals; (7) agricultural chemicals; and (8) miscellaneous chemical products.

Inorganic Chemical Industry: This industry segment uses the earth's natural resources to produce a wide array of goods. The industry's primary focus is breaking down salt (NaCl) into its principal components, sodium (Na) and chlorine (Cl), which are used in a variety of chemical processes.

Integrated Data for Enforcement Analysis (IDEA): IDEA is a data integration system that can retrieve information from all major EPA program office databases. IDEA uses the Facilities Index System (FINDS) identification number to unite various records from EPA's databases to create a master list of records for any given facility. Some of the data systems accessible through IDEA are: AIRS (Aerometric Information Retrieval System, Office of Air and Radiation), PCS (Permit Compliance System, Office of Water), RCRIS (Resource Conservation and Recovery Information System, Office of Solid Waste), NCDB (National Compliance Database, Office of Pollution Prevention, Pesticides, and Toxic Substances), CERCLIS (Comprehensive Environmental Response, Compensation, and Liability Information System), and TRIS (Toxics Release Inventory System). IDEA also contains information from such outside sources as Dun and Bradstreet Information Services, Inc. and the Occupational Safety and Health Administration.

Land Release: Under Toxics Release Inventory (TRI), releases to land are those that 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 and farming applications (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 or settle waste materials), other land disposal methods (such waste piles), and certain other events (such as spills or leaks).

Off-Site Transfer: Under TRI, an off-site transfer is a shipment of a listed chemical in waste to a facility that is geographically or physically separate from the facility reporting to TRI. Such transfers represent a movement of the chemical away from the reporting facility.

Organic Chemical Industry: This chemical industry segment processes raw materials that have a carbon structure into primary products or building blocks, including ethylene, propylene, benzene, methanol, toluene, xylenes, butadiene, and butylene. Chemicals are added in subsequent phases to create the end product.

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

Release: Under TRI, a release is a discharge of a listed chemical to the environment. Releases include emissions to the air, discharges to bodies of water, releases to land from a facility (such as a landfill or surface impoundment), and contained disposal into underground injection wells.

RCRA Information System (RCRIS): RCRIS is a database that tracks information relevant to the RCRA program (for example, number of regulated facilities, inspections conducted, violations found, and enforcement actions taken at each facility).

Standard Industrial Classification (SIC) Code: The SIC code system is a statistical classification standard used prior to 1996 for all establishment-based federal economic statistics.

Stipulated Penalty: This is a fixed sum of money that a defendant agrees to pay for violating the terms of a judicial consent decree.

Surface-Water Release: Under the TRI, releases to surface water include discharges to streams, rivers, lakes, oceans, and other bodies of water. They include releases from contained sources, such as industrial process outflow pipes or open trenches. Releases from runoff, including stormwater runoff, also are reportable under TRI.

Toxics Release Inventory (TRI) Facilities: TRI facilities are those manufacturing facilities that have 10 or more full-time employees and whose operations create transfers and releases of listed chemicals that exceed established thresholds on chemical throughput. Such facilities must submit estimates of quantities released or transferred for all chemicals that are on EPA's defined list that the facility uses in quantities that exceed a specific threshold quantity.

Transfer: Under TRI, a transfer occurs when a listed waste is removed to a facility that is geographically or physically separate from the facility that is required to report under the TRI. Transfers include wastes sent to publicly-owned treatment works (POTW), sent off-site for recycling, combusted off-site for energy recovery, moved off-site for treatment, or taken to another facility for disposal.

Transfer to a Publicly-Owned Treatment Works (POTW): Under TRI, reported information includes wastewaters that are transferred through pipes or sewers to a POTW. A POTW is a wastewater treatment facility (sewage treatment plant) that is owned by a state or municipality.

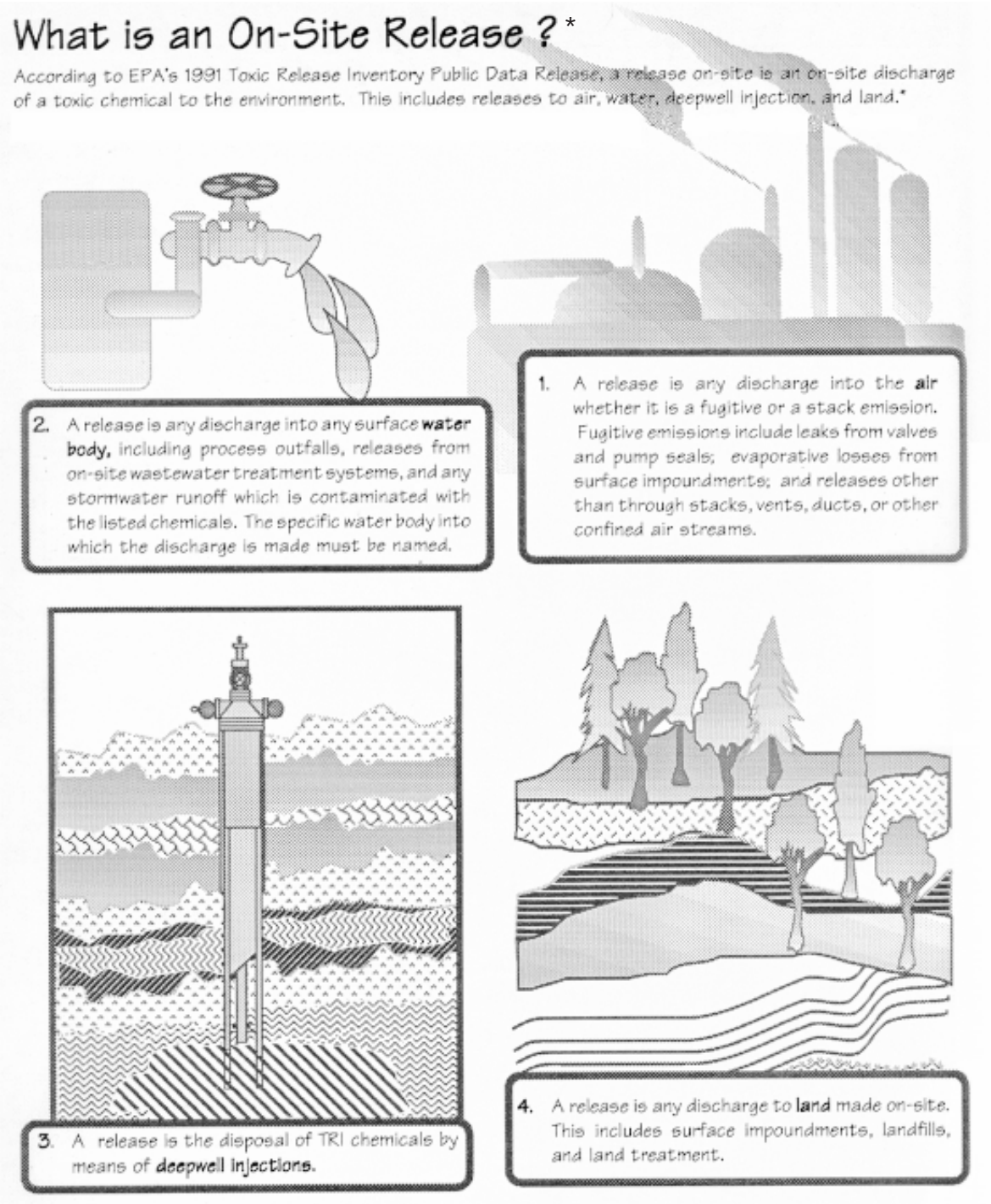
Transfer Off Site for Recycling: Under TRI, a transfer off site for recycling is the shipment of listed chemicals off site for recycling. The chemicals are subjected to solvent recovery, metals recovery, acid regeneration, or other processes. Once recycling has been accomplished, the chemicals may be returned to the originating facility or sold for further processing or use.

Transfer Off Site for Energy Recovery: Under TRI, such a transfer involves listed chemicals that are sent off site for energy recovery and are combusted off site in industrial furnaces (including kilns) or boilers that generate heat or energy for use at the off-site location. Treatment of a chemical by incineration is not considered energy recovery.

Transfer Off Site for Treatment: Under TRI, reported information includes listed chemicals that are sent off site and treated by such processes as biological treatment, neutralization, incineration, or physical separation. The methods achieve various degrees of destruction of the toxic chemical. In some cases (such as stabilization or solidification), the chemical is not destroyed but is prepared for further waste management, such as contained disposal.

Transfer Off Site for Disposal: Under TRI, listed chemicals sent off site to a facility for disposal usually are released to land or injected underground at the off -site location.

Underground Injection: Underground injection is a contained release of a fluid into a subsurface well for waste disposal. Most underground injection reported to TRI involves injection of waste into Class I or Class V wells. Class I wells are used to inject liquid hazardous wastes or industrial and municipal wastewaters beneath the lowermost underground source of drinking water. Class V wells usually are used to inject nonhazardous fluids into or above an underground source of drinking water. Beginning with 1996 data, reporting to TRI will distinguish between the two types of wells because they differ significantly in environmental effects.



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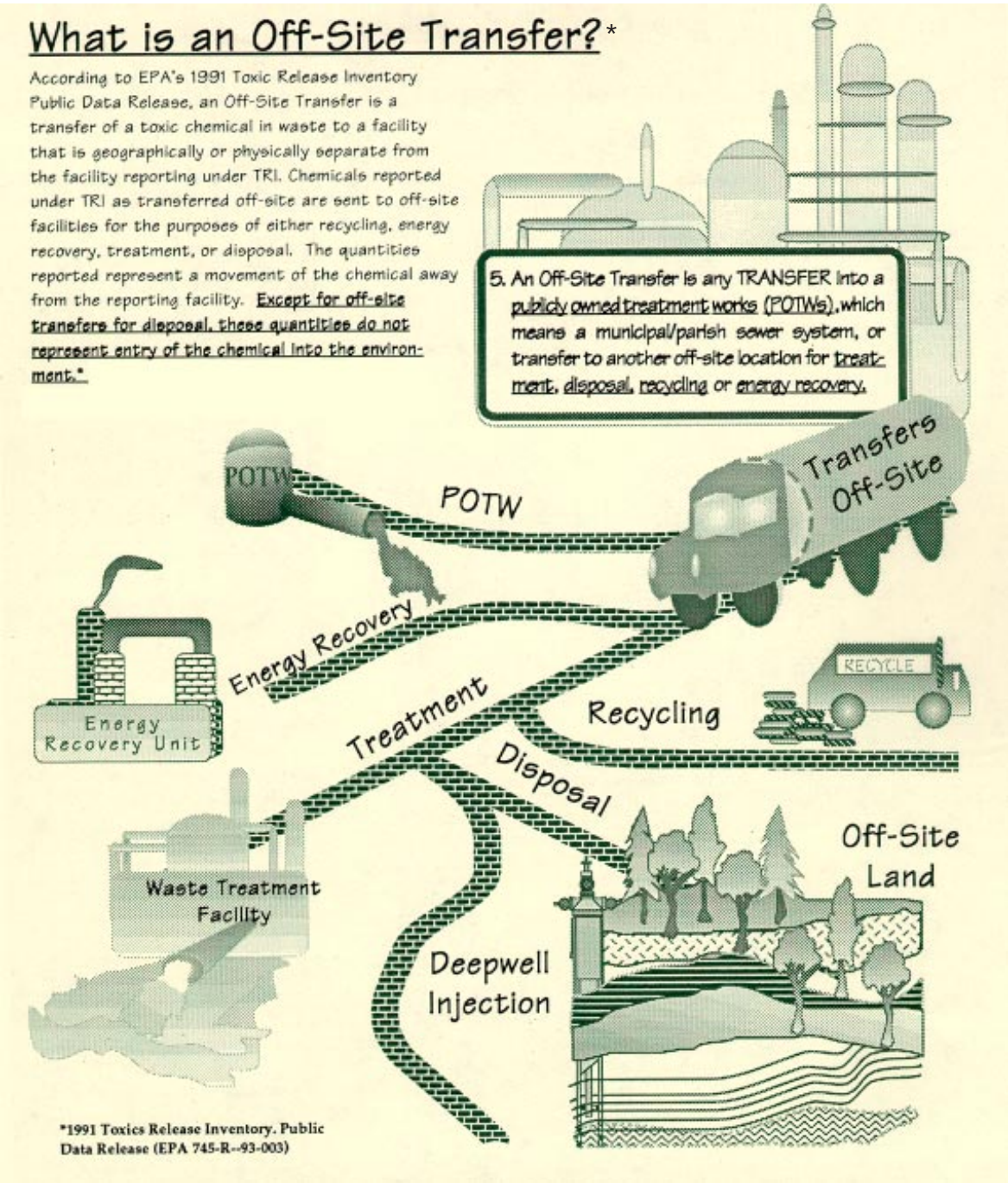

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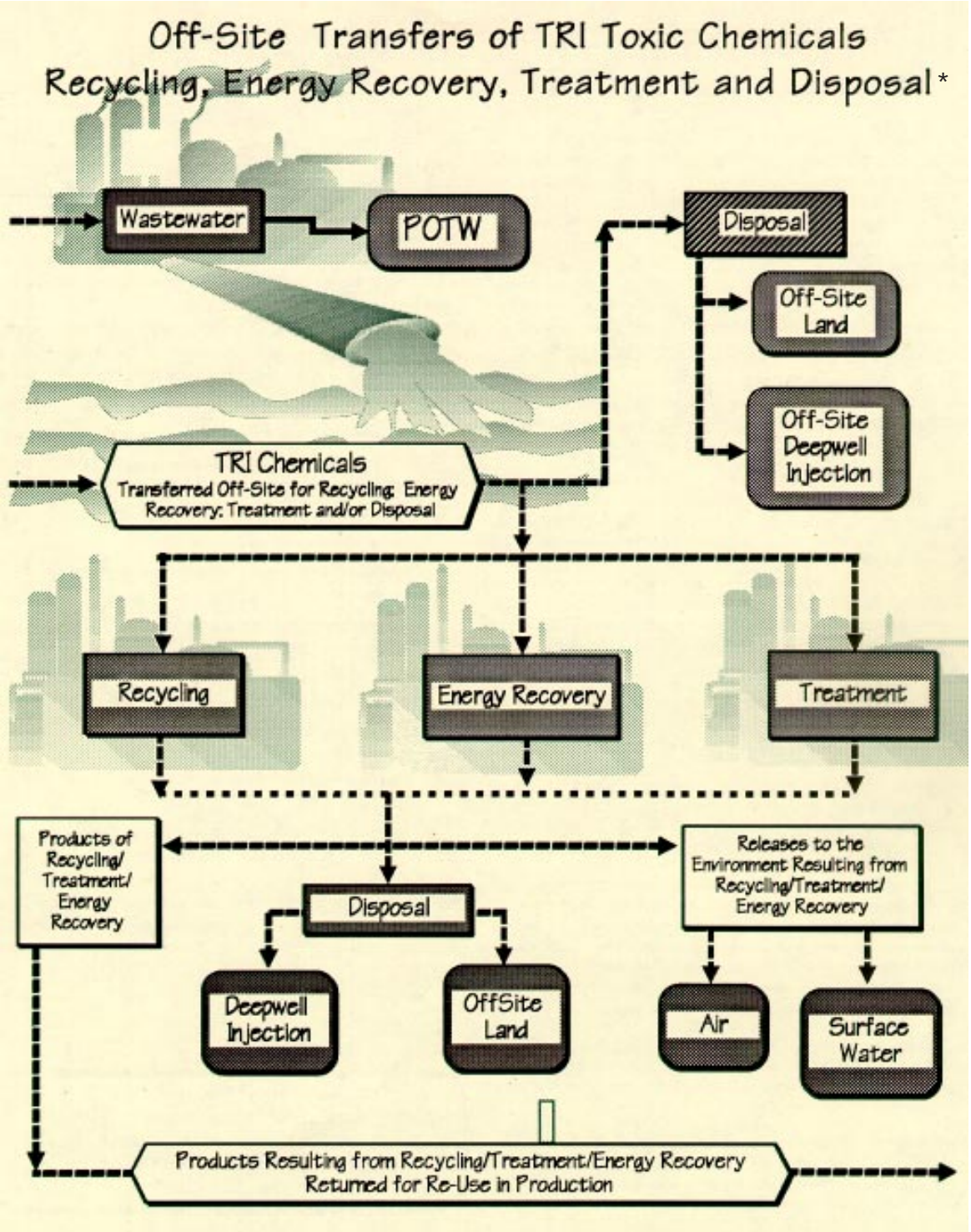


* Copied from the Louisiana Toxics Release Inventory 1993

APPENDIX C — Environmental Statutes and Regulations

This appendix provides a brief overview of some of the federal environmental statutes that apply to the U.S. chemical industry. It is important to note that a single acronym is used in this document to refer to the entire legislative history of a statute. For example, the Resource Conservation and Recovery Act (RCRA) was enacted in 1976 and amended in 1980 and again in 1984. Although RCRA amended the Solid Waste Disposal Act of 1965, RCRA and all its current amendments are included in the acronym RCRA, as it is used in this document. No attempt has been made to comprehensively review all the statutes, their amendments, or regulations promulgated under their authorities because that is beyond the scope of the current effort.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

The Resource Conservation and Recovery Act (RCRA) was enacted in 1976 to address problems in the U.S. related to management of solid and hazardous wastes. RCRA, which actually amended the Solid Waste Disposal Act of 1965, was amended in 1984 with the passage of the Hazardous and Solid Waste Amendments (HSWA). For the sake of convenience, the term RCRA will be considered here to encompass all related legislation and amendments not mentioned herein. Two major subtitles of RCRA affect the operations of the chemical manufacturing industry: Subtitle C, which regulates hazardous waste management, and Subtitle I, which regulates underground storage tanks.

Regulations promulgated under subtitle C of RCRA address the identification, generation, transportation, treatment, storage, and disposal of hazardous wastes. The regulations are found in 40 Code of Federal Regulations (CFR) part 124 and parts 260 to 279. Under RCRA, persons who generate secondary materials must determine whether those materials are defined as solid wastes and as hazardous wastes. Solid wastes are hazardous wastes if they are listed specifically by EPA as hazardous, or if they exhibit characteristics of a hazardous waste: toxicity, ignitability, corrosivity, or reactivity.

RCRA establishes management standards for hazardous wastes that are specific to the type of activity being performed. Generators of hazardous waste may accumulate such wastes on site, usually for a period of 90 days or less, only in containers, tanks, and containment buildings. While waste is on site, the generator is subject to general and unit-specific accumulation standards. The generator also must complete a hazardous waste manifest before waste is offered for transportation off site and must comply with the land disposal restrictions (LDR) program.

A chemical manufacturer that engages in treatment, long-term storage, or disposal of hazardous waste (treatment, storage, and disposal facilities [TSDF]) must obtain a permit or authorization under interim status for those activities. Chemical manufacturers that are TSDFs are subject to several requirements, including general standards for facilities, such as those requiring waste analysis, training of personnel, preparedness and prevention planning, and contingency planning. TSDFs also are subject to unit-specific requirements for the types of activities being performed (for example, operation of a landfill or an incinerator), corrective action for cleanup of releases of hazardous wastes or hazardous constituents, financial assurance for closure and corrective action, closure, and compliance with the LDRs.

Many chemical manufacturing facilities also are subject to the regulations in 40 CFR part 280 promulgated under RCRA subtitle I, the underground storage tank (UST) program. The UST regulations apply to entities that store "regulated substances" — either petroleum products or hazardous substances (except hazardous waste) identified under the Comprehensive Environmental Response, Compensation, and Liability Act

(CERCLA). UST regulations address design standards, leak detection, operating practices, response to releases, and financial responsibility for releases and impose closure standards.

Requirements under RCRA typically are implemented by the states. Under RCRA, a state may apply for authorization to administer and enforce the hazardous waste and UST programs, if the state can demonstrate through submittal of an application to EPA that its requirements are substantially equivalent to federal requirements. States also may establish requirements that are more stringent or broader in scope than the federal requirements. Although a state agency may obtain regulatory authorization, EPA retains authority for oversight of all activities.

Compliance monitoring under RCRA includes a combination of reporting requirements and field inspections to identify violations. Field inspections are conducted under the authority of section 3007 of RCRA. Such inspections include compliance evaluation inspections, case development inspections, compliance sampling evaluations, ground-water monitoring evaluations, and operation and maintenance inspections conducted by inspectors from EPA regional offices and states. Under RCRA, compliance monitoring activities at chemical facilities consist of both field inspections and record reviews. The inspections focus on compliance with requirements under the RCRA program, as well as corrective action requirements under the terms of an order or permit.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) was passed in 1980 and amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 to address threats to human health or the environment created by uncontrolled hazardous waste disposal sites. For the sake of convenience, the term CERCLA will be considered here to encompass all related legislation and amendments not mentioned herein. CERCLA generally does not impose requirements governing the day-to-day operations of chemical manufacturing facilities; rather, it imposes liability for the costs of investigation and cleanup of releases of hazardous substances. The liability provisions apply to potentially responsible parties (PRP) that: (1) generate hazardous substances that are sent to a site at which a hazardous substance has been released or at which there is a threat of release, (2) transport wastes to such a site, or (3) own or operate a site at which a hazardous substance has been released or at which there is a threat of release of such a substance. Under CERCLA, liability is strict, joint, and several: a single PRP can be held liable for the entire cost of cleanup, regardless of its contribution to the release.

Cleanups under CERCLA are implemented in accordance with regulations under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR part 300). The NCP provides for two types of response actions: removal actions and remedial actions. Removal actions are taken to address a release or threatened release of hazardous substances that poses an immediate threat to human health or the environment. Removal actions usually are short in duration. Remedial responses are long-term actions that are taken to reduce the risks to human health or the environment posed by a release or threatened release. A site under consideration for a response action first undergoes a preliminary assessment and a site inspection (PA/SI). If the results of the PA/SI indicate that it may be necessary to address a threat to human health or the environment through a long-term remedial response, the site is evaluated under the Hazard Ranking System (HRS) for placement on the National Priorities List (NPL). Once the site has been listed on the NPL, a remedial investigation and a feasibility study (RI/FS) are performed to determine the nature and magnitude of any releases at the site

and to identify a remedy, if needed, to address such releases. Finally, a remedial design (RD) is prepared and a remedial action (RA) conducted to implement the selected remedy.

Cleanups conducted under CERCLA generally must meet applicable or relevant and appropriate requirements under federal and state laws (for example, RCRA and the Clean Water Act [CWA] and their state analogues). Although no permits are required for actions conducted at a site that is undergoing cleanup, all substantive requirements (such as design and operating standards for an on-site incinerator) must be met. Cleanups are conducted in one of two ways: (1) by PRPs under the terms of an order or decree from EPA or a state, or (2) by EPA or the state, with the government later seeking reimbursement from the PRPs to recover the costs of cleanup.

Since CERCLA does not govern the day-to-day operations of facilities, compliance inspections typically are not associated with CERCLA. However, EPA and states monitor cleanups conducted by PRPs under CERCLA through oversight inspections conducted under the authority of CERCLA. The inspections are designed to evaluate a PRP's compliance with the provisions of an approved work plan or comparable document that outlines the required RI/FS, RD, or RA.

EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA)

The Emergency Planning and Community Right-to-Know Act (EPCRA), also known as Title III of SARA, was passed in 1986 to require certain facilities to divulge information about the amounts of hazardous substances they store and release. Regulations written under the law are found in 40 CFR parts 350-399. For the sake of convenience, EPCRA will be considered here to encompass all related legislation and amendments not mentioned herein. Three major provisions of EPCRA apply to the chemical manufacturing industry: (1) requirements for reporting of most releases, (2) emergency planning provisions, and (3) the Toxics Release Inventory (TRI) program.

Under EPCRA regulations at 40 CFR part 355, facilities are required to report releases of extremely hazardous substances in amounts greater than reportable quantities specific to each substance. The provisions governing reporting of releases are similar to those set forth under CERCLA, which requires reporting of releases of those substances identified under CERCLA as hazardous.

The emergency planning provisions of the law require that facilities report to the local emergency planning committee the quantities stored at those facilities of: (1) hazardous chemicals (as defined by the Occupational Safety and Health Administration) for which the preparation of Material Safety Data Sheets (MSDS) is required, and (2) extremely hazardous substances. Under the program, facilities that store hazardous chemicals in amounts in excess of threshold quantities specific to each chemical each year must submit to the local emergency planning committee (LEPC) MSDSs or chemical inventory forms. Local response authorities use the information in developing community-wide emergency response plans.

Reporting information to TRI is a requirement under EPCRA that applies strictly to chemical manufacturing facilities that have 10 or more employees. Facilities that manufacture, process, or otherwise use more than a specified quantity of any of more than 600 listed chemicals must estimate releases of each of those chemicals. The information must be entered on a form (Form R); the form requires that the affected facility estimate releases of listed chemicals to air and water and in solid wastes that leave the facility. Form R must be submitted to EPA once a year for each chemical, and the data are compiled once every two years.

Section 325 of EPCRA provides for administrative and civil penalties. However, because many substances regulated under EPCRA also are regulated under TSCA, compliance with EPCRA regulations may be monitored through the use of enforcement authorities under TSCA. For example, violations of EPCRA requirements can be identified while conducting inspections at facilities under the inspection authorities set forth in section 11 of TSCA. Because states are not authorized under TSCA to conduct such compliance monitoring activities, personnel in EPA regional offices usually do so.

CLEAN AIR ACT (CAA)

The Clean Air Act (CAA) was passed and later amended by the Clean Air Act Amendments (CAAA) of 1990, with the goal of protecting and enhancing the nation's air resources. Regulations in 40 CFR parts 1-99 were promulgated under this law and amendments. Under the law, each state must develop an implementation plan to identify sources of air pollution and implement measures to meet federal air quality standards. States historically have required sources of air pollutants to obtain preconstruction and operating permits. The three other major provisions of the CAA that apply to the chemical manufacturing industry are: (1) the new source performance standards (NSPS), (2) the national emissions standards for hazardous air pollutants (NESHAPS), and (3) the permit program under Title V of the act.

