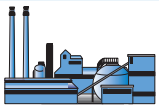
Chapter 4

Toxics Release Inventory Data for New Industries and Federal Facilities, 1998–1999

Chapter 4



Toxics Release Inventory Data for New Industries and Federal Facilities, 1998–1999

This chapter provides analyses of 1999 TRI data, by industry sector, for the seven industries that were required to report to TRI for the first time in 1998. Analyses of TRI reporting by the 20 industries in the manufacturing sector (Standard Industrial Classification codes 20 to 39) that have been required to report to TRI since the program began in 1987 appear in Chapters 3 and 5. Box 4–1 contains an explanation of SIC codes and their use in TRI.

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

More details for the individual industry sectors on products, services, employment and production, general environmental issues, processes involving toxic chemicals and the management of toxic chemicals in waste can be found in the *1998 Toxic Release Inventory Public Data Release* report (EPA 745-R-00-007).

Box 4–1. SIC Codes and Their Use in TRI

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

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

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

Industrial facilities often conduct interrelated operations that result in products or services which are classified in different SIC codes. In general, TRI forms with multiple SIC codes are analyzed in Chapter 5. (Box 5–2 explains the treatment of multiple codes.) If, however, a facility reported for the first time in 1998 with SIC codes for both new and original industries, it is included in the analyses in Chapter 4 under the new industry code.

NEW INDUSTRIES

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

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

Information and TRI data for RCRA subtitle C hazardous waste treatment and disposal facilities (in SIC code 4953) and solvent recovery services (in SIC code 7389) are presented together because of their similarity.

1998–1999 TRI Data

In 1999, TRI releases from all industries totaled 7.77 billion pounds, of which the new industries reported 5.45 billion (see Table 4–1). Among the new industries, metal mining and electric utilities accounted for the bulk of on- and off-site releases. Metal mining reported releases of 3.98 billion pounds (73.0 percent of the new industry total), and electric utilities reported 1.16 billion pounds (21.3 percent). Of the metal mining releases, most—3.93 billion pounds, or 98.7 percent—were on-site to land in other than RCRA subtitle C landfills. Metal mining's releases to Class II–V wells, 35.1 million pounds, made up less than 1 percent of the industry's releases but accounted for 99.2 percent of total TRI releases in this category. The original industries, by contrast, reported 199.4 million pounds of underground injection to Class I wells—89.7 percent of the TRI total—but less than 150,000 pounds to Class II–V wells. (For an explanation of the terminology, see Box 1–4 in Chapter 1.) Most (841.9 million pounds, or 72.4 percent) of the electric utilities' releases were on-site to the air.

Hazardous waste and solvent recovery facilities reported 288.0 million pounds of releases, 206.8 million pounds of which went to RCRA subtitle C landfills and 22.9 million pounds (10.3 percent of the TRI total for the category) to Class I wells.

Releases of all types from all industries rose 5.3 percent between 1998 and 1999, from 7.38 billion pounds to 7.77 billion pounds although overall the number of forms submitted decreased by 2.4 percent (Table 4-2). The overall increase can be accounted for by reporting by one facility in Utah. This metal mining facility retired a leach pad in

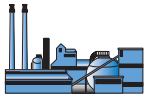


Table 4–1. TRI On-site and Off-site Releases by Industry, Original and New Industries, 1999

SIC Code	Industry	Total Facilities	Total Forms	On-site Releases: Total Air Emissions	On-site Releases: Surface Water Discharges	On-site Releases: Underground Injection: Class I Wells	On-site Releases: Underground Injection: Class II-V Wells	On-site Releases: On-site Land Releases: RCRA Subtitle C Landfills	On-site Releases: On-site Land Releases: Other On-site Land Releases	On-site Releases: Total On-site Releases	Off-site Releases: Transfers Off-site to Disposal	Total On- and Off-site Releases
		Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
20–39	Original Industries	20,698	69,471	1,175,054,932	253,591,816	199,398,335	149,468	12,440,355	311,227,496	1,951,862,402	374,647,596	2,326,509,998
10	Metal Mining	108	692	4,452,614	447,029	0	35,092,409	0	3,934,845,946	3,974,837,998	2,178,868	3,977,016,866
12	Coal Mining	50	205	1,771,548	235,267	0	143,700	0	9,608,323	11,758,838	0	11,758,838
491/493	Electric Utilities	625	4,225	841,919,820	4,510,038	0	5	1,298,989	256,822,151	1,104,551,003	57,958,243	1,162,509,246
5169	Chemical Wholesale Distributors	428	3,459	1,318,395	3,344	0	0	0	1,281	1,323,020	648,639	1,971,659
5171	Petroleum Terminals and Bulk Storage Facilities	532	3,568	4,044,223	43,606	0	0	528	14,641	4,102,998	165,553	4,268,551
4953/7389	Hazardous Waste and Solvent Recovery Facilities	198	2,448	802,891	50,676	22,861,227	0	206,756,050	13,707,014	244,177,858	43,824,555	288,002,413
	Total	**22,639**	**84,068**	**2,029,364,423**	**258,881,776**	**222,259,562**	**35,385,582**	**220,495,922**	**4,526,226,852**	**7,292,614,117**	**479,423,454**	**7,772,037,571**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release.

Facilities/forms are included in the original industry category if they did not report a new industry SIC code. Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39. If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category. If the facility reported for the first time in 1998 or later and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.

One facility, Phelps Dodge Miami Inc. in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1999 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the original industry sector were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change transfers off-site to disposal amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising transfers off-site to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds.

1999 and, therefore, had a large one-time increase of 505 million pounds reported as on-site land releases.

From 1998 to 1999, releases from the original industries decreased 2.5 percent. Among the new industries, coal mining reported a 9.7 decrease in releases, and petroleum terminals and bulk storage facilities reported a 5.5 percent decline. Releases from the chemical wholesale distributors category showed the largest increase, 28.3 percent, followed by metal mining, with 11.7 percent. Metal mining recorded the largest absolute increase, 416.3 million pounds; electric utilities reported the next-highest increase, 24.9 million pounds.

In 1999, production-related waste managed by all TRI industries totaled 29.49 billion pounds (Table 4–3). The original industries accounted for 23.10 billion pounds of production-related waste, of which 33.9 percent was recycled on-site. Among the new industries, 98.9 percent (3.59 billion pounds) of the production-related waste managed by metal mining was released on- or off-site, as was 70.9 percent (1.17 billion pounds) of the production-related waste from electric utilities. Hazardous waste and

Table 4–2. TRI Forms and Total Releases by Industry, Original and New Industries, 1998–1999

SIC Code	Industry	Total Forms				Total On-site and Off-site Releases			
		1998	1999	Change 1998-1999		1998	1999	Change 1998-1999	
		Number	Number	Number	Percent	Pounds	Pounds	Pounds	Percent
20–39	Original Industries	70,975	69,471	–1,504	–2.1	2,386,229,289	2,326,509,998	–59,719,291	–2.5
10	Metal Mining	768	692	–76	–9.9	3,560,719,410	3,977,016,866	416,297,456	11.7
12	Coal Mining	193	205	12	6.2	13,024,894	11,758,838	–1,266,056	–9.7
491/493	Electric Utilities	4,335	4,225	–110	–2.5	1,137,623,361	1,162,509,246	24,885,885	2.2
5169	Chemical Wholesale Distributors	3,615	3,459	–156	–4.3	1,537,099	1,971,659	434,560	28.3
5171	Petroleum Terminals and Bulk Storage Facilities	3,796	3,568	–228	–6.0	4,514,607	4,268,551	–246,056	–5.5
4953/7389	Hazardous Waste and Solvent Recovery Facilities	2,435	2,448	13	0.5	280,413,169	288,002,413	7,589,244	2.7
	Total	**86,117**	**84,068**	**-2,049**	**-2.4**	**7,384,061,829**	**7,772,037,571**	**387,975,742**	**5.3**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release.
Facilities/forms are included in the original industry category if they did not report a new industry SIC code. Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39. If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category. If the facility reported for the first time in 1998 or later and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category. One facility, Phelps Dodge Miami Inc. in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1999 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.
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solvent recovery facilities treated on-site 26.2 percent of their production-related waste and sent 24.9 percent to energy recovery off-site. The quantity released on- and off-site by this industry amounted to 27.5 percent of its production-related waste. Chemical wholesale distributors recycled on-site almost 50 percent of their production-related waste. The corresponding share for petroleum terminals and bulk storage facilities was 70.2 percent. Non-production-related waste is overstated in this report for all years. Those forms indicating NA for non-production-related waste were assigned one pound erroneously. The total amount overstated is about 4,500 pounds for each year.

As Table 4–4 shows, in 1999, transfers off-site to recycling made up more than half of total transfers for further waste management and disposal by all industries (2.11 billion pounds, out of a total 4.10 billion pounds). Although the original industries accounted for the bulk of the transfers, some of the new industries reported sizable amounts. For example, transfers to energy recovery by the original industries (514.4 million pounds) made up 66.2 percent of the total of 777.5 million pounds for all industries, but a new industry group, hazardous waste and solvent recovery facilities, reported 251.4 million pounds, or 32.3 percent of the total. The original industries accounted for 98.6 percent of transfers to off-site recycling, with 2.08 billion pounds, and for 82.2 percent of transfers to treatment (240.9 million pounds). For most industries, non-metal TRI chemicals predominated in transfers to publicly owned treatment works (POTWs). The original industries sent 318.9 million pounds and hazardous waste and solvent recovery facilities sent almost 2 million pounds of

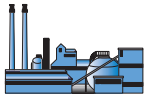

Table 4–3. Quantities of TRI Chemicals in Waste by Industry, Original and New Industries, 1999

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site	Off-site	On-site	Off-site	On-site	Off-site			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
20–39	Original Industries	7,839,852,848	2,134,897,467	2,806,098,993	511,631,406	6,850,326,119	571,669,556	2,384,303,476	23,098,779,865	305,727,127
10	Metal Mining	22,184,030	3,305,817	0	840	14,978,477	14,784	3,587,214,014	3,627,697,962	505,192,483
12	Coal Mining	1,137,970	6,753	0	0	376,542	0	10,632,473	12,153,738	34
491/493	Electric Utilities	786,720	7,571,783	5,304,250	42,200	463,594,435	441,961	1,173,660,962	1,651,402,311	318,178
5169	Chemical Wholesale Distributors	19,615,110	206,542	72,746	14,272,788	1,188,795	3,016,945	1,419,993	39,792,919	858,589
5171	Petroleum Terminals and Bulk Storage Facilities	34,171,226	1,649,555	31,599	298,076	7,734,904	681,114	4,149,103	48,715,577	273,565
4953/ 7389	Hazardous Waste and Solvent Recovery Facilities	120,601,759	22,417,208	5,354,008	253,050,431	266,454,305	68,475,580	279,212,369	1,015,565,660	15,273
	Total	**8,038,349,663**	**2,170,055,125**	**2,816,861,596**	**779,295,741**	**7,604,653,577**	**644,299,940**	**7,440,592,390**	**29,494,108,032**	**812,385,249**

Note: Data are from Section 8 of Form R.
Facilities/forms are included in the original industry category if they did not report a new industry SIC code. Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20-39. If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category. If the facility reported for the first time in 1998 or later and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category.
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non-metal TRI chemicals to POTWs. The exception is metal mines where most transfers to POTWs were for metals.

Total Releases by State

The geographic distribution of total releases differed considerably for the original and the new industries, and the new industries' data strongly influenced state rankings for total releases by all TRI industries in 1999. State-by-state comparisons of total releases by original industries, new industries, and all TRI industries appear in Table 4–5.

The states with the largest releases by new industries were Nevada, with 1.16 billion pounds; Utah, with 1.08 billion pounds; and Arizona, with 912.5 million pounds. As is seen later in this chapter, metal mining facilities reported large releases in these three states. These were also the top states, in the same order, for total releases by all TRI industries. For total releases by the original industries, Nevada ranked 44th, Utah 8th, and Arizona 18th. The top states for total releases by original industries in 1999 were Texas (257.9 million pounds), Pennsylvania (160.5 million pounds), and Ohio (140.2 million pounds). Due to an EPA data entry error, three chemical reporting revisions for 1999 for one facility, US Army Letterkenny Depot in Chambersburg, PA, were not included in tables in this report (except in federal facilities tables). The effect of the revisions is to change the facility's off-site transfers to disposal amounts

(off-site releases) for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising off-site transfers to disposal amounts (off-site releases) for manganese compounds from 5,584,900 pounds to below 500 pounds. Louisiana, which in 1998 ranked second in total releases by original industries, was in fourth place in 1999, with 134.8 million pounds.

Table 4–4. TRI Transfers Off-site for Further Waste Management/Disposal by Industry, Original and New Industries, 1999

SIC Code	Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs		Other Off-site Transfers*	Other Transfers Off-site to Disposal**	Total Transfers for Further Waste Management/ Disposal
					Metals and Metal Compounds	Non-metal TRI Chemicals			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
20–39	Original Industries	2,075,254,609	514,397,272	240,886,196	3,345,324	318,922,637	308,270	483,494,678	3,636,608,986
10	Metal Mining	2,888,726	840	4,419	40,000	500	0	2,141,852	5,076,337
12	Coal Mining	6,753	0	0	0	0	0	0	6,753
491/493	Electric Utilities	4,206,466	42,205	403,920	3,569	10,017	0	60,645,291	65,311,468
5169	Chemical Wholesale Distributors	4,387,518	11,379,798	3,214,228	75	49,600	0	654,072	19,685,291
5171	Petroleum Terminals and Bulk Storage Facilities	1,285,255	315,319	719,019	322	24,678	0	176,130	2,520,723
4953/7389	Hazardous Waste and Solvent Recovery Facilities	23,591,607	251,398,997	47,886,693	14,417	1,953,144	553,773	46,863,651	372,262,282
	Total	**2,111,620,934**	**777,534,431**	**293,114,475**	**3,403,707**	**320,960,576**	**862,043**	**593,975,674**	**4,101,471,840**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.

Facilities/forms are included in the original industry category if they did not report a new industry SIC code. Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39. If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category. If the facility reported for the first time in 1998 or later and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category. Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the original industry sector were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change the facility's other transfers off-site to disposal amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising other transfers off-site to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds.

One facility, Phelps Dodge Miami Inc. in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1999 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

*Other Off-site Transfers are transfers reported without a valid waste management code.

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

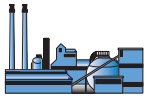


Table 4–5. TRI Total Releases by State, Original and New Industries, 1999

State	Total On-site and Off-site Releases		
	Original Industries	New Industries	All TRI Industries
	Pounds	Pounds	Pounds
Alabama	75,132,585	62,995,934	138,128,519
Alaska	1,671,982	431,345,804	433,017,786
American Samoa	0	5,628	5,628
Arizona	50,782,129	912,547,939	963,330,068
Arkansas	37,592,186	3,933,290	41,525,476
California	42,747,339	26,298,645	69,045,984
Colorado	6,675,202	19,409,489	26,084,691
Connecticut	6,359,752	1,475,523	7,835,275
Delaware	7,708,180	3,672,174	11,380,354
District of Columbia	18,096	79,871	97,967
Florida	76,714,040	72,692,580	149,406,620
Georgia	60,950,277	65,974,004	126,924,281
Guam	0	501,108	501,108
Hawaii	401,133	2,173,658	2,574,791
Idaho	26,517,444	59,458,895	85,976,339
Illinois	95,873,821	69,181,076	165,054,897
Indiana	125,781,848	73,088,864	198,870,712
Iowa	34,665,540	14,126,889	48,792,429
Kansas	33,069,818	9,504,240	42,574,058
Kentucky	45,813,925	60,391,397	106,205,322
Louisiana	134,825,056	15,327,549	150,152,605
Maine	7,728,607	120,061	7,848,668
Maryland	13,626,221	30,354,865	43,981,086
Massachusetts	5,602,815	6,273,390	11,876,205
Michigan	72,468,757	69,817,757	142,286,514
Minnesota	20,080,339	11,142,248	31,222,587
Mississippi	62,452,276	13,343,582	75,795,858
Missouri	56,780,432	72,960,345	129,740,777
Montana	48,659,575	78,959,073	127,618,648
Nebraska	19,012,631	8,254,822	27,267,453
Nevada	4,368,476	1,164,039,385	1,168,407,861
New Hampshire	3,114,421	2,757,533	5,871,954
New Jersey	21,818,000	9,465,385	31,283,385
New Mexico	20,463,178	241,812,999	262,276,177
New York	35,840,928	35,973,300	71,814,228
North Carolina	67,121,835	91,228,696	158,350,531
North Dakota	2,595,162	21,060,751	23,655,913
Northern Marianas	0	3,412	3,412
Ohio	140,208,448	163,019,708	303,228,156
Oklahoma	22,961,015	14,108,242	37,069,257
Oregon	21,811,249	45,884,507	67,695,756
Pennsylvania	160,461,734	92,314,818	252,776,552
Puerto Rico	6,324,486	11,848,219	18,172,705
Rhode Island	1,296,069	95,029	1,391,098
South Carolina	59,730,443	24,330,454	84,060,897
South Dakota	3,564,241	8,564,736	12,128,977
Tennessee	88,470,887	55,840,140	144,311,027
Texas	257,858,098	56,008,033	313,866,131
Utah	82,785,620	1,079,001,349	1,161,786,969
Vermont	646,780	0	646,780
Virgin Islands	699,418	69,495	768,913
Virginia	57,411,080	23,158,525	80,569,605
Washington	24,804,178	3,670,737	28,474,915
West Virginia	21,762,246	78,729,865	100,492,111
Wisconsin	40,990,645	17,391,132	58,381,777
Wyoming	9,689,355	9,740,423	19,429,778
Total	**2,326,509,998**	**5,445,527,573**	**7,772,037,571**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release. Facilities/forms are included in the original industry category if they did not report a new industry SIC code. Facilities/forms are included in the new industry category if the facility/form has a new industry SIC code and no SIC code in 20–39. If the facility reported in any year prior to 1998 and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the original industry category. If the facility reported for the first time in 1998 or later and the facility/form has a combination of original and new industry SIC codes, then the facility/form is included in the new industry category. One facility, Phelps Dodge Miami Inc. in Claypool, AZ, that reported under SIC code 33 and SIC code 10 in 1999 and previous years has been included in the new industry category SIC code 10 for the purpose of this analysis.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, reporting in the original industry sector were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change total releases for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising total releases for manganese compounds from 5,584,900 pounds to below 500 pounds.

Metal Mining (SIC Code 10)

Introduction

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

Mining operations are classified according to the ores they extract. Facilities in six categories reported to TRI for the first time in the 1998 reporting year (see Box 4–2). These categories include copper (SIC code 1021), lead and zinc (SIC code 1031), gold (SIC code 1041), and silver (SIC code 1044). Also covered are ferroalloy ores (SIC code 1061, alloys containing iron), such as chromium, manganese, molybdenum, nickel ore, and tungsten, and miscellaneous metal ores (SIC code 1099), which includes ores of aluminum, antimony, bauxite, beryllium, mercury, thorium, tin, and others. Three mining-related SIC codes are currently not subject to TRI reporting: iron ores (SIC code 1011), metal mining services (SIC code 1081), and uranium-radium-vanadium ores (SIC code 1094).

More details for this industry sector on products and services, employment and

Box 4–2. SIC Code 10, Metal Mining: Codes and Classifications Required to Report to TRI

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

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

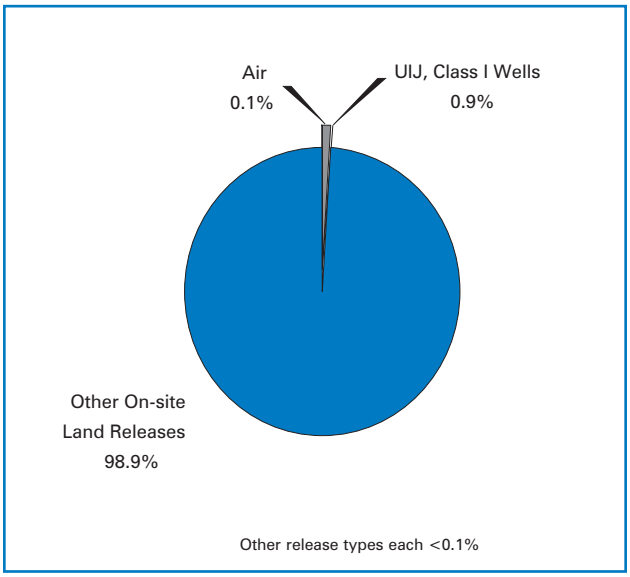
production, general environmental issues, processes involving toxic chemicals and the management of toxic chemicals in waste can be found in the *1998 Toxics Release Inventory Public Data Release* report (EPA 745-R-00-007).

1999 TRI Data for Metal Mining

On- and Off-site Releases

Metal mining facilities required to report to TRI had total on- and off-site releases of 3.98 billion pounds in 1999, as shown in Table 4–6. The bulk of these releases, 3.93 billion pounds, representing 98.9 percent of the total reported by the industry, was released on-site to land (Figure 4–1). All of the on-site land releases were released to land in other than RCRA subtitle C land-

Figure 4–1. Distribution of TRI On-site and Off-site Releases, 1999: Metal Mining



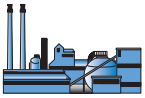
Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.
UIJ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

Table 4–6. TRI On-site and Off-site Releases by 4-digit SIC Code, 1999: Metal Mining

			On-site Releases							Off-site Releases	
					Underground Injection		On-site Land Releases				
SIC Code	Industry	Total Forms	Total Air Emissions	Surface Water Discharges	Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
		Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1021	Copper Ores	173	566,909	15,723	0	0	0	2,022,866,579	2,023,449,211	33	2,023,449,244
1031	Lead and Zinc Ores	65	912,883	38,121	0	143,612	0	439,843,526	440,938,142	40,006	440,978,148
1041	Gold Ores	271	1,593,174	364,966	0	2,797	0	938,514,462	940,475,399	29	940,475,428
1044	Silver Ores	40	73,652	8,856	0	0	0	112,135,907	112,218,415	24	112,218,439
1061	Ferroalloy Ores, Except Vanadium		68,444	16,017	0	0	0	708,600	793,061	2,136,888	2,929,949
1099	Miscellaneous Metal Ores, n.e.c.*	18	421,841	0	0	0	0	2,392,223	2,814,064	0	2,814,064
	Multiple within SIC Code 10	46	73,734	3,189	0	34,946,000	0	54,717,177	89,740,100	4	89,740,104
	SIC Code 1021 and SIC Code 33 (Primary Metals)	30	611,626	10	0	0	0	237,417,389	238,029,025	1,884	238,030,909
	SIC Code 1021 and SIC Code 4931 (Electric Utilities)	20	130,351	147	0	0	0	126,250,083	126,380,581	0	126,380,581
	Total	**692**	**4,452,614**	**447,029**	**0**	**35,092,409**	**0**	**3,934,845,946**	**3,974,837,998**	**2,178,868**	**3,977,016,866**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release. Forms that reported more than one 4-digit SIC Code within SIC Code 10 are assigned to the multiple codes category.

*n.e.c.: not elsewhere classified.



fills. (Types of on-site land releases are described in Box 1–4 in Chapter 1.)

Metal mining facilities injected 35.1 million pounds into underground wells, all Class II–V. (For an explanation of the terminology, see Box 1–4 in Chapter 1.) Underground injection was the second-largest release type for this industry, but the amount represented just 0.9 percent of total on- and off-site releases.

Copper mining facilities reported 2.02 billion pounds of total releases, the largest quantity within the industry. Gold mining facilities ranked second, with 940.5 million pounds. Together, copper mining and gold mining accounted for three-quarters (74.4 percent) of the metal mining total for on- and off-site releases. Nearly all of the releases from these industries were on-site to land.

Facilities in the lead and zinc mining industry ranked third for total on- and off-site releases, with 441.0 million pounds. This total included 439.8 million pounds of on-site land releases and almost 144,000 pounds of underground injection.

Facilities mining ferroalloy ores (except vanadium) reported transfers to disposal of 2.14 million pounds, nearly all of the metal mining industry's 2.18 million pounds of off-site releases. Ferroalloy mining was the only type of metal mining that released a larger amount off-site than on-site.

Total TRI releases from the metal mining industry rose 11.7 percent between 1998 and 1999 (Table 4-7). Off-site releases rose 71.9 percent, from 1.3 million pounds to 2.2 million pounds, with landfills/surface impoundments and transfers to POTWs accounting for most of the increase. On-site releases rose 11.7 percent. Within this category, total air emissions declined by 3.9 percent and surface water discharges decreased by 16.0 percent. Underground injection (entirely to Class II-V wells) rose 6.3 percent. On-site land releases rose 11.7 percent due to increase of 25.7 percent in the category of other disposal. Much of this increase can be accounted for by reporting by one facility in Utah that retired a leach pad in 1999, and therefore, had a large one-year increase of 505 million pounds reported as on-site land releases, in the other disposal category.

Waste Management Data

Quantities of TRI Chemicals in Waste

Metal mines reported total production-related waste of 3.63 billion pounds in 1999, of which 3.59 billion pounds were released on- and off-site (Table 4–8). As shown in Figure 4–2, the quantity released amounted to 98.9 percent of the industry total. The next largest waste management types were on-site recycling, with 22.2 million pounds, and on-site treatment, with 15.0 million pounds.

Production-related waste totaled 1.63 billion pounds for copper mining and 963.6 million pounds for gold mining, the largest totals in the metal mining industry. The quantities released on- and off-site were 1.63 billion pounds for copper mining and 946.6 million pounds for gold mining. Lead and zinc mining ranked third, with 448.9 million pounds of production-related waste, including 438.5 million pounds in quantities released.

Table 4–7. TRI On-site and Off-site Releases, 1998–1999: Metal Mining

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
On-site Releases				
Total Air Emissions	4,633,011	4,452,614	–180,397	–3.9
Fugitive Air Emissions	3,416,467	3,276,706	–139,761	–4.1
Point Source Air Emissions	1,216,544	1,175,908	–40,636	–3.3
Surface Water Discharges	532,476	447,029	–85,447	–16.0
Underground Injection	33,001,112	35,092,409	2,091,297	6.3
Class I Wells	0	0	0	—
Class II–V Wells	33,001,112	35,092,409	2,091,297	6.3
On-site Land Releases	3,521,285,025	3,934,845,946	413,560,921	11.7
RCRA Subtitle C Landfills	54	0	–54	–100.0
Other On-site Landfills	17,834,938	14,589,719	–3,245,219	–18.2
Land Treatment	32,171	4,796	–27,375	–85.1
Surface Impoundments	1,202,003,615	1,027,330,906	–174,672,709	–14.5
Other Disposal	2,301,414,247	2,892,920,525	591,506,278	25.7
Total On-site Releases	**3,559,451,624**	**3,974,837,998**	**415,386,374**	**11.7**
Off-site Releases				
Storage Only[a]	3	0	–3	–100.0
Solidification/Stabilization[b]	452	29	–423	–93.6
Metals and Metal Compounds Only				
Wastewater Treatment (excluding POTWs)[c]	0	0	0	—
Metals and Metal Compounds Only				
Transfers to POTWs[d]	798	40,000	39,202	4,912.5
Metals and Metal Compounds Only				
Underground injection	0	0	0	—
Landfills/Surface Impoundments	1,259,608	2,136,937	877,329	69.7
Land Treatment	0	0	0	—
Other Land Disposal	0	0	0	—
Other Off-site Management	1,039	988	–51	–4.9
Transfers to Waste Broker for Disposal	5,865	760	–5,105	–87.0
Unknown[e]	21	154	133	633.3
Total Off-site Releases (Transfers Off-site to Disposal)	**1,267,786**	**2,178,868**	**911,082**	**71.9**
Total On-site and Offsite Releases	**3,560,719,410**	**3,977,016,866**	**416,297,456**	**11.7**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

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

[b] Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it such transfers are included as a form of disposal (off-site release). See Box 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.

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

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

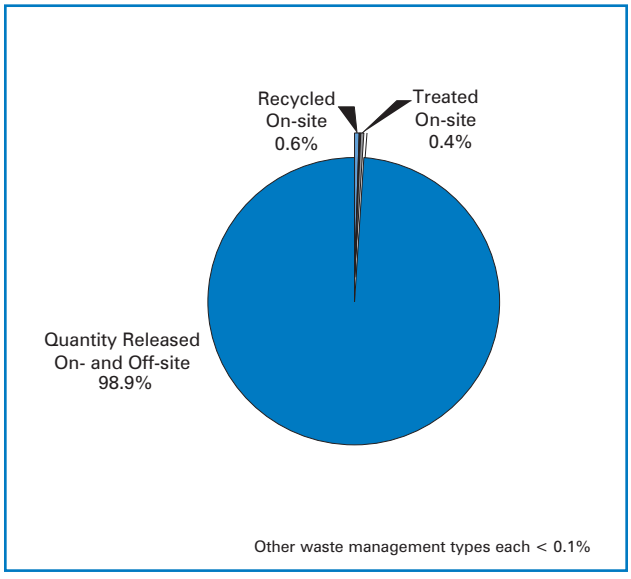
[e] Unknown (disposal code M99) indicates that a facility is not aware of the type of waste management used for the toxic chemical that is sent off-site. Amounts reported as unknown transfers are treated as a form of disposal (off-site release).

Table 4–8. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1999: Metal Mining

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
1021	Copper Ores	228,957	2,878,597	0	830	298,970	3,950	1,625,721,160	1,629,132,464	505,165,068
1031	Lead and Zinc Ores	10,392,057	31,904	0	0	0	0	438,476,266	448,900,227	8
1041	Gold Ores	5,323,207	181,991	0	0	11,498,647	9,346	946,563,131	963,576,322	27,298
1044	Silver Ores	12	59,138	0	0	2,788,000	0	112,207,937	115,055,087	20
1061	Ferroalloy Ores, Except Vanadium	0	2,900	0	0	0	0	2,928,604	2,931,504	25
1099	Miscellaneous Metal Ores, n.e.c.*	6,039,500	1,287	0	10	217,860	0	2,794,492	9,053,149	0
	Multiple within SIC Code 10	200,297	40,000	0	0	25,000	4	89,435,054	89,700,355	16
	SIC Code 1021 and SIC Code 33 (Primary Metals)	0	110,000	0	0	150,000	1,074	237,941,800	238,202,874	0
	SIC Code 1021 and SIC Code 4931 (Electric Utilities)	0	0	0	0	0	410	131,145,570	131,145,980	48
	Total	**22,184,030**	**3,305,817**	**0**	**840**	**14,978,477**	**14,784**	**3,587,214,014**	**3,627,697,962**	**505,192,483**

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

Figure 4–2. TRI Waste Management, 1999: Metal Mining



Note: Data are from Section 8 of Form R.

Gold mining facilities reported 11.5 million pounds treated on-site, the largest amount in this category. Metal mines sent little of their TRI chemicals in waste off-site for recycling (3.3 million pounds, mainly from copper mining) or treatment (less than 15,000 pounds). Lead and zinc mining reported the largest quantity recycled on-site (10.4 million pounds); next were miscellaneous metal mining (6.0 million pounds) and gold mining (5.3 million pounds). Only relatively small amounts of energy recovery, on- or off-site, were reported.

Table 4–9 shows the changes in the disposition of TRI chemicals in waste for the metal mining industry between 1998 and 1999. Total production-related waste decreased 2.5 percent. The largest absolute decrease was in the quantity released on- and off-site, which fell by 82.5 million pounds from 3.67 billion pounds to 3.59 billion pounds, a decrease of 2.2 percent. On-site treatment fell 37.3 percent, from 23.9 million pounds to 15.0 million pounds. On-site recycling also declined, from 26.1 million pounds to

Table 4–9. Quantities of TRI Chemicals in Waste, 1998–1999: Metal Mining

Waste Management Activity	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Recycled On-site	26,135,717	22,184,030	–3,951,687	–15.1
Recycled Off-site	1,223,189	3,305,817	2,082,628	170.3
Energy Recovery On-site	0	0	0	—
Energy Recovery Off-site	0	840	840	—
Treated On-site	23,887,778	14,978,477	–8,909,301	–37.3
Treated Off-site	34,712	14,784	–19,928	–57.4
Quantity Released On- and Off-site	3,669,752,395	3,587,214,014	–82,538,381	–2.2
Total Production-related Waste	**3,721,033,791**	**3,627,697,962**	**–93,335,829**	**–2.5**
Non-production-related Waste	399,484	505,192,483	504,792,999	126,361.3

Note: All data are from Section 8 of Form R for the year indicated.

Table 4–10. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1999: Metal Mining

SIC Code	Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs: Metals and Metal Compounds	Transfers to POTWs: Non-metal TRI Chemicals	Other Off-site Transfers**	Other Transfers Off-site to Disposal***	Total Transfers for Further Waste Management/ Disposal
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1021	Copper Ores	2,520,398	830	3,950	0	0	0	448	2,525,626
1031	Lead and Zinc Ores	0	0	0	40,000	0	0	73	40,073
1041	Gold Ores	182,003	0	11	0	500	0	2,531	185,045
1044	Silver Ores	59,138	0	0	0	0	0	24	59,162
1061	Ferroalloy Ores, Except Vanadium	2,900	0	0	0	0	0	2,136,888	2,139,788
1099	Miscellaneous Metal Ores, n.e.c.*	1,287	10	0	0	0	0	0	1,297
	Multiple within SIC Code 10	13,000	0	0	0	0	0	4	13,004
	SIC Code 1021 and SIC Code 33 (Primary Metals)	110,000	0	0	0	0	0	1,884	111,884
	SIC Code 1021 and SIC Code 4931 (Electric Utilities)	0	0	458	0	0	0	0	458
	Total	**2,888,726**	**840**	**4,419**	**40,000**	**500**	**0**	**2,141,852**	**5,076,337**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R. Forms that reported more than one 4-digit SIC Code within SIC Code 10 are assigned to the multiple codes category.

*n.e.c.: not elsewhere classified.

**Other Off-site Transfers are transfers reported without a valid waste management code.

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

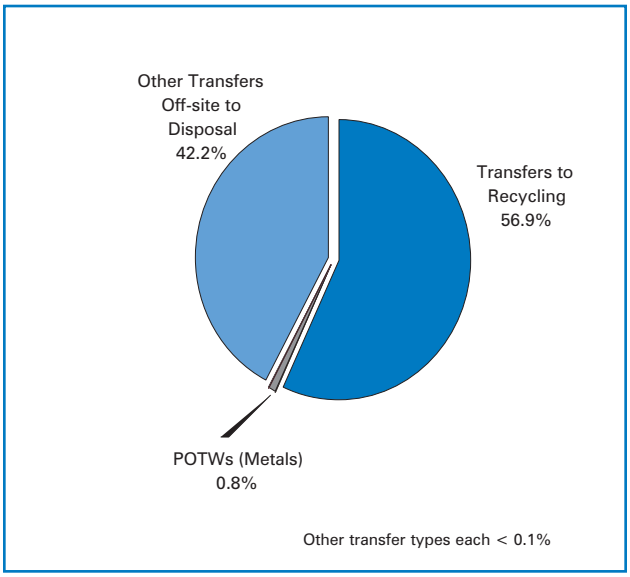
22.2 million pounds, or 15.1 percent, but off-site recycling rose from 1.2 million pounds to 3.3 million pounds, a jump of 170.3 percent.

Transfers Off-site for Further Waste Management/Disposal

Transfers off-site for further waste management/disposal by the metal mining industry totaled 5.1 million pounds, as shown in Table 4–10. Over half (56.9 percent) of this amount was transfers to recycling. The category other transfers off-site to disposal accounted for almost all the remainder—42.2 percent (see Figure 4–3).

Copper mining reported 2.5 million pounds, the largest of the four-digit SIC codes in this industry, almost all of which was transfers to recycling. The second largest amount (2.1 million pounds) was mining of ferroalloy ores (except vanadi-

Figure 4–3. Distribution of TRI Transfers Off-site for Further Waste Management/ Disposal, 1999: Metal Mining



Note: Data are from Section 6 of Form R.

um). Almost all of this amount was sent off-site to disposal. The largest transfers to POTWs were by lead and zinc mining facilities.

Table 4–11 shows changes in the disposition of waste sent off-site for further waste management or disposal. The total amount transferred rose sharply, from 2.3 million pounds to 5.1 million pounds, a 117.8 percent increase. Transfers to recycling rose 226.1 percent. Transfers to treatment showed a large increase (1,392.9 percent), but from a small base. Transfers to POTWs fell from almost 103,000 pounds to 40,500 pounds (60.6 percent). The category other off-site transfers to disposal rose from 1.3 million pounds to 2.1 million pounds, a 59.7 percent increase.

