Chapter 2

Toxics Release Inventory Data Overview, 1998 and 1999

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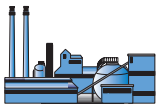


Toxics Release Inventory Data Overview, 1998 and 1999

This chapter provides a broad overview of TRI data for 1998 and 1999. Detailed analyses of the 20 industries in the manufacturing sector that have been required to report to TRI since the program began in 1987 (the "original" industries) appear in Chapters 3 and 5. These original industries are in Standard Industrial Classification (SIC) codes 20 to 39. (For information on SIC codes and their use in TRI, see Box 1–1 in Chapter 1.)

The seven industries that were required to report to TRI for the first time in 1998—the "new" industries—are analyzed in Chapter 4. Also in Chapter 4 is a separate analysis of reporting by federal facilities.

For definitions of types of releases and waste management activities, and for important information on factors to be considered when using TRI data, see Chapter 1.

TRI Data for Original and New Industries, 1998 and 1999

As shown in Table 2–1, in 1999, 20,698 facilities in the original industries submitted 69,471 TRI forms (both Forms R and Forms A). In 1999, 1,941 facilities in the new industries submitted 14,597 forms. Although these industries constituted only 8.6 percent of all TRI facilities reporting, they submitted 17.4 percent of the TRI forms. (In 1998, the new facilities accounted for 8.5 percent of all TRI facilities and 17.6 percent of all forms.) The numbers of facilities reporting and of forms submitted were slightly lower, by 2 to 3 percent, in 1999 than in 1998, for both original and new industries and for TRI industries as a whole.

On- and Off-site Releases

On- and off-site releases in 1999 for all TRI industries totaled 7.77 billion pounds, an increase from 7.38 billion pounds in 1998, or 5.3 percent. From 1998 to 1999, total releases by the new industries increased by 9.0 percent, from 5.00 billion pounds to 5.45 billion pounds. Total releases by original industries, on the other hand, decreased from 1998 to 1999 by 2.5 percent, from 2.39 billion pounds to 2.33 billion pounds.

On-site releases from all TRI industries grew from 6.96 billion pounds in 1998 to 7.29 billion pounds in 1999, an increase of 4.8 percent. The original industries' on-site releases fell by 5.3 percent, from 2.06 billion pounds in 1998 to 1.95 billion pounds in

Table 2–1. TRI On-site and Off-site Releases, Original and New Industries, 1998–1999