The NSPS and NESHAPS both establish specific emissions standards that are based on the use of available air pollution control technologies. The NSPS establish uniform emissions standards for new stationary sources that fall within particular categories of industrial sources. NSPS are based on the performance of the best available control technology for each category of industrial source, but allow affected industries to develop alternative, equivalent means of controlling emissions that are cost-effective. NESHAPS are standards that apply to emissions of hazardous air pollutants (HAP) for various categories of industrial sources and require the use of the maximum available control technology (MACT). The MACT is defined as the control technology that achieves the maximum degree of reduction in the emissions of HAPs, in light of cost and other considerations. The MACT source category descriptions do not match SIC codes for most source categories. Source Classification Codes (SCC) developed by the EPA Office of Air Quality Planning and Standards (OAQPS) that are used to describe operations of a facility that produce air emissions have been assigned to all MACT source categories.

OAQPS compiles the National Toxics Inventory (NTI). The NTI compiles inventory data on emissions from major, area, and mobile sources for the 188 HAPs. Emissions in NTI are generated from MACT data, state and local HAP inventory data, TRI data, and emissions factors and activity data. Nationally, mobile sources account for approximately 40 percent of the emissions in the NTI, area sources for 35 percent, and major sources for 25 percent. TRI data account for approximately 50 percent of the major emissions in NTI.

The Title V permit program, mandated by the CAAA of 1990, requires all major sources of air pollutants to submit a permit application and obtain a permit to control emissions. Major sources are defined as sources that emit more than specified threshold amounts of HAPs or other designated air pollutants, such as volatile organic compounds or particulate matter. Before the inception of the Title V program, the states required various preconstruction, operating, and other permits for sources of air pollutants. Title V permits are designed to address all sources of emissions from an affected major source, including fugitive emissions, under a single, consolidated permit. Under the program, states obtain authorization to implement the program; once authorized, the

states then review and issue permits. Although Title V permits are intended to supersede permits issued under state authority only, facilities that are not subject to Title V still are required to obtain such permits.

EPA and the states determine compliance with the provisions of the CAA largely through inspections conducted under section 114(a) of the CAA or analogous state authorities. Inspectors from EPA regional offices and, less frequently, states conduct inspections of stationary sources, such as those associated with chemical industry facilities. The compliance inspections focus on recordkeeping and other compliance activities, such as continuous emissions monitoring, associated with the requirements of the CAA.

CLEAN WATER ACT (CWA)

The Federal Water Pollution Control Act (more commonly known as the CWA) was enacted in 1972 to protect the navigable waterways of the U.S. Regulations promulgated under this legislation are found in 40 CFR parts 100-129 and parts 400-503. For the sake of convenience, the term CWA will be considered here to encompass all related legislation and amendments not mentioned herein. The major provisions of the CWA that apply to the chemical manufacturing industry are the National Pollutant Discharge Elimination System (NPDES) permit program and pretreatment requirements for discharges to a publicly-owned treatment works (POTW).

The NPDES permitting program requires each facility that discharges to a surface water body to prepare and submit a permit application that covers point-source discharges (for example, from a pipe) to surface water. NPDES permits require that facilities conduct monitoring for priority pollutants, which include various toxic pollutants, and for conventional and nonconventional pollutants. Conventional pollutants include indicators of activities that may compromise the chemical, physical, and biological characteristics of surface water, including fecal coliform bacteria, total suspended solids, and oil and grease. Nonconventional pollutants include any other pollutants deemed pertinent by EPA or a state that are not priority or conventional pollutants. In addition to the NPDES permit program for point-source discharges to surface water, EPA has established similar programs for nonpoint-source discharges from stormwater runoff or discharges that may affect groundwater. Although the NPDES permitting program is a federal program, most states have obtained authorization to implement and enforce the program.

The CWA also established a pretreatment program that regulates indirect discharges to POTWs by "industrial users." The purpose of the program is to prevent discharges that will have adverse effects on the operation of POTWs, that is, to ensure that POTWs can treat incoming wastewaters adequately to meet their discharge limits under NPDES permits. Under the pretreatment program, EPA has established general pretreatment standards (for example, the discharge of hazardous waste is prohibited) and industry-specific discharge limits. Finally, the pretreatment program includes local discharge limits established by the POTW.

EPA and state personnel monitor compliance through field inspections and through analysis of the results of self-monitoring conducted by regulated facilities. Field inspections conducted under the authority of section 308(a) of the CWA include compliance inspections conducted primarily by inspectors representing states or, less frequently, EPA regional offices. Under the CWA, compliance monitoring activities at chemical facilities consist of field inspections and record reviews. The inspections focus on compliance with the requirements of NPDES permits, but also may include an evaluation of pretreatment discharges to POTWs.

SAFE DRINKING WATER ACT (SDWA)

The Safe Drinking Water Act (SDWA) was passed in 1974 to protect the nation's drinking water supplies and was reauthorized most recently in 1996. For the sake of convenience, the term SDWA will be considered here to encompass all related legislation and amendments not mentioned herein. Regulations promulgated under this law are found in 40 CFR parts 130-149. The law establishes two programs that affect the chemical manufacturing industry: the national drinking water standards and the underground injection control (UIC) program.

EPA established the national drinking water standards as chemical-specific concentration limits for groundwater or surface water that is to be used as a source of drinking water for a public water supply. EPA has established maximum contaminant level goals (MCLG) for a number of organic and inorganic chemicals. MCLGs are health-based limits on concentrations that are not enforceable. For regulatory purposes, EPA has established maximum contaminant levels (MCL), which are enforceable limits set as close to the MCLGs as possible, considering cost and feasibility of attainment. The significance of MCLs and MCLGs to the chemical manufacturing industry is that they often are used as cleanup levels for remedial actions performed under CERCLA, RCRA, or state authorities.

The UIC program encompasses regulations, established under 40 CFR parts 144 through 148, that require facilities to obtain permits for subsurface discharges through underground injection wells. The program requires that facilities develop and submit permit applications and obtain permits that specify design, operating, inspection, and monitoring requirements for underground injection wells. The permit program is implemented initially by EPA, with the states able to apply for and obtain authorization to implement their own programs.

Under the SDWA, compliance monitoring is performed through a combination of self-monitoring and inspections conducted by EPA regional and state personnel. Under the SDWA, regulated facilities are required to conduct self-monitoring at frequencies ranging from daily to annual, and report the results of that monitoring, often monthly, to EPA or the state. Facilities usually submit such monitoring results to the state, since most states have primary responsibility for the regulations issued under the act. State (and occasionally EPA) personnel also conduct inspections under the authority of section 300j-4 of the SDWA. Those inspections typically focus on whether the facility is using required treatment techniques but may include sampling of water supplies. Usually, such sampling is focused on biological indicators, in consideration of the biological agent's potential acute effects on human health.

TOXIC SUBSTANCES CONTROL ACT (TSCA)

The Toxic Substances Control Act (TSCA) was enacted in 1976; its primary purpose is to regulate the manufacture, import, processing in commerce, and use of chemicals in the U.S. For the sake of convenience, the term TSCA will be considered here to encompass all related legislation and amendments not mentioned herein. These regulations are found in 40 CFR parts 700-789. Under TSCA, EPA collects data to determine whether new and existing chemicals are safe for distribution and use. Drawing on the information it collects, EPA has established an inventory of chemicals that are approved without restriction for use or import.

One of the major provisions of TSCA that affects the chemical manufacturing industry is the requirement for premanufacture notice (PMN). Chemical manufacturing facilities must submit a PMN before manufacturing any chemical that is not in the existing chemical inventory or that has not been excluded by EPA from the listing requirement. The PMN must identify the chemical and provide available information on health and environmental effects. If EPA deems the information insufficient, EPA may place restrictions, such as labeling requirements, on use of the chemical until sufficient data are available.

EPA may ban the manufacture or distribution in commerce of existing chemicals if they pose unreasonable risks. EPA may limit the use of such chemicals and require labeling or place other restrictions on chemicals, such as those that currently apply to asbestos, chlorofluorocarbons, and polychlorinated biphenyls (PCB). For example, regulations under 40 CFR part 761 set forth management standards for storage, marking and labeling requirements, and regulations that specify required treatment technologies for the disposal of materials that contain PCBs.

Under TSCA, compliance monitoring activities at chemical facilities encompass field inspections for the most part conducted by EPA regional offices. The inspections focus on reporting and recordkeeping requirements under TSCA sections 5 and 8. However, most PCB and asbestos inspections are conducted by the states under grants from EPA.

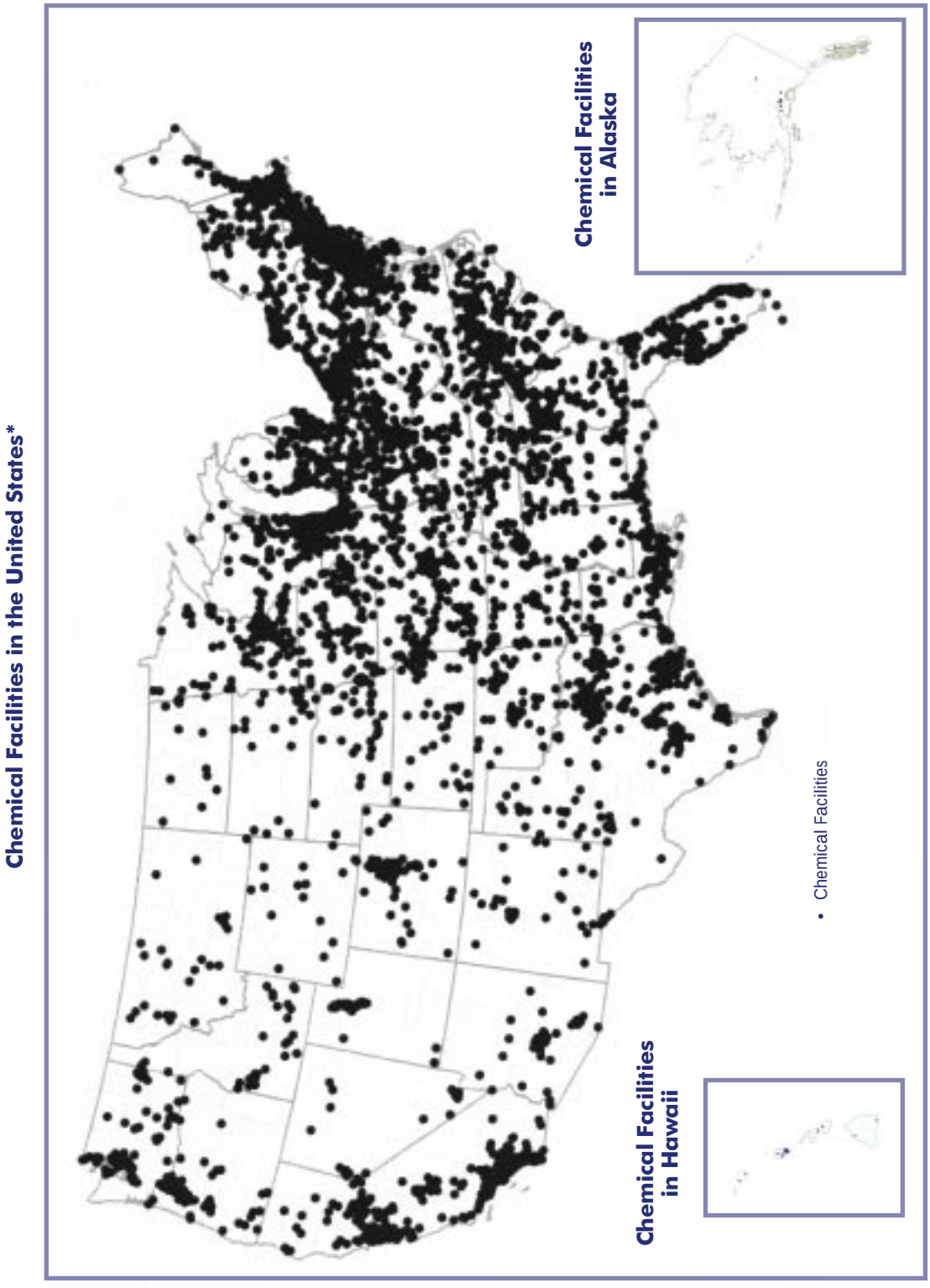
FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA)

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which was enacted in 1947, authorized the U.S. Department of Agriculture to monitor the use and sale of pesticides in the U.S. The law was concerned primarily with efficacy and the registering and labeling of pesticides. The Federal Environmental Pesticide Control Act (FEPCA) of 1972 mandated that EPA regulate the use and sale of pesticides to protect human health and preserve the environment. Specifically, EPA is authorized to: (1) strengthen the registration process by shifting the burden of proof to the chemical manufacturer, (2) enforce compliance against banned and unregistered products, and (3) promulgate the regulatory framework that had been missing from FIFRA. For the sake of convenience, the term FIFRA will be considered here to encompass all related legislation and amendments not mentioned herein. Regulations under these laws and their numerous amendments are found in 40 CFR parts 150-189.

FIFRA provides EPA with the authority to oversee the sale and use of pesticides and other products intended to kill or control living organisms, such as insects, weeds, and rodents. Under FIFRA, EPA requires that pesticides be registered and, through the registration process, collects data to be used in evaluating the risks posed by pesticides. As necessary, EPA may suspend, ban, or restrict the use of pesticides that pose a threat to human health or the environment. Under FIFRA, a chemical manufacturer that wishes to sell or distribute a pesticide must submit test data, information about proposed uses, and suggested labeling in support of the application for registration. Once a product has been registered, producers must report annual production of the product. The act also grants EPA inspection authority and enables the agency to take enforcement action against facilities that are not in compliance with applicable regulations.

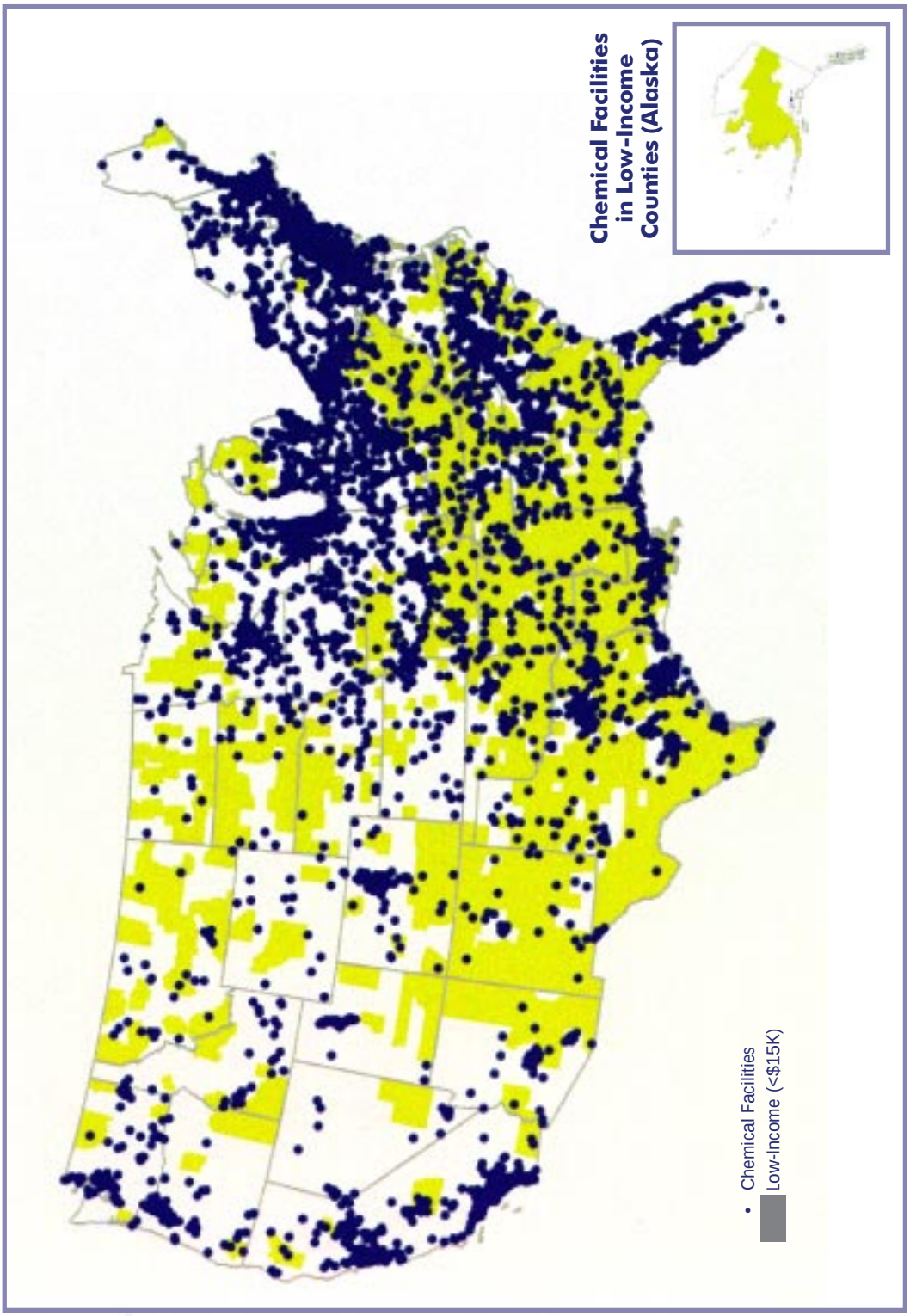
Section 9 of FIFRA authorizes representatives of EPA or duly designated states to inspect facilities, subject to the provisions of the law. The inspections usually are conducted by the states, either in states that have been delegated authority by EPA, or states that have entered into cooperative enforcement agreements with EPA. The inspections focus on pesticide applicators.

APPENDIX D — Location of Chemical Facilities



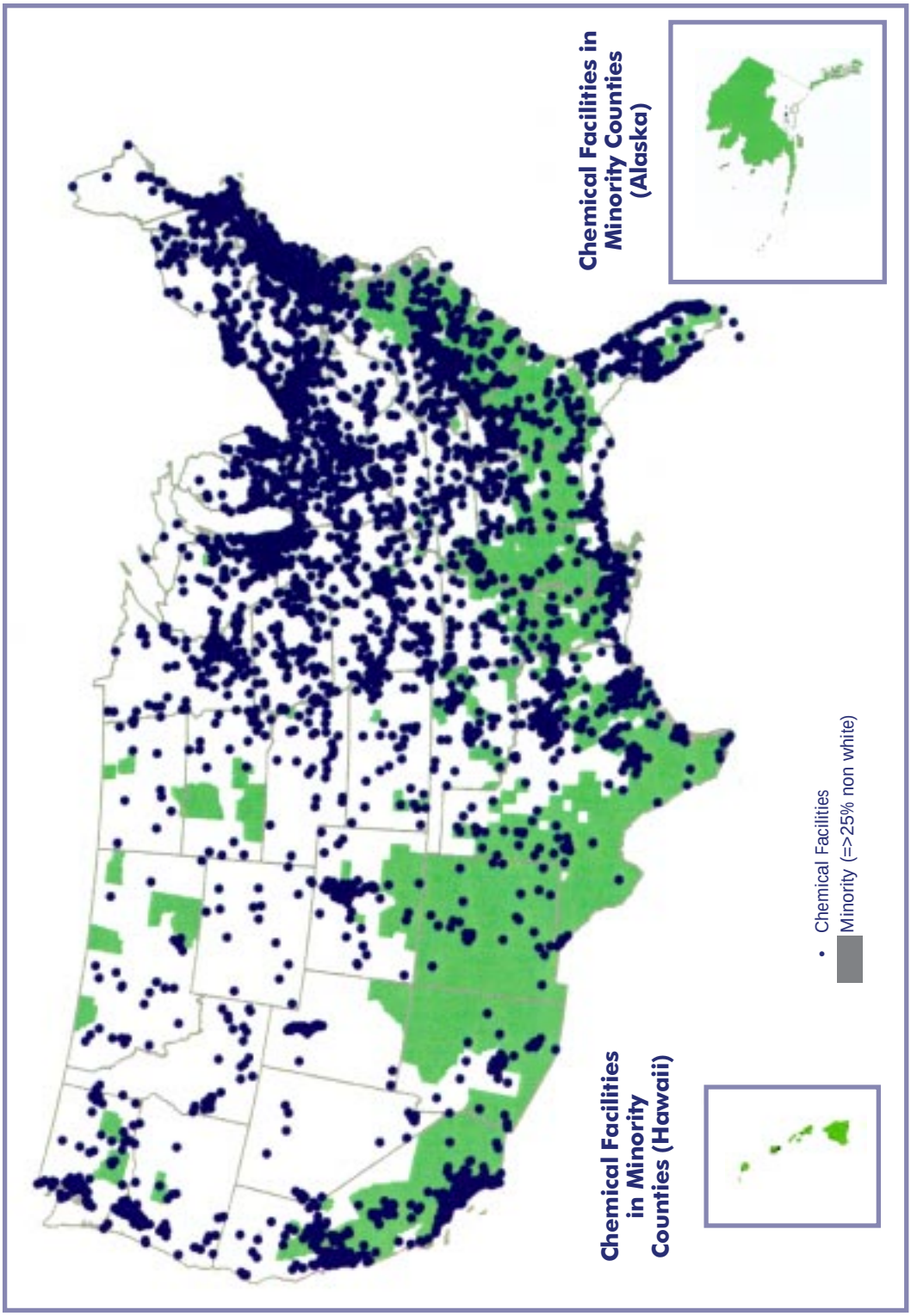
* EPA Office of Environmental Justice Database, 1994.

Chemical Facilities in Low-Income Counties*



* EPA Office of Environmental Justice Database, 1994.

Chemical Facilities in Minority Counties*



* EPA Office of Environmental Justice Database, 1994.

APPENDIX E — TRI Releases and Transfers by Four-Digit SIC Code*

Summary of Total TRI Releases, 1990 to 1994

Year	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Releases (Pounds)
1990	210,819,863	510,632,159	135,601,832	689,183,214	121,655,176	1,667,892,244
1991	198,163,102	449,890,383	190,970,875	655,110,548	107,440,474	1,601,575,382
1992	167,018,774	424,494,685	226,779,186	684,646,025	88,447,993	1,591,386,663
1993	159,683,683	337,140,924	234,877,413	536,444,507	84,052,350	1,352,198,877
1994	128,787,598	339,099,013	42,581,139	335,363,603	96,234,850	942,066,203

Summary of Total Carcinogenic Releases, 1990 to 1994

Year	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Releases (Pounds)
1990	9,761,363	16,626,780	1,068,640	37,131,546	623,367	65,211,696
1991	8,277,786	13,674,746	711,656	34,082,426	545,827	57,292,441
1992	8,282,614	11,637,133	697,158	33,446,210	368,657	54,431,772
1993	7,587,899	9,463,537	770,118	31,411,350	881,268	50,114,172
1994	7,371,994	9,998,971	670,101	35,990,037	804,774	54,835,877

Summary of Total TRI Transfers, 1990 to 1994

Year	POTW (Pounds)	Other Transfers (Pounds)	Disposal (Pounds)	Energy Recovery (Pounds)	Other (Pounds)	Recycling (Pounds)	Treatment (Pounds)	Total Transfers (Pounds)
1990	288,415,312	258,623,644	73,940,671	766,886	2,588,666	2,351,777	178,975,644	805,662,600
1991	227,725,275	995,491,849	52,583,314	326,071,090	2,505,857	422,043,659	192,287,929	2,218,708,973
1992	218,494,790	1,017,294,638	47,521,490	352,025,459	1,390,758	441,879,758	174,477,173	2,253,084,066
1993	181,377,222	1,005,198,647	42,031,991	366,953,724	135,211	429,500,308	166,577,413	2,191,774,516
1994	148,808,996	885,589,514	38,728,766	357,897,675	475,471	299,568,131	188,919,471	1,919,988,024

* EPA 1990-1994 Toxics Release Inventory (TRI) Database on TRI Releases and Transfers

1990 - Total Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Releases in 1990 (Pounds)
2800	90,645	557,228	41,306	0	10,600	699,779
Total 280	**90,645**	**557,228**	**41,306**	**0**	**10,600**	**699,779**
2812	88,342	486,291	7,812	0	4,674	587,119
2813	471,487	789,612	37,760	15	11,322	1,310,196
2815	18,235	7,677	0	0	0	25,912
2816	522,180	21,349,448	140,425	83,000,000	234,969	105,247,022
2819	3,658,753	16,575,943	2,577,643	12,477,398	30,342,351	65,632,088
Total 281	**4,758,997**	**39,208,971**	**2,763,640**	**95,477,413**	**30,593,316**	**172,802,337**
2821	14,382,284	22,651,210	908,547	50	44,469	37,986,560
2822	6,032,509	8,279,179	49,011	0	36,918	14,397,617
2823	2,355,480	6,814,916	138,031	0	283,750	9,592,177
2824	296,599	1,197,316	82,426	163,715	7,962	1,748,018
Total 282	**23,066,872**	**38,942,621**	**1,178,015**	**163,765**	**373,099**	**63,724,372**
2830	49,323	321,870	4,025	0	0	375,218
2831	7,293	505	0	5	20	7,823
2833	4,286,614	5,392,662	3,645,232	15	268,103	13,592,626
2834	5,191,393	15,725,170	744,056	6,962,036	7,199	28,629,854
2835	7,398	17,380	10	0	0	24,788
2836	8,577	289,431	0	0	0	298,008
2839	3,802	19,556	0	0	5	23,363
Total 283	**9,554,400**	**21,766,574**	**4,393,323**	**6,962,056**	**275,327**	**42,951,680**
2840	3,005	2,260	10	0	10	5,285
2841	416,451	839,184	545	5	994	1,257,179
2842	310,360	142,407	7,136	40	26,805	486,748
2843	1,020,926	915,349	3,677	18,820	17,689	1,976,461
2844	52,605	154,681	275	0	6	207,567
Total 284	**1,803,347**	**2,053,881**	**11,643**	**18,865**	**45,504**	**3,933,240**
2850	4,550	1,000	0	0	0	5,550
2851	6,862,514	12,219,239	5,541	6,477	97,505	19,191,276
Total 285	**6,867,064**	**12,220,239**	**5,541**	**6,477**	**97,505**	**19,196,826**
2860	27,666	113,866	45,589	0	0	187,121
2861	71,568	343,947	2,193	0	591	418,299
2864	3,400	525	0	0	0	3,925
2865	2,507,622	5,919,423	207,809	3,283,935	684,572	12,603,361
2869	26,483,815	39,674,073	4,409,364	108,404,087	983,219	179,954,558
Total 286	**29,094,071**	**46,051,834**	**4,664,955**	**111,688,022**	**1,668,382**	**193,167,264**
2873	4,518,398	86,585,314	6,991,908	5,020,050	939,782	104,055,452
2874	603,661	3,675,373	837,368	0	16,915,549	22,031,951
2875	66,429	2,212,619	3,250	0	458,447	2,740,745
2879	1,072,121	2,008,184	224,149	1,232,254	84,593	4,621,301
Total 287	**6,260,609**	**94,481,490**	**8,056,675**	**6,252,304**	**18,398,371**	**133,449,449**
2890	7,179	4,029	25	0	0	11,233
2891	1,401,852	1,677,702	6,689	15	2,515	3,088,773
2892	1,220,118	1,906,468	73,274	5	153,507	3,353,372
2893	1,004,869	1,132,874	500	0	843	2,139,086
2895	33,521	14,199,854	10	0	818,164	15,051,549
2899	1,579,026	2,511,706	12,654	105	7,800	4,111,291
Total 289	**5,246,565**	**21,432,633**	**93,152**	**125**	**982,829**	**27,755,304**
Multiple SIC with 2800 *	**124,077,293**	**233,916,688**	**114,393,582**	**468,614,187**	**69,210,243**	**1,010,211,993**
TOTAL	**210,819,863**	**510,632,159**	**135,601,832**	**689,183,214**	**121,655,176**	**1,667,892,244**

