Chapter 6

Toxics Release Inventory Data for Chemical Manufacturing (SIC Code 28)

A Look at the Chemicals and Allied Products Industry (SIC Code 28)

The chemical manufacturing industry, SIC code 28, primarily produces chemicals or manufactures products largely by chemical processes. Products fall into three general classes:

- Basic chemicals, such as acids, alkalies, salts, and organic chemicals;
- Chemical products to be used in further manufacture, such as synthetic fibers, plastics materials, dry colors, and pigments; and
- Finished chemical products that will either be consumed (such as drugs, cosmetics, and soaps) or used as materials or supplies in other industries (such as paints, fertilizers, and explosives).

Standard Industrial Classification (SIC) codes, listed in Box 6-1, distinguish eight major categories for this sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

The value of shipments for products from the chemical manufacturing sector was $367.44 billion in 1996 and $361.16 billion in 1995 (in current dollars). This sector employed 824,400 in 1996. Since 1989, production in the chemical manufacturing sector has risen moderately, 14.4% compared to 17.6% for manufacturing as a whole (see Chapter 4, Table 4-10).

The chemical industry is the United States' largest manufacturing sector, comprising more than 10% of U.S. gross domestic product (GDP) from manufacturing (and 2% of total GDP). It is also one of the largest exporters; exports grew from a little over 10% of product shipments in 1983 to 17% in 1995. Chemical production has become increasingly globalized, conducting both production and research and development internationally. Foreign investment in U.S. plants and ownership by U.S. companies of production facilities worldwide also make trade increasingly important for the economic performance of the industry. More than a third (estimated 35% to 37%) of U.S. production facilities are foreign-owned. At the same time, the United States stands as the world's largest consumer of chemicals, $318 billion worth in 1995. (This analysis excludes the manufacture of plastics

Box 6-1. SIC Code 28, Chemicals and Allied Products: Codes and Classifications

SIC Code		Industry Descriptions
281	**Industrial Inorganic Chemicals**	
2812	Alkalies and Chlorine	Manufacture of alkalies and chlorine.
2813	Industrial Gases	Manufacture of industrial gases (including organic) for sale in compressed, liquid, and solid forms.
2816	Inorganic Pigments	Manufacture of inorganic pigments, including black pigments (except carbon black), white pigments, and color pigments.
2819	Industrial Inorganic Chemicals, nec*	Manufacture of miscellaneous industrial inorganic chemicals. [More than 175 are listed.]
282	**Plastics Materials and Synthetic Resins, Synthetic Rubber, Cellulosic and Other Manmade Fibers, Except Glass**	
2821	Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers	Manufacture of synthetic resins, plastics materials, and nonvulcanizable elastomers, including: cellulose plastics materials; phenolic and other tar acid resins; urea and melamine resins; vinyl resins; styrene resins; alkyd resins; acrylic resins; polyethylene resins; polypropylene resins; rosin modified resins, and others.
2822	Synthetic Rubber (Vulcanizable Elastomers)	Manufacture of synthetic rubber by polymerization or copolymerization. Elastomers include copolymers of butadiene and styrene, or butadiene and acrylonitrile, polybutadienes, chloroprene rubbers, and iosbutylene-isoprene copolymers.
2823	Cellulosic Manmade Fibers	Manufacture of cellulosic fibers in the form of monofilament, yarn, staple, or tow suitable for further manufacture on spindles, looms, knitting machines, or other textile processing equipment.
2824	Manmade Organic Fibers, Except Cellulosic	Manufacture of manmade organic fibers, except cellulosic, in the form of monofilament, yarn, staple, or tow suitable for further manufacture on spindles, looms, knitting machines, or other textile processing equipment.
283	**Drugs**	
2833	Medicinal Chemicals and Botanical Products	Manufacture of bulk organic and inorganic medicinal chemicals and their derivatives. Processing (grading, grinding, and milling) of bulk botanical drugs and herbs.
2834	Pharmaceutical Preparations	Manufacture, fabrication, or processing of drugs in pharmaceutical preparations for human or veterinary use.
2835	In Vitro and In Vivo Diagnostic Substances	Manufacture of in vitro and in vivo diagnostic substances—chemical, biological, or radioactive substances used in diagnosing or monitoring human or veterinary health by identifying and measuring normal or abnormal constituents of body fluids or tissues.
2836	Biological Products, Except Diagnostic Substances	Production of bacterial and virus vaccines, toxoids, and analogous products (such as allergenic extracts), serums, plasmas, and other blood derivatives for human or veterinary use, other than in vitro and in vivo diagnostic substances. Includes production of microbiological products for other uses.
284	**Soap, Detergents, and Cleaning Preparations; Perfumes, Cosmetics, and Other Toilet Preparations**	
2841	Soap and Other Detergents, Except Specialty Cleaners	Manufacture of soap, synthetic organic detergents, inorganic alkaline detergents, or any combination thereof. Production of crude and refined glycerin from vegetable and animal fats and oils.
2842	Specialty Cleaning, Polishing, and Sanitation Preparations	Manufacture of furniture, metal, and other polishes; waxes and dressings for fabricated leather and other materials; household, institutional, and industrial plant disinfectants; nonpersonal deodorants; drycleaning preparations; household bleaches; and other sanitation preparations.

*** nec:** not elsewhere classified.

Box 6-1. SIC Code 28, Chemicals and Allied Products: Codes and Classifications, Continued

SIC Code		Industry Descriptions
2843	Surface Active Agents, Finishing Agents, Sulfonated Oils and Assistants	Production of surface active preparations for use as wetting agents, emulsifiers, and penetrants. Production of sulfonated oils and fats and related products.
2844	Perfumes, Cosmetics, and Other Toilet Preparations	Manufacture of perfumes (natural and synthetic), cosmetics, and other toilet preparations. Blending and compounding of perfume bases.
285	**Paints, Varnishes, Lacquers, Enamels, and Allied Products**	
2851	Paints, Varnishes, Lacquers, Enamels, and Allied Products	Manufacture of paints (in paste and ready-mixed forms); varnishes; lacquers; enamels and shellac; putties,wood fillers, and sealers; paint and varnish removers; paint brush cleaners; and allied paint products.
286	**Industrial Organic Chemicals**	
2861	Gum and Wood Chemicals	Manufacture of hardwood and softwood distillation products, wood and gum naval stores, charcoal, natural dyestuffs, and natural tanning materials.
2865	Cyclic Organic Crudes and Intermediates, and Organic Dyes and Pigments	Manufacture of cyclic organic crudes and intermediates, and organic dyes and pigments. Includes aromatic chemicals (such as benzene, toluene, xylenes, naphthalene), synthetic organic dyes, and synthetic organic pigments.
2869	Industrial Organic Chemicals, nec*	Manufacture of miscellaneous industrial organic chemicals.
287	**Agricultural Chemicals**	
2873	Nitrogenous Fertilizers	Manufacture of nitrogenous fertilizer materials or mixed fertilizers from nitrogenous materials.
2874	Phosphatic Fertilizers	Manufacture of phosphatic fertilizer materials or mixed fertilizers from phosphatic materials.
2875	Fertilizers, Mixing Only	Mixing fertilizers from purchased fertilizer materials.
2879	Pesticides and Agricultural Chemicals, nec*	Formulation and preparation of ready-to-use agricultural and household pest control chemicals, including insecticides, fungicides, and herbicides, from technical chemicals or concentrates. Production of concentrates for further processing before use as agricultural pesticides.
289	**Miscellaneous Chemical Products**	
2891	Adhesives and Sealants	Manufacture of industrial and household adhesives, glues, caulking compounds, sealants, linoleum, tile, and rubber cements.
2892	Explosives	Manufacture of explosives.
2893	Printing Ink	Manufacture of printing ink, including gravure ink, screen process ink, and lithographic ink.
2895	Carbon Black	Manufacture of carbon black (channel and furnace black).
2899	Chemicals and Chemical Preparations, nec*	Manufacture of miscellaneous chemical preparations.

Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987*: Standard Industrial Classification (SIC) codes and industry descriptions.
*** nec:** not elsewhere classified.

materials and resins, SIC code 282, but similar trends pertain in that industry as well.)

The biggest consumers of the chemical manufacturing sector's output are the producers of motor vehicles (and equipment) and of metal. Other large customers are the agriculture, health care, construction materials, and electronics sectors, followed by the chemical industry itself—purchasing chemical products for use in further manufacture. Plastics end users include producers of packaging, construction, motor vehicles, and consumer durables.

Industrial Organic Chemicals

Of the industry groups within the chemical manufacturing sector, industrial organics manufacturing—alone or in combination with production of plastics materials—represents the largest source of releases and other waste management of chemicals reported to TRI, as evident in the analyses presented later in this chapter. Economically, production of industrial organic chemicals (SIC code 286) is the second largest segment of the chemical manufacturing sector, after drugs and pharmaceuticals (SIC code 283) Industrial organics manufacturers shipped $75.67 billion in products in 1996, about 20% of the sector's total, while employing 125,900, which was 15% of the sector's employment. Production of organics and of plastics is growing in Asian countries (such as China and South Korea) and in the Middle East (Saudi Arabia, for example). Mexico, South America, and Asia, however, offer expanding markets for U.S. products. A significant impact on trade in organics has also been attributed to implementation of the North American Free Trade Agreement (NAFTA); nearly 20% of U.S. organics exports are shipped to Canada and Mexico.

Most organic chemical products are primary petrochemicals (chemicals derived from petroleum or from natural gas). Most are used as intermediates in the production of other chemicals. Chemical products include aromatics, such as benzene, toluene, and xylenes; solvents such as methanol; chlorinated solvents, such as carbon tetrachloride and perchloroethylene; cyclic intermediates such as cumene, cyclohexane, and styrene; and numerous others. Organic chemicals that represent finished products include dyes and organic pigments, and pesticides and other non-fertilizer agricultural products.

The industry uses and produces large numbers of chemicals in large amounts. Typically, multiple feedstocks ("building blocks") are combined in a series of reaction steps to produce both intermediates and end-products. Most reactions occur at high temperatures, involve metals as catalysts, and include one or two additional reaction components. A second operation separates the desired product from by-products, by settling, distillation, refrigeration, or other separation techniques. A third operation may further process the final product into a saleable form, by spray drying or pelletizing, for example. By-products may also be sold, and they may be managed as waste in some years and sold in others, depending on market economics. Plastics, drugs, soaps and detergents, paints, and agricultural chemicals are typical end-products manufactured from industrial organics.

The abundance of chemicals, especially petrochemicals, and the diversity of processes means that no one pattern of environmental releases or other management of chemicals in waste—or pollution prevention techniques—characterizes the industrial organics industry or even an individual facility. Feedstocks, processes, equipment, and maintenance practices determine a facility's releases, and these are seldom static. The Chemical Manufacturers' Association has listed some 130 pollution prevention opportunities to be found in process, product, or equipment modifications (*Designing Pollution Prevention into the Process—Research, Development and Engineering*, reproduced in *Profile of the Organic Chemical*

Industry, EPA Sector Notebook Project, 57-71; see Sources).

Plastics Materials and Synthetics

Producers of plastics materials and synthetics (SIC code 282) were the third largest economic segment of the chemical manufacturing sector, with $59.57 billion in shipments and 115,100 employees in 1996. These represent approximately 15% of the sector's totals. As with chemical manufacturing overall, the plastics materials industry has become increasingly globalized; production has been shifting into the developing regions, drawn by their rapidly expanding markets. At the same time, manufacture in the more developed countries has been moving toward specialty and higher-value-added products.

Plastics resins are made from organic chemicals and, as noted in the analyses of TRI data in this chapter, a substantial portion of TRI forms report SIC codes in both plastics materials and resins (SIC code 2821) and miscellaneous industrial organics (SIC code 2869). (Products manufactured from these resins are classified in SIC code 30, rubber and miscellaneous plastics products.) There are two categories of resins: thermoplastics that can be reheated and remolded repeatedly and thermosets that can be heated and molded once. Thermoplastics, which include polyethylene, polypropylene, polyvinyl chloride, and polystyrene, dominate, accounting for 87% of the plastics market in 1996. Polymerization—a process of reactions that bond small repeating molecules into large molecules—is central to the production of plastics materials. Operations involved in forming polymers include purifying the reactants, polymerization itself (application of catalysts, heat, and pressure), separation and recovery of the polymer from the reaction mass, and extrusion of the polymer into pellets. Potential releases from production of plastics materials and resins include volatile organic compounds (VOCs), unreacted monomers, off-spec or contaminated polymers, and wastewater from equipment cleaning.

Drugs and Pharmaceuticals

In 1996, drugs and pharmaceuticals (SIC code 283) accounted for the largest share—about one quarter—of the sector's value of shipments ($86.53 billion) and employment (213,200). Pharmaceutical production differs from much of the rest of the chemical manufacturing sector. The industry manufactures, in bulk, pharmaceutical intermediates and active ingredients, which are further processed into finished products. Often, small quantities of product must be extracted from large volumes of raw materials. Batch processing[1] is far more common in manufacturing drug products than in chemical manufacturing as a whole. Chemical synthesis, involving many intermediate stages and reactions, is the most common process in the manufacture of bulk pharmaceuticals. Pharmaceutical standards set more stringent limits for some operations than may apply elsewhere in chemical manufacturing—on cleaning equipment between batches, for example. Similarly, solvents used in pharmaceutical manufacture are not reused, to maintain standards for purity.

1996 TRI Data for Chemical Manufacturing

Table 6-1 summarizes TRI data for the chemical manufacturing sector for 1996. Chemical manufacturers submitted 21,098 forms, out of 71,381 total for TRI in 1996. Of the forms submitted in chemical manufacturing, 13.3% (2,810) were Form A certification statements, certifying that a facility's total annual reportable amount of a TRI chemical was less than 500

[1] Batch processing indicates that products are manufactured in discrete batches; this means generally that inputs are first put into the system, processing is conducted while the system is closed, and products are extracted when the process ends. In contrast, continuous processing indicates a system where inputs are continuously added, processes are ongoing, and products are continuously extracted. In batch processing, releases are more likely to occur at the beginning and end of the process, when the system is opened to add inputs or remove product. Cleaning the equipment between batches also often generates releases of toxic chemicals.

Table 6-1. Summary of TRI Information by 4-digit SIC Code, 1996: Chemical Manufacturing, SIC Code 28

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
22	21	2812	Alkalies & Chlorine	20	63	6	640,550	8,892	649,442
21	24	2813	Industrial Gases	67	122	18	819,463	0	819,463
8	11	2816	Inorganic Pigments	39	176	23	14,455,853	4,441,778	18,897,631
4	5	2819	Industrial Inorganic Chemicals, nec*	262	828	69	36,488,285	2,992,232	39,480,517
5	3	2821	Plastics Materials & Resins	311	1,813	180	29,039,345	1,110,634	30,149,979
12	12	2822	Synthetic Rubber	21	123	10	9,862,729	147,079	10,009,808
7	18	2823	Cellulosic Manmade Fibers	3	12	0	21,117,760	0	21,117,760
25	7	2824	Organic Fibers, Noncellulosic	10	34	9	491,968	44,140	536,108
16	14	2833	Medicinals & Botanicals	37	180	13	2,806,345	31,067	2,837,412
10	10	2834	Pharmaceutical Preparations	111	340	18	12,889,489	178,440	13,067,929
31	29	2835	Diagnostic Substances	14	24	5	16,878	1,100	17,978
30	31	2836	Biological Products Exc. Diagnostic	8	13	1	33,818	0	33,818
28	27	2841	Soap & Other Detergents	84	231	65	58,168	3,074	61,242
26	26	2842	Polishes & Sanitation Goods	161	423	128	240,325	15,400	255,725
24	23	2843	Surface Active Agents	55	259	81	622,261	5,681	627,942
27	30	2844	Toilet Preparations	40	68	17	60,532	62,239	122,771
13	13	2851	Paints & Allied Products	566	2,974	317	8,449,510	608,480	9,057,990
14	20	2861	Gum & Wood Chemicals	15	41	5	8,957,557	500	8,958,057
11	9	2865	Cyclic Crudes & Intermediates	91	667	111	9,313,598	1,318,042	10,631,640
2	2	2869	Industrial Organic Chemicals, nec*	334	2,601	264	126,108,529	8,854,506	134,963,035
3	8	2873	Nitrogenous Fertilizers	45	234	10	46,419,739	334,206	46,753,945
6	4	2874	Phosphatic Fertilizers	28	105	7	29,490,014	1,010	29,491,024
19	25	2875	Fertilizers, Mixing Only	64	213	74	1,678,603	2,000	1,680,603
18	6	2879	Agricultural Chemicals, nec*	111	759	205	2,082,246	306,983	2,389,229
17	19	2891	Adhesives & Sealants	188	615	115	2,246,144	163,331	2,409,475
20	17	2892	Explosives	32	79	7	1,470,670	755	1,471,425
23	22	2893	Printing Ink	115	254	45	632,091	1,689	633,780
9	16	2895	Carbon Black	19	79	7	16,855,773	755	16,856,528
15	15	2899	Chemical Preparations, nec*	290	1,186	344	2,679,848	2,311,623	4,991,471
1	1		Multiple within SIC 28	700	6,542	643	368,254,227	7,896,176	376,150,403
29	28		Invalid SIC Code within SIC 28	14	40	13	53,782	251	54,033
			Total for SIC Code 28	3,855	21,098	2,810	754,336,100	30,842,063	785,178,163

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

pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. (The Form A certification statement is explained in Chapter 1.)

Forms that reported more than one four-digit SIC code within SIC code 28 are the largest group in chemical manufacturing. A significant portion of the chemical manufacturing sector conducts more than one economic activity, as designated in the Standard Industrial Classification (SIC) system. Many facilities in this sector manufacture products classified in separate but similar categories. For example, some facilities manufacture industrial inorganic chemicals and inorganic fertilizers. Others produce both industrial organic chemicals and organic dyes and pigments. This occurs to such a large degree in chemical manufacturing that the multiple-codes category is overall the largest segment of the sector. (Box 4-2 in Chapter 4 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Table 6-1. Summary of TRI Information by 4-digit SIC Code, 1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2812	Alkalies & Chlorine	10,209,572	1,640,186	12,496,408	144
2813	Industrial Gases	2,041,818	348,439	3,098,233	9,089
2816	Inorganic Pigments	121,820,104	2,381,438	143,209,221	575
2819	Industrial Inorganic Chemicals, nec*	242,263,281	18,574,376	298,761,439	146,108
2821	Plastics Materials & Resins	645,309,591	130,341,411	806,534,910	106,630
2822	Synthetic Rubber	85,197,178	14,381,774	115,581,021	28,616
2823	Cellulosic Manmade Fibers	7,020,000	835	28,083,000	0
2824	Organic Fibers, Noncellulosic	225,655,928	4,521,488	230,701,490	0
2833	Medicinals & Botanicals	33,782,868	27,056,801	63,749,829	78
2834	Pharmaceutical Preparations	64,272,053	79,918,722	158,265,118	39,991
2835	Diagnostic Substances	122,000	307,458	477,866	0
2836	Biological Products Exc. Diagnostic	173,098	117,651	309,357	0
2841	Soap & Other Detergents	351,788	532,832	919,277	100
2842	Polishes & Sanitation Goods	685,552	371,348	1,281,309	13,192
2843	Surface Active Agents	2,471,936	2,390,172	4,668,368	6,735
2844	Toilet Preparations	39,342	290,789	469,340	0
2851	Paints & Allied Products	45,195,376	54,484,497	109,809,047	10,206
2861	Gum & Wood Chemicals	3,647,269	87,795	12,705,271	1,210
2865	Cyclic Crudes & Intermediates	125,087,026	29,451,711	165,050,442	22,971
2869	Industrial Organic Chemicals, nec*	1,850,422,083	137,545,758	2,131,447,740	3,351,020
2873	Nitrogenous Fertilizers	142,604,266	1,054,819	189,839,104	583,329
2874	Phosphatic Fertilizers	321,225,953	30	350,438,184	283,328
2875	Fertilizers, Mixing Only	115,846	155,994	1,833,438	0
2879	Agricultural Chemicals, nec*	264,412,207	12,718,434	279,005,337	48,114
2891	Adhesives & Sealants	8,073,622	7,176,760	16,804,457	1,958
2892	Explosives	36,190,072	24,308	37,693,600	1,100
2893	Printing Ink	2,512,819	2,715,638	5,782,633	105,730
2895	Carbon Black	29,074,757	40	45,929,245	0
2899	Chemical Preparations, nec*	40,128,008	6,409,652	50,421,374	29,918
	Multiple within SIC 28	4,024,088,800	363,308,016	4,766,348,743	4,627,743
	Invalid SIC Code within SIC	9,514	547,709	675,226	10
	Total for SIC Code 28	8,334,203,727	898,856,881	10,032,390,027	9,417,895

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

In 1996, there were 6,542 forms that reported more than one SIC code within SIC code 28. This was 31.0% of all forms in the chemical manufacturing sector. [This multiple-codes category had more than twice the number of forms submitted than the industry with the second largest number of forms, which was paints (SIC code 2851, with 2,974 forms). Third was miscellaneous industrial organic chemicals (SIC code 2869) with 2,601.]

