
Chapter 8



Toxics Release Inventory Data for Primary Metals (SIC Code 33)

A Look at the Primary Metal Industries (SIC Code 33)

The primary metal industries, Standard Industrial Classification (SIC) code 33, smelt and refine ferrous and nonferrous metals from ore, pig (crude iron cast in blocks or “pigs”), or scrap. This sector rolls, draws, and alloys metals, manufactures castings and other basic metal products, and makes nails, spikes, and insulated wire and cable. This group also includes coke production. Box 8-1 lists Standard Industrial Classification codes for the primary metals sector. In TRI, SIC codes are given as reported by the facilities; these may differ from information in economic and other data collections.

In 1996, primary metal industries shipped \$178.30 billion (in current dollars) in products and employed 687,400. Both measures represented a decrease from 1995, when the value of shipments was \$180.31 (in current dollars) billion and employment totaled 685,800. Overall, the sector lost 61% of its employment and 58% of its facilities from 1977 to 1992. From 1989 to 1991, production in primary metals (SIC code 33) fell more sharply (7.8%) than for U.S. manufacturing as a whole (2.8%). (See

Chapter 4, Table 4-10). In the following years, production levels rose in both the primary metal industries and U.S. manufacturing overall, although the primary metals sector has not been able to catch up with the overall improvement. The net increase in production for primary metals from 1989 to 1996 was 11.6%; for U.S. manufacturing as a whole, the increase was 17.6%.

Steel and aluminum are economically the most important products of this sector. Production of these and other metals varies strikingly with changing economic conditions, and also from one metal to another. SIC code designations also organize these industries differently. Steel production encompasses steel works, blast furnaces, and rolling and finishing mills (SIC code 331) and iron and steel foundries (SIC code 332). Steel mills in SIC code 331 may produce steel from iron ore or from iron and steel scrap. Production of nonferrous metals—copper, aluminum, and others such as zinc, lead, titanium, and more— involves primary smelting and refining (SIC code 333), secondary smelting and refining from scrap and waste (SIC code 334), rolling, drawing, and extruding (SIC code 335), and foundries (SIC code 336).

Steel

Steel mills (SIC code 331) shipped \$74.55 billion in products in 1996, employing 221,000. Iron and steel



Box 8-1. SIC Code 33, Primary Metal Industries: Codes and Classifications

SIC Code	Industry Description
331 Steel Works, Blast Furnaces, and Rolling and Finishing Mills	
3312 Steel Works, Blast Furnaces (Including Coke Ovens), and Rolling Mills	Manufacture of hot metal, pig iron, and silvery pig iron from iron ore and iron and steel scrap. Conversion of pig iron, scrap iron, and scrap steel into steel. Hot rolling of iron and steel into basic shapes, such as plates, sheets, strips, rods, bars and tubing.
3313 Electrometallurgical Products, Except Steel	Manufacture of ferro and nonferrous metal additive alloys by electro-metallurgical or metallothermic processes.
3315 Steel Wiredrawing and Steel Nails and Spikes	Drawing wire from purchased iron or steel rods, bars, or wire (may include further manufacture of products from wire). Manufacture of steel nails and spikes from purchased materials.
3316 Cold-Rolled Steel Sheet, Strip, and Bars	Cold-rolling of steel sheets and strip from purchase of hot-rolled sheets. Cold-drawing of steel bars and steel shapes from purchased hot-rolled steel bars. Production of other cold-finished steel.
3317 Steel Pipe and Tubes	Production of welded or seamless steel pipe and tubes and heavy riveted steel pipe from purchased materials.
332 Iron and Steel Foundries	
3321 Gray and Ductile Iron Foundries	Manufacture of gray and ductile iron castings, including cast iron pressure and soil pipes and fittings.
3322 Malleable Iron Foundries	Manufacture of malleable iron castings.
3324 Steel Investment Foundries	Manufacture of steel investment castings.
3325 Steel Foundries, nec*	Manufacture of miscellaneous steel castings.
333 Primary Smelting, Refining of Nonferrous Metals	
3331 Primary Smelting and Refining of Copper	Smelting copper from ore. Refining copper by electrolytic or other processes.
3334 Primary Production of Aluminum	Production of aluminum from alumina. Refining aluminum by any process.
3339 Primary Smelting and Refining of Nonferrous Metals, Except Copper and Aluminum	Smelting and refining nonferrous metals, except copper and aluminum.
334 Secondary Smelting, Refining of Nonferrous Metals	
3341 Secondary Smelting and Refining of Nonferrous Metals	Recovery of nonferrous metals and alloys from new and used scrap and dross. Production of alloys from purchased refined materials. Includes recovery and alloying of precious metals. Includes recovery of tin through secondary smelting and refining, as well.
335 Rolling, Drawing, Extruding of Nonferrous Metals	
3351 Rolling, Drawing, and Extruding of Copper	Rolling, drawing, and extruding copper, brass, bronze, and other copper base alloy basic shapes, such as plate, sheet, strip, bar, and tubing.
3353 Aluminum Sheet, Plate, and Foil	Flat rolling of aluminum and aluminum-base alloy basic shapes, such as sheet, plate, and foil, including production of welded tube. Includes production of similar products by continuous casting.
3354 Aluminum Extruded Products	Extruding aluminum and aluminum-base alloy basic shapes, such as rod and bar, pipe and tube, and tube blooms. Includes production of tube by drawing.
3355 Aluminum Rolling and Drawing, nec*	Rolling, drawing, and other operations resulting in production of aluminum ingot, including extrusion ingot, and miscellaneous aluminum and aluminum-base alloy basic shapes, such as rolled and continuous cast rod and bar.
3356 Rolling, Drawing, and Extruding of Nonferrous Metals, Except Copper and Aluminum	Rolling, drawing, and extruding nonferrous metals other than copper and aluminum.
3357 Drawing and Insulating of Nonferrous Wire	Drawing, drawing and insulating, and insulating wire and cable of nonferrous metals from purchased wire bars, rods, or wire. Includes manufacture of insulated fiber optic cable.