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

1991 - Total Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Releases in 1991 (Pounds)
2800	137,837	473,077	28,708	0	0	639,622
Total 280	**137,837**	**473,077**	**28,708**	**0**	**0**	**639,622**
2810	5	250	0	0	960	1,215
2812	179,673	444,634	2,621	0	3,452	630,380
2813	1,396,128	729,072	35,005	1	10,204	2,170,410
2815	36,892	3,250	0	0	0	40,142
2816	1,566,068	19,369,531	224,166	93,000,000	303,865	114,463,630
2819	3,595,171	14,374,103	2,656,924	20,459,620	27,241,763	68,327,581
Total 281	**6,773,937**	**34,920,840**	**2,918,716**	**113,459,621**	**27,560,244**	**185,633,358**
2821	12,948,735	17,501,180	669,052	250	68,306	31,187,523
2822	6,720,498	8,908,229	36,007	22,000,000	25,045	37,689,779
2823	43,560	3,313,730	137,600	0	111,500	3,606,390
2824	204,056	1,158,423	68,683	305,585	8,679	1,745,426
Total 282	**19,916,849**	**30,881,562**	**911,342**	**22,305,835**	**213,530**	**74,229,118**
2830	20,915	18,010	0	0	0	38,925
2831	10,056	10,095	0	0	0	20,151
2833	3,379,794	3,962,116	3,576,151	0	255,652	11,173,713
2834	4,135,902	15,471,856	963,160	5,615,735	1,478	26,188,131
2835	5,843	12,790	0	0	0	18,633
2836	8,290	209,452	0	0	5	217,747
Total 283	**7,560,800**	**19,684,319**	**4,539,311**	**5,615,735**	**257,135**	**37,657,300**
2840	5	5	0	0	0	10
2841	79,063	697,807	255	0	260	777,385
2842	297,228	175,928	4,519	0	2,306	479,981
2843	454,861	847,524	1,420	19,473	521	1,323,799
2844	50,971	113,389	63	0	1,530	165,953
Total 284	**882,128**	**1,834,653**	**6,257**	**19,473**	**4,617**	**2,747,128**
2850	3,600	450	0	0	0	4,050
2851	6,587,331	7,144,921	5,714	2	26,726	13,764,694
2859	250	0	0	0	0	250
Total 285	**6,591,181**	**7,145,371**	**5,714**	**2**	**26,726**	**13,768,994**
2860	49,995	134,015	28,474	0	0	212,484
2861	39,160	66,921	1,258	0	0	107,339
2864	1,995	600	0	0	0	2,595
2865	2,109,539	7,166,509	1,554,965	3,720,102	518,886	15,070,001
2869	22,754,286	36,725,032	4,130,454	97,033,953	817,826	161,461,551
Total 286	**24,954,975**	**44,093,077**	**5,715,151**	**100,754,055**	**1,336,712**	**176,853,970**
2871	31,093	0	0	0	0	31,093
2873	5,250,237	68,966,971	8,040,992	2,930,171	2,094,530	87,282,901
2874	2,898,146	5,274,052	763,659	0	28,504,741	37,440,598
2875	68,164	1,954,549	1,015	0	1,452	2,025,180
2879	535,158	1,163,257	105,600	878,563	28,760	2,711,338
Total 287	**8,782,798**	**77,358,829**	**8,911,266**	**3,808,734**	**30,629,483**	**129,491,110**
2890	4,815	4,020	0	0	500	9,335
2891	947,027	1,615,400	1,774	0	3,814	2,568,015
2892	1,211,281	1,683,336	72,913	0	130,517	3,098,047
2893	653,043	829,126	408	0	133	1,482,710
2895	16,070	13,835,953	255	0	306,092	14,158,370
2899	2,941,528	1,882,776	50,736	0	101,304	4,976,344
Total 289	**5,773,764**	**19,850,611**	**126,086**	**0**	**542,360**	**26,292,821**
Multiple SIC with 2800	**116,788,833**	**213,648,044**	**167,808,324**	**409,147,093**	**46,869,667**	**954,261,961**
TOTAL	**198,163,102**	**449,890,383**	**190,970,875**	**655,110,548**	**107,440,474**	**1,601,575,382**

1992 - Total Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Releases in 1992 (Pounds)
2800	95,830	506,984	28,769	0	0	631,583
2803	0	400	0	0	0	400
Total 280	**95,830**	**507,384**	**28,769**	**0**	**0**	**631,983**
2812	134,749	479,095	3,294	0	54,150	671,288
2813	1,068,843	802,029	18,427	0	14,000	1,903,299
2815	12,392	255	0	0	0	12,647
2816	1,444,351	15,113,409	286,918	99,000,000	193,931	116,038,609
2819	2,346,995	14,357,847	2,645,525	25,858,280	17,366,489	62,575,136
Total 281	**5,007,330**	**30,752,635**	**2,954,164**	**124,858,280**	**17,628,570**	**181,200,979**
2821	10,238,611	14,992,043	599,108	0	226,361	26,056,123
2822	4,113,729	7,160,521	33,927	0	31,002	11,339,179
2823	1,642,515	22,510,260	158,500	0	100	24,311,375
2824	146,833	178,798	5	0	0	325,636
2829	0	67,950	0	0	290,900	358,850
Total 282	**16,141,688**	**44,909,572**	**791,540**	**0**	**548,363**	**62,391,163**
2830	23,605	17,025	0	0	0	40,630
2831	272	2,997	0	0	0	3,269
2833	1,723,617	5,755,775	2,859,624	0	134,899	10,473,915
2834	2,086,210	11,294,923	361,030	5,725,395	24,773	19,492,331
2835	5,234	10,117	5	0	0	15,356
2836	5,708	266,659	0	0	0	272,367
Total 283	**3,844,646**	**17,347,496**	**3,220,659**	**5,725,395**	**159,672**	**30,297,868**
2841	45,284	464,283	1,005	0	510	511,082
2842	139,700	169,192	5,131	0	2,261	316,284
2843	740,402	698,587	260	21,962	539	1,461,750
2844	54,705	50,837	26	0	5	105,573
Total 284	**980,091**	**1,382,899**	**6,422**	**21,962**	**3,315**	**2,394,689**
2850	3,300	250	0	0	0	3,550
2851	6,978,976	5,514,856	5,391	198	6,203	12,505,624
2856	2,600	3,500	5	0	5	6,110
2857	250	0	0	0	0	250
Total 285	**6,985,876**	**5,519,356**	**5,396**	**198**	**6,208**	**12,517,034**
2861	50,536	69,986	1,257	0	1,500	123,279
2863	250	5	0	0	0	255
2864	630	150	0	0	0	780
2865	2,789,527	8,061,275	2,540,582	3,328,401	776,704	17,496,489
2869	22,911,390	31,547,174	1,074,338	86,800,110	707,868	143,040,880
Total 286	**25,752,333**	**39,678,590**	**3,616,177**	**90,128,511**	**1,486,072**	**160,661,683**
2871	33,645	0	0	0	0	33,645
2873	4,551,914	55,460,310	7,530,825	2,333,034	1,237,308	71,113,391
2874	1,114,034	5,326,300	14,323,877	0	25,573,902	46,338,113
2875	66,084	1,682,084	2,263	0	3,069	1,753,500
2879	324,854	1,510,737	55,586	720,310	69,620	2,681,107
Total 287	**6,090,531**	**63,979,431**	**21,912,551**	**3,053,344**	**26,883,899**	**121,919,756**
2881	16,715	49,180	512	0	0	66,407
Total 288	**16,715**	**49,180**	**512**	**0**	**0**	**66,407**
2890	1,005	1,005	0	0	1,500	3,510
2891	1,000,083	1,649,426	276	0	1,920	2,651,705
2892	670,820	1,893,470	204,626	0	69,009	2,837,925
2893	472,771	798,507	143	0	250	1,271,671
2895	13,107	20,080,154	255	250	0	20,093,766
2899	2,482,780	1,674,021	7,302	0	41,350	4,205,453
Total 289	**4,640,566**	**26,096,583**	**212,602**	**250**	**114,029**	**31,064,030**
Multiple SIC with 2800	**97,463,168**	**194,271,559**	**194,030,394**	**460,858,085**	**41,617,865**	**988,241,071**
TOTAL	**167,018,774**	**424,494,685**	**226,779,186**	**684,646,025**	**88,447,993**	**1,591,386,663**

1993 - Total Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Releases in 1993 (Pounds)
2810	250	250	0	0	0	500
2812	111,412	401,909	3,378	0	4,883	521,582
2813	1,101,709	371,321	22,168	0	447	1,495,645
2815	250	0	0	0	0	250
2816	1,041,302	10,365,044	471,846	105,000,000	1,188,049	118,066,241
2819	2,952,647	8,184,751	2,050,444	17,045,733	16,957,677	47,191,252
Total 281	**5,207,570**	**19,323,275**	**2,547,836**	**122,045,733**	**18,151,056**	**167,275,470**
2821	8,572,467	14,198,390	708,085	0	563,473	24,042,415
2822	4,692,470	3,513,034	41,244	0	36,490	8,283,238
2823	2,042,515	23,859,760	141,900	0	30	26,044,205
2824	622,330	307,545	53,900	238,020	14,304	1,236,099
Total 282	**15,929,782**	**41,878,729**	**945,129**	**238,020**	**614,297**	**59,605,957**
2833	722,709	1,971,226	153,891	0	17,948	2,865,774
2834	2,027,235	6,663,842	416,919	3,521,999	120,416	12,750,411
2835	4,927	12,738	0	0	0	17,665
2836	8,526	237,961	0	0	0	246,487
Total 283	**2,763,397**	**8,885,767**	**570,810**	**3,521,999**	**138,364**	**15,880,337**
2841	45,692	224,045	250	0	760	270,747
2842	197,953	158,725	7,633	0	1,770	366,081
2843	331,773	703,102	0	18,378	29	1,053,282
2844	39,955	44,740	21	0	1	84,717
Total 284	**615,373**	**1,130,612**	**7,904**	**18,378**	**2,560**	**1,774,827**
2851	6,176,453	5,045,801	10,601	0	26,089	11,258,944
Total 285	**6,176,453**	**5,045,801**	**10,601**	**0**	**26,089**	**11,258,944**
2861	51,592	184,616	755	0	0	236,963
2864	150	0	0	0	0	150
2865	1,497,256	4,291,295	278,384	3,774,950	654,720	10,496,605
2869	23,275,356	27,837,384	1,347,705	81,428,835	500,968	134,390,248
Total 286	**24,824,354**	**32,313,295**	**1,626,844**	**85,203,785**	**1,155,688**	**145,123,966**
2873	3,906,227	43,913,903	6,411,935	1,942,860	131,327	56,306,252
2874	484,466	4,360,336	435,778	0	18,300,315	23,580,895
2875	67,997	1,312,554	3,785	0	4,505	1,388,841
2879	259,324	849,112	28,971	800,632	401,686	2,339,725
Total 287	**4,718,014**	**50,435,905**	**6,880,469**	**2,743,492**	**18,837,833**	**83,615,713**
2889	1,910	24	0	0	0	1,934
Total 288	**1,910**	**24**	**0**	**0**	**0**	**1,934**
2891	825,006	1,555,058	24	0	41,550	2,421,638
2892	1,006,802	519,262	276,479	0	17,487	1,820,030
2893	283,825	633,075	124	0	250	917,274
2895	3,312	18,403,046	255	250	0	18,406,863
2899	1,943,148	1,503,669	10,561	0	11,954	3,469,332
Total 289	**4,062,093**	**22,614,110**	**287,443**	**250**	**71,241**	**27,035,137**
Multiple SIC with 2800	**95,384,737**	**155,513,406**	**222,000,377**	**322,672,850**	**45,055,222**	**840,626,592**
TOTAL	**159,683,683**	**337,140,924**	**234,877,413**	**536,444,507**	**84,052,350**	**1,352,198,877**

1994 - Total Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Releases in 1994 (Pounds)
2812	87,784	337,718	1,901	0	193	427,596
2813	603,521	808,137	25,755	0	0	1,437,413
2816	1,273,758	8,439,962	581,143	57,000,500	2,580,160	69,875,523
2819	2,536,197	7,447,910	607,140	15,348,569	14,887,432	40,827,248
Total 281	**4,501,260**	**17,033,727**	**1,215,939**	**72,349,069**	**17,467,785**	**112,567,780**
2821	9,095,159	15,685,373	688,594	0	28,598	25,497,724
2822	4,295,357	3,364,459	84,544	0	35,570	7,779,930
2823	2,042,515	22,424,260	149,950	0	16	24,616,741
2824	**402,516**	**225,203**	**12,026**	**84,050**	**1,213**	**725,008**
Total 282	**15,835,547**	**41,699,295**	**935,114**	**84,050**	**65,397**	**58,619,403**
2831	750	6,850	5	0	0	7,605
2833	688,590	1,599,848	224,733	0	160	2,513,331
2834	1,180,844	7,437,326	687,406	6,826,250	174,994	16,306,820
2835	**4,433**	**12,320**	**0**	**0**	**0**	**16,753**
2836	31,909	3,484	0	0	0	35,393
Total 283	**1,906,526**	**9,059,828**	**912,144**	**6,826,250**	**175,154**	**18,879,902**
2841	48,034	206,094	0	0	10	254,138
2842	89,925	159,322	2,282	0	1,508	253,037
2843	616,316	580,985	205	15,431	33,996	1,246,933
2844	29,249	5,597	250	0	0	35,096
Total 284	**783,524**	**951,998**	**2,737**	**15,431**	**35,514**	**1,789,204**
2850	750	2,550	0	0	0	3,300
2851	6,089,063	3,735,387	3,828	0	13,909	9,842,187
2859	250	250	0	0	0	500
Total 285	**6,090,063**	**3,738,187**	**3,828**	**0**	**13,909**	**9,845,987**
2860	15	750	0	0	0	765
2861	8,899	17,146	1,005	0	0	27,050
2863	5	5	0	0	0	10
2865	1,340,990	4,357,686	289,833	4,215,300	212,881	10,416,690
2869	19,845,942	25,269,722	718,209	48,446,070	936,935	95,216,878
Total 286	**21,195,851**	**29,645,309**	**1,009,047**	**52,661,370**	**1,149,816**	**105,661,393**
2873	4,006,831	44,444,498	4,310,700	1,803,927	44,748	54,610,704
2874	726,442	5,619,743	1,199,931	0	21,166,341	28,712,457
2875	155,286	1,128,094	2,765	0	4,539	1,290,684
2879	242,427	1,213,341	63,125	587,361	3,215	2,109,469
Total 287	**5,130,986**	**52,405,676**	**5,576,521**	**2,391,288**	**21,218,843**	**86,723,314**
2890	330	5,150	0	0	0	5,480
2891	598,525	971,967	785	0	600	1,571,877
2892	105,393	57,825	193,689	0	166,826	523,733
2893	258,434	699,640	121	0	250	958,445
2895	3,639	20,413,961	1,010	0	0	20,418,610
2899	1,390,532	1,392,426	47,422	0	87,945	2,918,325
Total 289	**2,356,853**	**23,540,969**	**243,027**	**0**	**255,621**	**26,396,470**
Multiple SIC with 2800	**70,986,988**	**161,024,024**	**32,682,782**	**201,036,145**	**55,852,811**	**521,582,750**
TOTAL	**128,787,598**	**339,099,013**	**42,581,139**	**335,363,603**	**96,234,850**	**942,066,203**

1990 - Carcinogenic Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Carcinogenic Release in 1990 (Pounds)
2800	3,945	3,888	84	0	10,600	18,517
Total 280	**3,945**	**3,888**	**84**	**0**	**10,600**	**18,517**
2812	335	15,552	1,060	0	0	16,947
2813	484	3,442	3,480	0	0	7,406
2815	250	250	0	0	0	500
2816	1,535	1,250	0	0	0	2,785
2819	9,328	211,594	1,147	5	14,770	236,844
Total 281	**11,932**	**232,088**	**5,687**	**5**	**14,770**	**264,482**
2821	1,700,091	3,872,303	326,053	15	11,145	5,909,607
2822	1,284,415	2,024,480	29,497	0	25,279	3,363,671
2823	18,817	32,566	2,223	0	0	53,606
2824	60,684	58,242	12,921	43,070	5	174,922
Total 282	**3,064,007**	**5,987,591**	**370,694**	**43,085**	**36,429**	**9,501,806**
2830	250	750	0	0	0	1,000
2833	69,353	291,456	27,955	0	255	389,019
2834	125,115	442,606	265	288,662	21	856,669
Total 283	**194,718**	**734,812**	**28,220**	**288,662**	**276**	**1,246,688**
2841	2,910	2,759	0	0	0	5,669
2842	2,110	1,294	0	5	20	3,429
2843	41,934	37,034	0	0	0	78,968
2844	15,629	250	0	0	0	15,879
Total 284	**62,583**	**41,337**	**0**	**5**	**20**	**103,945**
2851	146,225	71,563	15	5	275	218,083
Total 285	**146,225**	**71,563**	**15**	**5**	**275**	**218,083**
2860	470	628	39	0	0	1,137
2861	1,070	1,957	250	0	0	3,277
2864	1,800	100	0	0	0	1,900
2865	387,705	509,820	2,791	0	9,623	909,939
2869	2,462,050	1,509,006	189,265	7,778,745	48,302	11,987,368
Total 286	**2,853,095**	**2,021,511**	**192,345**	**7,778,745**	**57,925**	**12,903,621**
2873	2,025	3,804	15	0	2,265	8,109
2875	255	8,005	0	0	0	8,260
2879	8,537	102,013	585	5	85	111,225
Total 287	**10,817**	**113,822**	**600**	**5**	**2,350**	**127,594**
2890	500	500	0	0	0	1,000
2891	8,728	141,449	0	0	450	150,627
2892	0	0	0	0	5	5
2893	7,387	16,118	0	0	0	23,505
2899	90,066	69,465	278	20	80	159,909
Total 289	**106,681**	**227,532**	**278**	**20**	**535**	**335,046**
Multiple SIC with 2800	**3,307,360**	**7,192,636**	**470,717**	**29,021,014**	**500,187**	**40,491,914**
TOTAL	**9,761,363**	**16,626,780**	**1,068,640**	**37,131,546**	**623,367**	**65,211,696**

1991- Carcinogenic Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Carcinogenic Release in 1991 (Pounds)
2800	455	4,655	23	0	0	5,133
Total 280	**455**	**4,655**	**23**	**0**	**0**	**5,133**
2812	75	5	770	0	0	850
2813	360	1,550	0	0	0	1,910
2815	10	0	0	0	0	10
2816	255	255	0	0	0	510
2819	9,704	175,391	328	0	0	185,423
Total 281	**10,404**	**177,201**	**1,098**	**0**	**0**	**188,703**
2821	1,414,745	2,849,777	316,796	0	16,253	4,597,571
2822	933,482	1,925,000	17,445	0	16,388	2,892,315
2823	1,540	5,480	0	0	0	7,020
2824	35,565	69,510	15,096	207,685	0	327,856
Total 282	**2,385,332**	**4,849,767**	**349,337**	**207,685**	**32,641**	**7,824,762**
2831	2,200	9,500	0	0	0	11,700
2833	170,760	167,309	23,350	0	5	361,424
2834	30,556	204,336	255	162,500	2	397,649
Total 283	**203,516**	**381,145**	**23,605**	**162,500**	**7**	**770,773**
2841	3,337	2,446	0	0	0	5,783
2842	1,565	1,520	0	0	0	3,085
2843	34,853	48,394	0	0	0	83,247
2844	15,864	0	0	0	5	15,869
Total 284	**55,619**	**52,360**	**0**	**0**	**5**	**107,984**
2851	117,598	86,774	0	0	255	204,627
Total 285	**117,598**	**86,774**	**0**	**0**	**255**	**204,627**
2860	470	718	44	0	0	1,232
2861	546	1,803	251	0	0	2,600
2864	1,970	0	0	0	0	1,970
2865	171,146	535,080	3,172	8,100	13,531	731,029
2869	1,552,971	1,083,489	39,215	5,524,580	17,210	8,217,465
Total 286	**1,727,103**	**1,621,090**	**42,682**	**5,532,680**	**30,741**	**8,954,296**
2873	1,496	4,718	1,375	1,183	16	8,788
2875	250	23,000	0	0	0	23,250
2879	8,630	39,365	250	0	15	48,260
Total 287	**10,376**	**67,083**	**1,625**	**1,183**	**31**	**80,298**
2890	250	500	0	0	0	750
2891	16,508	12,837	0	0	200	29,545
2892	0	5	0	0	0	5
2893	2,116	9,741	0	0	0	11,857
2899	90,251	83,861	15	0	21	174,148
Total 289	**109,125**	**106,944**	**15**	**0**	**221**	**216,305**
Multiple SIC with 2800	**3,658,258**	**6,327,727**	**293,271**	**28,178,378**	**481,926**	**38,939,560**
TOTAL	**8,277,786**	**13,674,746**	**711,656**	**34,082,426**	**545,827**	**57,292,441**

1992 - Carcinogenic Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Carcinogenic Release in 1992 (Pounds)
2800	406	3,455	44	0	0	3,905
2803	0	400	0	0	0	400
Total 280	**406**	**3,855**	**44**	**0**	**0**	**4,305**
2812	80	5	92	0	0	177
2813	800	1,259	0	0	0	2,059
2815	5	0	0	0	0	5
2816	0	7	500	0	0	507
2819	3,639	165,559	173	0	10,001	179,372
Total 281	**4,524**	**166,830**	**765**	**0**	**10,001**	**182,120**
2821	1,302,878	2,372,657	253,261	0	546	3,929,342
2822	976,523	1,762,944	14,299	0	18,272	2,772,038
2824	3,500	170	0	0	0	3,670
Total 282	**2,282,901**	**4,135,771**	**267,560**	**0**	**18,818**	**6,705,050**
2833	200,495	59,639	6,600	0	5	266,739
2834	28,624	122,558	10	217,000	0	368,192
2835	0	5	0	0	0	5
Total 283	**229,119**	**182,202**	**6,610**	**217,000**	**5**	**634,936**
2841	2,663	1,516	0	0	0	4,179
2842	1,431	303	0	0	0	1,734
2843	23,172	37,280	0	0	3	60,455
2844	15,391	0	0	0	0	15,391
Total 284	**42,657**	**39,099**	**0**	**0**	**3**	**81,759**
2851	469,507	105,817	5	0	0	575,329
Total 285	**469,507**	**105,817**	**5**	**0**	**0**	**575,329**
2861	545	15,161	5	0	0	15,711
2864	325	0	0	0	0	325
2865	207,709	396,990	3,716	7,500	12,117	628,032
2869	1,408,246	937,252	42,372	4,608,499	10,651	7,007,020
Total 286	**1,616,825**	**1,349,403**	**46,093**	**4,615,999**	**22,768**	**7,651,088**
2873	1,350	4,105	25	176	19,005	24,661
2875	250	24,250	0	0	0	24,500
2879	4,862	12,475	167	0	10	17,514
Total 287	**6,462**	**40,830**	**192**	**176**	**19,015**	**66,675**
2881	15,000	44,600	250	0	0	59,850
Total 288	**15,000**	**44,600**	**250**	**0**	**0**	**59,850**
2890	250	250	0	0	250	750
2891	8,990	14,015	0	0	200	23,205
2892	5	0	0	0	0	5
2893	2,100	1,000	0	0	0	3,100
2899	62,749	66,948	20	0	457	130,174
Total 289	**74,094**	**82,213**	**20**	**0**	**907**	**157,234**
Multiple SIC with 2800	**3,541,119**	**5,486,513**	**375,619**	**28,613,035**	**297,140**	**38,313,426**
TOTAL	**8,282,614**	**11,637,133**	**697,158**	**33,446,210**	**368,657**	**54,431,772**

1993 - Carcinogenic Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Carcinogenic Release in 1993 (Pounds)
2812	80	5	33	0	0	118
2813	784	2,020	0	0	0	2,804
2819	3,131	32,679	14	0	9,760	45,584
Total 281	**3,995**	**34,704**	**47**	**0**	**9,760**	**48,506**
2821	1,036,471	2,298,073	242,534	0	236,727	3,813,805
2822	1,093,809	1,426,243	21,860	0	26,295	2,568,207
2824	55,725	69,895	18,000	127,385	0	271,005
Total 282	**2,186,005**	**3,794,211**	**282,394**	**127,385**	**263,022**	**6,653,017**
2833	18,490	5,681	680	0	0	24,851
2834	30,633	98,251	5	77,005	0	205,894
2835	0	5	0	0	0	5
Total 283	**49,123**	**103,937**	**685**	**77,005**	**0**	**230,750**
2841	3,065	1,105	0	0	0	4,170
2842	946	1,043	0	0	0	1,989
2843	38,433	62,974	0	0	3	101,410
2844	30,343	0	0	0	0	30,343
Total 284	**72,787**	**65,122**	**0**	**0**	**3**	**137,912**
2851	116,139	65,900	0	0	0	182,039
Total 285	**116,139**	**65,900**	**0**	**0**	**0**	**182,039**
2861	615	13,231	5	0	0	13,851
2864	150	0	0	0	0	150
2865	117,540	382,126	441	8,000	983	509,090
2869	1,513,476	886,142	210,903	5,724,020	11,817	8,346,358
Total 286	**1,631,781**	**1,281,499**	**211,349**	**5,732,020**	**12,800**	**8,869,449**
2873	1,610	3,495	35	339	105	5,584
2875	250	9,900	0	0	0	10,150
2879	5,223	13,826	80	0	10	19,139
Total 287	**7,083**	**27,221**	**115**	**339**	**115**	**34,873**
2891	6,968	18,104	0	0	450	25,522
2893	250	450	0	0	0	700
2899	62,229	77,676	25	0	0	139,930
Total 289	**69,447**	**96,230**	**25**	**0**	**450**	**166,152**
Multiple SIC with 2800	**3,451,539**	**3,994,713**	**275,503**	**25,474,601**	**595,118**	**33,791,474**
Total	**7,587,899**	**9,463,537**	**770,118**	**31,411,350**	**881,268**	**50,114,172**

