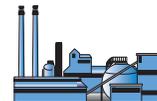


Chapter 2

1998 Toxics Release Inventory Data and 1995–1998 Trends

Chapter 2



1998 Toxics Release Inventory Data and 1995–1998 Trends

◆ Introduction ◆

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

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

Important descriptions of the categories of releases and waste management activities that are reportable to TRI appear in Chapter 1, in **TRI Releases and Waste Management: Data Analyzed in 1998 TRI**

Public Data Release. Information provided in Chapter 1 is essential to understanding the data presented throughout this book.

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

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

◆ TRI Releases, 1995–1998 ◆

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



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

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

Fifteen percent of the 1998 submissions were Form A certification statements rather than the Form R detailed reporting form. EPA established the Form A certification option, beginning with the 1995 reporting year, for facilities that meet TRI reporting thresholds, but whose total annual reportable amount¹ for a listed chemical does not exceed 500 pounds and who do not manufacture, process, or otherwise use more than 1 million pounds of the chemical. As explained in TRI Reporting Forms in Chapter 1, Form A certification statements do not report amounts of chemical releases, transfers, or other waste management activities.

On- and Off-site Releases

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

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

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

On-site Releases

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

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



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

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

Note: On-site Releases are from Section 5 of Form R. Off-site Releases are from Section 6 (transfers off-site to disposal) of Form R. Off-site Releases include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs. Breakdown of Underground Injection and On-site Land Releases (for RCRA Subtitle C landfills) began in 1996 reporting year.

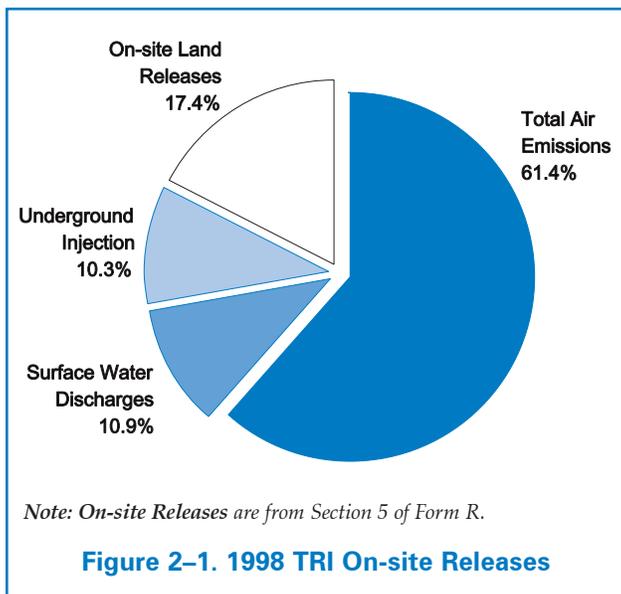
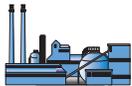
^aStorage only (disposal code M10) indicates the chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to storage only are included as a form of disposal (off-site release). See Box 1–5.

^bBeginning 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.

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

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

^eUnknown (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).



posal methods other than landfilling or surface impoundment.

Air emissions decreased 20.7 percent from 1995 to 1998, and this 328.2-million-pound decrease was the largest factor in the overall reduction of on-site releases.

Underground injection showed a reduction of 10.8 percent or 25.6 million pounds. However, both surface water discharges and on-site land releases increased from 1995 to 1998, by 23.7 percent and 11.4 percent respectively. Surface water discharges increased by 42.8 million pounds and on-site land releases by 36.4 million pounds.

Off-site Releases

As explained in Chapter 1 (see Box 1–5), off-site releases in this report consist of two general types of off-site transfers: transfers of all TRI chemicals to disposal (including landfills, surface impoundments, underground injection, and other disposal practices including storage) and transfers of metals and metal compounds to solidification/stabilization and to wastewater treatment by private treatment services or pub-

licly owned treatment works (POTWs, or municipal sewage treatment facilities). In Chapter 1, Boxes 1–6 and 1–7 supply detailed information on reporting and analysis of data on TRI metals and metal compounds. (1998 data for metals and their compounds appear in Appendix B.)