*nec: not elsewhere classified


Box 8-1. SIC Code 33, Primary Metal Industries: Codes and Classifications, Continued

SIC Code	Industry Description
336 Nonferrous Foundries	
3363 Aluminum Die-Castings	Manufacture of die-castings of aluminum (including alloys).
3364 Nonferrous Die-Castings, Except Aluminum	Manufacture of nonferrous metal die-castings, except aluminum.
3365 Aluminum Foundries	Manufacture of aluminum (including alloys) castings, except die-castings.
3366 Copper Foundries	Manufacture of copper (including alloys) castings, except die-castings.
3369 Nonferrous Foundries, Except Aluminum and Copper	Manufacture of nonferrous metal castings (including alloys), except all die-castings and other castings of aluminum or copper.
339 Miscellaneous Primary Metal Products	
3398 Metal Heat Treating	Heat treating of metal for the trade.
3399 Primary Metal Products, nec*	Manufacture of miscellaneous primary metal products, such as nonferrous nails, spikes, brads, and metal powder, flakes, and paste.

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

*nec: not elsewhere classified.

foundries (SIC code 332) recorded \$15.94 billion in shipments, with employment of 128,200. Steel production thus accounted for half the sector's total in both value of shipments and employment.

Demand for steel is increasing in parts of the developing world, especially Southeast Asia, and in South America, where growing demand is attributed to economic reform. In the developed world, demand for steel is relatively stable, although, as mature economies continue to grow, they tend to consume less steel. In countries of the former Soviet Union, demand for steel in 1996 was only 40% of its 1991 level. In the United States, steel consumption peaked in 1973, plummeted in the 1980s and has partly recovered in the 1990s. By 1996, U.S. steel consumption had reached a level 33% higher than in 1986.

The largest market for steel is motor vehicles, and world trade in that market affects domestic steel production: imported cars are not made with U.S. steel. Lighter materials continue to compete with steel for motor vehicle content, where they help automakers meet fuel efficiency standards and reduce costs, but steel content has in fact been increasing. Construction is the steel industry's second-largest market, and a growing one. According to an American Institute of Steel Construction survey, steel increased from 37% to 58% of commercial building construction in the

United States (measured by the square foot) from 1990 to 1995.

Important technological changes have occurred in the steel industry over the last two decades. The economic decline that hit the industry, shutting down mills and putting steelworkers out of their jobs, largely affected the older, integrated mills—those that produce steel from raw materials (coal, iron ore, as well as scrap steel). Minimills, which produce steel from scrap using electric arc furnaces, expanded during this period.

Recent technological change has focused on the minimills. In 1989, Nucor Corporation brought on line the first thin slab caster/flat rolling mill. This gave minimills the ability to produce low-cost flat-rolled steel, and minimills have since accounted for most of the U.S. added capacity in flat-rolled steel. (Flat-rolled steel represents nearly 60% of U.S. domestic steel shipments.) The minimills' need for quality scrap is expected to exceed supplies. This is one factor driving further technological change in the industry; another is the need to replace antiquated coke ovens, a major pollution source. Thus, further development in the industry now centers on extracting iron from iron ore without use of coke.