	Original Industries			New Industries			All TRI Industries		
	1998 Number	1999 Number	Change 1998–1999 Percent	1998 Number	1999 Number	Change 1998–1999 Percent	1998 Number	1999 Number	Change 1998–1999 Percent
Total Facilities	21,334	20,698	–3.1	1,988	1,941	–2.4	23,322	22,639	–3.0
Total Forms	70,975	69,471	–2.1	15,142	14,597	–3.7	86,117	84,068	–2.4
Form Rs	60,641	59,265	–2.3	12,492	12,124	–3.0	73,133	71,389	–2.4
Form As	10,334	10,206	–1.2	2,650	2,473	–7.2	12,984	12,679	–2.4
	Pounds	Pounds	Percent	Pounds	Pounds	Percent	Pounds	Pounds	Percent
On-site Releases									
Total Air Emissions	1,270,193,503	1,175,054,932	–7.5	811,010,244	854,309,491	5.3	2,081,203,747	2,029,364,423	–2.5
Fugitive Air Emissions	294,971,535	270,765,473	–8.2	6,968,039	7,546,743	8.3	301,939,574	278,312,216	–7.8
Point Source Air Emissions	975,221,968	904,289,459	–7.3	804,042,205	846,762,748	5.3	1,779,264,173	1,751,052,207	–1.6
Surface Water Discharges	238,483,036	253,591,816	6.3	7,553,237	5,289,960	–30.0	246,036,273	258,881,776	5.2
Underground Injection	209,711,433	199,547,803	–4.8	56,708,764	58,097,341	2.4	266,420,197	257,645,144	–3.3
Class I Wells	209,531,530	199,398,335	–4.8	23,536,771	22,861,227	–2.9	233,068,301	222,259,562	–4.6
Class II–V Wells	179,903	149,468	–16.9	33,171,993	35,236,114	6.2	33,351,896	35,385,582	6.1
On-site Land Releases	343,781,378	323,667,851	–5.9	4,022,499,616	4,423,054,923	10.0	4,366,280,994	4,746,722,774	8.7
RCRA Subtitle C Landfills	13,792,720	12,440,355	–9.8	208,597,751	208,055,567	–0.3	222,390,471	220,495,922	–0.9
Other On-site Landfills	100,142,596	86,002,777	–14.1	167,773,997	157,900,439	–5.9	267,916,593	243,903,216	–9.0
Land Treatment	8,154,812	8,961,222	9.9	1,313,197	1,864,462	42.0	9,468,009	10,825,684	14.3
Surface Impoundments	81,151,225	73,771,878	–9.1	1,338,519,185	1,157,407,580	–13.5	1,419,670,410	1,231,179,458	–13.3
Other Disposal	140,540,025	142,491,619	1.4	2,306,295,486	2,897,826,875	25.6	2,446,835,511	3,040,318,494	24.3
Total On-site Releases	**2,062,169,350**	**1,951,862,402**	**–5.3**	**4,897,771,861**	**5,340,751,715**	**9.0**	**6,959,941,211**	**7,292,614,117**	**4.8**
Off-site Releases									
Storage Only[a]	6,052,516	6,283,205	3.8	2,716,688	789,462	–70.9	8,769,204	7,072,667	–19.3
Solidification/Stabilization[b] Metals and Metal Compounds Only	42,773,352	53,081,746	24.1	5,631,223	5,955,229	5.8	48,404,575	59,036,975	22.0
Wastewater Treatment (excluding POTWs)[c] Metals and Metal Compounds Only	3,772,346	6,488,311	72.0	115,300	185,525	60.9	3,887,646	6,673,836	71.7
Transfers to POTWs[d] Metals and Metal Compounds Only	3,009,214	3,345,324	11.2	419,223	58,383	–86.1	3,428,437	3,403,707	–0.7
Underground injection	7,566,290	20,792,445	174.8	335,745	2,763,898	723.2	7,902,035	23,556,343	198.1
Landfills/Surface Impoundments	215,995,597	215,936,934	0.0	68,149,933	62,872,238	–7.7	284,145,530	278,809,172	–1.9
Land Treatment	1,396,685	4,239,385	203.5	487,775	598,919	22.8	1,884,460	4,838,304	156.7
Other Land Disposal	15,616,540	15,821,423	1.3	12,041,927	10,865,562	–9.8	27,658,467	26,686,985	–3.5
Other Off-site Management	10,303,490	34,046,804	230.4	8,809,908	17,642,367	100.3	19,113,398	51,689,171	170.4
Transfers to Waste Broker for Disposal	14,087,152	11,146,540	–20.9	884,192	2,506,673	183.5	14,971,344	13,653,213	–8.8
Unknown[e]	3,486,757	3,465,479	–0.6	468,765	537,602	14.7	3,955,522	4,003,081	1.2
Total Off-site Releases (Transfers Off-site to Disposal)	**324,059,939**	**374,647,596**	**15.6**	**100,060,679**	**104,775,858**	**4.7**	**424,120,618**	**479,423,454**	**13.0**
Total On-site and Off-site Releases	**2,386,229,289**	**2,326,509,998**	**–2.5**	**4,997,832,540**	**5,445,527,573**	**9.0**	**7,384,061,829**	**7,772,037,571**	**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.

Due to an EPA data entry error, three chemical reporting revisions for 1999 by one facility, the US Army Letterkenny Depot in Chambersburg, PA, were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change off-site transfers to disposal 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 for manganese compounds from 5,584,900 pounds to below 500 pounds.

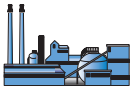
[a]Storage only (disposal code M10) indicates that the toxic chemical is sent off-site for storage because there is no known disposal method. Amounts reported as transferred to storage only are included as a form of disposal (off-site release). See Box 1–5.

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

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

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

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



1999, while the new industries' on-site releases increased by 9.0 percent, from 4.90 billion pounds to 5.34 billion pounds. This increase is accounted for by reporting by one facility in Utah. This metal mining facility retired a leach pad in 1999 and, therefore, had a large one-year increase of 505 million pounds reported in the other disposal category of on-site land releases.

A 10.0 percent rise in on-site land releases, from 4.02 billion pounds to 4.42 billion pounds, and a 5.3 percent rise in total air emissions, from 811.0 million pounds to 854.3 million pounds, accounted for much of the increase in the new industries' on-site releases. Surface water discharges by the new industries dropped by 30.0 percent, but the quantities involved were relatively small—5.3 million pounds in 1999, down from 7.6 million pounds in 1998. For the original industries, all the main categories of releases declined in quantity, except for surface water discharges which increased by 6.3 percent. The largest, air emissions, fell from 1.27 billion pounds in 1998 to 1.18 billion pounds in 1999, a decrease of 7.5 percent.

Off-site releases (transfers off-site to disposal) for TRI industries rose 13.0 percent, from 424.1 million pounds in 1998 to 479.4 million pounds in 1999. Off-site releases reported by both original industries and the new industries increased from 1998 to 1999.