As shown in Table 6-1, the multiple-codes group ranked first in the chemical manufacturing sector for total on- and off-site releases and for total production-related waste. On- and off-site releases reported on these forms totaled 376.2 million pounds, or 47.9% of the sector's total. Multiple-code reporting of production-related waste totaled 4.77 billion pounds, or 47.5%. Forms with multiple SIC codes also reported the largest amounts of on-site waste management (4.02 billion pounds) and transfers off-site for further waste management (363.3 million pounds). Only in off-site releases (transfers off-site to disposal) did multiple-codes forms account for the second largest amount (7.9

Table 6-2. Multiple SIC Codes, 1996: Chemical Manufacturing, SIC Code 28

SIC Code Combinations						Total Forms	Form As	Total On-site Releases	Total Off-site Releases	Total On- and Off-site Releases	Total Other On-site Waste Management	Total Transfers Off-site for Further Waste Management	Total Production-related Waste	Non-Production-related Waste
						Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
2812	2813	2819	2821	2869	2891	133	9	813,229	145,360	958,589	92,389,377	5,073,057	99,260,4762	2,922
2812	2813	2842				190	10	1,627,737	5,294	1,633,031	177,353,033	117,918	179,095,068	3,722
2812	2813	2869				2	0	44,442	0	44,442	7,907	7,500	58,692	1,161
2812	2816	2869				9	0	22,425	4,117	26,542	632,925	20,042	679,492	0
2812	2819					190	6	9,504,907	235,743	9,740,650	257,076,151	98,411	266,929,658	30,759
2812	2819	2821	2865	2869		6	1	2,597	0	2,597	1,073,300	226,269	1,302,176	0
2812	2819	2869				118	11	2,162,784	13,392	2,176,176	7,782,395	11,188,642	21,291,152	1,034
2812	2821	2869				12	1	31,262	0	31,262	3,251,154	18,487	3,300,937	22
2812	2869					7	0	1,118	15,017	16,135	8,186	3,580	27,652	0
2813	2819	2865	2869	2899		5	0	2,038	0	2,038	113,660	90	115,788	0
2813	2819	2869	2873	2899		27	0	168,561	255,905	424,466	1,027,308	830,955	2,296,495	541
2816	2819					39	2	11,610,586	158,518	11,769,104	124,145	265,360	12,124,550	0
2816	2821	2899				2	0	5,313	0	5,313	0	1,691	7,004	0
2816	2869					42	5	522,326	1,625	523,951	791,768	272,709	2,076,644	3,550
2819	2821	2834	2869	2879		14	1	5,975	70	6,045	1,486,774	9,661	1,501,922	287
2819	2821	2865	2869			1	0	140	0	140	0	0	140	0
2819	2821	2869				6	0	3,213	2,388	5,601	169,600	78,150	252,154	0
2819	2833	2869				9	0	37,161	0	37,161	43,985	1,135,795	1,216,023	0
2819	2834	2869	2873	2879		6	0	35	0	35	0	1,572	15,607	0
2819	2841	2843				41	3	119,404	520,149	639,553	36,480	301,538	548,172	427,993
2819	2843	2869	2899			41	8	1,247,311	16,534	1,263,845	916,240	251,059	2,426,126	0
2819	2865	2869				101	7	5,356,330	321,689	5,678,019	2,768,553	2,339,643	11,118,359	1,874
2819	2865	2869	2879			18	0	195,012	236,665	431,677	1,667,386	292,736	2,388,348	0
2819	2869					176	14	4,450,006	676,876	5,126,882	26,282,121	1,920,444	33,364,811	12,229
2819	2869	2879				54	4	884,557	264,041	1,148,598	91,541,968	17,598,031	110,030,804	16,436
2819	2869	2879	2899			6	0	111	4,787	4,898	53,227	78,840	137,125	0
2819	2873					194	27	67,432,668	13,811	67,446,479	78,723,236	24,694,588	175,743,068	2,275
2819	2879					6	1	7,452	264,688	272,140	26,370	312,253	610,594	2,469
2819	2879	2869				3	2	0	250	250	130	15	284	0
2819	2892					27	6	21,703	64,058	85,761	24,921	1,564,993	1,567,646	2,961
2821	2822	2869				42	2	680,896	2,704	683,600	30,984,085	1,267,285	32,937,053	202
2821	2823	2865	2869	2893		4	1	920	0	920	3,355	250	4,305	0
2821	2824					19	1	408,856	617	409,473	44,451,583	207	44,865,605	190
2821	2834	2869				38	2	461,560	91,054	552,614	5,078,426	211,982	5,916,950	81
2821	2843	2865	2869			2	0	84,222	0	84,222	779,998	80	864,300	0
2821	2843	2879				3	1	260	0	260	0	15,883	15,893	0
2821	2851					192	25	1,354,187	94,250	1,448,437	59,342,694	3,004,218	63,792,268	37,858
2821	2865	2869	2879			448	37	15,721,687	202,987	15,924,674	213,871,069	10,678,787	239,257,548	157,209
2821	2865	2893				1	0	0	668	668	0	303	971	0
2821	2869					1,194	99	52,941,527	837,784	53,779,311	1,148,337,585	106,212,921	1,305,680,838	3,452,925
2821	2869	2879				7	0	1,335	23,240	24,575	418,000	281,736	727,582	0
2821	2869	2899				4	0	23,007	0	23,007	345,271	52,312	420,590	0
2821	2879					3	0	215	4,350	4,565	0	2,460	13,384	0
2821	2879	2891				10	2	596	0	596	0	666	862	0
2821	2891					52	5	1,077,102	19,948	1,097,050	9,656,850	1,527,729	12,299,164	14,947
2822	2865	2869	2873			127	8	6,973,168	14,449	6,987,617	40,989,604	2,410,838	50,264,145	3,058
2822	2869	2879				3	0	350,024	420	350,444	9,400	17,180	377,024	0

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

Table 6-2. Multiple SIC Codes, 1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code Combinations				Total Forms	Form As	Total On-site Releases	Total Off-site Releases	Total On- and Off-site Releases	Total Other On-site Waste Management	Total Transfers Off-site for Further Waste Management	Total Production-related Waste	Non-Production-related Waste
				Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
2824	2869			9	3	36,473	0	36,473	227,039	1,132	264,604	0
2831	2833	2834		44	0	19,914,438	431	19,914,869	33,503,656	3,128,838	56,475,054	1,100
2833												
2834	2836			1	0	255	0	255	0	750	450	
2833	2834	2836	2879	1	0	5	0	5	0	7,005	7,160	0
2833	2869	2879		3	0	10	0	10	31	78	114	5
2833	2879			1	0	4,830	0	4,830	5,700	140	10,640	0
2834	2835	2836		21	2	251,509	7	251,516	8,237,954	3,054,879	11,537,674	527
2834	2836	2879		1	0	0	1	1	15	3,271	3,287	0
2834	2869			27	6	40,143	233	40,376	1,917,817	659,102	2,616,923	0
2834	2879			4	0	1,540	3,258	4,798	5,145	38,500	47,408	96
2834	2892			1	0	0	0	0	4,400	0	4,400	0
2841	2842			91	13	810,243	7,577	817,820	249,811,749	55,446	250,694,343	905
2841	2869	2899		14	2	10,627	3,306	13,933	5,099	766,171	782,754	880
2842	2879	2899		366	73	1,687,620	774,214	2,461,834	9,295,053	8,131,864	19,821,274	21,528
2843	2844			141	9	2,601,870	15,701	2,617,571	39,577,945	252,304	42,623,706	11,152
2851	2891			75	2	3,942,281	212,462	4,154,743	15,665,848	6,257,755	26,070,220	7,344
2861	2899			27	6	284,946	4,032	288,978	19,995,203	1,514,225	21,798,740	16,505
2865	2869			809	58	36,829,362	1,224,458	38,053,820	1,059,752,821	85,425,226	1,183,287,433	233,905
2865	2869	2879		1	0	44	0	44	0	0	44	0
2865	2869	2879	2899	3	0	105,767	504	106,271	171,000	26,378	301,733	780
2865	2873	2879		6	1	7	5,550	5,557	12,600	204,780	222,703	0
2869	2879			72	7	425,227	7,795	433,022	5,164,286	274,013	5,885,326	150
2869	2899			16	1	68,236	664	68,900	463,129	1,119,871	1,650,952	0
2873	2874			10	2	3,091	12,545	15,636	0	265	12,909	0
2873	2879			521	92	104,810,739	276,507	105,087,246	153,224,089	2,916,781	261,713,553	90,217
2875	2879			35	4	19,182	415,386	434,568	1,105,695	177,776	1,679,143	343
2879	2899			608	61	10,045,817	418,097	10,463,914	126,302,306	54,902,600	191,910,747	45,601
Total for SIC Code 28				6,542	643	368,254,227	7,896,176	376,150,403	4,024,088,800	363,308,016	4,766,348,743	4,627,743

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

million pounds), behind miscellaneous industrial organic chemicals (SIC code 2869; 8.9 million pounds). This industry (miscellaneous industrial organic chemicals, SIC code 2869) was second in all other categories presented in Table 6-1.

Although drug manufacture constitutes the largest economic activity in this sector, pharmaceutical preparations (SIC code 2834) ranked 10th for both total on- and off-site releases (with 13.1 million pounds) and total production-related waste (with 158.3 million pounds). For transfers off-site for further waste management, however, it ranked fourth (79.9 million pounds).

Multiple Codes within SIC Code 28

Table 6-2 further examines reporting of multiple SIC codes within SIC code 28. The combination filing the largest number of forms was plastics materials and resins (SIC code 2821) with miscellaneous industrial organics (SIC code 2869).

This combination submitted 1,194 forms and, within the multiple-codes category, accounted for the largest amount of other on-site waste management (1.15 billion pounds), transfers off-site for further waste management (106.2 million pounds), and total production-related waste (1.31 billion pounds). Cyclic organic crudes and intermediates and organic dyes and pigments (SIC code 2865) and miscellaneous industrial organics (SIC code 2869) also reported, in combination, large quantities of on-site waste management (1.06 billion pounds) and production-related waste (1.18 billion pounds). This group also reported the largest off-site releases (transfers to disposal), with 1.2 million pounds. There were 809 forms with this combination.

The multiple-code combination with the largest total on- and off-site releases occurred in agricultural chemical production: nitrogenous fertilizers (SIC code 2873) and pesticides and other agricultural chemicals (SIC code 2879). On- and off-site releases for this combination were 105.1 million pounds.

Miscellaneous industrial organics (SIC code 2869) appeared in 41 of the 74 multiple-codes combinations.

On- and Off-site Releases

Half (50.0%) of all on- and off-site releases reported in the chemical manufacturing sector were air emissions, 392.4 million pounds out of 785.2 million pounds of total releases (see Table 6-3 and

Table 6-3. TRI On-site and Off-site Releases, 1996: Chemical Manufacturing, SIC Code 28 (in Rank Order)

SIC Code	Industry	Total Air Emissions	Surface Water Discharges	On-site Releases: Underground Injection Class I Wells	On-site Releases: Underground Injection Class II-V Wells	On-site Releases: RCRA Subtitle C Landfills	On-site Releases: Other On-site Land Releases	Total On-site Releases	Off-site Releases: Transfers Off-site to Disposal	Total On- and Off-site Releases
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
	Multiple within SIC 28	161,112,769	60,399,711	122,029,684	0	2,572,553	22,139,510	368,254,227	7,896,176	376,150,403
2869	Industrial Organic Chemicals, nec*	44,631,009	15,092,188	65,810,868	2,600	90,034	481,830	126,108,529	8,854,506	134,963,035
2873	Nitrogenous Fertilizers	40,836,139	3,651,272	1,787,075	400	0	144,853	46,419,739	334,206	46,753,945
2819	Industrial Inorganic Chemicals, nec*	10,171,797	2,358,781	0	192,133	16,631	23,748,943	36,488,285	2,992,232	39,480,517
2821	Plastics Materials & Resins	27,354,038	1,657,131	0	0	1,200	26,976	29,039,345	1,110,634	30,149,979
2874	Phosphatic Fertilizers	9,572,419	2,962,896	0	0	0	16,954,699	29,490,014	1,010	29,491,024
2823	Cellulosic Manmade Fibers	20,368,225	105,100	0	0	0	644,435	21,117,760	0	21,117,760
2816	Inorganic Pigments	10,123,521	516,030	561,173	0	0	3,255,129	14,455,853	4,441,778	18,897,631
2895	Carbon Black	16,855,013	760	0	0	0	0	16,855,773	755	16,856,528
2834	Pharmaceutical Preparations	5,491,123	607,654	6,592,625	0	0	198,087	12,889,489	178,440	13,067,929
2865	Cyclic Crudes & Intermediates	5,823,856	741,352	2,679,000	0	0	69,390	9,313,598	1,318,042	10,631,640
2822	Synthetic Rubber	9,537,587	62,303	225,800	0	0	37,039	9,862,729	147,079	10,009,808
2851	Paints & Allied Products	8,415,949	2,562	0	0	1,500	29,499	8,449,510	608,480	9,057,990
2861	Gum & Wood Chemicals	8,956,801	756	0	0	0	0	8,957,557	500	8,958,057
2899	Chemical Preparations, nec*	2,304,856	54,386	0	2,308	717	317,581	2,679,848	2,311,623	4,991,471
2833	Medicinals & Botanicals	1,850,539	952,473	0	0	0	3,333	2,806,345	31,067	2,837,412
2891	Adhesives & Sealants	2,227,570	2	0	0	0	18,572	2,246,144	163,331	2,409,475
2879	Agricultural Chemicals, nec*	1,454,031	39,700	573,228	0	3,760	11,527	2,082,246	306,983	2,389,229
2875	Fertilizers, Mixing Only	1,671,508	3,250	0	0	0	3,845	1,678,603	2,000	1,680,603
2892	Explosives	261,025	1,199,900	0	0	0	9,745	1,470,670	755	1,471,425
2813	Industrial Gases	801,391	5,705	0	0	2,792	9,575	819,463	0	819,463
2812	Alkalies & Chlorine	480,802	184	0	0	6	159,558	640,550	8,892	649,442
2893	Printing Ink	631,490	1	0	0	250	350	632,091	1,689	633,780
2843	Surface Active Agents	600,529	47	21,395	0	0	290	622,261	5,681	627,942
2824	Organic Fibers, Noncellulosic	447,807	5,544	36,605	0	0	2,012	491,968	44,140	536,108
2842	Polishes & Sanitation Goods	238,040	1,025	0	0	250	1,010	240,325	15,400	255,725
2844	Toilet Preparations	55,692	90	0	0	0	4,750	60,532	62,239	122,771
2841	Soap & Other Detergents	54,100	0	0	0	0	4,068	58,168	3,074	61,242
	Invalid SIC Code within SIC 28	53,778	0	0	0	4	0	53,782	251	54,033
2836	Biological Products Exc. Diagnostic	33,818	0	0	0	0	0	33,818	0	33,818
	Total for SIC Code 28	392,417,222	90,420,803	200,317,453	197,441	2,689,697	68,276,606	754,319,222	30,840,963	785,160,185

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers of Form R). Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

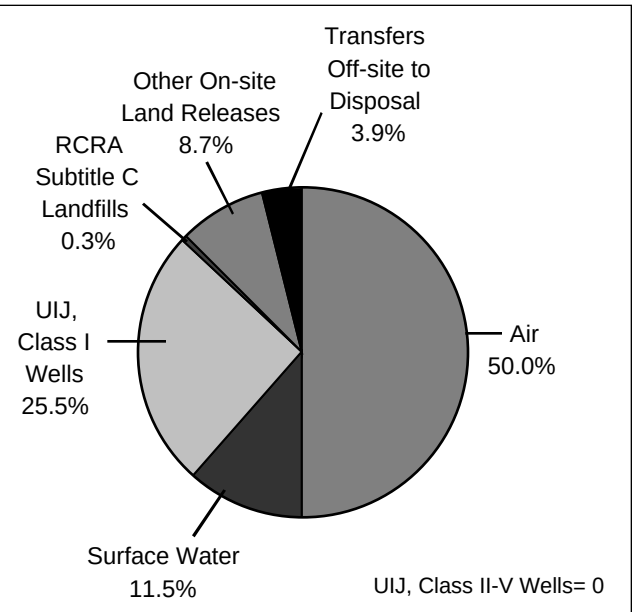


Figure 6-1. Distribution of TRI On-site and Off-site Releases, 1996: Chemical Manufacturing (SIC Code 28)

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

Figure 6-1). Forms with multiple codes in SIC code 28 reported the largest air emissions, 161.1 million pounds, which was 41.1% of total air emissions from chemical manufacturing.

Underground injection of 200.5 million pounds—99.9% of it into Class I wells—was the second largest release type, representing 25.5% of all releases. Surface water discharges were 90.4 million pounds (11.5% of releases). On-site land releases were 71.0 million pounds—2.7 million pounds to RCRA subtitle C landfills and 68.3 million pounds to other on-site land releases. This made on-site land releases 9.0% of total on- and off-site releases. Off-site releases (transfers off-site to disposal) totaled 30.8 million pounds, or 3.9%. Multiple-codes forms led all release types except, as indicated above, off-site releases.

As discussed in Chapter 4, the chemical manufacturing sector has reported the largest amounts in most categories of TRI reporting, including most types of on- and off-site releases (see Tables 4-2 through 4-4 in Chapter 4). This is especially true of underground injection, where the 200.3 million pounds reported as injected into Class I wells by chemical manufacturing represented 98.4% of all such injection reported to TRI.[2] (Forms in chemical manufacturing reported 197,000 pounds of injection into Class II-V wells, which represents 26.1% of the national total. Types of underground injection are explained in Chapter 2.)

Table 6-3 provides on- and off-site release data for all industries in SIC code 28. Figure 6-2 illustrates the distribution by four-digit SIC code of chemical manufacturing releases.

Other On-site Waste Management

Recycling was the largest on-site waste management method in chemical manufacturing, with 3.73 billion pounds (44.8%), followed by treatment with 3.25 billion pounds (39.1%), and energy recovery with 1.35 billion pounds (16.2%). On-site waste management data appear in Table 6-4 and their distribution is illustrated in Figure 6-3.

For all types of on-site waste management—recycling, energy recovery, and treatment—multiple-codes forms reported the largest quantities in the chemical manufacturing sector and miscellaneous industrial organic chemicals (SIC code 2869) the second largest (see Table 6-4). Together, they accounted for 2.37 billion pounds of on-site recycling (63.6% of the sector's total), 1.18 billion pounds of on-site energy recovery (87.4%), and 2.32 billion pounds of on-site treatment (71.4%). Total other on-site waste management for the multiple-codes forms (4.02 billion pounds) and the miscellaneous industrial organics (1.85 billion pounds) amounted to 70.5% of on-site waste

[2] It is important to note that companies using underground injection as a method of disposal have suggested that underground injection is not a "release" to the environment and should not be counted in release totals. However, it should be noted that underground injection is clearly included in the EPCRA definition of "release."

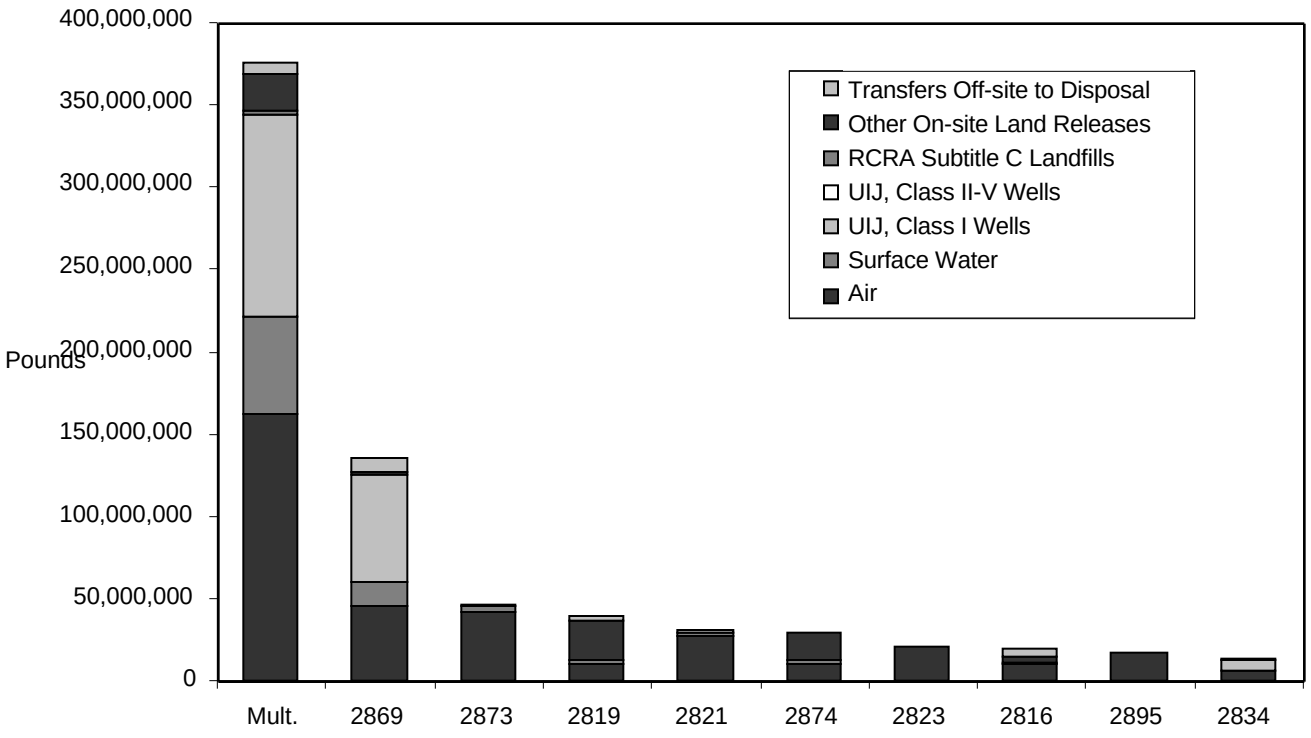


Figure 6-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Chemical Manufacturing (SIC Code 28)

Note: On-Site Releases from Section 5 of Form R. **Off-site releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the "multiple" category. **UIJ** = underground injection.

management in this sector. Figure 6-4 illustrates the distribution of on-site waste management reporting for the top 10 industries in the chemical manufacturing sector.

Transfers Off-site for Further Waste Management

Transfers to energy recovery were the largest off-site transfer type in chemical manufacturing, with 378.4 million pounds (42.1% of the total), as shown in Table 6-5 and illustrated in Figure 6-5. Next largest was recycling, with 256.6 million pounds (28.6%). A total of 154.3 million pounds (17.2%) was transferred to treatment and 109.5 million pounds to POTWs (12.2%).

Forms with multiple codes in SIC code 28 led all transfers off-site for further waste management. The multiple-codes category reported 40.4% of the off-site transfers (363.3 million pounds of the 898.9-million-pound total) and more than 35% of each transfer type. (See Table 6-5 and Figure 6-6.)

1996 TRI Data by State for Chemical Manufacturing

The large role of petrochemicals in the chemical manufacturing sector explains some of the geographic distribution of releases and waste management reported to TRI. In 1996, Texas led all

Table 6-4. TRI Other On-site Waste Management, 1996: Chemical Manufacturing, SIC Code 28 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
	Multiple within SIC 28	1,782,454,512	616,054,351	1,625,579,937	4,024,088,800
2869	Industrial Organic Chemicals, nec*	590,176,326	563,072,761	697,172,996	1,850,422,083
2821	Plastics Materials & Resins	286,924,305	102,190,602	256,194,684	645,309,591
2874	Phosphatic Fertilizers	316,143,932	0	5,082,021	321,225,953
2879	Agricultural Chemicals, nec*	235,140,169	312,932	28,959,106	264,412,207
2819	Industrial Inorganic Chemicals, nec*	121,761,254	11,623,000	108,879,027	242,263,281
2824	Organic Fibers, Noncellulosic	5,824,384	0	219,831,544	225,655,928
2873	Nitrogenous Fertilizers	117,479,132	7,287,494	17,837,640	142,604,266
2865	Cyclic Crudes & Intermediates	57,690,916	22,222,730	45,173,380	125,087,026
2816	Inorganic Pigments	22,341,985	0	99,478,119	121,820,104
2822	Synthetic Rubber	41,133,955	12,218,500	31,844,723	85,197,178
2834	Pharmaceutical Preparations	27,505,526	1,329,261	35,437,266	64,272,053
2851	Paints & Allied Products	36,489,898	114,045	8,591,433	45,195,376
2899	Chemical Preparations, nec*	35,520,982	976,540	3,630,486	40,128,008
2892	Explosives	26,283,771	0	9,906,301	36,190,072
2833	Medicinals & Botanicals	13,031,122	2,222,500	18,529,246	33,782,868
2895	Carbon Black	0	7,998,571	21,076,186	29,074,757
2812	Alkalies & Chlorine	522,299	0	9,687,273	10,209,572
2891	Adhesives & Sealants	6,862,357	796,479	414,786	8,073,622
2823	Cellulosic Manmade Fibers	6,820,000	0	200,000	7,020,000
2861	Gum & Wood Chemicals	0	9,900	3,637,369	3,647,269
2893	Printing Ink	166,026	0	2,346,793	2,512,819
2843	Surface Active Agents	639,549	0	1,832,387	2,471,936
2813	Industrial Gases	99,517	0	1,942,301	2,041,818
2842	Polishes & Sanitation Goods	52,008	0	633,544	685,552
2841	Soap & Other Detergents	37,279	0	314,509	351,788
2836	Biological Products Exc. Diagnostic	24,464	0	148,634	173,098
2835	Diagnostic Substances	0	0	122,000	122,000
2875	Fertilizers, Mixing Only	115,746	0	100	115,846
2844	Toilet Preparations	100	0	39,242	39,342
	Invalid SIC Code within SIC 28	5,300	0	4,214	9,514
	Total for SIC Code 28	3,731,246,814	1,348,429,666	3,254,527,247	8,334,203,727

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec**: not elsewhere classified.

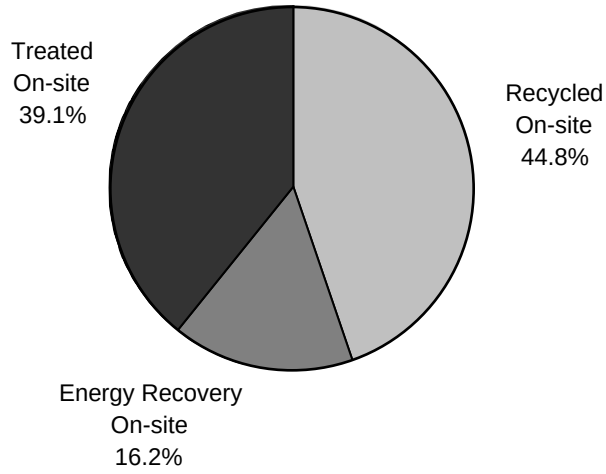


Figure 6-3. Distribution of TRI Other On-site Waste Management, 1996: Chemical Manufacturing (SIC Code 28)

Note: Data from Section 8 of Form R

states and territories in all categories summarized in Table 6-6.