Table 8-1. Summary of TRI Information by 4-digit SIC Code, 1996: Primary Metals, SIC Code 33

Total On- and Off-site Releases Rank	Total Production-related Waste Rank	SIC Code	Industry	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds
3	2	3312	Blast Furnaces & Steel Mills	147	1,093	47	55,726,602	59,881,420	115,608,022
7	8	3313	Electrometallurgical Products	13	51	1	22,621,521	141,236	22,762,757
14	16	3315	Steel Wire & Related Products	78	224	24	1,818,968	1,117,464	2,936,432
11	11	3316	Cold Finishing of Steel Shapes	41	146	8	4,445,071	1,788,877	6,233,948
13	12	3317	Steel Pipe & Tubes	67	230	13	2,750,234	796,681	3,546,915
5	10	3321	Gray & Ductile Iron Foundries	193	740	76	22,733,315	11,158,050	33,891,365
24	27	3322	Malleable Iron Foundries	5	22	2	76,132	150,260	226,392
25	24	3324	Steel Investment Foundries	34	96	16	140,150	51,741	191,891
8	13	3325	Steel Foundries, nec*	102	383	39	6,836,197	9,248,779	16,084,976
4	7	3331	Primary Copper	6	48	0	39,081,603	1,418,270	40,499,873
10	9	3334	Primary Aluminum	19	93	14	9,192,498	1,125,887	10,318,385
1	3	3339	Primary Nonferrous Metals, nec*	25	96	6	134,839,282	4,250,840	139,090,122
6	4	3341	Secondary Nonferrous Metals	163	519	44	7,029,167	16,755,093	23,784,260
18	5	3351	Copper Rolling & Drawing	68	150	11	1,184,606	200,096	1,384,702
16	14	3353	Aluminum Sheet, Plate, & Foil	21	97	1	1,946,393	312,365	2,258,758
20	20	3354	Aluminum Extruded Products	59	173	12	1,032,570	79,187	1,111,757
26	28	3355	Aluminum Rolling & Drawing, nec*	2	4	0	69,633	0	69,633
15	19	3356	Nonferrous Rolling & Drawing, nec*	40	126	5	2,105,783	719,723	2,825,506
9	6	3357	Nonferrous Wiredrawing & Insulating	152	519	6	2,836,932	11,032,346	13,869,278
23	15	3363	Aluminum Die-castings	76	158	7	539,478	145,953	685,431
28	26	3364	Nonferrous Die-casting Exc. Aluminum	14	22	4	10,609	8,291	18,900
17	22	3365	Aluminum Foundries	42	98	10	461,684	1,015,373	1,477,057
21	18	3366	Copper Foundries	57	132	10	340,898	753,939	1,094,837
22	21	3369	Nonferrous Foundries, nec*	49	136	6	304,079	689,713	993,792
19	23	3398	Metal Heat Treating	112	161	26	855,677	405,056	1,260,733
12	17	3399	Primary Metal Products, nec*	96	260	21	2,269,788	1,334,337	3,604,125
2	1		Multiple within SIC 33	198	784	55	72,104,755	46,565,361	118,670,116
27	25		Invalid SIC Code within SIC 33	23	42	1	30,576	4,644	35,220
			Total for SIC Code 33	1,902	6,603	465	393,384,201	171,150,982	564,535,183

Note: On-site Releases from Section 5 of Form R. On-site Waste Management from Section 8 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Total Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Total Production-related Waste sums Section 8 (Current Year, Column B) of Form R, except: Non-production-related Waste (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 20 are assigned to the "multiple" category.

*nec: not elsewhere classified.

Traditional steelmaking begins with making coke and making iron. Coke ovens heat coal, in the absence of oxygen, at high temperatures, to produce coke, which will supply fuel and carbon in the next stage. Coke, iron ore, and limestone are heated in a blast furnace, to produce pig iron. Finally, molten iron from the blast furnace is combined with flux and scrap steel in a basic oxygen furnace, where high-purity oxygen is injected. With subsequent forming and finishing operations, this process constitutes fully integrated production. Minimills,

however, melt and refine scrap steel in an electric arc furnace, by passing electric current through the scrap. Both traditional mills and minimills produce molten steel, which is formed into ingots or slabs. These are rolled (with or without reheating, cleaning, and coating) into finished products.



Table 8-1. Summary of TRI Information by 4-digit SIC Code, 1996: Primary Metals, SIC Code 33, Continued