The original industries reported off-site releases of 324.1 million pounds in 1998 and 374.6 million pounds in 1999, a 15.6 percent increase. The main categories in which the original industries reported increases were underground injection, from 7.6 million pounds to 20.8 million pounds (174.8 percent); solidification/stabilization, from 42.8 million pounds to 53.1 million pounds (24.1 percent); land treatment, from 1.4 million pounds to 4.2 million pounds (203.5 percent); and wastewater treatment, excluding publicly owned treatment works (POTWs), from 3.8 million pounds to 6.5 million pounds (72.0 percent). The only category of releases by the original industries to register a decrease was transfers to waste brokers for disposal, from 14.1 million pounds to 11.1 million pounds, a decline of 20.9 percent.

Total off-site releases from facilities in the new industries rose from 100.1 million pounds in 1998 to 104.8 million pounds in 1999, a 4.7 percent increase. The largest increase was in the category other off-site management, from 8.8 million pounds to 17.6 million pounds, a rise of 100.3 percent. The absolute increases for off-site underground injection and transfers to waste brokers for disposal were lower, but because the 1998 amounts were small, percentage growth was substantial. Off-site underground injection rose from about 336,000 pounds to 2.8 million pounds (723.2 percent). Transfers to waste brokers increased from about 884,000 pounds to 2.5 million pounds (183.5 percent).

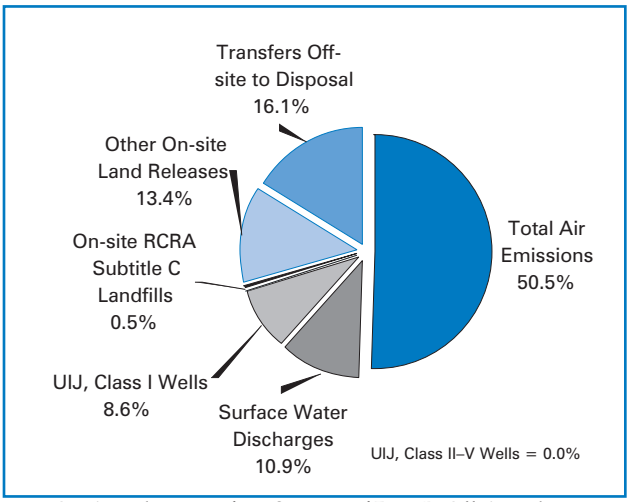
Three categories of off-site releases by the new industries showed decreases of more than a million pounds. The amount sent to landfills and surface impoundments fell from 68.1 million pounds in 1998 to 62.9 million pounds in 1999, a decrease of 7.7 percent. Releases to other land disposal declined from 12.0 million pounds to 10.9 million pounds (9.8 percent). Releases to storage fell from 2.7 million pounds to less than 800,000 million pounds (70.9 percent).

Transfers to landfills/surface impoundments constituted the largest type of off-site release for both original and new industries. Facilities in the new industries reported 62.9 million pounds in this category in 1999, or 1.2 percent of total releases from the new industry group. In 1999, the original industries sent 215.9 million pounds, or 9.3 percent of their total releases, to off-site landfills and surface impoundments.

Most of the new industries' releases were on-site to land (4.42 billion pounds in 1999), and, as discussed in Chapter 4, the bulk of these on-site land releases were reported by the metal mining industry. Much of this amount is reporting on toxic chemicals in mining waste rock by this industry. In 1999, on-site land releases (including the two categories other on-site land releases and on-site RCRA Subtitle C landfills) accounted for 13.9 percent of the original TRI industries' total releases (see Figure 2–1). The corresponding figure for the new industries in 1999 was 81.2 percent (see Figure 2–2). The new industries accounted for 93.2 percent of all TRI on-site land releases in 1999. (This group's on-site releases accounted for 73.2 percent of total on-site releases by all TRI industries.)

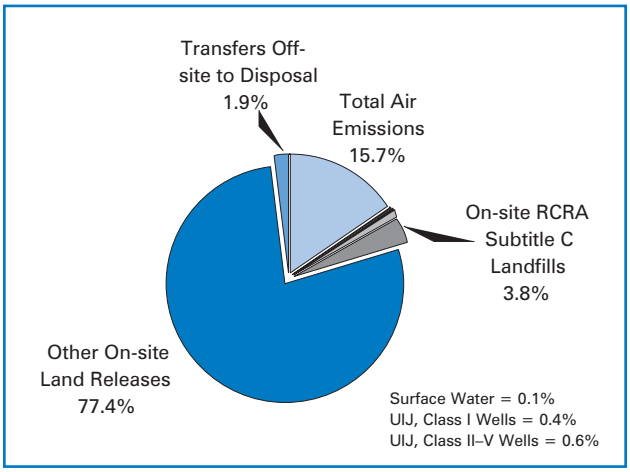
The large proportion of on-site land releases by the new industries substantially influences the distribution of other release types. For example, Figures 2–1 and 2–2 show that in 1999 air emissions accounted for 50.5 percent of total releases by the original industries but for only 15.7 percent of total releases by the new industries. As noted in Chapter 4, electric utilities reported by far the greatest part of the new industries' air emissions. Similarly, transfers off-site to disposal accounted for 16.1 per-