1994 - Carcinogenic Releases

SIC Code	Fugitive Air (Pounds)	Point Source Air (Pounds)	Water (Pounds)	Underground Injection (Pounds)	Land Disposal (Pounds)	Total Carcinogenic Release in 1994 (Pounds)
2812	68	250	0	0	0	318
2813	1,111	2,415	0	0	0	3,526
2816	0	16	86	0	280,000	280,102
2819	1,990	25,652	182	0	10,000	37,824
Total 281	**3,169**	**28,333**	**268**	**0**	**290,000**	**321,770**
2821	945,017	2,402,097	220,945	0	4,088	3,572,147
2822	608,476	1,183,327	66,390	0	27,645	1,885,838
2824	40,568	67,530	4,900	68,255	0	181,253
Total 282	**1,594,061**	**3,652,954**	**292,235**	**68,255**	**31,733**	**5,639,238**
2831	250	4,400	0	0	0	4,650
2833	20,465	10,609	0	0	0	31,074
2834	36,368	109,654	5	221,000	1,850	368,877
2835	250	255	0	0	0	505
Total 283	**57,333**	**124,918**	**5**	**221,000**	**1,850**	**405,106**
2841	2,925	967	0	0	0	3,892
2842	770	1,545	0	0	0	2,315
2843	53,226	26,981	29	0	33,737	113,973
2844	22,890	0	0	0	0	22,890
Total 284	**79,811**	**29,493**	**29**	**0**	**33,737**	**143,070**
2851	496,390	134,886	0	0	0	631,276
Total 285	**496,390**	**134,886**	**0**	**0**	**0**	**631,276**
2861	625	2,800	5	0	0	3,430
2865	124,863	453,365	897	8,000	2,126	589,251
2869	1,212,723	802,022	26,575	7,404,036	80,345	9,525,701
Total 286	**1,338,211**	**1,258,187**	**27,477**	**7,412,036**	**82,471**	**10,118,382**
2873	1,053	12,045	20	1,030	5	14,153
2875	250	3,614	0	0	0	3,864
2879	5,372	10,903	136	0	15	16,426
Total 287	**6,675**	**26,562**	**156**	**1,030**	**20**	**34,443**
2891	7,829	16,719	0	0	200	24,748
2893	260	111	0	0	0	371
2899	61,840	48,426	64	0	0	110,330
Total 289	**69,929**	**65,256**	**64**	**0**	**200**	**135,449**
Multiple SIC with 2800	**3,726,415**	**4,678,382**	**349,867**	**28,287,716**	**364,763**	**37,407,143**
Total	**7,371,994**	**9,998,971**	**670,101**	**35,990,037**	**804,774**	**54,835,877**

1990 - Total Transfers

SIC Code	POTW (Pounds)	Other Transfers (Pounds)	Disposal (Pounds)	Energy Recovery (Pounds)	Other (Pounds)	Recycling (Pounds)	Treatment (Pounds)	Total Transfers in 1990 (Pounds)
2800	0	94,986	681	0	0	0	94,305	189,972
Total 280	**0**	**94,986**	**681**	**0**	**0**	**0**	**94,305**	**189,972**
2812	0	72,297	10,351	0	250	0	61,696	144,594
2813	1,025	3,642,966	3,347,606	0	50	0	295,310	7,286,957
2815	506	5,826	1,350	0	0	0	4,476	12,158
2816	27,277,910	7,700,717	7,548,109	0	47,686	0	104,922	42,679,344
2819	19,090,081	23,749,616	12,961,783	0	430	0	10,787,403	66,589,313
Total 281	**46,369,522**	**35,171,422**	**23,869,199**	**0**	**48,416**	**0**	**11,253,807**	**116,712,366**
2821	6,973,069	19,978,835	3,483,565	0	40,810	243,429	16,211,031	46,930,739
2822	138,757	525,907	159,046	0	0	0	366,861	1,190,571
2823	0	567,342	340,000	0	0	0	227,342	1,134,684
2824	5,697	124,449	44,995	0	0	0	79,454	254,595
Total 282	**7,117,523**	**21,196,533**	**4,027,606**	**0**	**40,810**	**243,429**	**16,884,688**	**49,510,589**
2830	157,706	317,835	233,870	0	0	0	83,965	793,376
2831	41,245	250	250	0	0	0	0	41,745
2833	6,760,418	16,758,354	1,184,199	0	1,783,096	0	13,791,059	40,277,126
2834	8,090,983	9,210,834	274,460	500	2,345	0	8,933,529	26,512,651
2835	449,122	30,455	21,100	0	0	0	9,355	510,032
2836	1,078,686	3,120	0	0	0	0	3,120	1,084,926
2839	0	11,332	10	0	0	0	11,322	22,664
Total 283	**16,578,160**	**26,332,180**	**1,713,889**	**500**	**1,785,441**	**0**	**22,832,350**	**69,242,520**
2840	1,760	0	0	0	0	0	0	1,760
2841	7,962,763	788,851	726,157	0	0	0	62,694	9,540,465
2842	270,696	87,042	11,681	0	760	0	74,601	444,780
2843	2,368,783	238,386	149,714	0	500	0	88,172	2,845,555
2844	461,776	153,000	25,867	0	3,682	0	123,451	767,776
Total 284	**11,065,778**	**1,267,279**	**913,419**	**0**	**4,942**	**0**	**348,918**	**13,600,336**
2851	903,983	17,984,964	4,140,943	396,103	163,716	288,000	12,996,202	36,873,911
2859	5	0	0	0	0	0	0	5
Total 285	**903,988**	**17,984,964**	**4,140,943**	**396,103**	**163,716**	**288,000**	**12,996,202**	**36,873,916**
2860	0	45,180	730	0	0	0	44,450	90,360
2861	11,393	81,614	77,781	0	0	0	3,833	174,621
2865	31,094,446	7,618,040	2,860,310	88,000	4,874	0	4,664,856	46,330,526
2869	46,852,968	44,832,919	10,457,632	0	308,935	79,200	33,987,152	136,518,806
Total 286	**77,958,807**	**52,577,753**	**13,396,453**	**88,000**	**313,809**	**79,200**	**38,700,291**	**183,114,313**
2873	572,113	855,654	851,804	0	0	0	3,850	2,283,421
2874	435	248,695	206,151	0	0	0	42,544	497,825
2875	5,353	488,824	486,820	0	0	0	2,004	983,001
2879	123,551	5,359,750	305,623	0	1,295	0	5,052,832	10,843,051
Total 287	**701,452**	**6,952,923**	**1,850,398**	**0**	**1,295**	**0**	**5,101,230**	**14,607,298**
2882	0	104	104	0	0	0	0	208
Total 288	**0**	**104**	**104**	**0**	**0**	**0**	**0**	**208**
2890	4,039	7,777	0	0	0	0	7,777	19,593
2891	139,880	3,292,371	306,918	0	19,336	0	2,966,117	6,724,622
2892	2,071	3,087,028	2,544,743	0	0	0	542,285	6,176,127
2893	12,061	779,193	131,481	0	580	0	647,132	1,570,447
2895	0	8,733	7,964	0	0	0	769	17,466
2898	250	0	0	0	0	0	0	250
2899	2,777,701	3,471,791	2,838,033	0	4,115	0	629,643	9,721,283
Total 289	**2,936,002**	**10,646,893**	**5,829,139**	**0**	**24,031**	**0**	**4,793,723**	**24,229,788**
Multiple SIC with 2800	**124,784,080**	**86,398,607**	**18,198,840**	**282,283**	**206,206**	**1,741,148**	**65,970,130**	**297,581,294**
TOTAL	**288,415,312**	**258,623,644**	**73,940,671**	**766,886**	**2,588,666**	**2,351,777**	**178,975,644**	**805,662,600**

1991 - Total Transfers

SIC Code	POTW (Pounds)	Other Transfers (Pounds)	Disposal (Pounds)	Energy Recovery (Pounds)	Other (Pounds)	Recycling (Pounds)	Treatment (Pounds)	Total Transfers in 1991 (Pounds)
2800	0	173,620	130,005	0	0	0	43,615	347,240
Total 280	**0**	**173,620**	**130,005**	**0**	**0**	**0**	**43,615**	**347,240**
2812	1,650	61,295	13,646	0	0	1,360	46,289	124,240
2813	757	3,526,168	3,228,182	3,830	9,700	96,603	187,853	7,053,093
2815	0	19,802	0	0	0	19,802	0	39,604
2816	17,082,270	9,414,895	2,813,097	3,720	0	800,334	5,797,744	35,912,060
2819	13,645,631	47,772,620	16,685,131	11,647,701	478,302	3,896,520	15,064,966	109,190,871
Total 281	**30,730,308**	**60,794,780**	**22,740,056**	**11,655,251**	**488,002**	**4,814,619**	**21,096,852**	**152,319,868**
2821	5,855,093	90,340,807	1,332,765	18,163,159	43,539	61,440,974	9,360,370	186,536,707
2822	369,857	6,592,857	217,902	964,792	0	4,835,942	574,221	13,555,571
2823	549	242,200	80,000	0	0	162,200	0	484,949
2824	22,090	591,771	66,068	133,880	0	0	391,823	1,205,632
Total 282	**6,247,589**	**97,767,635**	**1,696,735**	**19,261,831**	**43,539**	**66,439,116**	**10,326,414**	**201,782,859**
2830	201,804	2,343,955	0	2,342,950	0	0	1,005	4,889,714
2831	750	118,059	0	16,770	0	101,129	160	236,868
2833	8,146,630	26,761,133	1,090,542	6,391,634	25	3,765,932	15,513,000	61,668,896
2834	9,955,024	49,617,114	233,861	27,301,254	250	13,985,165	8,096,584	109,189,252
2835	195,675	68,672	6,750	37,019	0	0	24,903	333,019
2836	881,151	126,857	0	76,527	0	1,900	48,430	1,134,865
Total 283	**19,381,034**	**79,035,790**	**1,331,153**	**36,166,154**	**275**	**17,854,126**	**23,684,082**	**177,452,614**
2840	1,250	0	0	0	0	0	0	1,250
2841	7,046,804	21,487,098	500,836	114,923	3,940	20,824,428	42,971	50,021,000
2842	245,709	382,107	23,921	95,426	250	140,741	121,769	1,009,923
2843	1,960,253	1,867,661	28,242	495,642	0	495,132	848,645	5,695,575
2844	269,764	520,272	31,092	218,734	1,000	63,100	206,346	1,310,308
Total 284	**9,523,780**	**24,257,138**	**584,091**	**924,725**	**5,190**	**21,523,401**	**1,219,731**	**58,038,056**
2851	1,343,002	83,424,022	512,547	48,681,174	747,770	24,745,762	8,736,769	168,191,046
2859	5	0	0	0	0	0	0	5
Total 285	**1,343,007**	**83,424,022**	**512,547**	**48,681,174**	**747,770**	**24,745,762**	**8,736,769**	**168,191,051**
2860	0	361,255	482	0	0	0	360,773	722,510
2861	8,375	5,822	500	150	0	0	5,172	20,019
2865	23,683,990	18,811,822	1,289,700	5,790,757	1,669	6,956,470	4,773,226	61,307,634
2869	39,604,489	204,606,109	9,903,411	69,703,194	1,107,910	80,685,792	43,205,802	448,816,707
Total 286	**63,296,854**	**223,785,008**	**11,194,093**	**75,494,101**	**1,109,579**	**87,642,262**	**48,344,973**	**510,866,870**
2873	1,704,368	1,081,180	411,498	0	0	663,062	6,620	3,866,728
2874	318	70,765	3,005	0	0	0	67,760	141,848
2875	2,000	290,183	246,533	0	0	34,980	8,670	582,366
2879	75,212	13,871,625	478,700	753,315	2,307	7,828,906	4,808,397	27,818,462
Total 287	**1,781,898**	**15,313,753**	**1,139,736**	**753,315**	**2,307**	**8,526,948**	**4,891,447**	**32,409,404**
2890	1,265	13,088	0	0	0	0	13,088	27,441
2891	68,626	6,249,433	176,297	4,020,215	0	870,797	1,182,124	12,567,492
2892	2,084	8,703,776	306,602	0	0	7,990,969	406,205	17,409,636
2893	9,395	1,951,402	21,969	609,368	5,230	957,133	357,702	3,912,199
2895	0	8,830	8,830	0	0	0	0	17,660
2898	250	0	0	0	0	0	0	250
2899	2,534,038	41,305,220	753,909	38,614,550	12,643	597,436	1,326,682	85,144,478
Total 289	**2,615,658**	**58,231,749**	**1,267,607**	**43,244,133**	**17,873**	**10,416,335**	**3,285,801**	**119,079,156**
Multiple SIC with 2800	**92,805,147**	**352,708,354**	**11,987,291**	**89,890,406**	**91,322**	**180,081,090**	**70,658,245**	**798,221,855**
TOTAL	**227,725,275**	**995,491,849**	**52,583,314**	**326,071,090**	**2,505,857**	**422,043,659**	**192,287,929**	**2,218,708,973**

1992 - Total Transfers

SIC Code	POTW (Pounds)	Other Transfers (Pounds)	Disposal (Pounds)	Energy Recovery (Pounds)	Other (Pounds)	Recycling (Pounds)	Treatment (Pounds)	Total Transfers in 1992 (Pounds)
2800	0	115,940	96,005	0	0	0	19,935	231,880
Total 280	**0**	**115,940**	**96,005**	**0**	**0**	**0**	**19,935**	**231,880**
2812	0	39,090	7,642	0	22	2,163	29,263	78,180
2813	7,798	5,843,534	5,555,106	1	17,500	66,455	204,472	11,694,866
2815	0	34,050	0	0	0	34,050	0	68,100
2816	16,287,071	12,738,884	1,158,817	5,994	0	800,163	10,773,910	41,764,839
2819	14,492,881	32,951,415	9,201,042	8,314,857	0	3,646,321	11,789,195	80,395,711
Total 281	**30,787,750**	**51,606,973**	**15,922,607**	**8,320,852**	**17,522**	**4,549,152**	**22,796,840**	**134,001,696**
2821	3,546,010	106,183,079	1,254,621	32,930,568	51,367	63,381,177	8,565,346	215,912,168
2822	303,327	8,590,110	115,184	1,317,193	700	6,469,385	687,648	17,483,547
2823	1,000	1,340,000	1,340,000	0	0	0	0	2,681,000
2824	27,911	47,432	1,826	8,620	0	34,000	2,986	122,775
Total 282	**3,878,248**	**116,160,621**	**2,711,631**	**34,256,381**	**52,067**	**69,884,562**	**9,255,980**	**236,199,490**
2830	237,890	2,708,571	0	2,664,420	0	2,100	42,051	5,655,032
2831	263	82,003	0	0	0	82,003	0	164,269
2833	8,222,313	30,482,425	1,391,871	9,796,501	0	2,713,524	16,580,529	69,187,163
2834	6,975,384	60,561,902	283,684	31,713,284	11,975	10,917,770	17,635,189	128,099,188
2835	30,357	74,165	1,200	41,612	0	0	31,353	178,687
2836	1,165,603	84,751	0	66,811	0	1,800	16,140	1,335,105
Total 283	**16,631,810**	**93,993,817**	**1,676,755**	**44,282,628**	**11,975**	**13,717,197**	**34,305,262**	**204,619,444**
2841	6,793,438	16,672,770	347,108	115,407	0	16,180,492	29,763	40,138,978
2842	207,739	137,124	12,505	40,720	0	42,320	41,579	481,987
2843	2,045,522	4,716,783	2,245,494	296,321	0	1,973,225	201,743	11,479,088
2844	409,758	282,337	34,008	116,846	6,300	36,010	89,173	974,432
Total 284	**9,456,457**	**21,809,014**	**2,639,115**	**569,294**	**6,300**	**18,232,047**	**362,258**	**53,074,485**
285	0	1,500	0	1,500	0	0	0	3,000
2850	0	35,750	750	35,000	0	0	0	71,500
2851	1,043,924	84,613,734	562,726	52,761,405	189,096	24,802,838	6,297,669	170,271,392
2856	0	245	220	25	0	0	0	490
2857	0	3,034	0	3,034	0	0	0	6,068
Total 285	**1,043,924**	**84,654,263**	**563,696**	**52,800,964**	**189,096**	**24,802,838**	**6,297,669**	**170,352,450**
2861	6,266	161,515	500	147,839	0	5,005	8,171	329,296
2863	250	0	0	0	0	0	0	250
2865	23,643,627	19,416,755	2,554,493	7,521,286	168	7,027,564	2,313,244	62,477,137
2869	34,744,899	189,572,106	7,580,747	83,487,877	33,533	79,382,596	19,087,353	413,889,111
Total 286	**58,395,042**	**209,150,376**	**10,135,740**	**91,157,002**	**33,701**	**86,415,165**	**21,408,768**	**476,695,794**
2873	175,069	1,050,941	484,902	0	0	566,039	0	2,276,951
2874	224	5,243	5,243	0	0	0	0	10,710
2875	500	70,645	68,545	0	0	0	2,100	141,790
2879	120,270	11,021,007	653,049	2,263,096	0	6,713,648	1,391,214	22,162,284
Total 287	**296,063**	**12,147,836**	**1,211,739**	**2,263,096**	**0**	**7,279,687**	**1,393,314**	**24,591,735**
2881	0	54,026	136	8,060	0	0	45,830	108,052
Total 288	**0**	**54,026**	**136**	**8,060**	**0**	**0**	**45,830**	**108,052**
2890	750	33,500	1,300	0	0	0	32,200	67,750
2891	61,551	7,699,581	473,681	4,904,449	43,909	950,092	1,327,450	15,460,713
2892	1,894	8,621,605	130,729	0	0	8,196,422	294,454	17,245,104
2893	25,521	2,438,069	16,285	765,866	89,220	1,021,411	545,287	4,901,659
2895	0	109	109	0	0	0	0	218
2898	250	0	0	0	0	0	0	250
2899	1,256,321	8,395,943	603,462	4,423,573	1,968	634,232	2,732,708	18,048,207
Total 289	**1,346,287**	**27,188,807**	**1,225,566**	**10,093,888**	**135,097**	**10,802,157**	**4,932,099**	**55,723,901**
Multiple SIC with 2800	**96,659,209**	**400,412,965**	**11,338,500**	**108,273,294**	**945,000**	**206,196,953**	**73,659,218**	**897,485,139**
TOTAL	**218,494,790**	**1,017,294,638**	**47,521,490**	**352,025,459**	**1,390,758**	**441,879,758**	**174,477,173**	**2,253,084,066**

1993 - Total Transfers

SIC Code	POTW (Pounds)	Other Transfers (Pounds)	Disposal (Pounds)	Energy Recovery (Pounds)	Other (Pounds)	Recycling (Pounds)	Treatment (Pounds)	Total Transfers in 1993 (Pounds)
2810	750	0	0	0	0	0	0	750
2812	10	15,450	2,648	0	0	0	12,802	30,910
2813	62,080	5,141,656	4,825,713	0	0	164,825	151,118	10,345,392
2815	0	1,210	0	0	0	1,210	0	2,420
2816	15,811,677	11,423,044	252,809	48,625	0	621,743	10,499,867	38,657,765
2819	13,727,333	22,553,205	4,320,498	2,265,472	0	4,182,093	11,785,142	58,833,743
Total 281	**29,601,850**	**39,134,565**	**9,401,668**	**2,314,097**	**0**	**4,969,871**	**22,448,929**	**107,870,980**
2821	5,288,055	88,481,239	991,191	32,938,218	37,567	46,694,694	7,819,569	182,250,533
2822	130,980	15,444,119	79,311	1,018,008	0	13,827,280	519,520	31,019,218
2823	1,000	1,615,500	1,615,500	0	0	0	0	3,232,000
2824	21,780	73,094	17,743	40,435	0	14,000	916	167,968
Total 282	**5,441,815**	**105,613,952**	**2,703,745**	**33,996,661**	**37,567**	**60,535,974**	**8,340,005**	**216,669,719**
2833	7,830,442	19,399,133	456,108	9,571,713	0	3,080,334	6,290,978	46,628,708
2834	4,096,943	47,213,877	111,945	15,803,627	250	12,609,333	18,688,722	98,524,697
2835	39,469	158,829	0	32,165	0	97,672	28,992	357,127
2836	41,341	114,112	660	99,046	0	13,994	412	269,565
Total 283	**12,008,195**	**66,885,951**	**568,713**	**25,506,551**	**250**	**15,801,333**	**25,009,104**	**145,780,097**
2841	6,749,961	14,428,630	233,061	30,000	0	14,142,743	22,826	35,607,221
2842	6,362,147	290,181	51,702	66,772	0	22,796	148,911	6,942,509
2843	2,109,476	4,590,059	881,664	420,614	0	3,188,807	98,974	11,289,594
2844	298,141	636,592	66,546	227,775	0	9,942	332,329	1,571,325
Total 284	**15,519,725**	**19,945,462**	**1,232,973**	**745,161**	**0**	**17,364,288**	**603,040**	**55,410,649**
2851	1,063,119	83,225,269	794,399	53,064,463	10,102	22,869,050	6,487,255	167,513,657
Total 285	**1,063,119**	**83,225,269**	**794,399**	**53,064,463**	**10,102**	**22,869,050**	**6,487,255**	**167,513,657**
2861	14,421	3,911	0	462	0	0	3,449	22,243
2865	21,951,067	18,588,434	2,464,785	5,186,539	0	9,087,464	1,849,646	59,127,935
2869	27,069,173	207,730,990	9,350,295	85,504,191	250	93,678,975	19,197,279	442,531,153
Total 286	**49,034,661**	**226,323,335**	**11,815,080**	**90,691,192**	**250**	**102,766,439**	**21,050,374**	**501,681,331**
2873	109,604	1,422,088	68,041	0	0	1,343,797	10,250	2,953,780
2874	193	1,760	1,760	0	0	0	0	3,713
2875	1,025	238,364	236,689	755	0	0	920	477,753
2879	103,788	12,304,741	648,235	493,095	0	7,856,177	3,307,234	24,713,270
Total 287	**214,610**	**13,966,953**	**954,725**	**493,850**	**0**	**9,199,974**	**3,318,404**	**28,148,516**
2889	0	7,600	0	7,600	0	0	0	15,200
Total 288	**0**	**7,600**	**0**	**7,600**	**0**	**0**	**0**	**15,200**
2891	59,998	7,658,327	562,544	4,741,886	1,505	868,121	1,484,271	15,376,652
2892	39	2,372,711	156,081	0	0	1,923,384	293,246	4,745,461
2893	28,872	2,146,483	15,587	812,665	83,000	927,289	307,942	4,321,838
2899	993,532	7,729,945	403,773	4,628,572	0	521,176	2,176,424	16,453,422
Total 289	**1,082,441**	**19,907,466**	**1,137,985**	**10,183,123**	**84,505**	**4,239,970**	**4,261,883**	**40,897,373**
Multiple SIC with 2800	**67,410,806**	**430,188,094**	**13,422,703**	**149,951,026**	**2,537**	**191,753,409**	**75,058,419**	**927,786,994**
Total	**181,377,222**	**1,005,198,647**	**42,031,991**	**366,953,724**	**135,211**	**429,500,308**	**166,577,413**	**2,191,774,516**