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

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

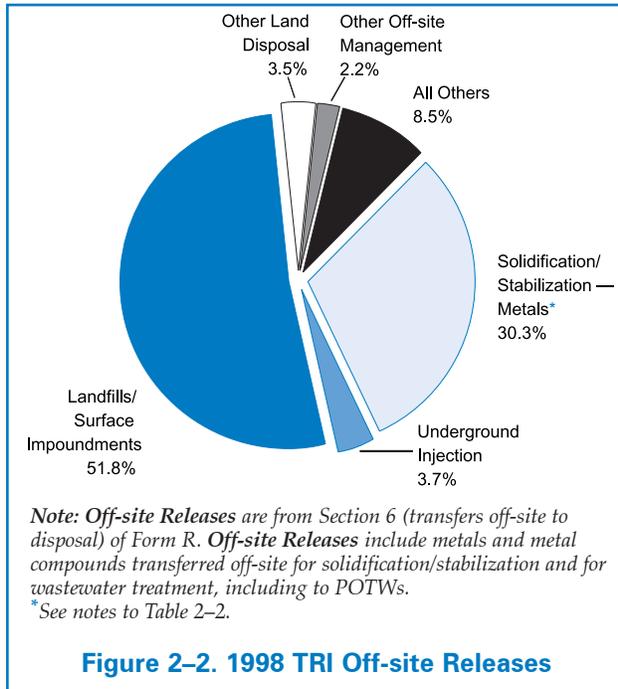


Figure 2-2. 1998 TRI Off-site Releases

❖Waste Management Data,❖ 1995–1998

Quantities of TRI Chemicals in Waste

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

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

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

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

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

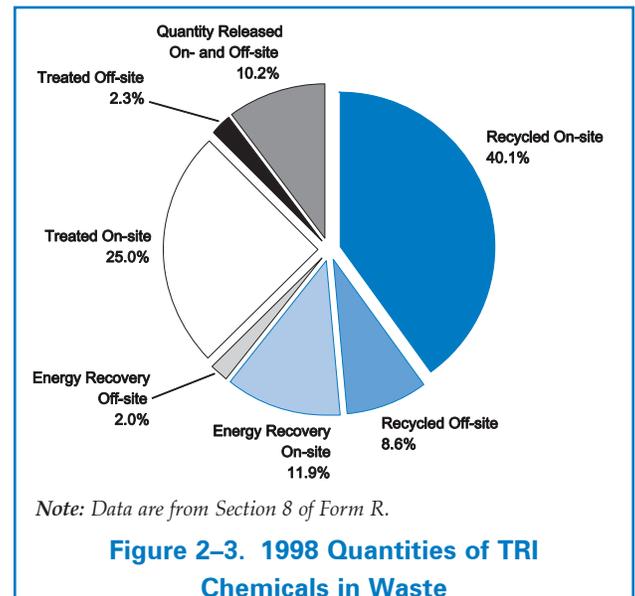


Figure 2-3. 1998 Quantities of TRI Chemicals in Waste

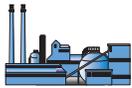


Table 2–3. Quantities of TRI Chemicals in Waste, 1995–1998

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

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

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

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

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

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

Table 2–3 shows that quantities released on- and off-site decreased from 2.56 billion



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

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

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

Transfers Off-site for Further Waste Management

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

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

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

Although recycling remains by far the largest type of transfer off-site for further waste management, it declined by 12.1 percent or 274.8 million pounds from 1995 to 1998. Transfers to energy recovery decreased by 7.7 percent or 40.1 million

pounds. Transfers to treatment and to POTWs both increased from 1995 to 1998, but all four types of transfers showed reductions in the last year.