Figure 2-1. Distribution of TRI On-site and Off-site Releases, Original Industries, 1999



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

Figure 2-2. Distribution of TRI On-site and Off-site Releases, New Industries, 1999



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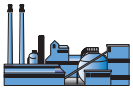

Box 2–1. Duplication of Off-site Transfers to Disposal, 1998 and 1999

TRI facilities may transfer off-site chemicals in waste to other facilities for disposal. Box 1–8 in Chapter 1 explains the analysis done to avoid counting transfers by one TRI facilities that are also reported as on-site releases by another facility. The off-site transfers to disposal are omitted from tables that compare or summarize on-site and off-site releases for all industries, including the new industries. Only the on-site releases from the other TRI facilities are included in such analyses.

The following shows the results of the analysis for 1998 and 1999 and how much is omitted from tables that present total releases for all TRI industries in this chapter and in Chapter 4.

Off-site Transfer M Code	Total Transfers to Disposal	Transfers to Disposal for Matching RCRA ID	Transfers Omitted Because Duplicated in Section 5 of Recipient TRI Facility	Section 5 Checked for Recipient TRI Facilities Based on Matching Chemical or, if Metal, Metal plus Metal Compound
	Pounds	Pounds	Pounds	
Duplication of Off-site Transfers to Disposal, 1998				
M10	8,769,324	3,520,834	120	5.5.4
M41*	143,083,648	132,394,969	94,679,073	5.5.1 A and B
M62*	4,084,840	2,745,648	197,194	5.5.1 A and B, 5.5.3 and 5.3
M71	12,492,253	10,485,816	4,590,218	5.4
M72	307,704,844	50,461,459	23,559,314	5.5.1 A and B, 5.5.3
M73	1,884,460	75,603	0	5.5.2
M79	27,672,169	9,021,530	13,702	5.5.4
M90	19,734,548	3,516,045	621,150	All Section 5
M99	4,226,315	2,051,217	270,793	All Section 5
Total	529,652,401	214,273,121	123,931,564	
Number of Form Rs	73,133	7,882	2,721	
Duplication of Off-site Transfers to Disposal, 1999				
M10	7,075,644	2,471,310	2,977	5.5.4
M41*	146,657,648	137,285,948	87,620,673	5.5.1 A and B
M62*	6,782,135	2,347,947	108,299	5.5.1 A and B, 5.5.3 and 5.3
M71	32,641,556	29,811,365	9,085,213	5.4
M72	299,664,864	41,525,922	20,855,692	5.5.1 A and B, 5.5.3
M73	4,838,304	33,973	0	5.5.2
M79	26,708,665	7,511,811	21,680	5.5.4
M90	51,773,270	2,756,092	84,099	All Section 5
M99	4,180,375	2,375,368	177,294	All Section 5
Total	580,322,461	226,119,736	117,955,927	
Number of Form Rs	71,389	7,855	2,743	

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

cent of the original industries' releases but for only 1.9 percent of total releases by the new industries.

Starting in 1998, hazardous waste treatment and disposal facilities in SIC code 4953 were required to report to TRI. The result is that TRI chemicals in waste may be sent by one TRI facility (which reports the amounts as transfers off-site to disposal) to another TRI facility (which reports the amounts as on-site releases). Box 2–1 shows how much of the off-site transfers to disposal were also reported as on-site releases in 1998 and 1999.

Waste Management Data

Quantities of TRI Chemicals in Waste

Table 2–2 compares the quantities of TRI chemicals in waste for original and new industries for 1998 and 1999. Total production-related waste for all TRI industries in 1999 was 29.49 billion pounds, an increase of 0.7 percent from 1998.

The original industries reported production-related waste totaling 23.10 billion pounds in 1999, up from 22.78 billion pounds in 1998, an increase of 1.4 percent. Of the 1999 total for original industries, 10.3

Table 2-2. Quantities of TRI Chemicals in Waste by Waste Management Activity, Original and New Industries, 1998–1999