TRI Data by State

In 1999, metal mining facilities in 22 states, largely in the West, submitted a total of 692 TRI forms. Nevada facilities submitted 252 forms, the largest number of any state. Arizona, with 109 forms, was second, and New Mexico ranked third, with 62 forms.

On- and Off-site Releases

Metal mines in Nevada and Utah reported total on- and off-site releases of 1.16 billion pounds and 1.05 billion pounds, respectively, as shown in Table 4–12. Arizona ranked third, with 904.4 million pounds. Map 4–1 shows the geographic distribution of metal mining releases reported to TRI in 1999.

Nevada, Utah, and Arizona also had the largest on-site land releases — 99.9 percent of their total releases in each case. On-site

Table 4–11. TRI Transfers Off-site for Further Waste Management/Disposal, 1998–1999: Metal Mining

	1998	1999	Change 1998–1999	
	Pounds	Pounds	Pounds	Percent
Transfers to Recycling	885,726	2,888,726	2,003,000	226.1
Transfers to Energy Recovery	0	840	840	—
Transfers to Treatment	296	4,419	4,123	1,392.9
Transfers to POTWs	102,780	40,500	–62,280	–60.6
Metals and Metal Compounds Only	798	40,000	39,202	4,912.5
Non-metal TRI Chemicals	101,982	500	–101,482	–99.5
Other Off-site Transfers*	0	0	0	—
Other Off-site Transfers to Disposal**	1,341,520	2,141,852	800,332	59.7
Total Transfers Off-site for Further Waste Management/Disposal	**2,330,322**	**5,076,337**	**2,746,015**	**117.8**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
*Other Off-site Transfers are transfers reported without a valid waste management code.
**Does not include transfers to POTWs of metals and metal compounds.

Table 4–12. Summary of TRI Information by State, 1999: Metal Mining

State	Total Forms	On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
		Total Air Emissions	Surface Water Discharges	Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alaska	35	503,301	2,095	0	34,946,000	0	395,352,370	430,803,766	5	430,803,771
Arizona	109	904,657	479	0	0	0	903,458,087	904,363,223	1,917	904,365,140
California	32	131,610	0	0	0	0	2,995,370	3,126,980	0	3,126,980
Colorado	16	8,456	16,484	0	143,612	0	8,787,803	8,956,355	440,037	9,396,392
Delaware	4	3,820	6	0	0	0	0	3,826	0	3,826
Florida	1	0	0	0	0	0	0	0	0	0
Idaho	27	3,638	11,526	0	0	0	35,383,022	35,398,186	24	35,398,210
Illinois	7	10,165	0	0	0	0	0	10,165	1,736,851	1,747,016
Minnesota	2	20,728	0	0	0	0	0	20,728	0	20,728
Missouri	19	185,639	24,404	0	0	0	45,487,756	45,697,799	0	45,697,799
Montana	38	141,747	0	0	0	0	70,753,568	70,895,315	0	70,895,315
Nevada	252	1,322,256	136,431	0	2,797	0	1,158,156,351	1,159,617,835	12	1,159,617,847
New Mexico	62	329,157	6	0	0	0	233,034,082	233,363,245	0	233,363,245
New York	7	62,022	2,876	0	0	0	7,763,814	7,828,712	0	7,828,712
Oklahoma	2	10	10	0	0	0	0	20	0	20
Oregon	1	0	0	0	0	0	0	0	0	0
South Carolina	5	0	0	0	0	0	1,158,825	1,158,825	0	1,158,825
South Dakota	13	121,254	228,280	0	0	0	5,117,500	5,467,034	10	5,467,044
Tennessee	21	193,759	9,047	0	0	0	13,196,626	13,399,432	1	13,399,433
Texas	4	53,179	0	0	0	0	0	53,179	0	53,179
Utah	29	457,169	15,385	0	0	0	1,053,722,357	1,054,194,911	0	1,054,194,911
Washington	6	47	0	0	0	0	478,415	478,462	11	478,473
Total	**692**	**4,452,614**	**447,029**	**0**	**35,092,409**	**0**	**3,934,845,946**	**3,974,837,998**	**2,178,868**	**3,977,016,866**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

land releases amounted to more than 90 percent of total releases in 15 of the 22 states with reporting by metal mines.

Alaska's metal mining facilities reported the largest underground injection, 34.9 million pounds. Facilities in Colorado reported the next-highest quantity released to underground injection, about 144,000 pounds. Total air emissions from facilities in Nevada were 1.3 million pounds. No other state reported more than a million pounds in air emissions, and total surface water discharges from all metal mining facilities were less than half a million pounds.

Table 4–13 summarizes, by state, changes in total releases in the metal mining group between 1998 and 1999. Total releases rose 11.7 percent. The largest absolute increases were for Utah (an increase of 605.1 million pounds, or 134.7 percent) and Alaska (an increase of 126.3 million pounds, or 41.5 percent). Illinois had the largest percentage increase, 186.4 percent, reflecting a rise from about 610,000 pounds of releases in 1998 to 1.7 million pounds in 1999. The largest absolute declines were for Nevada (a decrease of 151.7 million pounds, or 11.6 percent), and Arizona (a decrease of 101.5 million pounds, or 10.1 percent).

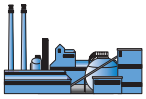


Table 4–12. Summary of TRI Information by State, 1999: Metal Mining *(continued)*

State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site	Off-site	On-site	Off-site	On-site	Off-site			
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alaska	761,277	49,921	0	0	41,631	9,330	425,956,878	426,819,037	18
Arizona	228,957	220,650	0	0	195,970	5,434	1,012,331,378	1,012,982,389	58
California	0	77,700	0	0	724,213	0	3,173,495	3,975,408	17
Colorado	0	2,900	0	0	0	0	9,394,824	9,397,724	8
Delaware	0	0	0	0	0	0	3,826	3,826	4
Florida	0	1,287	0	10	0	0	0	1,297	0
Idaho	832	8,920	0	0	0	0	40,941,286	40,951,038	6
Illinois	0	31,904	0	0	0	0	1,707,016	1,738,920	6
Minnesota	0	47,547	0	830	0	0	20,728	69,105	0
Missouri	0	0	0	0	0	0	45,489,544	45,489,544	0
Montana	0	27,000	0	0	20,460	0	70,794,069	70,841,529	12
Nevada	5,522,684	92,783	0	0	11,835,538	4	1,159,175,116	1,176,626,125	27,272
New Mexico	0	693,846	0	0	0	0	233,849,694	234,543,540	46
New York	0	0	0	0	0	0	10,142,877	10,142,877	0
Oklahoma	0	2,007,159	0	0	0	0	10	2,007,169	0
Oregon	0	0	0	0	0	0	0	0	0
South Carolina	0	0	0	0	32,000	0	1,165,000	1,197,000	0
South Dakota	0	44,200	0	0	1,931,265	5	5,465,830	7,441,300	24
Tennessee	9,630,780	0	0	0	0	0	13,362,037	22,992,817	8
Texas	0	0	0	0	0	0	53,179	53,179	4
Utah	6,039,500	0	0	0	197,400	0	553,708,827	559,945,727	505,165,000
Washington	0	0	0	0	0	11	478,400	478,411	0
Total	**22,184,030**	**3,305,817**	**0**	**840**	**14,978,477**	**14,784**	**3,587,214,014**	**3,627,697,962**	**505,192,483**

Note: Data are from Section 8 of Form R.

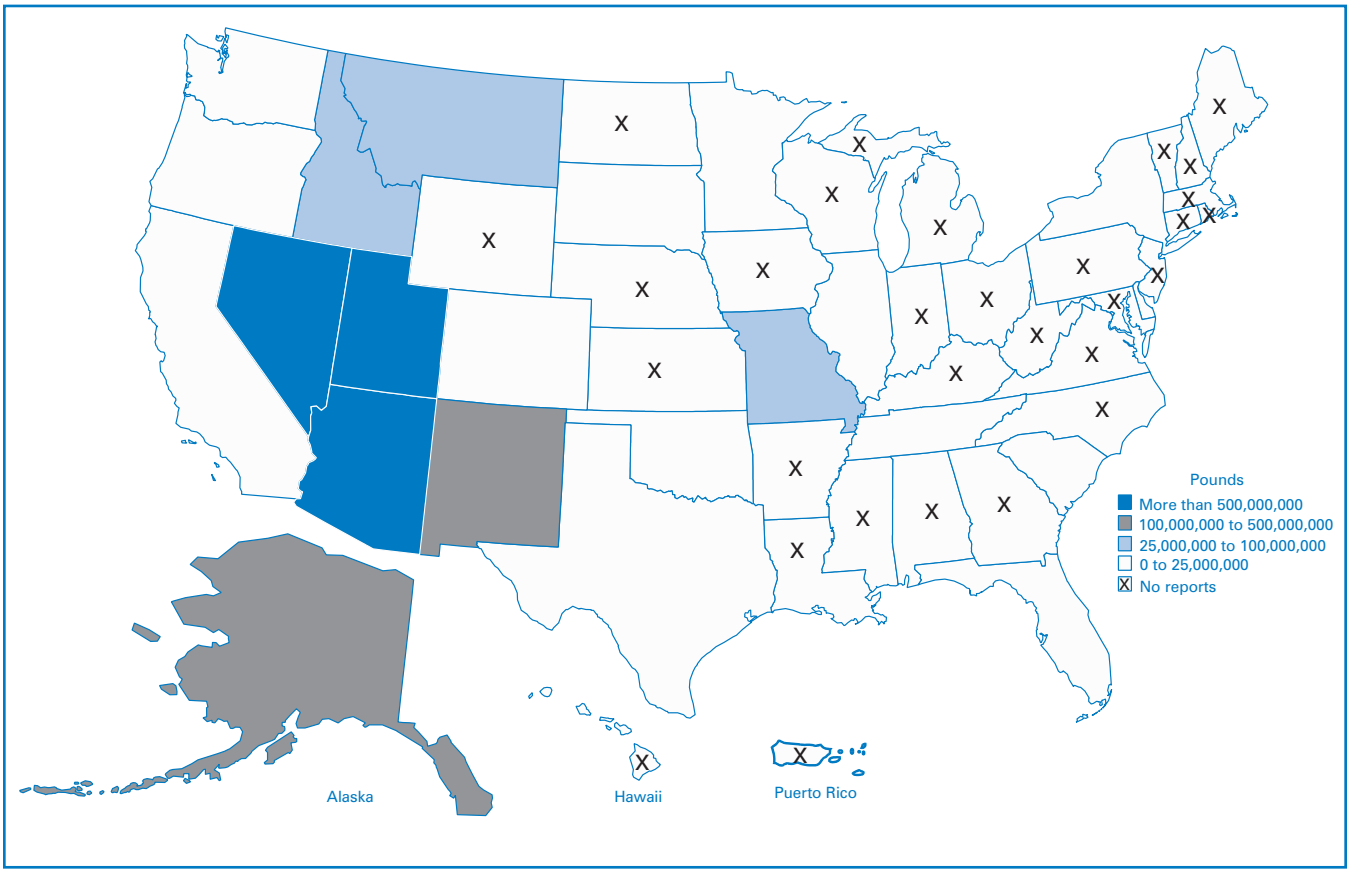
Waste Management Data

Nevada, Arizona, and Utah, the three states that ranked highest for total releases, also reported the largest amount of production-related waste in 1999. Nevada's production-related waste totaled 1.18 billion pounds. Arizona facilities reported 1.01 billion pounds, and Utah facilities reported 559.9 million pounds (see Table 4–12).

Quantities released on- and off-site accounted for more than 97 percent of total production-related waste in 15 states. Of these, Nevada, Arizona, and Utah reported the largest quantities: 1.16 billion pounds for Nevada, 1.01 billion pounds for Arizona, and 553.7 million pounds for Utah.

The states with the largest amounts of on-site recycling were Tennessee, with 9.6 million pounds, Utah, with 6.0 million pounds, and Nevada, with 5.5 million pounds. Oklahoma had the highest off-site recycling, 2.0 million pounds. Nevada reported the largest on-site treatment, 11.8 million pounds, followed by South Dakota, with 1.9 million pounds, and California, with about 724,000 pounds.

Map 4–1. Total On-site and Off-site Releases, 1999: Metal Mining



Top 15 Chemicals for On- and Off-site Releases

The top 15 chemicals released by the metal mining industry were metals, largely as metal compounds. On- and off-site releases of the top 15 chemicals totaled 3.95 billion pounds in 1999 (see Table 4–14). These 15 metals and metal compounds amounted to 99.3 percent of total releases from the industry.

The largest on- and off-site releases from the metal mining industry were of copper compounds, 1.71 billion pounds. Next largest was zinc compounds, with 678.5 million pounds. Arsenic compounds ranked third, with 549.9 million pounds.

On-site land releases accounted for 93 percent or more of the releases of all 15 chemicals. Underground injection, the second-largest release type, totaled 34.9 million pounds, of which 21.1 million pounds consisted of zinc compounds.

Projected Quantities of TRI Chemicals Managed in Waste, 1999–2001

Facilities in the metal mining industry expected to reduce their production-related waste by 18.7 percent between 1999 and 2001, from 3.63 billion pounds to 2.95 billion pounds. The projected overall reduction reflects expected decreases of 10.2 percent in 2000 and 9.4 percent in 2001 (see Table 4–15). The main change is expected to be in the quantity released on- and off-site, which dominates the industry totals. These

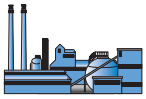


Table 4–13. TRI Total Releases by State, 1998–1999: Metal Mining

State	Total On-site and Off-site Releases			
	1998 Pounds	1999 Pounds	Change 1998-1999 Pounds	Change 1998-1999 Percent
Alaska	304,509,237	430,803,771	126,294,534	41.5
Arizona	1,005,845,908	904,365,140	–101,480,768	–10.1
California	5,947,616	3,126,980	–2,820,636	–47.4
Colorado	14,600,777	9,396,392	–5,204,385	–35.6
Delaware	12,713	3,826	–8,887	–69.9
Florida	0	0	0	—
Idaho	45,193,006	35,398,210	–9,794,796	–21.7
Illinois	609,917	1,747,016	1,137,099	186.4
Minnesota	0	20,728	20,728	—
Missouri	47,281,863	45,697,799	–1,584,064	–3.4
Montana	69,843,630	70,895,315	1,051,685	1.5
Nevada	1,311,271,215	1,159,617,847	–151,653,368	–11.6
New Mexico	226,009,646	233,363,245	7,353,599	3.3
New York	10,144,538	7,828,712	–2,315,826	–22.8
Oklahoma	0	20	20	—
Oregon	18,189,856	0	–18,189,856	–100.0
South Carolina	23,017,000	1,158,825	–21,858,175	–95.0
South Dakota	17,395,123	5,467,044	–11,928,079	–68.6
Tennessee	10,752,750	13,399,433	2,646,683	24.6
Texas	414,630	53,179	–361,451	–87.2
Utah	449,105,911	1,054,194,911	605,089,000	134.7
Washington	574,074	478,473	–95,601	–16.7
Total	**3,560,719,410**	**3,977,016,866**	**416,297,456**	**11.7**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

releases are projected to fall from 3.59 billion pounds in 1999 to 2.91 billion pounds in 2001. Even with this 18.9 percent reduction, quantity released, as a share of total production-related waste, was expected to decrease only slightly, from 98.9 percent to 98.7 percent. On- and off-site releases are the least-desirable outcome under the waste management hierarchy described in **Waste Management** in Chapter 1 (Figure 1–2).

Source Reduction

In 1999, the metal mining industry filed 32 forms reporting source reduction activity (see Table 4–16). As noted in **Waste Management** in Chapter 1, source reduction—an activity that prevents the generation of waste—is the preferred waste management option.

Facilities mining lead and zinc ores reported source reduction activity on 12 forms, 18.8 percent of the group's total Form Rs. Gold mining submitted 11 forms reporting source reduction activity, copper mining submitted 8 forms, and miscellaneous metals, 1 form.

The most frequently reported source reduction activity (identified on 24 forms, including 19 filed by lead and zinc mining facilities) was spill and leak prevention. Process modifications came next, with 13 forms, and good operating practices was third, with 9 forms.

Table 4–14. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1999: Metal Mining

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
—	Copper compounds	312,884	4,670	0	1,205,581	0	1,710,201,915	1,711,725,050	1,618	1,711,726,668
—	Zinc compounds	224,045	34,378	0	21,078,960	0	657,121,998	678,459,381	8,048	678,467,429
—	Arsenic compounds	57,401	6,057	0	880,034	0	548,995,573	549,939,065	263	549,939,328
—	Manganese compounds	71,727	10,505	0	1,100,000	0	373,166,213	374,348,445	1,964,332	376,312,777
—	Lead compounds	193,163	9,148	0	7,959,140	0	277,078,175	285,239,626	139	285,239,765
—	Chromium compounds	19,972	261	0	0	0	108,292,334	108,312,567	138,861	108,451,428
—	Barium compounds	8,741	25	0	1,900,000	0	91,548,207	93,456,973	25,170	93,482,143
—	Nickel compounds	6,021	3,340	0	41,007	0	39,562,810	39,613,178	5	39,613,183
7440-38-2	Arsenic	3,570	0	0	0	0	34,542,000	34,545,570	0	34,545,570
—	Antimony compounds	2,916	8,346	0	610,086	0	25,480,766	26,102,114	5	26,102,119
7440-50-8	Copper	9,714	5	0	0	0	11,139,279	11,148,998	0	11,148,998
—	Cobalt compounds	1,463	5	0	17,001	0	11,022,063	11,040,532	50	11,040,582
7440-47-3	Chromium	762	6	0	38,000	0	9,213,623	9,252,391	27	9,252,418
—	Cadmium compounds	18,434	754	0	100,000	0	8,571,734	8,690,922	255	8,691,177
—	Nitrate compounds	270	353,035	0	2,600	0	5,367,219	5,723,124	18	5,723,142
	Subtotal (top 15 chemicals)	**931,083**	**430,535**	**0**	**34,932,409**	**0**	**3,911,303,909**	**3,947,597,936**	**2,138,791**	**3,949,736,727**
	Total (all chemicals)	**4,452,614**	**447,029**	**0**	**35,092,409**	**0**	**3,934,845,946**	**3,974,837,998**	**2,178,868**	**3,977,016,866**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

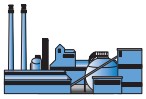


Table 4–15. Current Year and Projected Quantities of TRI Chemicals in Waste, 1999–2001: Metal Mining

Waste Management Activity	Current Year 1999		Projected 2000		Projected 2001	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
Recycled On-site	22,184,030	0.6	22,120,005	0.7	22,034,137	0.7
Recycled Off-site	3,305,817	0.1	3,214,707	0.1	3,198,617	0.1
Energy Recovery On-site	0	0.0	0	0.0	0	0.0
Energy Recovery Off-site	840	0.0	1,010	0.0	1,010	0.0
Treated On-site	14,978,477	0.4	14,685,590	0.5	14,273,070	0.5
Treated Off-site	14,784	0.0	14,945	0.0	14,945	0.0
Quantity Released On- and Off-site	3,587,214,014	98.9	3,217,644,294	98.8	2,910,564,928	98.7
Total Production-related Waste	**3,627,697,962**	**100.0**	**3,257,680,551**	**100.0**	**2,950,086,707**	**100.0**
Waste Management Activity	**Projected Change 1999-2000** Percent		**Projected Change 2000-2001** Percent		**Projected Change 1999-2001** Percent	
Recycled On-site	–0.3		–0.4		–0.7	
Recycled Off-site	–2.8		–0.5		–3.2	
Energy Recovery On-site	—		—		—	
Energy Recovery Off-site	20.2		0.0		20.2	
Treated On-site	–2.0		–2.8		–4.7	
Treated Off-site	1.1		0.0		1.1	
Quantity Released On- and Off-site	–10.3		–9.5		–18.9	
Total Production-related Waste	**–10.2**		**–9.4**		**–18.7**	

Note: Current year and projected amounts are from Section 8 of Form R for 1999.

Table 4–16. Number of Forms Reporting Source Reduction Activity, 1999: Metal Mining

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
1021	Copper Ores	167	8	4.8	1	0	4	0	5	0	0	0
1031	Lead and Zinc Ores	64	12	18.8	1	0	19	0	6	0	0	0
1041	Gold Ores	266	11	4.1	7	1	1	0	1	0	0	1
1044	Silver Ores	40	0	0.0	0	0	0	0	0	0	0	0
1061	Ferroalloy Ores, Except Vanadium	29	0	0.0	0	0	0	0	0	0	0	0
1099	Miscellaneous Metal Ores, n.e.c.*	18	1	5.6	0	0	0	0	1	0	0	0
	Multiple within SIC Code 10	37	0	0.0	0	0	0	0	0	0	0	0
	SIC Code 1021 and SIC Code 33 (Primary Metals)	30	0	0.0	0	0	0	0	0	0	0	0
	SIC Code 1021 and SIC Code 4931 (Electric Utilities)	16	0	0.0	0	0	0	0	0	0	0	0
	Total	**667**	**32**	**4.8**	**9**	**1**	**24**	**0**	**13**	**0**	**0**	**1**

Note: All source reduction activities on a form are counted in the corresponding category. Totals do not equal the sum of the categories because forms may report more than one source reduction activity. Forms that reported more than one 4-digit SIC Code within the SIC Code 10 are assigned to the multiple category.
*n.e.c.: not elsewhere classified.

Coal Mining (SIC Code 12)

Introduction

Coal mines in SIC code 12 include anthracite and bituminous mines, as listed in Box 4–3. They may be either surface or underground. Anthracite is a hard, compact coal differing from bituminous (or soft) coal in that it contains only a small amount of volatile matter and burns with a nearly smokeless flame. Most coal mined in the United States is bituminous. Production in the eastern United States is primarily from underground operations, and the bituminous coal found there typically has a high sulfur content. Anthracite is mined only in eastern Pennsylvania. No reports were received from anthracite mines in 1999.

Coal extraction activities are exempt from TRI reporting. Other coal mining activities, such as beneficiation, must be reported.

More details for this industry sector on products and services, employment and production, general environmental issues, processes involving toxic chemicals and the management of toxic chemicals in waste can be found in the *1998 Toxics Release Inventory Public Data Release* report (EPA 745-R-00-007).

1999 TRI Data for Coal Mining

On- and Off-site Releases

Coal mining facilities required to report to TRI released 11.8 million pounds of TRI chemicals on- and off-site in 1999, as shown in Table 4–17. Most of this amount, 9.6 million pounds, was released on-site to land. (Types of on-site land releases are described in Box 1–4 in Chapter 1.) Figure 4–4 shows that the category other on-site releases to land amounted to 81.7 percent of the industry's total releases.

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

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

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

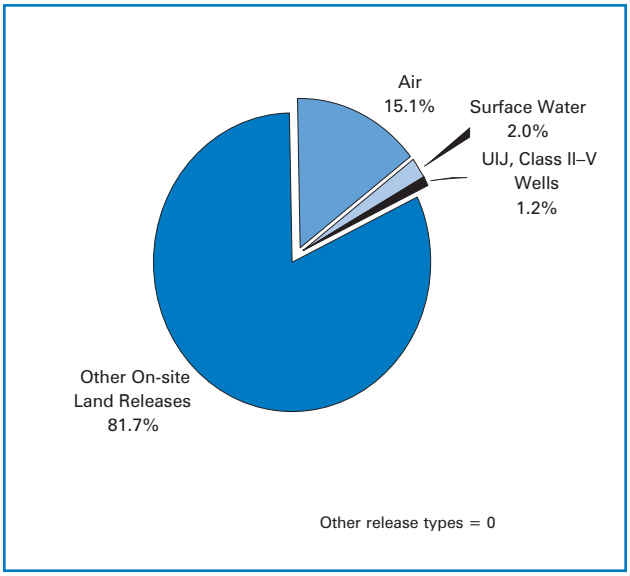
Table 4–17. TRI On-site and Off-site Releases by 4-digit SIC Code, 1999: Coal Mining

SIC Code	Industry	Total Forms	On-site Releases							Off-site Releases	
			Total Air Emissions	Surface Water Discharges	Underground Injection		On-site Land Releases		Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
					Class I Wells	Class II–V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases			
		Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1221	Bituminous Coal and Lignite Surface Mining	120	1,645,977	174,894	0	0	0	7,798,849	9,619,720	0	9,619,720
1222	Bituminous Coal Underground Mining	83	66,670	20,975	0	143,700	0	1,809,474	2,040,819	0	2,040,819
	Multiple within SIC code 12	2	58,901	39,398	0	0	0	0	98,299	0	98,299
	Total	**205**	**1,771,548**	**235,267**	**0**	**143,700**	**0**	**9,608,323**	**11,758,838**	**0**	**11,758,838**

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release. Forms that reported more than one 4-digit SIC code within SIC code 12 are assigned to the "multiple codes" category.

Air emissions by coal mines totaled 1.8 million pounds, the industry's second-largest release type (15.1 percent of total releases). The coal mining industry reported less than 250,000 pounds each of surface water discharges and underground injection. No off-site releases were reported.

Figure 4–4. Distribution of TRI On-site and Off-site Releases, 1999: Coal Mining



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

Bituminous coal and lignite surface mines reported the largest total releases, 9.6 million pounds. Underground coal mining facilities reported 2.0 million pounds of total releases. On-site releases to land predominated, with 7.8 million pounds from surface mines and 1.8 million pounds from underground mines.

Surface and underground mining accounted for most of the 205 forms submitted in the coal mining industry. Surface coal mines submitted 120 forms, and underground coal mines submitted 83 forms. No reports were received from anthracite mines in 1999; as previously noted, this type of coal is found only in eastern Pennsylvania.

Two forms were submitted with multiple SIC codes in SIC code 12 (coal mining). Releases reported by the multiple-codes group totaled less than 100,000 pounds.

Table 4–18 shows changes in releases by the coal mining industry between 1998 and 1999. Total on-site and off-site releases

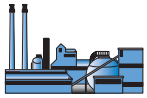


Table 4–18. TRI On-site and Off-site Releases, 1998–1999: Coal Mining

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
On-site Releases				
Total Air Emissions	1,105,245	1,771,548	666,303	60.3
Fugitive Air Emissions	453,341	1,716,321	1,262,980	278.6
Point Source Air Emissions	651,904	55,227	–596,677	–91.5
Surface Water Discharges	307,057	235,267	–71,790	–23.4
Underground Injection	90,480	143,700	53,220	58.8
Class I Wells	0	0	0	—
Class II–V Wells	90,480	143,700	53,220	58.8
On-site Land Releases	11,522,112	9,608,323	–1,913,789	–16.6
RCRA Subtitle C Landfills	0	0	0	—
Other On-site Landfills	8,162,856	6,381,871	–1,780,985	–21.8
Land Treatment	428,601	454,244	25,643	6.0
Surface Impoundments	2,493,943	2,456,027	–37,916	–1.5
Other Disposal	436,712	316,181	–120,531	–27.6
Total On-site Releases	**13,024,894**	**11,758,838**	**–1,266,056**	**–9.7**
Off-site Releases				
Storage Only[a]	0	0	0	—
Solidification/Stabilization[b]	0	0	0	—
Metals and Metal Compounds Only				—
Wastewater Treatment (excluding POTWs)[c]	0	0	0	—
Metals and Metal Compounds Only				—
Transfers to POTWs[d]	0	0	0	—
Metals and Metal Compounds Only				—
Underground injection	0	0	0	—
Landfills/Surface Impoundments	0	0	0	—
Land Treatment	0	0	0	—
Other Land Disposal	0	0	0	—
Other Off-site Management	0	0	0	—
Transfers to Waste Broker for Disposal	0	0	0	—
Unknown[e]	0	0	0	—
Total Off-site Releases (Transfers Off-site to Disposal)	**0**	**0**	**0**	**—**
Total On-site and Off-site Releases	**13,024,894**	**11,758,838**	**–1,266,056**	**–9.7**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

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

[b] Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it such transfers are included as a form of disposal (off-site release). See Box 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.

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

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

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

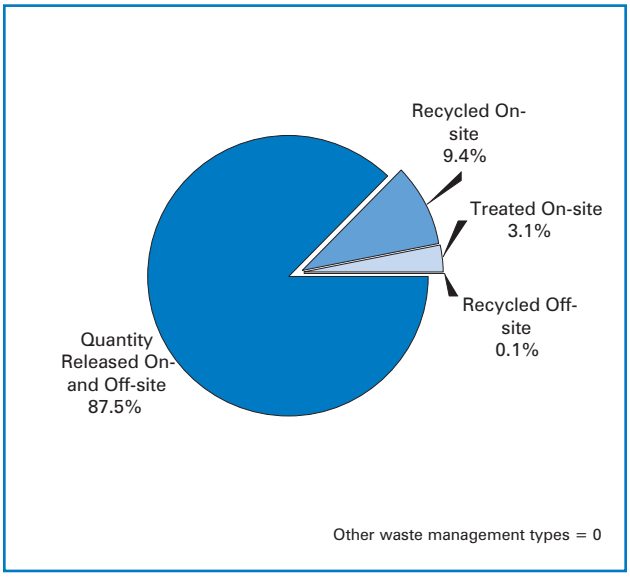
declined by 1.3 million pounds, or 9.7 percent. Total air emissions rose 60.3 percent, from 1.1 million pounds to 1.8 million pounds. Surface water discharges decreased 23.4 percent, and underground injection rose 58.8 percent, but both amounts were relatively modest. On-site land releases fell 16.6 percent, from 11.5 million pounds to 9.6 million pounds; within this category, the largest decrease was on-site releases to other than RCRA subtitle C landfills, a decline of 1.8 million pounds, or 21.8 percent.

Waste Management Data

Quantities of TRI Chemicals in Waste

Coal mines reported managing 12.2 million pounds of total production-related waste in 1999, as shown in Table 4–19. The quantity released on- and off-site totaled 10.6 million pounds, or 87.5 percent of the industry's production-related waste (see Figure 4–5). The industry's on-site treatment totaled about 377,000 pounds. On-site recycling amounted to 1.1 million pounds.

Figure 4–5. TRI Waste Management, 1999: Coal Mining



Note: Data are from Section 8 of Form R.

Surface mines managed 9.7 million pounds of total production-related waste, including 8.5 million pounds released on- and off-site. Underground mines managed a total of 2.4 million pounds, including 2.0 million pounds released on- and off-site. All of the less than 100,000 pounds of releases reported by the multiple-codes group was released on- and off-site.

Table 4–19. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1999: Coal Mining

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site	Off-site	On-site	Off-site	On-site	Off-site			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1221	Bituminous Coal and Lignite Surface Mining	1,130,070	6,753	0	0	36,642	0	8,495,746	9,669,211	34
1222	Bituminous Coal Underground Mining	7,900	0	0	0	339,900	0	2,038,428	2,386,228	0
	Multiple within SIC Code 12	0	0	0	0	0	0	98,299	98,299	0
	Total	**1,137,970**	**6,753**	**0**	**0**	**376,542**	**0**	**10,632,473**	**12,153,738**	**34**

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

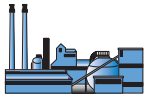


Table 4–20. Quantities of TRI Chemicals in Waste, 1998–1999: Coal Mining

Waste Management Activity	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Recycled On-site	44,417	1,137,970	1,093,553	2,462.0
Recycled Off-site	0	6,753	6,753	—
Energy Recovery On-site	0	0	0	—
Energy Recovery Off-site	43,735	0	–43,735	–100.0
Treated On-site	458,544	376,542	–82,002	–17.9
Treated Off-site	0	0	0	—
Quantity Released On- and Off-site	12,976,368	10,632,473	–2,343,895	–18.1
Total Production-related Waste	**13,523,064**	**12,153,738**	**–1,369,326**	**–10.1**
Non-production-related Waste	39	34	–5	–12.8

Note: All data are from Section 8 of Form R for the year indicated.

Table 4–20 shows the change in quantities of TRI chemicals in waste managed between 1998 and 1999. Total production-related waste decreased 10.1 percent. The largest percentage increase, although from a small base, was 2,462.0 percent for on-site recycling. The largest absolute decrease was for on- and off-site releases, from 13.0 million pounds to 10.6 million pounds, or 18.1 percent. Off-site energy recovery fell 100 percent—to zero. On-site treatment decreased 17.9 percent.

Transfers Off-site for Further Waste Management/Disposal

Bituminous coal and lignite surface mines transferred 6,753 pounds off-site to recycling (see Table 4–21). No other type of coal mining reported off-site transfers for further waste management.

Table 4–22 shows changes in these transfers between 1998 and 1999. Transfers to recycling dropped by 84.6 percent.

Table 4–21. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1999: Coal Mining

SIC Code	Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs		Other Off-site Transfers*	Other Transfers Off-site to Disposal**	Total Transfers for Further Waste Management/ Disposal
					Metals and Metal Compounds	Non-metal TRI Chemicals			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1221	Bituminous Coal and Lignite Surface Mining	6,753	0	0	0	0	0	0	6,753
1222	Bituminous Coal Underground Mining	0	0	0	0	0	0	0	0
	Multiple within SIC Code 12	0	0	0	0	0	0	0	0
	Total	**6,753**	**0**	**0**	**0**	**0**	**0**	**0**	**6,753**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R. Forms that reported more than one 4-digit SIC Code within SIC Code 12 are assigned to the multiple codes category.
*Other Off-site Transfers are transfers reported without a valid waste management code.
**Does not include transfers to POTWs of metals and metal compounds.

Table 4–22. TRI Transfers Off-site for Further Waste Management/Disposal, 1998–1999: Coal Mining

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Transfers to Recycling	43,735	6,753	–36,982	–84.6
Transfers to Energy Recovery	0	0	0	—
Transfers to Treatment	0	0	0	—
Transfers to POTWs	0	0	0	—
Metals and Metal Compounds Only	0	0	0	—
Non-metal TRI Chemicals	0	0	0	—
Other Off-site Transfers*	0	0	0	—
Other Off-site Transfers to Disposal**	0	0	0	—
Total Transfers Off-site for Further Waste Management/Disposal	**43,735**	**6,753**	**-36,982**	**-84.6**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
* Other Off-site Transfers are transfers reported without a valid waste management code.
** Does not include transfers to POTWs of metals and metal compounds.

TRI Data by State

Coal mines in 13 states reported to TRI in 1999. The states with the largest number of forms from coal mining facilities were Ohio (61 forms), Illinois (52 forms), and New Mexico (23 forms).

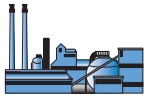
On- and Off-site Releases

As shown in Table 4–23, coal mining facilities in New Mexico reported the largest total on- and off-site releases in 1999, with 4.3 million pounds, all on-site to land. Illinois ranked second, with 2.7 million pounds of total releases, nearly all on-site to land. Together, New Mexico and Illinois facilities reported 72.7 percent of the coal mining industry's 9.6 million pounds of other on-site land releases (the majority of total releases). Colorado ranked third among states for coal mining releases, with

Table 4–23. Summary of TRI Information by State, 1999: Coal Mining

		On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
State	Total Forms	Total Air Emissions	Surface Water Discharges	Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	2	19	96	0	109,000	0	337	109,452	0	109,452
Colorado	7	430	127	0	0	0	2,037,119	2,037,676	0	2,037,676
Illinois	52	1,340	11,098	0	0	0	2,642,435	2,654,873	0	2,654,873
Indiana	18	1,152,469	0	0	0	0	107,641	1,260,110	0	1,260,110
Maryland	5	12,733	1,515	0	34,700	0	42,150	91,098	0	91,098
Montana	1	0	0	0	0	0	12,217	12,217	0	12,217
New Mexico	23	0	0	0	0	0	4,345,334	4,345,334	0	4,345,334
North Dakota	2	0	0	0	0	0	145,225	145,225	0	145,225
Ohio	61	2,390	1,502	0	0	0	750	4,642	0	4,642
Pennsylvania	11	36,600	0	0	0	0	187,682	224,282	0	224,282
Virginia	1	9,100	0	0	0	0	1,000	10,100	0	10,100
West Virginia	19	556,467	220,929	0	0	0	86,433	863,829	0	863,829
Wyoming	3	0	0	0	0	0	0	0	0	0
Total	**205**	**1,771,548**	**235,267**	**0**	**143,700**	**0**	**9,608,323**	**11,758,838**	**0**	**11,758,838**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Off-site Releases do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.



2.0 million pounds; almost all of these releases were on-site to land.

The largest air emissions were for Indiana, 1.2 million pounds out of a total 1.8 million pounds for this type of release. West Virginia had the second largest quantity of air emissions, about 556,000 pounds, and the largest surface water emissions, nearly 221,000 pounds.