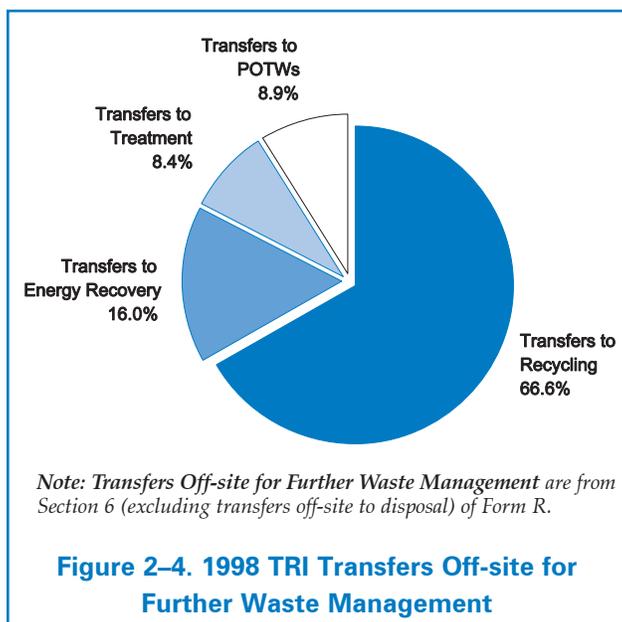
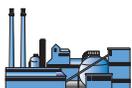
◆ TRI Data by State, 1995–1998 ◆

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

On- and Off-site Releases by State

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

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



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

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

On-site Releases

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

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

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

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

Off-site Releases

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



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

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

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

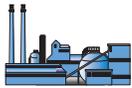


Table 2-5. TRI Total On-site and Off-site Releases by State, 1995–1998 (continued)

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

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

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

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

Landfills/disposal surface impoundments received the largest amount of off-site releases in 1998 (232.7 million pounds for all states, of the 449.0-million-pound total). Pennsylvania facilities sent 44.2 million pounds to disposal in landfills/surface

impoundments. Michigan ranked second in this category with 33.8 million pounds, and Ohio's 25.7 million pounds ranked third.