Waste Management Activity	Original Industries			New Industries			All TRI Industries		
	1998 Pounds	1999 Pounds	Change 1998–1999 Percent	1998 Pounds	1999 Pounds	Change 1998–1999 Percent	1998 Pounds	1999 Pounds	Change 1998–1999 Percent
Recycled On-site	8,407,381,641	7,839,852,848	–6.8	204,380,355	198,496,815	–2.9	8,611,761,996	8,038,349,663	–6.7
Recycled Off-site	2,071,439,013	2,134,897,467	3.1	37,327,609	35,157,658	–5.8	2,108,766,622	2,170,055,125	2.9
Energy Recovery On-site	2,827,695,743	2,806,098,993	–0.8	11,399,201	10,762,603	–5.6	2,839,094,944	2,816,861,596	–0.8
Energy Recovery Off-site	487,588,775	511,631,406	4.9	413,103,773	267,664,335	–35.2	900,692,548	779,295,741	–13.5
Treated On-site	5,913,717,613	6,850,326,119	15.8	629,209,581	754,327,458	19.9	6,542,927,194	7,604,653,577	16.2
Treated Off-site	592,216,295	571,669,556	–3.5	90,988,751	72,630,384	–20.2	683,205,046	644,299,940	–5.7
Quantity Released On- and Off-site	2,475,386,574	2,384,303,476	–3.7	5,118,407,472	5,056,288,914	–1.2	7,593,794,046	7,440,592,390	–2.0
Total Production-related Waste	**22,775,425,654**	**23,098,779,865**	**1.4**	**6,504,816,742**	**6,395,328,167**	**–1.7**	**29,280,242,396**	**29,494,108,032**	**0.7**
Non-Production-related Waste	26,311,489	305,727,127	1,062.0	1,613,324	506,658,122	31,304.6	27,924,813	812,385,249	2,809.2

Note: Data are from Section 8 of Form R for 1998 and 1999.

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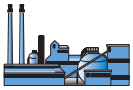


percent (2.38 billion pounds) consisted of quantities released on- and off-site.

For the new industries, production-related waste amounted to 6.40 billion pounds in 1999, a decrease of 1.7 percent from 1998. Of the 1999 total for new industries, 79.1 percent (5.06 billion pounds) was released on- and off-site.

The amount of production-related waste recycled on-site for all TRI industries decreased by 6.7 percent between 1998 and 1999, from 8.61 billion pounds to 8.04 billion pounds. The quantity recycled on-site by the original industries declined by 6.8 percent, but that group's 7.84 billion pounds still accounted for 97.5 percent of total on-site recycling in 1999. The new industries reported 198.5 million pounds of on-site recycling in 1999, 2.9 percent lower than in 1998. The original industries managed 33.9 percent of their production-related waste through on-site recycling; for the new industries, the share was 3.1 percent.

For off-site recycling, too, the original industries, with 2.13 billion pounds, accounted for the bulk of the 2.17 billion pounds for all TRI industries. The original industries' quantity of waste recycled off-site rose by 3.1 percent, and total off-site recycling by all TRI industries increased by 2.9 percent. The new industries recycled off-site 35.2 million pounds; the amount recycled declined by 5.8 percent between 1998 and 1999. Off-site recycling accounted for 9.2 percent of waste management by the original industries in 1999; for the new industries, the share was about 0.6 percent.

On-site energy recovery for the original industries and for all TRI industries declined slightly between 1998 and 1999, by 0.8 percent in each case. The amount sent to energy recovery by the original industries decreased from 2.83 billion pounds to 2.81 billion pounds. The new industries reported a 5.6 percent decline in on-site energy recovery, but the decrease (from 11.4 million pounds to 10.8 million pounds) had little effect on the TRI total. The original industries managed 12.1 percent of their production-related waste through on-site energy recovery. The new industries managed only about 0.2 percent of their waste by this method.

Off-site energy recovery for TRI industries as a whole fell from 900.7 million pounds in 1998 to 779.3 million pounds in 1999, a decrease of 13.5 percent. A 35.2 percent drop in off-site energy recovery by the new industries (from 413.1 million pounds to 267.7 million pounds) more than offset a 4.9 percent increase for the original industries, from 487.6 million pounds to 511.6 million pounds. The new industries accounted for 34.3 percent of the TRI total for off-site energy recovery, sharply down from the 1998 share, 45.9 percent. For both groups, off-site energy recovery accounted for a small proportion of waste managed—about 2 percent for the original industries and 4 percent for the new industries.

On-site treatment for all TRI industries rose by 16.2 percent, from 6.54 billion pounds to 7.60 billion pounds. Both the original and the new industries reported increases in this category, by 15.8 percent and 19.9 percent, respectively. For the original industries, the increase was from 5.91 billion pounds in 1998 to 6.85 billion pounds in 1999; for the new industries, it was from 629.2 million pounds to 754.3 million pounds. The original industries managed almost 30 percent of their production-relat-

ed waste through on-site treatment. For the new industries, the share was about 11.8 percent.

Off-site treatment declined across the board—by 5.7 percent for all TRI industries, by 3.5 percent for the original industries, and by 20.2 percent for the new industries. The quantity treated off-site for all TRI industries was 683.2 million pounds in 1998 and 644.3 million pounds in 1999. The share managed by this method was small: less than 3 percent for the original industries and about 1 percent for the new industries.