Texas' 202.2 million pounds of total on- and off-site releases was 25.8% of the sector's total of 785.2 million pounds. Louisiana was second with 148.9 million pounds, or 19.0%. For on-site releases, Texas was also first (with 193.0 million pounds, or 25.6%) and Louisiana second (147.8 million pounds, or 19.6%). For off-site releases (transfers to disposal), Texas reported 9.2 million pounds (30.0%) and Ohio was second with 6.0 million pounds (19.5%).

For other on-site waste management, Texas reported 2.73 billion pounds, or 32.8% of the total. Louisiana followed with 1.56 billion pounds, or 18.7%. Transfers off-site for further waste

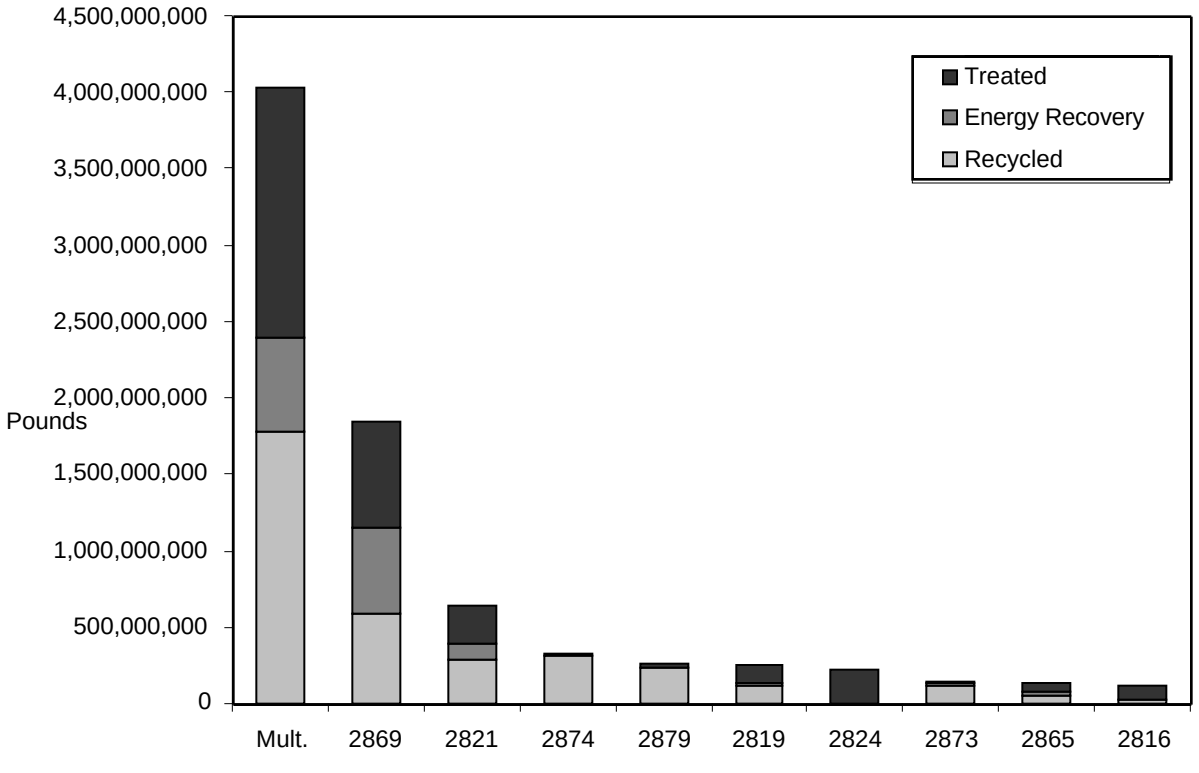


Figure 6-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Chemical Manufacturing (SIC Code 28)

Note: Other On-Site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC Code 28 are assigned to the "multiple" category.

Table 6-5. TRI Transfers Off-site for Further Waste Management, 1996: Chemical Manufacturing, SIC Code 28 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
	Multiple within SIC 28	107,208,728	135,922,272	68,337,839	51,838,464	713	363,308,016
2869	Industrial Organic Chemicals, nec*	18,767,560	70,621,180	25,877,851	22,270,248	8,919	137,545,758
2821	Plastics Materials & Resins	67,603,104	50,449,412	8,320,583	3,968,312	0	130,341,411
2834	Pharmaceutical Preparations	7,193,129	48,588,394	20,497,843	3,558,808	80,548	79,918,722
2851	Paints & Allied Products	17,386,095	32,441,404	3,808,181	848,057	760	54,484,497
2865	Cyclic Crudes & Intermediates	4,203,666	6,713,095	5,335,285	13,199,665	0	29,451,711
2833	Medicinals & Botanicals	606,897	18,788,469	2,439,764	5,221,671	0	27,056,801
2819	Industrial Inorganic Chemicals, nec*	8,583,527	311,463	7,694,808	1,984,078	500	18,574,376
2822	Synthetic Rubber	9,063,698	2,139,422	2,890,414	288,240	0	14,381,774
2879	Agricultural Chemicals, nec*	6,612,868	2,794,757	3,202,883	107,926	0	12,718,434
2891	Adhesives & Sealants	620,984	3,871,511	2,605,423	78,842	0	7,176,760
2899	Chemical Preparations, nec*	776,677	1,798,717	2,044,257	1,790,001	0	6,409,652
2824	Organic Fibers, Noncellulosic	4,468,347	3,364	6,217	43,560	0	4,521,488
2893	Printing Ink	1,315,638	1,021,091	287,777	91,132	0	2,715,638
2843	Surface Active Agents	101,873	762,231	64,972	1,461,096	0	2,390,172
2816	Inorganic Pigments	483,903	0	76,589	1,820,946	0	2,381,438
2812	Alkalies & Chlorine	18,222	1,588,333	33,376	255	0	1,640,186
2873	Nitrogenous Fertilizers	782,046	0	93,496	179,277	0	1,054,819
	Invalid SIC Code within SIC 28	500,000	32,242	12,910	2,557	0	547,709
2841	Soap & Other Detergents	251,591	14,511	48,027	218,703	0	532,832
2842	Polishes & Sanitation Goods	1,920	50,794	144,955	173,679	0	371,348
2813	Industrial Gases	9,260	167,302	159,281	0	12,596	348,439
2835	Diagnostic Substances	68,619	128,788	77,788	32,263	0	307,458
2844	Toilet Preparations	0	54,919	32,416	202,974	480	290,789
2875	Fertilizers, Mixing Only	0	0	155,739	255	0	155,994
2836	Biological Products Exc. Diagnostic	3,980	51,247	4,298	58,126	0	117,651
2861	Gum & Wood Chemicals	6,075	55,000	3,940	22,780	0	87,795
2892	Explosives	840	0	23,213	255	0	24,308
2823	Cellulosic Manmade Fibers	0	0	0	835	0	835
2895	Carbon Black	0	0	20	20	0	40
2874	Phosphatic Fertilizers	0	0	0	30	0	30
	Total for SIC Code 28	256,639,247	378,369,918	154,280,145	109,463,055	104,516	898,856,881

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. **Other Off-site Transfers** reported without valid waste management code. Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the multiple category.
***nec:** not elsewhere classified.

management were 161.4 million pounds in Texas, or 18.0%, and 102.4 million pounds in second-ranked Michigan, or 11.4%. Production-related waste totaled 3.11 billion pounds in Texas, or 31.0%, again followed by Louisiana, with 1.76 billion pounds, or 17.6%. Finally, non-production related waste (from one-time events such as catastrophic events or clean-up actions) was 3.8 million pounds in Texas, or 40.9% of the total, and 3.1 million pounds in North Carolina, or 33.2%.

Map 6-1 illustrates the geographic distribution of total on- and off-site releases in the chemical manufacturing sector.

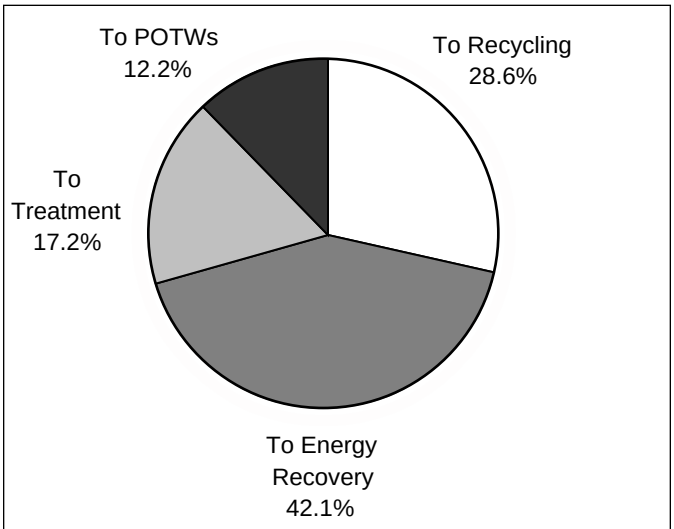


Figure 6-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Chemical Manufacturing (SIC Code 28)

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

1996 TRI Data by Chemical for Chemical Manufacturing

In 1996, the chemical with the largest on- and off-site releases in the chemical manufacturing sector was ammonia, with 108.4 million pounds, as shown in Table 6-7. Ammonia is used in many chemical manufacturing processes and is the building block for all synthetic nitrogen products. Its prevalence, its volatility, and its solubility in water allow it to be readily released to the air and water. Ammonia is used to produce fertilizers, plastics, explosives, and pharmaceuticals. It is also used as a catalyst in phenol-formaldehyde condensation and in urea-formaldehyde condensation to make synthetic resin.

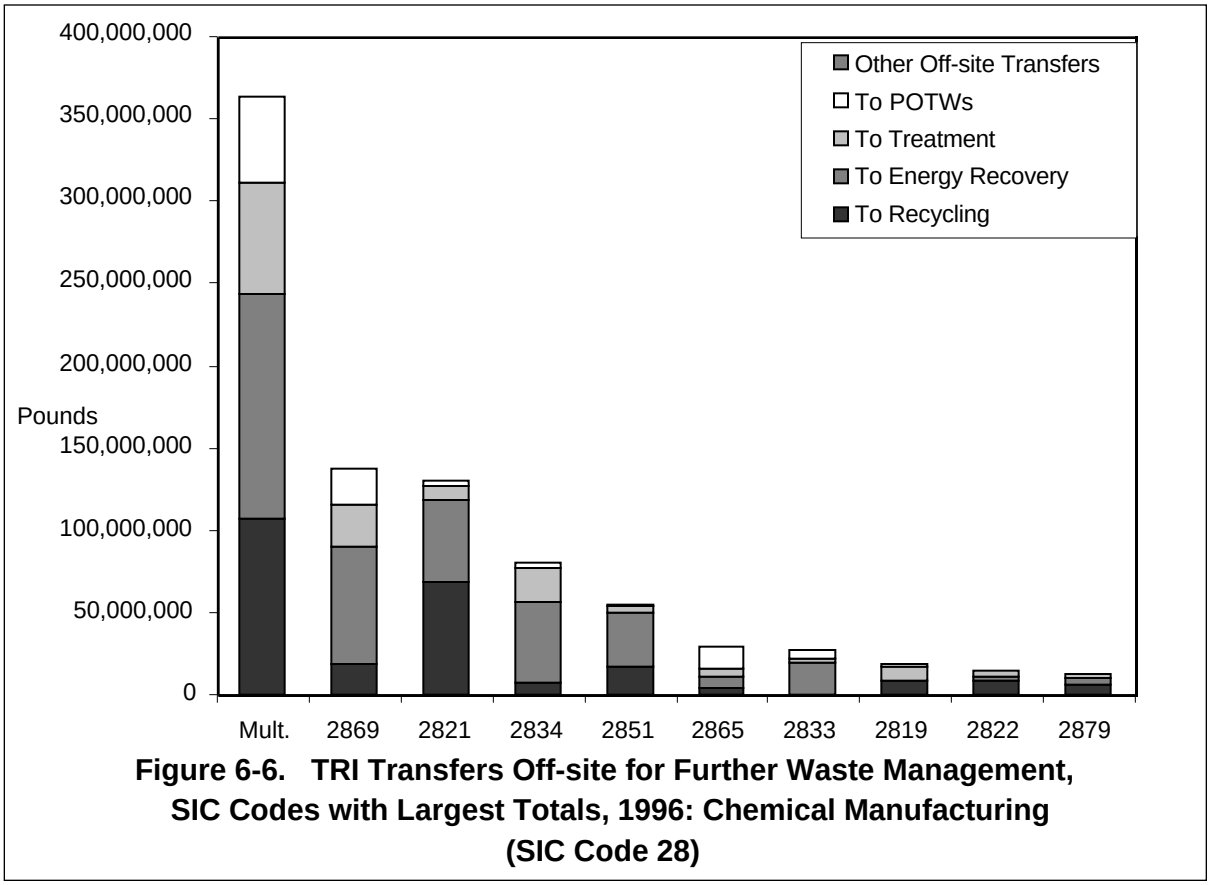


Figure 6-6. TRI Transfers Off-site for Further Waste Management, SIC Codes with Largest Totals, 1996: Chemical Manufacturing (SIC Code 28)

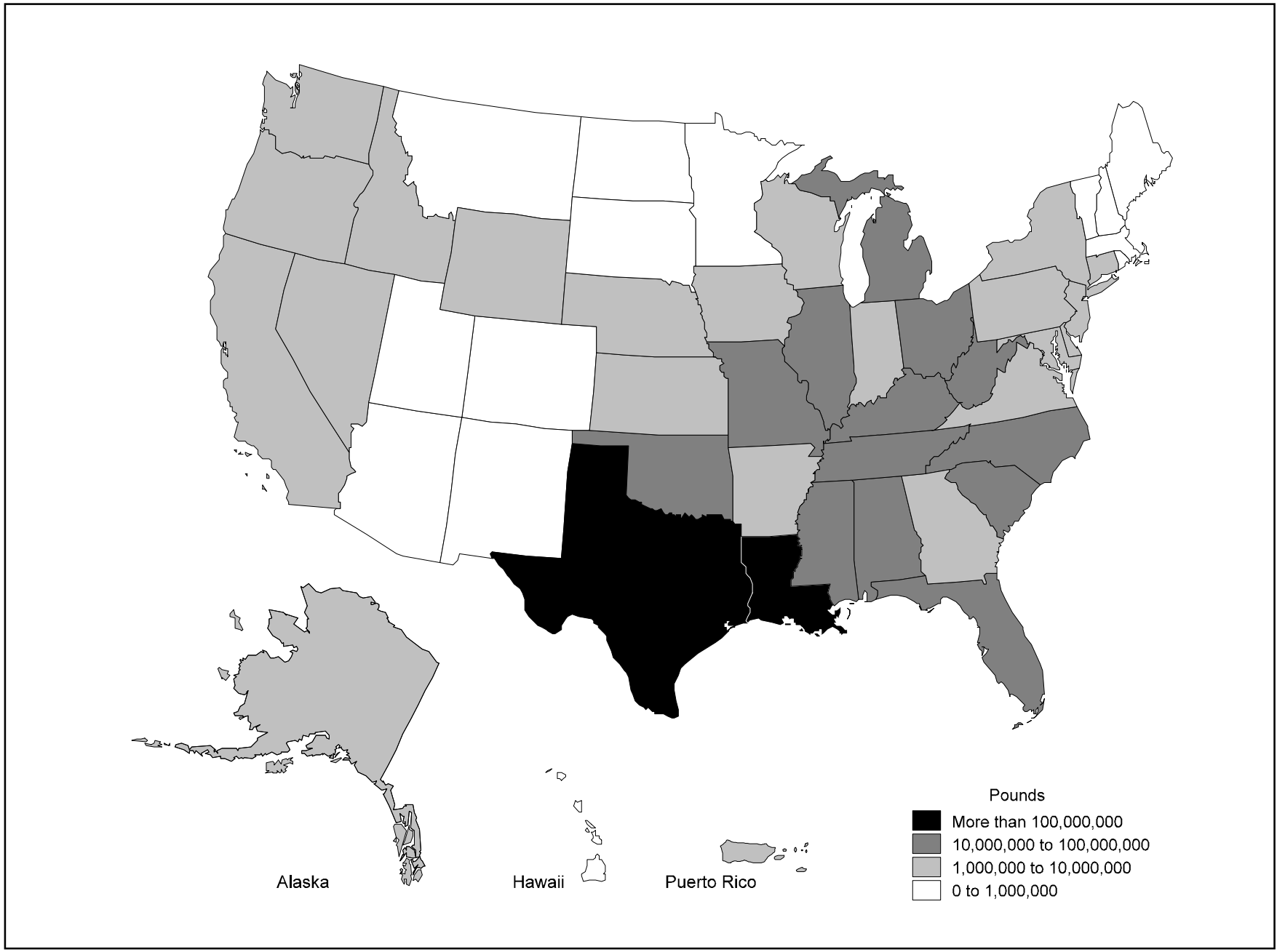
Note: Off-site transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. **Other Off-Site Transfers** reported without valid waste management code. Forms with more than one 4-digit SIC code within SIC Code 28 are assigned to the "multiple" category.

Table 6-6. Summary of TRI Information by State, 1996: Chemical Manufacturing, SIC Code 28

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	69	471	67	36,256,912	618,444	36,875,356	250,719,277	13,106,050	301,255,192	39,208
Alaska	1	10	0	4,715,420	0	4,715,420	3,097,400	213,885	8,064,924	79,000
Arizona	27	86	20	295,602	532	296,134	17,464,982	73,119	17,827,545	11,695
Arkansas	41	247	45	7,755,860	563,398	8,319,258	138,750,132	10,025,280	157,174,263	690
California	272	1,010	151	5,144,883	437,621	5,582,504	44,171,522	15,901,758	65,480,518	31,123
Colorado	27	85	17	548,274	36,600	584,874	1,137,926	4,500,603	6,212,306	18,003
Connecticut	34	212	21	1,803,958	301,459	2,105,417	83,049,612	6,539,897	91,515,575	35,399
Delaware	28	115	13	1,611,092	95,248	1,706,340	50,223,316	5,475,792	57,389,695	13,173
Florida	123	427	68	48,420,645	95,750	48,516,395	159,224,567	4,360,732	211,803,901	286,570
Georgia	175	774	191	8,822,284	309,370	9,131,654	295,389,027	10,859,002	315,272,953	16,693
Hawaii	1	1	0	0	0	0	0	0	0	0
Idaho	7	34	0	8,953,540	3,752	8,957,292	311,332	192,258	9,519,439	17,401
Illinois	258	1,467	234	18,228,475	2,007,116	20,235,591	224,612,209	46,075,506	290,294,227	53,675
Indiana	96	506	45	7,180,851	752,513	7,933,364	137,780,619	11,824,299	158,072,740	37,534
Iowa	48	240	27	5,428,228	232,511	5,660,739	23,193,730	5,110,249	33,536,843	248,954
Kansas	44	223	21	5,568,820	2,583,171	8,151,991	102,119,940	7,371,316	117,658,339	86,434
Kentucky	61	494	60	13,606,273	437,860	14,044,133	160,630,831	17,041,020	191,396,937	177,483
Louisiana	132	1,281	69	147,821,794	1,038,973	148,860,767	1,560,078,542	53,892,930	1,762,618,869	185,930
Maine	2	4	0	6,029	2,453	8,482	8,005,992	0	8,014,463	0
Maryland	50	223	36	3,992,318	132,040	4,124,358	33,735,292	4,053,887	42,004,515	0
Massachusetts	86	360	52	620,604	44,640	665,244	3,140,409	6,405,744	10,384,191	1,401
Michigan	104	679	55	12,295,482	290,770	12,586,252	68,888,478	102,378,648	184,487,426	21,431
Minnesota	54	175	51	472,427	3,111	475,538	505,820	205,778	1,296,660	4
Mississippi	38	218	40	12,694,232	79,087	12,773,319	198,939,835	3,858,053	215,184,731	9,835
Missouri	112	553	88	14,947,833	401,901	15,349,734	88,072,868	37,367,152	139,818,581	31,252
Montana	9	37	0	87,065	18,587	105,652	436,810	58,151	612,619	323
Nebraska	19	77	10	1,930,166	4,305	1,934,471	3,523,664	1,913,577	7,384,385	54,947
Nevada	15	41	11	2,400,670	29,430	2,430,100	7,398,289	14,953	9,842,473	6,527
New Hampshire	9	37	14	30,863	30,032	60,895	15,306,040	182,739	15,521,122	17,279
New Jersey	232	1,144	169	7,829,079	1,068,310	8,897,389	159,943,534	58,590,419	226,465,823	54,597
New Mexico	4	17	8	33,156	1,250	34,406	11,371	2,250	45,967	0
New York	137	571	63	5,719,738	366,079	6,085,817	95,307,476	13,491,976	115,161,129	24,768
North Carolina	129	708	91	32,475,407	1,185,449	33,660,856	375,245,123	47,646,908	454,231,180	3,129,279
North Dakota	4	12	8	250	0	250	200	1,108	1,608	0
Ohio	275	1,465	200	30,621,467	6,027,879	36,649,346	177,158,047	58,594,420	272,028,935	57,892
Oklahoma	34	140	20	11,159,256	53,367	11,212,623	38,671,234	292,512	50,147,842	43,307
Oregon	33	135	18	1,351,214	2,505	1,353,719	19,144,069	328,357	20,806,580	119
Pennsylvania	174	944	127	3,879,566	395,310	4,274,876	83,378,130	23,497,561	108,503,955	17,618
Puerto Rico	61	232	10	3,846,230	67,233	3,913,463	15,811,291	23,691,207	44,345,288	11,567
Rhode Island	15	77	25	87,486	206	87,692	472,528	663,999	1,223,317	0
South Carolina	98	635	94	11,037,662	532,273	11,569,935	203,546,248	46,793,640	262,971,728	211,508
South Dakota	1	8	0	327,250	0	327,250	1,403,000	107,864	1,876,794	0
Tennessee	96	570	86	42,381,294	144,701	42,525,995	132,709,522	11,587,305	186,704,773	50,085
Texas	353	2,961	274	192,978,481	9,248,340	202,226,821	2,730,560,792	161,375,551	3,113,819,489	3,849,979
Utah	22	77	19	704,294	1,573	705,867	1,732,810	437,742	2,607,566	1,120
Vermont	1	8	0	13,248	0	13,248	91,192	5,450	107,961	0
Virginia	71	305	39	9,297,224	208,173	9,505,397	292,462,637	21,774,807	324,643,920	36,096
Washington	38	129	19	1,548,356	305,705	1,854,061	47,498,047	447,036	49,305,658	410,222
West Virginia	39	398	10	18,080,942	593,162	18,674,104	266,860,761	36,979,022	322,581,703	37,063
Wisconsin	88	427	114	1,061,348	89,280	1,150,628	10,485,453	23,518,514	35,074,119	711
Wyoming	8	48	10	8,262,552	594	8,263,146	1,801,801	26,855	10,089,260	0
Total for SIC Code 28	3,855	21,098	2,810	754,336,100	30,842,063	785,178,163	8,334,203,727	898,856,881	10,032,390,027	9,417,895

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

Map 6-1. Total On- and Off-site Releases, 1996: Chemical Manufacturing, SIC Code 28



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

Table 6-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Chemical Manufacturing, SIC Code 28 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection: Class I Wells Pounds	Underground Injection: Class II-V Wells Pounds	On-site Land Releases: RCRA Subtitle C Landfills Pounds	On-site Land Releases: Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases: Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
7664-41-7	Ammonia	80,117,508	3,673,351	22,370,883	192,283	425,318	709,001	107,488,344	875,871	108,364,215
—	Nitrate compounds	271,349	52,991,156	39,398,312	250	0	252,836	92,913,903	1,063,493	93,977,396
67-56-1	Methanol	39,338,505	781,457	23,656,675	0	1,908	403,078	64,181,623	1,212,076	65,393,699
75-15-0	Carbon disulfide	60,152,700	66,151	3,788	0	0	270	60,222,909	19,097	60,242,006
7664-38-2	Phosphoric acid	612,359	28,358,221	9,316	0	250	25,611,553	54,591,699	416,763	55,008,462
74-85-1	Ethylene	31,368,678	22,190	0	0	0	0	31,390,868	2,953	31,393,821
75-05-8	Acetonitrile	970,241	10,600	22,826,712	0	11	5	23,807,569	544,920	24,352,489
—	Chromium compounds	49,852	23,413	33,944	0	26,034	21,514,596	21,647,839	461,427	22,109,266
115-07-1	Propylene	19,966,587	83	0	0	0	370	19,967,040	1,044	19,968,084
7697-37-2	Nitric acid	1,273,268	170,657	17,483,860	0	513	14,199	18,942,497	287,553	19,230,050
108-88-3	Toluene	15,011,903	23,173	154,308	2,600	119,079	4,340	15,315,403	487,821	15,803,224
—	Manganese compounds	188,249	575,935	11,480	2,308	250	6,450,091	7,228,313	7,624,113	14,852,426
107-21-1	Ethylene glycol	3,010,513	474,268	7,698,571	0	821	224,868	11,409,041	2,027,535	13,436,576
64-18-6	Formic acid	2,023,649	80,119	11,001,260	0	5	3,005	13,108,038	101,851	13,209,889
7647-01-0	Hydrochloric acid	11,596,245	4,969	260,005	0	0	1,051	11,862,270	17,333	11,879,603
	Subtotal	265,951,606	87,255,743	144,909,114	197,441	574,189	55,189,263	554,077,356	15,143,850	569,221,206
	Total for SIC Code 28	392,434,100	90,420,803	200,317,453	197,441	2,689,697	68,276,606	754,336,100	30,842,063	785,178,163

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

Air emissions were the largest type of on- or off-site release reported by the chemical industry and the largest release for seven of the top 15 chemicals in this industry: ammonia, methanol, carbon disulfide, ethylene, propylene, toluene, and hydrochloric acid (see Table 6-7). The 257.6 million pounds of air emissions of these seven chemicals were two-thirds (65.6%) of all air emissions in the sector. Nitrate compounds and phosphoric acid were discharged to surface waters in the largest amounts, 53.0 million pounds and 28.4 million pounds, respectively. These two chemicals accounted for 90.0% of the sector's on-site releases to water.