Map 4–2 shows the geographic distribution of coal mining releases reported to TRI in 1999.

Table 4–24 shows changes in coal mining releases, by state, between 1998 and 1999. Total releases fell by 9.7 percent. The largest absolute decreases were 1.3 million pounds in New Mexico (a decline of 22.7 percent), almost a million pounds in Alabama (89.4 percent), and about 575,000 pounds in West Virginia (40.0 percent). The largest increase was 1.2 million pounds in Indiana, a rise of 1,571.9 percent.

Waste Management Data

New Mexico, Illinois, Colorado, and Indiana ranked highest among the states for total production-related waste reported by the coal mining industry (see Table 4–23). New Mexico facilities managed 4.3 million pounds of production-related waste. This consisted entirely of quantities released on- and off-site. Illinois reported 2.7 million pounds of production-related waste, almost all of it released on- and off-site. All of Colorado's 2.0 million pounds of waste managed was released on- and off-site. Of Indiana's 1.3 million pounds of waste managed, 89.1 percent was recycled on-site.

Quantities released on- and off-site amounted to more than 90 percent of production-related waste in 7 of the 12 states:

Table 4–23. Summary of TRI Information by State, 1999: Coal Mining *(continued)*

State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
Alabama	3,900	0	0	0	4,100	0	109,000	117,000	0
Colorado	0	0	0	0	0	0	2,037,000	2,037,000	0
Illinois	0	0	0	0	94,400	0	2,653,838	2,748,238	0
Indiana	1,129,120	0	0	0	0	0	137,645	1,266,765	16
Maryland	0	0	0	0	43,000	0	90,255	133,255	0
Montana	0	6,753	0	0	0	0	12,217	18,970	1
New Mexico	0	0	0	0	0	0	4,345,334	4,345,334	12
North Dakota	0	0	0	0	0	0	145,225	145,225	0
Ohio	4,950	0	0	0	5,500	0	4,540	14,990	0
Pennsylvania	0	0	0	0	154,900	0	226,683	381,583	5
Virginia	0	0	0	0	0	0	10,100	10,100	0
West Virginia	0	0	0	0	74,642	0	860,636	935,278	0
Wyoming	0	0	0	0	0	0	0	0	0
Total	**1,137,970**	**6,753**	**0**	**0**	**376,542**	**0**	**10,632,473**	**12,153,738**	**34**

Note: Data are from Section 8 of Form R.

Map 4–2. Total On-site and Off-site Releases, 1999: Coal Mining

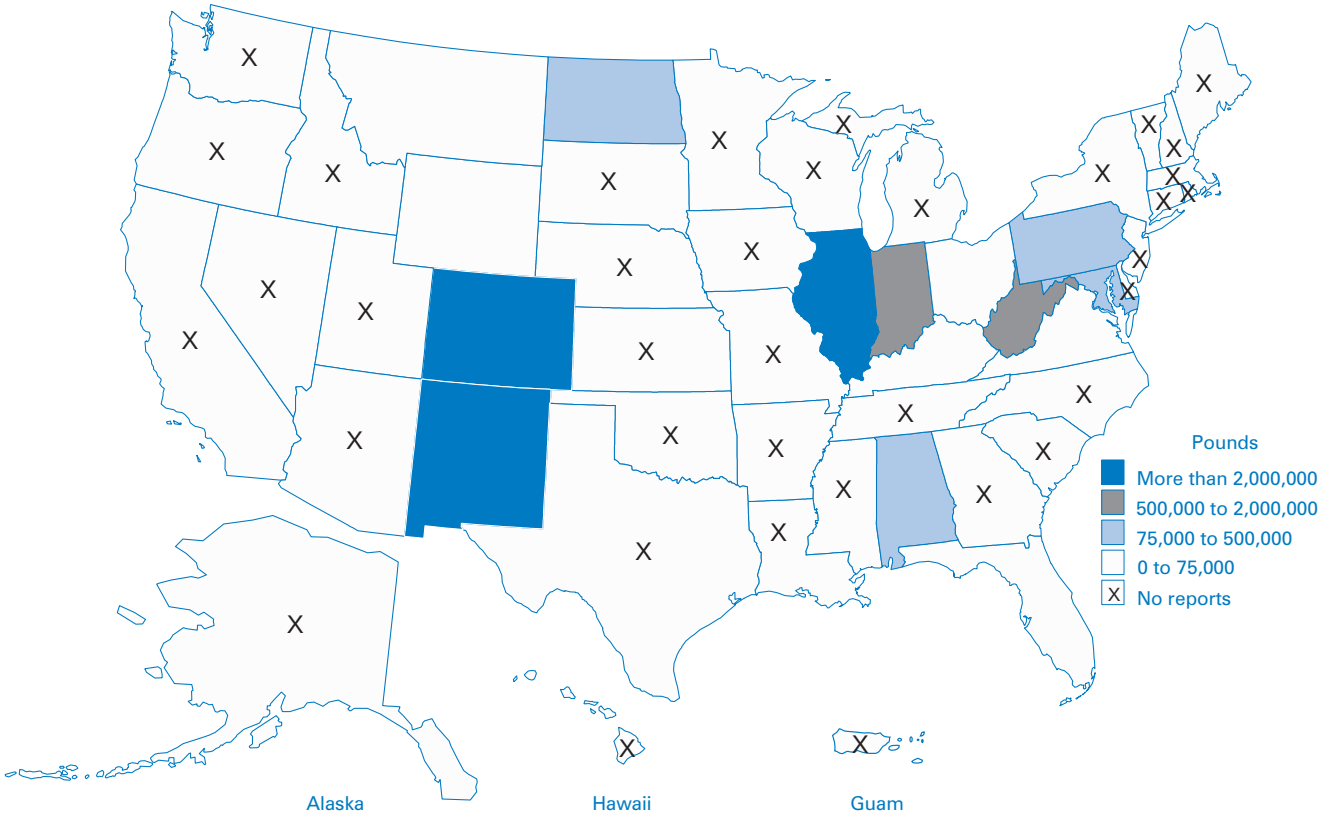
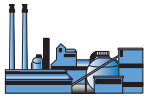


Table 4–24. TRI Total Releases by State, 1998–1999: Coal Mining

State	Total On-site and Off-site Releases			
	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Alabama	1,030,087	109,452	–920,635	–89.4
Colorado	1,593,746	2,037,676	443,930	27.9
Illinois	2,766,360	2,654,873	–111,487	–4.0
Indiana	75,371	1,260,110	1,184,739	1,571.9
Kentucky	19,588	0	–19,588	–100.0
Maryland	60,023	91,098	31,075	51.8
Montana	0	12,217	12,217	—
New Mexico	5,620,000	4,345,334	–1,274,666	–22.7
North Dakota	96,707	145,225	48,518	50.2
Ohio	3,642	4,642	1,000	27.5
Pennsylvania	318,563	224,282	–94,281	–29.6
Virginia	1,810	10,100	8,290	458.0
West Virginia	1,438,997	863,829	–575,168	–40.0
Wyoming	0	0	0	—
Total	**13,024,894**	**11,758,838**	**–1,266,056**	**–9.7**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.



Alabama, Colorado, Illinois, New Mexico, North Dakota, Virginia, and West Virginia.

Coal mines reported much smaller quantities in other waste management activities. The largest single such item was Indiana's 1.1 million pounds of on-site recycling. On-site treatment accounted for 75,000–155,000 pounds of waste in Pennsylvania, Illinois, and West Virginia and for lesser quantities in Maryland, Ohio, and Alabama.

Top 15 Chemicals for On- and Off-site Releases

Table 4–25 presents data for the 15 chemicals released in the largest amounts by TRI coal mining facilities. Coal mines reported releasing more barium compounds, 5.7 million pounds, than any other chemical. They also reported releases of 1.7 million pounds of manganese compounds and just over 1 million pounds each of aluminum and of zinc compounds.

Table 4–25. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1999: Coal Mining

CAS Number	Chemical	Total Air Emissions (Pounds)	Surface Water Discharges (Pounds)	Underground Injection: Class I Wells (Pounds)	Underground Injection: Class II-V Wells (Pounds)	On-site Land Releases: RCRA Subtitle C Landfills (Pounds)	On-site Land Releases: Other On-site Land Releases (Pounds)	Total On-site Releases (Pounds)	Off-site Releases: Transfers Off-site to Disposal (Pounds)	Total On- and Off-site Releases (Pounds)
—	Barium compounds	436	144	0	82,400	0	5,638,016	5,720,996	0	5,720,996
—	Manganese compounds	642	49,389	0	50,500	0	1,590,560	1,691,091	0	1,691,091
7429-90-5	Aluminun (fume or dust)	1,013,539	0	0	0	0	0	1,013,539	0	1,013,539
—	Zinc compounds	38	27	0	10,800	0	998,549	1,009,414	0	1,009,414
7664-41-7	Ammonia	588,058	184,811	0	0	0	179,901	952,770	0	952,770
—	Copper compounds	12	5	0	0	0	288,155	288,172	0	288,172
—	Lead compounds	10	15	0	0	0	241,150	241,175	0	241,175
—	Chromium compounds	23	5	0	0	0	175,822	175,850	0	175,850
—	Nickel compounds	19	5	0	0	0	139,840	139,864	0	139,864
—	Arsenic compounds	0	864	0	0	0	120,914	121,778	0	121,778
7723-14-0	Phosphorus (yellow or white)	75,121	0	0	0	0	0	75,121	0	75,121
—	Cobalt compounds	0	0	0	0	0	64,080	64,080	0	64,080
7440-39-3	Barium	27,425	0	0	0	0	12,908	40,333	0	40,333
—	Beryllium compounds	0	0	0	0	0	39,224	39,224	0	39,224
—	Selenium compounds	0	0	0	0	0	34,453	34,453	0	34,453
	Subtotal (top 15 chemicals)	**1,705,323**	**235,265**	**0**	**143,700**	**0**	**9,523,572**	**11,607,860**	**0**	**11,607,860**
	Total (all chemicals)	**1,771,548**	**235,267**	**0**	**143,700**	**0**	**9,608,323**	**11,758,838**	**0**	**11,758,838**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

For barium compounds, ranked first, manganese, ranked second, and zinc compounds, ranked fourth, on-site land releases predominated. All the aluminum releases were to air. For manganese compounds, coal mines released about 50,000 pounds each to surface water and to Class II–V wells, in addition to 1.6 million pounds of on-site releases to land.

Releases of the 15 chemicals totaled 11.61 million pounds, 98.7 percent of the industry's total of 11.76 million pounds of releases.

Projected Quantities of TRI Chemicals Managed in Waste, 1999–2001

Table 4–26 shows the coal mining industry's expected changes in quantities released on- and off-site between 1999 and 2001. Facilities reporting to TRI expected to increase their production-related waste slightly during that period, from a total of 12.15 million pounds to 12.24 million pounds, or 0.7 percent. The projected increase represents a reduction of 0.2 percent in 2000 followed by an increase of 0.9 percent in 2001.

The projections indicate little change in waste management practices except for a decrease in off-site recycling of 11.2 percent. The quantity released on- and off-site—the least-desirable outcome under the waste management hierarchy described in **Waste Management** in Chapter 1 (Figure 1–2)—would rise slightly, from 87.5 percent of total production-related waste in 1999 to 87.6 percent in 2001.

Source Reduction

As noted in **Waste Management** in Chapter 1, source reduction—activity that prevents the generation of waste—is the preferred waste management option. No coal mining facility reported any source reduction activity undertaken in 1999.

Table 4–26. Current Year and Projected Quantities of TRI Chemicals in Waste, 1999–2001: Coal Mining

Waste Management Activity	Current Year 1999		Projected 2000		Projected 2001	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
Recycled On-site	1,137,970	9.4	1,127,640	9.3	1,127,640	9.2
Recycled Off-site	6,753	0.1	6,000	0.0	6,000	0.0
Energy Recovery On-site	0	0.0	0	0.0	0	0.0
Energy Recovery Off-site	0	0.0	0	0.0	0	0.0
Treated On-site	376,542	3.1	383,900	3.2	383,900	3.1
Treated Off-site	0	0.0	0	0.0	0	0.0
Quantity Released On- and Off-site	10,632,473	87.5	10,609,017	87.5	10,719,427	87.6
Total Production-related Waste	**12,153,738**	**100.0**	**12,126,557**	**100.0**	**12,236,967**	**100.0**
Waste Management Activity	**Projected Change 1999-2000** Percent		**Projected Change 2000-2001** Percent		**Projected Change 1999-2001** Percent	
Recycled On-site	–0.9		0.0		–0.9	
Recycled Off-site	–11.2		0.0		–11.2	
Energy Recovery On-site	—		—		—	
Energy Recovery Off-site	—		—		—	
Treated On-site	2.0		0.0		2.0	
Treated Off-site	—		—		—	
Quantity Released On- and Off-site	–0.2		1.0		0.8	
Total Production-related Waste	**-0.2**		**0.9**		**0.7**	

Note: Current year and projected amounts are from Section 8 of Form R for 1999.

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

Introduction

Electric utilities may use a variety of fuels to generate electricity, but only facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce must report to TRI. These facilities report under SIC codes 4911, 4931, and 4939, as identified in Box 4–4. Other electric utilities in these SIC codes—those fueled only by natural gas, nuclear, hydroelectric, or other sources—are not required to report. Electric power generation by utilities takes place across the United States. The states with the highest utility net generation are those with the largest population densities and industrial centers: California, Texas, Illinois, Ohio, Pennsylvania, and Florida. Different areas of the country use different energy sources. Coal and petroleum-fired power plants are found in the East, while gas-fired plants are located in the coastal South.

More details for this industry sector on products and services, employment and production, general environmental issues, processes involving toxic chemicals and the management of toxic chemicals in waste can be found in the *1998 Toxics Release Inventory Public Data Release* report (EPA 745-R-00-007).

Box 4–4. SIC Codes 493, Combination Electric and Gas, and Other Utility Services: Codes and Classifications Required to Report to TRI

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

4911	Electric Services	Generation, transmission, and/or distribution of electric energy for sale.
4931	Electric and Other Services Combined	Mining, milling or otherwise preparing lead ores, zinc ores, or lead-zinc ores.
4939	Combination Utilities, Not Elsewhere Classified	Providing combinations of electric, gas, and other services, not elsewhere classified.

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

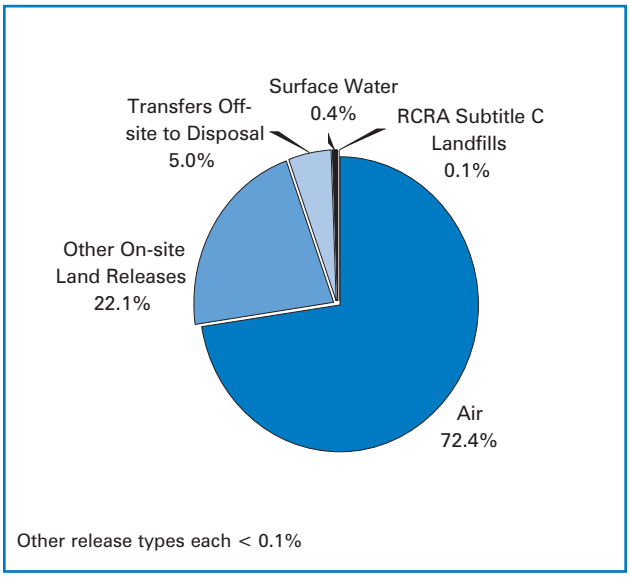
1999 TRI Data for Electric Utilities

On- and Off-site Releases

Electric utilities required to report to TRI reported 1.16 billion pounds of TRI chemicals released on- and off-site in 1999, as shown in Table 4–27. The bulk, 841.9 million pounds, was in the form of air emissions, which constituted 72.4 percent of the industry's total releases (see Figure 4–6.)

The electric utilities' second-largest release type was other on-site land releases (that is, other than to RCRA subtitle C landfills), which totaled 256.8 million pounds, or 22.1 percent of total releases. (Types of on-site land releases are described in Box 1–4 in Chapter 1.) Electric utilities reported 58.0 million pounds released off-site as transfers to disposal, 4.5 million pounds of surface water discharges, 1.3 million pounds of on-site releases to RCRA subtitle C landfills, and only 5 pounds of underground injection.

Figure 4–6. Distribution of TRI On-site and Off-site Releases, 1999: Electric Utilities



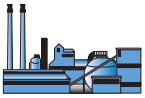
Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

Facilities providing only electric services reported the largest total releases in this industry, with 1.11 billion pounds, or 95.1 percent of the electric utility industry total.

Table 4–27. TRI On-site and Off-site Releases by 4-digit SIC Code, 1999: Electric Utilities

SIC Code	Industry	Total Forms	On-site Releases						Total On-site Releases	Off-site Releases	Total On- and Off-site Releases
			Total Air Emissions	Surface Water Discharges	Underground Injection: Class I Wells	Underground Injection: Class II–V Wells	On-site Land Releases: RCRA Subtitle C Landfills	On-site Land Releases: Other On-site Land Releases		Transfers Off-site to Disposal	
		Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
4911	Electric Services	3,892	814,112,292	4,447,239	0	5	1,298,989	231,879,643	1,051,738,168	53,653,606	1,105,391,774
4931	Electric and Other Services Combined	120	7,138,195	14,386	0	0	0	207,965	7,360,546	2,501,335	9,861,881
4939	Combination Utilities, n.e.c.*	22	1,405,657	0	0	0	0	0	1,405,657	368,591	1,774,248
	Multiple within SIC Code 49	30	672,931	54	0	0	0	148,786	821,771	414,983	1,236,754
	SIC Code 4911 and SIC Code 12 (Coal Mining)	153	18,440,286	48,359	0	0	0	24,585,757	43,074,402	327,448	43,401,850
	SIC Code 4911 and SIC Code 28 (Chemicals)	8	150,459	0	0	0	0	0	150,459	692,280	842,739
	Total	**4,225**	**841,919,820**	**4,510,038**	**0**	**5**	**1,298,989**	**256,822,151**	**1,104,551,003**	**57,958,243**	**1,162,509,246**

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release. Forms that reported more than one 4-digit SIC Code within SIC Code 49 are assigned to the multiple codes category.
*n.e.c.: not elsewhere classified.



These facilities reported 1.05 billion pounds of total on-site releases—largely air emissions (814.1 million pounds), other on-site land releases (231.9 million pounds), and surface water discharges (4.4 million pounds. They reported 53.7 million pounds of off-site releases (transfers to disposal).

The second ranked group within the electric utility industry was facilities that generate electricity in combination with coal mining. They accounted for 43.4 million pounds, or 3.7 percent of total releases from electric utilities. Their releases were mainly in the form of other on-site land releases (24.6 million pounds) and air emissions (18.4 million pounds).

Table 4–28 shows changes in releases by electric utilities reporting between 1998 and 1999. Total on- and off-site releases increased by 2.2 percent. On-site releases were 2.8 percent higher. The largest absolute change in on-site releases was a 43.5 million pound (5.4 percent) increase in total air emissions, mainly point source emissions. On-site land releases were 11.8 million pounds (4.4 percent) lower in 1999 than in 1998. Off-site releases fell by 8.2 percent, from 63.1 million pounds to 58.0 million pounds. The largest absolute decrease was in landfills/surface impoundments (4.1 million pounds, or 10.3 percent).

Waste Management Data

Quantities of TRI Chemicals in Waste

Electric utilities reported managing 1.65 billion pounds of total production-related waste in 1999, as shown in Table 4–29. The quantity released on- and off-site totaled 1.17 billion pounds, or 71.1 percent of the industry's production-related waste (see Figure 4–7). The industry's on-site treatment amounted to 463.6 million pounds, or 28.1 percent of the total. Off-site recycling accounted for 7.6 million pounds and on-site energy recovery for 5.3 million pounds.

Facilities providing only electric services managed 1.54 billion pounds of total production-related waste, including 1.12 billion pounds released on- and off-site. Facilities combining electric services and coal mining operations managed a total of 87.6 million pounds, including 43.4 million pounds released on- and off-site and 42.6 million pounds treated on-site.

Table 4–30 shows the changes in the quantities of TRI chemicals in waste from electric utilities between 1998 and 1999. Total production-related waste increased by 5.1 percent. The main increases were in on-site treatment (a rise of 40.9 million pounds, or 9.7 percent) and in quantity released on- and off-site (up by 38.4 million pounds, or 3.4 percent). On-site energy recovery fell by 2.8 million pounds, or 34.2 percent.

Transfers Off-site for Further Waste Management/Disposal

Electric utilities reported 65.3 million pounds of transfers off-site for further waste management and disposal in 1999, as shown in Table 4–31. Figure 4–8 shows that other transfers to disposal by reporting electric utilities accounted for 92.9 percent of all transfers for further waste management and disposal for this industry; the amount was 60.6 million pounds. Total transfers to recycling were 4.2 million pounds or 6.4 percent of total transfers off-site. Facilities providing only electric

Table 4–28. TRI On–site and Off-site Releases, 1998–1999: Electric Utilities

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
On-site Releases				
Total Air Emissions	798,428,091	841,919,820	43,491,729	5.4
Fugitive Air Emissions	672,902	471,510	–201,392	–29.9
Point Source Air Emissions	797,755,189	841,448,310	43,693,121	5.5
Surface Water Discharges	6,086,113	4,510,038	–1,576,075	–25.9
Underground Injection	80,418	5	–80,413	–100.0
Class I Wells	18	0	–18	–100.0
Class II–V Wells	80,400	5	–80,395	–100.0
On-site Land Releases	269,887,886	258,121,140	–11,766,746	–4.4
RCRA Subtitle C Landfills	1,033,076	1,298,989	265,913	25.7
Other On-site Landfills	132,489,492	125,449,297	–7,040,195	–5.3
Land Treatment	852,400	1,403,445	551,045	64.6
Surface Impoundments	131,149,107	125,388,324	–5,760,783	–4.4
Other Disposal	4,363,811	4,581,085	217,274	5.0
Total On-site Releases	**1,074,482,508**	**1,104,551,003**	**30,068,495**	**2.8**
Off-site Releases				
Storage Only[a]	593,430	327,673	–265,757	–44.8
Solidification/Stabilization[b]	3,096,250	2,174,985	–921,265	–29.8
Metals and Metal Compounds Only				
Wastewater Treatment (excluding POTWs)[c]	4,333	120,425	116,092	2,679.3
Metals and Metal Compounds Only				
Transfers to POTWs[d]	5,807	3,569	–2,238	–38.5
Metals and Metal Compounds Only				
Underground injection	158,000	57,000	–101,000	–63.9
Landfills/Surface Impoundments	39,813,240	35,724,945	–4,088,295	–10.3
Land Treatment	486,892	598,862	111,970	23.0
Other Land Disposal	11,550,699	10,216,363	–1,334,336	–11.6
Other Off-site Management	6,878,619	8,260,469	1,381,850	20.1
Transfers to Waste Broker for Disposal	549,307	432,620	–116,687	–21.2
Unknown[e]	4,276	41,332	37,056	866.6
Total Off-site Releases (Transfers Off-site to Disposal)	**63,140,853**	**57,958,243**	**-5,182,610**	**-8.2**
Total On-site and Off-site Releases	**1,137,623,361**	**1,162,509,246**	**24,885,885**	**2.2**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

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

[b] Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it such transfers are included as a form of disposal (off-site release). See Box 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.

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

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

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

Table 4–29. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1999: Electric Utilities

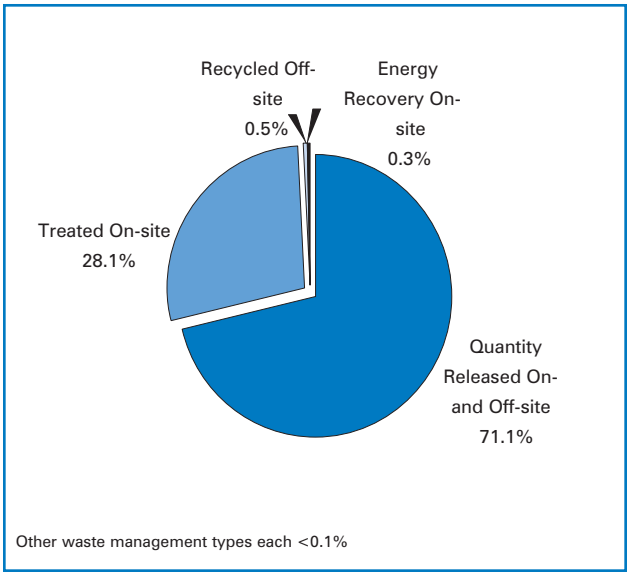
SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
4911	Electric Services	786,720	5,623,200	0	42,200	413,706,821	441,961	1,117,304,751	1,537,905,653	318,147
4931	Electric and Other Services Combined	0	317,477	9,780	0	4,519,674	0	9,320,577	14,167,508	30
4939	Combination Utilities, n.e.c.*	0	6	5,294,470	0	50,296	0	1,673,485	7,018,257	1
	Multiple within SIC Code 49	0	0	0	0	2,737,392	0	1,164,046	3,901,438	0
	SIC Code 4911 and SIC Code 12 (Coal Mining)	0	1,631,100	0	0	42,580,252	0	43,357,103	87,568,455	0
	SIC Code 4911 and SIC Code 28 (Chemicals)	0	0	0	0	0	0	841,000	841,000	0
	Total	**786,720**	**7,571,783**	**5,304,250**	**42,200**	**463,594,435**	**441,961**	**1,173,660,962**	**1,651,402,311**	**318,178**

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

services reported 58.9 million pounds, 90.2 percent of all transfers for further waste management and disposal for this industry sector.

Table 4–32 shows changes in the disposition of off-site transfers for further waste management and disposal by reporting electric utilities between 1998 and 1999. Total transfers fell by 2.8 percent. Transfers to recycling rose 19.7 percent, from 3.5 million pounds to 4.2 million pounds. Transfers to treatment rose dramatically, by 1,309.3 percent, from less than 30,000 pounds to over 400,000 pounds. The category other off-site transfers to disposal declined by 4.6 percent, from 63.6 million pounds to 60.6 million pounds.

Figure 4–7. TRI Waste Management, 1999: Electric Utilities



Note: Data are from Section 8 of Form R.

TRI Data by State

Electric utilities from 52 states and territories submitted 4,225 TRI forms for 1999. The states with the largest number of forms from electric utilities were Pennsylvania, with 345 forms, Indiana, with 234 forms, and Ohio, with 232 forms. No reports were received from Idaho and Vermont in 1999.

On- and Off-site Releases

As shown in Table 4–33, electric utilities in Ohio reported the largest total on- and off-site releases in 1999, with 102.1 million

Table 4–30. Quantities of TRI Chemicals in Waste, 1998–1999: Electric Utilities

Waste Management Activity	1998	1999	Change 1998–1999	
	Pounds	Pounds	Pounds	Percent
Recycled On-site	733,700	786,720	53,020	7.2
Recycled Off-site	4,216,363	7,571,783	3,355,420	79.6
Energy Recovery On-site	8,057,169	5,304,250	–2,752,919	–34.2
Energy Recovery Off-site	24,978	42,200	17,222	68.9
Treated On-site	422,718,142	463,594,435	40,876,293	9.7
Treated Off-site	386,691	441,961	55,270	14.3
Quantity Released On- and Off-site	1,135,275,908	1,173,660,962	38,385,054	3.4
Total Production-related Waste	**1,571,412,951**	**1,651,402,311**	**79,989,360**	**5.1**
Non-production-related Waste	211,290	318,178	106,888	50.6

Note: All data are from Section 8 of Form R for the year indicated.

Table 4–31. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1999: Electric Utilities

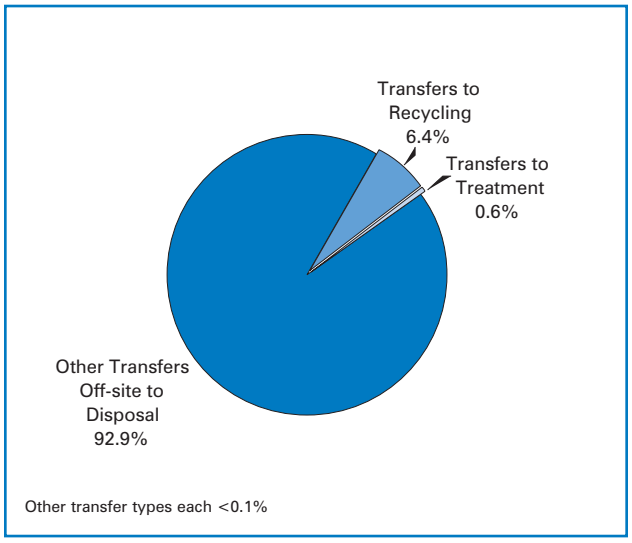
SIC Code	Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs		Other Off-site Transfers**	Other Transfers Off-site to Disposal***	Total Transfers for Further Waste Management/ Disposal
					Metals and Metal Compounds	Non-metal TRI Chemicals			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
4911	Electric Services	2,146,173	42,205	403,920	3,549	818	0	56,340,536	58,937,201
4931	Electric and Other Services Combined	317,517	0	0	3	8,510	0	2,501,464	2,827,494
4939	Combination Utilities, n.e.c.*	111,602	0	0	0	500	0	368,591	480,693
	Multiple within SIC Code 49	56	0	0	17	189	0	414,966	415,228
	SIC Code 4911 and SIC Code 12 (Coal Mining)	1,631,118	0	0	0	0	0	327,454	1,958,572
	SIC Code 4911 and SIC Code 28 (Chemicals)	0	0	0	0	0	0	692,280	692,280
	Total	**4,206,466**	**42,205**	**403,920**	**3,569**	**10,017**	**0**	**60,645,291**	**65,311,468**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R. Forms that reported more than one 4-digit SIC Code within SIC Code 49 are assigned to the multiple codes category.
* n.e.c.: not elsewhere classified.
** Other Off-site Transfers are transfers reported without a valid waste management code.
*** Does not include transfers to POTWs of metals and metal compounds.

pounds, of which 85.4 million pounds (83.6 percent) were in the form of air emissions. Ohio, North Carolina, and Pennsylvania reported the largest amounts of total releases in 1999. (Map 4–3 shows the geographic distribution of releases by the electric utilities industry.) North Carolina ranked second, with 90.8 million pounds of total releases, of which 81.4 million pounds were released to air. Pennsylvania ranked third among states for electric utility releases, with 85.9 million pounds, including 72.5 million pounds of air emissions.

In five other states, electric utility releases exceeded 55 million pounds. West Virginia electric utilities reported 77.8 million pounds, Florida reported 72.5 million pounds, Georgia reported 65.9 million pounds, Indiana reported 65.3 million pounds, and Kentucky reported 59.7 million pounds. Electric utilities in the eight states with the largest on- and off-site releases reported more than 70 percent of total releases as air emissions.

Figure 4–8. Distribution of TRI Transfers Off–site for Further Waste Management/ Disposal, 1999: Electric Utilities



Note: Data are from Section 6 of Form R.

Table 4–34 shows changes in releases by electric utilities between 1998 and 1999, by state. The largest absolute rise in on- and off-site releases was reported by Pennsylvania facilities, with an increase of 13.7 million pounds (19.0 percent), followed by North Carolina, with 9.5 million pounds (11.7 percent). The largest absolute decreases were in Ohio (11.7 million pounds, or 10.3 percent) and Missouri (5.0 million pounds, or 15.7 percent).

Waste Management Data

Ohio ranked highest among the states for total production-related waste reported by the electric utility industry, with 160.7 million pounds (see Table 4–33). This amount consisted largely of 102.1 million pounds released on- and off-site but also included 56.9 million pounds of waste treated on-site.

Pennsylvania ranked second in total production-related waste, with 121.8 million pounds. Of this, 85.3 million pounds were released on- and off-site (the third largest amount of any state), and 36.4 million pounds were treated on-site (the fifth-largest amount of any state). Indiana ranked third for total production-related waste, with 107.5 million pounds, consisting of 65.3 million pounds released on- and off-site (ranking seventh for this category) and 42.0 million pounds treated on-site (ranking third).

Electric utilities reported much smaller quantities in other waste management activities. The largest amounts were 5.3 million pounds of on-site energy recovery in Alabama (which accounted for almost all the total in this category), 1.8 million

Table 4–32. TRI Transfers Off-site for Further Waste Management/Disposal, 1998–1999: Electric Utilities

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Transfers to Recycling	3,513,226	4,206,466	693,240	19.7
Transfers to Energy Recovery	24,952	42,205	17,253	69.1
Transfers to Treatment	28,661	403,920	375,259	1,309.3
Transfers to POTWs	40,530	13,586	–26,944	–66.5
Metals and Metal Compounds Only	5,807	3,569	–2,238	–38.5
Non-metal TRI Chemicals	34,723	10,017	–24,706	–71.2
Other Off-site Transfers*	0	0	0	—
Other Off-site Transfers to Disposal**	63,585,082	60,645,291	–2,939,791	–4.6
Total Transfers Off-site for Further Waste Management/Disposal	**67,232,981**	**65,325,054**	**–1,907,927**	**–2.8**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
* Other Off–site Transfers are transfers reported without a valid waste management code.
** Does not include transfers to POTWs of metals and metal compounds.