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



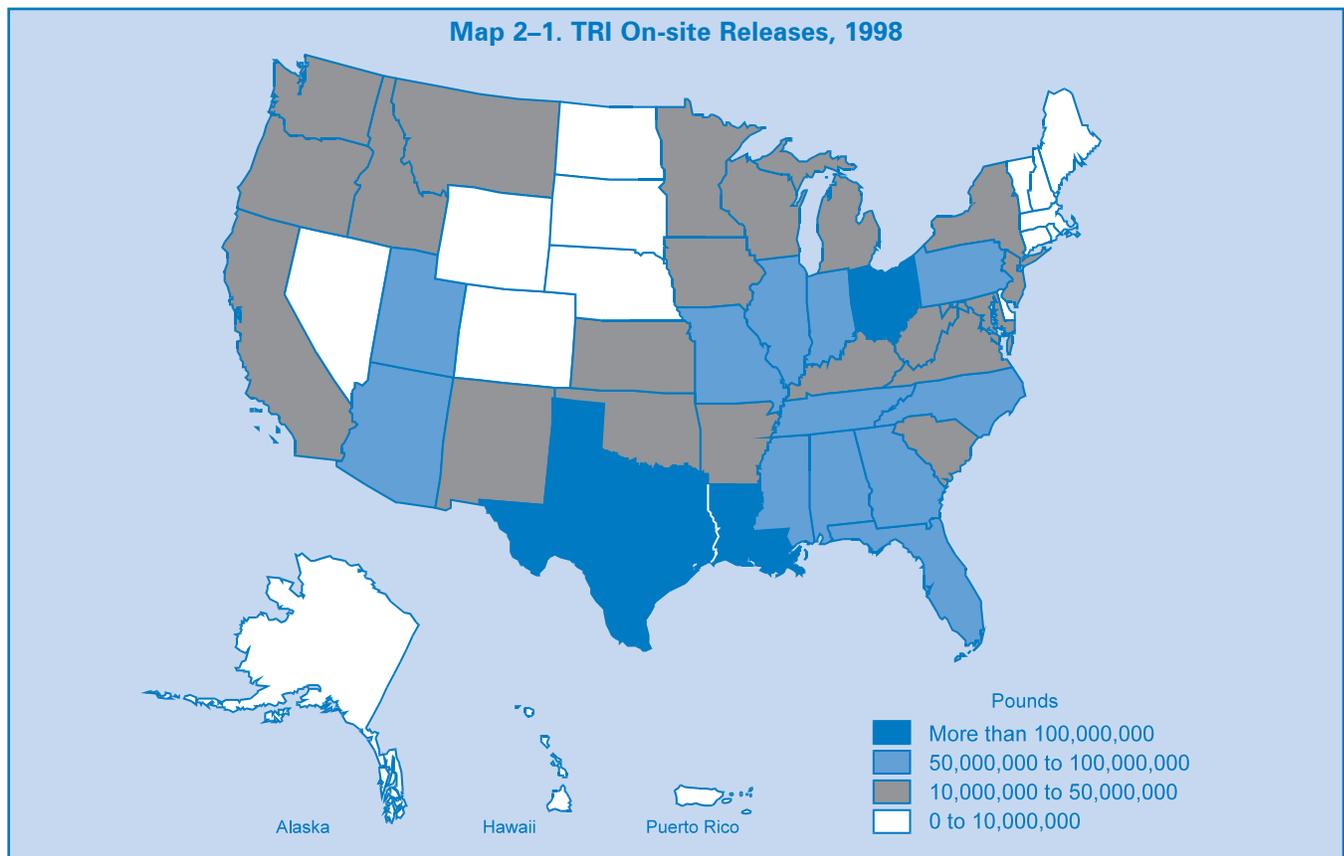
Transfers Within and Among States

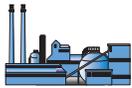
Off-site Releases

TRI facilities report the specific off-site locations to which they are transferring TRI chemicals. Table 2–8 summarizes off-site releases (transfers to disposal) that were transferred within the state, received into the state from TRI facilities elsewhere, or sent out of state. The largest transfers to disposal within a state in 1998 occurred in Pennsylvania, with 40.3 million pounds. Ohio received the largest amount of such transfers—46.4 million pounds—from facilities located in other states. Pennsylvania also shipped the largest amount—19.2 million pounds—of TRI chemicals to disposal to locations outside the state.

When all releases in a state are taken into account, Texas led all states and territories for the largest total on- and off-site releases reported as occurring in the state. Releases in Texas totaled 264.6 million pounds (whether originating from facilities in Texas or transferred into Texas from facilities in other states and territories). By this accounting, Ohio ranked second with 189.5 million pounds and Louisiana ranked third with 178.7 million pounds, reversing their ranking for total on- and off-site releases (discussed above).

Most off-site releases were transferred within the state where they originated (275.2 million pounds). A total of 173.8 million pounds was sent by facilities in one state to locations in another.





**Chapter 2 — 1998 Toxics Release Inventory
Data and 1995–1998 Trends**

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

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

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



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

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

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

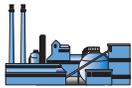


Table 2–6. TRI On-site and Off-site Releases by State, 1998 (continued)

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

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

Transfers Off-site for Further Waste Management

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

The largest transfers for further waste management within a state were reported in Texas, with 222.8 million pounds. Illinois was the largest recipient state, with 166.0 million pounds, closely followed by

Indiana with 165.4 million pounds. Ohio ranked first for amounts transferred out of state for further waste management with 140.2 million pounds.

Accounting for the movement of transfers among states, Texas had the largest total transfers to destinations within its borders (whether originating from facilities in Texas or transferred into Texas from facilities in other states and territories). Transfers within and into Texas totaled 314.9 million pounds in 1998. Indiana and Ohio followed with 256.6 million pounds and 255.5 million pounds respectively.



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

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

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

Management of TRI Chemicals in Waste by State

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

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

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

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



Chapter 2 — 1998 Toxics Release Inventory Data and 1995–1998 Trends

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

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

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

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

^aStorage 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.

^bBeginning 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.

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

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



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

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

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

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

^eUnknown (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).



Chapter 2 — 1998 Toxics Release Inventory Data and 1995–1998 Trends

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

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

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

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

^aStorage 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.

^bBeginning 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.

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

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

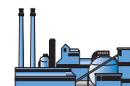


Table 2-7. TRI Off-site Releases (Transfers Off-site to Disposal), 1998 (continued)

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

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

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

^eUnknown (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).