The largest waste management category for the new industries, and the only one for which the new industries reported a larger amount than did the original industries, was quantity released on- and off-site. The total quantity released on- and off-site for all TRI industries in 1999 was 7.44 billion pounds, a decline of 2.0 percent from the 1998 total of 7.59 billion pounds. The original industries reported 2.38 billion pounds released on- and off-site, a 3.7 percent decrease from 2.48 billion pounds in 1998. For the new industries, the 1999 amount was 5.06 billion pounds, down by 1.2 percent from 5.12 billion pounds in 1998. The new industries' on- and off-site releases constituted 68.0 percent of total on- and off-site releases for all TRI industries. As noted above, on- and off-site releases accounted for almost 80 percent of the new industries' production-related waste. The quantity released on- and off-site accounted for 10.3 percent of the original industries' total production-related waste. 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.

Transfers Off-site for Further Waste Management/Disposal

As shown in Table 2–3, transfers off-site for further waste management and disposal in 1999 totaled 4.10 billion pounds for all TRI industries, of which 3.64 billion pounds were reported by the original TRI industries and 464.9 million pounds by the new industries. The figure for the original industries was a 3.6 percent increase over the 3.51 billion pounds reported in 1998. The new industries' 1999 transfers were 28.2 percent lower than in 1998, when the amount was 647.7 million pounds.

Recycling accounted for 57.1 percent (2.08 billion pounds) of off-site transfers by the original industries in 1999, about the same share as in 1998. The amount sent for recycling rose from 2.01 billion pounds in 1998 to 2.08 billion pounds in 1999, an increase of 3.4 percent. That increase offset a 3.7 percent decrease in transfers to recycling by the new industries, and the TRI total rose 3.3 percent, from 2.04 billion pounds to 2.11 billion pounds.

In 1998 most of the new industries' transfers were to energy recovery (430.2 million pounds or 66.4 percent of all the group's transfers); in 1999, energy recovery accounted for 56.6 percent, and the amount had fallen to 263.1 million pounds, a decrease of 38.8 percent. Although transfers to energy recovery by the original industries rose 6.5 percent, from 483.2 million pounds to 514.4 million pounds, the drop in the new industries' transfers in this category meant a decline of 14.9 percent for all TRI industries, from 913.3 million pounds to 777.5 million pounds.

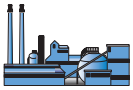


Table 2-3. TRI Off-site Transfers for Further Waste Management/Disposal, Original and New Industries, 1998–1999

Type of Transfer	Original Industries			New Industries			All TRI Industries		
	1998 Pounds	1999 Pounds	Change 1998–1999 Percent	1998 Pounds	1999 Pounds	Change 1998–1999 Percent	1998 Pounds	1999 Pounds	Change 1998–1999 Percent
Transfers to Recycling	2,007,189,584	2,075,254,609	3.4	37,769,396	36,366,325	–3.7	2,044,958,980	2,111,620,934	3.3
Transfers to Energy Recovery	483,159,533	514,397,272	6.5	430,181,326	263,137,159	–38.8	913,340,859	777,534,431	–14.9
Transfers to Treatment	252,642,579	240,886,196	–4.7	71,988,800	52,228,279	–27.4	324,631,379	293,114,475	–9.7
Transfers to POTWs	328,348,688	322,267,961	–1.9	2,047,567	2,096,322	2.4	330,396,255	324,364,283	–1.8
Metals and Metal Compounds	3,009,214	3,345,324	11.2	419,223	58,383	–86.1	3,428,437	3,403,707	–0.7
Non-metal TRI Chemicals	325,339,474	318,922,637	–2.0	1,628,344	2,037,939	25.2	326,967,818	320,960,576	–1.8
Other Off-site Transfers*	648,856	308,270	–52.5	10,320	553,773	5,266.0	659,176	862,043	30.8
Other Transfers Off-site to Disposal**	438,959,755	483,494,678	10.1	105,663,990	110,480,996	4.6	544,623,745	593,975,674	9.1
Total Transfers Off-site for Further Waste Management/Disposal	**3,510,948,995**	**3,636,608,986**	**3.6**	**647,661,399**	**464,862,854**	**–28.2**	**4,158,610,394**	**4,101,471,840**	**–1.4**

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

Transfers to treatment fell for both groups, by 4.7 percent for the original industries and by 27.4 percent for the new industries. The TRI total decreased from 324.6 million pounds to 293.1 million pounds, a decline of 9.7 percent. The new industries accounted for 17.8 percent (52.2 million pounds) of wastes sent to treatment by TRI industries, a decrease from 22.2 percent in 1998. Transfers to POTWs also fell for TRI industries as a whole, by 1.8 percent. The new industries reported a 2.4 percent increase in their relatively small quantity of transfers to POTWs, to 2.1 million pounds in 1999, but the larger transfers by the original industries declined by 1.9 percent, from 328.3 million pounds in 1998 to 322.3 million pounds in 1999. Within the category of new industry transfers to POTWs, transfers of metals and metal compounds dropped by 86.1 percent, and those of nonmetals rose by 25.2 percent. On the other hand, within the category of original industry transfers to POTWs, transfers of metals and metal compounds increased by 11.2 percent, and those of nonmetals decreased by 2.0 percent.