Table 4–33. Summary of TRI Information by State, 1999: Electric Utilities

State	Total Forms	On-site Releases							Off-site Releases	
				Underground Injection		On-site Land Releases				
		Total Air Emissions	Surface Water Discharges	Class I Wells	Class II–V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	122	32,696,016	216,492	0	0	0	16,044,180	48,956,688	162,384	49,119,072
Alaska	5	502,375	0	0	0	0	0	502,375	0	502,375
Arizona	54	1,647,755	919	0	0	0	5,718,427	7,367,101	114,023	7,481,124
Arkansas	28	1,015,983	24,657	0	0	0	2,724,049	3,764,689	363	3,765,052
California	44	778,591	313	0	0	0	234,786	1,013,690	64,383	1,078,073
Colorado	66	1,343,235	4,070	0	0	0	2,616,208	3,963,513	3,954,394	7,917,907
Connecticut	18	538,911	257	0	0	0	0	539,168	161,166	700,334
Delaware	18	3,398,665	11,816	0	0	0	184,260	3,594,741	71,152	3,665,893
District of Columbia	1	79,000	0	0	0	0	0	79,000	0	79,000
Florida	216	60,570,202	53,942	0	0	1,298,793	9,319,310	71,242,247	1,238,932	72,481,179
Georgia	113	54,543,403	113,475	0	0	0	11,226,245	65,883,123	6	65,883,129
Guam	1	0	0	0	0	0	0	0	0	0
Hawaii	20	2,067,609	0	0	5	0	0	2,067,614	48,445	2,116,059
Illinois	198	34,537,639	241,297	0	0	196	4,923,905	39,703,037	2,129,383	41,832,420
Indiana	234	46,714,700	145,147	0	0	0	16,493,723	63,353,570	1,962,743	65,316,313
Iowa	107	9,122,604	6,552	0	0	0	4,610,803	13,739,959	360,720	14,100,679
Kansas	58	2,061,158	5,865	0	0	0	6,866,224	8,933,247	476,846	9,410,093
Kentucky	196	44,705,422	1,266,435	0	0	0	12,882,410	58,854,267	820,537	59,674,804
Louisiana	41	1,400,387	78,350	0	0	0	3,560,598	5,039,335	0	5,039,335
Maine	3	66,173	0	0	0	0	0	66,173	0	66,173
Maryland	58	29,542,697	220,527	0	0	0	58,610	29,821,834	372,000	30,193,834
Massachusetts	58	4,786,424	799	0	0	0	5,088	4,792,311	605,517	5,397,828
Michigan	163	39,088,613	131,604	0	0	0	7,609,212	46,829,429	2,701,675	49,531,104
Minnesota	60	940,738	20,566	0	0	0	8,911,560	9,872,864	1,218,357	11,091,221
Mississippi	30	11,957,940	3,370	0	0	0	1,372,758	13,334,068	16	13,334,084
Missouri	110	12,440,063	129,950	0	0	0	14,565,004	27,135,017	295	27,135,312
Montana	32	985,954	10	0	0	0	6,664,154	7,650,118	376,802	8,026,920
Nebraska	40	3,468,620	52,515	0	0	0	3,823,110	7,344,245	387,600	7,731,845
Nevada	26	1,158,997	0	0	0	0	1,042,724	2,201,721	37,173	2,238,894
New Hampshire	20	2,712,745	0	0	0	0	20,300	2,733,045	24,070	2,757,115
New Jersey	58	7,767,004	12,443	0	0	0	383,700	8,163,147	150,525	8,313,672
New Mexico	31	546,609	8,202	0	0	0	1,562,006	2,116,817	1,969,002	4,085,819
New York	120	19,265,823	363,617	0	0	0	1,361,757	20,991,197	679,084	21,670,281
North Carolina	155	81,356,465	79,663	0	0	0	9,207,440	90,643,568	138,237	90,781,805
North Dakota	72	1,496,223	62,731	0	0	0	9,017,040	10,575,994	10,338,610	20,914,604
Ohio	232	85,405,211	191,070	0	0	0	12,541,133	98,137,414	3,989,352	102,126,766
Oklahoma	51	1,513,280	16,568	0	0	0	2,180,182	3,710,030	1,554,825	5,264,855
Oregon	8	163,935	0	0	0	0	582,005	745,940	0	745,940
Pennsylvania	345	72,523,409	53,604	0	0	0	5,371,206	77,948,219	7,943,947	85,892,166
Puerto Rico	34	11,474,578	10,310	0	0	0	165,956	11,650,844	68,991	11,719,835
Rhode Island	4	41,134	5	0	0	0	0	41,139	0	41,139
South Carolina	103	15,253,504	37,970	0	0	0	2,345,801	17,637,275	272,808	17,910,083
South Dakota	13	207,869	51	0	0	0	2,520,000	2,727,920	369,772	3,097,692
Tennessee	102	33,342,755	709,105	0	0	0	7,994,950	42,046,810	280,365	42,327,175
Texas	193	7,509,773	61,400	0	0	0	28,568,098	36,139,271	4,680,842	40,820,113
Utah	57	1,930,027	165	0	0	0	6,068,857	7,999,049	258,715	8,257,764
Virgin Islands	10	64,515	10	0	0	0	0	64,525	0	64,525
Virginia	120	18,757,582	61,295	0	0	0	3,197,250	22,016,127	811,805	22,827,932
Washington	20	1,190,744	627	0	0	0	1,783,358	2,974,729	108,604	3,083,333
West Virginia	167	65,104,387	82,091	0	0	0	10,819,640	76,006,118	1,842,405	77,848,523
Wisconsin	114	11,319,107	17,835	0	0	0	1,396,192	12,733,134	4,598,275	17,331,409
Wyoming	76	813,267	12,348	0	0	0	8,277,932	9,103,547	613,097	9,716,644
Total	**4,225**	**841,919,820**	**4,510,038**	**0**	**5**	**1,298,989**	**256,822,151**	**1,104,551,003**	**57,958,243**	**1,162,509,246**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

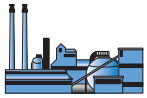
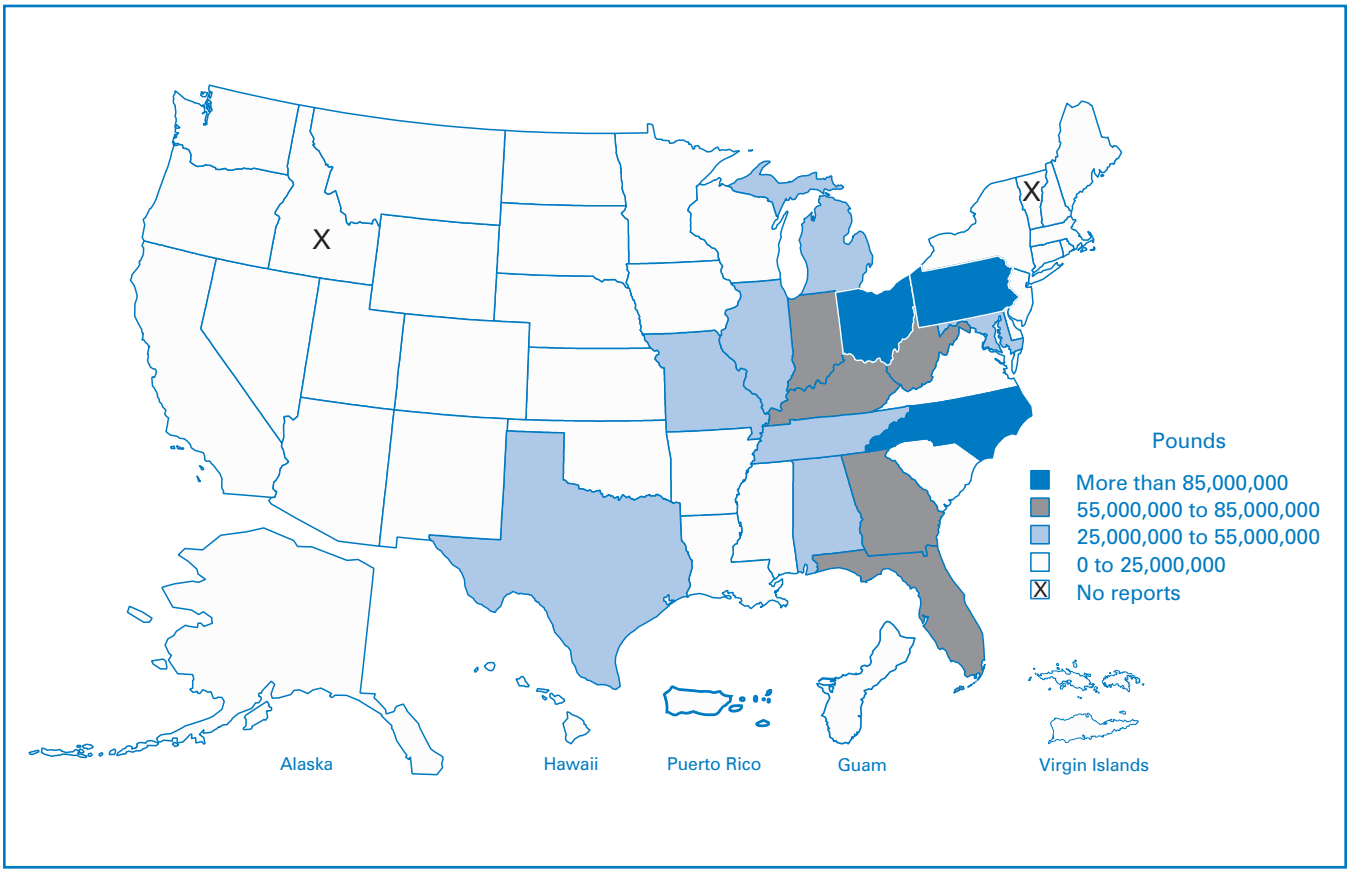


Table 4–33. Summary of TRI Information by State, 1999: Electric Utilities *(continued)*

State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site	Off-site	On-site	Off-site	On-site	Off-site			
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	0	171,000	5,294,470	0	11,016,000	820	49,211,585	65,693,875	1
Alaska	0	0	0	0	0	0	502,375	502,375	5
Arizona	0	0	0	0	4,287,107	0	7,450,322	11,737,429	20
Arkansas	0	0	0	0	219,000	0	4,842,687	5,061,687	23
California	0	0	0	0	0	1,561	882,563	884,124	87
Colorado	0	0	0	0	2,652,175	0	8,186,351	10,838,526	480
Connecticut	0	11,600	0	0	1,228,000	24,831	675,226	1,939,657	6
Delaware	0	0	0	0	351,207	0	3,665,893	4,017,100	0
District of Columbia	0	0	0	0	0	0	79,000	79,000	0
Florida	0	27	0	0	33,697,141	8,600	70,546,941	104,252,709	120,134
Georgia	0	0	0	0	0	0	65,883,179	65,883,179	0
Guam	0	0	0	0	0	0	0	0	0
Hawaii	0	0	0	0	0	0	2,114,825	2,114,825	0
Illinois	0	155,000	0	0	20,707,335	0	41,527,472	62,389,807	195,340
Indiana	0	208,688	0	0	41,997,784	890	65,321,106	107,528,468	12
Iowa	0	0	0	0	409,114	0	14,010,552	14,419,666	11
Kansas	0	314,477	0	0	2,802,000	207	8,913,471	12,030,155	0
Kentucky	0	49,200	0	0	36,489,000	0	59,650,092	96,188,292	28
Louisiana	0	0	0	0	1,896,768	0	5,037,766	6,934,534	8
Maine	0	0	0	0	0	0	66,002	66,002	1
Maryland	0	0	0	0	72,006,000	0	30,183,797	102,189,797	0
Massachusetts	0	673	0	0	703,830	30	5,397,699	6,102,232	0
Michigan	0	97,201	0	0	7,550,782	0	49,397,596	57,045,579	722
Minnesota	0	0	0	0	857,770	0	11,043,341	11,901,111	0
Mississippi	0	333,986	0	0	0	0	13,333,944	13,667,930	4
Missouri	529,340	745,548	0	0	4,789,820	0	26,956,740	33,021,448	0
Montana	0	0	0	0	2,873,000	0	8,121,829	10,994,829	4
Nebraska	257,380	389,705	0	0	0	0	7,656,675	8,303,760	0
Nevada	0	83,735	0	0	45,858	5,973	2,249,140	2,384,706	0
New Hampshire	0	0	0	0	470	0	2,756,800	2,757,270	0
New Jersey	0	6	0	0	3,467,431	0	8,311,269	11,778,706	0
New Mexico	0	0	0	0	3,110,111	0	6,397,629	9,507,740	0
New York	0	0	0	42,200	6,720,296	2	21,497,226	28,259,724	796
North Carolina	0	0	0	0	2,968,900	0	90,889,960	93,858,860	179
North Dakota	0	1,300	0	0	1,833,400	0	20,800,866	22,635,566	5
Ohio	0	1,749,313	0	0	56,866,617	0	102,052,709	160,668,639	52
Oklahoma	0	0	0	0	2,498,900	0	5,249,894	7,748,794	8
Oregon	0	0	0	0	0	0	745,910	745,910	0
Pennsylvania	0	185	0	0	36,426,719	17,500	85,328,161	121,772,565	15
Puerto Rico	0	0	0	0	0	0	11,717,418	11,717,418	154
Rhode Island	0	0	0	0	0	90	40,884	40,974	0
South Carolina	0	1,216	9,780	0	11,500,114	0	30,513,928	42,025,038	22
South Dakota	0	0	0	0	371,000	0	3,065,100	3,436,100	0
Tennessee	0	687,200	0	0	25,407,500	0	42,299,890	68,394,590	0
Texas	0	1,833,516	0	0	13,764,536	0	40,613,026	56,211,078	5
Utah	0	0	0	0	10,960,500	10	8,281,877	19,242,387	0
Virgin Islands	0	0	0	0	27,590	0	64,525	92,115	0
Virginia	0	123,060	0	0	9,938,680	0	22,647,401	32,709,141	0
Washington	0	189,897	0	0	96,966	0	3,083,437	3,370,300	0
West Virginia	0	425,250	0	0	26,770,000	0	77,874,751	105,070,001	0
Wisconsin	0	0	0	0	2,945,102	381,447	16,937,499	20,264,048	4
Wyoming	0	0	0	0	1,339,912	0	9,582,633	10,922,545	52
Total	**786,720**	**7,571,783**	**5,304,250**	**42,200**	**463,594,435**	**441,961**	**1,173,660,962**	**1,651,402,311**	**318,178**

Note: Data are from Section 8 of Form R.

Map 4–3. Total On-site and Off-site Releases, 1999: Electric Utilities



pounds of off-site recycling in Texas, and 1.7 million pounds of off-site recycling in Ohio.

Top 15 Chemicals for On- and Off-site Releases

Table 4–35 presents data for the 15 chemicals released in the largest amounts by the TRI electric utilities. Electric utilities reported releasing more hydrochloric acid, 615.4 million pounds, than any other chemical. Because only aerosol forms of hydrochloric acid are reportable to TRI, air emissions of hydrochloric acid accounted for almost all of the total releases of this chemical.

For barium compounds, ranked second with 180.8 million pounds, most of the releases were other on-site land releases, with 142.9 million pounds (79.1 percent of total releases for these compounds). Sulfuric acid was the chemical with the third-largest total releases, 152.9 million pounds. As with hydrochloric acid, only aerosol forms are reportable to TRI, and air emissions of sulfuric acid were nearly 100 percent of total releases for that chemical.

Releases of the 15 chemicals totaled 1.15 billion pounds, or 99.0 percent of the industry's total 1.16 million pounds of releases.

Projected Quantities of TRI Chemicals Managed in Waste, 1999–2001

Electric utility facilities reporting to TRI expected to reduce their production-related waste by 2.9 percent between 1999 and

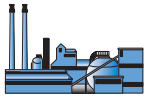


Table 4–34. TRI Total Releases by State, 1998–1999: Electric Utilities

State	Total On-site and Off-site Releases			
	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Alabama	46,039,988	49,119,072	3,079,084	6.7
Alaska	567,100	502,375	–64,725	–11.4
Arizona	9,533,058	7,481,124	–2,051,934	–21.5
Arkansas	3,312,965	3,765,052	452,087	13.6
California	555,449	1,078,073	522,624	94.1
Colorado	8,770,929	7,917,907	–853,022	–9.7
Connecticut	1,476,628	700,334	–776,294	–52.6
Delaware	6,400,919	3,665,893	–2,735,026	–42.7
District of Columbia	66,250	79,000	12,750	19.2
Florida	70,013,689	72,481,179	2,467,490	3.5
Georgia	58,465,777	65,883,129	7,417,352	12.7
Guam	0	0	0	—
Hawaii	3,137,772	2,116,059	–1,021,713	–32.6
Illinois	38,591,148	41,832,420	3,241,272	8.4
Indiana	61,830,845	65,316,313	3,485,468	5.6
Iowa	15,005,265	14,100,679	–904,586	–6.0
Kansas	11,480,944	9,410,093	–2,070,851	–18.0
Kentucky	59,914,104	59,674,804	–239,300	–0.4
Louisiana	8,799,994	5,039,335	–3,760,659	–42.7
Maine	43,001	66,173	23,172	53.9
Maryland	25,535,714	30,193,834	4,658,120	18.2
Massachusetts	4,304,824	5,397,828	1,093,004	25.4
Michigan	45,545,255	49,531,104	3,985,849	8.8
Minnesota	11,605,799	11,091,221	–514,578	–4.4
Mississippi	11,304,718	13,334,084	2,029,366	18.0
Missouri	32,170,255	27,135,312	–5,034,943	–15.7
Montana	8,005,777	8,026,920	21,143	0.3
Nebraska	7,846,522	7,731,845	–114,677	–1.5
Nevada	2,246,050	2,238,894	–7,156	–0.3
New Hampshire	4,097,749	2,757,115	–1,340,634	–32.7
New Jersey	8,055,418	8,313,672	258,254	3.2
New Mexico	7,791,792	4,085,819	–3,705,973	–47.6
New York	18,717,213	21,670,281	2,953,068	15.8
North Carolina	81,298,874	90,781,805	9,482,931	11.7
North Dakota	21,310,837	20,914,604	–396,233	–1.9
Ohio	113,846,358	102,126,766	–11,719,592	–10.3
Oklahoma	6,586,843	5,264,855	–1,321,988	–20.1
Oregon	747,590	745,940	–1,650	–0.2
Pennsylvania	72,176,234	85,892,166	13,715,932	19.0
Puerto Rico	10,277,247	11,719,835	1,442,588	14.0
Rhode Island	455,007	41,139	–413,868	–91.0
South Carolina	17,705,119	17,910,083	204,964	1.2
South Dakota	1,899,875	3,097,692	1,197,817	63.0
Tennessee	36,159,200	42,327,175	6,167,975	17.1
Texas	41,324,304	40,820,113	–504,191	–1.2
Utah	10,150,504	8,257,764	–1,892,740	–18.6
Virgin Islands	54,729	64,525	9,796	17.9
Virginia	20,873,294	22,827,932	1,954,638	9.4
Washington	4,593,693	3,083,333	–1,510,360	–32.9
West Virginia	75,881,813	77,848,523	1,966,710	2.6
Wisconsin	17,704,755	17,331,409	–373,346	–2.1
Wyoming	13,344,174	9,716,644	–3,627,530	–27.2
Total	**1,137,623,361**	**1,162,509,246**	**24,885,885**	**2.2**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

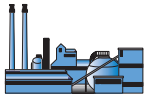
Table 4–35. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1999: Electric Utilities

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
7647-01-0	Hydrochloric acid	615,428,784	11	0	0	0	5	615,428,800	0	615,428,800
—	Barium compounds	2,213,061	1,061,682	0	0	600,000	142,937,546	146,812,289	33,984,111	180,796,400
7664-93-9	Sulfuric acid	152,853,011	6	0	0	0	0	152,853,017	17,800	152,870,817
7664-39-3	Hydrogen fluoride	58,264,893	11	0	0	0	86,120	58,351,024	15,743	58,366,767
—	Manganese compounds	505,509	485,010	0	0	180,081	31,981,637	33,152,237	5,906,702	39,058,939
—	Zinc compounds	2,255,717	335,379	0	0	80,408	25,191,550	27,863,054	4,834,770	32,697,824
—	Copper compounds	339,846	272,026	0	0	315,000	13,267,619	14,194,491	2,285,567	16,480,058
—	Nickel compounds	718,154	156,607	0	5	34,500	10,326,171	11,235,437	1,991,221	13,226,658
—	Chromium compounds	259,377	96,385	0	0	89,000	10,444,248	10,889,010	2,046,124	12,935,134
—	Lead compounds	153,039	24,335	0	0	0	5,606,969	5,784,343	662,079	6,446,422
—	Arsenic compounds	142,287	161,151	0	0	0	4,922,742	5,226,180	999,087	6,225,267
7440-39-3	Barium	150,261	55,281	0	0	0	3,897,093	4,102,635	1,372,843	5,475,478
7664-41-7	Ammonia	4,435,805	72,150	0	0	0	247,690	4,755,645	23,807	4,779,452
—	Cobalt compounds	43,272	24,943	0	0	0	3,509,799	3,578,014	400,998	3,979,012
7440-66-6	Zinc (fume or dust)	2,404,456	7,895	0	0	0	99,014	2,511,365	168,777	2,680,142
	Subtotal (top 15 chemicals)	**840,167,472**	**2,752,872**	**0**	**5**	**1,298,989**	**252,518,203**	**1,096,737,541**	**54,709,629**	**1,151,447,170**
	Total (all chemicals)	**841,919,820**	**4,510,038**	**0**	**5**	**1,298,989**	**256,822,151**	**1,104,551,003**	**57,958,243**	**1,162,509,246**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

2001, from a total of 1.65 billion pounds to 1.60 billion pounds (see Table 4–36). The projected decrease represents reductions of 0.7 percent in 2000 and 2.2 percent in 2001. These projections reflect in part the industry's expected reduction in the quantity released on- and off-site, from 1.17 billion pounds in 1999 to 1.12 billion pounds in 2001, a decline of 4.3 percent. On-site treatment, a large item (463.6 million pounds in 1999) is expected to increase in 2000, by 9.0 percent, but to decrease in 2001, by 6.1 percent, for an increase over the period of 2.4 percent.

The projections indicate only slight changes in waste management practices. The share of quantity released on- and off-site—the least-desirable outcome under the waste management hierarchy described in **Waste Management** in Chapter 1 (Figure 2–1)—would decrease little between 1999



(71.1 percent of total production-related waste) and 2001 (70.0 percent). Off-site recycling and off-site treatment would decrease somewhat; off-site energy recovery (already small) would fall to zero.

Source Reduction

Of the Form Rs submitted by electric utility facilities in 1999, 12.3 percent reported source reduction activity undertaken during the year (see Table 4–37). As noted in **Waste Management** in Chapter 1, source reduction—activity that prevents the generation of waste—is the preferred waste management option.

Facilities that combine electric services and coal mining operations reported source reduction activities on 30 forms, 20.3 percent of the Form Rs submitted by this group. Facilities providing only electric services reported source reduction activity on 452 forms, representing 12.1 percent of the Form Rs from these facilities.

Good operating practices were identified on 345 forms, making it the most frequently cited source reduction activity in the industry. Raw material modifications were reported on 119 forms, inventory control on 49, process modifications on 48, and spill and leak prevention on 38 forms.

Table 4–36. Current Year and Projected Quantities of TRI Chemicals in Waste, 1999–2001: Electric Utilities

Waste Management Activity	Current Year 1999		Projected 2000		Projected 2001	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
Recycled On-site	786,720	0.0	270,000	0.0	260,500	0.0
Recycled Off-site	7,571,783	0.5	7,333,141	0.4	6,063,944	0.4
Energy Recovery On-site	5,304,250	0.3	380	0.0	380	0.0
Energy Recovery Off-site	42,200	0.0	42,200	0.0	0	0.0
Treated On-site	463,594,435	28.1	505,162,111	30.8	474,545,366	29.6
Treated Off-site	441,961	0.0	46,774	0.0	58,094	0.0
Quantity Released On- and Off-site	1,173,660,962	71.1	1,127,587,697	68.7	1,122,774,741	70.0
Total Production-related Waste	**1,651,402,311**	**100.0**	**1,640,442,303**	**100.0**	**1,603,703,025**	**100.0**
Waste Management Activity	**Projected Change 1999-2000** Percent		**Projected Change 2000-2001** Percent		**Projected Change 1999-2001** Percent	
Recycled On-site	–65.7		–3.5		–66.9	
Recycled Off-site	–3.2		–17.3		–19.9	
Energy Recovery On-site	–100.0		0.0		–100.0	
Energy Recovery Off-site	0.0		–100.0		–100.0	
Treated On-site	9.0		–6.1		2.4	
Treated Off-site	–89.4		24.2		–86.9	
Quantity Released On- and Off-site	–3.9		–0.4		–4.3	
Total Production-related Waste	**-0.7**		**-2.2**		**-2.9**	

Note: Current year and projected amounts are from Section 8 of Form R for 1999.

Table 4–37. Number of Forms Reporting Source Reduction Activity, 1999: Electric Utilities

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
4911	Electric Services	3,738	452	12.1	311	49	37	110	47	0	1	1
4931	Electric and Other Services Combined	113	15	13.3	6	0	1	7	1	0	0	0
4939	Combination Utilities, n.e.c.*	22	0	0.0	0	0	0	0	0	0	0	0
	Multiple within SIC Code 49	26	0	0.0	0	0	0	0	0	0	0	0
	SIC Code 4911 and SIC Code 12 (Coal Mining)	148	30	20.3	28	0	0	2	0	0	0	0
	SIC Code 4911 and SIC Code 28 (Chemicals)	8	0	0.0	0	0	0	0	0	0	0	0
	Total	**4,055**	**497**	**12.3**	**345**	**49**	**38**	**119**	**48**	**0**	**1**	**1**

Note: All source reduction activities on a form are counted in the corresponding category. Totals do not equal the sum of the categories because forms may report more than one source reduction activity. Forms that reported more than one 4-digit SIC Code within the SIC Code 49 are assigned to the multiple category.

*n.e.c.: not elsewhere classified.

Chemical Wholesale Distributors (SIC Code 5169)

Introduction

Chemical wholesale distributors (SIC code 5169) package, blend, or formulate chemicals for distribution into commerce, as shown in Box 4–5. Facilities that only store, relabel, or redistribute chemicals are not included in this industry sector. Chemical distribution facilities buy chemicals in bulk and blend and/or repackage them to customer specifications. Products include acids, industrial and heavy chemicals, dyes and substances used to make dyes, industrial salts, rosin, and turpentine. Also included are industrial gases (compressed and liquefied), such as oxygen and acetylene.

More details for this industry sector on products and services, employment and production, general environmental issues, processes involving toxic chemicals and the management of toxic chemicals in waste can be found in the *1998 Toxics Release Inventory Public Data Release* report (EPA 745-R-00-007).

1999 TRI Data for Chemical Wholesale Distributors

On- and Off-site Releases

Chemical wholesale distributors required to report to TRI released 2.0 million pounds of TRI chemicals on- and off-site in 1999, as shown in Table 4–38. The largest type of release was 1.3 million pounds of air emissions, 66.9 percent of the industry's total releases (see Figure 4–9).

Off-site releases (transfers off-site to disposal) totaled about 650,000 pounds, or 32.9 percent of total releases, making this the industry's second-largest release type. A little more than 3,300 pounds were discharged to surface waters and less than 1,300 pounds were released on-site to land. Chemical wholesale distributors reported no underground injection.

Box 4–5. SIC Code 516, Wholesale Trade—Chemicals and Allied Products: Codes and Classifications Required to Report to TRI

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

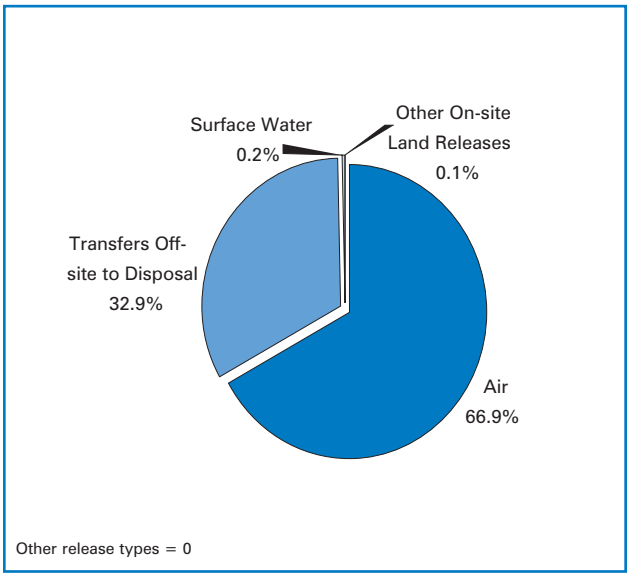
Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987.*

Forms reporting only chemical wholesale distribution accounted for the bulk of total releases by the industry—1.9 million pounds, or 95.9 percent of the total. These were largely air emissions, totaling 1.3 million pounds.

Facilities reporting both chemical wholesale distribution operations and solvent recovery operations reported the second largest amount of total releases, about 55,000 pounds (2.8 percent of the total for the industry). Their releases consisted of almost 27,000 pounds of off-site releases and a little more than 27,000 pounds of air emissions.

Total on- and off-site releases by chemical wholesalers rose 28.3 percent between 1998 and 1999, as shown in Table 4–39. Transfers off-site to disposal rose 216.6 percent, from a little over 200,000 pounds to almost 650,000 pounds. Total air emissions rose 2.0 percent, from 1.29 million pounds to 1.32 million pounds.

Figure 4–9. Distribution of TRI On-site and Off-site Releases, 1999: Chemical Wholesalers



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

Table 4–38. TRI On-site and Off-site Releases by 4-digit SIC Code, 1999: Chemical Wholesalers

			On-site Releases							Off-site Releases	
					Underground Injection		On-site Land Releases				
SIC Code	Industry	Total Forms	Total Air Emissions	Surface Water Discharges	Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
		Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
5169	Chemical Wholesale Distributors	3,363	1,269,938	824	0	0	0	447	1,271,209	620,031	1,891,240
	SIC Code 5169 and SIC Code 5171 (Petroleum Bulk Terminals)	13	7,713	25	0	0	0	0	7,738	0	7,738
	SIC Code 5169 and SIC Code 7389 (Solvent Recovery Services)	40	27,338	0	0	0	0	334	27,672	26,987	54,659
	SIC Code 5169 and SIC Code 28 (Chemical Products)	43	13,406	2,495	0	0	0	500	16,401	1,621	18,022
	Total	**3,459**	**1,318,395**	**3,344**	**0**	**0**	**0**	**1,281**	**1,323,020**	**648,639**	**1,971,659**

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release.

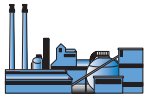


Table 4–39. TRI On-site and Off-site Releases, 1998–1999: Chemical Wholesalers

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
On-site Releases				
Total Air Emissions	1,292,169	1,318,395	26,226	2.0
Fugitive Air Emissions	555,932	536,921	–19,011	–3.4
Point Source Air Emissions	736,237	781,474	45,237	6.1
Surface Water Discharges	22,075	3,344	–18,731	–84.9
Underground Injection	1	0	–1	–100.0
Class I Wells	0	0	0	—
Class II–V Wells	1	0	–1	–100.0
On-site Land Releases	17,981	1,281	–16,700	–92.9
RCRA Subtitle C Landfills	0	0	0	—
Other On-site Landfills	0	0	0	—
Land Treatment	0	0	0	—
Surface Impoundments	0	0	0	—
Other Disposal	17,981	1,281	–16,700	–92.9
Total On-site Releases	**1,332,226**	**1,323,020**	**-9,206**	**-0.7**
Off-site Releases				
Storage Only[a]	2,597	300	–2,297	–88.4
Solidification/Stabilization[b]	850	2,220	1,370	161.2
Metals and Metal Compounds Only				
Wastewater Treatment (excluding POTWs)[c]	6,000	1,612	–4,388	–73.1
Metals and Metal Compounds Only				
Transfers to POTWs[d]	351	75	–276	–78.6
Metals and Metal Compounds Only				
Underground injection	7,780	8,457	677	8.7
Landfills/Surface Impoundments	20,578	508,609	488,031	2,371.6
Land Treatment	112	57	–55	–49.1
Other Land Disposal	17,002	34,064	17,062	100.4
Other Off-site Management	93,984	24,839	–69,145	–73.6
Transfers to Waste Broker for Disposal	11,023	16,399	5,376	48.8
Unknown[e]	44,596	52,007	7,411	16.6
Total Off-site Releases (Transfers Off-site to Disposal)	**204,873**	**648,639**	**443,766**	**216.6**
Total On-site and Off-site Releases	**1,537,099**	**1,971,659**	**434,560**	**28.3**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

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

[b] Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it such transfers are included as a form of disposal (off-site release). See Box 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.

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

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

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

Table 4–40. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1999: Chemical Wholesalers

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
5169	Chemical Wholesale Distributors	132,431	189,583	72,746	3,945,229	1,143,795	2,294,354	1,328,070	9,106,208	856,332
	SIC Code 5169 and SIC Code 5171 (Petroleum Bulk Terminals)	7	0	0	74,920	0	15,326	7,714	97,967	7
	SIC Code 5169 and SIC Code 7389 (Solvent Recovery Services)	19,481,224	0	0	10,240,971	0	690,344	59,492	30,472,031	958
	SIC Code 5169 and SIC Code 28 (Chemical Products)	1,448	16,959	0	11,668	45,000	16,921	24,717	116,713	1,292
	Total	**19,615,110**	**206,542**	**72,746**	**14,272,788**	**1,188,795**	**3,016,945**	**1,419,993**	**39,792,919**	**858,589**

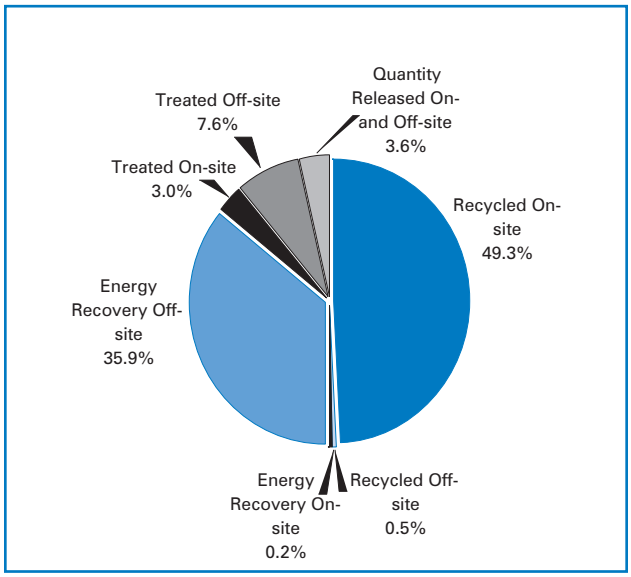
Note: Data are from Section 8 of Form R.

Waste Management Data

Quantities of TRI Chemicals in Waste

The chemical wholesale distribution industry reported managing 39.8 million pounds of total production-related waste in 1999, as shown in Table 4–40. On-site recycling totaled 19.6 million pounds, or 49.3 percent of the industry's production-related waste (see Figure 4–10). Off-site energy recovery totaled 14.3 million pounds, 35.9 percent. Off-site treatment amounted to 3.0 million pounds, and on-site treatment to 1.2 million pounds. Quantities released on- and off-site were 1.4 million pounds.

Figure 4–10. TRI Waste Management, 1999: Chemical Wholesalers



Note: Data are from Section 8 of Form R.

Facilities with a combination of chemical wholesale distribution and solvent recovery services managed the largest quantities of TRI chemicals in waste, with 30.5 million pounds of total production-related waste, or 76.6 percent of the total for the industry. These facilities reported 19.5 million pounds of on-site recycling and 10.2 million pounds of off-site energy recovery.

Facilities reporting only chemical wholesale distribution operations reported 9.1 million pounds of total production-related waste managed, or 22.9 percent of the industry total. These facilities reported 3.9 million pounds of off-site energy recovery, 2.3 million pounds treated off-site, 1.1 million pounds treated on-site, and 1.3 million pounds released on- and off-site.

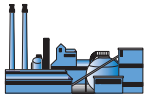


Table 4–41 shows the changes in the disposition of wastes from the chemical wholesale distribution industry between 1998 and 1999. Total production-related waste managed fell by 28.5 percent. The quantity released on- and off-site decreased by 18.2 percent, from 1.7 million pounds to 1.4 million pounds. Declines were reported in all waste management categories except for on-site energy recovery, which rose by about a third, from almost 55,000 pounds to almost 73,000 pounds. Energy recovery off-site fell by 46.3 percent, from 26.6 million pounds to 14.3 million pounds. On-site recycling fell by 10.9 percent, from 22.0 million pounds to 19.6 million pounds.

Transfers Off-site for Further Waste Management/Disposal

As shown in Table 4–42, the chemical wholesale distribution industry reported 19.7 million pounds of transfers off-site for further waste management and disposal in 1999. Transfers off-site to energy recovery represented 57.8 percent of all such transfers (see Figure 4–11). The industry reported 4.4 million pounds sent off-site to recycling (22.3 percent) and 3.2 million pounds sent to treatment (16.3 percent).

Facilities with a combination of chemical wholesale distribution operations and solvent recovery services reported 12.2 million

Table 4–41. Quantities of TRI Chemicals in Waste, 1998–1999: Chemical Wholesalers

Waste Management Activity	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Recycled On-site	22,023,234	19,615,110	–2,408,124	–10.9
Recycled Off-site	735,748	206,542	–529,206	–71.9
Energy Recovery On-site	54,418	72,746	18,328	33.7
Energy Recovery Off-site	26,582,594	14,272,788	–12,309,806	–46.3
Treated On-site	1,521,953	1,188,795	–333,158	–21.9
Treated Off-site	3,031,122	3,016,945	–14,177	–0.5
Quantity Released On- and Off-site	1,735,780	1,419,993	–315,787	–18.2
Total Production-related Waste	**55,684,849**	**39,792,919**	**–15,891,930**	**–28.5**
Non-production-related Waste	49,671	858,589	808,918	1,628.6

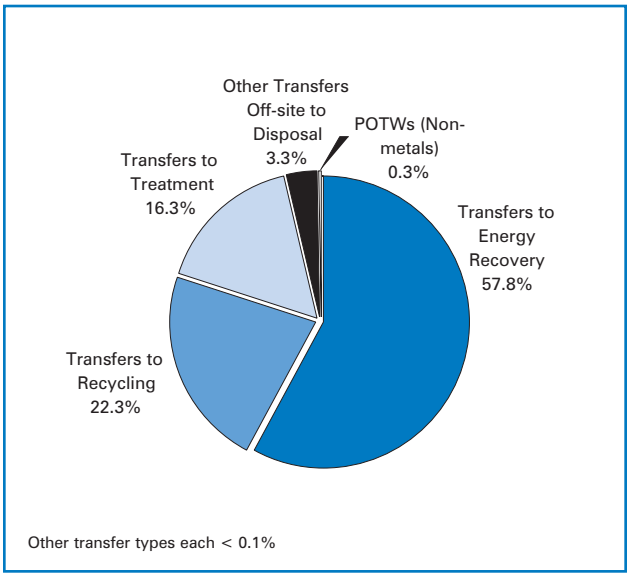
Note: All data are from Section 8 of Form R for the year indicated.