Nitrate compounds was also the largest chemical for injection to Class I wells, with 39.4 million pounds. Ammonia, methanol, and acetonitrile also had more than 20 million pounds each of such underground injection, and these four chemicals together (totaling 108.3 million pounds) represented 54.0% of the sector's underground injection to Class I wells.

Forms in chemical manufacturing reported more phosphoric acid (25.6 million pounds) and chromium compounds (21.5 million pounds) in other on-site land releases than any other TRI chemical. These two chemicals accounted for 69.0% of the sector's other on-site land releases. On-site disposal in RCRA subtitle C landfills was only 3.8% of all on-site land releases in the sector, and this category was led by ammonia with 425,000 pounds. Manganese compounds were sent off-site for disposal (off-site releases) in the largest amount (7.6 million pounds); more of this chemical was released off-site than in all its on-site releases (totaling 7.2 million pounds). Manganese compounds accounted for 24.7% of all chemical manufacturing off-site releases.

OSHA Carcinogens

On- and off-site releases of chemicals designated as OSHA carcinogens totaled 65.1 million pounds, or 8.3% of all releases in the chemical manufacturing sector in 1996, as shown on Table 6-8. (OSHA carcinogens and the bases for their designation appear in Box 2-4 in Chapter 2.) Two OSHA carcinogens had releases of more than 10 million pounds each: formaldehyde (11.9 million pounds) and dichloromethane (10.5 million pounds). The three carcinogens with the next largest releases in

Table 6-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Chemical Manufacturing, SIC Code 28 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Class I Wells Pounds	Underground Injection Class II-V Wells Pounds	On-site Land Releases RCRA Subtitle C Landfills Pounds	On-site Land Releases Other On-site Land Releases Pounds	Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- and Off-site Releases Pounds
	Multiple within SIC 28	14,668,339	468,583	15,774,009	0	286,539	457,720	31,655,190	1,342,263	32,997,453
2869	Industrial Organic Chemicals, nec*	5,123,084	44,255	6,763,011	0	10,471	22,541	11,963,362	1,232,139	13,195,501
2821	Plastics Materials & Resins	7,906,776	120,739	0	0	0	5,217	8,032,732	96,644	8,129,376
2834	Pharmaceutical Preparations	2,589,380	337	1,123,150	0	0	10,699	3,723,566	69,036	3,792,602
2822	Synthetic Rubber	1,642,179	938	0	0	0	17,334	1,660,451	33,446	1,693,897
2865	Cyclic Crudes & Intermediates	1,010,827	5,911	10,400	0	0	712	1,027,850	391,569	1,419,419
2899	Chemical Preparations, nec*	179,314	34	0	0	0	0	179,348	502,108	681,456
2819	Industrial Inorganic Chemicals, nec*	40,140	2,220	0	0	13,181	444,289	499,830	138,264	638,094
2879	Agricultural Chemicals, nec*	471,431	1,586	73,406	0	755	538	547,716	81,011	628,727
2891	Adhesives & Sealants	598,335	0	0	0	0	8,096	606,431	564	606,995
2851	Paints & Allied Products	460,100	754	0	0	0	4,250	465,104	12,671	477,775
2833	Medicinals & Botanicals	448,557	9,545	0	0	0	200	458,302	5,000	463,302
2824	Organic Fibers, Noncellulosic	92,724	0	19,091	0	0	0	111,815	3,300	115,115
2812	Alkalies & Chlorine	80,746	9	0	0	0	0	80,755	8,736	89,491
2843	Surface Active Agents	53,212	6	0	0	0	13	53,231	536	53,767
2873	Nitrogenous Fertilizers	19,885	805	490	0	0	570	21,750	19,300	41,050
2842	Polishes & Sanitation Goods	35,228	0	0	0	0	0	35,228	2,905	38,133
2895	Carbon Black	35,900	5	0	0	0	0	35,905	5	35,910
2813	Industrial Gases	17,400	0	0	0	776	0	18,176	0	18,176
2861	Gum & Wood Chemicals	4,794	250	0	0	0	0	5,044	0	5,044
2875	Fertilizers, Mixing Only	2,771	0	0	0	0	0	2,771	0	2,771
2835	Diagnostic Substances	2,436	0	0	0	0	0	2,436	0	2,436
2892	Explosives	2,250	0	0	0	0	0	2,250	0	2,250
2841	Soap & Other Detergents	2,161	0	0	0	0	0	2,161	0	2,161
2836	Biological Products Exc. Diagnostic	1,950	0	0	0	0	0	1,950	0	1,950
2816	Inorganic Pigments	274	161	0	0	0	0	435	851	1,286
	Invalid SIC Code within SIC 28	762	0	0	0	0	0	762	0	762
2844	Toilet Preparations	700	0	0	0	0	0	700	0	700
2893	Printing Ink	502	0	0	0	0	0	502	5	507
	Subtotal	35,492,157	656,138	23,763,557	0	311,722	972,179	61,195,753	3,940,353	65,136,106
	Total for SIC Code 28	392,434,100	90,420,803	200,317,453	197,441	2,689,697	68,276,606	754,336,100	30,842,063	785,178,163

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec**: not elsewhere classified.

this sector were acrylamide (6.2 million pounds), styrene (5.2 million pounds), and acrylonitrile (4.9 million pounds). None of the OSHA carcinogens ranked among the top 15 TRI chemicals for total releases in this sector (presented in Table 6-7).

Forms with multiple SIC codes in SIC 28 reported half of the OSHA carcinogen releases in the chemical manufacturing sector—33.0 million pounds, or 50.7%. Miscellaneous industrial organic chemical manufacturing (SIC code 2869) accounted for another 13.2 million pounds, or 20.3%. Emissions to air were 14.7 million pounds for multiple codes and 5.1 million pounds for miscellaneous industrial organic chemicals. Figure 6-7 shows the on- and off-site releases of the four-digit SIC codes with the largest OSHA carcinogen releases.

1996 TRI Chemicals in Waste for Chemical Manufacturing

Table 6-9 and Figure 6-8 present waste management data for all chemical manufacturing industries. Production-related waste totaled 10.03 billion pounds in 1996.

Forms with multiple SIC codes within SIC 28 led all waste management categories in 1996. Forms reporting the miscellaneous industrial organic chemicals SIC code (2869) were second in all categories, except off-site recycling (where plastics

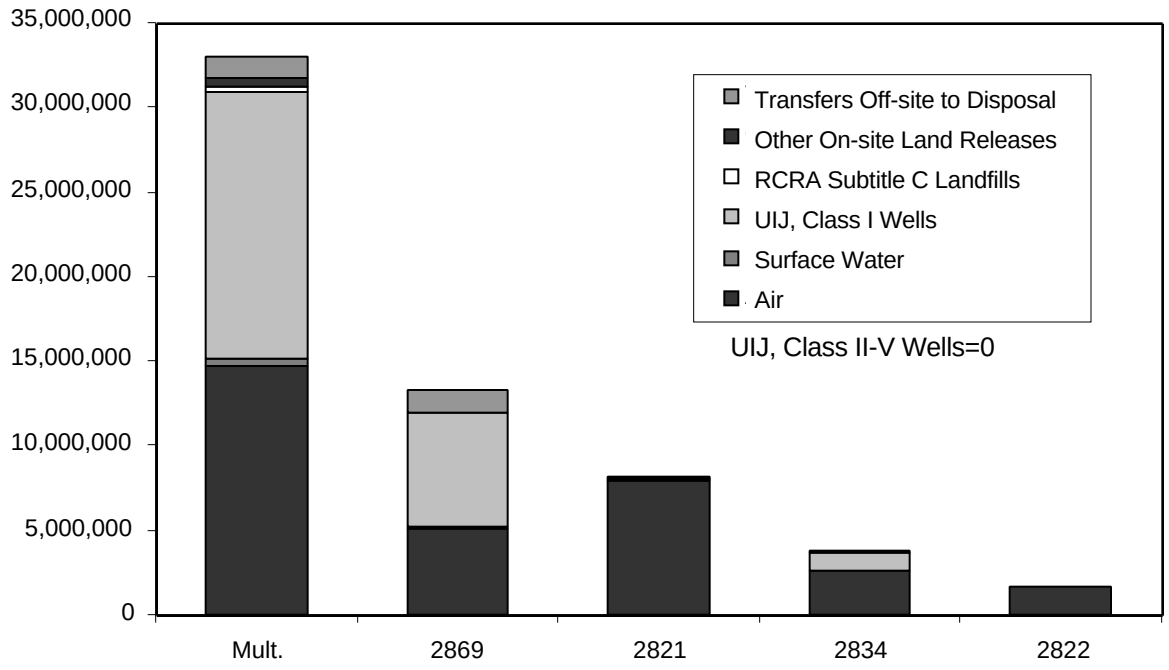


Figure 6-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Chemical Manufacturing (SIC Code 28

Notes: On-site Releases from Section 5 of Form R. **Off-site Releases** from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the "multiple" category. **UIJ=** underground injection.

Table 6-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Chemical Manufacturing, SIC Code 28 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non Production-related Waste Pounds
	Multiple within SIC 28	1,782,454,512	616,054,351	1,625,579,937	105,373,291	137,039,894	120,186,512	379,660,246	4,766,348,743	4,627,743
2869	Industrial Organic Chemicals, nec*	590,176,326	563,072,761	697,172,996	18,783,258	74,783,716	49,793,691	137,664,992	2,131,447,740	3,351,020
2821	Plastics Materials & Resins	286,924,305	102,190,602	256,194,684	67,720,050	45,711,839	16,864,052	30,929,378	806,534,910	106,630
2874	Phosphatic Fertilizers	316,143,932	0	5,082,021	0	0	29	29,212,202	350,438,184	283,328
2819	Industrial Inorganic Chemicals, nec*	121,761,254	11,623,000	108,879,027	8,464,006	304,681	8,389,844	39,339,627	298,761,439	146,108
2879	Agricultural Chemicals, nec*	235,140,169	312,932	28,959,106	6,612,794	2,798,301	2,937,897	2,244,138	279,005,337	48,114
2824	Organic Fibers, Noncellulosic	5,824,384	0	219,831,544	4,468,347	12,003	49,449	515,763	230,701,490	0
2873	Nitrogenous Fertilizers	117,479,132	7,287,494	17,837,640	910,518	0	199,773	46,124,547	189,839,104	583,329
2865	Cyclic Crudes & Intermediates	57,690,916	22,222,730	45,173,380	4,203,666	4,527,167	20,812,154	10,420,429	165,050,442	22,971
2834	Pharmaceutical Preparations	27,505,526	1,329,261	35,437,266	7,231,689	51,537,812	22,186,093	13,037,471	158,265,118	39,991
2816	Inorganic Pigments	22,341,985	0	99,478,119	515,583	9,500	1,877,824	18,986,210	143,209,221	575
2822	Synthetic Rubber	41,133,955	12,218,500	31,844,723	14,868,428	2,307,731	3,155,855	10,051,829	115,581,021	28,616
2851	Paints & Allied Products	36,489,898	114,045	8,591,433	17,208,162	32,962,450	4,804,061	9,638,998	109,809,047	10,206
2833	Medicinals & Botanicals	13,031,122	2,222,500	18,529,246	647,032	18,698,199	5,646,306	4,975,424	63,749,829	78
2899	Chemical Preparations, nec*	35,520,982	976,540	3,630,486	752,911	1,970,260	3,730,664	3,839,531	50,421,374	29,918
2895	Carbon Black	0	7,998,571	21,076,186	0	0	24	16,854,464	45,929,245	0
2892	Explosives	26,283,771	0	9,906,301	7,300	0	30,589	1,465,639	37,693,600	1,100
2823	Cellulosic Manmade Fibers	6,820,000	0	200,000	0	0	85	21,062,915	28,083,000	0
2891	Adhesives & Sealants	6,862,357	796,479	414,786	960,450	3,875,872	1,492,714	2,401,799	16,804,457	1,958
2861	Gum & Wood Chemicals	0	9,900	3,637,369	6,075	55,000	26,950	8,969,977	12,705,271	1,210
2812	Alkalies & Chlorine	522,299	0	9,687,273	18,222	1,588,333	31,105	649,176	12,496,408	144
2893	Printing Ink	166,026	0	2,346,793	1,232,402	936,454	449,048	651,910	5,782,633	105,730
2843	Surface Active Agents	639,549	0	1,832,387	46,855	755,608	564,152	829,817	4,668,368	6,735
2813	Industrial Gases	99,517	0	1,942,301	9,260	165,302	75,362	806,491	3,098,233	9,089
2875	Fertilizers, Mixing Only	115,746	0	100	0	0	53,681	1,663,911	1,833,438	0
2842	Polishes & Sanitation Goods	52,008	0	633,544	2,673	45,007	322,588	225,489	1,281,309	13,192
2841	Soap & Other Detergents	37,279	0	314,509	255,659	20,111	230,686	61,033	919,277	100
	Invalid SIC Code within SIC 28	5,300	0	4,214	500,000	28,575	65,609	71,528	675,226	10
2835	Diagnostic Substances	0	0	122,000	68,519	134,258	134,546	18,543	477,866	0
2844	Toilet Preparations	100	0	39,242	0	60,778	209,819	159,401	469,340	0
2836	Biological Products Exc. Diagnostic	24,464	0	148,634	0	26,669	52,527	57,063	309,357	0
	Total for SIC Code 28	3,731,246,814	1,348,429,666	3,254,527,247	260,867,150	380,355,520	264,373,689	792,589,941	10,032,390,027	9,417,895

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec**: not elsewhere classified.

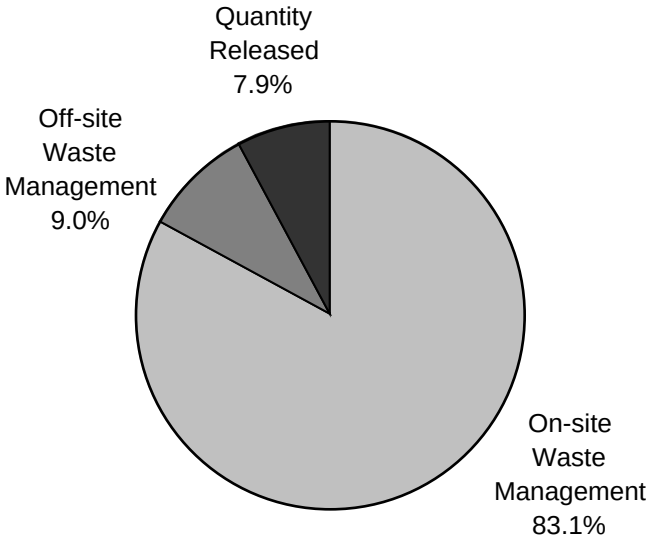


Figure 6-8. Distribution of TRI Production-Related Waste, 1996: Chemical Manufacturing (SIC Code 28)

Note: Data from Section 8 of Form R.

materials and resins, SIC code 2861 was second). Together, the multiple-codes group and the miscellaneous industrial organics chemicals industry accounted for 68.8% (6.90 billion pounds) of the sector's production-related waste (see Table 6-9).

For multiple-codes reporting, the largest quantities of chemicals in production-related waste were managed by on-site recycling, 1.78 billion pounds. On-site treatment followed with 1.63 billion pounds. These two categories of multiple-code reporting accounted for one third (34.0%) of all production-related waste reported by the chemical manufacturing sector. Distribution of production-related waste for the top industries in the sector appears in Figure 6-9.

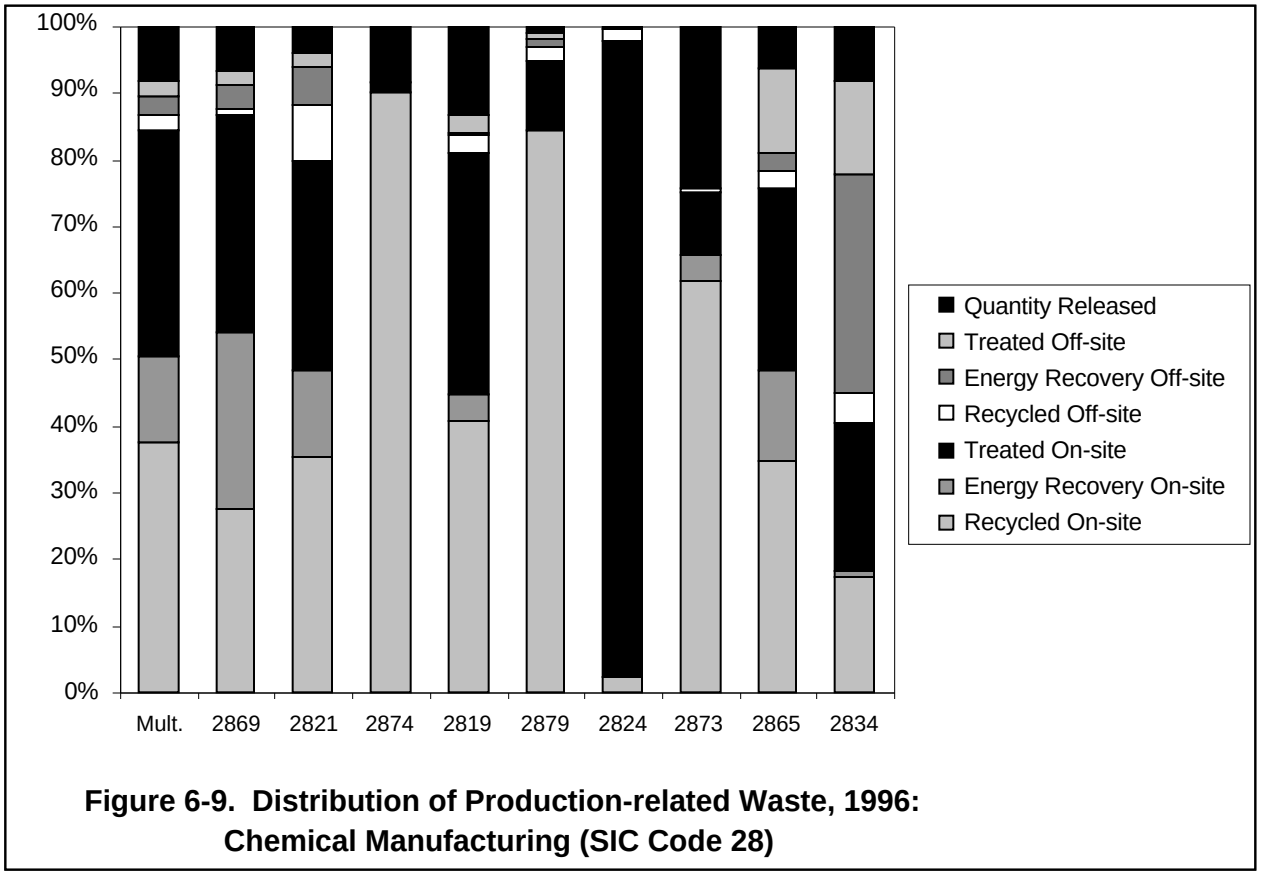


Figure 6-9. Distribution of Production-related Waste, 1996: Chemical Manufacturing (SIC Code 28)

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC Code 28 are assigned to the "multiple" category.