Chapter 2 — 1998 Toxics Release Inventory Data and 1995–1998 Trends

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

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

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

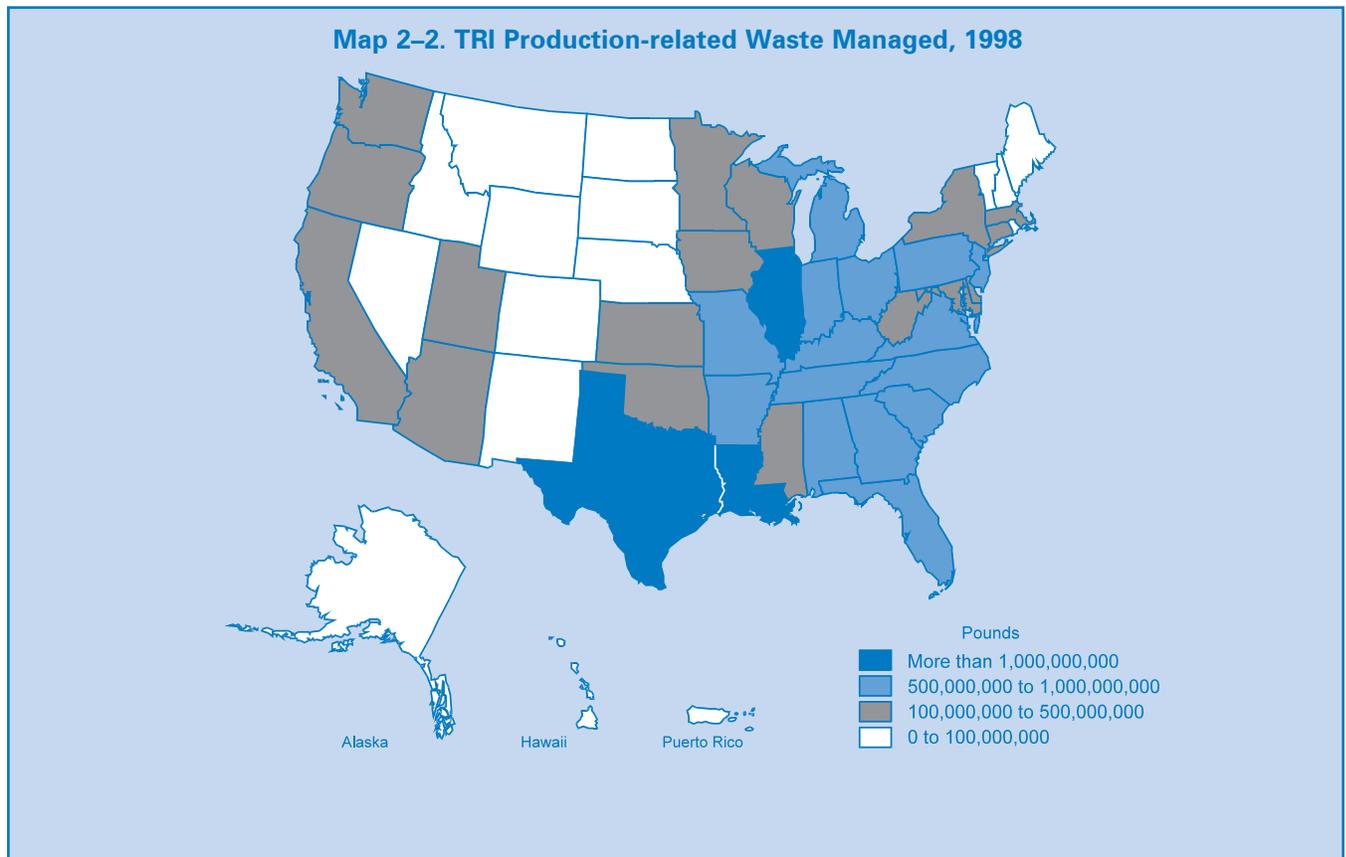


Table 2-8. TRI Releases in the State and Transferred Out of State, 1998 (continued)

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

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

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





Chapter 2 — 1998 Toxics Release Inventory Data and 1995–1998 Trends

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

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

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



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

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

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

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

❖ TRI Releases, 1988–1998 ❖

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

analyses. Reporting by facilities in the industries added to TRI beginning in 1998 is also not included here.