1994 - Total Transfers

SIC Code	POTW (Pounds)	Other Transfers (Pounds)	Disposal (Pounds)	Energy Recovery (Pounds)	Other (Pounds)	Recycling (Pounds)	Treatment (Pounds)	Total Transfers in 1994 (Pounds)
2812	0	14,154	389	0	0	0	13,765	28,308
2813	39,499	1,315,702	1,090,225	30,000	0	23,724	171,753	2,670,903
2815	1,189	450	200	0	0	0	250	2,089
2816	16,011,554	7,121,252	2,209,274	1,118	0	422,958	4,487,902	30,254,058
2819	9,368,128	13,891,012	3,556,653	153,678	0	4,784,368	5,396,313	37,150,152
Total 281	**25,420,370**	**22,342,570**	**6,856,741**	**184,796**	**0**	**5,231,050**	**10,069,983**	**70,105,510**
2821	6,661,083	97,950,469	1,012,962	32,024,637	47,288	57,059,915	7,805,667	202,562,021
2822	88,106	16,844,823	149,936	1,120,442	0	13,596,548	1,977,897	33,777,752
2823	1,000	1,407,400	1,407,400	0	0	0	0	2,815,800
2824	370	38,678	6,754	2,932	0	0	28,992	77,726
Total 282	**6,750,559**	**116,241,370**	**2,577,052**	**33,148,011**	**47,288**	**70,656,463**	**9,812,556**	**239,233,299**
2831	0	137,300	137,300	0	0	0	0	274,600
2833	6,864,334	19,139,995	36,280	9,665,984	0	2,048,469	7,389,262	45,144,324
2834	4,388,542	61,321,598	366,194	36,683,534	250	11,774,033	12,497,587	127,031,738
2835	53,279	110,323	0	18,640	0	56,878	34,805	273,925
2836	26,537	2,950	0	0	0	250	2,700	32,437
Total 283	**11,332,692**	**80,712,166**	**539,774**	**46,368,158**	**250**	**13,879,630**	**19,924,354**	**172,757,024**
2841	3,850,289	537,086	161,112	15,845	0	291,787	68,342	4,924,461
2842	987,028	229,736	16,237	104,898	0	15,500	93,101	1,446,500
2843	1,092,678	2,956,538	19,730	485,340	0	2,375,552	75,916	7,005,754
2844	139,790	59,552	34,045	7,306	0	52	18,149	258,894
Total 284	**6,069,785**	**3,782,912**	**231,124**	**613,389**	**0**	**2,682,891**	**255,508**	**13,635,609**
2850	0	112,364	260	112,104	0	0	0	224,728
2851	1,529,544	63,703,724	683,172	40,227,877	2,042	17,046,801	5,743,832	128,936,992
Total 285	**1,529,544**	**63,816,088**	**683,432**	**40,339,981**	**2,042**	**17,046,801**	**5,743,832**	**129,161,720**
2860	0	3,974	949	2,507	0	0	518	7,948
2861	0	8,000	0	0	0	0	8,000	16,000
2863	1,369	0	0	0	0	0	0	1,369
2865	15,695,496	15,923,420	1,091,760	8,127,957	0	4,637,942	2,065,761	47,542,336
2869	21,080,523	174,620,821	7,580,224	86,248,022	423,109	20,885,686	59,483,780	370,322,165
Total 286	**36,777,388**	**190,556,215**	**8,672,933**	**94,378,486**	**423,109**	**25,523,628**	**61,558,059**	**417,889,818**
2873	121,011	1,247,870	103,519	50	0	1,049,401	94,900	2,616,751
2874	180	515	515	0	0	0	0	1,210
2875	1,005	10,043	7,103	0	0	0	2,940	21,091
2879	52,683	7,981,381	385,717	1,756,262	0	4,000,280	1,839,122	16,015,445
Total 287	**174,879**	**9,239,809**	**496,854**	**1,756,312**	**0**	**5,049,681**	**1,936,962**	**18,654,497**
2890	0	474	0	474	0	0	0	948
2891	83,640	8,291,727	388,446	4,244,858	0	1,529,568	2,128,855	16,667,094
2892	1,000	666,103	8,581	0	0	304,497	353,025	1,333,206
2893	27,477	2,358,546	31,564	699,484	0	1,292,328	335,170	4,744,569
2895	20	2,510	1,510	1,000	0	0	0	5,040
2899	995,107	6,644,322	1,133,398	3,326,116	0	627,135	1,557,673	14,283,751
Total 289	**1,107,244**	**17,963,682**	**1,563,499**	**8,271,932**	**0**	**3,753,528**	**4,374,723**	**37,034,608**
Multiple SIC with 2800	**59,646,535**	**380,934,702**	**17,107,357**	**132,836,610**	**2,782**	**155,744,459**	**75,243,494**	**821,515,939**
Total	**148,808,996**	**885,589,514**	**38,728,766**	**357,897,675**	**475,471**	**299,568,131**	**188,919,471**	**1,919,988,024**

APPENDIX F — Compliance Monitoring Activities Summary by 4-Digit SIC Code*‡

Summary of Compliance Monitoring Activities, 1990 to 1994

Statute	Year					
	1990	1991	1992	1993	1994	Total
CAA	856	856	829	882	863	**4,286**
EPCRA	26	35	37	46	15	**159**
FIFRA	45	62	33	37	26	**203**
CWA	601	620	610	544	548	**2,923**
RCRA	1,322	1,403	1,230	1,227	1,239	**6,421**
TSCA	116	119	101	114	76	**526**
Total	**2,966**	**3,095**	**2,840**	**2,850**	**2,767**	**14,518**

Summary of Violations 1990 to 1994

Statute	Year					
	1990	1991	1992	1993	1994	Total
CAA	35	47	40	45	41	**208**
EPCRA	8	11	11	5	6	**41**
FIFRA	31	32	47	30	29	**169**
CWA	61	115	141	79	79	**475**
RCRA	687	919	1,318	1,267	1,005	**5,196**
TSCA	19	26	26	25	20	**116**
Total	**841**	**1,150**	**1,583**	**1,451**	**1,180**	**6,205**

Summary of Enforcement Actions 1990 to 1994

Statute	Year					
	1990	1991	1992	1993	1994	Total
CAA	88	93	96	72	72	**421**
EPCRA	8	9	7	5	4	**33**
FIFRA	28	29	42	25	21	**145**
CWA	54	101	86	88	78	**407**
RCRA	562	536	446	460	390	**2,394**
TSCA	12	13	20	20	16	**81**
Total	**752**	**781**	**697**	**670**	**581**	**3,481**

* EPA IDEA Database

‡ The tables in Appendix F are intended to give the reader an overview of enforcement and compliance history by four-digit SIC code. Chemical facilities that have been identified, but for which no four-digit SIC code is recorded in the database, are excluded from this section but are included in the overall industry analysis found in Sections 4 and 5 of this report. Further, Appendix F does not include every compliance monitoring activity–for example, it does not track review of self-monitoring reporting. The IDEA database does not capture differences in programmatic activities (for example, compliance monitoring activities performed under TSCA differ from those performed under CAA). Also regions and states vary somewhat in how they implement programs.

Compliance Monitoring Activities Summary - 281

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2812	CAA	41	40	40	43	35	199
	EPCRA	0	1	2	0	0	3
	FIFRA	1	4	1	0	0	6
	CWA	30	21	27	19	18	115
	RCRA	36	35	41	44	37	193
	TSCA	8	3	11	2	3	27
Subtotal		116	104	122	108	93	543
2813	CAA	5	5	6	6	5	27
	EPCRA	2	1	3	1	0	7
	FIFRA	0	0	1	0	0	1
	CWA	11	9	14	11	10	55
	RCRA	15	18	14	15	12	74
	TSCA	0	4	0	0	0	4
Subtotal		33	37	38	33	27	168
2816	CAA	6	13	16	9	19	63
	EPCRA	0	1	0	0	1	2
	FIFRA	0	0	0	0	0	0
	CWA	23	13	16	11	18	81
	RCRA	8	5	6	1	4	24
	TSCA	0	2	6	0	0	8
Subtotal		37	34	44	21	42	178
2819	CAA	204	159	168	177	179	887
	EPCRA	0	6	3	7	3	19
	FIFRA	3	1	0	1	2	7
	CWA	150	156	137	133	136	712
	RCRA	278	308	253	245	228	1,312
	TSCA	25	33	15	13	8	94
Subtotal		660	663	576	576	556	3,031
TOTAL 281		846	838	780	738	718	3,920

Compliance Monitoring Activities Summary - 282

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2821	CAA	81	75	67	79	68	**370**
	EPCRA	0	3	0	3	0	**6**
	FIFRA	0	0	1	0	0	**1**
	CWA	74	90	77	62	72	**375**
	RCRA	89	89	94	87	83	**442**
	TSCA	6	11	1	18	7	**43**
Subtotal		**250**	**268**	**240**	**249**	**230**	**1,237**
2822	CAA	17	22	16	16	20	**91**
	EPCRA	0	0	1	1	0	**2**
	FIFRA	0	0	0	0	0	**0**
	CWA	11	9	11	11	15	**57**
	RCRA	30	35	20	23	20	**128**
	TSCA	2	0	1	5	0	**8**
Subtotal		**60**	**66**	**49**	**56**	**55**	**286**
2823	CAA	5	5	12	10	5	**37**
	EPCRA	0	0	0	1	0	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	10	9	6	9	6	**40**
	RCRA	5	2	6	8	6	**27**
	TSCA	0	0	0	0	0	**0**
Subtotal		**20**	**16**	**24**	**28**	**17**	**105**
2824	CAA	14	32	20	28	30	**124**
	EPCRA	0	0	0	1	0	**1**
	FIFRA	1	1	1	0	1	**4**
	CWA	17	16	17	14	12	**76**
	RCRA	17	17	12	14	11	**71**
	TSCA	2	2	0	0	2	**6**
Subtotal		**51**	**68**	**50**	**57**	**56**	**282**
TOTAL 282		**381**	**418**	**363**	**390**	**358**	**1,910**

Compliance Monitoring Activities Summary - 283

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2833	CAA	7	22	8	12	13	**62**
	EPCRA	1	1	0	1	0	**3**
	FIFRA	3	1	1	0	1	**6**
	CWA	17	13	12	12	13	**67**
	RCRA	34	25	24	27	24	**134**
	TSCA	3	0	1	0	3	**7**
Subtotal		**65**	**62**	**46**	**52**	**54**	**279**
2834	CAA	55	44	44	40	50	**233**
	EPCRA	3	1	4	5	1	**14**
	FIFRA	1	1	0	0	1	**3**
	CWA	40	48	47	43	44	**222**
	RCRA	67	77	55	71	77	**347**
	TSCA	3	0	7	4	6	**20**
Subtotal		**169**	**171**	**157**	**163**	**179**	**839**
2835	CAA	0	0	0	0	0	**0**
	EPCRA	1	0	0	0	0	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	1	0	2	1	2	**6**
	RCRA	1	2	5	3	0	**11**
	TSCA	0	0	0	0	0	**0**
Subtotal		**3**	**2**	**7**	**4**	**2**	**18**
2836	CAA	4	2	2	3	2	**13**
	EPCRA	1	0	0	0	0	**1**
	FIFRA	1	0	0	1	0	**2**
	CWA	0	0	0	0	0	**0**
	RCRA	3	3	2	4	8	**20**
	TSCA	0	0	0	0	0	**0**
Subtotal		**9**	**5**	**4**	**8**	**2**	**36**
TOTAL 283		**246**	**240**	**214**	**227**	**237**	**1,172**

Compliance Monitoring Activities Summary - 284

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2841	CAA	20	26	21	14	17	98
	EPCRA	0	3	1	1	1	6
	FIFRA	1	4	2	2	0	9
	CWA	5	12	6	8	2	33
	RCRA	18	17	17	17	16	85
	TSCA	0	6	1	6	2	15
Subtotal		44	68	48	48	38	246
2842	CAA	11	10	5	14	7	47
	EPCRA	5	3	2	4	0	14
	FIFRA	8	23	10	18	9	68
	CWA	4	3	5	3	4	19
	RCRA	28	27	28	15	25	123
	TSCA	7	5	2	6	2	22
Subtotal		63	71	52	60	47	293
2843	CAA	0	1	0	0	2	3
	EPCRA	0	2	1	1	0	4
	FIFRA	0	0	0	0	0	0
	CWA	3	3	4	4	4	18
	RCRA	3	4	2	2	5	16
	TSCA	0	0	0	0	0	0
Subtotal		6	10	7	7	11	41
2844	CAA	11	8	4	4	6	33
	EPCRA	2	0	0	1	0	3
	FIFRA	0	1	0	0	0	1
	CWA	15	10	15	8	8	56
	RCRA	21	15	13	13	31	93
	TSCA	1	1	0	0	0	2
Subtotal		50	35	32	26	45	188
TOTAL 284		163	184	139	141	141	768

Compliance Monitoring Activities Summary - 285

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2851	CAA	58	57	58	48	47	268
	EPCRA	2	7	6	7	1	23
	FIFRA	11	2	0	1	2	16
	CWA	8	6	9	9	9	41
	RCRA	161	180	157	147	140	785
	TSCA	15	17	11	17	10	70
TOTAL 285		255	269	241	229	209	1,203

Compliance Monitoring Activities Summary - 286

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2861	CAA	7	6	21	30	18	**82**
	EPCRA	0	0	2	0	0	**2**
	FIFRA	0	0	0	0	0	**0**
	CWA	6	6	8	7	6	**33**
	RCRA	15	10	19	10	12	**66**
	TSCA	2	0	3	1	0	**6**
Subtotal		**30**	**22**	**53**	**48**	**36**	**189**
2865	CAA	34	34	35	35	26	**164**
	EPCRA	1	1	2	1	0	**5**
	FIFRA	0	0	0	0	0	**0**
	CWA	20	16	17	13	16	**82**
	RCRA	25	32	33	40	28	**158**
	TSCA	4	0	5	0	11	**20**
Subtotal		**84**	**83**	**92**	**89**	**81**	**429**
2869	CAA	115	111	90	121	113	**550**
	EPCRA	2	1	2	2	3	**10**
	FIFRA	0	4	1	0	0	**5**
	CWA	77	84	91	76	62	**390**
	RCRA	206	241	213	228	253	**1,141**
	TSCA	19	16	12	16	10	**73**
Subtotal		**419**	**457**	**409**	**443**	**441**	**2,169**
TOTAL 286		**533**	**562**	**554**	**580**	**558**	**2,787**

Compliance Monitoring Activities Summary - 287

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2873	CAA	20	32	30	31	29	142
	EPCRA	0	0	1	2	0	3
	FIFRA	0	0	0	0	0	0
	CWA	13	19	14	14	15	75
	RCRA	9	9	11	11	14	54
	TSCA	1	2	0	1	0	4
Subtotal		43	62	56	59	58	278
2874	CAA	19	16	32	25	24	116
	EPCRA	0	0	1	1	0	2
	FIFRA	0	0	0	0	0	0
	CWA	4	6	4	8	7	29
	RCRA	7	6	5	12	5	35
	TSCA	0	0	0	0	0	0
Subtotal		30	28	42	46	36	182
2875	CAA	6	8	4	6	7	31
	EPCRA	0	0	0	0	0	0
	FIFRA	0	1	0	1	4	6
	CWA	1	0	1	1	1	4
	RCRA	0	1	1	1	1	4
	TSCA	0	0	0	0	0	0
Subtotal		7	10	6	9	13	45
2879	CAA	22	25	19	18	24	108
	EPCRA	1	1	0	2	0	4
	FIFRA	12	16	8	9	3	48
	CWA	6	9	10	15	11	51
	RCRA	47	50	43	42	46	228
	TSCA	3	1	4	4	1	13
Subtotal		91	102	84	90	85	452
TOTAL 287		171	202	188	204	192	957

Compliance Monitoring Activities Summary - 289

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2891	CAA	16	18	17	20	23	**94**
	EPCRA	2	0	2	1	2	**7**
	FIFRA	0	0	1	0	0	**1**
	CWA	0	6	10	7	8	**31**
	RCRA	30	22	13	18	26	**109**
	TSCA	6	1	1	8	5	**21**
Subtotal		**54**	**47**	**44**	**54**	**64**	**263**
2892	CAA	10	6	11	5	5	**37**
	EPCRA	0	0	0	1	0	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	8	5	4	5	6	**28**
	RCRA	18	18	14	12	10	**72**
	TSCA	0	0	0	4	0	**4**
Subtotal		**36**	**29**	**29**	**27**	**21**	**142**
2893	CAA	6	5	5	3	3	**22**
	EPCRA	1	1	0	1	0	**3**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	1	1	3	1	**6**
	RCRA	39	36	22	18	20	**135**
	TSCA	0	0	0	1	0	**1**
Subtotal		**46**	**43**	**28**	**26**	**24**	**167**
2895	CAA	13	12	17	15	16	**73**
	EPCRA	0	0	0	0	1	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	1	0	0	0	0	**1**
	RCRA	1	1	1	0	0	**3**
	TSCA	0	0	0	0	3	**3**
Subtotal		**15**	**13**	**18**	**15**	**20**	**81**
2899	CAA	49	62	61	64	70	**306**
	EPCRA	3	2	4	1	2	**12**
	FIFRA	3	3	6	4	3	**19**
	CWA	46	50	45	37	42	**220**
	RCRA	111	118	101	99	97	**526**
	TSCA	9	15	20	8	3	**55**
Subtotal		**221**	**250**	**237**	**213**	**217**	**1,138**
TOTAL 289		**372**	**382**	**356**	**335**	**346**	**1,791**

Violations Summary - 281

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2812	CAA	3	4	2	2	1	**12**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	1	0	0	**1**
	CWA	2	0	2	5	4	**13**
	RCRA	20	19	23	16	22	**100**
	TSCA	2	2	0	0	0	**4**
Subtotal		**27**	**25**	**28**	**23**	**27**	**130**
2813	CAA	0	1	0	0	0	**1**
	EPCRA	0	0	5	0	0	**5**
	FIFRA	0	0	1	1	0	**2**
	CWA	0	2	6	3	2	**13**
	RCRA	3	4	25	9	2	**43**
	TSCA	1	0	0	0	1	**2**
Subtotal		**4**	**7**	**37**	**13**	**5**	**66**
2816	CAA	0	4	2	1	5	**12**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	1	4	2	0	**7**
	RCRA	3	2	0	0	0	**5**
	TSCA	0	0	0	0	0	**0**
Subtotal		**3**	**7**	**6**	**3**	**5**	**24**
2819	CAA	6	4	7	10	10	**37**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	4	1	1	2	2	**10**
	CWA	12	44	48	21	26	**151**
	RCRA	162	216	253	185	145	**961**
	TSCA	4	2	7	5	2	**20**
Subtotal		**188**	**267**	**316**	**223**	**185**	**1,179**
TOTAL 281		**222**	**306**	**387**	**262**	**222**	**1,399**

Violations Summary - 282

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2821	CAA	2	2	4	8	3	**19**
	EPCRA	1	0	0	0	0	**1**
	FIFRA	0	0	1	0	0	**1**
	CWA	11	14	17	5	4	**51**
	RCRA	67	69	120	139	140	**535**
	TSCA	1	0	0	3	3	**7**
Subtotal		**82**	**85**	**142**	**155**	**150**	**614**
2822	CAA	1	2	0	1	1	**5**
	EPCRA	0	0	0	1	0	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	0	0	0	0	**0**
	RCRA	9	52	42	51	15	**169**
	TSCA	0	0	0	3	0	**3**
Subtotal		**10**	**54**	**42**	**56**	**16**	**178**
2823	CAA	0	0	3	0	1	**4**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	0	0	0	0	**0**
	RCRA	0	0	3	11	7	**21**
	TSCA	0	0	0	0	0	**0**
Subtotal		**0**	**0**	**6**	**11**	**8**	**25**
2824	CAA	0	0	0	1	0	**1**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	1	2	0	1	0	**4**
	CWA	0	1	1	1	0	**3**
	RCRA	3	1	0	3	2	**9**
	TSCA	0	0	0	1	0	**1**
Subtotal		**4**	**4**	**1**	**7**	**2**	**18**
TOTAL 282		**96**	**143**	**191**	**229**	**176**	**835**

Violations Summary - 283

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2833	CAA	0	0	2	0	5	**7**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	2	2	1	0	**5**
	RCRA	6	41	21	40	47	**155**
	TSCA	0	0	0	0	0	**0**
Subtotal		**6**	**43**	**25**	**41**	**52**	**167**
2834	CAA	4	2	1	0	1	**8**
	EPCRA	0	1	0	1	3	**5**
	FIFRA	1	0	0	0	0	**1**
	CWA	5	7	7	5	3	**27**
	RCRA	20	19	34	41	94	**208**
	TSCA	0	0	1	1	4	**6**
Subtotal		**30**	**29**	**43**	**48**	**105**	**255**
2835	CAA	0	0	0	0	0	**0**
	EPCRA	0	1	0	0	0	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	2	1	1	1	**5**
	RCRA	0	2	2	1	0	**5**
	TSCA	0	0	0	0	0	**0**
Subtotal		**0**	**5**	**3**	**2**	**1**	**11**
2836	CAA	0	0	0	0	0	**0**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	1	1	0	**2**
	CWA	0	0	0	0	0	**0**
	RCRA	0	2	1	1	2	**6**
	TSCA	0	0	0	0	0	**0**
Subtotal		**0**	**2**	**2**	**2**	**2**	**8**
TOTAL 283		**36**	**79**	**73**	**93**	**160**	**441**

Violations Summary - 284

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2841	CAA	2	0	0	0	0	2
	EPCRA	0	0	1	0	2	3
	FIFRA	0	3	4	0	1	8
	CWA	0	0	0	1	2	3
	RCRA	6	9	9	2	2	28
	TSCA	0	0	1	1	2	4
Subtotal		8	12	15	4	9	48
2842	CAA	0	0	0	1	0	1
	EPCRA	1	1	2	0	1	5
	FIFRA	10	12	3	6	11	42
	CWA	0	0	0	0	0	0
	RCRA	15	4	18	26	33	96
	TSCA	0	4	2	0	2	8
Subtotal		26	21	25	33	47	152
2843	CAA	0	0	0	0	0	0
	EPCRA	0	0	0	0	0	0
	FIFRA	0	0	0	0	0	0
	CWA	1	0	0	0	0	1
	RCRA	0	4	0	0	1	5
	TSCA	0	0	0	0	0	0
Subtotal		1	4	0	0	1	6
2844	CAA	1	0	0	1	0	2
	EPCRA	0	0	0	0	0	0
	FIFRA	1	0	0	0	0	1
	CWA	3	4	2	4	3	16
	RCRA	5	8	5	23	13	54
	TSCA	0	0	0	0	0	0
Subtotal		10	12	7	28	16	73
TOTAL 284		45	49	47	65	73	279

Violations Summary - 285

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2851	CAA	4	5	5	4	1	19
	EPCRA	5	2	1	1	0	9
	FIFRA	6	4	1	11	2	24
	CWA	1	0	12	1	4	18
	RCRA	95	132	222	275	178	902
	TSCA	1	0	4	4	1	10
TOTAL 285		112	143	245	296	186	982

Violations Summary - 286

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2861	CAA	0	4	0	1	0	**5**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	1	0	0	**1**
	CWA	0	0	0	0	0	**0**
	RCRA	4	7	15	12	10	**48**
	TSCA	0	1	0	0	0	**1**
Subtotal		**4**	**12**	**16**	**13**	**10**	**55**
2865	CAA	0	2	0	0	1	**3**
	EPCRA	0	2	0	0	0	**2**
	FIFRA	1	0	0	0	2	**3**
	CWA	12	6	6	1	4	**29**
	RCRA	19	27	36	37	39	**158**
	TSCA	4	6	1	0	0	**11**
Subtotal		**36**	**43**	**43**	**38**	**46**	**206**
2869	CAA	6	7	7	11	6	**37**
	EPCRA	1	1	0	2	0	**4**
	FIFRA	2	1	2	1	1	**7**
	CWA	13	18	15	7	12	**65**
	RCRA	104	117	143	94	59	**517**
	TSCA	4	6	5	3	3	**21**
Subtotal		**130**	**150**	**172**	**118**	**81**	**651**
TOTAL 286		**170**	**205**	**231**	**169**	**137**	**912**

Violations Summary - 287

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2873	CAA	0	1	0	1	0	**2**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	0	1	0	0	**1**
	RCRA	3	6	20	13	10	**52**
	TSCA	0	0	0	0	0	**0**
Subtotal		**3**	**7**	**21**	**14**	**10**	**55**
2874	CAA	1	3	2	0	0	**6**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	2	1	10	3	**16**
	RCRA	5	2	1	15	1	**24**
	TSCA	0	0	0	0	0	**0**
Subtotal		**6**	**7**	**4**	**25**	**4**	**46**
2875	CAA	0	1	0	0	0	**1**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	2	**2**
	CWA	0	0	0	0	0	**0**
	RCRA	0	1	1	1	1	**4**
	TSCA	0	0	0	0	0	**0**
Subtotal		**0**	**2**	**1**	**1**	**3**	**7**
2879	CAA	1	2	3	3	1	**10**
	EPCRA	0	2	1	0	0	**3**
	FIFRA	3	7	31	5	8	**54**
	CWA	0	4	5	6	6	**21**
	RCRA	29	47	24	37	34	**171**
	TSCA	0	2	0	0	1	**3**
Subtotal		**33**	**64**	**64**	**51**	**50**	**262**
TOTAL 287		**42**	**80**	**90**	**91**	**67**	**370**

Violations Summary - 289

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2891	CAA	1	1	0	0	0	**2**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	1	0	0	1	0	**2**
	CWA	0	3	7	4	3	**17**
	RCRA	13	13	9	14	27	**76**
	TSCA	0	0	0	0	0	**0**
Subtotal		**15**	**17**	**16**	**19**	**30**	**97**
2892	CAA	1	0	1	0	0	**2**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	1	2	0	2	**5**
	RCRA	6	14	20	14	21	**75**
	TSCA	0	0	0	1	0	**1**
Subtotal		**7**	**15**	**23**	**15**	**23**	**83**
2893	CAA	0	0	0	0	0	**0**
	EPCRA	0	1	1	0	0	**2**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	0	0	0	0	**0**
	RCRA	25	21	19	25	10	**100**
	TSCA	2	0	0	0	0	**2**
Subtotal		**27**	**22**	**20**	**25**	**10**	**104**
2895	CAA	1	2	0	0	0	**3**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	0	0	0	0	**0**
	RCRA	0	0	2	0	0	**2**
	TSCA	0	0	0	1	0	**1**
Subtotal		**1**	**2**	**2**	**1**	**0**	**6**
2899	CAA	1	1	0	0	5	**7**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	1	2	0	1	0	**4**
	CWA	1	4	2	1	0	**8**
	RCRA	65	80	250	182	90	**667**
	TSCA	0	3	5	2	1	**11**
Subtotal		**68**	**90**	**257**	**186**	**96**	**697**
TOTAL 289		**118**	**146**	**318**	**246**	**159**	**890**

Enforcement Actions Summary - 281

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2812	CAA	8	0	9	1	2	**20**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	1	0	0	**1**
	CWA	1	3	1	2	5	**12**
	RCRA	9	17	19	17	10	**72**
	TSCA	1	1	0	0	0	**2**
Subtotal		**19**	**21**	**30**	**20**	**17**	**107**
2813	CAA	1	1	0	0	0	**2**
	EPCRA	0	0	2	0	0	**2**
	FIFRA	0	0	1	1	0	**2**
	CWA	1	3	5	1	3	**13**
	RCRA	7	3	4	11	3	**28**
	TSCA	1	0	0	0	1	**2**
Subtotal		**10**	**7**	**12**	**13**	**6**	**49**
2816	CAA	0	1	0	0	0	**1**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	1	2	2	1	0	**6**
	RCRA	2	2	3	0	2	**9**
	TSCA	0	0	1	0	0	**1**
Subtotal		**3**	**5**	**6**	**1**	**2**	**17**
2819	CAA	13	9	21	16	7	**66**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	4	1	1	2	2	**10**
	CWA	16	26	17	7	17	**83**
	RCRA	116	97	84	73	70	**440**
	TSCA	2	2	5	4	2	**15**
Subtotal		**151**	**135**	**128**	**102**	**98**	**614**
TOTAL 281		**183**	**168**	**176**	**136**	**123**	**787**