SIC Code	Industry	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-production-related Waste Pounds
3312	Blast Furnaces & Steel Mills	205,965,896	314,485,847	628,035,453	322,543
3313	Electrometallurgical Products	104,044,559	1,608,095	129,275,720	0
3315	Steel Wire & Related Products	13,358,482	13,899,744	29,749,282	36,200
3316	Cold Finishing of Steel Shapes	24,452,828	30,464,657	61,180,242	90,536
3317	Steel Pipe & Tubes	40,928,854	14,379,110	60,001,800	851
3321	Gray & Ductile Iron Foundries	20,842,781	8,021,377	62,253,862	48,057
3322	Malleable Iron Foundries	0	119,741	356,713	0
3324	Steel Investment Foundries	1,287,468	2,771,308	4,635,688	0
3325	Steel Foundries, nec*	24,056,101	5,237,799	46,717,710	21
3331	Primary Copper	63,441,113	51,468,853	154,109,859	704,205
3334	Primary Aluminum	80,086,665	2,733,344	93,154,004	32,371
3339	Primary Nonferrous Metals, nec*	400,129,325	3,133,791	542,169,117	8,729
3341	Secondary Nonferrous Metals	436,069,665	46,367,308	505,109,702	31,532
3351	Copper Rolling & Drawing	326,276,386	38,285,160	378,004,591	27
3353	Aluminum Sheet, Plate, & Foil	40,646,605	3,999,555	46,614,936	25
3354	Aluminum Extruded Products	9,924,938	3,681,182	14,901,594	0
3355	Aluminum Rolling & Drawing, nec*	29,000	24,945	123,618	0
3356	Nonferrous Rolling & Drawing, nec*	9,966,542	4,642,462	15,871,121	3,652
3357	Nonferrous Wiredrawing & Insulating	36,181,666	182,152,735	230,676,573	25,806
3363	Aluminum Die-castings	30,545,599	9,913,790	42,609,575	0
3364	Nonferrous Die-casting Exc. Aluminum	226,487	518,487	763,482	0
3365	Aluminum Foundries	5,831,280	1,838,784	10,053,782	0
3366	Copper Foundries	18,270,757	6,807,397	27,216,087	0
3369	Nonferrous Foundries, nec*	8,253,326	4,779,327	13,523,812	12
3398	Metal Heat Treating	2,739,203	818,364	5,114,086	1,087
3399	Primary Metal Products, nec*	21,871,641	4,028,179	29,729,019	12,764
	Multiple within SIC 33	842,007,107	118,645,496	1,050,163,029	14,070,685
	Invalid SIC Code within SIC 33	663,664	1,171,843	1,977,215	0
	Total for SIC Code 33	2,768,097,938	875,998,680	4,184,091,672	15,389,103

Note: On-site Releases from Section 5 of Form R. On-site Waste Management from Section 8 of Form R. Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Total Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R.

Total Production-related Waste sums Section 8 (Current Year, Column B) of Form R, except: Non-production-related Waste (remedial/catastrophic incidents). Facilities/forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.

Aluminum, Copper, Lead, Zinc, and Other Nonferrous Metals

Nonferrous rolling and drawing (SIC code 335)—that is, production of basic shapes (plate, sheet, strip, foil, etc.) of copper and aluminum—was the third largest industry group in SIC code 33. This industry group had \$48.82 billion in shipments in 1996 and employment of 162,300. Dissolution of the Soviet Union had an even greater impact on the aluminum industry than on steel, as Russian

demand collapsed but Russian production continued. By 1995, the aluminum industry in Russia and worldwide appeared to have absorbed and adjusted to these changes.

Primary smelting and refining of nonferrous metals (SIC code 333) had \$15.42 billion in value of shipments in 1996, employing 34,900. This SIC code includes copper (SIC code 3331), aluminum (SIC code 3334), and miscellaneous nonferrous metals (SIC code 3339). Miscellaneous primary



nonferrous metals production (SIC code 3339) includes lead and zinc. Although SIC code 333 represents a relatively small segment of the primary metals sector, TRI reporting in this group is significant, as seen in the analyses in this chapter.

Use of aluminum in auto manufacture is rising, and this use overtook containers and packaging in 1994 as aluminum's largest end-use. That was also the year that U.S. production of aluminum cans peaked, at 100 billion units. Virtually all beer and soda cans are now aluminum, and growth in the aluminum container business now depends on growth in beverage consumption. Cool summers were a limiting influence in 1995 and 1996. Copper use is also increasing in automobile manufacture, and it is important in airplane construction, but its primary use is in electrical wiring. The lead market is dominated by one major use: manufacture of lead-acid batteries. Such batteries accounted for 81% of U.S. lead consumption in 1992 and 86% in 1996. The second largest use is ammunition. Galvanizing accounts for more than half of zinc consumption; the automotive and construction industries represent large and growing markets for galvanized steel. Zinc is also used in alloys for die casting and in brass and bronze products.

Processes vary for aluminum, copper, and other metals such as zinc and lead, but metal refining and smelting operations commonly generate slag, sludge, and wastewater that bear pollutants, including metals and metal compounds.

Other Environmental Issues

Energy costs represent about one fifth of the cost of producing steel, and steelmaking may depend on coal, electricity, natural gas, or oil. Integrated producers (in contrast to minimills) depend on coal for 60% of their energy. Electricity represents one-third of the cost of smelting aluminum—and about half of that electricity comes from coal-fired power plants. Because metal production is energy-intensive, limitations on emissions under consideration in support of the United Nations

Framework Convention for Climate Change could have significant future impact on this sector. Another factor for steelmakers has been the Clean Air Act Amendments of 1990, requiring substantial reductions in coke oven emissions of carcinogens (effective in 1993).