Table 6-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Chemical Manufacturing, SIC Code 28

Waste Management Activity	Current Year 1996 Total Pounds	Current Year 1996 Percent of Total	Projected 1997 Total Pounds	Projected 1997 Percent of Total	Projected 1998 Total Pounds	Projected 1998 Percent of Total
On-site Waste Management						
Recycled On-site	3,731,246,814	37.2	4,037,270,795	39.0	4,239,492,141	39.6
Energy Recovery On-site	1,348,429,666	13.4	1,424,116,977	13.8	1,393,016,262	13.0
Treated On-site	3,254,527,247	32.4	3,288,538,187	31.8	3,506,074,427	32.7
Off-site Waste Management						
Recycled Off-site	260,867,150	2.6	246,415,014	2.4	259,445,976	2.4
Energy Recovery Off-site	380,355,520	3.8	339,566,297	3.3	337,139,694	3.1
Treated Off-site	264,373,689	2.6	251,579,501	2.4	251,783,800	2.4
Quantity Released On- and Off-site	792,589,941	7.9	765,539,089	7.4	724,066,248	6.8
Total Production-related Waste for SIC Code 28	10,032,390,027	100.0	10,353,025,860	100.0	10,711,018,548	100.0

Waste Management Activity	Projected Change 1996-1997 Percent	Projected Change 1997-1998 Percent	Projected Change 1996-1998 Percent
On-site Waste Management			
Recycled On-site	8.2	5.0	13.6
Energy Recovery On-site	5.6	-2.2	3.3
Treated On-site	1.0	6.6	7.7
Off-site Waste Management			
Recycled Off-site	-5.5	5.3	-0.5
Energy Recovery Off-site	-10.7	-0.7	-11.4
Treated Off-site	-4.8	0.1	-4.8
Quantity Released On- and Off-site	-3.4	-5.4	-8.6
Total Production-related Waste for SIC Code 28	3.2	3.5	6.8

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

Projected Quantities of TRI Chemicals in Waste

Projections by the chemical manufacturing sector show that on-site recycling is expected to increase by 13.6% through 1998 and on-site treatment by 7.7%. Off-site energy recovery is projected to decrease by 11.4% over that period and quantities released on- and off-site to decrease by 8.6%. Less than 5% change is expected in on-site energy recovery (3.3% increase) and off-site treatment (4.8% decrease). Current year and projected waste management data for chemical manufacturing are given in Table 6-10 and percentage changes are

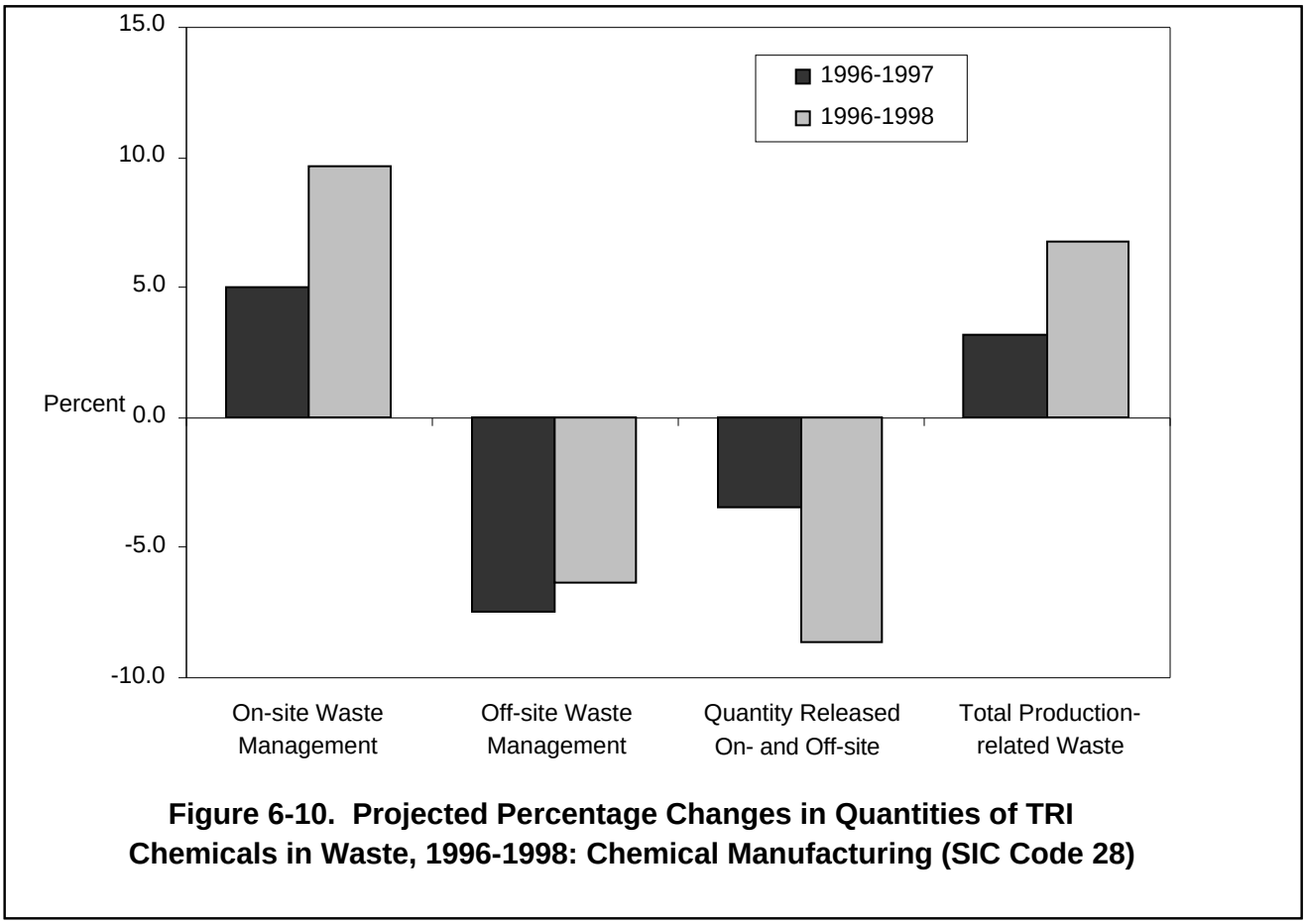


Figure 6-10. Projected Percentage Changes in Quantities of TRI Chemicals in Waste, 1996-1998: Chemical Manufacturing (SIC Code 28)

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

illustrated in Figure 6-10. (As explained in Chapter 2, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.)

The projections indicate that quantities released would decrease from 7.9% of all production-related waste in 1996 to 6.8% in 1998, and on-site recycling would increase from 37.2% of the sector's production-related waste to 39.6%, as shown in Table 6-10. This points to possible improvement in managing TRI chemicals in waste, by moving up the waste management hierarchy. In that hierarchy, as explained in Chapter 2, recycling is the preferred management option for waste that is not prevented or cannot be prevented in the first place.

Source Reduction Activity

Of the 21,098 forms reporting chemical manufacturing SIC codes, 3,940 (18.7%) forms indicated at least one source reduction activity implemented in 1996, as shown in Table 6-11. The largest number, 1,094, came from multiple-codes reporting, followed by 890 from manufacture of paints and varnishes (SIC code 2851). These were 16.7% of the forms reporting multiple SIC codes within SIC code 28 and 29.9% of the forms for paints and allied products. Activities to reduce volatile organic chemicals in paint manufacture and in paint products are likely to account for the high standing of the paint industry in this regard. Improvements in operating practices and modifications in process were the highest categories in the sector, among multiple-codes forms, and for paints and allied products.

Table 6-11. Number of Forms Reporting Source Reduction Activity, 1996: Chemical Manufacturing, SIC Code 28

SIC Code	Industry	Total Forms	Forms Reporting Source Reduction Activities		Category of Source Reduction Activity							
				Percent of All Forms	Good Operating Practices	Inventory Control	Spill and Leak Prevention	Raw Material Modifi-cations	Process Modifi-cations	Cleaning and Degreasing	Surface Preparation and Finishing	Product Modifi-cations
		Number	Number	Percent	Number	Number	Number	Number	Number	Number	Number	Number
2812	Alkalies & Chlorine	63	14	22.2	0	1	7	2	4	0	0	0
2813	Industrial Gases	122	27	22.1	8	1	6	1	12	3	0	1
2816	Inorganic Pigments	176	36	20.5	22	3	9	7	12	0	0	2
2819	Industrial Inorganic Chemicals, nec*	828	135	16.3	56	7	48	4	68	2	0	1
2821	Plastics Materials & Resins	1,813	394	21.7	173	43	107	50	180	8	2	13
2822	Synthetic Rubber	123	37	30.1	11	0	25	0	11	0	0	0
2823	Cellulosic Manmade Fibers	12	4	33.3	1	0	1	0	2	0	0	0
2824	Organic Fibers, Noncellulosic	34	5	14.7	0	0	1	3	1	0	0	0
2833	Medicinals & Botanicals	180	34	18.9	14	1	9	5	15	3	0	0
2834	Pharmaceutical Preparations	340	58	17.1	32	2	11	9	30	3	2	3
2835	Diagnostic Substances	24	6	25.0	4	3	0	0	2	0	0	0
2836	Biological Products Exc. Diagnostic	13	2	15.4	1	0	0	0	1	0	0	0
2841	Soap & Other Detergents	231	28	12.1	20	3	12	2	14	2	0	0
2842	Polishes & Sanitation Goods	423	76	18.0	40	11	26	16	18	10	0	17
2843	Surface Active Agents	259	42	16.2	19	6	13	6	16	0	0	4
2844	Toilet Preparations	68	12	17.6	3	2	2	3	5	0	2	1
2851	Paints & Allied Products	2,974	890	29.9	448	192	162	191	325	86	2	209
2861	Gum & Wood Chemicals	41	2	4.9	1	0	2	0	0	0	0	0
2865	Cyclic Crudes & Intermediates	667	97	14.5	35	1	44	4	50	0	0	2
2869	Industrial Organic Chemicals, nec*	2,601	365	14.0	157	15	166	20	121	12	0	8
2873	Nitrogenous Fertilizers	234	37	15.8	13	0	16	5	14	0	0	0
2874	Phosphatic Fertilizers	105	18	17.1	11	0	6	1	6	0	0	1
2875	Fertilizers, Mixing Only	213	12	5.6	1	3	6	0	0	0	0	2
2879	Agricultural Chemicals, nec*	759	90	11.9	66	6	24	1	28	6	0	5
2891	Adhesives & Sealants	615	141	22.9	46	36	39	29	38	11	1	21
2892	Explosives	79	23	29.1	13	0	10	1	4	0	0	0
2893	Printing Ink	254	59	23.2	14	28	6	24	13	5	0	16
2895	Carbon Black	79	17	21.5	12	4	0	5	4	0	0	0
2899	Chemical Preparations, nec*	1,186	180	15.2	90	30	37	25	66	14	0	16
	Multiple within SIC 28	6,542	1,094	16.7	460	72	447	93	449	30	2	42
	Invalid SIC Code within SIC 28	40	5	12.5	3	0	1	0	3	0	0	0
	Total for SIC Code 28	21,098	3,940	18.7	1,774	470	1,243	507	1,512	195	11	364

Note: Forms with more than one 4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Year-to-Year Comparisons for Chemical Manufacturing

1995-1996 TRI Data for Chemical Manufacturing

On- and Off-site Releases

From 1995 to 1996, on- and off-site releases reported by the chemical manufacturing sector decreased from 844.2 million pounds to 785.2 million pounds, a reduction of 59.1 million pounds or 7.0%. The largest reduction, in both pounds and percent, occurred in reported underground injection, which decreased 34.5 million pounds, or 14.7%. Reported air emissions were reduced by 29.5 million pounds, or 7.0%; both fugitive and point source air emissions decreased. Increases were reported in surface water discharges (2.2 million pounds, a 2.5% increase), on-site land releases (1.5 million pounds, or 2.2%), and off-site releases (transfers to disposal; 1.2 million pounds or 4.0%). Table 6-12 presents 1995 and 1996 reporting by the chemical manufacturing sector, and Figure 6-11 illustrates the changes by release type.

Also indicated on Table 6-12 is a 2.5% decrease from 1995 to 1996 in the number of forms submitted by this industry. At the same time, Form A certification statements from chemical manufacturing increased 11.4%. (The Form A certification statement is explained in Chapter 1.) This may reflect more widespread awareness of the

Table 6-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Chemical Manufacturing, SIC Code 28

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	3,905	3,855	-1.3
Total Forms	21,644	21,098	-2.5
Form Rs	19,122	18,288	-4.4
Form As	2,522	2,810	11.4
	Pounds	Pounds	Percent
On-site Releases			
Total Air Emissions	421,919,788	392,434,100	-7.0
Fugitive Air	98,579,277	93,363,107	-5.3
Point Source Air	323,340,511	299,070,993	-7.5
Surface Water Discharges	88,184,358	90,420,803	2.5
Underground Injection	235,053,481	200,514,894	-14.7
On-site Land Releases	69,423,353	70,966,303	2.2
Total On-site Releases	814,580,980	754,336,100	-7.4
Off-site Releases			
Transfers Off-site to Disposal	29,651,233	30,842,063	4.0
Total On- and Off-site Releases	844,232,213	785,178,163	-7.0
Other On-site Waste Management			
Recycled On-site	3,324,704,960	3,731,246,814	12.2
Energy Recovery On-site	1,277,579,401	1,348,429,666	5.5
Treated On-site	3,829,359,360	3,254,527,247	-15.0
Total Other On-site Waste Management	8,431,643,721	8,334,203,727	-1.2
Transfers Off-site for Further Waste Management			
Transfers to Recycling	236,051,192	256,639,247	8.7
Transfers to Energy Recovery	410,316,527	378,369,918	-7.8
Transfers to Treatment	158,936,820	154,280,145	-2.9
Transfers to POTWs	114,761,842	109,463,055	-4.6
Other Off-site Transfers	117,929	104,516	-11.4
Total Transfers Off-site for Further Waste Management	920,184,310	898,856,881	-2.3

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

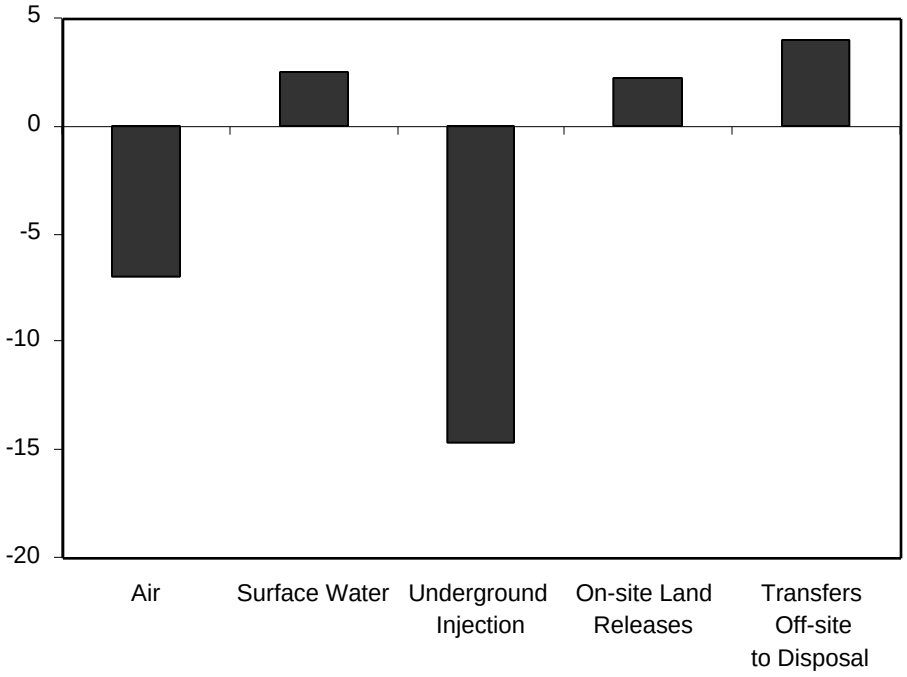


Figure 6-11. Percentage Change in On-site and Off-site Releases, 1995-1996: Chemical Manufacturing (SIC Code 28)

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

Form A certification statement in its second year of availability.

Other On-site Waste Management

Chemical manufacturing reporting of on-site waste management also appears in Table 6-12. In 1995, on-site waste management in this sector totaled 8.43 billion pounds, and in 1996, 8.33 billion pounds. This constituted a 1.2% decrease. Much greater change occurred, however, within the three waste management methods—a 12.2% increase in on-site recycling, from 3.32 billion pounds to 3.73 billion pounds; a 5.5% increase in on-site energy recovery, from 1.28 billion pounds to 1.35 billion pounds; and, offsetting these, a 15.0% decrease in on-site waste treatment, from 3.83 billion pounds to 3.25 billion pounds.

Transfers Off-site for Further Waste Management

Transfers off-site for further waste management decreased 21.3 million pounds (2.3%), from 920.2 million pounds to 898.9 million pounds. Off-site recycling was the only waste management option with an increase, which was 20.6 million pounds more in 1996 than in 1995, an 8.7% increase. Off-site energy recovery had the largest decrease, 31.9 million pounds (7.8% decrease). Transfers to treatment decreased by 4.7 million pounds and transfers to POTWs by 5.3 million pounds (2.9% and 4.6%, respectively). Table 6-12 provides these off-site transfer data for the two-year period.

1988-1996 TRI Data for Chemical Manufacturing

As explained in Chapter 3, comparisons from the 1988 TRI baseline year to the current year rely on

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

The number of forms submitted with chemical industry SIC codes has remained relatively stable since 1988, decreasing just 0.4% through 1996. Use of the Form A certification statement, however, is evident in the 13.5% decrease in Form Rs since 1988. Table 6-13 summarizes 1988-1996 reporting for the chemical manufacturing sector, illustrated in Figure 6-12.

Since 1988, on- and off-site releases reported in this sector have decreased by half (51.0%), from 1.05 billion pounds to 513.0 million pounds. This was a reduction of 534.7 million pounds. Much of this reduction occurred in air emissions, which decreased 315.9 million pounds or 54.0%. The largest percentage reduction occurred in surface water discharges—77.0%, or 108.0 million pounds. Underground injection decreased by 43.1 million pounds (27.1%), on-site land releases by 27.6 million pounds (28.6%), and off-site releases (transfers to disposal) by 40.1 million pounds (60.3%).

On-site waste management data were not collected in TRI before 1991. Table 6-13 presents these data for recent years. Since 1994, other on-site waste management has shown a slight increase, 0.3%, in the chemical manufacturing sector, an increase of 18.0 million pounds. Much larger change has occurred in the three waste management methods within this category: On-site recycling decreased by 164.4 million pounds from 1994 to 1996, a reduction of 5.2%. On-site treatment also decreased, by 99.6 million pounds, or 4.0%. On-site energy recovery, however, increased by 282.0 million pounds, a 30.0% increase.

Off-site transfers to treatment and to POTWs decreased by 26.1% (45.1 million) and 49.8% (65.5 million), respectively, from 1988 to 1996. Data for off-site transfers to recycling and energy recovery also were not collected until 1991; for the recent years shown in Table 6-13, these amounts fluctuated.

Production in the chemical manufacturing sector increased through most of this period; employment has fluctuated, but has remained above 1988 levels in all years but one (1994). TRI facilities report absolute amounts of waste managed and of environmental releases, not those adjusted for changes in production levels. As production in the chemical manufacturing sector has increased, however, all types of releases have decreased (see Table 6-13). Overall, the sector's releases have decreased by half since TRI's baseline year.

Changes in SIC Codes

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

1988-1996 Data for Four-Digit Industries in Chemical Manufacturing

Tables 6-14 through 6-16 present data by four-digit SIC codes in chemical manufacturing (SIC code 28) for on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

Table 6-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28

	1988	1994	1995	1996	Change 1988 to 1996
	Number	Number	Number	Number	Percent
Total Facilities	3,673	3,704	3,643	3,619	-1.5
Total Forms	17,048	17,717	17,335	16,977	-0.4
Form Rs	17,048	17,717	15,369	14,742	-13.5
Form As	NA	NA	1,966	2,235	NA
	Pounds	Pounds	Pounds	Pounds	Percent
On-site Releases					
Total Air Emissions	584,784,741	301,408,689	288,356,923	268,929,786	-54.0
Fugitive Air	159,041,536	87,247,201	76,063,740	71,956,588	-54.8
Point Source Air	425,743,205	214,161,488	212,293,183	196,973,198	-53.7
Surface Water Discharges	140,266,541	26,512,984	24,573,671	32,250,242	-77.0
Underground Injection	159,374,099	112,392,443	136,571,844	116,260,191	-27.1
On-site Land Releases	96,789,189	71,848,513	66,421,814	69,148,399	-28.6
Total On-site Land Releases	981,214,570	512,162,629	515,924,252	486,588,618	-50.4
Off-site Releases					
Transfers Off-site to Disposal	66,567,653	25,320,056	23,676,003	26,454,493	-60.3
Total On- and Off-site Releases	1,047,782,223	537,482,685	539,600,255	513,043,111	-51.0
Other On-site Waste Management					
Recycled On-site	NA	3,162,659,917	2,745,605,831	2,998,270,797	NA
Energy Recovery On-site	NA	941,022,092	1,161,480,350	1,222,975,556	NA
Treated On-site	NA	2,475,723,968	2,647,593,460	2,376,129,409	NA
Total Other On-site Waste Management	NA	6,579,405,977	6,554,679,641	6,597,375,762	NA
Transfers Off-site for Further Waste Management					
Transfers to Recycling	NA	243,979,329	219,963,159	238,369,136	NA
Transfers to Energy Recovery	NA	352,005,525	385,420,395	351,356,029	NA
Transfers to Treatment	172,345,850	130,367,058	141,685,154	127,282,487	-26.1
Transfers to POTWs	131,623,520	78,172,560	74,572,446	66,139,592	-49.8
Other Off-site Transfers	16,517,434	426,569	117,679	12,748	-99.9
Total Transfers Off-site for Further Waste Management	NA	804,951,041	821,758,833	783,159,992	NA

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

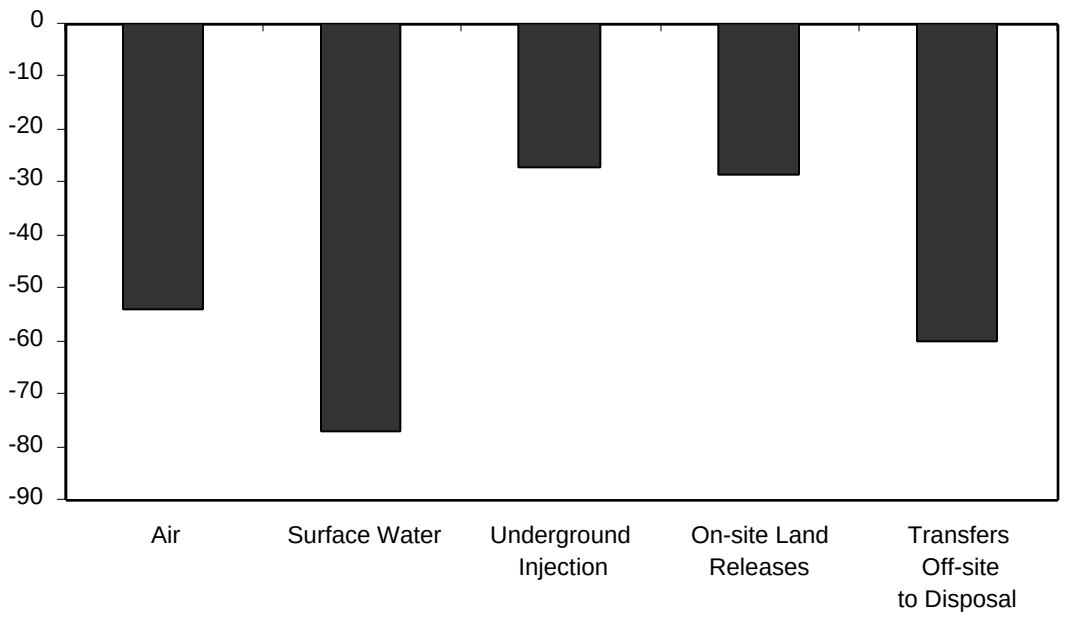


Figure 6-12. Percentage Change in On-site and Off-site Releases, 1988-1996: Chemical Manufacturing (SIC Code 28)

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

On- and Off-site Releases

Forms with multiple SIC codes in SIC code 28 reported a net decrease of 293.2 million pounds in on- and off-site releases from 1988 to 1996, a 56.2% reduction (see Table 6-14). Decreases in on-site release media for this group ranged from a 35.5% reduction in land releases to a 79.0% decrease in surface water discharges. Off-site releases (transfers to disposal) for multiple codes in SIC code 28 decreased 75.5%.

The second largest reduction in on-and off-site releases was reported in miscellaneous industrial organic chemical production (SIC code 2869), a decrease of 66.1 million pounds, or 41.2%. Most of this reduction appeared in air emissions, which were 50.7 million pounds less in 1996 than in 1988 (decrease of 57.2%).

The industry with the greatest increase in on- and off-site releases from 1988 to 1996 was gum and wood chemical production (SIC code 2861), which had relatively little reporting in 1988. This industrial organic category increased by 8.5 million pounds, and most of the increase occurred in reporting of air emissions.

Table 6-14 summarizes release data for 1988 and 1994-1996 for all four-digit SIC codes in chemical manufacturing.