Enforcement Actions Summary - 282

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2821	CAA	3	8	10	10	7	**38**
	EPCRA	1	0	0	0	0	**1**
	FIFRA	0	0	1	0	0	**1**
	CWA	8	16	15	8	8	**55**
	RCRA	43	35	30	29	43	**180**
	TSCA	1	0	0	2	2	**5**
Subtotal		**56**	**59**	**56**	**49**	**60**	**280**
2822	CAA	7	1	0	0	2	**10**
	EPCRA	0	0	0	1	0	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	3	3	0	2	4	**12**
	RCRA	15	10	5	8	4	**42**
	TSCA	0	0	0	1	0	**1**
Subtotal		**25**	**14**	**5**	**12**	**10**	**66**
2823	CAA	1	0	3	2	3	**9**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	0	1	1	1	**3**
	RCRA	1	0	1	4	1	**7**
	TSCA	0	0	0	0	0	**0**
Subtotal		**2**	**0**	**5**	**7**	**5**	**19**
2824	CAA	0	0	0	0	0	**0**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	1	1	0	1	0	**3**
	CWA	0	0	0	1	0	**1**
	RCRA	2	4	0	3	2	**11**
	TSCA	0	0	0	1	0	**1**
Subtotal		**3**	**5**	**0**	**6**	**2**	**16**
TOTAL 282		**86**	**78**	**66**	**74**	**77**	**381**

Enforcement Actions Summary - 283

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2833	CAA	0	1	2	1	4	**8**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	1	0	0	0	1	**2**
	RCRA	8	8	7	13	6	**42**
	TSCA	0	0	0	0	0	**0**
Subtotal		**9**	**9**	**9**	**14**	**11**	**52**
2834	CAA	7	15	15	10	14	**61**
	EPCRA	0	1	0	1	1	**3**
	FIFRA	1	0	0	0	0	**1**
	CWA	3	9	7	3	13	**35**
	RCRA	20	20	15	29	24	**108**
	TSCA	0	0	1	1	2	**4**
Subtotal		**31**	**45**	**38**	**44**	**54**	**212**
2835	CAA	0	0	0	0	0	**0**
	EPCRA	0	1	0	0	0	**1**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	1	1	0	1	**3**
	RCRA	0	1	1	1	0	**3**
	TSCA	1	0	0	0	0	**1**
Subtotal		**1**	**3**	**2**	**1**	**1**	**8**
2836	CAA	0	0	0	0	0	**0**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	1	1	0	**2**
	CWA	0	0	0	0	0	**0**
	RCRA	3	3	1	2	2	**11**
	TSCA	0	0	1	1	0	**2**
Subtotal		**3**	**3**	**3**	**4**	**2**	**15**
TOTAL 283		**44**	**60**	**52**	**63**	**68**	**287**

Enforcement Actions Summary - 284

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2841	CAA	1	1	1	0	0	**3**
	EPCRA	0	0	1	0	2	**3**
	FIFRA	0	3	4	0	1	**8**
	CWA	0	0	0	0	0	**0**
	RCRA	8	6	4	4	1	**23**
	TSCA	0	0	1	1	2	**4**
Subtotal		**9**	**10**	**11**	**5**	**6**	**41**
2842	CAA	0	1	0	0	0	**1**
	EPCRA	1	1	1	0	1	**4**
	FIFRA	10	12	3	6	7	**38**
	CWA	0	0	0	0	1	**1**
	RCRA	14	10	11	8	13	**56**
	TSCA	0	1	2	0	2	**5**
Subtotal		**25**	**25**	**17**	**14**	**24**	**105**
2843	CAA	0	0	0	0	0	**0**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	0	0	0	0	**0**
	RCRA	2	2	1	0	1	**6**
	TSCA	0	0	0	0	0	**0**
Subtotal		**2**	**2**	**1**	**0**	**1**	**6**
2844	CAA	0	0	0	0	0	**0**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	1	0	0	0	0	**1**
	CWA	4	3	2	1	0	**10**
	RCRA	13	12	6	4	12	**47**
	TSCA	1	0	0	0	0	**1**
Subtotal		**19**	**15**	**8**	**5**	**12**	**59**
TOTAL 284		**55**	**52**	**37**	**24**	**43**	**211**

Enforcement Actions Summary - 285

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2851	CAA	2	3	4	3	0	12
	EPCRA	5	2	1	1	0	9
	FIFRA	4	4	1	7	2	18
	CWA	1	0	1	0	1	3
	RCRA	71	86	76	86	45	364
	TSCA	1	0	2	4	1	8
TOTAL 285		84	95	85	101	49	414

Enforcement Actions Summary - 286

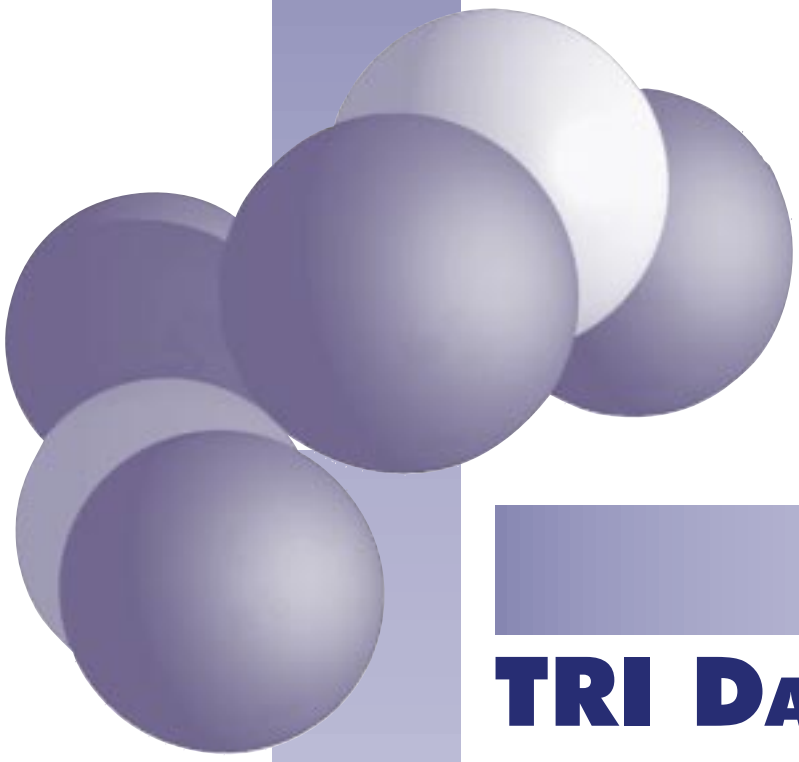
SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2861	CAA	5	3	0	2	0	10
	EPCRA	0	0	0	0	0	0
	FIFRA	0	0	1	0	0	1
	CWA	1	1	0	0	0	2
	RCRA	6	7	5	6	5	29
	TSCA	0	1	0	0	0	1
Subtotal		12	12	6	8	5	43
2865	CAA	7	4	6	1	2	20
	EPCRA	0	1	0	0	0	1
	FIFRA	1	0	0	0	1	2
	CWA	2	3	6	3	3	17
	RCRA	7	12	16	14	11	60
	TSCA	1	1	1	0	0	3
Subtotal		18	21	29	18	17	103
2869	CAA	22	31	19	12	23	107
	EPCRA	1	1	0	2	0	4
	FIFRA	2	1	2	1	1	7
	CWA	8	17	13	6	10	54
	RCRA	82	87	68	61	39	337
	TSCA	3	4	4	3	2	16
Subtotal		118	141	106	85	75	525
TOTAL 286		148	174	141	111	97	671

Enforcement Actions Summary - 287

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2873	CAA	3	0	0	0	0	**3**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	4	1	1	1	**7**
	RCRA	6	7	4	10	6	**33**
	TSCA	0	0	0	0	0	**0**
Subtotal		**9**	**11**	**5**	**11**	**7**	**43**
2874	CAA	3	0	0	0	0	**3**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	0	**0**
	CWA	0	1	2	1	0	**4**
	RCRA	0	1	1	2	4	**8**
	TSCA	0	0	0	0	0	**0**
Subtotal		**3**	**2**	**3**	**3**	**4**	**15**
2875	CAA	1	1	0	0	0	**2**
	EPCRA	0	0	0	0	0	**0**
	FIFRA	0	0	0	0	2	**2**
	CWA	0	0	0	0	0	**0**
	RCRA	0	1	1	0	0	**2**
	TSCA	0	0	0	0	1	**1**
Subtotal		**1**	**2**	**1**	**0**	**3**	**7**
2879	CAA	1	4	4	8	5	**22**
	EPCRA	0	1	1	0	0	**2**
	FIFRA	2	5	26	4	5	**42**
	CWA	0	3	2	2	2	**9**
	RCRA	19	26	22	20	19	**106**
	TSCA	0	1	0	0	1	**2**
Subtotal		**22**	**40**	**55**	**34**	**32**	**183**
TOTAL 287		**35**	**55**	**64**	**48**	**46**	**248**

Enforcement Actions Summary - 289

SIC Code	Statute	Year					
		1990	1991	1992	1993	1994	Total
2891	CAA	0	1	0	0	0	1
	EPCRA	0	0	0	0	0	0
	FIFRA	1	0	0	1	0	2
	CWA	0	0	0	1	2	3
	RCRA	16	7	7	6	9	45
	TSCA	0	0	0	0	0	0
Subtotal		17	8	7	8	11	51
2892	CAA	1	0	0	0	0	1
	EPCRA	0	0	0	0	0	0
	FIFRA	0	0	0	0	0	0
	CWA	0	1	0	4	0	5
	RCRA	10	10	8	0	4	32
	TSCA	0	0	0	1	0	1
Subtotal		11	11	8	5	4	39
2893	CAA	0	0	0	0	0	0
	EPCRA	0	1	1	0	0	2
	FIFRA	0	0	0	0	0	0
	CWA	0	0	0	0	1	1
	RCRA	23	18	8	9	8	66
	TSCA	2	0	0	0	0	2
Subtotal		25	19	9	9	9	71
2895	CAA	0	2	0	0	0	2
	EPCRA	0	0	0	0	0	0
	FIFRA	0	0	0	0	0	0
	CWA	1	0	0	0	0	1
	RCRA	2	0	1	1	0	4
	TSCA	0	0	0	1	0	1
Subtotal		3	2	1	2	0	8
2899	CAA	2	6	2	6	3	19
	EPCRA	0	0	0	0	0	0
	FIFRA	1	2	0	1	0	4
	CWA	3	5	3	3	4	18
	RCRA	57	46	37	41	46	227
	TSCA	0	2	4	1	1	8
Subtotal		63	61	46	52	54	276
TOTAL 289		119	101	71	76	78	445



TRI Data

3. TRI Data

Reporting under the Toxics Release Inventory (TRI) is mandated under the Emergency Planning and Community Right-to-Know Act (EPCRA), Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986. Manufacturing facilities that have the equivalent of 10 or more full-time employees and manufacture, process, or otherwise use listed chemicals in quantities that meet the established thresholds must report their releases and transfers. Manufacturing facilities are defined as facilities in SIC major groups 20 through 39, which include, among others, chemicals, petroleum refining, primary metals, fabricated metals, paper, plastics, and transportation equipment. Facilities that manufacture or process more than 25,000 pounds or otherwise use more than 10,000 pounds of any listed chemical during the calendar year must submit to EPA a Form R for each listed chemical. Reports for each calendar year are due to EPA by July 1 of the following year.[h]

EPA has created a database to track national trends in releases and transfers, known as the Toxics Release Inventory System (TRIS). The database contains information about releases, transfers, and waste management activities. The database tracks information about the amounts of chemicals released to the environment, transferred, or otherwise managed either on site or off site. The TRI database primarily reflects lawful, permitted releases and transfers. Broad categories tracked in the TRI database are: (1) facility identification, (2) substance identification, (3) environmental releases of TRI chemicals, (4) waste treatment, (5) transfer of waste off site, and (6) source reduction and recycling. The inventory contains data dating from 1987; however, 1988 is considered the inventory's baseline year, because of concerns about the quality of the data submitted by industry during the first year such submittals were required. Transfers for treatment and disposal have been reported since 1987. Transfers for recycling and energy recovery have been reported since 1991.

Beginning with reporting year 1994, federal facilities are required to report to TRI. For reporting purposes, TRI designates 118 chemicals as carcinogens on the basis of criteria set forth in the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standards. Some of those chemicals, such as benzene and asbestos, are known to cause cancer in humans. Others are suspected to cause cancer in humans because they have been shown to cause cancer in laboratory animals. For more information regarding chemicals tracked in TRI, please visit EPA's website at *http://www.epa.gov/opptintr/chemfact/* or the Agency for Toxic Substances and Disease Registry website at *http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html*.

A final rule adding 286 chemicals to the TRI was published on November 30, 1994. The first reports that included those chemicals were due August 1, 1996. Other industry groups were added in 1997. Currently under consideration is the future expansion of the reporting requirements to include accounting for use of materials.

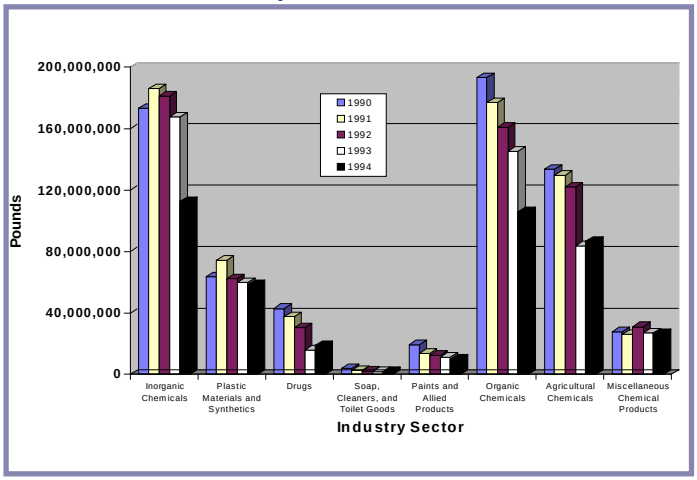
It is important to note the following data limitations:

- TRI data should be adjusted for production to obtain a more accurate accounting of industry activities.
- The congressional Office of Technology Assessment estimates that releases reported to TRI represent only five percent of all chemical releases.
- Changes in reporting thresholds and TRI obligations occurred throughout the baseline period.
- The database contains information about only a portion of the toxic chemicals released nationwide, because facilities that have fewer than 10 full-time employees and that do not meet or exceed threshold amounts established for the various chemicals are not required to file TRI reports.
- Facilities not included in SIC major groups 20 to 39 were not required to report to TRI.

- Not all toxic chemicals are listed under the TRI.
- The TRI requires the reporting of estimated data and does not mandate that facilities monitor their releases.
- TRI data reflect releases and transfers of chemicals, not exposure of the public to those chemicals.
- Since 1987, EPA has deleted a number of chemicals from the TRI reporting list, added other chemicals, and modified the reporting requirements for still others.
- EPA does not have a national database that tracks indirect discharges to surface water. That information exists at the local level only. Therefore, data on surface water discharges includes only direct discharges.
- Data were extracted from the EPA TRI Public Data Releases for all TRI industry trends.
- Data were extracted from the EPA TRI Data CD-ROM, 1990 to 1994, for all industries that reported under 2800 SIC code.

The following sections describe trends from 1990 to 1994, including national trends for all industries and trends within the chemical industry. National trends for all industries are provided to aid the reader in placing the chemical industry in the context of all releases and transfers of toxic chemicals reported nationwide under the TRI.

Figure 3-1.
Total Release Trends, 1990 to 1994.



3.A. Chemical Industry Trends (1990 to 1994)

Figure 3-1 shows the trend in total releases for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in total releases reportable under TRI during this period, except for slight increases in some sectors for the period between 1990 and 1991, attributable at least in part, to expansion of reporting requirements for the chemical industry. However, the data from 1991 to 1994 show an overall decrease of 43.5 percent in total releases reportable under TRI. During that time, production increased by 8.6 percent.[d]

Figure 3-2.
Carcinogenic Release Trends for Chemical Industry, 1990 to 1994.

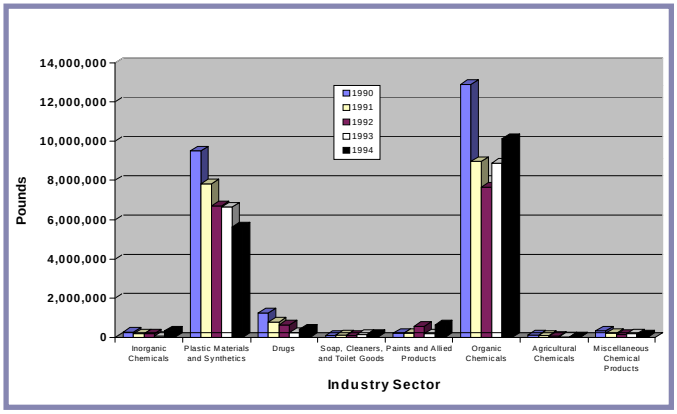


Figure 3-3.
Transfer Trends for Chemical Industry, 1990 to 1994.

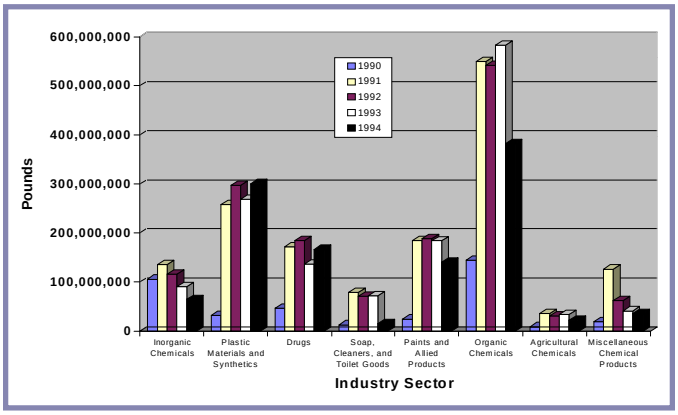


Figure 3-2 shows the trend in releases of carcinogenic chemicals for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in such releases, except for a slight increase in 1994 in some sectors, again a circumstance that may be attributable to a change in reporting requirements for the chemical industry. However, an overall decrease of 15.9 percent in total releases of carcinogens reportable to TRI occurred from 1990 to 1994.

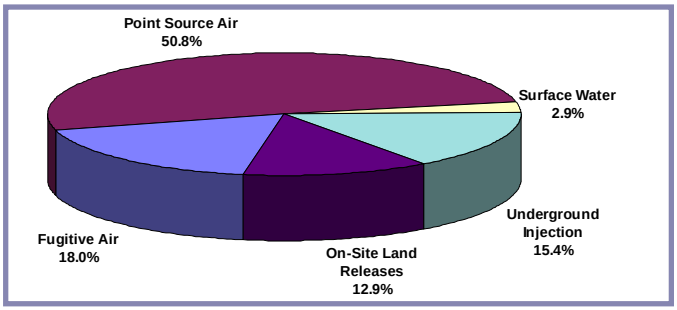
Figure 3-3 shows the trend in total transfers for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in total transfers of chemicals reportable under TRI in most sectors, during that period, except for the period between 1990 and 1991, a circumstance that can be attributed to changes in requirements for reporting of transfers for recycling and energy recovery. However, an overall decrease of 13.5 percent in total transfers reportable to TRI occurred from 1991 to 1994.

A comparison among the chemical industry sectors shows that, in 1990, the organic chemical sector reported the greatest number of transfers reportable to TRI, followed by the inorganic chemical, drug, plastic material, and synthetic sectors, respectively. The organic chemical sector reported the largest quantity of toxic chemicals released, followed by inorganic chemicals, agricultural chemicals, and plastic materials and synthetics, respectively. Releases of carcinogenic chemicals were highest for the organic chemicals and plastic materials and synthetics sectors.

In 1991 and 1992, the organic chemicals sector again reported the largest number of transfers reportable to TRI, followed by the plastic materials and synthetics sector. The inorganic chemicals sector reported the largest quantity of toxic chemicals released, followed by the organic chemicals and agricultural chemicals sector, respectively. Releases of carcinogenic chemicals decreased from the levels reported in 1990, but the same sectors reported the largest quantities of carcinogenic chemicals released.

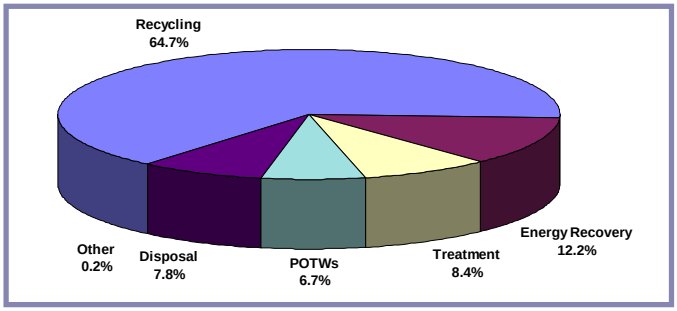
In 1993 and 1994, the organic chemical sector led the other sectors in the transfer of TRI chemicals, followed by the plastic materials and synthetics sector. The inorganic chemicals sector reported the greatest number of pounds released, followed by the organic chemicals and agricultural sectors, respectively. Releases of carcinogenic chemicals decreased from the levels reported in 1990, but the same sectors reported the largest quantities of carcinogenic chemicals released.

Figure 3-4.
Distribution of TRI Releases for All Industries, 1994.[h]



Half of all 1994 TRI releases were those to air from point sources.

Figure 3-5.
Distribution of TRI Transfers for All Industries, 1994.[h]



Over 64 percent of all 1994 TRI transfers were attributed to recycling.

3.B. TRI Data for All Industries (1994)

In 1994, 22,744 facilities filed 75,332 TRI reporting forms, or an average of 3.3 forms per facility. The facilities reported releasing approximately 2.26 billion pounds of listed chemicals into the environment.[h] Table 3-1 and Figure 3-4 show the total releases to various media.

Facilities sent almost 3.8 billion pounds of listed chemicals to off-site locations for treatment, disposal, energy recovery, or recycling in 1994. Table 3-2 and Figure 3-5 show the total transfers by source.

Table 3-1.[h]

Total Quantities of TRI Releases for All Industries, 1994.

Source	Pounds	Percent
Fugitive Air	407,515,304	18.0
Point Source Air	1,148,492,781	50.8
Surface Water	66,083,288	2.9
Underground Injection	348,968,226	15.4
On-Site Land Releases	289,151,126	12.9

Figure 3-6.
Industry Categories that Reported the Largest Quantities of On-Site TRI Releases for All Industries, 1994.[h]

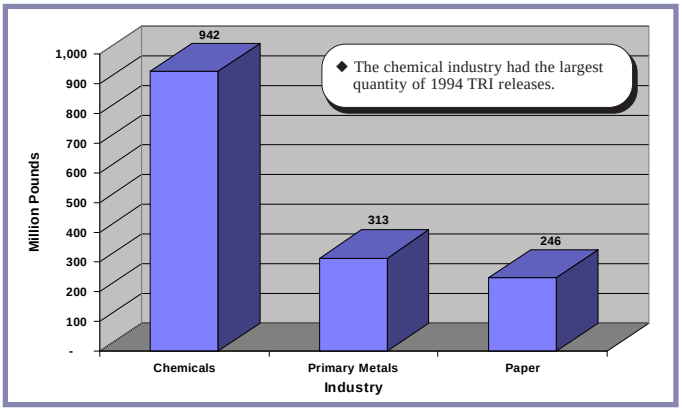


Table 3-2.[h]

Total Quantities of TRI Transfers for All Industries, 1994.

Source	Pounds	Percent
Recycling	2,456,120,948	64.7
Energy Recovery	464,206,483	12.2
Treatment	318,810,333	8.4
POTWs	254,688,836	6.7
Disposal	297,600,462	7.8
Other	3,602,423	0.2

Figure 3-7.
Industry Categories that Reported the Largest Quantities of TRI Transfers, 1994.[h]

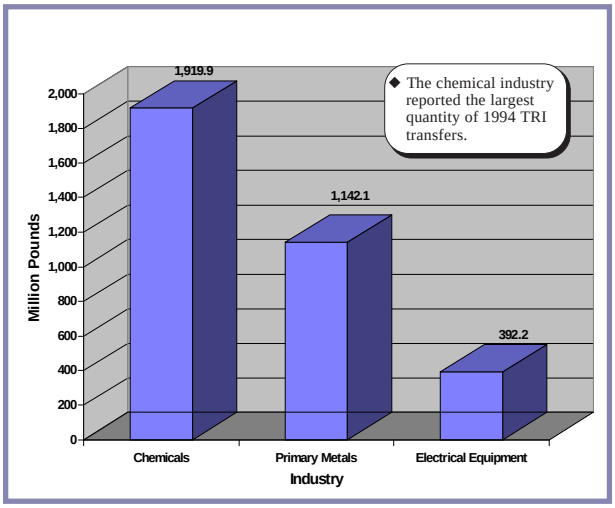


Figure 3-6 shows the industry categories that reported the largest quantities of on-site TRI releases in 1994. The chemical industry had the largest quantity of releases (942 million pounds), followed by the primary metals (313 million pounds) and paper (246 million pounds) industries.

It is important to note that, while the 50 facilities reporting the largest total amounts of listed TRI chemicals released represent just 0.2 percent of all facilities reporting to the TRI, they accounted for 26.1 percent of all releases reported to TRI in 1994. The facilities submitted an average of 14.9 reports each. More than one-half (31) of those facilities were chemical facilities.[h]

Figure 3-7 shows the industry categories in which facilities reported the largest quantities of transfers of TRI chemicals. The chemical industry reported the largest quantities transferred (1,920 million pounds), followed by the primary metals (1,142 million pounds) and electrical equipment (392.2 million pounds) industries. However, most of the transfers reported by primary metals and electrical equipment industries were transfers to recycling (79.4 percent and 90.9 percent, respectively). In contrast, only 15.6 percent of the chemical industry's transfers were to recycling, although the chemical industry accounted for 75.3 percent of all transfers to energy recovery.

Figure 3-8 shows the industry categories in which facilities reported the largest quantities of releases of carcinogenic chemicals as identified under TRI reporting requirements. The chemical industry reported the largest quantity of releases (54.8 million pounds), followed by the plastics industry (43.5 million pounds), and paper (18.2 million pounds).