Aluminum and steel are now widely recycled. Recycling accounts for more than one third (34.8%) of the U.S. aluminum supply, according to the Aluminum Association, Inc., and 62.8 billion aluminum cans were recycled in 1996. Steel is the material most recycled in the United States, with an overall recycling rate of 65.2%, according to the Steel Recycling Institute. Not only cans—aluminum and steel—but also steel from automobiles, appliances, and construction products is recycled. Minimills described above depend on such scrap for raw material.

1996 TRI Data for Primary Metals

Table 8-1 summarizes TRI data for primary metals production (SIC code 33) by four-digit SIC code, for 1996. The sector submitted 6,603 TRI forms for the year. Seven percent of these were Form A certification statements, certifying that a chemical's annual reportable amount was less than 500 pounds for the year and that the facility did not manufacture, process, or otherwise use more than 1 million pounds. This is a lower percentage of Form A certification statement submissions than in TRI overall (10.1% of all TRI forms). (The Form A certification statement is explained in Chapter 1.) Blast furnaces and steel mills (SIC code 3312) submitted the largest number of forms, 1,093. The second largest number was for forms with more than one SIC code within SIC code 33, the "multiple-codes" category, explained below, with 784. Gray and ductile iron foundries (SIC code 3321) were third with 740.



Table 8-2. Multiple SIC Codes, 1996: Primary Metals, SIC Code 33

SIC Codes	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3312 3316	2	0	208,000	250	208,250	0	0	208,000	0
3312 3317 3325	67	7	1,576,445	10,001	1,586,446	6,615,064	680,305	9,524,603	0
3312 3398	6	1	94	0	94	55,770	22,785	78,881	0
3313 3341	1	0	0	0	0	198,100	0	198,100	0
3315 3398	27	0	7,569,264	4,046,643	11,615,907	9,247,284	10,021,121	30,714,128	1,423,000
3321 3322 3365	4	0	113,108	0	113,108	86,000	480	199,610	0
3321 3365	4	0	44,965	668	45,633	0	41,819	87,603	0
3324 3365 3366	1	0	0	34,500	34,500	9,505	0	44,005	0
3324 3369	84	7	19,006,666	5,405,824	24,412,490	14,975,250	11,920,298	51,230,368	2,020,890
3331 3351	78	5	5,648,284	2,566,775	8,215,059	4,985,475	7,478,086	20,667,029	394,011
3334 3341	76	3	17,365,498	33,153,259	50,518,757	13,700,289	39,830,592	88,486,538	10,202,698
3334 3355	158	14	10,417,316	549,476	10,966,792	239,829,255	40,078,491	277,147,110	27,362
3339 3341	1	0	130	6,700	6,830	0	4,000	10,500	260
3339 3351	3	0	483,358	1,410	484,768	232,200	69,437	734,226	0
3339 3356	195	10	7,863,405	787,643	8,651,048	48,823,168	7,467,265	64,762,389	1,672
3341 3351 3366	5	0	257,031	0	257,031	0	94,633	343,264	0
3341 3351 3398	3	0	194,620	0	194,620	465,400	16,070	672,520	0
3341 3353	1	0	297,000	0	297,000	3,900,014	6,800	4,204,914	0
3341 3355	9	0	424,998	0	424,998	7,480,000	567,475	8,476,124	0
3341 3356 3399	1	0	660	0	660	0	0	660	0
3341 3363 3365 3398	1	0	255	0	255	0	0	27	0
3341 3369	10	1	1,791	746	2,537	41,860	277,040	320,495	0
3341 3398	17	2	328,694	0	328,694	489,186,772	1,402	489,506,136	792
3341 3399	2	1	7,352	0	7,352	5,200	94	12,646	0
3351 3356	3	0	223,079	0	223,079	0	12,580	235,659	0
3351 3357	1	2	0	72,093	0	72,093	2,170,109	45,501	2,285,9320
3365 3366	1	0	392	0	392	392	17	818	0
3365 3369	12	4	257	1,466	1,723	0	9,205	10,744	0
Total for SIC Code 33	784	55	72,104,755	46,565,361	118,670,116	842,007,107	118,645,496	1,050,163,029	14,070,685

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

Miscellaneous primary nonferrous metals (SIC code 3339) had the largest total on- and off-site releases in SIC code 33, with 139.1 million pounds. It also had the largest on-site releases (134.8 million pounds). This industry smelts and refines nonferrous metals other than copper and aluminum; its products include lead and zinc. Blast furnaces and steel mills (SIC code 3312) had the largest off-site releases (59.9 million pounds) and the largest off-site waste management (314.5 million pounds transferred off-site for further waste management). This industry was second or third in other categories given in Table 8-1.