Other On-site Waste Management

In other on-site waste management, an agricultural chemical industry reported the largest decrease since 1994 (these data were not collected in 1988). This was production of phosphatic fertilizers (SIC code 2874), with a reduction of 139.6 million pounds, or 33.7%. In this industry, on-site treatment decreased 259.9 million pounds for 1994-1996,

Table 6-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28

SIC Code	Industry	Year	On-site Releases: Total Air Emissions (Pounds)	On-site Releases: Surface Water Discharges (Pounds)	On-site Releases: Underground Injection (Pounds)	On-site Releases: Releases to Land (Pounds)	Total On-site Releases (Pounds)	Off-site Releases: Transfers Off-site to Disposal (Pounds)	Total On- and Off-site Releases (Pounds)
2812	Alkalies & Chlorine	96	349,893	184	0	159,564	509,641	8,793	518,434
		95	209,077	18,984	0	5,780	233,841	188	234,029
		94	359,777	245	0	142	360,164	389	360,553
		88	857,579	8,636	0	9,702	875,917	40,735	916,652
2813	Industrial Gases	96	355,151	4,976	0	2,689	362,816	0	362,816
		95	352,392	2,086	0	0	354,478	29,470	383,948
		94	162,895	2,101	0	0	164,996	21,100	186,096
		88	728,866	6,437	3,563	0	738,866	28,701	767,567
2816	Inorganic Pigments	96	8,733,593	384,030	0	3,255,125	12,372,748	4,441,778	16,814,526
		95	8,703,214	161,591	0	3,806,845	12,671,650	2,437,262	15,108,912
		94	9,223,873	112,174	500	2,580,000	11,916,547	2,209,274	14,125,821
		88	21,899,938	25,993	6,500,000	3,602,527	32,028,458	4,491,486	36,519,944
2819	Industrial Inorganic Chemicals, nec*	96	4,276,137	240,331	0	23,393,206	27,909,674	2,928,517	30,838,191
		95	4,951,230	24,461	0	21,436,265	26,411,956	3,487,878	29,899,834
		94	5,627,638	121,115	0	20,606,295	26,355,048	3,255,091	29,610,139
		88	16,788,211	295,253	31,618	17,325,871	34,440,953	11,050,974	45,491,927
2821	Plastics Materials & Resins	96	24,127,141	585,634	0	25,687	24,738,462	741,364	25,479,826
		95	24,010,059	595,425	0	196,778	24,802,262	1,219,756	26,022,018
		94	24,490,800	623,654	0	24,044	25,138,498	1,017,120	26,155,618
		88	45,267,692	1,226,439	86,000	72,537	46,652,668	2,205,805	48,858,473
2822	Synthetic Rubber	96	5,622,330	5,098	222,400	22,039	5,871,867	121,169	5,993,036
		95	5,131,941	4,935	0	14,026	5,150,902	168,397	5,319,299
		94	6,968,680	46,643	0	27,770	7,043,093	142,123	7,185,216
		88	14,864,643	21,618	0	28,867	14,915,128	713,212	15,628,340
2823	Cellulosic Manmade Fibers	96	20,322,125	47,400	0	644,435	21,013,960	0	21,013,960
		95	25,972,265	51,800	0	265	26,024,330	830,000	26,854,330
		94	24,432,265	48,150	0	0	24,480,415	1,407,400	25,887,815
		88	40,431,047	71,339	0	3,576,750	44,079,136	56,000	44,135,136
2824	Organic Fibers, Noncellulosic	96	446,886	69	24,341	0	471,296	41,640	512,936
		95	898,444	14,735	14,760	750	928,689	86,554	1,015,243
		94	779,355	16,000	72,005	750	868,110	20,154	888,264
		88	3,151,229	88,176	25,455	750	3,265,610	164,195	3,429,805
2833	Medicinals & Botanicals	96	1,290,867	42,426	0	200	1,333,493	27,365	1,360,858
		95	1,144,006	24,668	0	346	1,169,020	38,493	1,207,513
		94	2,020,032	38,138	0	160	2,058,330	36,030	2,094,360
		88	8,633,996	4,838,145	0	102,654	13,574,795	1,229,709	14,804,504
2834	Pharmaceutical Preparations	96	4,737,110	158,403	5,383,115	14,477	10,293,105	155,785	10,448,890
		95	6,687,408	132,049	8,405,770	20	15,225,247	100,519	15,325,766
		94	7,964,088	414,194	6,746,235	20	15,124,537	347,938	15,472,475
		88	20,315,322	56,524	3,643,650	11,960	24,027,456	1,912,858	25,940,314
2835	Diagnostic Substances	96	16,728	0	0	0	16,728	1,100	17,828
		95	45,261	0	0	0	45,261	0	45,261
		94	16,253	0	0	0	16,253	0	16,253
		88	69,542	4,749	0	0	74,291	0	74,291
2836	Biological Products Exc. Diagnostic	96	11,458	0	0	0	11,458	0	11,458
		95	8,653	0	0	0	8,653	750	9,403
		94	5,174	0	0	0	5,174	0	5,174
		88	10,150	0	0	0	10,150	750	10,900

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions (Pounds)	On-site Releases: Surface Water Discharges (Pounds)	On-site Releases: Underground Injection (Pounds)	On-site Releases: Releases to Land (Pounds)	Total On-site Releases (Pounds)	Off-site Releases: Transfers Off-site to Disposal (Pounds)	Total On- and Off-site Releases (Pounds)
2841	Soap & Other Detergents	96	36,863	0	0	4,068	40,931	3,074	44,005
		95	352,104	250	0	5	352,359	186,548	538,907
		94	215,685	0	0	10	215,695	161,112	376,807
		88	377,176	500	0	3,264	380,940	247,864	628,804
2842	Polishes & Sanitation Goods	96	223,850	515	0	1,260	225,625	13,165	238,790
		95	196,491	750	0	500	197,741	17,677	215,418
		94	226,378	1,277	0	1,003	228,658	16,801	245,459
		88	753,382	1,000	0	1,000	755,382	157,687	913,069
2843	Surface Active Agents	96	400,831	7	21,312	290	422,440	5,681	428,121
		95	979,054	17	19,539	31	998,641	9,513	1,008,154
		94	981,722	178	15,348	33,996	1,031,244	19,730	1,050,974
		88	1,842,271	59,763	0	500	1,902,534	127,390	2,029,924
2844	Toilet Preparations	96	50,387	90	0	4,750	55,227	62,239	117,466
		95	41,170	250	0	1,300	42,720	50,478	93,198
		94	28,685	250	0	875	29,810	30,700	60,510
		88	106,841	293	0	250	107,384	40,114	147,498
2851	Paints & Allied Products	96	8,282,377	2,542	0	29,064	8,313,983	595,936	8,909,919
		95	8,736,423	337	0	18,693	8,755,453	672,563	9,428,016
		94	9,867,259	3,828	0	14,633	9,885,720	678,799	10,564,519
		88	20,322,888	425,062	750	22,836	20,771,536	4,867,860	25,639,396
2861	Gum & Wood Chemicals	96	8,904,577	751	0	0	8,905,328	500	8,905,828
		95	7,519,835	750	0	0	7,520,585	0	7,520,585
		94	7,522,855	1,005	0	0	7,523,860	0	7,523,860
		88	349,380	3,500	0	1,850	354,730	2,600	357,330
2865	Cyclic Crudes & Intermediates	96	4,804,610	54,237	2,644,000	68,177	7,571,024	1,103,358	8,674,382
		95	4,162,154	175,688	3,045,300	73,358	7,456,500	1,131,449	8,587,949
		94	4,967,713	224,092	4,466,154	191,861	9,849,820	1,030,857	10,880,677
		88	10,683,698	122,517	66,557	103,684	10,976,456	866,192	11,842,648
2869	Industrial Organic Chemicals, nec*	96	37,979,817	275,680	48,825,414	508,435	87,589,346	6,940,586	94,529,932
		95	36,794,081	360,930	52,147,291	564,642	89,866,944	4,988,362	94,855,306
		94	41,701,804	443,340	39,000,641	736,179	81,881,964	3,869,933	85,751,897
		88	88,675,121	1,214,359	64,050,959	837,095	154,777,534	5,900,926	160,678,460
2873	Nitrogenous Fertilizers	96	3,191,124	118,464	725	13,826	3,324,139	334,206	3,658,345
		95	3,096,652	175,847	6,848	11,419	3,290,766	214,991	3,505,757
		94	2,844,898	258,550	1,637	134,296	3,239,381	55,819	3,295,200
		88	10,646,761	558,096	383	156,668	11,361,908	9,000	11,370,908
2874	Phosphatic Fertilizers	96	126,079	2,947,246	0	16,865,765	19,939,090	1,010	19,940,100
		95	152,050	17,926	0	17,673,379	17,843,355	1,010	17,844,365
		94	91,868	1,166,821	0	23,321,961	24,580,650	515	24,581,165
		88	99,235	843,836	0	33,710,082	34,653,153	88,769	34,741,922
2875	Fertilizers, Mixing Only	96	25,294	3,000	0	2,158	30,452	2,000	32,452
		95	33,050	3,365	0	3,250	39,665	8,066	47,731
		94	35,814	2,510	0	3,000	41,324	6,538	47,862
		88	30,249	2,750	0	111,137	144,136	16,422	160,558
2879	Agricultural Chemicals, nec*	96	1,223,687	12,276	510,696	13,326	1,759,985	176,286	1,936,271
		95	1,174,838	11,843	470,876	3,125	1,660,682	123,289	1,783,971
		94	1,321,040	8,113	556,363	2,937	1,888,453	366,341	2,254,794
		88	2,830,376	61,412	708,023	6,374	3,606,185	2,153,370	5,759,555

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code	Industry	Year	On-site Releases: Total Air Emissions (Pounds)	On-site Releases: Surface Water Discharges (Pounds)	On-site Releases: Underground Injection (Pounds)	On-site Releases: Releases to Land (Pounds)	Total On-site Releases (Pounds)	Off-site Releases: Transfers Off-site to Disposal (Pounds)	Total On- and Off-site Releases (Pounds)
2891	Adhesives & Sealants	96	1,844,806	2	0	10,086	1,854,894	81,180	1,936,074
		95	2,061,388	1,155	0	550	2,063,093	93,933	2,157,026
		94	2,034,770	785	0	550	2,036,105	347,171	2,383,276
		88	2,979,592	5,000	0	16,134	3,000,726	307,893	3,308,619
2892	Explosives	96	182,587	25,788	0	500	208,875	250	209,125
		95	82,441	18,015	0	750	101,206	5,052	106,258
		94	125,577	16,606	0	601	142,784	3,413	146,197
		88	334,923	45,663	0	97,899	478,485	736	479,221
2893	Printing Ink	96	600,939	1	0	500	601,440	1,249	602,689
		95	848,114	8	0	253	848,375	26,486	874,861
		94	940,786	121	0	250	941,157	31,564	972,721
		88	1,478,224	1,073	0	540	1,479,837	549,106	2,028,943
2895	Carbon Black	96	16,852,992	760	0	0	16,853,752	755	16,854,507
		95	17,814,340	760	0	0	17,815,100	755	17,815,855
		94	20,084,024	760	0	0	20,084,784	1,510	20,086,294
		88	13,445,853	3,000	0	0	13,448,853	0	13,448,853
2899	Chemical Preparations, nec*	96	1,769,488	8,864	2,308	318,298	2,098,958	2,265,053	4,364,011
		95	2,087,379	1,800	0	2,008	2,091,187	895,828	2,987,015
		94	2,001,227	8,979	0	86,945	2,097,151	1,029,219	3,126,370
		88	3,040,466	9,557	140,996	65,295	3,256,314	1,156,953	4,413,267
	Multiple within SIC Code 28	96	112,088,232	27,331,468	58,625,880	23,790,470	221,836,050	6,400,453	228,236,503
		95	124,008,313	22,773,231	72,461,460	22,607,476	241,850,480	6,848,481	248,698,961
		94	124,278,507	22,953,335	61,533,560	24,080,235	232,845,637	9,073,022	241,918,659
		88	247,972,949	130,163,280	80,334,325	36,912,791	495,383,345	26,078,225	521,461,570
	Invalid SIC Code within SIC 28	96	51,827	0	0	4	51,831	1	51,832
		95	103,096	15	0	0	103,111	2,255	105,366
		94	87,247	20	0	0	87,267	140,393	227,660
		88	5,797,141	102,571	3,781,820	10,172	9,691,704	2,102,121	11,793,825
	Total for SIC Code 28	96	268,929,786	32,250,242	116,260,191	69,148,399	486,588,618	26,454,493	513,043,111
		95	288,356,923	24,573,671	136,571,844	66,421,814	515,924,252	23,676,003	539,600,255
		94	301,408,689	26,512,984	112,392,443	71,848,513	512,162,629	25,320,056	537,482,685
		88	584,784,741	140,266,541	159,374,099	96,789,189	981,214,570	66,567,653	1,047,782,223

Note: **On-site Releases** from Section 5 of Form R and **Off-site Releases** from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

partly offset by a 120.2 million pound increase in on-site recycling. (See Table 6-15.) Plastics materials and resins (SIC code 2821) had the second-largest decrease, 137.9 million pounds or 18.8%. On-site recycling of 144.4 million pounds less in 1996 than in 1994 accounted for this reduction. No other industry reduced its other on-site waste management by more than 100 million pounds from 1994 to 1996.

Miscellaneous industrial organics (SIC code 2869) reported the largest increase in on-site waste management from 1994 to 1996, 255.7 million pounds, or 21.0%, followed by multiple codes with 96.7 million pounds, or 3.1%. (These were the groups ranking second and first, respectively, for decreases in on and off-site releases since 1988.) For miscellaneous industrial organics (SIC code 2869), all on-site waste management methods increased (34.5 million pounds recycled, 184.4 million pounds burned for energy recovery, and

Table 6-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2812	Alkalies & Chlorine	96	517,179	0	9,221,223	9,738,402
		95	866,310	0	9,239,585	10,105,895
		94	1,929,134	0	7,661,577	9,590,711
		88	NA	NA	NA	NA
2813	Industrial Gases	96	90,142	0	848,924	939,066
		95	160,618	0	563,229	723,847
		94	115,669	0	688,908	804,577
		88	NA	NA	NA	NA
2816	Inorganic Pigments	96	8,835,185	0	39,040,454	47,875,639
		95	52,421,329	0	39,245,139	91,666,468
		94	106,211	0	34,927,376	35,033,587
		88	NA	NA	NA	NA
2819	Industrial Inorganic Chemicals, nec*	96	88,585,575	11,623,000	46,038,317	146,246,892
		95	89,751,430	3,757,000	78,708,610	172,217,040
		94	90,598,190	10,939,000	72,447,775	173,984,965
		88	NA	NA	NA	NA
2821	Plastics Materials & Resins	96	285,437,883	96,161,214	213,217,148	594,816,245
		95	268,141,314	78,784,152	211,380,712	558,306,178
		94	429,839,410	82,144,669	220,695,428	732,679,507
		88	NA	NA	NA	NA
2822	Synthetic Rubber	96	41,133,955	9,077,700	15,158,012	65,369,667
		95	41,577,648	624,140	7,441,637	49,643,425
		94	38,276,477	516,240	4,800,983	43,593,700
		88	NA	NA	NA	NA
2823	Cellulosic Manmade Fibers	96	6,820,000	0	200,000	7,020,000
		95	9,980,000	0	450,000	10,430,000
		94	7,900,000	0	200,000	8,100,000
		88	NA	NA	NA	NA
2824	Organic Fibers, Noncellulosic	96	5,824,384	0	219,291,544	225,115,928
		95	34,545,304	474,140	252,319,809	287,339,253
		94	22,403,675	231,040	284,596,399	307,231,114
		88	NA	NA	NA	NA
2833	Medicinals & Botanicals	96	12,855,822	2,122,300	7,687,640	22,665,762
		95	5,632,383	2,242,900	6,208,128	14,083,411
		94	6,032,477	1,490,000	5,475,453	12,997,930
		88	NA	NA	NA	NA
2834	Pharmaceutical Preparations	96	20,335,443	1,248,818	8,805,574	30,389,835
		95	18,423,181	1,527,141	12,690,793	32,641,115
		94	14,916,317	1,602,778	15,223,405	31,742,500
		88	NA	NA	NA	NA
2835	Diagnostic Substances	96	0	0	122,000	122,000
		95	0	0	91,090	91,090
		94	454	0	51,500	51,954
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2836	Biological Products Exc. Diagnostic	96	24,464	0	148,634	173,098
		95	26,371	0	200,909	227,280
		94	0	0	231,568	231,568
		88	NA	NA	NA	NA
2841	Soap & Other Detergents	96	19,611	0	193,499	213,110
		95	24,801	0	325,163	349,964
		94	30,641	0	361,580	392,221
		88	NA	NA	NA	NA
2842	Polishes & Sanitation Goods	96	47,439	0	555,871	603,310
		95	49,783	0	1,047,533	1,097,316
		94	145,860	0	356,911	502,771
		88	NA	NA	NA	NA
2843	Surface Active Agents	96	639,549	0	292,963	932,512
		95	618,838	0	384,863	1,003,701
		94	673,251	0	443,719	1,116,970
		88	NA	NA	NA	NA
2844	Toilet Preparations	96	100	0	1,000	1,100
		95	5,341	0	91	5,432
		94	5,104	0	92,633	97,737
		88	NA	NA	NA	NA
2851	Paints & Allied Products	96	36,470,885	114,045	8,554,884	45,139,814
		95	38,800,995	102,481	7,759,189	46,662,665
		94	38,037,709	79,619	5,915,323	44,032,651
		88	NA	NA	NA	NA
2861	Gum & Wood Chemicals	96	0	9,900	3,631,369	3,641,269
		95	0	13,500	51,023	64,523
		94	23,000	13,500	228,925	265,425
		88	NA	NA	NA	NA
2865	Cyclic Crudes & Intermediates	96	43,447,651	11,232,987	34,054,085	88,734,723
		95	43,658,776	11,919,756	25,053,974	80,632,506
		94	47,903,702	22,630,002	27,221,973	97,755,677
		88	NA	NA	NA	NA
2869	Industrial Organic Chemicals, nec*	96	429,710,927	537,624,985	506,812,851	1,474,148,763
		95	375,107,848	497,899,802	494,409,694	1,367,417,344
		94	395,206,881	353,184,000	470,049,097	1,218,439,978
		88	NA	NA	NA	NA
2873	Nitrogenous Fertilizers	96	867,416	564,598	1,135,923	2,567,937
		95	496,264	608,174	1,152,971	2,257,409
		94	692,794	608,273	1,120,706	2,421,773
		88	NA	NA	NA	NA
2874	Phosphatic Fertilizers	96	270,473,032	0	4,282,753	274,755,785
		95	164,801,788	0	228,668,000	393,469,788
		94	150,232,388	0	264,154,500	414,386,888
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
2875	Fertilizers, Mixing Only	96	15,856	0	100	15,956
		95	24,352	0	3,806	28,158
		94	24,877	0	3,084	27,961
		88	NA	NA	NA	NA
2879	Agricultural Chemicals, nec*	96	232,709,918	312,932	20,684,378	253,707,228
		95	208,677,688	378,989	21,684,474	230,741,151
		94	206,671,578	0	18,264,876	224,936,454
		88	NA	NA	NA	NA
2891	Adhesives & Sealants	96	6,807,371	796,479	400,559	8,004,409
		95	3,593,710	529,784	451,242	4,574,736
		94	4,038,024	967,107	560,283	5,565,414
		88	NA	NA	NA	NA
2892	Explosives	96	11,890,000	0	9,680,931	21,570,931
		95	40,580,000	0	12,193,969	52,773,969
		94	22,504,730	0	7,123,725	29,628,455
		88	NA	NA	NA	NA
2893	Printing Ink	96	165,026	0	2,346,664	2,511,690
		95	205,085	0	1,955,363	2,160,448
		94	296,853	0	1,768,414	2,065,267
		88	NA	NA	NA	NA
2895	Carbon Black	96	0	7,998,571	20,142,170	28,140,741
		95	0	6,289,183	25,719,596	32,008,779
		94	0	3,023,543	19,732,590	22,756,133
		88	NA	NA	NA	NA
2899	Chemical Preparations, nec*	96	33,905,171	350,540	2,122,426	36,378,137
		95	30,913,108	205,760	1,950,013	33,068,881
		94	46,854,142	1,144,755	1,782,515	49,781,412
		88	NA	NA	NA	NA
	Multiple within SIC Code 28	96	1,460,635,513	543,737,487	1,201,453,299	3,205,826,299
		95	1,314,597,803	556,123,448	1,205,561,430	3,076,282,681
		94	1,637,112,600	462,447,566	1,009,542,321	3,109,102,487
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC 28	96	5,300	0	4,214	9,514
		95	1,923,763	0	681,425	2,605,188
		94	87,769	0	421	88,190
		88	NA	NA	NA	NA
	Total for SIC Code 28	96	2,998,270,797	1,222,975,556	2,376,129,409	6,597,375,762
		95	2,745,605,831	1,161,480,350	2,647,593,460	6,554,679,641
		94	3,162,659,917	941,022,092	2,475,723,968	6,579,405,977
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2812	Alkalies & Chlorine	96	7,935	1,588,333	28,768	250	0	1,625,286
		95	3,533	0	12,329	35,401	0	51,263
		94	0	0	13,765	0	0	13,765
		88	NA	NA	44,745	32,362	0	NA
2813	Industrial Gases	96	9,260	167,302	115,533	0	0	292,095
		95	58,137	100,000	224,603	0	0	382,740
		94	15,000	30,000	21,240	277	0	66,517
		88	NA	NA	107,808	3,332	0	NA
2816	Inorganic Pigments	96	483,443	0	75,779	10,696	0	569,918
		95	525,379	611	219,569	11,357	0	756,916
		94	419,858	1,118	286,172	11,304	0	718,452
		88	NA	NA	384,736	737,935	395,314	NA
2819	Industrial Inorganic Chemicals, nec*	96	5,704,944	298,325	7,165,638	172,880	250	13,342,037
		95	3,311,633	268,287	4,031,316	211,194	0	7,822,430
		94	3,606,542	154,379	4,329,959	137,278	0	8,228,158
		88	NA	NA	1,912,334	846,238	84,619	NA
2821	Plastics Materials & Resins	96	61,397,915	41,777,048	7,845,595	3,150,700	0	114,171,258
		95	35,194,147	35,713,502	23,067,200	4,017,043	130	97,992,022
		94	56,746,257	34,453,498	10,898,145	2,871,190	828	104,969,918
		88	NA	NA	19,260,090	4,642,893	473,610	NA
2822	Synthetic Rubber	96	8,362,060	964,314	2,390,609	100,329	0	11,817,312
		95	7,478,112	15,283,874	265,044	19,067	0	23,046,097
		94	8,144,060	1,023,619	1,977,787	20,469	0	11,165,935
		88	NA	NA	857,449	21,807	0	NA
2823	Cellulosic Manmade Fibers	96	0	0	0	85	0	85
		95	0	0	0	250	0	250
		94	0	0	0	250	0	250
		88	NA	NA	20,460	0	0	NA
2824	Organic Fibers, Noncellulosic	96	4,468,347	2,063	250	43,560	0	4,514,220
		95	4,899,058	259,379	825	45,649	0	5,204,911
		94	14,000	2,932	17,642	365	0	34,939
		88	NA	NA	65,629	68,266	0	NA
2833	Medicinals & Botanicals	96	497,460	17,478,404	2,266,869	4,985,431	0	25,228,164
		95	1,035,688	9,601,486	4,644,196	6,130,334	0	21,411,704
		94	2,033,469	9,627,810	7,164,891	6,355,570	0	25,181,740
		88	NA	NA	10,986,850	6,255,279	0	NA
2834	Pharmaceutical Preparations	96	6,915,155	45,646,574	19,180,835	3,202,517	1,926	74,947,007
		95	9,047,881	45,675,723	13,794,672	2,249,105	11,899	70,779,280
		94	11,596,555	36,739,730	12,083,437	3,281,710	590	63,702,022
		88	NA	NA	3,334,700	3,144,131	4,888,730	NA
2835	Diagnostic Substances	96	68,619	128,788	77,788	32,263	0	307,458
		95	7,496	102,781	95,609	36,165	0	242,051
		94	56,878	18,640	34,800	53,274	0	163,592
		88	NA	NA	3,766	392,764	0	NA
2836	Biological Products Exc. Diagnostic	96	3,980	51,247	4,298	58,126	0	117,651
		95	0	34,560	7,334	61,990	0	103,884
		94	13,250	3,850	2,450	26,187	0	45,737
		88	NA	NA	2,600	56,291	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2841	Soap & Other Detergents	96	209,591	14,511	45,858	171,761	0	441,721
		95	485,853	9,681	52,649	2,952,744	5	3,500,932
		94	270,787	15,845	60,847	2,580,295	0	2,927,774
		88	NA	NA	188,258	332,418	0	NA
2842	Polishes & Sanitation Goods	96	1,920	40,268	142,614	85,071	0	269,873
		95	11,454	42,744	141,695	74,230	0	270,123
		94	15,475	103,898	92,942	110,496	0	322,811
		88	NA	NA	87,977	171,340	2,622	NA
2843	Surface Active Agents	96	82,661	762,231	64,972	917,363	0	1,827,227
		95	32,143	725,814	232,719	882,345	0	1,873,021
		94	39,546	465,311	54,348	972,503	0	1,531,708
		88	NA	NA	15,156	2,072,073	205	NA
2844	Toilet Preparations	96	0	52,639	32,357	190,222	480	275,698
		95	0	32,811	21,928	115,732	0	170,471
		94	0	6,536	14,826	112,594	0	133,956
		88	NA	NA	127,963	481,239	500	NA
2851	Paints & Allied Products	96	17,091,643	32,322,008	3,387,301	805,374	760	53,607,086
		95	14,509,680	38,389,824	4,359,367	1,193,625	7,800	58,460,296
		94	17,053,252	40,380,949	5,170,412	1,406,271	2,042	64,012,926
		88	NA	NA	18,126,270	2,526,420	4,030,249	NA
2861	Gum & Wood Chemicals	96	6,075	0	3,940	22,780	0	32,795
		95	0	0	2,550	39,800	0	42,350
		94	0	0	8,000	16,549	0	24,549
		88	NA	NA	17,809	60,846	0	NA
2865	Cyclic Crudes & Intermediates	96	2,742,345	6,693,958	5,162,542	10,606,440	0	25,205,285
		95	2,974,562	7,639,986	2,923,657	10,276,169	0	23,814,374
		94	2,095,343	8,155,867	2,036,979	12,771,984	0	25,060,173
		88	NA	NA	6,470,580	19,612,919	2,470	NA
2869	Industrial Organic Chemicals, nec*	96	17,775,153	66,179,053	19,669,813	16,495,683	8,919	120,128,621
		95	19,924,884	89,123,583	22,096,691	18,547,915	0	149,693,073
		94	18,712,650	86,571,880	21,921,206	17,548,683	423,109	145,177,528
		88	NA	NA	18,857,857	26,178,527	784,684	NA
2873	Nitrogenous Fertilizers	96	767,389	0	93,000	32,677	0	893,066
		95	767,402	0	0	21,279	0	788,681
		94	1,049,401	0	85,000	26,441	0	1,160,842
		88	NA	NA	250	1,700	0	NA
2874	Phosphatic Fertilizers	96	0	0	0	30	0	30
		95	0	0	0	148	0	148
		94	0	0	0	180	0	180
		88	NA	NA	0	532	0	NA
2875	Fertilizers, Mixing Only	96	0	0	17,398	255	0	17,653
		95	1,500	0	13,322	1,005	0	15,827
		94	0	0	2,940	1,005	0	3,945
		88	NA	NA	0	0	160,000	NA
2879	Agricultural Chemicals, nec*	96	6,612,868	2,720,224	2,539,914	79,770	0	11,952,776
		95	4,066,210	3,124,010	2,228,748	74,328	760	9,494,056
		94	4,000,280	1,756,262	1,807,507	24,046	0	7,588,095
		88	NA	NA	4,270,317	287,827	86,250	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