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

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



**Chapter 2 — 1998 Toxics Release Inventory
Data and 1995–1998 Trends**

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

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

Note: Data are from Section 8.



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

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

Note: Data are from Section 8.

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

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

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

◆ Source Reduction and Projections of TRI Chemicals in Waste ◆

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



Chapter 2 — 1998 Toxics Release Inventory Data and 1995–1998 Trends

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

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

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

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

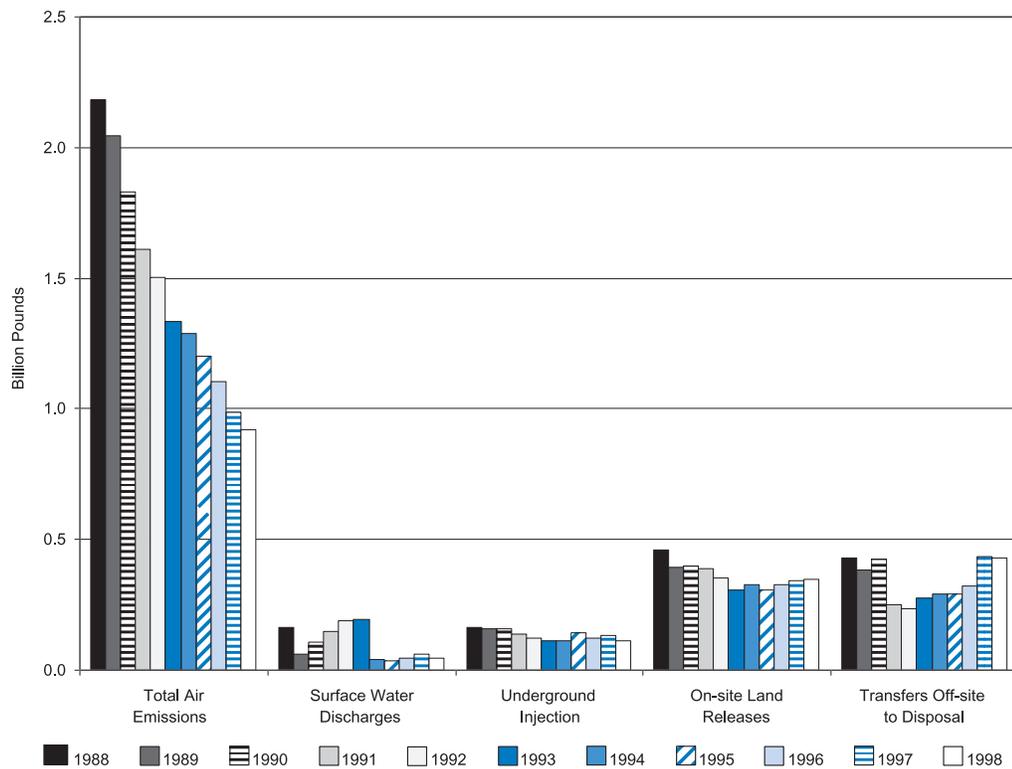
^aStorage only (disposal code M10) indicates the chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to storage only are included as a form of disposal (off-site release). See Box 1–5.

^bBeginning 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.

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

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

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



Note: Does not include delisted chemicals, chemicals added in 1990, 1991, 1994 and 1995, aluminum oxide, ammonia, hydrochloric acid and sulfuric acid. **On-site Releases** are from Section 5 of Form R. **Off-site Releases** are from Section 6 (transfers off-site to disposal) of Form R. **Off-site Releases** include metals and metal compounds transferred off-site for solidification/stabilization and for wastewater treatment, including to POTWs.

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

information about source reduction activities they implemented during the year.

Source Reduction

Source reduction activities are undertaken to reduce the amount of a toxic chemical which enters a wastestream or is otherwise released to the environment. By reducing the generation of toxic chemicals in waste, source reduction activities reduce the need to recycle, treat, or dispose of toxic chemicals. Chapter 1 further explains source reduction as defined by the PPA (see Box 1–13).

A reported source reduction activity could have been implemented at any time during

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

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



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

Facility Projections of TRI Chemicals in Waste

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

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

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

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

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

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

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



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

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

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