Multiple Codes within SIC Code 33

Forms with more than one four-digit SIC code within SIC code 33 represent a significant segment

of primary metals reporting in TRI. Many primary metals facilities conduct related, but distinct, operations, that are classified separately in the Standard Industrial Classification system. For example, steel mills (SIC code 3312) may also manufacture steel pipe (SIC code 3317). Smelters of some nonferrous metals may engage in both primary smelting (producing the metal from ore or other raw materials) and secondary smelting (producing the metal from scrap and dross). These activities have separate SIC codes (for example, SIC code 3334 and SIC code 3341 for aluminum). Refiners and smelters may also further process the metal they produce. A primary lead smelter (SIC code 3339), for example, may also produce lead in basic shapes, such as bars, pipes, plates, rods, sheets, and others (SIC code 3356). Such facilities report on each TRI form all the SIC codes that describe the operations associated with releases and



Table 8-3. TRI On-site and Off-site Releases, 1996: Primary Metals, SIC Code 33 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- & Off-site Releases Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds			
3339	Primary Nonferrous Metals, nec*	71,751,734	42,739	0	0	0	63,044,809	134,839,282	4,250,840	139,090,122
	Multiple within SIC 33	16,889,530	5,950,092	0	0	12,550,133	36,715,000	72,104,755	46,565,361	118,670,116
3312	Blast Furnaces & Steel Mills	12,702,728	20,561,293	613,200	0	8,845,161	13,004,220	55,726,602	59,881,420	115,608,022
3331	Primary Copper	2,620,634	5,000	251,535	0	0	36,204,434	39,081,603	1,418,270	40,499,873
3321	Gray & Ductile Iron Foundries	6,034,095	27,971	0	0	75,497	16,595,752	22,733,315	11,158,050	33,891,365
3341	Secondary Nonferrous Metals	2,574,542	119,311	65,672	0	92,774	4,176,868	7,029,167	16,755,093	23,784,260
3313	Electrometallurgical Products	5,517,982	1,040,031	0	0	0	16,063,508	22,621,521	141,236	22,762,757
3325	Steel Foundries, nec*	1,542,091	6,143	0	0	2,652	5,285,311	6,836,197	9,248,779	16,084,976
3357	Nonferrous Wiredrawing & Insulating	2,811,181	2,680	0	0	0	23,071	2,836,932	11,032,346	13,869,278
3334	Primary Aluminum	9,172,654	7,379	0	0	9,205	3,260	9,192,498	1,125,887	10,318,385
3316	Cold Finishing of Steel Shapes	440,045	3,686,484	250	0	305,800	12,492	4,445,071	1,788,877	6,233,948
3399	Primary Metal Products, nec*	1,786,500	9,962	4	0	3,904	469,418	2,269,788	1,334,337	3,604,125
3317	Steel Pipe & Tubes	2,566,973	133,602	0	0	6,964	42,695	2,750,234	796,681	3,546,915
3315	Steel Wire & Related Products	1,695,031	12,478	0	0	83,104	28,355	1,818,968	1,117,464	2,936,432
3356	Nonferrous Rolling & Drawing, nec*	406,935	48,433	113	0	0	1,650,302	2,105,783	719,723	2,825,506
3353	Aluminum Sheet, Plate, & Foil	1,900,396	43,497	0	0	0	2,500	1,946,393	312,365	2,258,758
3365	Aluminum Foundries	436,581	528	0	0	0	24,575	461,684	1,015,373	1,477,057
3351	Copper Rolling & Drawing	694,187	260,324	0	0	92,762	137,333	1,184,606	200,096	1,384,702
3398	Metal Heat Treating	855,640	37	0	0	0	0	855,677	405,056	1,260,733
3354	Aluminum Extruded Products	1,017,031	15,530	5	0	0	4	1,032,570	79,187	1,111,757
3366	Copper Foundries	197,923	1,797	0	0	122,073	19,105	340,898	753,939	1,094,837
3369	Nonferrous Foundries, nec*	263,825	292	0	0	2,000	37,962	304,079	689,713	993,792
3363	Aluminum Die-castings	534,584	61	0	0	0	4,833	539,478	145,953	685,431
3322	Malleable Iron Foundries	40,240	11,770	0	0	0	24,122	76,132	150,260	226,392
3324	Steel Investment Foundries	118,499	836	0	0	0	20,815	140,150	51,741	191,891
3355	Aluminum Rolling & Drawing, nec*	69,633	0	0	0	0	0	69,633	0	69,633
	Invalid SIC Code within SIC 33	29,151	573	0	0	0	852	30,576	4,644	35,220
3364	Nonferrous Die-casting Exc. Aluminum	10,519	0	0	0	0	90	10,609	8,291	18,900
Total for SIC Code 33		144,680,864	31,988,843	930,779	0	22,192,029	193,591,686	393,384,201	171,150,982	564,535,183