Table 6-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
2891	Adhesives & Sealants	96	543,785	3,488,474	2,317,631	44,939	0	6,394,829
		95	526,953	3,900,457	1,615,076	37,951	0	6,080,437
		94	1,532,428	4,219,576	2,107,578	39,063	0	7,898,645
		88	NA	NA	2,250,323	146,166	471,547	NA
2892	Explosives	96	840	0	10,063	0	0	10,903
		95	85,302	0	148,794	0	0	234,096
		94	304,497	0	337,025	750	0	642,272
		88	NA	NA	321,360	314	14,106	NA
2893	Printing Ink	96	1,315,638	1,021,091	286,766	69,374	0	2,692,869
		95	966,085	738,655	457,780	2,764	5	2,165,289
		94	1,292,278	702,116	332,730	5,762	0	2,332,886
		88	NA	NA	524,990	24,146	33,785	NA
2895	Carbon Black	96	0	0	20	20	0	40
		95	0	1,000	0	20	0	1,020
		94	0	1,000	0	20	0	1,020
		88	NA	NA	8,000	0	0	NA
2899	Chemical Preparations, nec*	96	476,638	1,569,505	1,873,179	1,278,401	0	5,197,723
		95	533,449	2,917,506	1,866,327	438,064	250	5,755,596
		94	624,023	3,316,665	1,670,225	409,409	0	6,020,322
		88	NA	NA	2,274,681	3,414,917	26,719	NA
	Multiple within SIC Code 28	96	102,323,472	128,357,427	52,470,497	23,580,875	413	306,732,684
		95	112,817,910	131,569,754	59,024,249	27,089,789	96,830	330,598,532
		94	114,044,900	124,134,343	57,812,379	29,383,542	0	325,375,164
		88	NA	NA	79,020,590	58,064,209	5,060,175	NA
	Invalid SIC Code within SIC 28	96	500,000	32,242	12,660	1,720	0	546,622
		95	698,708	164,367	136,905	6,983	0	1,006,963
		94	298,600	119,701	21,826	5,093	0	445,220
		88	NA	NA	2,802,302	2,046,629	1,849	NA
	Total for SIC Code 28	96	238,369,136	351,356,029	127,282,487	66,139,592	12,748	783,159,992
		95	219,963,159	385,420,395	141,685,154	74,572,446	117,679	821,758,833
		94	243,979,329	352,005,525	130,367,058	78,172,560	426,569	804,951,041
		88	NA	NA	172,345,850	131,623,520	16,517,434	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Forms with more than one-4-digit SIC code within SIC code 28 are assigned to the "multiple" category.
***nec:** not elsewhere classified.

36.8 million pounds treated). Multiple-code forms reported a 191.9-million-pound increase in on-site treatment and an 81.3-million-pound increase in energy recovery, partly offset by a reduction of 176.5 million pounds in recycling. Table 6-15 supplies on-site waste management data for all industries in SIC code 28.

Transfers Off-site for Further Waste Management

As shown in Table 6-16, the chemical manufacturing industries with the largest reductions since 1994 in transfers off-site for further waste management were miscellaneous industrial organics (SIC code 2869)—25.0 million pounds, or 17.3% decrease—and multiple codes—18.6 million pounds, or 5.7%. (Data for some types of transfers were not collected in 1988.) One other industry in

this sector reported more than 10 million pounds in reductions for the three-year period: paints and varnishes (SIC code 2851) had a decrease of 10.4 million pounds, or 16.3%. Pharmaceutical preparations (SIC code 2834) reported the largest increase from 1994 to 1996 in transfers off-site for further waste management. This was an increase of 11.2 million pounds or 17.7%. The second largest increase was reported in plastics materials and resins (SIC code 2821), 9.2 million pounds, or 8.8%.

Data on off-site transfers for all four-digit SIC codes in chemical manufacturing appear in Table 6-16.

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

Huntsman Petrochemical Corporation in Port Arthur, Texas (multiple SIC codes 2819, 2865, and 2869), ranked first for increases in total on- and off-site releases from 1988 to 1996, with a net increase of 8.3 million pounds. Point source air releases of propylene increased from 3,700 pounds in 1988 to 7.9 million pounds in 1996, and this accounted for 95.5% of the total increase at the facility for all chemicals. The Huntsman facility, purchased from Texaco in 1996, manufactures ethylene and propylene to sell as chemical feedstock. A large cooling tower containing propylene developed a leak in mid-1995, resulting in the increase in emissions. The leak was repaired in 1997.

FMC Corporation in Pocatello, Idaho (SIC code 2819), had the second largest increase in releases, 4.3 million pounds. As a result of coming into compliance with an EPA enforcement action and modifying its methods for estimating land releases, FMC Corporation's numbers increased dramatically (from 203,040 pounds for on-site land releases in 1988 to 4.1 million pounds in 1996). FMC Corporation now plans to modify its 1988 submission for the amount of zinc compounds released to land to reflect an estimation technique similar to that used in the 1996 submission. The revised 1988 releases to land will total over 3.9 million pounds. Consequently, the increase in releases to land between 1988 and 1996 will drop from 3.9 million pounds to 21,000 pounds.

Monsanto Company in Luling, Louisiana (multiple SIC codes 2865, 2873, 2879 in 1988 and multiple SIC codes 2819, 2834, 2869, 2873, 2879 in 1996), ranked third with a 4.1-million-pound increase in releases. This was almost entirely due to an increase in the amount of formaldehyde injected to underground wells as a result of production increases over this period. (Because of the changes to the definition for reporting ammonia to TRI, releases of the chemical are not included in the 1988-to-1996 comparison. However, during this period, the TRI data reflect a reduction in ammonia emissions to air of 4.1 million pounds by the facility.) The Monsanto facility dropped one SIC code (2865) and added three others (2819, 2834, and 2869) between 1988 and 1996. Monsanto attributes this to a change in products manufactured at the facility.

The top two facilities for decreases in releases from 1988 to 1996 were IMC-Agrico plants. Both manufacture phosphoric acid for use in production of phosphate fertilizers. Large quantities of gypsum are generated as by-product in the process. When rainwater comes in contact with the gypsum, stockpiled in uncovered outdoor stacks, it flushes out residual phosphoric acid. This phosphoric acid is reported as discharges to water. Significant reductions in the amount of phosphoric acid reported to TRI have resulted from reducing the surface area of some stacks and from covering the stacks with grass-covered clay. Additionally, evaporation ponds built on top of inactive stacks were lined with a synthetic material, preventing some water from entering the stacks. A system was also implemented to collect water from within the stacks and recycle the phosphoric acid contained within. IMC-Agrico Company in Uncle Sam, Louisiana (51.0-million-pound overall reduction; multiple SIC codes 2819 and 2874 in 1988 and SIC code 2874 in 1996), reported a 51.2-million-pound

reduction in the discharge of phosphoric acid to water between 1988 and 1996. IMC-Agrico Company in Saint James, Louisiana (37.3-million-pound overall reduction; multiple codes 2873 and 2874 in 1988 and 2819, 2873, and 2874 in 1996), reported a 37.6 million-pound reduction in discharges to water.

Other Apparent Increases and Decreases in Releases, 1988-1996

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

Angus Chemical Company, Sterlington, Louisiana, increase of 6.0 million pounds, EPA error in TRI database.

Hoechst-Celanese Polyester, Wilmington, North Carolina, decrease of 25.1 million pounds, reporting error.

Avtex Fibers Front Royal, Inc., Front Royal, Virginia, decrease of 37.7 million pounds, closed in 1989.

1991-1996 Waste Management Data for Chemical Manufacturing

Table 6-17 summarizes on- and off-site waste management data for the chemical manufacturing sector for 1991 and 1994-1996; these data were first collected in 1991. Total production-related waste increased 4.7%, from 7.59 billion pounds to 7.94 billion pounds over the six years, for the 1991-1996 “core” chemicals. For the more recent years (1994-1996), production-related waste has decreased, from 7.96 billion in 1994 to 7.94 billion in 1996.

Figure 6-13 shows the percentage changes for on- and off-site waste management types. The largest component of the 1991-1996 change was an increase in on-site recycling of 365.3 million pounds, a 13.8% increase. The two other methods of on-site waste management also increased: energy recovery by 210.1 million pounds (20.3% increase) and treatment by 61.7 million pounds (2.7% increase). This meant an overall increase of 637.1 million pounds in on-site waste management (10.6% increase).

Smaller increases were reported in off-site recycling (7.4 million pounds, a 3.2% increase) and off-site energy recovery (34.9 million pounds, a 10.8% increase). Off-site treatment, however, decreased 60.5 million pounds, a 24.0% reduction. Thus, off-site waste management showed a net decrease from 1991 to 1996 of 18.3 million pounds, or 2.3%.

The quantity released on- and off-site decreased by 263.0 million pounds in reporting by the chemical manufacturing sector. This was a reduction of one-third (33.6%). Non-production-related waste decreased 6.5 million pounds, or 42.8%, for the period.

Overall, increases in production-related waste over this period have been driven by increases in on-site waste management methods, especially recycling and energy recovery. At the same time, the quantities reported as released on- and off-site have decreased. These changes suggest improvements in managing TRI chemicals in waste in accordance with the waste management hierarchy, explained in Chapter 2. Some facilities with large increases, however, attribute those increases, at least in part, to increasing production or to new production (from operations brought on line during this period). Projected waste management data in the chemical manufacturing sector indicate that this movement up the waste management hierarchy is expected to continue (see Table 6-10).

Table 6-17. TRI Waste Management Data, 1991, 1994-1996: Chemical Manufacturing, SIC Code 28

Waste Management Activity	1991	1994	1995	1996
	Pounds	Pounds	Pounds	Pounds
On-site Waste Management				
Recycled On-site	2,637,884,279	3,171,240,288	2,752,600,663	3,003,186,108
Energy Recovery On-site	1,032,619,127	949,676,347	1,173,017,653	1,242,694,636
Treated On-site	2,324,438,700	2,483,582,506	2,657,033,238	2,386,119,008
Total On-site Waste Management	5,994,942,106	6,604,499,141	6,582,651,554	6,631,999,752
Off-site Waste Management				
Recycled Off-site	235,099,698	250,059,982	230,078,692	242,512,053
Energy Recovery Off-site	323,954,599	355,348,505	373,574,617	358,824,204
Treated Off-site	252,241,377	202,571,473	209,926,880	191,698,876
Total Off-site Waste Management	811,295,674	807,979,960	813,580,189	793,035,133
Quantity Released On- and Off-site	782,416,918	548,296,305	549,073,467	519,411,122
Total Production-related Waste	7,588,654,698	7,960,775,406	7,945,305,210	7,944,446,007
Non- Production-related Waste	15,130,942	6,419,535	6,757,987	8,655,298

Waste Management Activity	Change 1994-1995	Change 1995-1996	Change 1991-1996
	Percent	Percent	Percent
On-site Waste Management			
Recycled On-site	-13.2	9.1	13.8
Energy Recovery On-site	23.5	5.9	20.3
Treated On-site	7.0	-10.2	2.7
Total On-site Waste Management	-0.3	0.7	10.6
Off-site Waste Management			
Recycled Off-site	-8.0	5.4	3.2
Energy Recovery Off-site	5.1	-3.9	10.8
Treated Off-site	3.6	-8.7	-24.0
Total Off-site Waste Management	0.7	-2.5	-2.3
Quantity Released On- and Off-site	0.1	-5.4	-33.6
Total Production-related Waste	-0.2	-0.0	4.7
Non- Production-related Waste	5.3	28.1	-42.8

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

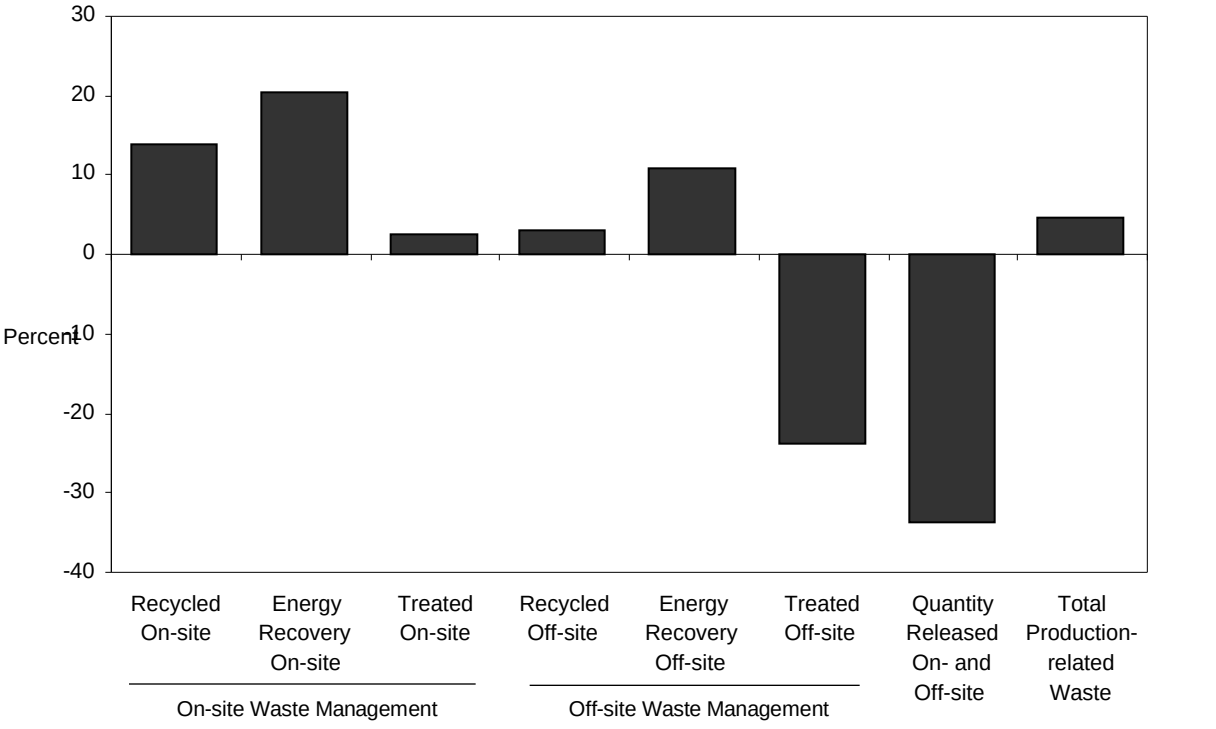


Figure 6-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Chemical Manufacturing (SIC Code 28)

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

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

Four of the five top facilities showing increases in production-related waste reported their largest increases in on-site recycling. Novartis Crop Protection, Inc. in St. Gabriel, Louisiana (multiple codes 2819, 2869, and 2879 in 1988 and 2819, 2865, 2869, and 2879 in 1996) ranked first in increases of production-related waste between 1991 and 1996, with a net increase of 459.0 million pounds. This is largely due to an increase in on-site recycling of toluene. Toluene is used in several processes at the facility as a solvent. In one case, it is used to transport a chemical intermediate from one production unit to another. It is then separated from the intermediate and returned to the first production operation for reuse. Beginning in 1993, the toluene reused between the two sequential processes was reported as on-site recycling. Consequently, reported amounts of toluene recycled on-site increased by 458.3 million pounds between comparison years. Novartis noted that the increase in reporting does not indicate a change in the amount of toluene used.[3]

Four of the top five facilities cited production increases (including new facilities) to explain all or part of their increases in waste management quantities from 1991 to 1996. The number-two-ranked facility for increases, Zeneca, Inc., in Pasadena, Texas (181.4-million-pound increase; SIC code 2879), reported a 181.5 million pound

[3] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in facility interpretations do not represent a change in guidance by EPA on how to report recycling.

increase in glycol ethers recycled on-site. Reasons for this change included a mistake in calculating the 1991 value and a production increase that affected the amount of the chemical used in process (it is used as a solvent). Formosa Plastics Corporation in Point Comfort, Texas (multiple SIC codes 2821 and 2869), reported no on-site recycling of propylene in 1991 and 57.7 million pounds in 1996, contributing to the facility's number three ranking (102.1-million-pound overall increase). The plant, which uses propylene as feedstock for the production of polypropylene resin, began operation in 1994, and thus there were no data for this facility in comparison year 1991.

The facility with the fourth largest increase in total production-related waste (98.4 million pounds) was Texaco Chemical, Inc., Port Neches, Texas (no code reported in 1991 and SIC code 2869 in 1996). Huntsman Petrochemical Corporation purchased the facility, built by Texaco between 1992 and 1994, in 1994; however, the facility reported to TRI under the facility name, Texaco Chemical, for the 1995 and 1996 reporting years. Methyl tertiary-butyl ether (MTBE) is produced at the plant and is sold as a gasoline additive. MTBE raises both the octane and the oxygen content of automobile gasoline. The use of oxygenated gasoline results in reduced amounts of carbon monoxide in exhaust. Tert-butyl alcohol, a feedstock for MTBE production, had a reported increase of 22.0 million pounds to on-site energy recovery. Propylene, used in the manufacture of propylene oxide, had an increase of 25.0 million pounds in on-site energy recovery. The propylene oxide product is used in the manufacture of polyurethane. Unrecoverable propylene and tert-butyl alcohol remain after the production processes and are burned in boilers or industrial furnaces (BIFs) as fuel. The facility did not report to TRI prior to reporting year 1995, and consequently, there are no data for comparison year 1991.

Fifth-ranked Hoechst-Celanese Polyester in Wilmington, North Carolina (SIC code 2869), reported an increase of 93.3 million pounds of methanol recycled on-site. The overall methanol increase, 92.9% of the facility's total increase of 98.3 million pounds, was due to growth in production and inclusion of a product that had not previously been considered in TRI reporting.

All of the top four facilities showing decreases in production-related waste reported large reductions in on-site recycling. Lubrizol Corporation, Pasadena, Texas (SIC code 2869) reported a 143.0 million pound decrease in acrylonitrile recycling on-site (and an overall reduction of 217.1 million pounds in production-related waste). The decrease was due to a change in the facility's interpretation of on-site recycling. Acrylonitrile is used as a "carrier fluid" in one process at the plant. It is recovered and reused within that process (at no point in the process is it removed). This does not meet the Lubrizol facility's current interpretation of the definition of on-site recycling, which is that on-site recycling is constituted by removing a chemical from a main production process and then returning it. Because the acrylonitrile is part of a closed loop process, Lubrizol does not interpret the activity as on-site recycling. The facility uses acrylonitrile as a feedstock for production of a monomer that is a precursor in acrylic fiber manufacturing.[4]

Ranking second, Tennessee Eastman in Kingsport, Tennessee (multiple codes 2821, 2823, 2865, and 2869 in 1991 and multiple codes 2821, 2823, 2865, 2869, and 2893 in 1996), had a 174.0-million-pound reduction of methanol (and a 200.2-million-pound reduction overall), in on-site recycling. Carolina Eastman in Eastman Columbia, South Carolina (multiple codes 2821 and 2865), ranked third due to a 122.0-million-pound decrease in the amount of methanol reported as recycled on-site. Its overall reduction was 123.9 million pounds.

The fourth-ranked facility showing decreases in production-related waste (overall reduction of 103.7 million pounds), PCS Phosphate Company,

[4] There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

Inc., Aurora, North Carolina (SIC code 2874), reported an increase of 110.6 million pounds of phosphoric acid recycled on-site. This facility also reported a 208.3-million-pound decrease in phosphoric acid treated on-site. The net decrease for phosphoric acid was 103.8 million pounds. PCS Phosphate treats its gypsum by-product to remove and neutralize the residual phosphoric acid. The facility has also improved techniques to recover rainwater runoff from the gypsum stacks.

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

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

Shintech, Inc., Freeport, Texas, decrease of 152.7 million pounds, reporting error.

Facilities Contacted for Explanations (alphabetical by facility):

Angus Chemical Company, Sterlington, Louisiana: Chet Chiles, March 18, 1998 (explanation provided)

Carolina Eastman, Eastman Columbia, South Carolina (no explanation provided)

FMC Corporation, Pocatello, Idaho: Kelly Packard and Jim Rice, March 18 and 19, 1998 (explanation provided)

Formosa Plastics Corporation, Point Comfort, Texas: Jim Shephard, April 17, 1998 (explanation provided)

Hoechst-Celanese Polyester, Wilmington, North Carolina: Larry Joh, March 16, 1998, and Karen Harbaugh, March 17, 1998 (explanation provided)

Huntsman Petrochemical Corporation, Port Arthur, Texas: Bill Forbes, March 18, 1998 (explanation provided)

IMC-Agrico Company, Saint James, Louisiana: Samuel Reed, March 16, 1998 (explanation provided)

IMC-Agrico Company, Uncle Sam, Louisiana: John Wen, March 16, 1998 (explanation provided)

Lubrizol Corporation, Pasadena, Texas: Bill Henry, March 20, 1998 (explanation provided)

Monsanto Company, Luling, Louisiana: Bill Rhodes, March 18 and April 9, 1998 (explanation provided)

Novartis Crop Protection, Inc., St. Gabriel, Louisiana: Kim Pagel, March 16 and 20, 1998 (explanation provided)

PCS Phosphate, Aurora, North Carolina: Leon Montgomery, March 16, 1998 (explanation provided)

Texaco Chemical, Inc., Port Neches, Texas: Bill Forbes (Huntsman Petrochemical Corporation), March 17 and 20, 1998 (explanation provided)

Tennessee Eastman, Kingsport, Tennessee (no explanation provided)

Zeneca, Inc., Pasadena, Texas: Jeanetta Daly, March 16, 1998 (explanation provided)

Sources

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

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

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

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U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Organic Chemical Industry*, Sector Notebook Project, EPA/310-R-95-012, September 1995; *Profile of the Pharmaceutical Manufacturing Industry*, EPA/310-R-97-005, September 1997; *Profile of the Plastic Resin and Manmade Fiber Industries*, EPA/310/R-97/008, September 1997 <http://es.epa.gov/oeca/sector/index.html>: industry processes and technologies, pollutant sources, and selected economic data.