Figure 3-8.
Industry Categories that Reported the Largest Quantities of Releases of Carcinogens, 1994.[h]

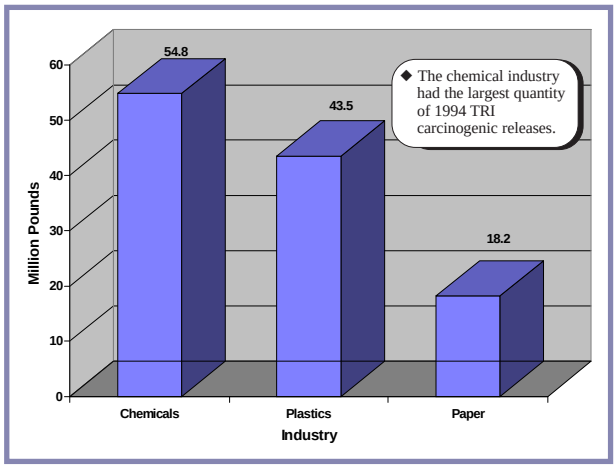


Table 3-3.

Total Quantities of TRI Releases, 1994.[h]

SIC Code	Industry	Number of Facilities	Number of Forms	Total Air Emissions (Pounds)	Surface Water Discharges (Pounds)	Underground Injection (Pounds)	Releases to Land (Pounds)	Total Releases (Pounds)
281	Inorganic Chemicals	366	1,377	21,534,987	1,215,939	72,349,069	17,467,785	112,567,780
282	Plastic Materials and Synthetics	323	1,956	57,534,842	935,114	84,050	65,397	58,619,403
283	Drugs	175	601	10,966,354	912,144	6,826,250	175,154	18,879,902
284	Soaps, Cleaners, and Toilet Goods	233	1,070	1,735,522	2,737	15,431	35,514	1,789,204
285	Paints and Allied Products	536	3,123	9,828,250	3,828	0	13,909	9,845,987
286	Organic Chemicals	384	3,111	50,841,160	1,009,047	52,661,370	1,149,816	105,661,393
287	Agricultural Chemicals	163	1,039	57,536,662	5,576,521	2,391,288	21,218,843	86,723,314
289	Miscellaneous Chemicals	527	2,245	25,897,822	243,027	0	255,621	26,396,470
*	Multiple SIC with 2800	1,024	8,396	232,011,012	32,682,782	201,036,145	55,852,811	521,582,750
	TOTAL	**3,731**	**22,918**	**467,886,611**	**42,581,139**	**335,363,603**	**96,234,850**	**942,066,203**

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

3.C. TRI Data for the Chemical Industry (1994)

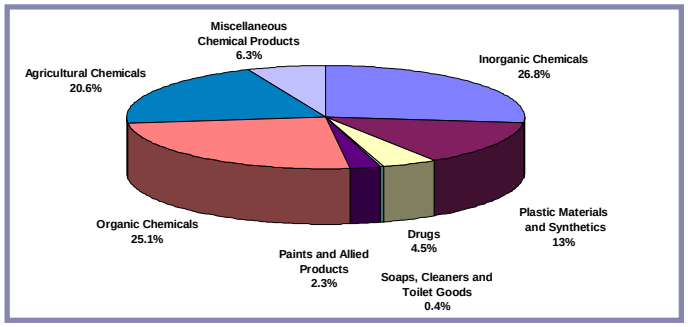
In 1994, facilities in the chemical industry submitted 22,918 TRI forms, or 30.4 percent of all forms submitted to the TRI, filing an average of 6.2 forms per facility (see Table 3-3). Chemical facilities reported an average of 255,372 pounds released, second only to primary metals. The chemical industry accounted for almost all reported underground injection of waste (96.0 percent) and a majority of surface-water discharges (64.4 percent).

Table 3-3 and Figure 3-9 break down the total quantity of TRI releases for the chemical industry. The inorganic chemicals segment of the industry reported the largest quantity of releases (27 percent), followed by the organic chemicals (25 percent) and agricultural chemicals (21 percent) segments.

Figure 3-10 shows the breakdown of air emissions for the chemical industry. The plastic materials and synthetics segments of the industry reported the largest quantity of air releases (25 percent), followed by the agricultural chemicals (24 percent) and organic chemicals (22 percent) segments.

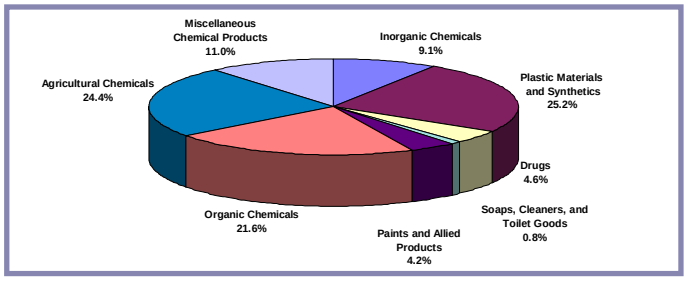
Figure 3-11 breaks down the total surface-water discharges for the chemical industry. The agricultural chemicals segment of the industry reported the largest quantity of surface-water

Figure 3-9.
Total TRI Releases for Chemical Industry, 1994.[h]



The inorganic chemicals segment reported the largest quantity of releases.

Figure 3-10.
Total Air Emissions for Chemical Industry, 1994.[h]



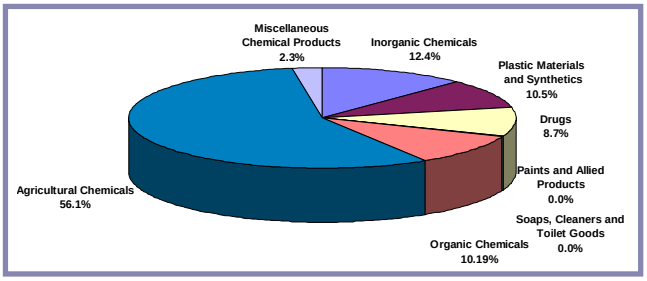
The plastics and synthetics segment reported the largest quantity of air releases.

discharges (56 percent), followed by the inorganic chemicals (12 percent) and the plastic materials and synthetics (11 percent) segments.

Figure 3-12 breaks down the total releases by underground injection for the chemical industry. The inorganic chemicals segment of the industry reported the largest quantity of underground injection releases (66 percent), followed by the organic chemicals (29 percent) and drug (4 percent) segments.

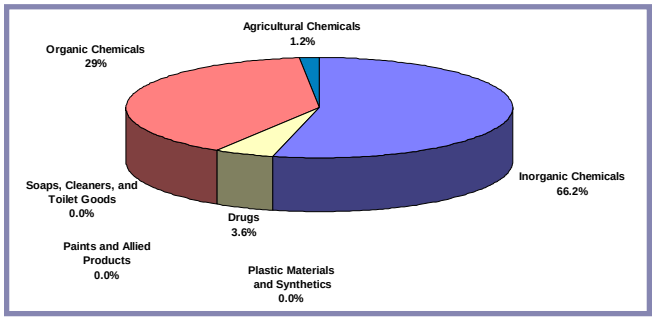
Figure 3-13 breaks down the total releases to land for the chemical industry. The agricultural chemicals segment of the industry reported the largest quantity of releases to land (53 percent), followed by the inorganic chemicals (43 percent) and organic chemicals (3 percent) segments.

**Figure 3-11.
Surface-Water Discharges for Chemical Industry, 1994.[h]**



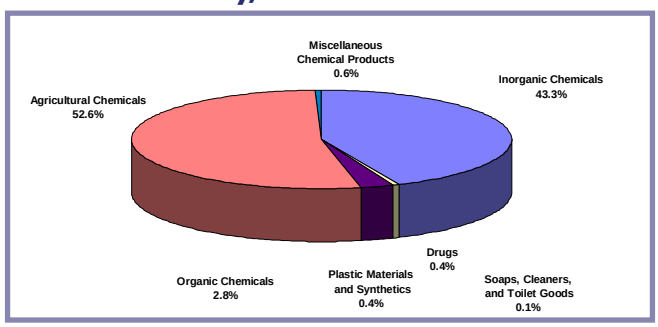
The agricultural chemicals segment reported the largest surface-water discharges.

**Figure 3-12.
Underground Injection Releases for Chemical Industry, 1994.[h]**



The inorganic chemicals segment reported the largest quantity of underground injection releases.

**Figure 3-13.
Releases to Land for Chemical Industry, 1994.[h]**



The agricultural chemicals segment reported the largest quantity of releases to land.

3.D. National Trends for All Industries (1990 to 1994)

The number of all facilities reporting to TRI increased slightly between 1990 and 1991, but the general trend is a steady decline in the number of facilities reporting to TRI (see Table 3-4). Following that trend, the number of TRI reports submitted declined gradually from 1990 to 1994.

Reported releases of listed chemicals decreased by 500 million pounds between 1993 and 1994. That figure represents a decline of nearly 18 percent. Reports of releases of listed chemicals decreased by 13 percent between 1992 and 1993, at more than double the rate of decline between 1991 and 1992. The quantity of TRI chemicals released decreased from 3.6 billion pounds in 1990 to 2.3 billion pounds in 1994, a decrease of 36.1 percent.

Amounts of carcinogenic chemicals released dropped from 236 million pounds in 1990 to 177 million pounds in 1994, a 25 percent decrease. The quantity of TRI chemicals transferred increased from 3.9 billion pounds in 1991 to 4.8 billion pounds in 1993. The increase of 23 percent is primarily the result of increased transfers for recycling. Reports of TRI chemicals transferred show a decrease between 1993 and 1994, from 4.8 billion pounds, to 3.8 billion pounds, a 21 percent decrease. Table 3-5 summarizes national TRI trends for all industries.

3.E. National Trends for the Chemical Industry (1990 to 1994)

Throughout the period from 1990 to 1994, the chemical industry as a whole generally reported the largest quantities of carcinogens released, followed by the plastics products (SIC 3000) and transportation equipment (SIC 3700) industries. The chemical industry consistently has reported the largest quantities of total pounds released, followed by the primary metals and paper industries. In addition, the chemical industry has reported the largest quantities transferred, followed by the primary metals and paper industries.

Table 3-4.

TRI Trends For All Industries, 1990 to 1994.[i]

Year	1990	1991	1992	1993	1994
Number of Facilities Reporting to TRI	23,638	23,719	23,630	23,321	22,744
Number of Forms Submitted to TRI	83,387	82,293	81,016	79,987	75,332
Average Number of Forms per Facility	3.5	3.5	3.4	3.4	3.3
Total Pounds Released	3.6 billion	3.4 billion	3.2 billion	2.8 billion	2.3 billion
Total Pounds of Carcinogens Released	236 million[1]	212 million	197 million	180 million	177 million
Total Pounds Transferred	1.3 billion[2]	3.9 billion	4.4 billion	4.8 billion	3.8 billion

[1] Does not include releases to land.
[2] Transfers include only those to POTWs and off-site locations. Transfers to energy recovery and recycling were not reported.

It is important to note that, for the 1990 to 1994 period, the chemical industry as a whole reported more than half the total quantity of production-related waste reported by all industries and more than four times the amount reported by the second-ranked industry, primary metals. Table 3-6 summarizes national TRI trends for the chemical industry.

3.F. Five Chemicals Released in the Greatest Quantities by the Chemical Industry (1990 to 1994)

From 1990 to 1993, ammonia was the TRI chemical released into the environment in the largest quantity (see Table 3-7). However, the amount reported decreased steadily from approximately 404.6 million pounds in 1990 to 126.7 million pounds in 1994. Those figures represent a decrease of 277.9 million pounds, or 68.7 percent. The TRI chemicals released in the second, third, fourth, and fifth largest quantities show a generally downward trend in the releases of phosphoric acid, sulfuric acid, and methanol. The reporting requirements for ammonia and sulfuric acid were revised during that period.

Releases of carcinogenic chemicals from 1990 to 1994 are shown in Table 3-8. Styrene is the TRI carcinogenic chemical released to the environment in the largest quantity, followed by acetonitrile, and formaldehyde.

The TRI chemicals transferred in the largest quantities from 1990 to 1994 are not the same chemicals from one year to the next (see Table 3-9). However, the TRI chemical transferred in the greatest quantity shows a trend towards accounting for more than half of all TRI transfers.

In 1990, the top five chemicals released accounted for 56.8 percent of all chemicals released. This percentage rose to 59.6 and 63.3 percent in 1991 and 1992, respectively. In 1993, it decreased to 60.9 percent and then to 53.2 percent in 1994.

Table 3-5.

TRI Trends for All Industries, Summary of 1990 to 1994[h]

TRI Category	Trend
Chemicals released	36.1 percent decrease
Carcinogenic chemicals released	25 percent decrease
Chemicals transferred	292 percent increase

Table 3-6.

TRI Trends for Chemical Industry, Summary of 1990 to 1994[i]

TRI Category	Trend
Chemicals released	43.5 percent decrease
Carcinogenic chemicals released	15.9 percent decrease
Chemicals transferred	13.5 percent decrease

Table 3-7.

Top Five Chemicals Released in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Ammonia	404,608,062	24.2
	1991	Ammonia	366,126,752	22.7
	1992	Ammonia	365,374,868	22.9
	1993	Ammonia	255,719,521	18.9
	1994	Hydrochloric acid	150,824,955	16.0
Second	1990	Hydrochloric acid	188,082,470	11.3
	1991	Hydrochloric acid	216,287,343	13.4
	1992	Hydrochloric acid	217,970,514	13.7
	1993	Phosphoric acid	211,252,927	15.6
	1994	Ammonia	126,778,226	13.5
Third	1990	Phosphoric acid	136,784,943	8.2
	1991	Phosphoric acid	161,636,911	10.0
	1992	Phosphoric acid	205,183,078	12.9
	1993	Hydrochloric acid	151,586,039	11.2
	1994	Phosphoric acid	77,649,114	8.2
Fourth	1990	Sulfuric acid	121,472,207	7.3
	1991	Sulfuric acid	122,521,308	7.6
	1992	Sulfuric acid	122,423,015	7.7
	1993	Sulfuric acid	124,690,389	9.2
	1994	Methanol	74,561,119	7.9
Fifth	1990	Methanol	96,488,265	5.8
	1991	Methanol	95,135,510	5.9
	1992	Methanol	97,452,887	6.1
	1993	Carbon Disulfide	81,284,733	6.0
	1994	Carbon Disulfide	71,795,989	7.6

Table 3-8.

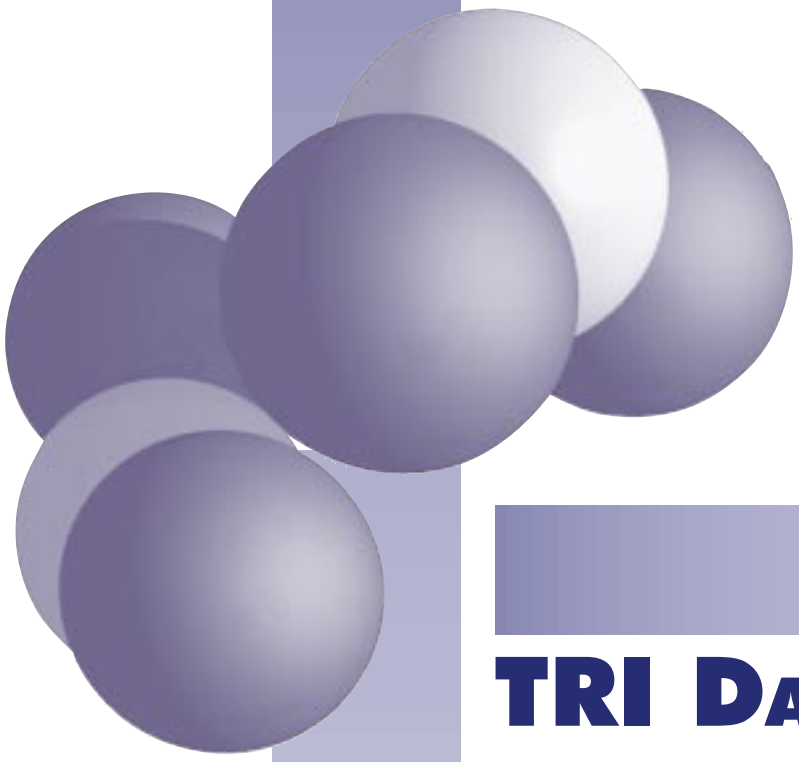
Top Five Carcinogenic Chemicals Released in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Styrene	14,371,179	37.1
	1991	Styrene	21,573,455	21.6
	1992	Styrene	23,853,716	28.1
	1993	Acetonitrile	23,349,289	22.5
	1994	Acetonitrile	22,581,548	20.6
Second	1990	Formaldehyde	7,558,513	19.5
	1991	Acetonitrile	20,246,192	20.3
	1992	Acetonitrile	19,791,225	23.3
	1993	Styrene	16,457,053	15.9
	1994	Styrene	18,850,062	17.2
Third	1990	Acetonitrile	3,953,185	10.2
	1991	Diethyl Sulfate	14,276,861	14.3
	1992	Formaldehyde	5,867,222	6.9
	1993	1,3-Butadiene	15,167,497	14.6
	1994	1,3-Butadiene	15,801,079	14.4
Fourth	1990	Diaminotoluene (Mixed Isomers)	2,416,480	6.2
	1991	Formaldehyde	6,329,773	6.3
	1992	Di(2-Ethylyexyl)	5,778,997	6.8
	1993	Diethyl Sulfate	10,744,465	10.4
	1994	Diethyl Sulfate	12,368,251	11.3
Fifth	1990	Asbestos (Friable)	2,084,026	5.4
	1991	Di(2-Ethylyexyl) Phthalate	5,708,647	5.7
	1992	1,3-Butadiene	4,965,581	5.9
	1993	Di(2-Ethylyexyl) Phthalate (DEHP)	5,357,730	5.2
	1994	Di(2-Ethylyexyl) Phthalate (DEHP)	5,728,831	5.23.5

Table 3-9.

Top Five Chemicals Transferred in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Methanol	153,139,319	19.0
	1991	Sulfuric acid	352,611,719	15.9
	1992	Sulfuric acid	369,047,778	16.4
	1993	Sulfuric acid	360,165,712	16.4
	1994	Methanol	267,397,243	13.9
Second	1990	Ammonia	71,660,866	8.9
	1991	Methanol	278,678,189	12.6
	1992	Methanol	284,529,890	12.6
	1993	Methanol	268,881,669	12.3
	1994	Ethylene Glycol	237,064,296	12.3
Third	1990	Hydrochloric acid	70,729,618	8.8
	1991	Ethylene Glycol	196,755,104	8.9
	1992	Ethylene Glycol	215,926,458	9.6
	1993	Ethylene Glycol	209,156,217	9.5
	1994	Toluene	174,790,497	9.1
Fourth	1990	Toluene	46,593,137	5.8
	1991	Xylene (Mixed Isomers)	166,345,343	7.5
	1992	Toluene	169,273,165	7.5
	1993	Toluene	182,327,913	8.3
	1994	Xylene (Mixed Isomers)	160,010,711	8.3
Fifth	1990	Sulfuric acid	43,583,277	5.4
	1991	Toluene	164,122,956	7.4
	1992	Xylene (Mixed Isomers)	129,305,610	5.7
	1993	Xylene (Mixed Isomers)	140,004,661	6.4
	1994	Hydrochloric acid	85,067,427	4.4



TRI Data

3. TRI Data

Reporting under the Toxics Release Inventory (TRI) is mandated under the Emergency Planning and Community Right-to-Know Act (EPCRA), Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986. Manufacturing facilities that have the equivalent of 10 or more full-time employees and manufacture, process, or otherwise use listed chemicals in quantities that meet the established thresholds must report their releases and transfers. Manufacturing facilities are defined as facilities in SIC major groups 20 through 39, which include, among others, chemicals, petroleum refining, primary metals, fabricated metals, paper, plastics, and transportation equipment. Facilities that manufacture or process more than 25,000 pounds or otherwise use more than 10,000 pounds of any listed chemical during the calendar year must submit to EPA a Form R for each listed chemical. Reports for each calendar year are due to EPA by July 1 of the following year.[h]

EPA has created a database to track national trends in releases and transfers, known as the Toxics Release Inventory System (TRIS). The database contains information about releases, transfers, and waste management activities. The database tracks information about the amounts of chemicals released to the environment, transferred, or otherwise managed either on site or off site. The TRI database primarily reflects lawful, permitted releases and transfers. Broad categories tracked in the TRI database are: (1) facility identification, (2) substance identification, (3) environmental releases of TRI chemicals, (4) waste treatment, (5) transfer of waste off site, and (6) source reduction and recycling. The inventory contains data dating from 1987; however, 1988 is considered the inventory's baseline year, because of concerns about the quality of the data submitted by industry during the first year such submittals were required. Transfers for treatment and disposal have been reported since 1987. Transfers for recycling and energy recovery have been reported since 1991.

Beginning with reporting year 1994, federal facilities are required to report to TRI. For reporting purposes, TRI designates 118 chemicals as carcinogens on the basis of criteria set forth in the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standards. Some of those chemicals, such as benzene and asbestos, are known to cause cancer in humans. Others are suspected to cause cancer in humans because they have been shown to cause cancer in laboratory animals. For more information regarding chemicals tracked in TRI, please visit EPA's website at *http://www.epa.gov/opptintr/chemfact/* or the Agency for Toxic Substances and Disease Registry website at *http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html*.

A final rule adding 286 chemicals to the TRI was published on November 30, 1994. The first reports that included those chemicals were due August 1, 1996. Other industry groups were added in 1997. Currently under consideration is the future expansion of the reporting requirements to include accounting for use of materials.

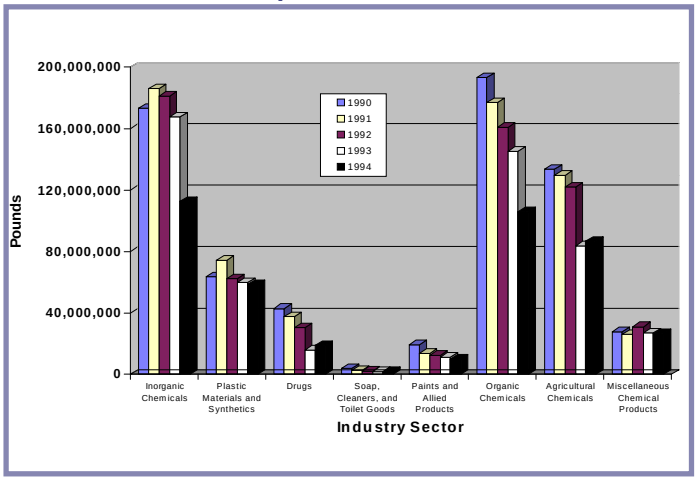
It is important to note the following data limitations:

- TRI data should be adjusted for production to obtain a more accurate accounting of industry activities.
- The congressional Office of Technology Assessment estimates that releases reported to TRI represent only five percent of all chemical releases.
- Changes in reporting thresholds and TRI obligations occurred throughout the baseline period.
- The database contains information about only a portion of the toxic chemicals released nationwide, because facilities that have fewer than 10 full-time employees and that do not meet or exceed threshold amounts established for the various chemicals are not required to file TRI reports.
- Facilities not included in SIC major groups 20 to 39 were not required to report to TRI.

- Not all toxic chemicals are listed under the TRI.
- The TRI requires the reporting of estimated data and does not mandate that facilities monitor their releases.
- TRI data reflect releases and transfers of chemicals, not exposure of the public to those chemicals.
- Since 1987, EPA has deleted a number of chemicals from the TRI reporting list, added other chemicals, and modified the reporting requirements for still others.
- EPA does not have a national database that tracks indirect discharges to surface water. That information exists at the local level only. Therefore, data on surface water discharges includes only direct discharges.
- Data were extracted from the EPA TRI Public Data Releases for all TRI industry trends.
- Data were extracted from the EPA TRI Data CD-ROM, 1990 to 1994, for all industries that reported under 2800 SIC code.

The following sections describe trends from 1990 to 1994, including national trends for all industries and trends within the chemical industry. National trends for all industries are provided to aid the reader in placing the chemical industry in the context of all releases and transfers of toxic chemicals reported nationwide under the TRI.

Figure 3-1.
Total Release Trends, 1990 to 1994.



3.A. Chemical Industry Trends (1990 to 1994)

Figure 3-1 shows the trend in total releases for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in total releases reportable under TRI during this period, except for slight increases in some sectors for the period between 1990 and 1991, attributable at least in part, to expansion of reporting requirements for the chemical industry. However, the data from 1991 to 1994 show an overall decrease of 43.5 percent in total releases reportable under TRI. During that time, production increased by 8.6 percent.[d]

Figure 3-2.
Carcinogenic Release Trends for Chemical Industry, 1990 to 1994.

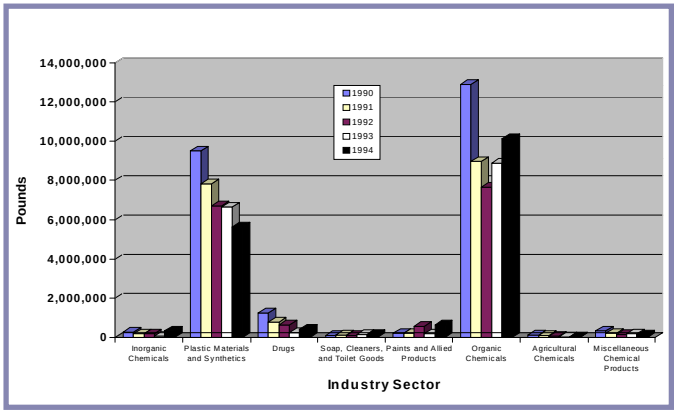


Figure 3-3.
Transfer Trends for Chemical Industry, 1990 to 1994.