Table 4–42. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1999: Chemical Wholesalers

SIC Code	Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs		Other Off-site Transfers*	Other Transfers Off-site to Disposal**	Total Transfers for Further Waste Management/ Disposal
					Metals and Metal Compounds	Non-metal TRI Chemicals			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
5169	Chemical Wholesale Distributors	300,578	3,903,431	2,497,669	69	32,995	0	620,212	7,354,954
	SIC Code 5169 and SIC Code 5171 (Petroleum Bulk Terminals)	0	74,920	23,931	0	0	0	0	98,851
	SIC Code 5169 and SIC Code 7389 (Solvent Recovery Services)	4,069,980	7,389,669	688,889	6	1,949	0	32,239	12,182,732
	SIC Code 5169 and SIC Code 28 (Chemical Products)	16,960	11,778	3,739	0	14,656	0	1,621	48,754
	Total	**4,387,518**	**11,379,798**	**3,214,228**	**75**	**49,600**	**0**	**654,072**	**19,685,291**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
*Other Off-site Transfers are transfers reported without a valid waste management code.
**Does not include transfers to POTWs of metals and metal compounds.

Figure 4–11. Distribution of TRI Transfers Off-site for Further Waste Management/Disposal, 1999: Chemical Wholesalers



Note: Data are from Section 6 of Form R.

pounds of off-site transfers, of which 60.7 percent (7.4 million pounds) was to energy recovery. Facilities with only chemical distribution operations reported 7.4 million pounds of transfers off-site for further waste management and disposal. These facilities reported 3.9 million pounds of transfers to energy recovery and 2.5 million pounds of transfers to treatment.

Table 4–43 shows changes in transfers between 1998 and 1999. Total transfers off-site for further waste management and disposal fell by 36.4 percent. The largest absolute decrease was in transfers to energy recovery, from 24.5 million pounds to 11.4 million pounds, a decline of 53.5 percent. Transfers to recycling increased, from 3.0 million pounds to 4.4 million pounds (45.9 percent). The category other off-site transfers to disposal rose 200.4 percent, to almost 655,000 pounds.

TRI Data by State

Facilities in the chemical wholesale distribution industry in Texas submitted the largest number of forms in 1999, 475 forms. Ohio and California ranked second and third, with 238 and 218 forms, respectively.

On- and Off-site Releases

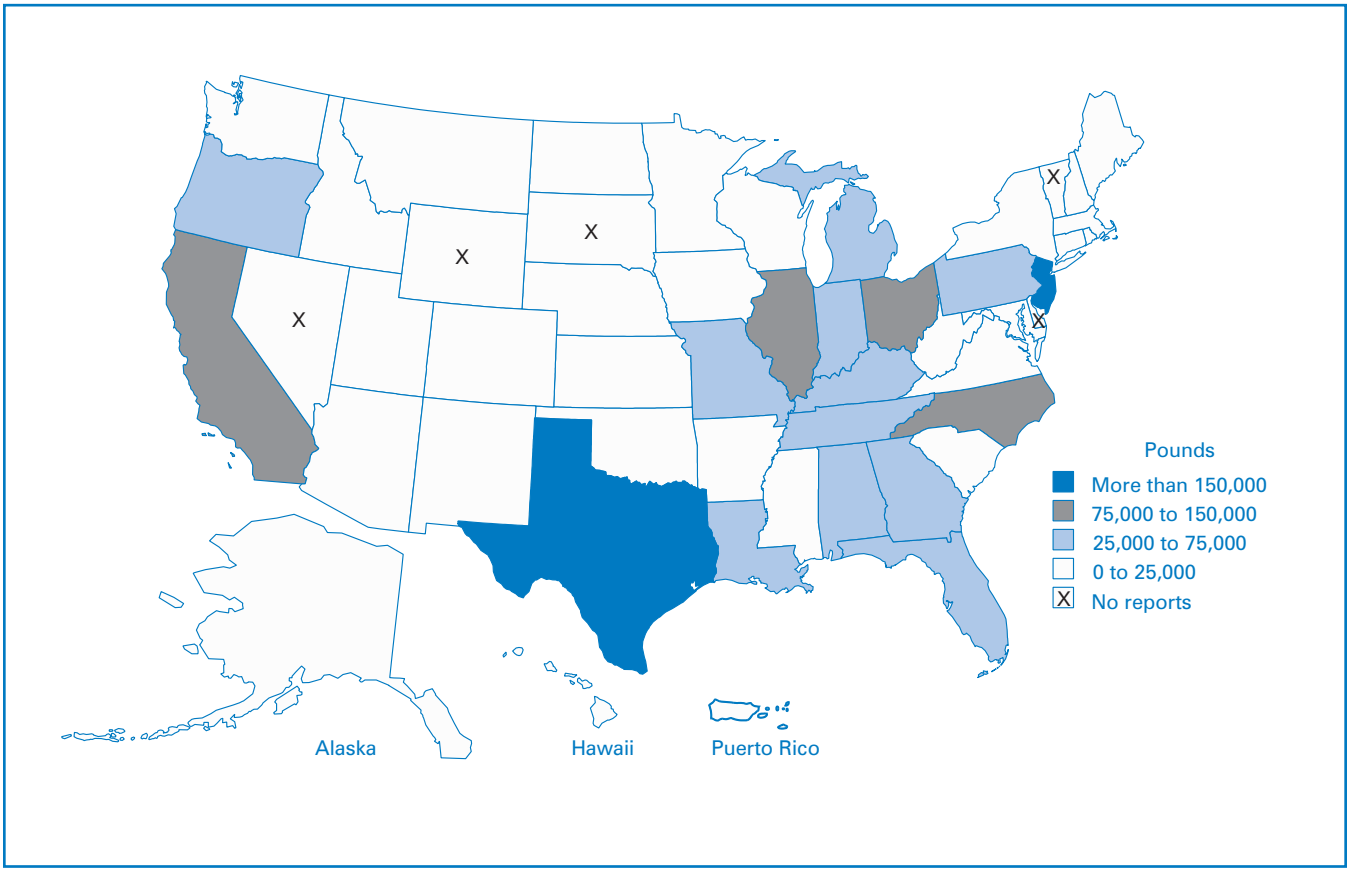
In 1999, chemical wholesale distributors in Texas reported about 716,000 pounds of on- and off-site releases, of which over 511,000 pounds were off-site releases and over 204,000 pounds were air emissions. Texas's off-site releases of 511,00 pounds totaled more than all other states combined (see Table 4–44). These were the largest of any state for both off-site releases and air emissions. As shown in Map 4–4, Texas and New Jersey reported the largest amounts of total releases in 1999; the total for New

Table 4–43. TRI Transfers Off-site for Further Waste Management/Disposal, 1998–1999: Chemical Wholesalers

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Transfers to Recycling	3,007,695	4,387,518	1,379,823	45.9
Transfers to Energy Recovery	24,491,927	11,379,798	–13,112,129	–53.5
Transfers to Treatment	3,093,759	3,214,228	120,469	3.9
Transfers to POTWs	116,369	49,675	–66,694	–57.3
Metals and Metal Compounds Only	351	75	–276	–78.6
Non-metal TRI Chemicals	116,018	49,600	–66,418	–57.2
Other Off-site Transfers*	4,320	0	–4,320	–100.0
Other Off-site Transfers to Disposal**	217,706	654,072	436,366	200.4
Total Transfers Off-site for Further Waste Management/Disposal	**30,931,776**	**19,685,291**	**–11,246,485**	**–36.4**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
* Other Off-site Transfers are transfers reported without a valid waste management code.
** Does not include transfers to POTWs of metals and metal compounds.

Map 4–4. Total On-site and Off-site Releases, 1999: Chemical Wholesalers



Jersey was more than 180,000 pounds, almost all in the form of air emissions. Next in rank were Ohio, North Carolina, California, and Illinois. Only Texas, New Jersey, Ohio, and North Carolina had releases of more than 100,000 pounds from the industry.

Ohio's more than 126,000 pounds of total releases included almost 90,000 pounds of air emissions and nearly 37,000 pounds of transfers off-site to disposal. Facilities in North Carolina reported about 120,000 pounds, including nearly 104,000 pounds of air emissions. The largest quantity of surface water emissions reported was about 2,300 pounds, for California.

Table 4–45 shows changes in total releases by the chemical wholesale distribution industry between 1998 and 1999, by state. The largest absolute increase was for Texas, from 236,137 pounds to 715,884 pounds, a rise of 203.2 percent. The largest absolute decrease was for Ohio, from 186,627 pounds to 126,256 pounds, a 32.3 percent decline.

Waste Management Data

The state with the largest quantity of total production-related waste reported by the chemical wholesale distribution industry was Ohio, with 23.8 million pounds (see Table 4–44). Ohio's 16.4 million pounds recycled on-site represented 83.6 percent of all on-site recycling by the industry. The state's off-site energy recovery amounted

Table 4–44. Summary of TRI Information by State, 1999: Chemical Wholesalers

State	Total Forms	On-site Releases						Off-site Releases	
				Underground Injection		On-site Land Releases			
		Total Air Emissions	Surface Water Discharges	Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	67	29,529	191	0	0	0	0	29,720	0	29,720
Alaska	7	575	0	0	0	0	0	575	0	575
Arizona	46	16,625	0	0	0	0	0	16,625	0	16,625
Arkansas	9	1,702	0	0	0	0	0	1,702	0	1,702
California	218	80,605	2,304	0	0	0	0	82,909	13,395	96,304
Colorado	33	4,645	0	0	0	0	0	4,645	0	4,645
Connecticut	23	8,776	0	0	0	0	0	8,776	0	8,776
Florida	76	64,548	30	0	0	0	0	64,578	5	64,583
Georgia	104	28,566	0	0	0	0	0	28,566	10	28,576
Hawaii	1	5	0	0	0	0	0	5	0	5
Idaho	2	0	0	0	0	0	0	0	0	0
Illinois	125	42,405	30	0	0	0	0	42,435	33,708	76,143
Indiana	156	36,827	0	0	0	0	0	36,827	250	37,077
Iowa	71	12,693	5	0	0	0	5	12,703	3,610	16,313
Kansas	52	8,389	0	0	0	0	0	8,389	6,955	15,344
Kentucky	72	39,217	0	0	0	0	0	39,217	88	39,305
Louisiana	112	38,419	0	0	0	0	0	38,419	6,402	44,821
Maine	1	5	0	0	0	0	0	5	0	5
Maryland	19	380	0	0	0	0	0	380	0	380
Massachusetts	105	13,759	0	0	0	0	0	13,759	300	14,059
Michigan	100	29,165	0	0	0	0	0	29,165	0	29,165
Minnesota	77	12,710	0	0	0	0	0	12,710	0	12,710
Mississippi	20	2,400	5	0	0	0	0	2,405	0	2,405
Missouri	152	71,613	0	0	0	0	177	71,790	100	71,890
Montana	6	2,031	0	0	0	0	0	2,031	0	2,031
Nebraska	10	0	0	0	0	0	0	0	0	0
New Hampshire	3	418	0	0	0	0	0	418	0	418
New Jersey	165	180,214	5	0	0	0	0	180,219	5	180,224
New Mexico	6	14	0	0	0	0	0	14	710	724
New York	100	18,925	4	0	0	0	0	18,929	0	18,929
North Carolina	129	103,628	0	0	0	0	0	103,628	15,973	119,601
North Dakota	6	922	0	0	0	0	0	922	0	922
Ohio	238	89,522	0	0	0	0	0	89,522	36,734	126,256
Oklahoma	66	16,155	0	0	0	0	0	16,155	0	16,155
Oregon	50	16,864	0	0	0	0	5	16,869	9,684	26,553
Pennsylvania	195	47,539	5	0	0	0	0	47,544	3,121	50,665
Puerto Rico	15	15,029	0	0	0	0	0	15,029	0	15,029
Rhode Island	5	250	0	0	0	0	0	250	0	250
South Carolina	29	17,330	0	0	0	0	0	17,330	1,810	19,140
Tennessee	114	26,263	0	0	0	0	500	26,763	250	27,013
Texas	475	204,390	0	0	0	0	55	204,445	511,439	715,884
Utah	37	6,509	0	0	0	0	0	6,509	0	6,509
Virginia	28	4,260	0	0	0	0	0	4,260	0	4,260
Washington	41	3,934	765	0	0	0	205	4,904	3,650	8,554
West Virginia	17	1,650	0	0	0	0	0	1,650	440	2,090
Wisconsin	76	18,990	0	0	0	0	334	19,324	0	19,324
Total	**3,459**	**1,318,395**	**3,344**	**0**	**0**	**0**	**1,281**	**1,323,020**	**648,639**	**1,971,659**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

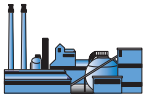


Table 4–44. Summary of TRI Information by State, 1999: Chemical Wholesalers *(continued)*

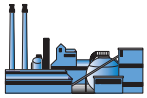
State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site	Off-site	On-site	Off-site	On-site	Off-site			
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	0	0	0	23,990	4	1	28,191	52,186	148
Alaska	0	0	0	0	0	0	183	183	0
Arizona	10,000	0	0	15,758	169,000	78	15,600	210,436	2
Arkansas	0	0	0	0	0	0	1,702	1,702	0
California	12,198	32,159	0	434,694	19,045	19,643	122,814	640,553	1,261
Colorado	0	0	0	1,349	0	4,314	4,149	9,812	0
Connecticut	0	0	0	0	0	0	8,776	8,776	11
Florida	607	600	0	26,032	0	100	57,685	85,024	204
Georgia	0	4,106	0	28,139	9	250	27,703	60,207	42
Hawaii	0	0	0	0	0	0	2	2	5
Idaho	0	0	0	0	0	0	0	0	0
Illinois	0	0	0	479,964	210	22,388	74,204	576,766	229
Indiana	656	18,245	0	347,011	33,743	109,388	30,770	539,813	201
Iowa	43,693	24,244	0	86,378	0	5,210	12,383	171,908	0
Kansas	23,860	0	0	64,362	0	18,495	8,386	115,103	0
Kentucky	2,738	0	0	19,221	43	88	34,700	56,790	0
Louisiana	30,613	0	72,746	157,045	12	99	44,408	304,923	0
Maine	0	0	0	0	2,200	0	5	2,205	1
Maryland	0	0	0	0	0	0	380	380	0
Massachusetts	0	5,362	0	49,432	0	0	28,490	83,284	32
Michigan	0	8,900	0	213,257	1,015	9,251	26,536	258,959	18
Minnesota	0	6,208	0	71,528	1,828	5,413	12,433	97,410	0
Mississippi	0	0	0	22,500	0	68,691	2,298	93,489	0
Missouri	0	60	0	348,481	0	80,387	64,244	493,172	0
Montana	0	0	0	0	0	0	2,031	2,031	0
Nebraska	0	0	0	0	0	0	0	0	0
New Hampshire	0	0	0	0	0	16	418	434	0
New Jersey	0	4,656	0	164,594	7,433	34,649	186,589	397,921	350,087
New Mexico	0	0	0	0	0	0	724	724	0
New York	0	0	0	52,750	0	104,701	16,396	173,847	4
North Carolina	0	2,600	0	355,571	14,338	1,511,768	101,698	1,985,975	5
North Dakota	0	0	0	0	0	0	922	922	0
Ohio	16,393,300	29,700	0	6,559,998	1,284	685,936	124,208	23,794,426	1,605
Oklahoma	0	0	0	45,994	0	310	14,191	60,495	562
Oregon	0	0	0	1,808	43,079	690	25,465	71,042	290
Pennsylvania	0	0	0	37,055	15,365	16,305	43,908	112,633	203
Puerto Rico	0	0	0	0	0	0	15,029	15,029	0
Rhode Island	0	0	0	0	0	0	400	400	0
South Carolina	0	600	0	994	2,679	2,750	17,330	24,353	1
Tennessee	3,125	0	0	17,029	4,054	24	32,379	56,611	240
Texas	6,396	65,902	0	694,242	867,828	303,133	202,607	2,140,108	498,947
Utah	0	0	0	57,988	4,968	6,944	5,457	75,357	1
Virginia	0	0	0	6,633	0	0	2,466	9,099	7
Washington	0	0	0	580	0	0	3,927	4,507	3,511
West Virginia	0	3,200	0	0	0	400	1,400	5,000	0
Wisconsin	3,087,924	0	0	3,888,411	658	5,523	16,406	6,998,922	972
Total	**19,615,110**	**206,542**	**72,746**	**14,272,788**	**1,188,795**	**3,016,945**	**1,419,993**	**39,792,919**	**858,589**

Note: Data are from Section 8 of Form R.

Table 4–45. TRI Total Releases by State, 1998–1999: Chemical Wholesalers

State	Total On-site and Off-site Releases			
	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Alabama	25,369	29,720	4,351	17.2
Alaska	1,255	575	–680	–54.2
Arizona	12,249	16,625	4,376	35.7
Arkansas	985	1,702	717	72.8
California	143,661	96,304	–47,357	–33.0
Colorado	4,092	4,645	553	13.5
Connecticut	7,408	8,776	1,368	18.5
Florida	85,572	64,583	–20,989	–24.5
Georgia	38,724	28,576	–10,148	–26.2
Hawaii	0	5	5	—
Idaho	0	0	0	—
Illinois	52,829	76,143	23,314	44.1
Indiana	39,300	37,077	–2,223	–5.7
Iowa	20,569	16,313	–4,256	–20.7
Kansas	10,576	15,344	4,768	45.1
Kentucky	29,925	39,305	9,380	31.3
Louisiana	47,045	44,821	–2,224	–4.7
Maine	17	5	–12	–70.6
Maryland	260	380	120	46.2
Massachusetts	31,796	14,059	–17,737	–55.8
Michigan	28,175	29,165	990	3.5
Minnesota	17,563	12,710	–4,853	–27.6
Mississippi	7,961	2,405	–5,556	–69.8
Missouri	65,547	71,890	6,343	9.7
Montana	1,907	2,031	124	6.5
Nebraska	0	0	0	—
Nevada	475	0	–475	–100.0
New Hampshire	504	418	–86	–17.1
New Jersey	156,061	180,224	24,163	15.5
New Mexico	1,165	724	–441	–37.9
New York	15,441	18,929	3,488	22.6
North Carolina	31,993	119,601	87,608	273.8
North Dakota	772	922	150	19.4
Ohio	186,627	126,256	–60,371	–32.3
Oklahoma	11,273	16,155	4,882	43.3
Oregon	35,337	26,553	–8,784	–24.9
Pennsylvania	42,974	50,665	7,691	17.9
Puerto Rico	22,161	15,029	–7,132	–32.2
Rhode Island	250	250	0	0.0
South Carolina	12,990	19,140	6,150	47.3
Tennessee	28,377	27,013	–1,364	–4.8
Texas	236,137	715,884	479,747	203.2
Utah	4,708	6,509	1,801	38.3
Virginia	27,158	4,260	–22,898	–84.3
Washington	31,275	8,554	–22,721	–72.6
West Virginia	2,300	2,090	–210	–9.1
Wisconsin	16,336	19,324	2,988	18.3
Total	**1,537,099**	**1,971,659**	**434,560**	**28.3**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.



to 6.6 million pounds, 46.0 percent of the total for the industry in this category.

Wisconsin ranked second, with total production-related waste of 7.0 million pounds. This consisted of 3.1 million pounds of on-site recycling and 3.9 million pounds of off-site energy recovery. Texas ranked third, with 2.1 million pounds of total production-related waste, including the largest amount treated on-site, about 868,000 pounds.

Chemical wholesale distributors reported smaller quantities in other waste management activities. The largest amount of production-related waste released on- and off-site was about 203,000 pounds in Texas. As seen in Table 4–45, total releases in Texas were about 716,000, which includes the non-production-related waste of almost 499,000 pounds. Texas also reported the largest amount of off-site recycling, almost 66,000 pounds.

Top 15 Chemicals for On- and Off-site Releases

Table 4–46 presents data for the 15 chemicals released in the largest amounts by TRI chemical wholesale distributors. Methyl acrylate was the chemical with the largest amount of on- and off-site releases in the chemical wholesale distribution industry. Chemical wholesale distributors reported releasing more than half a million pounds of this chemical, largely as transfers off-site to disposal.

Methanol ranked second, with 315,030 pounds, 93.4 percent of which was air releases. Five other chemicals had total on- and off-site releases greater than 100,000 pounds each: toluene (140,935 pounds), methyl ethyl ketone (140,606 pounds), dichloromethane (126,949 pounds), chlorodifluoromethane (107,851 pounds), and ammonia (100,176 pounds). For all of these chemicals except methyl acrylate, air emissions accounted for more than 85 percent of total on- and off-site releases. Only 3 of the top 15 chemicals—methyl acrylate, zinc compounds, and ethylene glycol—reported more than 50 percent of their total releases as off-site transfers to disposal; for methyl acrylate and zinc compounds, the share was more than 97 percent.

Releases of the 15 chemicals totaled 1.8 million pounds, 89.2 percent of the industry's total releases of 2.0 million pounds.

Projected Quantities of TRI Chemicals Managed in Waste, 1999–2001

Chemical wholesale distribution facilities reporting to TRI expected their production-related waste to increase by 8.7 percent between 1999 and 2001, from 39.8 million pounds to 43.3 million pounds (see Table 4–47). The projected increase represents a rise of 9.4 percent in 2000 followed by a decrease of 0.7 percent in 2001. On-site treatment is expected to fall by 63.3 percent and off-site treatment to increase by 21.4 percent. The largest amounts involved are for on-site recycling, which would increase from 19.6 million pounds to 20.6 million pounds (a rise of 5.1 percent, although its share of waste managed would decrease), and off-site energy recovery, projected to increase from 14.3 million pounds to 17.0 million pounds, a rise of 19.3 percent.

The projections indicate some change in waste management practices. The share of on-site recycling would decrease from 49.3 percent of total production-related waste managed in 1999 to 47.6 percent in 2001,

Table 4–46. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1999: Chemical Wholesalers

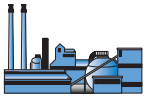
CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
96-33-3	Methyl acrylate	2,206	0	0	0	0	0	2,206	498,922	501,128
67-56-1	Methanol	294,222	0	0	0	0	345	294,567	20,463	315,030
108-88-3	Toluene	122,906	10	0	0	0	5	122,921	18,014	140,935
78-93-3	Methyl ethyl ketone	130,945	14	0	0	0	254	131,213	9,393	140,606
75-09-2	Dichloromethane	123,742	0	0	0	0	0	123,742	3,207	126,949
75-45-6	Chlorodifluoromethane (HCFC-22)	107,851	0	0	0	0	0	107,851	0	107,851
7664-41-7	Ammonia	98,252	794	0	0	0	205	99,251	925	100,176
1330-20-7	Xylene (mixed isomers)	79,076	20	0	0	0	145	79,241	6,991	86,232
110-54-3	n-Hexane	76,378	0	0	0	0	7	76,385	4,292	80,677
—	Glycol ethers	31,845	0	0	0	0	250	32,095	9,670	41,765
108-05-4	Vinyl acetate	28,070	0	0	0	0	0	28,070	598	28,668
—	Zinc compounds	703	0	0	0	0	0	703	24,965	25,668
107-21-1	Ethylene glycol	9,893	0	0	0	0	0	9,893	13,633	23,526
108-10-1	Methyl isobutyl ketone	19,048	0	0	0	0	5	19,053	1,426	20,479
75-71-8	Dichlorodifluoro-methane (CFC-12)	18,566	0	0	0	0	0	18,566	0	18,566
	Subtotal (top 15 chemicals)	**1,143,703**	**838**	**0**	**0**	**0**	**1,216**	**1,145,757**	**612,499**	**1,758,256**
	Total (all chemicals)	**1,318,395**	**3,344**	**0**	**0**	**0**	**1,281**	**1,323,020**	**648,639**	**1,971,659**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

and that of off-site energy recovery would increase from 35.9 percent to 39.4 percent. The quantity released on- and off-site—the least-desirable outcome under the waste management hierarchy described in **Waste Management** in Chapter 1 (Figure 2–1)—would decrease slightly, from 1.4 million pounds (3.6 percent of the total) to 1.3 million pounds (3.0 percent).

Source Reduction

Of the Form Rs submitted by chemical wholesale distribution facilities in 1999, 11.4 percent reported source reduction activity undertaken during the year (see Table 4–48). As noted in **Waste Management** in Chapter 1, source reduction—activity that prevents the generation of waste—is the preferred waste management option.



Facilities with only chemical wholesale distribution operations reported 180 forms with source reductions activities, representing 10.3 percent of the total 1,741. These facilities identified good operating practices on 112 forms and spill and leak prevention on 105. Facilities with combinations of chemical wholesale distribution and other operations filed smaller numbers of forms but reported source reduction activity on a greater percentage of them. Facilities that combined chemical wholesale distribution with petroleum bulk terminals or with manufacture of chemical products reported source reduction activity on about 70 percent of their Form Rs. These facilities identified as their main source reduction activities spill and leak prevention (25 forms for the two groups) and good operating practices (23 forms).

Table 4–47. Current Year and Projected Quantities of TRI Chemicals in Waste, 1999–2001: Chemical Wholsesalers

Waste Management Activity	Current Year 1999		Projected 2000		Projected 2001	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
Recycled On-site	19,615,110	49.3	20,308,682	46.6	20,615,628	47.6
Recycled Off-site	206,542	0.5	143,232	0.3	143,388	0.3
Energy Recovery On-site	72,746	0.2	81,018	0.2	81,018	0.2
Energy Recovery Off-site	14,272,788	35.9	16,719,067	38.4	17,033,061	39.4
Treated On-site	1,188,795	3.0	435,666	1.0	436,303	1.0
Treated Off-site	3,016,945	7.6	4,554,572	10.5	3,661,683	8.5
Quantity Released On- and Off-site	1,419,993	3.6	1,311,017	3.0	1,294,814	3.0
Total Production-related Waste	**39,792,919**	**100.0**	**43,553,254**	**100.0**	**43,265,895**	**100.0**
Waste Management Activity	**Projected Change 1999-2000** Percent		**Projected Change 2000-2001** Percent		**Projected Change 1999-2001** Percent	
Recycled On-site	3.5		1.5		5.1	
Recycled Off-site	–30.7		0.1		–30.6	
Energy Recovery On-site	11.4		0.0		11.4	
Energy Recovery Off-site	17.1		1.9		19.3	
Treated On-site	–63.4		0.1		–63.3	
Treated Off-site	51.0		–19.6		21.4	
Quantity Released On- and Off-site	–7.7		–1.2		–8.8	
Total Production-related Waste	**9.4**		**-0.7**		**8.7**	

Note: Current year and projected amounts are from Section 8 of Form R for 1999.

Table 4–48. Number of Forms Reporting Source Reduction Activity, 1999: Chemical Wholesalers

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
5169	Chemical Wholesale Distributors	1,741	180	10.3	112	45	105	0	8	5	0	1
	SIC Code 5169 and SIC Code 5171 (Petroleum Bulk Terminals)	11	8	72.7	8	0	16	0	0	0	0	0
	SIC Code 5169 and SIC Code 7389 (Solvent Recovery Services)	40	0	0.0	0	0	0	0	0	0	0	0
	SIC Code 5169 and SIC Code 28 (Chemical Products)	29	20	69.0	15	0	9	0	3	0	0	0
	Total	**1,821**	**208**	**11.4**	**135**	**45**	**130**	**0**	**11**	**5**	**0**	**1**

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

Petroleum Terminals and Bulk Storage Facilities (SIC Code 5171)

Introduction

Petroleum terminals and bulk storage facilities (SIC code 5171) repackage or blend petroleum products for sale to gasoline stations and other retailers. Petroleum terminals and bulk storage facilities buy petroleum products in bulk and blend and/or repackage them to customer specifications. The industry includes liquefied petroleum gases. Petroleum terminals and bulk storage facilities sell to industrial, commercial, institutional, farm, construction, and business users and to other wholesalers. They have a bulk liquid storage capacity of 10,000 gallons or more, and the quantities sold are large. Retail gasoline stations are not included in this industry sector. Box 4–6 describes the products of the wholesale petroleum industry.

More details for this industry sector on products and services, employment and production, general environmental issues, processes involving toxic chemicals and the management of toxic chemicals in waste can be found in the *1998 Toxics Release Inventory Public Data Release* report (EPA 745-R-00-007).

1999 TRI Data for Petroleum Terminals and Bulk Storage Facilities

On- and Off-site Releases

Petroleum terminals and bulk storage facilities required to report to TRI released 4.3 million pounds of TRI chemicals on- and off-site in 1999, as shown in Table 4–49. The bulk of the total, 4.0 million pounds, was air emissions, which accounted for 94.8 percent of the industry's total releases (see Figure 4–12).

Box 4–6. SIC Code 517, Wholesale Trade-Petroleum and Petroleum Products: Codes and Classifications Required to Report to TRI

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

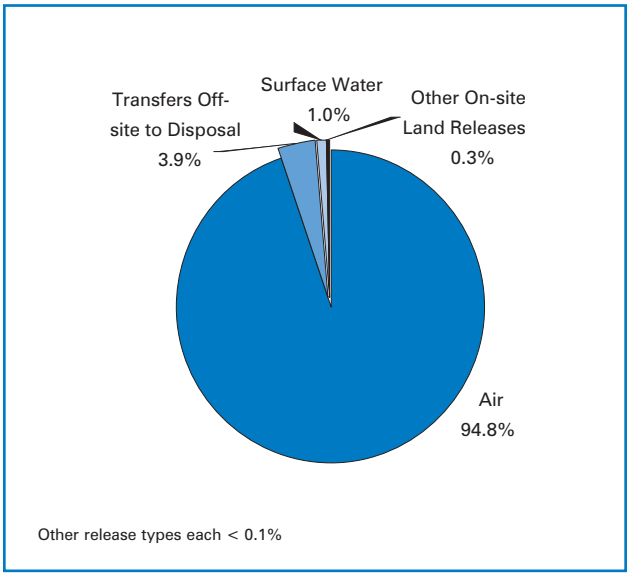
Source: Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual, 1987.*

The second-largest release type, off-site releases (transfers off-site to disposal), totaled about 166,000 pounds, or 3.9 percent of total releases. Petroleum terminals and bulk storage facilities also reported about 44,000 pounds discharged to surface waters and almost 15,000 pounds of on-site land releases. No underground injection was reported.

Of the 3,568 forms submitted in 1999, 32 indicated a combination of facility activities covering petroleum terminals and bulk storage operations, along with petroleum refining. Those reporting only petroleum terminals and bulk storage facilities represented 99.1 percent of total releases by this industry. Facilities reporting combined operations reported about 40,000 pounds of total releases for 1999.

Table 4–50 shows changes in releases from petroleum terminals and bulk storage facilities between 1998 and 1999. Total releases declined by 5.5 percent, on-site releases decreased 4.3 percent, and off-site releases fell 26.7 percent. Air emissions decreased by 3.9 percent. Surface water discharges and land treatment rose, although the amounts were modest. Off-site transfers to storage, solidification/stabilization, and underground injection all showed large percentage increases, but from small bases. The unknown category decreased by 81.8 percent, from almost 75,000 pounds to about 13,500 pounds.

Figure 4–12. Distribution of TRI On-site and Off-site Releases, 1999: Petroleum Terminals and Bulk Storage Facilities



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

Table 4–49. TRI On-site and Off-site Releases by 4-digit SIC Code, 1999: Petroleum Terminals and Bulk Storage Facilities

			On-site Releases							Off-site Releases	
					Underground Injection		On-site Land Releases				
SIC Code	Industry	Total Forms	Total Air Emissions	Surface Water Discharges	Class I Wells	Class II–V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
		Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
5171	Petroleum Terminals and Bulk Storage Facilities	3,536	4,032,415	42,645	0	0	528	14,641	4,090,229	138,847	4,229,076
	SIC Code 5171 and SIC Code 29 (Petroleum Refining)	32	11,808	961	0	0	0	0	12,769	26,706	39,475
	Total	**3,568**	**4,044,223**	**43,606**	**0**	**0**	**528**	**14,641**	**4,102,998**	**165,553**	**4,268,551**

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release.

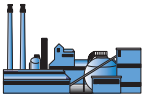


Table 4–50. TRI On-site and Off-site Releases, 1998–1999: Petroleum Terminals and Bulk Storage Facilities

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
On-site Releases				
Total Air Emissions	4,209,302	4,044,223	–165,079	–3.9
Fugitive Air Emissions	1,142,198	1,117,226	–24,972	–2.2
Point Source Air Emissions	3,067,104	2,926,997	–140,107	–4.6
Surface Water Discharges	26,706	43,606	16,900	63.3
Underground Injection	0	0	0	—
Class I Wells	0	0	0	—
Class II–V Wells	0	0	0	—
On-site Land Releases	52,811	15,169	–37,642	–71.3
RCRA Subtitle C Landfills	0	528	528	—
Other On-site Landfills	0	0	0	—
Land Treatment	25	1,977	1,952	7,808.0
Surface Impoundments	0	4,881	4,881	—
Other Disposal	52,786	7,783	–45,003	–85.3
Total On-site Releases	**4,288,819**	**4,102,998**	**-185,821**	**-4.3**
Off-site Releases				
Storage Only[a]	258	22,642	22,384	8,676.0
Solidification/Stabilization[b] Metals and Metal Compounds Only	27	2,462	2,435	9,018.5
Wastewater Treatment (excluding POTWs)[c] Metals and Metal Compounds Only	0	0	0	—
Transfers to POTWs[d] Metals and Metal Compounds Only	370	322	–48	–13.0
Underground injection	1	2,502	2,501	250,100.0
Landfills/Surface Impoundments	32,616	34,662	2,046	6.3
Land Treatment	520	0	–520	–100.0
Other Land Disposal	41	0	–41	–100.0
Other Off-site Management	82,769	76,954	–5,815	–7.0
Transfers to Waste Broker for Disposal	34,950	12,464	–22,486	–64.3
Unknown[e]	74,236	13,545	–60,691	–81.8
Total Off-site Releases (Transfers Off-site to Disposal)	**225,788**	**165,553**	**-60,235**	**-26.7**
Total On-site and Off-site Releases	**4,514,607**	**4,268,551**	**-246,056**	**-5.5**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

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

[b] Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it such transfers are included as a form of disposal (off-site release). See Box 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.

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

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

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

Table 4–51. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1999: Petroleum Terminals and Bulk Storage Facilities

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site	Off-site	On-site	Off-site	On-site	Off-site			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
5171	Petroleum Terminals and Bulk Storage Facilities	34,171,226	1,649,275	31,599	297,993	7,734,904	680,248	4,113,270	48,678,515	273,557
	SIC Code 5171 and SIC Code 29 (Petroleum Refining)	0	280	0	83	0	866	35,833	37,062	8
	Total	**34,171,226**	**1,649,555**	**31,599**	**298,076**	**7,734,904**	**681,114**	**4,149,103**	**48,715,577**	**273,565**

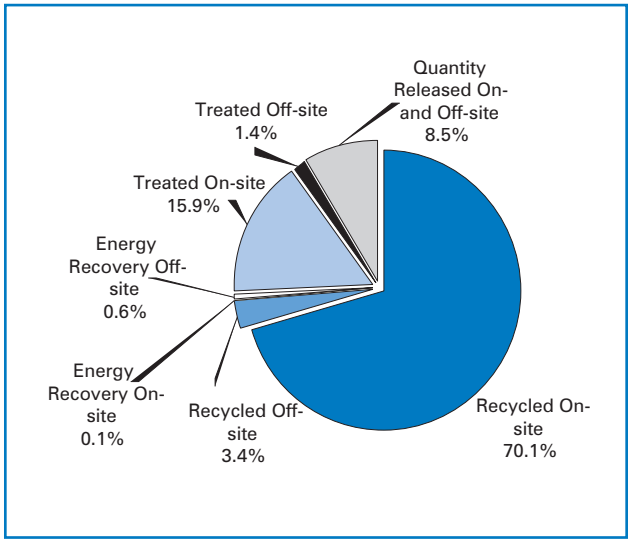
Note: Data are from Section 8 of Form R.

Waste Management Data

Quantities of TRI Chemicals in Waste

Petroleum terminals and bulk storage facilities reported managing a little over 48.7 million pounds of total production-related waste in 1999, as shown in Table 4–51. On-site recycling totaled 34.2 million pounds, or 70.1 percent of the industry's production-related waste (see Figure 4–13). The industry's on-site treatment was 7.7 million pounds (15.9 percent of the total), quantity released on- and off-site came to 4.1 million pounds, or 8.5 percent of the total, and off-site recycling amounted to 1.6 million pounds (3.4 percent). The total for on-site and off-site energy recovery was about 330,000 pounds.

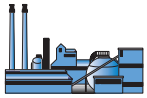
Figure 4–13. TRI Waste Management, 1999: Petroleum Terminals and Bulk Storage Facilities



Note: Data are from Section 8 of Form R.