In Chapter 6 of the first volume of the *1996 Toxics Release Inventory Public Data Release* (published May 1998), the table that presented data from TRI forms reporting more than one SIC code in SIC code 28 in 1996 (Table 6-2 on pages 214-215) contained incorrect data. The total row in Table 6-2 was correct, but the detailed data were not. This errata sheet presents the correct data, on the following pages.

The text on "Multiple Codes within SIC Code 28," on pages 215-216 reflected the incorrect data. The revised text follows on this page.

Multiple Codes within SIC Code 28

Table 6-2 further examines reporting of multiple SIC codes within SIC code 28. The combination filing the largest number of forms was plastics materials and resins (SIC code 2821) with miscellaneous industrial organics (SIC code 2869). This combination submitted 810 forms and, within the multiple-codes category, accounted for the largest amount of on- and off-site releases (38.3 million pounds), transfers off-site for further waste management (44.4 milllion pounds), and production-related waste (536.0 million pounds). This combination also reported the second-largest amount of other on-site waste management (453.1 million pounds) among the multiple-codes groups in SIC code 28.

A combination of four SIC codes—miscellaneous industrial inorganic chemicals (SIC code 2819), cyclic crudes and intermediates (SIC code 2865), miscellaneous industrial organic chemicals (SIC code 2869), and micellaneous agricultural chemicals (SIC code 2879)—reported the largest other on-site waste management (481.1 million pounds).

Miscellaneous industrial organics (SIC code 2869) appeared in 97 of the 226 multiple-codes combinations.

Table 6-2. Multiple SIC Codes, 1996: Chemical Manufacturing, SIC Code 28

SIC Codes						Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2812	2813					13	0	9,080	29,430	38,510	50,000	10	89,089	369
2812	2813	2819				9	0	8,228	7,081	15,309	0	750	15,632	0
2812	2813	2819	2821	2869	2891	98	0	4,804,668	0	4,804,668	278,523,023	52,179	283,346,000	66,960
2812	2813	2842				3	0	49	0	49	0	0	39	0
2812	2813	2869				24	0	931,819	0	931,819	1,900,433	26,809	2,804,706	63,294
2812	2816	2869				38	0	554,674	110,781	665,455	158,779,000	1,391,845	160,828,297	7,823
2812	2819					49	10	40,027	1,096	41,123	37,884,829	99,265	38,025,989	580
2812	2819	2821	2865	2869		32	0	543,281	0	543,281	176,384,133	58,767	176,996,054	0
2812	2819	2841				11	0	2,408	0	2,408	0	8,375	10,783	0
2812	2819	2841	2851	2879	2891	4	0	20	0	20	4,300	0	4,300	0
2812	2819	2860	2899			5	0	49,728	0	49,728	2,442,719	52,764	2,545,212	0
2812	2819	2865				12	0	246,166	191	246,357	12,291,965	88,146	12,626,293	0
2812	2819	2865	2869			20	0	96,873	3,172	100,045	11,124,156	36,008	11,254,666	5,182
2812	2819	2869				23	19	409	0	409	224,237	291	224,937	2
2812	2819	2869	2899			6	3	468	0	468	153	2	625	0
2812	2819	2873				4	0	6,139,460	0	6,139,460	4,513,448	0	10,652,908	0
2812	2819	2879				3	0	1,291	2,453	3,744	8,005,992	0	8,009,725	0
2812	2821	2869				128	0	3,067,801	4,530	3,072,331	182,354,827	15,875,559	201,251,887	6,831
2812	2841	2842				3	1	260	0	260	136	0	151	0
2812	2869					54	2	938,484	176,479	1,114,963	9,148,090	971,066	11,203,363	430
2813	2819					3	0	3,823	0	3,823	23,175	0	26,764	0
2813	2819	2842	2869			8	0	334,259	24	334,283	3,356,165	913,029	4,603,477	0
2813	2819	2865	2869	2899		17	0	44,233	4,864	49,097	5,797,211	260,932	6,168,699	0
2813	2819	2869	2873	2899		13	4	7,674,410	255	7,674,665	0	21,024	7,695,665	0
2813	2821	2869	2873			22	0	2,336,185	53,021	2,389,206	56,480,918	132,267	58,975,393	0
2813	2834					3	0	0	0	0	0	255,168	255,168	0
2813	2869					4	0	1,750	0	1,750	0	750	3,760	0
2816	2819					40	1	12,139,461	228,100	12,367,561	234,975,900	574,538	247,905,269	0
2816	2821	2899				30	0	198,243	0	198,243	11,234,132	3,429,623	14,819,913	5,806
2816	2851					18	1	12,792	35,198	47,990	76,002	160,002	285,375	0
2816	2865					8	1	3,794	24,042	27,836	0	236,207	134,757	0
2816	2869					73	8	9,385,695	44,955	9,430,650	10,037,043	6,242,205	25,736,736	907
2816	2869	2899				1	1	0	0	0	0	0	0	0
2816	2879					2	0	4,850	0	4,850	0	500	5,550	0
2816	2899					9	0	4,848	158,610	163,458	0	61,294	223,680	0
2819	2821	2834	2869	2879		74	0	1,523,414	0	1,523,414	28,592,079	25,650	30,141,144	0
2819	2821	2843	2865	2899		18	3	83,345	30	83,375	168,689	61,040	313,070	0
2819	2821	2869				25	2	2,407,234	18,161	2,425,395	9,372,165	532,344	12,324,145	24,739
2819	2821	2869	2873			20	0	29,017	38	29,055	19,749,882	682,475	20,459,808	1,604
2819	2821	2869	2891			16	0	12,406	0	12,406	0	4,661,161	4,673,567	0
2819	2823					4	0	28,182,560	0	28,182,560	10,794,000	0	39,277,200	0
2819	2833	2869				23	0	308,739	47,190	355,929	3,928,000	6,253,410	10,557,233	8,403
2819	2833	2899				7	0	45,460	0	45,460	150,827	134,132	330,419	0
2819	2834					5	2	510	11,300	11,810	9,489,048	0	9,500,548	0
2819	2834	2869	2873	2879		15	0	7,742,540	5,900	7,748,440	24,605,180	345,330	32,777,071	0
2819	2841					8	1	10,836	0	10,836	0	63,068	73,000	0
2819	2841	2843				16	0	98,467	0	98,467	43,437	107,748	229,967	19,277
2819	2841	2869	2879			22	0	7,718,029	0	7,718,029	20,240,213	0	27,933,831	0
2819	2841	2869	2899			10	10	0	0	0	0	0	0	0
2819	2841	2899				2	1	50	0	50	0	0	50	0
2819	2842					4	0	270	0	270	150	260	421	0
2819	2842	2844				1	1	0	0	0	0	0	0	0
2819	2842	2869				19	13	3,220	0	3,220	241,720	241,918	485,807	20
2819	2843					2	1	1	0	1	0	815	1,035	0
2819	2843	2869				4	0	2,260	0	2,260	951,850	4,650	958,890	0
2819	2843	2869	2899			71	10	959,449	168,943	1,128,392	47,047,483	605,057	48,671,314	17,279
2819	2843	2899				5	4	34	0	34	0	660	694	0
2819	2851					4	1	1,250	0	1,250	0	1,500	0	0
2819	2851	2869				14	0	88,193	0	88,193	9,791,000	1,570,800	11,448,490	59
2819	2865					8	0	138,476	0	138,476	7,054,442	90,143	7,275,055	8,007
2819	2865	2869				176	4	24,103,630	122,780	24,226,410	173,812,294	10,195,032	213,924,863	16,081
2819	2865	2869	2873			19	0	420,200	50,453	470,653	22,453,103	640,478	23,564,228	0
2819	2865	2869	2879			29	0	1,488,589	235,938	1,724,527	481,136,989	845	482,870,734	0
2819	2869					532	63	34,200,240	628,915	34,829,155	198,123,148	27,425,671	260,235,915	3,421
2819	2869	2873				27	0	3,801,644	167,233	3,968,877	11,589,286	2,469,135	18,026,759	0

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

Table 6-2. Multiple SIC Codes, 1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Codes						Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2819	2869	2879				54	9	2,770,796	25,918	2,796,714	47,692,925	1,837,130	52,282,605	36,000
2819	2869	2879	2899			27	0	61,855	5,200	67,055	1,838,865	85,278	1,991,298	0
2819	2869	2899				30	11	42,012	765	42,777	0	69,331	211,094	812
2819	2873					30	1	6,176,874	7,700	6,184,574	8,467,600	0	14,588,952	11
2819	2873	2874				28	0	36,185,857	1,155	36,187,012	4,353,952	73,839	40,613,266	18,697
2819	2873	2892				6	0	979,477	0	979,477	1,260,000	129,914	2,381,802	870
2819	2874					13	0	8,605,852	0	8,605,852	9,827,497	0	18,441,588	2,955
2819	2879					39	5	316,236	774,453	1,090,689	8,240,101	2,734,615	12,441,494	7,245
2819	2879	2899				22	18	20,645	0	20,645	135,360	30,099	186,126	0
2819	2892					1	1	0	0	0	0	0	0	0
2819	2899					44	2	140,660	4,382	145,042	11,076,731	355,312	11,593,224	2,817
2821	2819	2869				26	0	708,633	31	708,664	53,246,550	383,802	54,328,036	894
2821	2822					34	3	345,900	27,484	373,384	7,368,676	333,503	8,069,808	544
2821	2822	2869				27	8	1,490,425	408	1,490,833	7,093,576	156,272	8,740,173	7,941
2821	2822	2891				6	0	24,706	11,164	35,870	422,830	43,450	501,610	50
2821	2823	2824	2869			22	0	831,683	3,987	835,670	3,567,436	39,890	4,442,633	0
2821	2823	2865	2869	2893		72	0	5,606,314	38,000	5,644,314	40,998,221	2,632,338	49,233,777	0
2821	2823	2869				9	0	566,059	0	566,059	726,000	4,201	1,297,219	0
2821	2824					105	6	5,885,291	822,125	6,707,416	173,982,221	32,465,278	210,367,879	3,070,329
2821	2824	2865				21	0	2,806,970	42,344	2,849,314	2,902,265	5,763,959	11,515,548	0
2821	2824	2865	2869			23	0	22,368,147	4,781	22,372,928	15,291,427	110,000	37,748,197	2,580
2821	2824	2869				26	0	2,246,680	25,961	2,272,641	50,785,333	135,814	53,198,788	0
2821	2833	2843	2899			22	0	437,980	0	437,980	32,481,054	592,790	33,497,625	18,500
2821	2834	2869				25	0	2,142,512	750	2,143,262	113,830,700	85,984	116,032,039	0
2821	2841					6	3	1,388	0	1,388	1,057	946	3,391	0
2821	2841	2842	2843	2844	2865	22	7	747,427	84	747,511	15,697,346	1,863,776	18,308,301	0
2821	2841	2843	2869	2893	2899	16	9	2,206	0	2,206	2,948	27,085	31,958	0
2821	2841	2869				1	0	0	0	0	0	0	0	0
2821	2841	2891				3	0	500	500	1,000	0	10	977	0
2821	2842					9	0	4,255	40	4,295	0	6,833	7,915	0
2821	2842	2843	2869			3	0	918	0	918	0	126,511	127,429	0
2821	2842	2869				4	0	5,219	0	5,219	213,327	0	220,872	0
2821	2843					4	0	2,265	76,100	78,365	0	64,250	140,850	0
2821	2843	2851	2869			11	5	5,405	0	5,405	7,069	505	11,969	0
2821	2843	2865	2869			67	0	3,998,160	395,812	4,393,972	42,021,791	4,995,864	51,982,731	20,400
2821	2843	2869				20	0	53,526	11,628	65,154	62,626	210,597	338,003	261
2821	2843	2869	2891	2893	2899	9	0	1,584	76,620	78,204	0	188,498	266,702	24
2821	2843	2869	2899			11	0	2,380	500	2,880	14,011	5,500	19,968	0
2821	2843	2879				10	3	4,109	0	4,109	0	250	1,300	0
2821	2851					390	27	2,194,685	78,545	2,273,230	10,750,026	38,807,073	51,885,304	8
2821	2851	2865				3	0	0	69	69	0	63,539	63,608	0
2821	2851	2891				42	7	163,383	16,965	180,348	1,252,089	735,159	2,166,978	0
2821	2851	2891	2893			6	6	0	0	0	0	0	0	0
2821	2861	2869				24	5	189,595	14,237	203,832	1,192,093	21,536	1,417,006	74
2821	2861	2869	2899			8	0	772,291	0	772,291	88,228	24,000	884,519	0
2821	2861	2899				4	1	2,668	234	2,902	0	630	3,787	0
2821	2865					48	4	1,991,421	115,694	2,107,115	10,259,924	535,204	12,885,743	14,902
2821	2865	2869	2873			14	0	78,480	0	78,480	9,258,700	18,808,620	29,599,430	3,425
2821	2865	2869	2879			72	10	1,089,647	45,100	1,134,747	20,566,056	7,040,622	28,733,118	2,186
2821	2865	2893				5	0	32,768	735	33,503	0	810,341	843,843	0
2821	2869					810	43	37,620,974	653,918	38,274,892	453,103,109	44,431,173	535,972,285	736,393
2821	2869	2879				105	0	1,325,775	37,088	1,362,863	22,633,767	4,103,992	28,094,997	1,550
2821	2869	2891				12	4	33,684	260	33,944	1,498,505	24,348	1,555,691	29
2821	2869	2895				25	5	1,398,491	122,434	1,520,925	17,939,980	372,383	19,833,907	0
2821	2869	2899				35	0	591,959	1,444	593,403	1,535,760	10,706,372	12,853,044	2,595
2821	2876	2879				1	0	5,747	0	5,747	0	0	5,747	0
2821	2879					13	0	485	70,355	70,840	0	5,985	150,914	0
2821	2879	2891				27	0	33,743	0	33,743	0	349,052	382,795	0
2821	2891					81	13	227,001	3,436	230,437	1,125,237	719,567	2,074,911	200
2821	2891	2899				19	0	30,303	63,419	93,722	60,978	147,593	185,362	126,449
2821	2899					34	10	13,231	250	13,481	543,854	125,320	720,765	0
2822	2865					5	0	369,180	0	369,180	36,380	417,475	823,035	1,345
2822	2865	2869				43	0	1,598,012	23,439	1,621,451	22,367,307	5,559,501	29,538,695	0
2822	2865	2869	2873			24	0	10,880,836	28,422	10,909,258	33,859,263	598,442	45,366,488	476
2822	2869	2879				30	0	2,936,127	4,220	2,940,347	0	3,232,828	6,109,173	66,510

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

Table 6-2. Multiple SIC Codes, 1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Codes						Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
2822	2891					1	0	221	0	221	0	0	221	0
2823	2834					1	0	21,549	84	21,633	118,504	100	140,242	0
2824	2869					30	0	1,025,788	16,970	1,042,758	10,067,121	127,677	11,238,251	0
2831	2833	2834				3	0	24,700	0	24,700	21,615	29,800	75,955	10
2833	2834					102	1	1,827,418	4,873	1,832,291	38,110,524	6,696,941	46,735,021	4,407
2833	2834	2836				18	1	105,988	0	105,988	3,712,500	2,786,270	6,594,400	20
2833	2834	2836	2879			22	0	285,478	0	285,478	10,186,400	4,907,245	15,378,651	0
2833	2834	2841	2899			2	0	6,200	0	6,200	0	177,728	183,928	0
2833	2834	2865	2869	2873		9	2	104,762	0	104,762	514,887	230,865	850,713	0
2833	2834	2869				5	0	7,050	0	7,050	300,530	889,678	1,198,250	0
2833	2865					30	8	831,809	205,535	1,037,344	1,743,288	1,313,845	4,017,389	0
2833	2869					10	0	578,113	256,117	834,230	842,000	6,152,358	7,603,351	0
2833	2869	2879				16	0	329,936	13,300	343,236	3,210,760	2,269,187	5,823,180	5
2833	2879					47	0	1,323,404	365,017	1,688,421	24,185,160	8,675,478	34,563,099	18,920
2833	2899					26	0	884,745	48,050	932,795	4,131,150	4,496,933	9,504,033	400
2834	2833	2869	2879			8	0	24,621	0	24,621	1,084,284	9,219	1,118,124	0
2834	2835	2836				1	0	4	0	4	0	35,000	35,435	0
2834	2836					7	2	2,637	0	2,637	0	354,127	356,657	0
2834	2836	2879				3	1	0	1	1	622	3,397	4,020	0
2834	2841	2843	2869	2879	2899	7	0	3,395	93,484	96,879	112,690	178,721	388,290	0
2834	2842	2843				3	3	0	0	0	0	0	0	0
2834	2843					3	0	181	0	181	0	4,910	9,984	0
2834	2844					4	1	592	0	592	0	13,733	15,364	0
2834	2865	2869				16	0	212,120	0	212,120	3,276,033	1,737,561	5,248,359	0
2834	2865	2869	2899			5	0	8,110	0	8,110	0	161,320	170,330	0
2834	2869					38	0	1,292,552	250	1,292,802	6,768,200	1,224,703	9,202,756	125
2834	2879					32	2	1,206,730	25,758	1,232,488	14,638,170	535,815	16,406,101	0
2834	2892					3	0	3,988	0	3,988	22,400	4,656	30,956	0
2834	2899					2	0	1,292	0	1,292	117	200	25,431	0
2840	2842					8	4	2,039	0	2,039	10,533	30,655	43,347	0
2841	2842					135	51	33,734	1,000	34,734	264,003	284,998	581,640	125
2841	2842	2843				12	0	16,933	0	16,933	11,585	40,381	77,723	0
2841	2842	2843	2844			22	9	8,455	0	8,455	14,585	73,390	96,430	0
2841	2842	2844	2899			3	0	0	0	0	0	0	0	0
2841	2842	2899				18	13	15	6,387	6,402	25,700	4,179	34,441	0
2841	2843					20	5	2,262	0	2,262	1,742	20,020	20,294	0
2841	2843	2861				1	0	155	0	155	0	0	155	0
2841	2843	2869				9	4	18,609	0	18,609	1,858	78,551	99,015	3
2841	2843	2869	2899			11	0	359,610	15,205	374,815	273,400	324,001	998,175	575
2841	2843	2899				11	2	18,941	0	18,941	2,366,613	22,468	2,406,191	2,300
2841	2844					3	0	2,949	0	2,949	3	0	15,101	0
2841	2851					3	0	11,600	0	11,600	105,000	750	116,600	0
2841	2851	2869	2891			20	11	5,543	0	5,543	0	49,604	52,333	0
2841	2869					8	0	0	0	0	0	61,809	34,700	0
2841	2869	2899				3	0	28,600	0	28,600	0	403,500	432,221	0
2841	2891					1	0	0	250	250	0	5	15	0
2841	2899					26	7	13,804	755	14,559	54,931	6,977	75,031	0
2842	2844					4	0	33	0	33	21,994	124,646	146,673	0
2842	2851					4	2	10,285	0	10,285	1,800	4,105	14,700	4

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

Table 6-2. Multiple SIC Codes, 1996: Chemical Manufacturing, SIC Code 28, Continued

SIC Codes				Total Forms	Form As	Total On-site Releases	Total Off-site Releases	Total On- and Off-site Releases	Total Other On-site Waste Management	Total Transfers Off-site for Further Waste Management	Total Production-related Waste	Non-Production-related Waste
				Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
2842	2851	2891		6	0	0	0	0	0	15,722	15,722	0
2842	2865			4	0	151,423	0	151,423	6,979,477	928	7,131,828	0
2842	2879			1	0	470	0	470	0	250	750	0
2842	2879	2899		9	9	0	0	0	0	0	0	0
2842	2891	2899		4	4	0	0	0	0	0	0	0
2842	2893	2899		3	0	10,360	0	10,360	0	474	10,401	0
2842	2899			12	2	4,265	0	4,265	11,519	6,850	20,782	0
2843	2844			18	7	11,542	0	11,542	4,700,398	39,180	4,751,061	0
2843	2851			2	0	1,649	0	1,649	0	1,500	1,988	0
2843	2861			5	0	358	0	358	0	0	358	0
2843	2865	2869		7	7	0	0	0	0	0	0	0
2843	2869			50	4	39,535	4,143	43,678	10,663,722	273,625	10,972,229	2,137
2843	2869	2873		1	1	0	0	0	0	0	0	0
2843	2869	2899		50	1	69,434	14,766	84,200	517,970	169,858	760,935	0
2843	2899			33	8	12,669	339	13,008	186,941	289,537	488,681	0
2844	2869			3	0	59	0	59	24,756	31,318	56,141	0
2844	2869	2874		11	0	19,560	0	19,560	64,883	690,252	774,668	0
2851	2865	2891		6	2	38,005	1,420	39,425	0	75,016	157,330	0
2851	2865	2893	2895	5	4	0	46	46	84,116	6,621	90,783	0
2851	2869			31	0	23,102	2,685	25,787	1,691,400	17,315,220	19,056,040	2,361
2851	2879			5	4	3	0	3	256	907	1,161	0
2851	2891			63	11	104,774	9,259	114,033	2,262,326	148,336	2,482,955	0
2851	2891	2893		1	0	3,982	0	3,982	0	3,882	7,964	0
2851	2899			29	3	22,267	0	22,267	38,287	111,231	181,568	0
2861	2869			9	0	543,743	0	543,743	190,390	33,960	768,093	0
2861	2869	2899		11	0	526,025	0	526,025	24,432,150	800,500	25,754,589	0
2861	2899			7	1	10,294	452	10,746	3,043	4,170	17,955	5
2865	2867			8	0	48,994	0	48,994	240,549	96,064	385,607	1,707
2865	2869			127	1	5,483,836	420,552	5,904,388	170,822,941	6,285,210	180,874,727	82,176
2865	2869	2873		34	0	8,327,597	31,106	8,358,703	12,945,000	21,430	21,362,123	234
2865	2869	2879		19	0	103,432	7,575	111,007	1,675,045	1,280,570	3,066,502	613
2865	2869	2879	2899	18	0	251,100	1,755	252,855	53,631,403	1,027,605	54,917,621	37,060
2865	2873	2879		17	2	210,728	7,970	218,698	3,489,100	2,627,785	6,331,750	0
2865	2899			6	0	367	0	367	26,450	91,131	117,625	0
2869	2873			38	3	8,125,780	5,700	8,131,480	20,680,495	142,412	28,834,431	5,902
2869	2879			121	6	959,483	258,120	1,217,603	27,909,941	5,271,809	34,615,298	9,478
2869	2879	2899		11	0	35,805	0	35,805	0	489,812	546,232	13,000
2869	2899			98	12	99,957	95,698	195,655	558,211	956,090	1,661,802	27,311
2873	2874			8	1	128,411	0	128,411	2,700,000	0	2,812,181	14,000
2873	2874	2875		2	0	6,750	0	6,750	0	0	6,000	0
2873	2874	2875	2879	2	0	18,950	0	18,950	0	0	18,950	0
2873	2879			6	0	16,322	75	16,397	0	0	16,843	0
2874	2875			5	4	1,005	0	1,005	700	0	1,350	0
2875	2879			38	2	19,643	755	20,398	14,872	21,369	60,660	719
2879	2899			56	22	52,116	1,405	53,521	4,714,034	134,710	4,910,931	0
2891	2899			8	0	2,490	0	2,490	0	38,300	36,440	0
Total for SIC Code 28				6,542	643	368,254,227	7,896,176	376,150,403	4,024,088,800	363,308,016	4,766,348,743	4,627,743

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