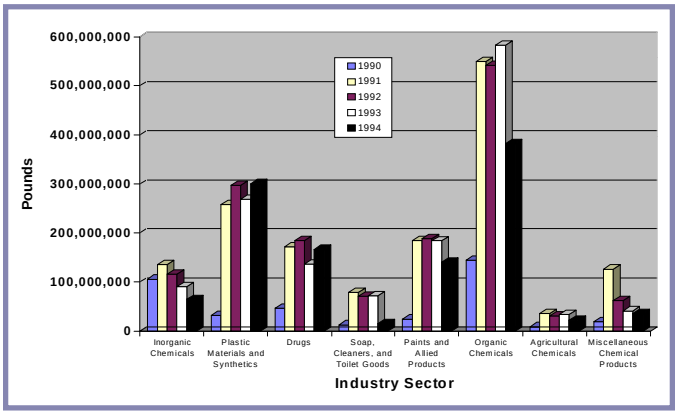


Figure 3-2 shows the trend in releases of carcinogenic chemicals for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in such releases, except for a slight increase in 1994 in some sectors, again a circumstance that may be attributable to a change in reporting requirements for the chemical industry. However, an overall decrease of 15.9 percent in total releases of carcinogens reportable to TRI occurred from 1990 to 1994.

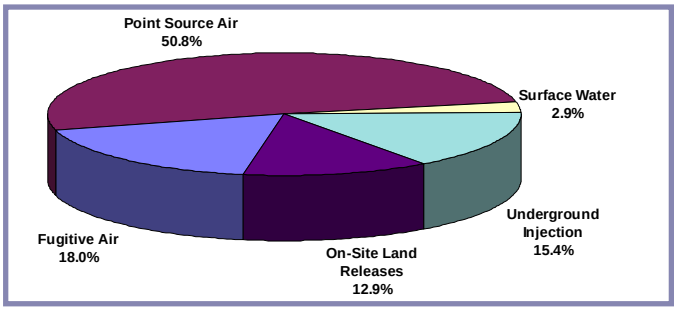
Figure 3-3 shows the trend in total transfers for each of the chemical industry sectors from 1990 to 1994. There was a steady decline in total transfers of chemicals reportable under TRI in most sectors, during that period, except for the period between 1990 and 1991, a circumstance that can be attributed to changes in requirements for reporting of transfers for recycling and energy recovery. However, an overall decrease of 13.5 percent in total transfers reportable to TRI occurred from 1991 to 1994.

A comparison among the chemical industry sectors shows that, in 1990, the organic chemical sector reported the greatest number of transfers reportable to TRI, followed by the inorganic chemical, drug, plastic material, and synthetic sectors, respectively. The organic chemical sector reported the largest quantity of toxic chemicals released, followed by inorganic chemicals, agricultural chemicals, and plastic materials and synthetics, respectively. Releases of carcinogenic chemicals were highest for the organic chemicals and plastic materials and synthetics sectors.

In 1991 and 1992, the organic chemicals sector again reported the largest number of transfers reportable to TRI, followed by the plastic materials and synthetics sector. The inorganic chemicals sector reported the largest quantity of toxic chemicals released, followed by the organic chemicals and agricultural chemicals sector, respectively. Releases of carcinogenic chemicals decreased from the levels reported in 1990, but the same sectors reported the largest quantities of carcinogenic chemicals released.

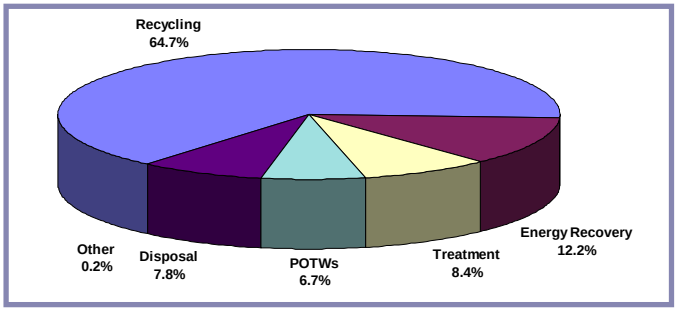
In 1993 and 1994, the organic chemical sector led the other sectors in the transfer of TRI chemicals, followed by the plastic materials and synthetics sector. The inorganic chemicals sector reported the greatest number of pounds released, followed by the organic chemicals and agricultural sectors, respectively. Releases of carcinogenic chemicals decreased from the levels reported in 1990, but the same sectors reported the largest quantities of carcinogenic chemicals released.

Figure 3-4.
Distribution of TRI Releases for All Industries, 1994.[h]



Half of all 1994 TRI releases were those to air from point sources.

Figure 3-5.
Distribution of TRI Transfers for All Industries, 1994.[h]



Over 64 percent of all 1994 TRI transfers were attributed to recycling.

3.B. TRI Data for All Industries (1994)

In 1994, 22,744 facilities filed 75,332 TRI reporting forms, or an average of 3.3 forms per facility. The facilities reported releasing approximately 2.26 billion pounds of listed chemicals into the environment.[h] Table 3-1 and Figure 3-4 show the total releases to various media.

Facilities sent almost 3.8 billion pounds of listed chemicals to off-site locations for treatment, disposal, energy recovery, or recycling in 1994. Table 3-2 and Figure 3-5 show the total transfers by source.

Table 3-1.[h]

Total Quantities of TRI Releases for All Industries, 1994.

Source	Pounds	Percent
Fugitive Air	407,515,304	18.0
Point Source Air	1,148,492,781	50.8
Surface Water	66,083,288	2.9
Underground Injection	348,968,226	15.4
On-Site Land Releases	289,151,126	12.9

Figure 3-6.
Industry Categories that Reported the Largest Quantities of On-Site TRI Releases for All Industries, 1994.[h]

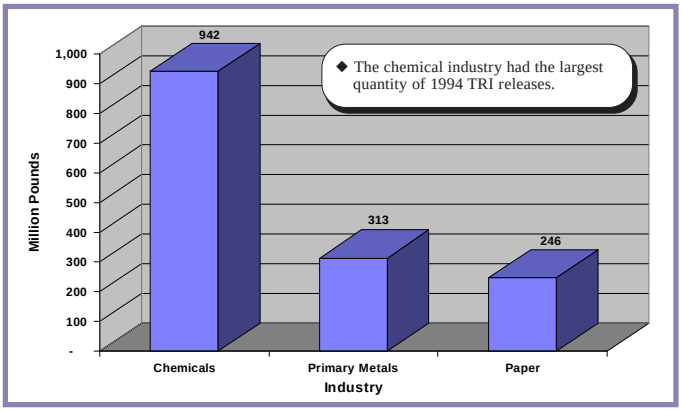


Table 3-2.[h]

Total Quantities of TRI Transfers for All Industries, 1994.

Source	Pounds	Percent
Recycling	2,456,120,948	64.7
Energy Recovery	464,206,483	12.2
Treatment	318,810,333	8.4
POTWs	254,688,836	6.7
Disposal	297,600,462	7.8
Other	3,602,423	0.2

Figure 3-7.
Industry Categories that Reported the Largest Quantities of TRI Transfers, 1994.[h]

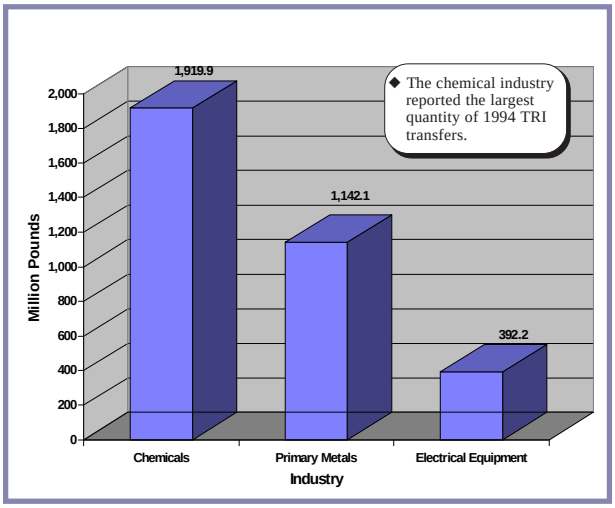


Figure 3-6 shows the industry categories that reported the largest quantities of on-site TRI releases in 1994. The chemical industry had the largest quantity of releases (942 million pounds), followed by the primary metals (313 million pounds) and paper (246 million pounds) industries.

It is important to note that, while the 50 facilities reporting the largest total amounts of listed TRI chemicals released represent just 0.2 percent of all facilities reporting to the TRI, they accounted for 26.1 percent of all releases reported to TRI in 1994. The facilities submitted an average of 14.9 reports each. More than one-half (31) of those facilities were chemical facilities.[h]

Figure 3-7 shows the industry categories in which facilities reported the largest quantities of transfers of TRI chemicals. The chemical industry reported the largest quantities transferred (1,920 million pounds), followed by the primary metals (1,142 million pounds) and electrical equipment (392.2 million pounds) industries. However, most of the transfers reported by primary metals and electrical equipment industries were transfers to recycling (79.4 percent and 90.9 percent, respectively). In contrast, only 15.6 percent of the chemical industry's transfers were to recycling, although the chemical industry accounted for 75.3 percent of all transfers to energy recovery.

Figure 3-8 shows the industry categories in which facilities reported the largest quantities of releases of carcinogenic chemicals as identified under TRI reporting requirements. The chemical industry reported the largest quantity of releases (54.8 million pounds), followed by the plastics industry (43.5 million pounds), and paper (18.2 million pounds).

Figure 3-8.
Industry Categories that Reported the Largest Quantities of Releases of Carcinogens, 1994.[h]

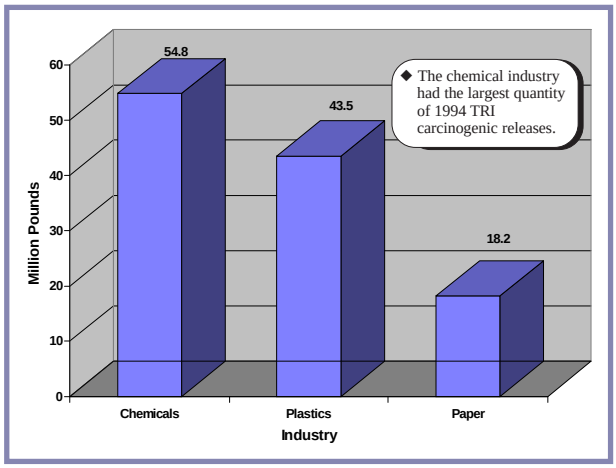


Table 3-3.

Total Quantities of TRI Releases, 1994.[h]

SIC Code	Industry	Number of Facilities	Number of Forms	Total Air Emissions (Pounds)	Surface Water Discharges (Pounds)	Underground Injection (Pounds)	Releases to Land (Pounds)	Total Releases (Pounds)
281	Inorganic Chemicals	366	1,377	21,534,987	1,215,939	72,349,069	17,467,785	112,567,780
282	Plastic Materials and Synthetics	323	1,956	57,534,842	935,114	84,050	65,397	58,619,403
283	Drugs	175	601	10,966,354	912,144	6,826,250	175,154	18,879,902
284	Soaps, Cleaners, and Toilet Goods	233	1,070	1,735,522	2,737	15,431	35,514	1,789,204
285	Paints and Allied Products	536	3,123	9,828,250	3,828	0	13,909	9,845,987
286	Organic Chemicals	384	3,111	50,841,160	1,009,047	52,661,370	1,149,816	105,661,393
287	Agricultural Chemicals	163	1,039	57,536,662	5,576,521	2,391,288	21,218,843	86,723,314
289	Miscellaneous Chemicals	527	2,245	25,897,822	243,027	0	255,621	26,396,470
*	Multiple SIC with 2800	1,024	8,396	232,011,012	32,682,782	201,036,145	55,852,811	521,582,750
	TOTAL	**3,731**	**22,918**	**467,886,611**	**42,581,139**	**335,363,603**	**96,234,850**	**942,066,203**

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

3.C. TRI Data for the Chemical Industry (1994)

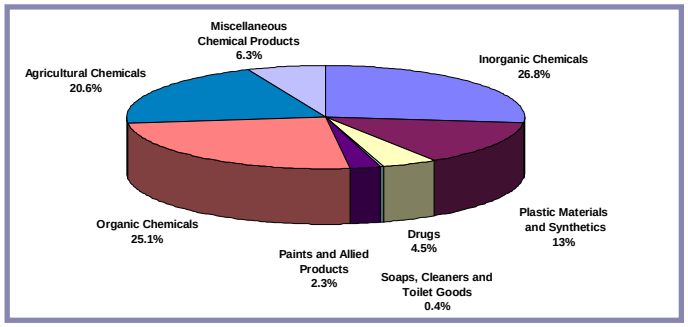
In 1994, facilities in the chemical industry submitted 22,918 TRI forms, or 30.4 percent of all forms submitted to the TRI, filing an average of 6.2 forms per facility (see Table 3-3). Chemical facilities reported an average of 255,372 pounds released, second only to primary metals. The chemical industry accounted for almost all reported underground injection of waste (96.0 percent) and a majority of surface-water discharges (64.4 percent).

Table 3-3 and Figure 3-9 break down the total quantity of TRI releases for the chemical industry. The inorganic chemicals segment of the industry reported the largest quantity of releases (27 percent), followed by the organic chemicals (25 percent) and agricultural chemicals (21 percent) segments.

Figure 3-10 shows the breakdown of air emissions for the chemical industry. The plastic materials and synthetics segments of the industry reported the largest quantity of air releases (25 percent), followed by the agricultural chemicals (24 percent) and organic chemicals (22 percent) segments.

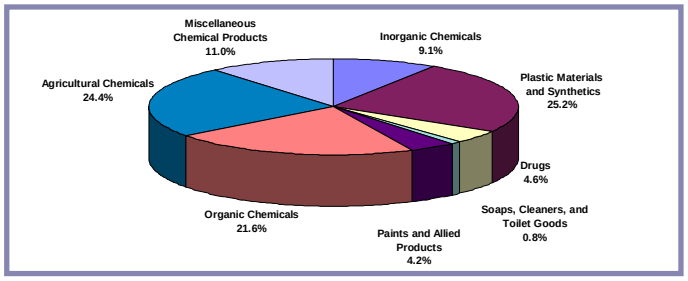
Figure 3-11 breaks down the total surface-water discharges for the chemical industry. The agricultural chemicals segment of the industry reported the largest quantity of surface-water

Figure 3-9.
Total TRI Releases for Chemical Industry, 1994.[h]



The inorganic chemicals segment reported the largest quantity of releases.

Figure 3-10.
Total Air Emissions for Chemical Industry, 1994.[h]



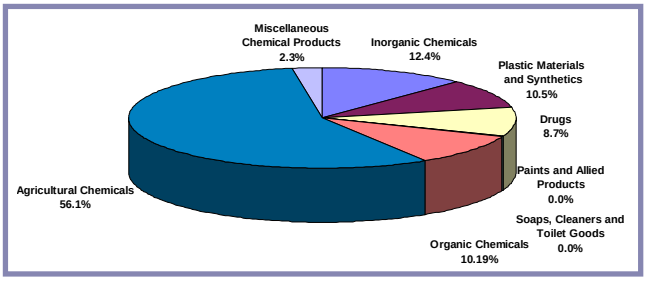
The plastics and synthetics segment reported the largest quantity of air releases.

discharges (56 percent), followed by the inorganic chemicals (12 percent) and the plastic materials and synthetics (11 percent) segments.

Figure 3-12 breaks down the total releases by underground injection for the chemical industry. The inorganic chemicals segment of the industry reported the largest quantity of underground injection releases (66 percent), followed by the organic chemicals (29 percent) and drug (4 percent) segments.

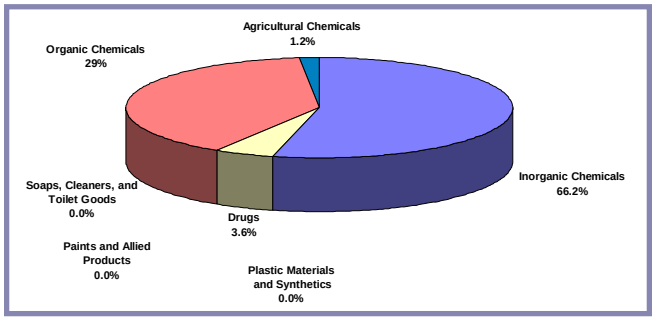
Figure 3-13 breaks down the total releases to land for the chemical industry. The agricultural chemicals segment of the industry reported the largest quantity of releases to land (53 percent), followed by the inorganic chemicals (43 percent) and organic chemicals (3 percent) segments.

**Figure 3-11.
Surface-Water Discharges for Chemical Industry, 1994.[h]**



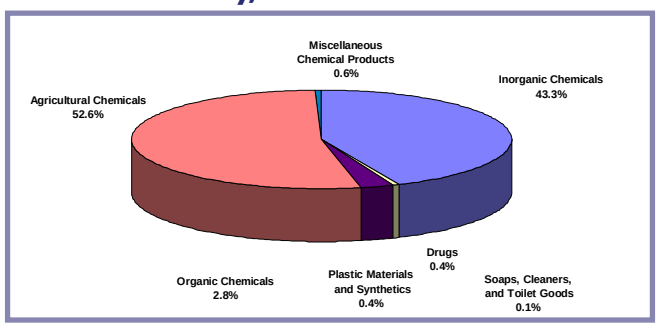
The agricultural chemicals segment reported the largest surface-water discharges.

**Figure 3-12.
Underground Injection Releases for Chemical Industry, 1994.[h]**



The inorganic chemicals segment reported the largest quantity of underground injection releases.

**Figure 3-13.
Releases to Land for Chemical Industry, 1994.[h]**



The agricultural chemicals segment reported the largest quantity of releases to land.

3.D. National Trends for All Industries (1990 to 1994)

The number of all facilities reporting to TRI increased slightly between 1990 and 1991, but the general trend is a steady decline in the number of facilities reporting to TRI (see Table 3-4). Following that trend, the number of TRI reports submitted declined gradually from 1990 to 1994.

Reported releases of listed chemicals decreased by 500 million pounds between 1993 and 1994. That figure represents a decline of nearly 18 percent. Reports of releases of listed chemicals decreased by 13 percent between 1992 and 1993, at more than double the rate of decline between 1991 and 1992. The quantity of TRI chemicals released decreased from 3.6 billion pounds in 1990 to 2.3 billion pounds in 1994, a decrease of 36.1 percent.

Amounts of carcinogenic chemicals released dropped from 236 million pounds in 1990 to 177 million pounds in 1994, a 25 percent decrease. The quantity of TRI chemicals transferred increased from 3.9 billion pounds in 1991 to 4.8 billion pounds in 1993. The increase of 23 percent is primarily the result of increased transfers for recycling. Reports of TRI chemicals transferred show a decrease between 1993 and 1994, from 4.8 billion pounds, to 3.8 billion pounds, a 21 percent decrease. Table 3-5 summarizes national TRI trends for all industries.

3.E. National Trends for the Chemical Industry (1990 to 1994)

Throughout the period from 1990 to 1994, the chemical industry as a whole generally reported the largest quantities of carcinogens released, followed by the plastics products (SIC 3000) and transportation equipment (SIC 3700) industries. The chemical industry consistently has reported the largest quantities of total pounds released, followed by the primary metals and paper industries. In addition, the chemical industry has reported the largest quantities transferred, followed by the primary metals and paper industries.

Table 3-4.

TRI Trends For All Industries, 1990 to 1994.[i]

Year	1990	1991	1992	1993	1994
Number of Facilities Reporting to TRI	23,638	23,719	23,630	23,321	22,744
Number of Forms Submitted to TRI	83,387	82,293	81,016	79,987	75,332
Average Number of Forms per Facility	3.5	3.5	3.4	3.4	3.3
Total Pounds Released	3.6 billion	3.4 billion	3.2 billion	2.8 billion	2.3 billion
Total Pounds of Carcinogens Released	236 million[1]	212 million	197 million	180 million	177 million
Total Pounds Transferred	1.3 billion[2]	3.9 billion	4.4 billion	4.8 billion	3.8 billion

[1] Does not include releases to land.
[2] Transfers include only those to POTWs and off-site locations. Transfers to energy recovery and recycling were not reported.

It is important to note that, for the 1990 to 1994 period, the chemical industry as a whole reported more than half the total quantity of production-related waste reported by all industries and more than four times the amount reported by the second-ranked industry, primary metals. Table 3-6 summarizes national TRI trends for the chemical industry.

3.F. Five Chemicals Released in the Greatest Quantities by the Chemical Industry (1990 to 1994)

From 1990 to 1993, ammonia was the TRI chemical released into the environment in the largest quantity (see Table 3-7). However, the amount reported decreased steadily from approximately 404.6 million pounds in 1990 to 126.7 million pounds in 1994. Those figures represent a decrease of 277.9 million pounds, or 68.7 percent. The TRI chemicals released in the second, third, fourth, and fifth largest quantities show a generally downward trend in the releases of phosphoric acid, sulfuric acid, and methanol. The reporting requirements for ammonia and sulfuric acid were revised during that period.

Releases of carcinogenic chemicals from 1990 to 1994 are shown in Table 3-8. Styrene is the TRI carcinogenic chemical released to the environment in the largest quantity, followed by acetonitrile, and formaldehyde.

The TRI chemicals transferred in the largest quantities from 1990 to 1994 are not the same chemicals from one year to the next (see Table 3-9). However, the TRI chemical transferred in the greatest quantity shows a trend towards accounting for more than half of all TRI transfers.

In 1990, the top five chemicals released accounted for 56.8 percent of all chemicals released. This percentage rose to 59.6 and 63.3 percent in 1991 and 1992, respectively. In 1993, it decreased to 60.9 percent and then to 53.2 percent in 1994.

Table 3-5.

TRI Trends for All Industries, Summary of 1990 to 1994[h]

TRI Category	Trend
Chemicals released	36.1 percent decrease
Carcinogenic chemicals released	25 percent decrease
Chemicals transferred	292 percent increase

Table 3-6.

TRI Trends for Chemical Industry, Summary of 1990 to 1994[i]

TRI Category	Trend
Chemicals released	43.5 percent decrease
Carcinogenic chemicals released	15.9 percent decrease
Chemicals transferred	13.5 percent decrease

Table 3-7.

Top Five Chemicals Released in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Ammonia	404,608,062	24.2
	1991	Ammonia	366,126,752	22.7
	1992	Ammonia	365,374,868	22.9
	1993	Ammonia	255,719,521	18.9
	1994	Hydrochloric acid	150,824,955	16.0
Second	1990	Hydrochloric acid	188,082,470	11.3
	1991	Hydrochloric acid	216,287,343	13.4
	1992	Hydrochloric acid	217,970,514	13.7
	1993	Phosphoric acid	211,252,927	15.6
	1994	Ammonia	126,778,226	13.5
Third	1990	Phosphoric acid	136,784,943	8.2
	1991	Phosphoric acid	161,636,911	10.0
	1992	Phosphoric acid	205,183,078	12.9
	1993	Hydrochloric acid	151,586,039	11.2
	1994	Phosphoric acid	77,649,114	8.2
Fourth	1990	Sulfuric acid	121,472,207	7.3
	1991	Sulfuric acid	122,521,308	7.6
	1992	Sulfuric acid	122,423,015	7.7
	1993	Sulfuric acid	124,690,389	9.2
	1994	Methanol	74,561,119	7.9
Fifth	1990	Methanol	96,488,265	5.8
	1991	Methanol	95,135,510	5.9
	1992	Methanol	97,452,887	6.1
	1993	Carbon Disulfide	81,284,733	6.0
	1994	Carbon Disulfide	71,795,989	7.6

Table 3-8.

Top Five Carcinogenic Chemicals Released in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Styrene	14,371,179	37.1
	1991	Styrene	21,573,455	21.6
	1992	Styrene	23,853,716	28.1
	1993	Acetonitrile	23,349,289	22.5
	1994	Acetonitrile	22,581,548	20.6
Second	1990	Formaldehyde	7,558,513	19.5
	1991	Acetonitrile	20,246,192	20.3
	1992	Acetonitrile	19,791,225	23.3
	1993	Styrene	16,457,053	15.9
	1994	Styrene	18,850,062	17.2
Third	1990	Acetonitrile	3,953,185	10.2
	1991	Diethyl Sulfate	14,276,861	14.3
	1992	Formaldehyde	5,867,222	6.9
	1993	1,3-Butadiene	15,167,497	14.6
	1994	1,3-Butadiene	15,801,079	14.4
Fourth	1990	Diaminotoluene (Mixed Isomers)	2,416,480	6.2
	1991	Formaldehyde	6,329,773	6.3
	1992	Di(2-Ethylyexyl)	5,778,997	6.8
	1993	Diethyl Sulfate	10,744,465	10.4
	1994	Diethyl Sulfate	12,368,251	11.3
Fifth	1990	Asbestos (Friable)	2,084,026	5.4
	1991	Di(2-Ethylyexyl) Phthalate	5,708,647	5.7
	1992	1,3-Butadiene	4,965,581	5.9
	1993	Di(2-Ethylyexyl) Phthalate (DEHP)	5,357,730	5.2
	1994	Di(2-Ethylyexyl) Phthalate (DEHP)	5,728,831	5.23.5

Table 3-9.

Top Five Chemicals Transferred in the Greatest Quantities by the Chemical Industry, 1990 to 1994.[h]

Rank	Year	Chemical	Amount	Percentage
First	1990	Methanol	153,139,319	19.0
	1991	Sulfuric acid	352,611,719	15.9
	1992	Sulfuric acid	369,047,778	16.4
	1993	Sulfuric acid	360,165,712	16.4
	1994	Methanol	267,397,243	13.9
Second	1990	Ammonia	71,660,866	8.9
	1991	Methanol	278,678,189	12.6
	1992	Methanol	284,529,890	12.6
	1993	Methanol	268,881,669	12.3
	1994	Ethylene Glycol	237,064,296	12.3
Third	1990	Hydrochloric acid	70,729,618	8.8
	1991	Ethylene Glycol	196,755,104	8.9
	1992	Ethylene Glycol	215,926,458	9.6
	1993	Ethylene Glycol	209,156,217	9.5
	1994	Toluene	174,790,497	9.1
Fourth	1990	Toluene	46,593,137	5.8
	1991	Xylene (Mixed Isomers)	166,345,343	7.5
	1992	Toluene	169,273,165	7.5
	1993	Toluene	182,327,913	8.3
	1994	Xylene (Mixed Isomers)	160,010,711	8.3
Fifth	1990	Sulfuric acid	43,583,277	5.4
	1991	Toluene	164,122,956	7.4
	1992	Xylene (Mixed Isomers)	129,305,610	5.7
	1993	Xylene (Mixed Isomers)	140,004,661	6.4
	1994	Hydrochloric acid	85,067,427	4.4