Facilities reporting only petroleum terminals and bulk storage operations reported 48.68 million pounds of total production-related waste managed—more than 99.9 percent of the industry total. Facilities with a combination of petroleum terminals and bulk storage operations and petroleum refining reported about 37,000 pounds of production-related waste managed, largely as quantity released on- and off-site.

Table 4–52 shows changes in waste management activity by petroleum terminals and bulk storage facilities between 1998 and 1999. Total production-related waste fell 12.2 million pounds, a decline of 20.0 percent. Most of the decrease was attributable to a 71.4 percent fall in quantity released on- and off-site, from 14.5 million pounds in 1998 to 4.1 million pounds in 1999 and to an 85.2 percent decrease in off-site recycling, from 11.1 million pounds in 1998 to 1.6 million pounds in 1999. This is apparently due to a reporting error by two facilities owned by the same company that included the amounts sent off-site to recycling in the quantity released on- and off-



site. On-site recycling rose by 41.6 percent, from 24.1 million pounds to 34.2 million pounds.

Transfers Off-site for Further Waste Management/Disposal

Petroleum terminals and bulk storage facilities reported 2.5 million pounds of transfers off-site for further waste management and disposal in 1999, as shown in Table 4–53. Transfers off-site to recycling, 1.3 million pounds, represented 51.0 percent of all transfers for further waste management and disposal (see Figure 4–14). Transfers off-site to treatment, about 720,000 pounds, accounted for 28.5 percent of the total.

Most of these quantities were reported by facilities with only petroleum terminals and bulk storage operations. Facilities that combined petroleum terminals and bulk storage operations with petroleum refining reported less than 31,000 pounds of transfers off-site for further waste management and disposal.

Transfers off-site for further waste management or disposal by petroleum terminals and bulk storage facilities dropped by 10.5 million pounds, or 80.7 percent, between 1998 and 1999 (see Table 4–54). The largest absolute decrease was in transfers to recycling, which fell from 11.4 million pounds to 1.3 million pounds, a decrease of 88.7 percent. All other waste management cate-

Table 4–52. Quantities of TRI Chemicals in Waste, 1998–1999: Petroleum Terminals and Bulk Storage Facilities

Waste Management Activity	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Recycled On-site	24,127,709	34,171,226	10,043,517	41.6
Recycled Off-site	11,136,925	1,649,555	–9,487,370	–85.2
Energy Recovery On-site	6	31,599	31,593	526,550.0
Energy Recovery Off-site	324,237	298,076	–26,161	–8.1
Treated On-site	9,606,632	7,734,904	–1,871,728	–19.5
Treated Off-site	1,190,963	681,114	–509,849	–42.8
Quantity Released On- and Off-site	14,502,350	4,149,103	–10,353,247	–71.4
Total Production-related Waste	**60,888,822**	**48,715,577**	**–12,173,245**	**–20.0**
Non-production-related Waste	830,269	273,565	–556,704	–67.1

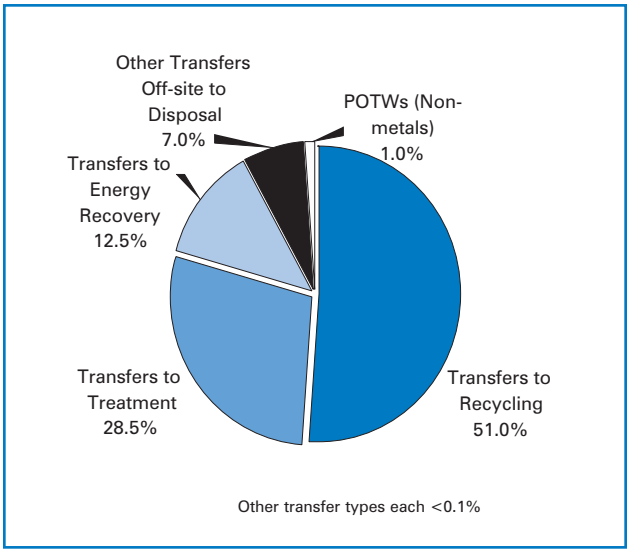
Note: All data are from Section 8 of Form R for the year indicated.

Table 4–53. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1999: Petroleum Terminals and Bulk Storage Facilities

SIC Code	Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs		Other Off-site Transfers*	Other Transfers Off-site to Disposal**	Total Transfers for Further Waste Management/ Disposal
					Metals and Metal Compounds	Non-metal TRI Chemicals			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
5171	Petroleum Terminals and Bulk Storage Facilities	1,284,967	314,993	715,964	321	24,265	0	149,425	2,489,935
	SIC Code 5171 and SIC Code 29 (Petroleum Refining)	288	326	3,055	1	413	0	26,705	30,788
	Total	**1,285,255**	**315,319**	**719,019**	**322**	**24,678**	**0**	**176,130**	**2,520,723**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
*Other Off-site Transfers are transfers reported without a valid waste management code.
**Does not include transfers to POTWs of metals and metal compounds.

Figure 4–14. Distribution of TRI Transfers Off-site for Further Waste Management/Disposal, 1999: Petroleum Terminals and Bulk Storage Facilities



Note: Data are from Section 6 of Form R.

gories declined except for transfers to POTWs, which rose from about 8,200 pounds to 25,000 pounds.

TRI Data by State

Petroleum terminals and bulk storage facilities in California submitted 394 forms, the largest number of forms. New York and Pennsylvania ranked second and third, with 325 and 311 forms, respectively.

On- and Off-site Releases

Petroleum terminals and bulk storage facilities in Guam reported more than 500,000 pounds of on-and off-site releases in 1999, almost all in the form of air emissions (see Table 4–55). As is shown in Map 4–5, Guam, Texas, California, and New Jersey reported the largest amounts of total releases in 1999, over 300,000 pounds each.

Texas had the second highest releases, with over 483,000 pounds, of which almost 474,000 pounds were air emissions. California was third, with over 416,000 pounds, of which almost 412,000 pounds were air emissions. New Jersey ranked fourth among states for releases in this industry, with more than 302,000 pounds, including almost 297,000 pounds of air emissions.

Facilities in Kentucky reported the largest amount of discharges to surface waters, with 11,790 pounds, representing 27.0 percent of total surface water discharges for the industry. Facilities in Kentucky also reported the largest off-site releases (off-site transfers to disposal), with over 24,000 pounds.

Table 4–54. TRI Transfers Off-site for Further Waste Management/Disposal, 1998–1999: Petroleum Terminals and Bulk Storage Facilities

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Transfers to Recycling	11,391,030	1,285,255	–10,105,775	–88.7
Transfers to Energy Recovery	345,493	315,319	–30,174	–8.7
Transfers to Treatment	1,057,826	719,019	–338,807	–32.0
Transfers to POTWs	8,188	25,000	16,812	205.3
Metals and Metal Compounds Only	370	322	–48	–13.0
Non-metal TRI Chemicals	7,818	24,678	16,860	215.7
Other Off-site Transfers*	6,000	0	–6,000	–100.0
Other Off-site Transfers to Disposal**	–370	–322	48	–13.0
Total Transfers Off-site for Further Waste Management/Disposal	**13,048,697**	**2,520,723**	**-10,527,974**	**-80.7**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
*Other Off-site Transfers are transfers reported without a valid waste management code.
**Does not include transfers to POTWs of metals and metal compounds.

Map 4–5. Total On-site and Off-site Releases, 1999: Petroleum Terminals and Bulk Storage Facilities

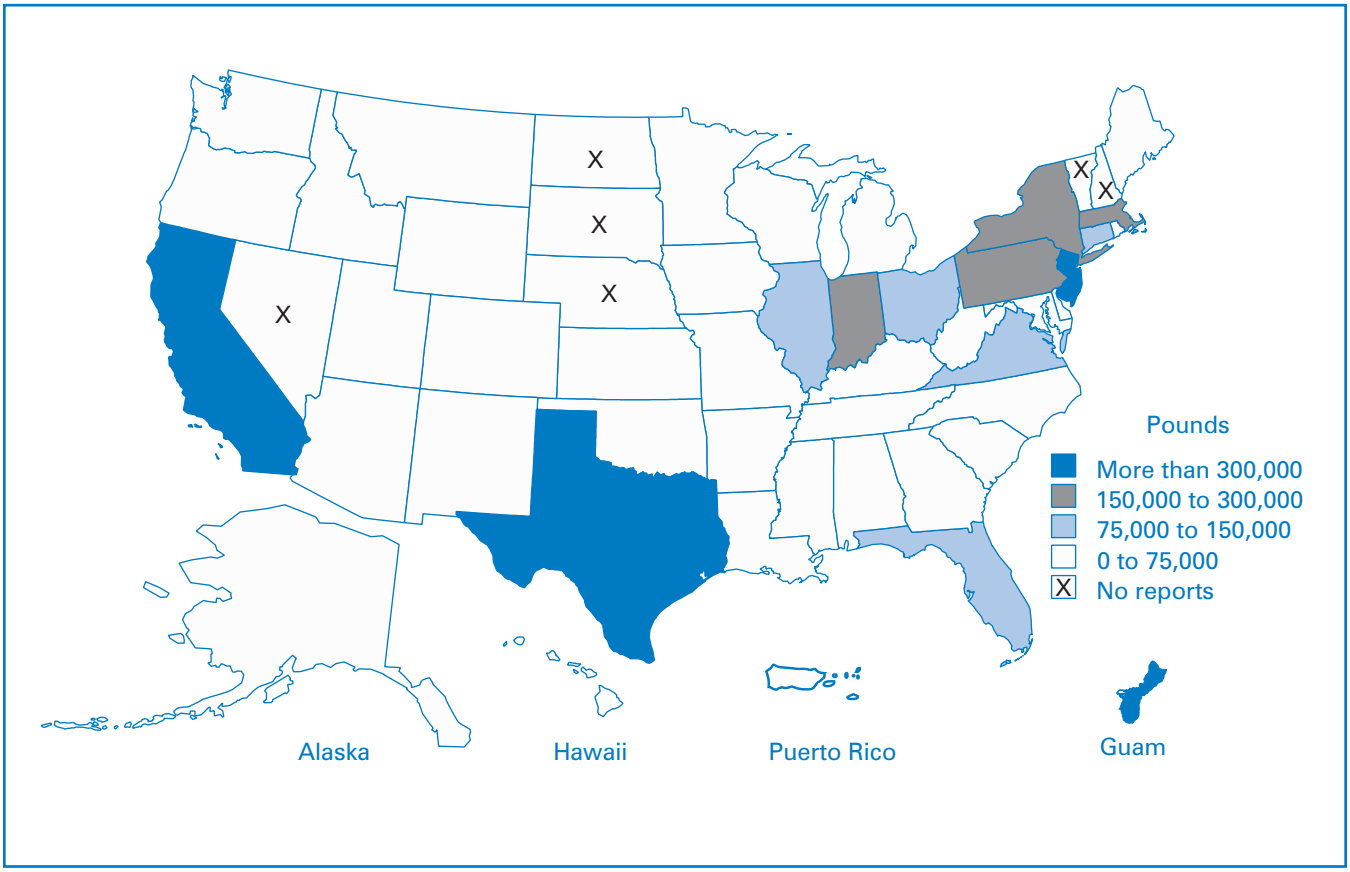


Table 4–56 summarizes the changes in total on-site and off-site releases by petroleum terminals and bulk storage facilities, by state, between 1998 and 1999. The largest increase was for Guam; releases jumped by 4,431.6 percent, from about 11,000 pounds to a little over 500,000 pounds. The largest absolute decreases were for Connecticut, from about 204,000 pounds to about 80,500 pounds, a decline of 60.4 percent, and New York, from about 344,000 pounds to about 238,500 pounds (30.7 percent).

Waste Management Data

Texas, with 16.4 million pounds, was the state with the largest total production-related waste in petroleum terminals and bulk storage facilities (see Table 4–55). Texas facilities in this industry reported 13.4 million pounds recycled on-site—the largest amount of on-site recycling in the industry, 39.2 percent of the total 34.2 million pounds for the category in this industry. Texas facilities also reported 2.0 million pounds of on-site treatment, or 25.5 percent of the total 7.7 million pounds of on-site treatment in the industry.

California ranked second, with total production-related waste of 4.8 million pounds. This included 3.1 million pounds of on-site recycling.

Georgia ranked third, with 4.1 million pounds of total production-related waste. Georgia facilities reported 4.0 million pounds recycled on-site, the second largest amount of any state for this industry.

Table 4–55. Summary of TRI Information by State, 1999: Petroleum Terminals and Bulk Storage Facilities

State	Total Forms	On-site Releases							Off-site Release	Total On- and Off-site Releases
				Underground Injection		On-site Land Releases				
		Total Air Emissions	Surface Water Discharges	Class I Wells	Class II–V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	
	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	28	10,997	61	0	0	0	0	11,058	0	11,058
Alaska	28	39,068	1	0	0	0	14	39,083	0	39,083
American Samoa	6	5,627	1	0	0	0	0	5,628	0	5,628
Arizona	62	57,811	0	0	0	0	25	57,836	0	57,836
Arkansas	11	16,017	0	0	0	0	0	16,017	0	16,017
California	394	411,624	535	0	0	461	827	413,447	2,924	416,371
Colorado	52	52,320	43	0	0	0	0	52,363	255	52,618
Connecticut	42	80,595	5	0	0	0	0	80,600	13	80,613
Delaware	33	2,455	0	0	0	0	0	2,455	0	2,455
District of Columbia	11	871	0	0	0	0	0	871	0	871
Florida	155	130,721	823	0	0	0	4,000	135,544	4,472	140,016
Georgia	71	29,799	512	0	0	0	0	30,311	19,566	49,877
Guam	20	501,016	25	0	0	67	0	501,108	0	501,108
Hawaii	41	57,237	292	0	0	0	65	57,594	0	57,594
Idaho	14	26,455	0	0	0	0	0	26,455	0	26,455
Illinois	92	95,421	186	0	0	0	242	95,849	1,113	96,962
Indiana	90	216,854	82	0	0	0	2,000	218,936	1,525	220,461
Iowa	12	9,888	0	0	0	0	0	9,888	0	9,888
Kansas	29	57,658	525	0	0	0	2,763	60,946	0	60,946
Kentucky	60	37,726	11,790	0	0	0	0	49,516	24,121	73,637
Louisiana	46	11,557	0	0	0	0	250	11,807	0	11,807
Maine	21	45,784	295	0	0	0	0	46,079	7,804	53,883
Maryland	48	66,624	1,604	0	0	0	0	68,228	1,312	69,540
Massachusetts	70	182,736	542	0	0	0	0	183,278	16,910	200,188
Michigan	82	51,626	7,135	0	0	0	0	58,761	1,339	60,100
Minnesota	12	2,255	6	0	0	0	0	2,261	0	2,261
Mississippi	53	7,090	0	0	0	0	0	7,090	0	7,090
Missouri	59	55,210	15	0	0	0	79	55,304	16	55,320
Montana	16	22,590	0	0	0	0	0	22,590	0	22,590
New Jersey	147	296,594	2,309	0	0	0	0	298,903	3,148	302,051
New Mexico	23	12,556	0	0	0	0	0	12,556	0	12,556
New York	325	222,928	2,609	0	0	0	5	225,542	12,893	238,435
North Carolina	118	58,604	54	0	0	0	290	58,948	3,360	62,308
Northern Marianas	10	3,387	25	0	0	0	0	3,412	0	3,412
Ohio	198	96,085	7,135	0	0	0	1	103,221	1,512	104,733
Oklahoma	25	32,363	0	0	0	0	0	32,363	0	32,363
Oregon	42	71,819	60	0	0	0	0	71,879	14	71,893
Pennsylvania	311	156,834	2,663	0	0	0	0	159,497	3,834	163,331
Puerto Rico	29	32,314	0	0	0	0	0	32,314	3,000	35,314
Rhode Island	21	36,596	36	0	0	0	0	36,632	16,498	53,130
South Carolina	11	10,439	9	0	0	0	0	10,448	0	10,448
Tennessee	89	37,667	136	0	0	0	0	37,803	1,015	38,818
Texas	287	473,797	1,249	0	0	0	2,575	477,621	5,602	483,223
Utah	16	8,979	0	0	0	0	0	8,979	0	8,979
Virgin Islands	12	3,960	0	0	0	0	0	3,960	1,010	4,970
Virginia	147	118,773	123	0	0	0	0	118,896	8,081	126,977
Washington	54	65,416	250	0	0	0	0	65,666	1,255	66,921
West Virginia	20	12,606	280	0	0	0	1,505	14,391	1,025	15,416
Wisconsin	16	5,031	2,190	0	0	0	0	7,221	0	7,221
Wyoming	9	1,843	0	0	0	0	0	1,843	21,936	23,779
Total	**3,568**	**4,044,223**	**43,606**	**0**	**0**	**528**	**14,641**	**4,102,998**	**165,553**	**4,268,551**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

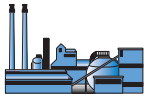


Table 4–55. Summary of TRI Information by State, 1999: Petroleum Terminals and Bulk Storage Facilities *(continued)*

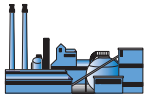
State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site	Off-site	On-site	Off-site	On-site	Off-site			
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	0	900	0	0	6,833	30	10,746	18,509	8
Alaska	12,410	0	0	998	9,227	56	39,137	61,828	14
American Samoa	0	0	0	1,724	0	0	5,630	7,354	183
Arizona	0	189	0	0	0	259,148	56,197	315,534	0
Arkansas	15,553	0	0	0	0	0	16,017	31,570	0
California	3,065,821	425,270	59	859	824,117	54,552	389,039	4,759,717	2,517
Colorado	0	155	0	138	621,625	1,520	46,392	669,830	274
Connecticut	0	0	0	0	36,459	156	81,708	118,323	0
Delaware	0	0	0	0	0	0	2,455	2,455	0
District of Columbia	0	2,282	0	0	0	0	871	3,153	0
Florida	1,511,567	7,797	0	15,827	404,268	5,456	148,388	2,093,303	4,706
Georgia	3,993,600	4,050	31,540	22	35,587	6,652	52,801	4,124,252	139
Guam	0	0	0	0	0	67	501,143	501,210	113
Hawaii	0	0	0	5	9,500	94	52,892	62,491	1,941
Idaho	0	0	0	0	164,839	326	26,458	191,623	99
Illinois	581,250	13	0	32	266,930	70,405	96,742	1,015,372	106,732
Indiana	967,030	5,500	0	180	308,118	3,863	217,956	1,502,647	0
Iowa	4,510	0	0	0	0	0	9,891	14,401	89
Kansas	17,559	15	0	0	73,813	17	34,840	126,244	20,908
Kentucky	1,925,973	2	0	2,858	0	22,471	61,763	2,013,067	0
Louisiana	565,236	168,700	0	0	0	10,953	11,581	756,470	0
Maine	0	0	0	0	11,400	3,053	48,861	63,314	0
Maryland	18	332	0	609	267,641	8,900	67,576	345,076	586
Massachusetts	339,432	812	0	566	0	24,879	193,287	558,976	4,391
Michigan	3,071,455	883	0	23	9,361	52,149	51,333	3,185,204	512
Minnesota	1,590	770	0	0	70,345	18	2,125	74,848	118
Mississippi	0	0	0	0	0	1	7,120	7,121	0
Missouri	920	8,465	0	4,925	884,471	10,874	53,525	963,180	2,609
Montana	0	0	0	0	0	1,439	20,077	21,516	0
New Jersey	91	2,398	0	0	95,468	16,561	300,031	414,549	142
New Mexico	0	0	0	0	108,110	1,172	11,864	121,146	143
New York	1,170,500	47,897	0	149,886	181,311	22,302	265,548	1,837,444	9,131
North Carolina	30,911	22,927	0	12	93,529	19,494	58,787	225,660	3,232
Northern Marianas	0	0	0	0	0	0	3,387	3,387	0
Ohio	2,803,711	22,968	0	399	660,203	10,676	100,048	3,598,005	1,655
Oklahoma	0	0	0	0	67,128	23	29,585	96,736	0
Oregon	118,500	249,947	0	3,642	2,010	1,844	69,619	445,562	0
Pennsylvania	78,499	259,243	0	0	6,054	43,267	159,655	546,718	113,134
Puerto Rico	0	0	0	1,830	0	256	32,614	34,700	3
Rhode Island	0	0	0	242	151,289	1,932	51,933	205,396	0
South Carolina	0	0	0	0	0	1,459	10,439	11,898	0
Tennessee	4,152	3,096	0	0	0	77	38,038	45,363	3
Texas	13,406,341	409,702	0	112,548	1,970,231	12,715	472,148	16,383,685	103
Utah	0	0	0	0	0	5	8,109	8,114	0
Virgin Islands	0	0	0	0	0	0	3,750	3,750	0
Virginia	57,674	2,414	0	44	318,522	1,413	123,385	503,452	14
Washington	426,140	64	0	94	76,513	10,837	62,511	576,159	0
West Virginia	0	0	0	613	0	0	7,413	8,026	23
Wisconsin	783	2,764	0	0	0	0	7,133	10,680	37
Wyoming	0	0	0	0	2	2	26,555	26,559	6
Total	**34,171,226**	**1,649,555**	**31,599**	**298,076**	**7,734,904**	**681,114**	**4,149,103**	**48,715,577**	**273,565**

Note: Data are from Section 8 of Form R.

Table 4–56. TRI Total Releases by State, 1998–1999: Petroleum Terminals and Bulk Storage Facilities

State	Total On-site and Off-site Releases			
	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Alabama	9,535	11,058	1,523	16.0
Alaska	17,330	39,083	21,753	125.5
American Samoa	5,147	5,628	481	9.3
Arizona	57,397	57,836	439	0.8
Arkansas	24,216	16,017	–8,199	–33.9
California	499,086	416,371	–82,715	–16.6
Colorado	114,573	52,618	–61,955	–54.1
Connecticut	203,393	80,613	–122,780	–60.4
Delaware	2,100	2,455	355	16.9
District of Columbia	970	871	–99	–10.2
Florida	158,535	140,016	–18,519	–11.7
Georgia	35,668	49,877	14,209	39.8
Guam	11,058	501,108	490,050	4,431.6
Hawaii	56,143	57,594	1,451	2.6
Idaho	30,224	26,455	–3,769	–12.5
Illinois	114,989	96,962	–18,027	–15.7
Indiana	181,858	220,461	38,603	21.2
Iowa	9,978	9,888	–90	–0.9
Kansas	29,075	60,946	31,871	109.6
Kentucky	34,040	73,637	39,597	116.3
Louisiana	9,647	11,807	2,160	22.4
Maine	67,953	53,883	–14,070	–20.7
Maryland	91,117	69,540	–21,577	–23.7
Massachusetts	286,910	200,188	–86,722	–30.2
Michigan	130,069	60,100	–69,969	–53.8
Minnesota	2,557	2,261	–296	–11.6
Mississippi	29,372	7,090	–22,282	–75.9
Missouri	69,420	55,320	–14,100	–20.3
Montana	23,586	22,590	–996	–4.2
New Jersey	311,388	302,051	–9,337	–3.0
New Mexico	42,135	12,556	–29,579	–70.2
New York	343,936	238,435	–105,501	–30.7
North Carolina	70,646	62,308	–8,338	–11.8
Northern Marianas	3,086	3,412	326	10.6
Ohio	121,865	104,733	–17,132	–14.1
Oklahoma	49,020	32,363	–16,657	–34.0
Oregon	60,607	71,893	11,286	18.6
Pennsylvania	222,182	163,331	–58,851	–26.5
Puerto Rico	22,351	35,314	12,963	58.0
Rhode Island	84,115	53,130	–30,985	–36.8
South Carolina	28,234	10,448	–17,786	–63.0
Tennessee	45,493	38,818	–6,675	–14.7
Texas	530,011	483,223	–46,788	–8.8
Utah	5,988	8,979	2,991	49.9
Virgin Islands	3,676	4,970	1,294	35.2
Virginia	131,826	126,977	–4,849	–3.7
Washington	92,168	66,921	–25,247	–27.4
West Virginia	13,904	15,416	1,512	10.9
Wisconsin	26,030	7,221	–18,809	–72.3
Wyoming	0	23,779	23,779	—
Total	**4,514,607**	**4,268,551**	**-246,056**	**-5.5**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.



Top 15 Chemicals for On- and Off-site Releases

Table 4–57 presents data for the 15 chemicals released in the largest amounts by petroleum terminals and bulk storage facilities. Methyl tert-butyl ether was the chemical with the largest amount of on- and off-site releases in this industry: 1.3 million pounds, mostly in the form of air emissions.

Second in rank was n-hexane, with 884,251 pounds, most of which was air releases. Total releases of toluene were 600,042 pounds. The other chemicals had total on- and off-site releases of less than 500,000 pounds.

For 14 of the top 15 chemicals, air emissions accounted for more than 80 percent of total on- and off-site releases. The exception was zinc compounds, which were mainly (97.8 percent) in the form of off-site releases (transfers to disposal). The largest discharges to surface water were for toluene and benzene, both approximately 14,200 pounds. No releases to underground injection were reported for the industry, and land releases did not exceed 3,200 for any chemical.

Releases of the 15 chemicals totaled 4.1 million pounds, 96.7 percent of the industry's total releases of 4.3 million pounds.

Projected Quantities of TRI Chemicals Managed in Waste, 1999–2001

Petroleum terminals and bulk storage facilities reporting to TRI expected their production-related waste to increase by 1.2 percent between 1999 and 2001, as shown in Table 4–58. The projected increase represents a decrease of 0.5 percent in 2000, followed by an increase of 1.7 percent in 2000. The industry expects an increase in on-site recycling, from 34.2 million pounds to 35.3 million pounds, for a 3.4 percent rise. The category of on-site treatment is expected to grow from 7.7 million pounds to 8.3 million pounds, a 6.7 percent increase.

The quantity released on- and off-site is expected to fall from 4.1 million pounds to 3.7 million pounds, a decrease of 11.2 percent. That category is the least-desirable outcome under the waste management hierarchy described in **Waste Management** in Chapter 1 (Figure 2–1). Other types of off-site waste management are expected to decrease as well: off-site energy recycling by 18.9 percent (from 1.6 million pounds to 1.3 million pounds), off-site energy recovery by 94.6 percent (from almost 300,000 pounds to about 16,200 pounds), and off-site treatment by 7.4 percent, from about 681,000 pounds to over 630,000 pounds.

The projections indicate a continuation in the shift in the industry's waste management practices, away from off-site waste management activities and on- and off-site releases toward on-site recycling. The percentage of waste managed through on-site recycling would rise from 70.1 percent of total production-related waste in 1999 to 71.7 percent in 2001. The share of quantity released on- and off-site is expected to fall from 8.5 percent in 1999 to 7.5 percent in 2001, and reductions are also expected in the shares of off-site recycling, off-site energy recovery, and off-site treatment.

Source Reduction

Of the Form Rs submitted by petroleum terminals and bulk storage facilities in 1999, 7.4 percent reported source reduction activ-

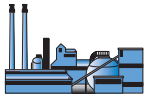
Table 4–57. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1999: Petroleum Terminals and Bulk Storage Facilities

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
1634-04-4	Methyl tert-butyl ether	1,241,571	2,286	0	0	0	1,020	1,244,877	21,641	1,266,518
110-54-3	n-Hexane	868,187	2,773	0	0	113	444	871,517	12,734	884,251
108-88-3	Toluene	561,025	14,208	0	0	78	3,124	578,435	21,607	600,042
71-43-2	Benzene	346,746	14,290	0	0	51	824	361,911	10,417	372,328
1330-20-7	Xylene (mixed isomers)	312,848	4,909	0	0	55	2,419	320,231	22,958	343,189
95-63-6	1,2,4-Trimethyl-benzene	134,612	1,607	0	0	22	1,032	137,273	7,972	145,245
91-20-3	Naphthalene	94,444	574	0	0	14	10	95,042	17,952	112,994
100-41-4	Ethylbenzene	97,160	1,799	0	0	16	957	99,932	10,365	110,297
7782-50-5	Chlorine	84,161	0	0	0	0	0	84,161	0	84,161
110-82-7	Cyclohexane	64,299	25	0	0	157	6	64,487	3,807	68,294
74-85-1	Ethylene	33,420	0	0	0	0	0	33,420	0	33,420
—	Zinc compounds	392	304	0	0	0	0	696	31,406	32,102
75-65-0	tert-Butyl alcohol	24,760	260	0	0	0	5	25,025	1,505	26,530
115-07-1	Propylene	25,411	0	0	0	0	0	25,411	0	25,411
106-42-3	p-Xylene	22,159	0	0	0	0	290	22,449	2,106	24,555
	Subtotal (top 15 chemicals)	**3,911,195**	**43,035**	**0**	**0**	**506**	**10,131**	**3,964,867**	**164,470**	**4,129,337**
	Total (all chemicals)	**4,044,223**	**43,606**	**0**	**0**	**528**	**14,641**	**4,102,998**	**165,553**	**4,268,551**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

ity undertaken during the year (see Table 4–59). As noted in **Waste Management** in Chapter 1, source reduction—activity that prevents the generation of waste—is the preferred waste management option.

Facilities with only petroleum terminals and bulk storage operations filed the largest number of forms (3,025) and reported source reduction activities on 7.1 percent of them. These facilities identified spill and leak prevention on 191 forms and good operating practices on 112, making these practices the most frequently reported source reduction activities in the industry. The facilities with a combination of petrole-



um terminals and bulk storage operations and petroleum refining filed only 31 forms but reported source reduction activity on 35.5 percent of them (11 forms). These facilities identified as source reduction activities spill and leak prevention (14 forms) and good operating practices (3 forms).

Table 4–58. Current Year and Projected Quantities of TRI Chemicals in Waste, 1999–2001: Petroleum Terminals and Bulk Storage Facilities

Waste Management Activity	Current Year 1999		Projected 2000		Projected 2001	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
Recycled On-site	34,171,226	70.1	34,965,087	72.1	35,326,825	71.7
Recycled Off-site	1,649,555	3.4	1,308,545	2.7	1,337,519	2.7
Energy Recovery On-site	31,599	0.1	34,684	0.1	37,974	0.1
Energy Recovery Off-site	298,076	0.6	41,291	0.1	16,203	0.0
Treated On-site	7,734,904	15.9	7,925,242	16.3	8,253,505	16.7
Treated Off-site	681,114	1.4	629,297	1.3	630,431	1.3
Quantity Released On- and Off-site	4,149,103	8.5	3,581,416	7.4	3,684,013	7.5
Total Production-related Waste	**48,715,577**	**100.0**	**48,485,562**	**100.0**	**49,286,470**	**100.0**
Waste Management Activity	**Projected Change 1999-2000** Percent		**Projected Change 2000-2001** Percent		**Projected Change 1999-2001** Percent	
Recycled On-site	2.3		1.0		3.4	
Recycled Off-site	–20.7		2.2		–18.9	
Energy Recovery On-site	9.8		9.5		20.2	
Energy Recovery Off-site	–86.1		–60.8		–94.6	
Treated On-site	2.5		4.1		6.7	
Treated Off-site	–7.6		0.2		–7.4	
Quantity Released On- and Off-site	–13.7		2.9		–11.2	
Total Production-related Waste	**-0.5**		**1.7**		**1.2**	

Note: Current year and projected amounts are from Section 8 of Form R for 1999.

Table 4–59. Number of Forms Reporting Source Reduction Activity, 1999: Petroleum Terminals and Bulk Storage Facilities

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
5171	Petroleum Terminals and Bulk Stations	3,025	215	7.1	112	14	191	0	12	22	0	7
	SIC Code 5171 and SIC Code 29 (Petroleum Refining)	31	11	35.5	3	0	14	0	0	0	0	0
	Total	**3,056**	**226**	**7.4**	**115**	**14**	**205**	**0**	**12**	**22**	**0**	**7**

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

RCRA Subtitle C Treatment, Storage and Disposal Facilities (in SIC Code 4953) and Solvent Recovery Facilities (in SIC Code 7389)

Introduction

Facilities regulated under the Resource Conservation and Recovery Act (RCRA), Subtitle C, receive hazardous wastes from other facilities or from other operations at their own facilities and treat, store, and dispose of the wastes. These TSD facilities are categorized among refuse systems in SIC code 4953, as shown in Box 4–7. This SIC code also includes many refuse facilities that collect and dispose of non-hazardous waste; these facilities are not covered by RCRA Subtitle C and are not required to report to TRI.

For the purpose of release reporting analyses within this document, RCRA Subtitle C treatment, storage, and disposal (TSD) facilities (in SIC Code 4953) and solvent recovery facilities (in SIC Code 7389) are treated as a single category. The two industries conduct similar waste management activities and employ the use of like chemicals.

TSD facilities obtain RCRA Subtitle C hazardous waste permits from EPA that regulate how they may treat, store, and dispose of wastes. RCRA Subtitle C established a federal program to manage hazardous wastes "from cradle to grave," to ensure

Box 4–7. SIC Codes 495, Sanitary Services, and 738, Miscellaneous Business Services: Codes and Classifications Required to Report to TRI

4953	Refuse Systems	Collection and disposal of refuse by processing or destruction. Operation of incinerators, waste treatment plants, landfills, or other disposal sites.
	TRI reporting in SIC code 4953 is limited to facilities regulated under the Resource Conservation and Recovery Act, subtitle C, 42 U.S.C. section 6921 et seq.	
7389	Business Services, Not Elsewhere Classified	Furnishing business services not elsewhere classified.
	TRI reporting in SIC code 7389 is limited to facilities primarily engaged in solvent recovery services on a contract or fee basis.	

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

that such waste is handled in a manner that protects human health and the environment. The law regulates hazardous waste generators, transporters, and TSD facilities.

Solvent recovery facilities receive spent solvents and recover them for further use. Only facilities that recover solvents on a contract or fee basis are required to report to TRI. This business activity is one of many categorized in miscellaneous business services (SIC code 7389), also listed in Box 4–7.

More details for this industry sector on products and services, employment and production, general environmental issues, processes involving toxic chemicals and the management of toxic chemicals in waste can be found in the *1998 Toxics Release Inventory Public Data Release* report (EPA 745-R-00-007).

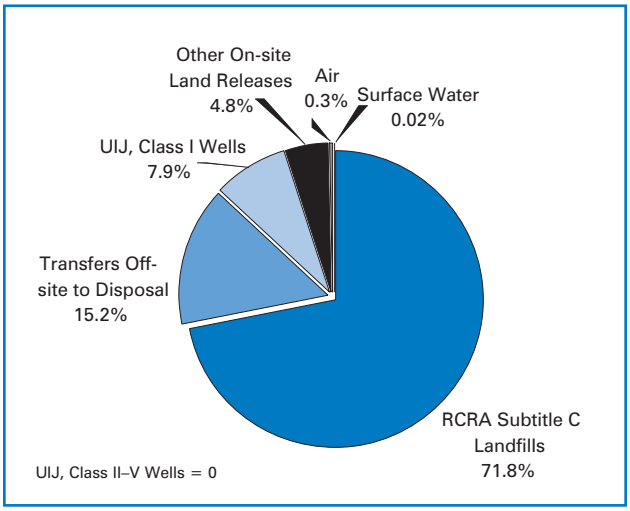
1999 TRI Data for RCRA Subtitle C TSD and Solvent Recovery Facilities

On- and Off-site Releases

RCRA Subtitle C TSD and solvent recovery facilities reported 288.0 million pounds of TRI chemicals released on- and off-site in 1999, as shown in Table 4–60. Most of the releases, 206.8 million pounds, went to on-site RCRA Subtitle C landfills. Releases to these landfills amounted to 71.8 percent of the industry's total releases (see Figure 4–15).

The industry's second-largest release type, off-site releases (transfers off-site to disposal), totaled 43.8 million pounds, 15.2 percent of total releases. The industry also

Figure 4–15. Distribution of TRI On-site and Off-site Releases, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities



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

reported 22.9 million pounds injected underground into Class I wells, representing 7.9 percent of total releases for this industry, and 13.7 million pounds of other on-site land releases, 4.8 percent of total releases. (Types of underground injection wells and on-site land releases are described in Box 1–4 in Chapter 1.)

Facilities with only RCRA Subtitle C TSD operations reported the largest total releases, with 261.4 million pounds, or 90.8 percent of total releases for this industry. These facilities reported 182.7 million pounds of TRI chemicals released on-site to RCRA Subtitle C landfills. Transfers off-site for disposal amounted to 42.2 million pounds. All of the industry's underground injection was from this group.