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

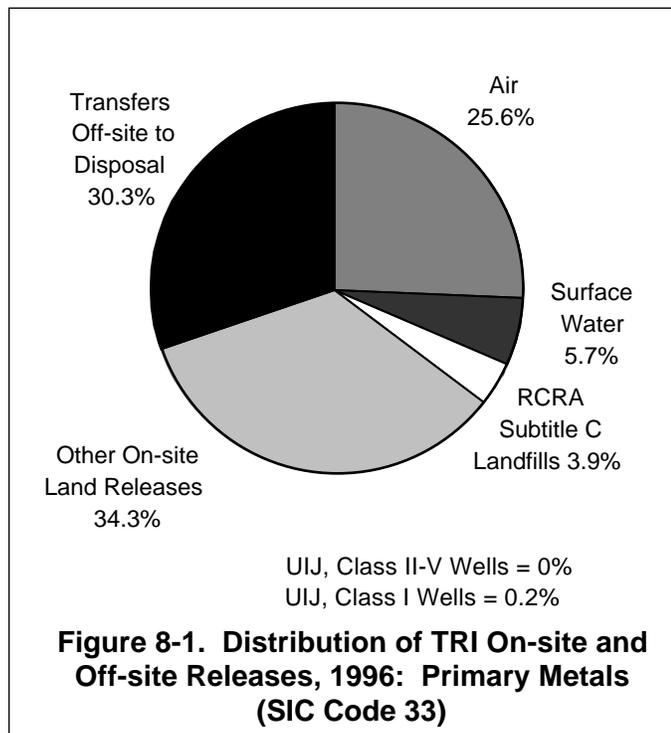
*nec: not elsewhere classified.

other waste management of the reported chemical. These are the forms in the "multiple codes" category in this report. (Box 4-2 in Chapter 4 further explains reporting of multiple SIC codes and its affect on the analyses presented in the TRI data release.)

Reporting on forms with multiple SIC codes within the sector is further examined in Table 8-2. Secondary smelters and refiners of nonferrous metals (SIC code 3341) appear most often (in 12 of the 28 combinations). Secondary smelting generally recovers metals and alloys from scrap. This activity may combine with primary smelting and refining (SIC code 333), with further processing of the metal (rolling, drawing,

extruding, in SIC code 335), die-casting (SIC code 336), or miscellaneous products (SIC code 339).

Forms with multiple SIC codes had the largest on-site waste management (842.0 million pounds) and the largest total production-related waste (1.05 billion pounds). Forms with multiple SIC codes also had the second or third largest amounts in the other categories (on- and off-site releases and transfers off-site for further waste management). As shown in Table 8-2, the multiple-code combination with the largest total on- and off-site releases was primary production of aluminum (SIC code 3334) with secondary smelting and refining of nonferrous metals (SIC code 3341). This combination had total



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

on-and-off-site releases of 50.5 million pounds. The combination of secondary nonferrous metal producers (SIC code 3341) and metal heat treating (SIC code 3398) accounted for 489.2 million pounds of other on-site waste management and 489.5 million pounds of total production-related waste.

On- and Off-site Releases

Table 8-3 shows on- and off-site releases for primary metal industries for 1996, and Figure 8-1 gives the distribution by media of these releases. On-site land releases were the largest category, with 22.2 million pounds released to RCRA subtitle C landfills and 193.6 million pounds in other on-site land releases. Together, they represented 38.2% of all on- and off-site releases in the sector. Off-site releases (transfers off-site to disposal) were the next largest release, with 171.2 million pounds, or 30.3%. Air emissions were 144.7 million pounds, or 25.6%, and surface water discharges were 32.0 million pounds, or 5.7%. Little underground

injection was reported, 931,000 pounds (0.2%), all of it to Class I wells.

Miscellaneous primary nonferrous metals (SIC code 3339) reported the largest total for on- and off-site releases, 139.1 million pounds. Forms with multiple codes in SIC code 33 reported 118.7 million pounds, followed by blast furnaces and steel mills (SIC code 3312) with 115.6 million pounds. These three groups accounted for two-thirds (66.1%) of the sector's reported releases.

Producers of miscellaneous primary nonferrous metals reported half (49.6%, or 71.8 million pounds) of the sector's air emissions and one third (32.6%, or 63.0 million pounds) of the other on-site land releases. The multiple-codes group reported the largest RCRA landfill releases (12.6 million pounds, or 56.6% of the total). Blast furnaces and steel mills reported the largest amounts in surface water discharges (20.6 million pounds, or 64.3% of that release type), underground injection (613,000 pounds, or 65.9%), and off-site releases (59.9 million pounds, or 35.0%).

Figure 8-2 illustrates the distribution of on- and off-site releases for the primary metal industries with the largest releases.

Other On-site Waste Management

Recycling was the largest on-site waste management method reported in the primary metals sector, with 2.09 billion pounds recycled out of 2.77 billion pounds managed on-site. Recycling was 75.6% of total on-site waste management. On-site treatment was second with 625.8 million pounds, or 22.6%. Very little energy recovery was reported (49.8 million pounds, or 1.8%), and none of this on-site energy recovery was reported for metals or metal compounds. Metals are not combustible and do not contribute any heat value for energy recovery purposes. Table 8-4 and Figure 8-3 present these data.