Other transfers off-site to disposal rose for both groups, from 439.0 million pounds to 483.5 million pounds for the original industries, an increase of 10.1 percent, and from 105.7 million pounds to 110.5 million pounds for the new industries (4.6 percent). The total for all TRI industries rose 9.1 percent, from 544.6 million pounds to 594.0 million pounds. The new industries accounted for 18.6 percent of other transfers to disposal, down from 19.4 percent in 1998.

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

As described in **Waste Management** in Chapter 1, on each Form R that it submits, a facility reports actual waste management quantities for the current and prior years and projected quantities for the next two years. TRI facilities (both original and new

industries) projected a reduction in total production-related waste to 29.01 billion pounds by 2001, from 29.49 billion pounds in 1999, a projected decrease of 1.7 percent (see Table 2–4). The original industries, however, expected their total to increase by 1.4 percent, from 23.10 billion pounds in 1999 to 23.42 billion pounds in 1999. The new industries expected their total production-related waste to decrease by 12.7 percent, from 6.40 billion pounds in 1999 to 5.58 billion pounds in 2001. The expected decreases would reduce the new industries' proportion of total production-related waste from 21.7 percent in 1999 to a projected 19.2 percent in 2001.

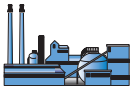
Quantities released on- and off-site are expected to decrease, for both original and new industries and for TRI industries as a whole. Releases on- and off-site represent the least-desirable option under the waste management hierarchy described in **Waste Management** in Chapter 1. The projected decrease of 11.6 percent in such releases—from 7.44 billion pounds in 1999 to 6.58 billion pounds in 2001 for all TRI industries—therefore represents a positive develop-

Table 2-4. Current Year and Projected Quantities of TRI Chemicals in Waste, Original and New Industries, 1999–2001

Waste Management Activity	Original Industries			New Industries		
	1999	2000	2001	1999	2000	2001
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Recycled On-site	7,839,852,848	7,813,877,076	8,488,898,837	198,496,815	193,850,040	193,458,146
Recycled Off-site	2,134,897,467	2,123,946,416	2,159,583,461	35,157,658	32,579,155	29,862,573
Energy Recovery On-site	2,806,098,993	2,798,226,054	2,901,923,158	10,762,603	5,234,611	5,252,671
Energy Recovery Off-site	511,631,406	490,326,952	508,060,464	267,664,335	222,350,235	224,605,934
Treated On-site	6,850,326,119	6,465,227,785	6,559,499,666	754,327,458	763,242,958	732,082,011
Treated Off-site	571,669,556	535,158,963	543,776,497	72,630,384	64,921,430	78,596,620
Quantity Released On- and Off-site	2,384,303,476	2,277,326,241	2,261,450,905	5,056,288,914	4,625,585,250	4,319,500,294
Total Production-related Waste	**23,098,779,865**	**22,504,089,487**	**23,423,192,988**	**6,395,328,167**	**5,907,763,679**	**5,583,358,249**

Waste Management Activity	All TRI Industries			Projected Change 1999–2001		
	1999	2000	2001	Original Industries	New Industries	All Industries
	Pounds	Pounds	Pounds	Percent	Percent	Percent
Recycled On-site	8,038,349,663	8,007,727,116	8,682,356,983	8.3	–2.5	8.0
Recycled Off-site	2,170,055,125	2,156,525,571	2,189,446,034	1.2	–15.1	0.9
Energy Recovery On-site	2,816,861,596	2,803,460,665	2,907,175,829	3.4	–51.2	3.2
Energy Recovery Off-site	779,295,741	712,677,187	732,666,398	–0.7	–16.1	–6.0
Treated On-site	7,604,653,577	7,228,470,743	7,291,581,677	–4.2	–2.9	–4.1
Treated Off-site	644,299,940	600,080,393	622,373,117	–4.9	8.2	–3.4
Quantity Released On- and Off-site	7,440,592,390	6,902,911,491	6,580,951,199	–5.2	–14.6	–11.6
Total Production-related Waste	**29,494,108,032**	**28,411,853,166**	**29,006,551,237**	**1.4**	**–12.7**	**–1.7**

Note: Current year (1999) and projected (2000 and 2001) amounts are from Section 8 of Form R for 1999.
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, were not included in tables in this report (except in federal facility tables). The effect of the revisions is to change treated off-site amounts for zinc compounds from 17,147,839 pounds to zero and lead compounds from 60,123 pounds to zero. The facility anticipated revising treated off-site for manganese compounds from 5,584,900 pounds to below 500 pounds.



ment in TRI facilities' waste management. For new industries the expected decrease would be 14.6 percent and for original industries 5.2 percent.