Facilities that had both RCRA Subtitle C TSD and solvent recovery operations reported the second-largest total releases for this industry, 24.1 million pounds. Of

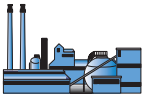


Table 4–60. TRI On-site and Off-site Releases by 4-digit SIC Code, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

			On-site Releases							Off-site Releases	
					Underground Injection		On-site Land Releases				
SIC Code	Industry	Total Forms	Total Air Emissions	Surface Water Discharges	Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases	Total On-site Releases	Transfers Off-site to Disposal	Total On- and Off-site Releases
		Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
4953	RCRA Subtitle C TSD Facilities	2,039	311,083	50,671	22,861,227	0	182,725,050	13,264,572	219,212,603	42,202,456	261,415,059
7389	Solvent Recovery Services	324	412,654	0	0	0	0	0	412,654	954,052	1,366,706
	SIC Code 4953 and SIC Code 7389	63	69,746	0	0	0	24,031,000	0	24,100,746	1,548	24,102,294
	SIC Code 4953 and SIC Code 34 (Fabricated Metals)	16	2,270	5	0	0	0	442,442	444,717	666,499	1,111,216
	SIC Code 4953 and SIC Code 5169 (Chemical Wholesalers)	3	1,690	0	0	0	0	0	1,690	0	1,690
	SIC Code 7389 and SIC Code 5169 (Chemical Wholesalers)	3	5,448	0	0	0	0	0	5,448	0	5,448
	Total	**2,448**	**802,891**	**50,676**	**22,861,227**	**0**	**206,756,050**	**13,707,014**	**244,177,858**	**43,824,555**	**288,002,413**

Note: On-site Releases from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI Facilities that reported the amount as an on-site release.

this quantity, 24.0 million pounds went to on-site RCRA Subtitle C landfills. Facilities with only solvent recovery operations had the third-largest total releases, with 1.4 million pounds, almost a million pounds of which were transferred off-site for disposal.

Table 4–61 summarizes the changes in total releases by RCRA Subtitle C TSD and solvent recovery facilities between 1998 and 1999. Total on- and off-site releases rose 2.7 percent, an increase of 7.6 million pounds. On-site releases decreased 0.4 percent, by a little over a million pounds. Decreases in this category were spread fairly evenly among total air emissions, surface water discharges (about half a million pounds each), underground injection (about 675,000 pounds), and surface impoundments (a little over 645,000 pounds). On-site land releases rose slightly, by 0.3 percent, but the subcategory other on-site landfills rose 23.6 percent, by 2.2 million pounds.

Total off-site releases to disposal rose 24.4 percent, from 35.2 million pounds to 43.8 million pounds. Storage declined 79.3 percent, from 2.1 million pounds to less than half a million pounds. Solidification/stabilization rose 49.0 percent, from 2.5 million pounds to 3.8 million pounds. Underground injection jumped 1,486.2 percent, from less than 170,000 pounds to 2.7 million pounds. Releases to landfills and surface impoundments decreased from 27.0 million pounds to 24.5 million pounds, a decline of 9.5 percent. Releases to other off-site management rose from 1.8 million pounds to 9.3 million pounds, an increase of 429.2 percent.

Waste Management Data

Quantities of TRI Chemicals in Waste

RCRA Subtitle C TSD and solvent recovery facilities reported managing 1.02 billion pounds of total production-related waste in 1999, as shown in Table 4–62. On-site treat-

Table 4–61. TRI On-site and Off-site Releases, 1998–1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
On-site Releases				
Total Air Emissions	1,342,426	802,891	–539,535	–40.2
Fugitive Air Emissions	727,199	428,059	–299,140	–41.1
Point Source Air Emissions	615,227	374,832	–240,395	–39.1
Surface Water Discharges	578,810	50,676	–528,134	–91.2
Underground Injection	23,536,753	22,861,227	–675,526	–2.9
Class I Wells	23,536,753	22,861,227	–675,526	–2.9
Class II–V Wells	0	0	0	—
On-site Land Releases	219,733,801	220,463,064	729,263	0.3
RCRA Subtitle C Landfills	207,564,621	206,756,050	–808,571	–0.4
Other On-site Landfills	9,286,711	11,479,552	2,192,841	23.6
Land Treatment	0	0	0	—
Surface Impoundments	2,872,520	2,227,442	–645,078	–22.5
Other Disposal	9,949	20	–9,929	–99.8
Total On-site Releases	**245,191,790**	**244,177,858**	**–1,013,932**	**–0.4**
Off-site Releases				
Storage Only[a]	2,120,400	438,847	–1,681,553	–79.3
Solidification/Stabilization[b]	2,533,644	3,775,533	1,241,889	49.0
Metals and Metal Compounds Only				
Wastewater Treatment (excluding POTWs)[c]	104,967	63,488	–41,479	–39.5
Metals and Metal Compounds Only				
Transfers to POTWs[d]	411,897	14,417	–397,480	–96.5
Metals and Metal Compounds Only				
Underground injection	169,964	2,695,939	2,525,975	1,486.2
Landfills/Surface Impoundments	27,023,891	24,467,085	–2,556,806	–9.5
Land Treatment	251	0	–251	–100.0
Other Land Disposal	474,185	615,135	140,950	29.7
Other Off-site Management	1,753,497	9,279,117	7,525,620	429.2
Transfers to Waste Broker for Disposal	283,047	2,044,430	1,761,383	622.3
Unknown[e]	345,636	430,564	84,928	24.6
Total Off-site Releases (Transfers Off-site to Disposal)	**35,221,379**	**43,824,555**	**8,603,176**	**24.4**
Total On-site and Off-site Releases	**280,413,169**	**288,002,413**	**7,589,244**	**2.7**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

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

[b] Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it such transfers are included as a form of disposal (off-site release). See Box 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.

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

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

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

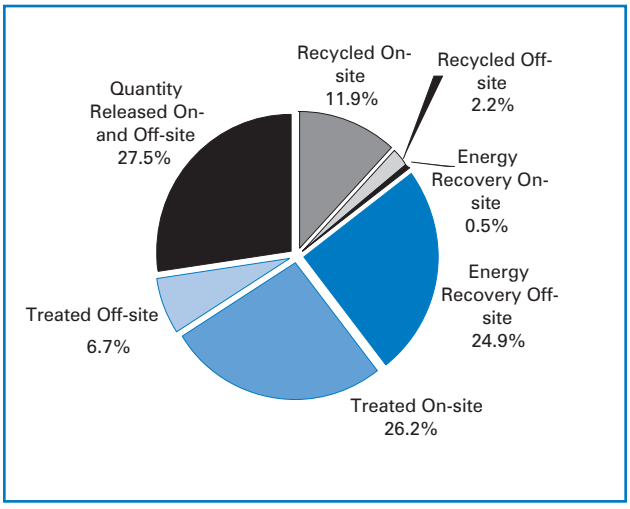
Table 4–62. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

SIC Code	Industry	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
		On-site	Off-site	On-site	Off-site	On-site	Off-site			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
4953	RCRA Subtitle C TSD Facilities	47,405,885	11,035,781	4,763,092	130,817,837	251,725,000	53,461,130	253,003,432	752,212,157	13,837
7389	Solvent Recovery Services	49,911,178	11,290,622	0	66,305,099	14,725,352	10,486,301	847,182	153,565,734	1,431
	SIC Code 4953 and SIC Code 7389	19,546,476	0	590,916	53,582,660	53	4,004,584	24,099,512	101,824,201	0
	SIC Code 4953 and SIC Code 34 (Fabricated Metals)	338,220	90,805	0	128,745	0	279,495	1,255,110	2,092,375	5
	SIC Code 4953 and SIC Code 5169 (Chemical Wholesalers)	0	0	0	2,090	0	6,070	1,690	9,850	0
	SIC Code 7389 and SIC Code 5169 (Chemical Wholesalers)	3,400,000	0	0	2,214,000	3,900	238,000	5,443	5,861,343	0
	Total	**120,601,759**	**22,417,208**	**5,354,008**	**253,050,431**	**266,454,305**	**68,475,580**	**279,212,369**	**1,015,565,660**	**15,273**

Note: Data are from Section 8 of Form R.

ment totaled 266.5 million pounds, or 26.2 percent of the industry's production-related waste (see Figure 4–16). Off-site energy recovery accounted for 253.1 million pounds, or 24.9 percent of the total, and on-site recycling totaled 120.6 million pounds, 11.9 percent of the total.

Figure 4–16. TRI Waste Management, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities



Note: Data are from Section 8 of Form R.

Facilities with only RCRA Subtitle C TSD operations reported 752.2 million pounds of total production-related waste managed, 74.1 percent of the total for this industry. These facilities reported 253.0 million pounds released on- and off-site, 251.7 million pounds treated on-site and 130.8 million pounds sent for energy recovery off-site.

Facilities with only solvent recovery operations reported 153.6 million pounds of total production-related waste managed, or 15.1 percent of the total for the industry. These facilities reported 66.3 million pounds in off-site energy recovery and 49.9 million pounds recycled on-site. Facilities reporting both RCRA Subtitle C TSD and solvent recovery operations managed 101.8 million pounds of total production-related waste, representing 10.0 percent of the total for the industry. These facilities reported 53.6 million pounds in off-site energy recovery and 24.1 million pounds released on- and off-site.

Total production-related waste for RCRA Subtitle C TSD and solvent recovery facilities fell 6.2 percent between 1998 and 1999, a decline of 66.7 million pounds (see Table 4–63). The largest absolute decline was in energy recovery off-site, a decrease of 133.1 million pounds, or 34.5 percent. Off-site treatment decreased by 20.7 percent and on-site recycling decreased by 8.2 percent. The quantity released on- and off-site declined by 1.7 percent, from 284.2 million pounds to 279.2 million pounds. The largest absolute increase was in on-site treatment, which rose by 55.8 percent, from 171.0 million pounds to 266.5 million pounds.

Transfers Off-site for Further Waste Management/Disposal

RCRA Subtitle C TSD and solvent recovery facilities reported 372.3 million pounds of transfers off-site for further waste management and disposal in 1999, as shown in

Table 4–63. Quantities of TRI Chemicals in Waste, 1998–1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

Waste Management Activity	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Recycled On-site	131,315,578	120,601,759	–10,713,819	–8.2
Recycled Off-site	20,015,384	22,417,208	2,401,824	12.0
Energy Recovery On-site	3,287,608	5,354,008	2,066,400	62.9
Energy Recovery Off-site	386,128,229	253,050,431	–133,077,798	–34.5
Treated On-site	171,016,532	266,454,305	95,437,773	55.8
Treated Off-site	86,345,263	68,475,580	–17,869,683	–20.7
Quantity Released On- and Off-site	284,164,671	279,212,369	–4,952,302	–1.7
Total Production-related Waste	**1,082,273,265**	**1,015,565,660**	**-66,707,605**	**-6.2**
Non-production-related Waste	122,571	15,273	–107,298	–87.5

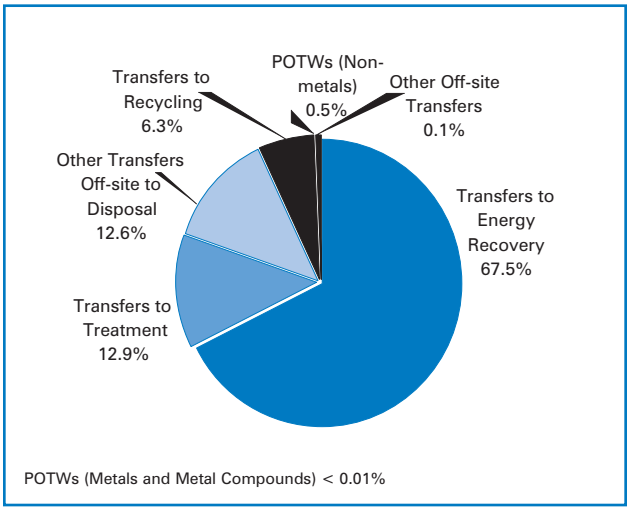
Note: All data are from Section 8 of Form R for the year indicated.

Table 4–64. TRI Transfers Off-site for Further Waste Management/Disposal by 4-digit SIC Code, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

SIC Code	Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs		Other Off-site Transfers*	Other Transfers Off-site to Disposal**	Total Transfers for Further Waste Management/ Disposal
					Metals and Metal Compounds	Non-metal TRI Chemicals			
		Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
4953	RCRA Subtitle C Facilities	10,169,682	131,558,767	30,825,909	14,358	1,682,113	0	45,162,328	219,413,157
7389	Solvent Recovery Services	13,308,224	63,011,969	12,483,727	59	270,816	553,773	981,486	90,610,054
	SIC Code 4953 and SIC Code 7389	22,835	54,419,367	3,980,303	0	45	0	1,840	58,424,390
	SIC Code 4953 and SIC Code 34 (Fabricated Metals)	90,866	193,304	352,784	0	0	0	717,997	1,354,951
	SIC Code 4953 and SIC Code 5169 (Chemical Wholesalers)	0	2,090	6,070	0	0	0	0	8,160
	SIC Code 7389 and SIC Code 5169 (Chemical Wholesalers)	0	2,213,500	237,900	0	170	0	0	2,451,570
	Total	**23,591,607**	**251,398,997**	**47,886,693**	**14,417**	**1,953,144**	**553,773**	**46,863,651**	**372,262,282**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
* Other Off-site Transfers are transfers reported without a valid waste management code.
** Does not include transfers to POTWs of metals and metal compounds.

Figure 4–17. Distribution of TRI Transfers Off-site for Further Waste Management/ Disposal, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities



Note: Data are from Section 6 of Form R.

Table 4–64. Transfers off-site to energy recovery amounted to 251.4 million pounds, or 67.5 percent of all transfers for further waste management and disposal (see Figure 4–17). The industry reported 47.9 million pounds sent off-site to treatment (12.9 percent of the total) and 23.6 million pounds sent off-site to recycling (6.3 percent). The category other transfers off-site to disposal totaled 46.9 million pounds (12.6 percent of total transfers for further waste management and disposal). Transfers of non-metal TRI chemicals to POTWs amounted to 2.0 million pounds (0.5 percent).

Facilities with only RCRA Subtitle C TSD operations reported a total of 219.4 million pounds of transfers off-site for further waste management and disposal, or 58.9 percent of the total for the industry. Most of this was transfers sent off-site for energy recovery (131.6 million pounds). These facilities sent 45.2 million pounds off-site for disposal, accounting for 96.4 percent of the industry total for this category.

Facilities with only solvent recovery operations reported 90.6 million pounds of transfers sent off-site for further waste management and disposal, 24.3 percent of the total. Of this, 63.0 million pounds went to energy recovery, 13.3 million pounds to recycling, and 12.5 million pounds to treatment. Other transfers off-site to disposal accounted for almost a million pounds. Facilities with both RCRA Subtitle C TSD and solvent recovery operations reported 58.4 million pounds, or 15.7 percent of total transfers for further waste management and disposal for the industry. These facilities reported 54.4 million pounds sent off-site for energy recovery and 4.0 million pounds sent off-site for treatment.

Transfers off-site for further waste management and disposal by RCRA Subtitle C TSD and solvent recovery facilities fell 30.3 percent between 1998 and 1999, a drop of 161.9 million pounds (see Table 4–65). The largest absolute decrease was in transfers to energy recovery, from 405.3 million pounds to 251.4 million pounds, or 38.0 percent. Transfers to treatment fell 29.4 percent, from 67.8 million pounds to 47.9 million pounds. Other off-site transfers to disposal rose 16.3 percent, from 40.3 million pounds to 46.9 million pounds. Transfers to recycling rose 24.6 percent, from 18.9 million pounds to 23.6 million pounds, and transfers to POTWs rose 10.6 percent, from 1.8 million pounds to 2.0 million pounds. Within the POTW category, transfers of metals and metal compounds fell 96.5 percent, and transfers of non-metal TRI chemicals rose 42.8 percent.

TRI Data by State

RCRA Subtitle C TSD and solvent recovery facilities in Texas submitted the largest number of TRI forms, 461. The only other

Table 4–65. TRI Transfers Off-site for Further Waste Management/Disposal, 1998–1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Transfers to Recycling	18,927,984	23,591,607	4,663,623	24.6
Transfers to Energy Recovery	405,318,954	251,398,997	–153,919,957	–38.0
Transfers to Treatment	67,808,258	47,886,693	–19,921,565	–29.4
Transfers to POTWs	1,779,700	1,967,561	187,861	10.6
Metals and Metal Compounds Only	411,897	14,417	–397,480	–96.5
Non-metal TRI Chemicals	1,367,803	1,953,144	585,341	42.8
Other Off-site Transfers*	0	553,773	553,773	—
Other Off-site Transfers to Disposal**	40,279,522	46,863,651	6,584,129	16.3
Total Transfers Off-site for Further Waste Management/Disposal	**534,114,418**	**372,262,282**	**-161,852,136**	**-30.3**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
* Other Off-site Transfers are transfers reported without a valid waste management code.
** Does not include transfers to POTWs of metals and metal compounds.

state to submit more than 300 forms was Ohio, with 356.

On- and Off-site Releases

RCRA Subtitle C TSD and solvent recovery facilities in Ohio reported the largest total on- and off-site releases in 1999, 60.7 million pounds (see Table 4–66). As shown in Map 4–6, Ohio, Oregon, Idaho, Illinois, California and Michigan reported the largest amounts of total releases in 1999, over 20 million pounds each.

Of Ohio's 60.7 million pounds in total transfers, 38.6 million pounds were released on-site to RCRA Subtitle C landfills, the largest such amount of any state. Ohio facilities also reported the largest amount injected underground in Class I wells, 13.4 million pounds.

Oregon ranked second in total releases, with 45.0 million pounds, of which 35.9 million pounds were released in on-site RCRA Subtitle C landfills. Idaho was third, with 24.0 million pounds of total releases, Illinois ranked fourth, with 22.8 million pounds, and California was fifth, with 21.6 million pounds. Most of those states' releases went to on-site RCRA Subtitle C landfills. Facilities in Michigan, which ranked sixth overall, with 20.2 million pounds of total releases, reported the largest amount of off-site releases; 13.1 million pounds were transferred off-site to disposal.

The largest absolute increase in total releases by RCRA Subtitle C TSD and solvent recovery facilities between 1998 and 1999, by state, was for Oregon, where total releases jumped 87.9 percent, from 24.0 million pounds to 45.0 million pounds (see Table 4–67). Next was Michigan, where total releases rose from 11.8 million pounds to 20.2 million pounds, an increase of 71.0 percent. Louisiana recorded an increase of almost 6 million pounds (130.0 percent). The largest decreases were for Ohio, from 75.3 million pounds to 60.7 million pounds, a 19.4 percent decline, and Idaho, from 31.7 million pounds to 24.0 million pounds, a 24.1 percent decrease. Indiana also recorded a large decrease, from 12.4 million pounds to 6.3 million pounds, a decline of 49.4 percent. No other state had absolute changes of more than 2 million pounds.

Waste Management Data

Among states, Ohio facilities reported the largest total production-related waste managed in RCRA Subtitle C TSD and solvent recovery facilities, 155.0 million pounds (see Table 4–66). Ohio facilities in this industry reported 61.0 million pounds of on- and off-site releases, the largest amount of any state for this category of waste management. Ohio facilities also reported 53.8 million pounds of on-site treatment, 21.6 million pounds of off-site energy recovery, and 14.9 million pounds of on-site recycling.

Texas ranked second, with total production-related waste managed of 122.6 million pounds. Texas facilities reported the largest amount of waste treated on-site, 62.8 million pounds. Texas also reported 29.3 million pounds sent to off-site energy recovery, the largest amount of any state in this industry, slightly ahead of Arkansas (27.7 million pounds) and California (27.2 million pounds).

California ranked third, with 116.5 million pounds of total production-related waste managed. The state ranked first in on-site recycling (32.3 million pounds) and off-site treatment (24.0 million pounds).

Top 15 Chemicals for On- and Off-site Releases

Table 4–68 presents data for the 15 chemicals released in the largest amounts by TRI

Map 4–6. Total On-site and Off-site Releases, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

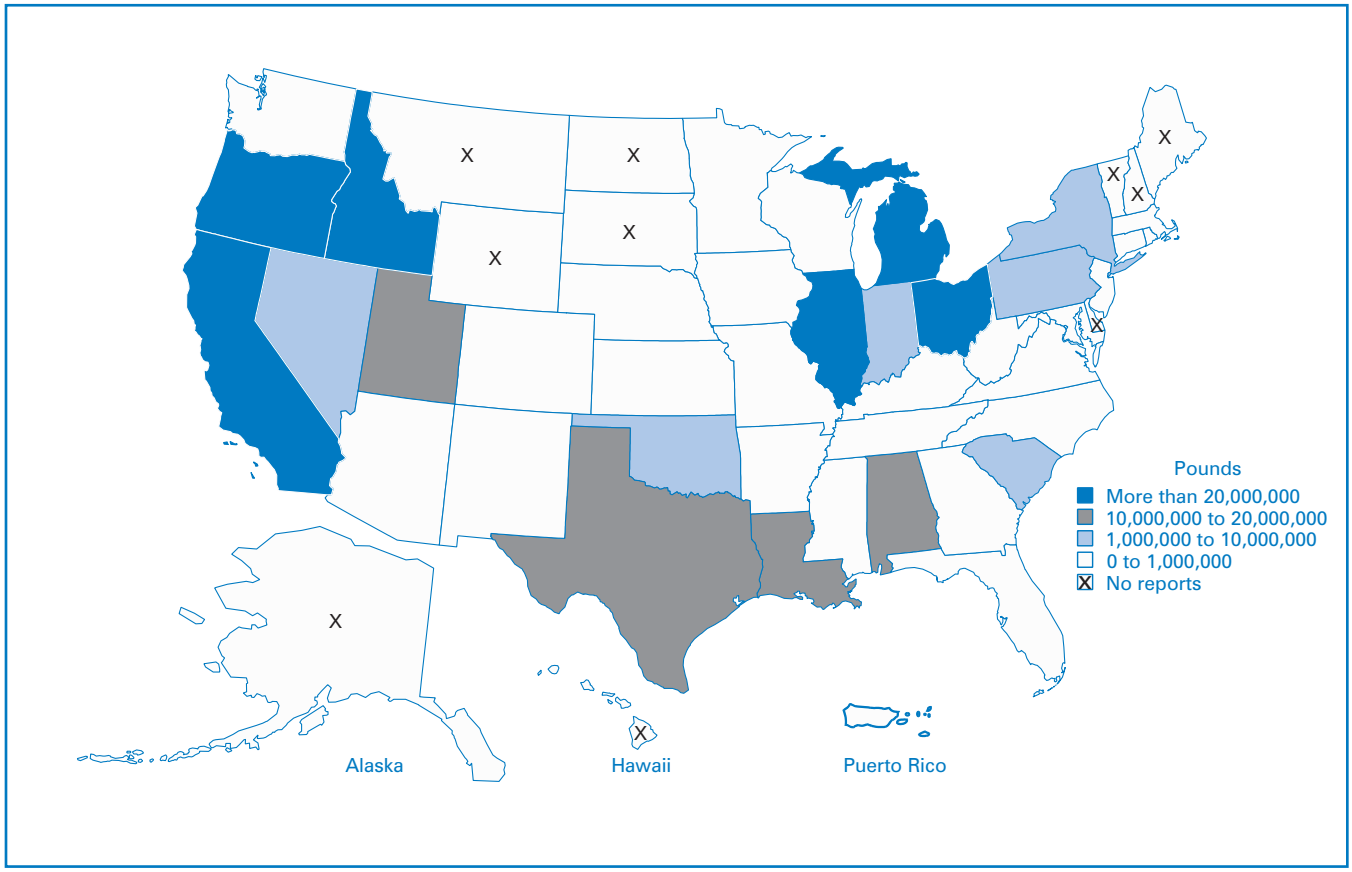


Table 4–66. Summary of TRI Information by State, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

State	Total Forms	On-site Releases							Off-site Releases	Total On- and Off-site Releases
		Total Air Emissions	Surface Water Discharges	Underground Injection		On-site Land Releases		Total On-site Releases	Transfers Off-site to Disposal	
				Class I Wells	Class II-V Wells	RCRA Subtitle C Landfills	Other On-site Land Releases			
	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	50	3,004	0	0	0	13,554,931	0	13,557,935	168,697	13,726,632
Arizona	22	4,664	0	0	0	0	0	4,664	622,550	627,214
Arkansas	159	13,926	108	0	0	32,100	0	46,134	104,385	150,519
California	158	82,596	0	0	0	18,178,901	93,562	18,355,059	3,225,858	21,580,917
Colorado	2	251	0	0	0	0	0	251	0	251
Connecticut	20	0	0	0	0	0	0	0	685,800	685,800
Florida	8	6,622	0	0	0	0	0	6,622	180	6,802
Georgia	6	12,422	0	0	0	0	0	12,422	0	12,422
Idaho	12	3,205	0	0	0	24,031,000	0	24,034,205	25	24,034,230
Illinois	231	73,075	21	0	0	18,737,328	771,825	19,582,249	3,191,413	22,773,662
Indiana	33	11,497	168	0	0	0	0	11,665	6,243,238	6,254,903
Iowa	2	9	0	0	0	0	0	9	0	9
Kansas	12	17,671	1	0	0	0	0	17,672	185	17,857
Kentucky	102	17,872	15	0	0	0	442,442	460,329	143,322	603,651
Louisiana	63	2,930	0	2,807,375	0	7,311,500	0	10,121,805	109,781	10,231,586
Maryland	1	13	0	0	0	0	0	13	0	13
Massachusetts	10	3,693	5	0	0	0	0	3,698	657,617	661,315
Michigan	140	82,787	0	0	0	7,008,813	0	7,091,600	13,105,788	20,197,388
Minnesota	7	348	0	0	0	0	0	348	14,980	15,328
Mississippi	1	3	0	0	0	0	0	3	0	3
Missouri	8	24	0	0	0	0	0	24	0	24
Nebraska	76	18,643	0	0	0	0	476,841	495,484	27,493	522,977
Nevada	18	260	0	0	0	2,054,100	0	2,054,360	128,284	2,182,644
New Jersey	121	24,213	23	0	0	0	0	24,236	645,202	669,438
New Mexico	3	5,321	0	0	0	0	0	5,321	0	5,321
New York	18	1,072	209	0	0	6,184,700	0	6,185,981	30,962	6,216,943
North Carolina	15	15,188	34	0	0	0	0	15,222	249,760	264,982
Ohio	356	299,748	1,193	13,360,000	0	38,573,000	18	52,233,959	8,423,352	60,657,311
Oklahoma	22	1,205	0	2,513,899	0	6,264,394	0	8,779,498	15,351	8,794,849
Oregon	52	755	0	0	0	35,877,473	9,152,811	45,031,039	9,082	45,040,121
Pennsylvania	47	4,372	6,730	0	0	1,614,600	2,100,900	3,726,602	2,257,772	5,984,374
Puerto Rico	16	9,895	0	0	0	0	0	9,895	68,146	78,041
Rhode Island	2	510	0	0	0	0	0	510	0	510
South Carolina	36	4,347	0	0	0	5,227,609	2	5,231,958	0	5,231,958
Tennessee	47	6,840	2,136	0	0	0	0	8,976	38,725	47,701
Texas	461	40,731	40,033	4,179,953	0	6,281,274	0	10,541,991	3,393,643	13,935,634
Utah	63	4,267	0	0	0	15,824,327	668,613	16,497,207	35,979	16,533,186
Virginia	6	4,844	0	0	0	0	0	4,844	184,412	189,256
Washington	16	2,150	0	0	0	0	0	2,150	31,306	33,456
West Virginia	1	7	0	0	0	0	0	7	0	7
Wisconsin	25	21,911	0	0	0	0	0	21,911	11,267	33,178
Total	**2,448**	**802,891**	**50,676**	**22,861,227**	**0**	**206,756,050**	**13,707,014**	**244,177,858**	**43,824,555**	**288,002,413**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

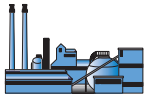


Table 4–66. Summary of TRI Information by State, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities *(continued)*

State	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site	Off-site	On-site	Off-site	On-site	Off-site			
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Alabama	3,151,674	141,710	0	227,000	23	330,531	10,179,113	14,030,051	0
Arizona	2,784,487	1,780,516	0	1,309,185	28,132	617,310	4,689	6,524,319	1
Arkansas	2,802,061	389,348	4,628,714	27,714,479	19,388,784	133,417	441,025	55,497,828	0
California	32,257,185	2,091,966	0	27,215,059	12,543,432	24,002,675	18,438,452	116,548,769	386
Colorado	1,075	27,098	0	0	2,398	0	1	30,572	0
Connecticut	0	0	0	0	352,400	218,687	935,020	1,506,107	8
Florida	880,501	160,832	0	1,876,021	1,447,266	181,646	6,622	4,552,888	0
Georgia	0	111,029	0	0	256,909	0	12,522	380,460	0
Idaho	0	0	0	0	0	0	24,031,000	24,031,000	0
Illinois	5,989,766	382,666	0	7,797,656	20,363,551	1,818,266	23,365,078	59,716,983	70
Indiana	8,358,000	835,520	0	2,235,574	1,692,512	950	6,237,945	19,360,501	0
Iowa	0	303,642	0	0	0	0	9	303,651	0
Kansas	208,100	172,640	0	0	1,050,437	4,135	20,124	1,455,436	0
Kentucky	0	240,359	0	12,806,818	10,006,596	1,417,282	619,485	25,090,540	0
Louisiana	0	74,082	0	2,800	18,503	1,193,537	10,257,665	11,546,587	0
Maryland	0	429,952	0	0	0	0	13	429,965	0
Massachusetts	338,220	210,937	0	130,835	0	279,942	805,404	1,765,338	6
Michigan	17,747,516	63,700	0	57,421,708	818,721	18,257,233	20,337,627	114,646,505	58
Minnesota	4,305,598	1,271,306	0	0	58,000	14,596	15,381	5,664,881	0
Mississippi	0	95,538	0	0	0	0	3	95,541	0
Missouri	0	542,305	0	0	20,000	20,000	19	582,324	0
Nebraska	0	100,011	0	15,048	23,879,414	46,658	487,136	24,528,267	0
Nevada	0	1,064,488	0	0	25,029	820,339	2,054,100	3,963,956	83
New Jersey	8,083,574	474,983	0	23,961,922	28,811,007	1,670,089	644,198	63,645,773	839
New Mexico	0	35,598	0	0	393,000	0	5,301	433,899	0
New York	0	308,244	0	0	323,500	64,049	6,221,767	6,917,560	0
North Carolina	0	883,707	0	0	378,000	460	426,677	1,688,844	520
Ohio	14,885,370	1,621,380	0	21,600,288	53,765,180	2,097,451	61,023,190	154,992,859	13,298
Oklahoma	0	0	0	0	2,713,439	6,102	8,854,083	11,573,624	0
Oregon	0	97,505	0	0	24,334	1,202,564	44,572,379	45,896,782	0
Pennsylvania	0	1,307,009	0	0	2,954,300	412,088	5,588,706	10,262,103	0
Puerto Rico	1,465,156	1,099,765	0	11,401,702	1,763,772	1,643,119	20,260	17,393,774	1
Rhode Island	120,974	0	0	0	0	768,783	402	890,159	0
South Carolina	3,195,088	246,310	0	14,585,574	34,777	473,521	5,216,491	23,751,761	0
Tennessee	0	215,260	134,378	3,574,812	171,842	51,596	45,297	4,193,185	0
Texas	5,590,594	3,592,225	0	29,266,230	62,822,278	9,690,926	11,590,400	122,552,653	0
Utah	0	0	0	0	20,072,066	48,163	16,710,703	36,830,932	3
Virginia	0	849,399	0	0	212,420	24,210	4,844	1,090,873	0
Washington	1,310,154	537,176	0	115	62,283	236,008	2,163	2,147,899	0
West Virginia	0	207,900	0	0	0	0	7	207,907	0
Wisconsin	7,126,666	451,102	590,916	9,907,605	0	729,247	37,068	18,842,604	0
Total	**120,601,759**	**22,417,208**	**5,354,008**	**253,050,431**	**266,454,305**	**68,475,580**	**279,212,369**	**1,015,565,660**	**15,273**

Note: Data are from Section 8 of Form R.

Table 4–67. TRI Total Releases by State, 1998-1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

State	Total On-site and Off-site Releases			
	1998 Pounds	1999 Pounds	Change 1998-1999 Pounds	Change 1998-1999 Percent
Alabama	12,309,866	13,726,632	1,416,766	11.5
Arizona	1,002	627,214	626,212	62,496.2
Arkansas	261,420	150,519	-110,901	-42.4
California	20,405,960	21,580,917	1,174,957	5.8
Colorado	250	251	1	0.4
Connecticut	708,015	685,800	-22,215	-3.1
Florida	21,001	6,802	-14,199	-67.6
Georgia	17,488	12,422	-5,066	-29.0
Idaho	31,653,505	24,034,230	-7,619,275	-24.1
Illinois	24,729,141	22,773,662	-1,955,479	-7.9
Indiana	12,365,925	6,254,903	-6,111,022	-49.4
Iowa	10	9	-1	-10.0
Kansas	24,677	17,857	-6,820	-27.6
Kentucky	1,290,632	603,651	-686,981	-53.2
Louisiana	4,449,005	10,231,586	5,782,581	130.0
Maryland	6	13	7	116.7
Massachusetts	1,173,299	661,315	-511,984	-43.6
Michigan	11,809,095	20,197,388	8,388,293	71.0
Minnesota	1,345	15,328	13,983	1,039.6
Mississippi	2	3	1	50.0
Missouri	28,931	24	-28,907	-99.9
Nebraska	209,481	522,977	313,496	149.7
Nevada	1,385,954	2,182,644	796,690	57.5
New Jersey	329,135	669,438	340,303	103.4
New Mexico	5,990	5,321	-669	-11.2
New York	6,282,640	6,216,943	-65,697	-1.0
North Carolina	546,966	264,982	-281,984	-51.6
Ohio	75,286,300	60,657,311	-14,628,989	-19.4
Oklahoma	7,884,687	8,794,849	910,162	11.5
Oregon	23,965,094	45,040,121	21,075,027	87.9
Pennsylvania	6,395,761	5,984,374	-411,387	-6.4
Puerto Rico	324,772	78,041	-246,731	-76.0
Rhode Island	1,432	510	-922	-64.4
South Carolina	5,373,461	5,231,958	-141,503	-2.6
Tennessee	72,855	47,701	-25,154	-34.5
Texas	13,201,673	13,935,634	733,961	5.6
Utah	16,379,483	16,533,186	153,703	0.9
Virginia	4,937	189,256	184,319	3,733.4
Washington	1,470,712	33,456	-1,437,256	-97.7
West Virginia	6	7	1	16.7
Wisconsin	41,255	33,178	-8,077	-19.6
Total	**280,413,169**	**288,002,413**	**7,589,244**	**2.7**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

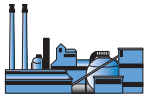


Table 4–68. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- and Off-site Releases Pounds
				Class I Wells Pounds	Class II–V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
7440-66-6	Zinc (fume or dust)	3,228	5	0	0	53,107,211	586,002	53,696,446	13,908	53,710,354
—	Zinc compounds	7,673	367	850,750	0	31,390,534	1,027,201	33,276,525	10,202,181	43,478,706
1344-28-1	Aluminum oxide (fibrous forms)	338	0	0	0	30,469,494	258,064	30,727,896	347,172	31,075,068
—	Lead compounds	6,244	308	0	0	12,043,875	189,232	12,239,659	6,237,980	18,477,639
1332-21-4	Asbestos (friable)	43	0	0	0	4,742,648	8,475,949	13,218,640	1	13,218,641
7439-92-1	Lead	3,893	30	13,250	0	9,046,156	160,054	9,223,383	1,469,410	10,692,793
1336-36-3	Polychlorinated biphenyls (PCBs)	531	2	0	0	10,316,919	313,508	10,630,960	1,533	10,632,493
—	Copper compounds	4,698	117	68,000	0	7,263,149	408,896	7,744,860	2,001,955	9,746,815
—	Chromium compounds	1,663	551	720,000	0	3,711,644	114,063	4,547,921	2,952,455	7,500,376
—	Nickel compounds	2,007	491	140,000	0	3,248,507	162,489	3,553,494	3,594,078	7,147,572
—	Barium compounds	1,286	272	250	0	5,034,475	66,561	5,102,844	1,821,748	6,924,592
7697-37-2	Nitric acid	471	0	6,328,468	0	58,238	1,780	6,388,957	206,958	6,595,915
—	Nitrate compounds	265	8,356	4,563,034	0	0	981,000	5,552,655	539,647	6,092,302
—	Manganese compounds	446	24	36,000	0	4,564,123	19,446	4,620,039	181,510	4,801,549
7429-90-5	Aluminum (fume or dust)	1,281	0	0	0	4,072,525	100,105	4,173,911	18,368	4,192,279
	Subtotal (top 15 chemicals)	**34,067**	**10,523**	**12,719,752**	**0**	**179,069,498**	**12,864,350**	**204,698,190**	**29,588,904**	**234,287,094**
	Total (all chemicals)	**802,891**	**50,676**	**22,861,227**	**0**	**206,756,050**	**13,707,014**	**244,177,858**	**43,824,555**	**288,002,413**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

RCRA Subtitle C TSD and solvent recovery facilities. Zinc (fume or dust) and zinc compounds were the two chemicals with the largest on- and off-site releases in the industry: 53.7 million pounds of zinc and 43.5 million pounds of zinc compounds. Over 98 percent of the zinc releases were to RCRA Subtitle C landfills. About 72.2 percent of the releases of zinc compounds (31.4 million pounds) went to RCRA Subtitle C landfills, other on-site releases accounted for a little over a million pounds, and 10.2 million pounds, or 23.4 percent of the total, were sent off-site to disposal.