Economic Overview, by Industry

TRI data present significant information about toxic chemicals that are released on- and off-site, managed in waste on- and off-site, and transferred off-site for further waste management. TRI data do, however, have limitations, as discussed in Chapter 1. One limitation is that TRI data do not distinguish the industry-specific factors that influence the chemicals, amounts, types of releases, and other waste management, including transfers, reported by facilities. For the new TRI industries, the 1998 TRI Public Data Release (EPA 745-R-00-007, September 2000) supplied information about some of these factors, such as industry-specific processes that involve toxic chemicals. The 1996 TRI Public Data Release, in two volumes (EPA 745-R-98-005, May 1998, and EPA 745-R-98-018, December 1998), provided similar information for the original TRI industries.

Basic economic information provides another tool for identifying certain industry characteristics. Table 2–5 presents two economic measures—employment, and the dollar value of sales, receipts, shipments, or revenue—that suggest the relative size of the new industries. Economic analyses use data on the value of production (sales, receipts, shipments, or revenue) as one way of indicating the size of industrial sectors, in as much as no direct comparison can be drawn among the products and services of the sectors. The economic data in Table 2–5 are from the 1997 Economic Census, the latest consistent data available across all TRI industries, original and new.

Table 2–5 also provides total production-related waste managed, as reported by TRI facilities for 1999, to allow approximate comparisons with the economic activity of the industry sectors. The last column of the table shows the ratio of total production-related waste managed to production value (sales, receipts, shipments, or revenue). This ratio permits a comparison of the 1999 reported TRI quantities for each industry with that industry's production level for 1997. Relating TRI quantities to the dollar value of each industry's products provides one measure of the differences in waste production between different sectors independent of economic activity.

As shown in Table 2–5, metal mines reporting to TRI managed 395,774 pounds of total production-related waste for each $1 million of shipments. This was the largest ratio among the new TRI industries. Hazardous waste treatment and disposal and solvent recovery services (treated as a single category for the purpose of this analysis) managed 352,874 pounds of total production-related waste per $1 million of receipts, the second-highest ratio, and electrical utilities ranked third, with 34,174 pounds per $1 million.

Table 2-5. Employees and Sales (1997) and Total Production-related Waste (1999), by Industry

US SIC Code[a]	NAICS Code[a]	Industry Sector	Paid Employees, 1997	Sales, Receipts, Shipments or Revenue, 1997	TRI Total Production-related Waste Managed, 1999	Waste Managed per Sales, Receipts, Shipments or Revenue
			Number	($000)	Pounds	Pounds per $1,000,000
10		Metal Mining[b]	36,884	9,166,095	3,627,697,962	395,774
1021	212234	Copper Ores				
1031	212231	Lead and Zinc Ores				
1041	212221	Gold Ores				
1044	212222	Silver Ores				
1061		Ferroalloy Ores, exc. Vanadium (included in 109920)				
1099	109920	Misc. metal ores, n.e.c.				
12		Coal Mining[c]	87,793	23,377,137	12,153,738	520
1221	212111	Bituminous Coal and Lignite Surface Mining				
1222	212112	Bituminous Coal Underground Mining				
1231	212113	Anthracite Mining				
5169	4226	Chemical and Allied Products Wholesale	165,768	128,923,496	39,792,919	309
5171	42271	Petroleum Bulk Stations and Terminals[d]	137,829	267,625,942	48,715,577	182
	221112	Fossil Fuel Electric Power Generation	93,765	48,324,008	1,651,402,311	34,174
4911 (part)		Electric Services (electric power generation by fossil fuels)				
4931 (part)		Electric and Other Services Combined (electric power generation by fossil fuels)				
4939 (part)		Combination utilities n.e.c. (electric power generation by fossil fuels)				
4953 (part) 7389 (part)	562211	Hazardous Waste Treatment and Disposal and Solvent Recovery Services	17,816	2,877,982	1,015,565,660	352,874
20–39		Manufacturing Industries	17,633,977	3,964,788,992	23,037,403,159	5,810

Note: Paid Employees and Sales, Receipts, Shipments or Revenue from U.S. Census Bureau, 1997 Economic Census http://www.census.gov/epcd/www/econ97.html [accessed June 4, 2000]. These data are preliminary and are subject to change; includes only establishments with payroll. Data are in current dollars and have not been adjusted for inflation.
Total Production-related Waste Managed from Section 8 (total of 8.1 through 8.7, Column B) of TRI Form for 1999. **Total Production-related Waste Managed** in this table does not include forms reporting more than one 2-digit SIC code and forms reporting SIC codes outside the 20–39 range.
[a] 1997 Economic Census data were collected and published using the 1997 North American Industry Classification System (NAICS). Data presented here with the 1987 Standard Industrial Classification (SIC) Codes, used by TRI, follow the U.S. Census Bureau crosswalk between the two systems.
[b] Economic data for SIC code 10, metal mining, include activities not covered by TRI (processing or otherwise use of TRI chemical in mining overburden).
[c] Economic data for SIC code 12, coal mining, include extraction activities not covered by TRI.
[d] 1997 Economic Census data revised March 2000.