Of the 15 top chemicals released by the industry, 9 reported more than 70 percent of their total releases as releases on-site to RCRA Subtitle C landfills. Almost 65 percent of the friable asbestos was in other on-site land releases, and a little more than half of nickel compounds releases were in

Table 4–69. Current Year and Projected Quantities of TRI Chemicals in Waste, 1999–2001: RCRA Subtitle C TSD and Solvent Recovery Facilities

Waste Management Activity	Current Year 1999		Projected 2000		Projected 2001	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
Recycled On-site	120,601,759	11.9	115,058,626	12.7	114,093,416	12.3
Recycled Off-site	22,417,208	2.2	20,573,530	2.3	19,113,105	2.1
Energy Recovery On-site	5,354,008	0.5	5,118,529	0.6	5,133,299	0.6
Energy Recovery Off-site	253,050,431	24.9	205,546,667	22.7	207,555,660	22.4
Treated On-site	266,454,305	26.2	234,650,449	25.9	234,189,867	25.3
Treated Off-site	68,475,580	6.7	59,675,842	6.6	74,231,467	8.0
Quantity Released On- and Off-site	279,212,369	27.5	264,851,809	29.3	270,462,371	29.2
Total Production-related Waste	**1,015,565,660**	**100.0**	**905,475,452**	**100.0**	**924,779,185**	**100.0**
Waste Management Activity	**Projected Change 1999-2000**		**Projected Change 2000-2001**		**Projected Change 1999-2001**	
	Percent		Percent		Percent	
Recycled On-site	–4.6		–0.8		–5.4	
Recycled Off-site	–8.2		–7.1		–14.7	
Energy Recovery On-site	–4.4		0.3		–4.1	
Energy Recovery Off-site	–18.8		1.0		–18.0	
Treated On-site	–11.9		–0.2		–12.1	
Treated Off-site	–12.9		24.4		8.4	
Quantity Released On- and Off-site	–5.1		2.1		–3.1	
Total Production-related Waste	**-10.8**		**2.1**		**-8.9**	

Note: Current year and projected amounts are from Section 8 of Form R for 1999.

transfers off-site to disposal. Nitrate compounds and nitric acid were mainly injected underground into Class I wells; the amounts were 6.3 million pounds for nitric acid and 4.6 million pounds for nitrate compounds.

Releases of the 15 chemicals amounted to 234.3 million pounds, 81.3 percent of the industry total of 288.0 million pounds.

Projected Quantities of TRI Chemicals Managed in Waste, 1999–2001

RCRA Subtitle C TSD and solvent recovery facilities reporting to TRI expected their production-related waste managed to decrease by 8.9 percent between 1999 and 2001, from a total of 1.02 billion pounds to 924.8 million pounds, as shown in Table 4–69. The projected decrease reflects an expected decrease of 10.8 percent in 2000 followed by a small increase of 2.1 percent in 2001.

The projected decrease between 1999 and 2001 is expected to come primarily from reductions of 5.4 percent in on-site recycling, 14.7 percent in off-site recycling, 18.0 percent in off-site energy recovery, and 12.1 percent in on-site treatment. The quantity released on- and off-site—the least-desirable outcome under the waste management hierarchy described in Waste Management in Chapter 1 (Figure 1–2)—is projected to decrease by 3.1 percent. The reductions are expected to offset an increase in off-site treatment of 8.4 percent.

The projections do not indicate dramatic changes in waste management practices. Off-site energy recovery would fall from

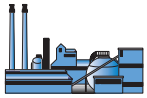


Table 4–70. Number of Forms Reporting Source Reduction Activity, 1999: RCRA Subtitle C TSD and Solvent Recovery Facilities

SIC Code	Industry	Total Form Rs Number	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Number	Percent of All Form Rs Percent	Good Operating Practices Number	Inventory Control Number	Spill and Leak Prevention Number	Raw Material Modifications Number	Process Modifications Number	Cleaning and Degreasing Number	Surface Preparation and Finishing Number	Product Modifications Number
4953	RCRA Subtitle C Facilities	2,022	143	7.1	136	0	51	0	25	0	0	0
7389	Solvent Recovery Services	305	65	21.3	64	0	23	0	11	0	0	4
	SIC Code 4953 and SIC Code 7389	63	23	36.5	0	0	46	0	0	0	0	0
	SIC Code 4953 and SIC Code 34 (Fabricated Metals)	16	0	0.0	0	0	0	0	0	0	0	0
	SIC Code 4953 and SIC Code 5169 (Chemical Wholesalers)	3	0	0.0	0	0	0	0	0	0	0	0
	SIC Code 7389 and SIC Code 5169 (Chemical Wholesalers)	3	1	33.3	1	0	0	0	0	0	0	0
	Total	**2,412**	**232**	**9.6**	**201**	**0**	**120**	**0**	**36**	**0**	**0**	**4**

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

24.9 percent of total production-related waste managed in 1999 to 22.4 percent in 2001. The share of on-site treatment would decline from 26.2 percent to 25.3 percent. The quantity released on- and off-site would increase from 27.5 percent of total production-related waste managed for this industry to 29.2 percent, although the absolute amount in this category would fall from 279.2 million pounds to 270.5 million pounds.

Source Reduction

Of the Form Rs submitted by RCRA Subtitle C TSD and solvent recovery facilities in 1999, 9.6 percent reported source reduction activity undertaken during the year (see Table 4–70). As noted in **Waste Management** in Chapter 1, source reduction—activity that prevents the generation of waste—is the preferred waste management option.

Facilities with a combination of RCRA Subtitle C TSD and solvent recovery operations had the largest percentage of forms reporting source reduction activities, 36.5 percent. These facilities identified spill and leak prevention as the source reduction activity undertaken, on 46 forms. Facilities with solvent recovery services only reported undertaking source reduction activities on 21.3 percent of their Form Rs. These facilities identified good operating practices (64 forms), spill and leak prevention (23 forms), and process modifications (11 forms) as their main source reduction activities. Facilities with RCRA Subtitle C TSD operations only reported source reduction activity on 7.1 percent of their Form Rs, with good operating practices identified most often, on 136 forms, followed by spill and leak prevention (51 forms) and process modifications (25 forms).

Federal Facilities

Introduction

Facilities owned and operated by federal agencies are required to report to TRI. Executive Order 13148 extends reporting to federal facilities regardless of SIC code. As a result, facilities reporting to TRI range from military bases to agricultural testing sites. Federal facilities have been required to report to TRI since the 1994 reporting year, although Department of Energy facilities began reporting a year earlier. In addition to reporting to TRI, federal agencies have been directed by executive order to reduce their on-site releases and off-site transfers to treatment and disposal by 50 percent by the 1999 reporting year, based on the 1994 data. Federal facilities are encouraged to use source reduction wherever practicable to achieve their reductions.

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

As stated above, federal facilities should report to TRI regardless of SIC code. Some federal facilities have manufacturing activities similar to the original industries. Other federal facilities have activities similar to the new TRI industries. Still others have activities that are not in either the original industries or in the new industries. This section divides the federal facilities into two broad groups to show how the federal facilities mirror the activities in the private sector. These two broad groups are "Facilities with Activities Related to Original Industries and Other Industries" (hereafter referred to as original industries) and "Facilities with Activities Related to the New Industries" (hereafter referred to as new industries).

Due to an EPA data entry error, reporting revisions by one federal facility, US Army Letterkenny Depot in Chambersburg, Pennsylvania, were not included in the data used for this 1999 TRI Public Data Release report. Revisions for two chemical compounds (zinc compounds and lead compounds) have been included in the tables in this section, but not included in other tables in this report. The effect of these revisions is to change the facility's off-site transfers to disposal and treated off-site amounts for zinc compounds from 17,147,839 to zero and lead compounds from 60,123 pounds to zero. In addition, at the time of publication, the facility had notified EPA that it anticipated revising off-site transfers to disposal and treated off-site for manganese compounds from 5,584,900 pounds to below 500 pounds.

1999 TRI Data for Federal Facilities

In 1999, a total of 127 federal facilities submitted 507 TRI forms, as shown in Table 4–71. Of these, 109 facilities and 328 forms were from original TRI industries, and 18 facilities and 179 forms from new industries.

Facilities owned or operated by Department of Defense agencies submitted 238 forms in the original TRI industries. DOD submissions included 110 reports by Army facilities, 53 reports by Navy facilities and 51 reports by Air Force facilities. The Department of Energy submitted 41 forms.

In the new industries, 14 Tennessee Valley Authority (TVA) facilities submitted 165 forms. (One TVA facility filed 3 forms in the original TRI industries.) Three Department of Energy facilities filed a total of 13 forms in new industry SIC codes. One DOD form, from the Navy, was submitted in a new industry, but it reported zero amounts of releases and waste management.

On- and Off-site Releases

As is also shown in Table 4–71, federal facilities reported on- and off-site releases totaling 87.4 million pounds. The bulk of the releases, 81.1 million pounds, occurred on-site. Off-site releases totaled 6.3 million pounds.

TVA facilities reported 69.7 million pounds of on- and off-site releases in the new industries. This amount represented 66.6 percent of all releases by all federal facilities. It included the largest amounts in all on-site release types by both original and new industries, except for 505 pounds of underground injection by the Energy Department. TVA's new industry reporting included 52.1 million pounds of air emissions and 15.5 million pounds of other on-site land releases.

Together, the DOD agencies reported 15.7 million pounds of total releases, including 9.7 million pounds of on-site releases, with 7.2 million pounds of that as air emissions. Within the DOD, Army releases of 14.1 million pounds consisted of on-site releases of 8.4 million pounds, of which air emissions were 6.0 million pounds, on-site land releases were 1.7 million pounds and surface water discharges were nearly 687,000 pounds. The Air Force's total of 1.1 million pounds consisted principally of air emissions (about 769,000 pounds) and surface water discharges (nearly 157,000 pounds).

Table 4–72 summarizes changes in on- and off-site releases reported by federal facilities between 1998 and 1999. Total releases rose 35.0 percent, an increase of 22.7 million pounds. Total on-site releases reported rose 27.1, largely because of a 32.9 percent (15.0 million pound) increase in air emissions. On-site land releases were 3.7 million pounds, or 25.6 percent, higher in 1999 than in 1998.

Off-site releases rose from less than 960,000 pounds to 6.3 million pounds. The main component of the increase was the category other off-site management, which increased from 47 pounds in 1998 to 5.6 million pounds in 1999. This was primarily due to reporting by one Army facility that expected to revise its reported amount of off-site releases, as explained above.

Table 4–71. TRI On-site and Off-site Releases, 1999: Federal Facilities

Federal Agency	Total Facilities	Total Forms	On-site Releases: Total Air Emissions	Surface Water Discharges	Underground Injection: Class I Wells	Underground Injection: Class II–V Wells	On-site Land Releases: RCRA Subtitle C Landfills	On-site Land Releases: Other On-site Land Releases	Total On-site Releases	Off-site Releases: Transfers Off-site to Disposal	Total On- and Off-site Releases
	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Federal Facilities with Activities Related to Original Industries and Other Industries											
Department of Defense	74	238	7,165,901	849,544	0	0	0	1,719,257	9,734,702	5,995,730	15,730,432
Air Force	15	51	768,715	156,629	0	0	0	21,930	947,274	116,777	1,064,051
Army	34	110	6,045,847	686,874	0	0	0	1,687,817	8,420,538	5,717,304	14,137,842
Army Corps of Engineers	2	6	0	44	0	0	0	0	44	16,700	16,744
Defense Logistics	1	4	5,670	0	0	0	0	0	5,670	0	5,670
Marines	8	14	62,387	0	0	0	0	0	62,387	9,319	71,706
Navy	14	53	283,282	5,997	0	0	0	9,510	298,789	135,630	434,419
Department of Energy	12	41	406,389	65,040	0	505	0	21,809	493,743	20,797	514,540
Department of Interior	2	2	750	4,333	0	0	0	0	5,083	0	5,083
Department of Treasury	8	14	834	0	0	0	0	138,690	139,524	13,598	153,122
Department of Veterans Affairs	1	1	0	0	0	0	0	0	0	0	0
Environmental Protection Agency	1	2	0	0	0	0	0	0	0	0	0
National Aeronautics and Space Administration	6	17	207,289	0	0	0	0	0	207,289	4,138	211,427
Tennessee Valley Authority	1	3	30	765	0	0	0	15	810	10,435	11,245
U.S. Department of Agriculture	3	4	0	0	0	0	0	541,563	541,563	0	541,563
U.S. Enrichment Corporation	1	6	517,200	153	0	0	0	0	517,353	0	517,353
Subtotal for Original Industries	**109**	**328**	**8,298,393**	**919,835**	**0**	**505**	**0**	**2,421,334**	**11,640,067**	**6,044,698**	**17,684,765**
Federal Facilities with Activities Related to New Industries											
Department of Defense —Navy	1	1	0	0	0	0	0	0	0	0	0
Department of Energy	3	13	48,044	2,136	0	0	0	0	50,180	1,091	51,271
Tennessee Valley Authority	14	165	52,085,546	1,761,635	0	0	0	15,529,475	69,376,656	287,645	69,664,301
Subtotal for New Industries	**18**	**179**	**52,133,590**	**1,763,771**	**0**	**0**	**0**	**15,529,475**	**69,426,836**	**288,736**	**69,715,572**
Total for Federal Facilities	**127**	**507**	**60,431,983**	**2,683,606**	**0**	**505**	**0**	**17,950,809**	**81,066,903**	**6,333,434**	**87,400,337**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.

Due to an EPA data entry error, one chemical reporting revision for 1999 by a facility, the US Army Letterkenny Depot in Chambersburg, PA, was not included in this table. At the time of publication, the facility had notified EPA that it anticipated revising off-site transfers to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds. Revisions by this facility of two other compounds are included in the federal facility tables but not included in other tables in the *1999 TRI Public Data Release* report.

Table 4–72. TRI On-site and Off-site Releases, 1998–1999: Federal Facilities

	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
On-site Releases				
Total Air Emissions	45,472,233	60,431,983	14,959,750	32.9
Fugitive Air Emissions	1,097,485	6,608,696	5,511,211	502.2
Point Source Air Emissions	44,374,748	53,823,287	9,448,539	21.3
Surface Water Discharges	4,009,631	2,683,606	–1,326,025	–33.1
Underground Injection	505	505	0	0.0
Class I Wells	0	0	0	—
Class II–V Wells	505	505	0	0.0
On-site Land Releases	14,292,558	17,950,809	3,658,251	25.6
RCRA Subtitle C Landfills	31,563	0	–31,563	–100.0
Other On-site Landfills	4,837,419	4,519,519	–317,900	–6.6
Land Treatment	582,541	552,597	–29,944	–5.1
Surface Impoundments	7,640,076	9,909,819	2,269,743	29.7
Other Disposal	1,200,959	2,968,874	1,767,915	147.2
Total On-site Releases	**63,774,927**	**81,066,903**	**17,291,976**	**27.1**
Off-site Releases				
Storage Only[a]	16,843	57,696	40,853	242.6
Solidification/Stabilization[b]	11,273	3,400	–7,873	–69.8
Metals and Metal Compounds Only				
Wastewater Treatment (excluding POTWs)[c]	320	1	–319	–99.7
Metals and Metal Compounds Only				
Transfers to POTWs[d]	2,746	4,326	1,580	57.5
Metals and Metal Compounds Only				
Underground injection	1,632	388	–1,244	–76.2
Landfills/Surface Impoundments	154,956	162,686	7,730	5.0
Land Treatment	4,190	1,356	–2,834	–67.6
Other Land Disposal	632,645	287,635	–345,010	–54.5
Other Off-site Management	47	5,585,458	5,585,411	11,883,853.2
Transfers to Waste Broker for Disposal	74,196	135,136	60,940	82.1
Unknown[e]	59,579	95,352	35,773	60.0
Total Off-site Releases (Transfers Off-site to Disposal)	**958,427**	**6,333,434**	**5,375,007**	**560.8**
Total On-site and Off-site Releases	**64,733,354**	**87,400,337**	**22,666,983**	**35.0**

Note: On-site Releases are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. **Off-site Releases** do not include transfers to disposal sent to other TRI facilities that reported the amount as an on-site release.
Due to an EPA data entry error, one chemical reporting revision for 1999 by a facility, the US Army Letterkenny Depot in Chambersburg, PA, was not included in this table. At the time of publication, the facility had notified EPA that it anticipated revising off-site transfers to disposal (other off-site management) for manganese compounds from 5,584,900 pounds to below 500 pounds. Revisions by this facility of two other compounds are included in the federal facility tables but not included in other tables in the *1999 TRI Public Data Release* report.

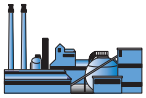
[a] Storage only (disposal code M10) indicates that the toxic chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to storage only are included as a form of disposal (off-site release). See Box 1–5.

[b] Beginning in reporting year 1997, transfers to solidification/stabilization of metals and metal compounds (waste treatment code M41) are reported separately from transfers to solidification/stabilization of non-metal TRI chemicals (waste treatment code M40). Because this treatment method prepares a metal for disposal, but does not destroy it such transfers are included as a form of disposal (off-site release). See Box 1–6. Reports under code M40 of metals and metal compounds have been included in solidification/stabilization of metals and metal compounds in this report.

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

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

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



Waste Management Data

Quantities of TRI Chemicals in Waste

Federal facilities reported managing 192.5 million pounds of TRI chemicals in production-related waste in 1999, as shown in Table 4–73. The largest waste management types reported by federal facilities were quantity released on- and off-site (81.5 million pounds) and on-site treatment (60.6 million pounds).

New industry reporting by TVA facilities accounted for 119.0 million pounds of production-related waste managed, or 56.7 percent of the total for all TRI industries. These TVA facilities reported 69.6 million pounds released on- and off-site and 48.5 million pounds treated on-site, as well as about 900,000 pounds sent off-site to recycling.

DOD facilities in the original industries reported the second-largest quantity of production-related waste, 39.7 million

Table 4–73. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1999: Federal Facilities

Federal Agency	Recycled		Energy Recovery		Treated		Quantity Released On- and Off-site	Total Production-related Waste Managed	Non-production-related Waste Managed
	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	On-site Pounds	Off-site Pounds	Pounds	Pounds	Pounds
Federal Facilities with Activities Related to Original Industries and Other Industries									
Department of Defense	10,767,449	2,679,499	326	134,909	10,334,001	5,948,556	9,824,243	39,688,983	12,595
Air Force	27,360	152,816	0	12,260	586,615	205,182	1,080,490	2,064,723	51
Army	9,385,849	2,142,100	0	60,168	9,432,479	5,661,856	8,239,276	34,921,728	8,747
Army Corps of Engineers	0	1,502	0	0	0	0	16,744	18,246	0
Defense Logistics	1,324,948	0	0	0	0	0	5,670	1,330,618	0
Marines	21,392	134,491	326	27,100	526	2,572	71,170	257,577	1,273
Navy	7,900	248,590	0	35,381	314,381	78,946	410,893	1,096,091	2,524
Department of Energy	74,295	106,000	0	830	1,676,766	11,971	610,227	2,480,089	53
Department of Interior	0	0	0	0	0	0	5,122	5,122	0
Department of Treasury	0	29,374,571	0	0	2,467	63	157,328	29,534,429	0
Department of Veterans Affairs	0	0	0	0	0	0	0	0	0
Environmental Protection Agency	0	0	0	0	0	0	0	0	0
National Aeronautics and Space Administration	236,406	1,800	0	13,790	25,905	16,394	211,731	506,026	7,001
Tennessee Valley Authority	0	43,000	0	0	0	0	11,000	54,000	0
U.S. Department of Agriculture	0	0	0	0	0	0	541,349	541,349	0
U.S. Enrichment Corporation	0	0	0	0	60,300	0	521,343	581,643	0
Subtotal for Original Industries	**11,078,150**	**32,204,870**	**326**	**149,529**	**12,099,439**	**5,976,984**	**11,882,343**	**73,391,641**	**19,649**
Federal Facilities with Activities Related to New Industries									
Department of Defense—Navy	0	0	0	0	0	0	0	0	0
Department of Energy	0	100,058	0	0	33,937	0	52,070	186,065	1
Tennessee Valley Authority	0	892,320	0	0	48,461,200	820	69,601,046	118,955,386	0
Subtotal for New Industries	**0**	**992,378**	**0**	**0**	**48,495,137**	**820**	**69,653,116**	**119,141,451**	**1**
Total for Federal Facilities	**11,078,150**	**33,197,248**	**326**	**149,529**	**60,594,576**	**5,977,804**	**81,535,459**	**192,533,092**	**19,650**

Note: Data are from Section 8 of Form R.
Due to an EPA data entry error, one chemical reporting revision for 1999 by a facility, the US Army Letterkenny Depot in Chambersburg, PA, was not included in this table. At the time of publication, the facility had notified EPA that it anticipated revising treated off-site for manganese compounds from 5,584,900 pounds to below 500 pounds. Revisions by this facility of two other compounds are included in the federal facility tables but not included in other tables in the *1999 TRI Public Data Release* report.

pounds, including the Army's 34.9 million pounds. The Army recycled on-site 9.4 million pounds, treated on-site 9.4 million pounds and released on- or off-site 8.2 million pounds.

The Treasury Department ranked third among federal agencies for total production-related waste, with 29.5 million pounds. Most of this amount was reported as recycled off-site.

Table 4–74 shows changes between 1998 and 1999 in the disposition of production-related waste reported by federal facilities. Total production-related waste rose 23.7 percent. The quantity released on- and off-site increased from 64.7 million pounds to 81.5 million pounds, 26.0 percent higher in 1999 than in 1998. Off-site recycling increased by 60.6 percent, from 20.7 million pounds to 33.2 million pounds. On-site recycling fell by 26.5 percent, from 15.1 million pounds to 11.1 million pounds and off-site energy recovery fell by 43.3 percent, from about 264,000 pounds to about 150,000 pounds.

Transfers Off-site for Further Waste Management/Disposal

Table 4–75 summarizes reporting by federal facilities of transfers off-site for further waste management and disposal. These transfers totaled 40.4 million pounds in 1999. Much of this amount (33.4 million pounds) was transferred off-site to recycling. The category of other off-site transfers to disposal accounted for 6.5 million pounds. Much of this amount was due to reporting by one Army facility that expected to revise its reported amount of off-site transfers to disposal, as explained above.

Federal facilities in the original TRI industries reported the bulk of the total, with 39.1 million pounds sent off-site for further waste management and disposal. The Treasury Department reported the largest total transfers, 29.4 million pounds, and nearly all of this amount was sent off-site to recycling.

Federal facilities filing forms for new industry SIC codes reported a total of 1.3 million pounds transferred, of which almost a million pounds were sent to recycling, about 290,000 pounds were sent to disposal.

Table 4–76 presents the changes in transfers off-site between 1998 and 1999 reported by federal facilities. Total transfers increased by 82.7 percent, a gain of 18.3 million pounds. Transfers to recycling grew from 20.4 million pounds to 33.4 million pounds, a 63.5 percent increase.

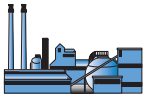


Table 4–74. Quantities of TRI Chemicals in Waste, 1998–1999: Federal Facilities

Waste Management Activity	1998	1999	Change 1998-1999	
	Pounds	Pounds	Pounds	Percent
Recycled On-site	15,069,474	11,078,150	–3,991,324	–26.5
Recycled Off-site	20,671,626	33,197,248	12,525,622	60.6
Energy Recovery On-site	0	326	326	—
Energy Recovery Off-site	263,952	149,529	–114,423	–43.3
Treated On-site	54,371,092	60,594,576	6,223,484	11.4
Treated Off-site	553,513	5,977,804	5,424,291	980.0
Quantity Released On- and Off-site	64,712,129	81,535,459	16,823,330	26.0
Total Production-related Waste	**155,641,786**	**192,533,092**	**36,891,306**	**23.7**
Non-Production-related Waste	44,847	19,650	–25,197	–56.2

Note: All data are from Section 8 of Form R for the year indicated.
Due to an EPA data entry error, one chemical reporting revision for 1999 by a facility, the US Army Letterkenny Depot in Chambersburg, PA, was not included in this table. At the time of publication, the facility had notified EPA that it anticipated revising treated off-site for manganese compounds from 5,584,900 pounds to below 500 pounds. Revisions by this facility of two other compounds are included in the federal facility tables but not included in other tables in the *1999 TRI Public Data Release* report.

Table 4–75. TRI Transfers Off-site for Further Waste Management/Disposal, 1999: Federal Facilities

Federal Agency	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs		Other Off-site Transfers*	Other Transfers Off-site to Disposal**	Total Transfers for Further Waste Management/ Disposal
				Metals and Metal Compounds	Non-metal TRI Chemicals			
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Federal Facilities with Activities Related to Original Industries and Other Industries								
Department of Defense	2,868,369	134,191	242,960	114,770	2,243	0	6,047,563	9,410,096
Air Force	141,772	11,573	94,070	112,453	686	0	136,625	497,179
Army	2,326,489	60,168	67,085	1,943	459	0	5,747,641	8,203,785
Army Corps of Engineers	1,502	0	0	0	0	0	16,700	18,202
Defense Logistics	0	0	0	0	0	0	0	0
Marines	134,903	27,100	2,604	320	0	0	9,319	174,246
Navy	263,703	35,350	79,201	54	1,098	0	137,278	516,684
Department of Energy	90,880	750	3,834	5,593	73	0	114,209	215,339
Department of Interior	0	0	0	0	0	0	0	0
Department of Treasury	29,374,572	0	0	0	2,010	0	15,676	29,392,258
Department of Veterans Affairs	0	0	0	0	0	0	0	0
Environmental Protection Agency	0	0	0	0	0	0	0	0
National Aeronautics and Space Administration	0	13,690	16,025	0	0	0	4,138	33,853
Tennessee Valley Authority	43,100	0	0	0	0	0	10,435	53,535
U.S. Department of Agriculture	0	0	0	0	0	0	0	0
U.S. Enrichment Corporation	0	0	0	0	0	0	0	0
Subtotal for Original Industries	**32,376,921**	**148,631**	**262,819**	**120,363**	**4,326**	**0**	**6,192,021**	**39,105,081**
Federal Facilities with Activities Related to New Industries								
Department of Defense — Navy	0	0	0	0	0	0	0	0
Department of Energy	100,058	0	0	0	0	0	1,891	101,949
Tennessee Valley Authority	893,600	0	820	0	0	0	287,645	1,182,065
Subtotal for New Industries	**993,658**	**0**	**820**	**0**	**0**	**0**	**289,536**	**1,284,014**
Total for Federal Facilities	**33,370,579**	**148,631**	**263,639**	**120,363**	**4,326**	**0**	**6,481,557**	**40,389,095**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
Due to an EPA data entry error, one chemical reporting revision for 1999 by a facility, the US Army Letterkenny Depot in Chambersburg, PA, was not included in this table. At the time of publication, the facility had notified EPA that it anticipated revising other off-site transfers to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds. Revisions by this facility of two other compounds are included in the federal facility tables but not included in other tables in the *1999 TRI Public Data Release* report.
* Other Off-site Transfers are transfers reported without a valid waste management code.
** Does not include transfers to POTWs of metals and metal compounds.

Projected Quantities of TRI Chemicals Managed in Waste, 1999–2001

As Table 4–77 shows, production-related waste for federal facilities is projected to decrease by 2.2 percent between 1999 and 2001, with the largest decline, 2.2 percent, taking place in 2000. Treated on-site was expected to decrease by 5.2 percent. While off-site treatment was projected to decrease by 93.8 percent, much of this was due to reporting by one Army facility that expected to revise its reported amount of treated off-site for 1999, as explained above.

Off-site recycling was expected to rise by 14.1 percent, from 33.2 million pounds to 37.9 million pounds, and on-site recycling was expected to increase by 5.7 percent. The quantity released on- and off-site was projected to decrease slightly, by 1 percent.

These projected changes would not make much difference to the share of production-related waste handled by the various waste management methods. The share of on-site recycling would rise slightly, to 6.2 percent of the total, and that of off-site recycling would increase from 15.8 percent of the total to 20.1 percent. The share of on-site treatment would increase from 28.9 percent to 30.5 percent. Despite the decrease in the quantity released on- and off-site, this item was expected to account for 42.9 percent of total production-related waste in 2001, up from 38.9 percent in 1999. On- and off-site releases are the least-desirable outcome under the waste management hierarchy described in **Waste Management** in Chapter 1 (Figure 1–2).

Source Reduction

In 1999, federal facilities filed 143 forms reporting source reduction activity (see Table 4–78). As noted in Waste Management in Chapter 1, source reduction—activity that prevents the generation of waste—is the preferred waste management option.

Department of Defense facilities reported source reduction activity on 70 forms, 29.4 percent of their total Form Rs. The National Aeronautics and Space Administration facilities submitted 12 forms reporting source reduction activity, representing 70.6 percent

Table 4–76. TRI Transfers Off-site for Further Waste Management/Disposal, 1998–1999: Federal Facilities

	1998	1999	Change 1998–1999	
	Pounds	Pounds	Pounds	Percent
Transfers to Recycling	20,407,893	33,370,579	12,962,686	63.5
Transfers to Energy Recovery	238,631	148,631	–90,000	–37.7
Transfers to Treatment	359,297	263,639	–95,658	–26.6
Transfers to POTWs	121,179	124,689	3,510	2.9
Metals and Metal Compounds Only	2,746	4,326	1,580	57.5
Non-metal TRI Chemicals	118,433	120,363	1,930	1.6
Other Off-site Transfers*	0	0	0	—
Other Off-site Transfers to Disposal**	1,047,978	6,481,557	5,433,579	518.5
Total Transfers Off-site for Further Waste Management/Disposal	**22,174,978**	**40,513,784**	**18,338,806**	**82.7**

Note: Total Transfers Off-site for Further Waste Management/Disposal are from Section 6 of Form R.
Due to an EPA data entry error, one chemical reporting revision for 1999 by a facility, the US Army Letterkenny Depot in Chambersburg, PA, was not included in this table. At the time of publication, the facility had notified EPA that it anticipated revising other off-site transfers to disposal for manganese compounds from 5,584,900 pounds to below 500 pounds. Revisions by this facility of two other compounds are included in the federal facility tables but not included in other tables in the *1999 TRI Public Data Release* report.
* Other Off-site Transfers are transfers reported without a valid waste management code.
** Does not include transfers to POTWs of metals and metal compounds.

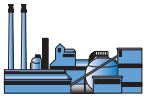


Table 4–77. Current Year and Projected Quantities of TRI Chemicals in Waste, 1999–2001: Federal Faciltiies

Waste Management Activity	Current Year 1999		Projected 2000		Projected 2001	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
Recycled On-site	11,078,150	5.8	11,735,313	6.2	11,714,313	6.2
Recycled Off-site	33,197,248	17.2	37,864,844	20.1	37,887,263	20.1
Energy Recovery On-site	326	0.0	326	0.0	326	0.0
Energy Recovery Off-site	149,529	0.1	160,815	0.1	154,100	0.1
Treated On-site	60,594,576	31.5	57,297,203	30.4	57,420,937	30.5
Treated Off-site	5,977,804	3.1	383,094	0.2	370,468	0.2
Quantity Released On- and Off-site	81,535,459	42.3	80,906,904	43.0	80,682,560	42.9
Total Production-related Waste	**192,533,092**	**100.0**	**188,348,499**	**100.0**	**188,229,967**	**100.0**
Waste Management Activity	**Projected Change 1999-2000** Percent		**Projected Change 2000-2001** Percent		**Projected Change 1999-2001** Percent	
Recycled On-site	5.9		–0.2		5.7	
Recycled Off-site	14.1		0.1		14.1	
Energy Recovery On-site	0.0		0.0		0.0	
Energy Recovery Off-site	7.5		–4.2		3.1	
Treated On-site	–5.4		0.2		–5.2	
Treated Off-site	–93.6		–3.3		–93.8	
Quantity Released On- and Off-site	–0.8		–0.3		–1.0	
Total Production-related Waste	**-2.2**		**-0.1**		**-2.2**	

Note: Current year and projected amounts are from Section 8 of Form R for 1999.
Due to an EPA data entry error, one chemical reporting revision for 1999 by a facility, the US Army Letterkenny Depot in Chambersburg, PA, was not included in this table. At the time of publication, the facility had notified EPA that it anticipated revising treated off-site for manganese compounds from 5,584,900 pounds to below 500 pounds. Revisions by this facility of two other compounds are included in the federal facility tables but not included in other tables in the *1999 TRI Public Data Release* report.

of their total Form Rs. The Tennessee Valley Authority facilities with activities related to the new industry sectors reported source reduction activity on 50 forms, 30.3 percent of their total Form Rs.

The most frequently reported source reduction activity (identified on 65 forms, including 47 filed by the Tennessee Valley Authority facilities with activities related to the new industry sectors) was raw material modifications. Good operating practices came next, with 44 forms (including 32 by Department of Defense facilities), and surface preparation and finishing was third, with 26 forms (all from Department of Defense facilities).

Table 4–78. Number of Forms Reporting Source Reduction Activity, 1999: Federal Facilities

Federal Agency	Total Form Rs	Forms Reporting Source Reduction Activity		Category of Source Reduction Activity							
			Percent of All Form Rs	Good Operating Practices	Inventory Control	Spill and Leak Prevention	Raw Material Modifications	Process Modifications	Cleaning and Degreasing	Surface Preparation and Finishing	Product Modifications
	Number	Number	Percent	Number	Number	Number	Number	Number	Number	Number	Number
Federal Facilities with Activities Related to Original Industries and Other Industries											
Department of Defense	238	70	29.4	32	15	9	14	13	17	26	2
Air Force	51	19	37.3	11	0	1	9	4	16	15	0
Army	110	21	19.1	8	5	8	1	7	0	1	1
Army Corps of Engineers	6	6	100.0	6	0	0	0	0	0	0	0
Defense Logistics	4	0	0.0	0	0	0	0	0	0	0	0
Marines	14	6	42.9	1	2	0	1	0	0	8	1
Navy	53	18	34.0	6	8	0	3	2	1	2	0
Department of Energy	41	6	14.6	1	4	1	2	1	1	0	0
Department of Interior	2	0	0.0	0	0	0	0	0	0	0	0
Department of Treasury	14	4	28.6	1	0	0	2	1	0	0	0
Department of Veterans Affairs	1	0	0.0	0	0	0	0	0	0	0	0
Environmental Protection Agency	2	0	0.0	0	0	0	0	0	0	0	0
National Aeronautics and Space Administration	17	12	70.6	9	2	0	0	4	3	0	1
Tennessee Valley Authority	3	0	0.0	0	0	0	0	0	0	0	0
U.S. Department of Agriculture	4	1	25.0	0	0	1	0	0	0	0	0
U.S. Enrichment Corporation	6	0	0.0	0	0	0	0	0	0	0	0
Subtotal for Original Industries	**328**	**93**	**28.4**	**43**	**21**	**11**	**18**	**19**	**21**	**26**	**3**
Federal Facilities with Activities Related to New Industries											
Department of Defense - Navy	1	0	0.0	0	0	0	0	0	0	0	0
Department of Energy	13	0	0.0	0	0	0	0	0	0	0	0
Tennessee Valley Authority	165	50	30.3	1	0	0	47	2	0	0	0
Subtotal for New Industries	**179**	**50**	**27.9**	**1**	**0**	**0**	**47**	**2**	**0**	**0**	**0**
Total for Federal Facilities	**507**	**143**	**28.2**	**44**	**21**	**11**	**65**	**21**	**21**	**26**	**3**

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