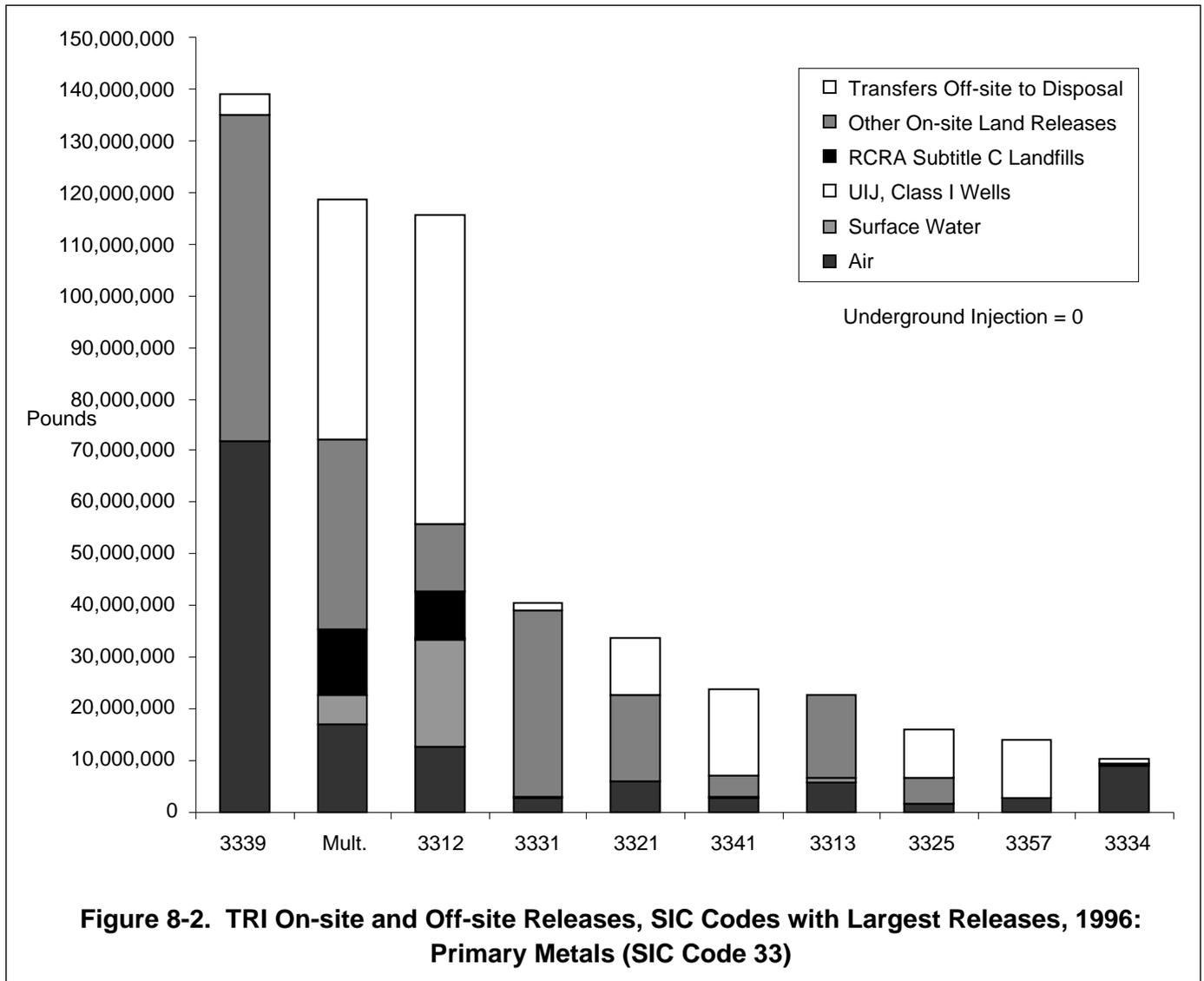


Figure 8-2. TRI On-site and Off-site Releases, SIC Codes with Largest Releases, 1996: Primary Metals (SIC Code 33)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the “multiple” category. UIJ: underground injection.

Multiple-codes submissions reported the largest total on-site waste management, with 842.0 million pounds, as also shown in Table 8-4. Of this amount, 778.5 million pounds was recycled on-site. Forms with multiple codes in SIC code 33 accounted for 37.2% of on-site recycling and 30.4% of total on-site waste management in the sector. Primary nonferrous metals facilities (SIC code 3339) had the largest on-site treatment, 240.1 million pounds, or 38.4%. Secondary refining of nonferrous metals (SIC code 3341) was second for total on-site waste management, although it did not

lead any category. Its total was 436.1 million pounds, or 15.8% of all on-site waste management.

Figure 8-4 illustrates the on-site waste management of the primary metal industries with the largest totals.

Transfers Off-site for Further Waste Management

With 277.4 million pounds transferred off-site to recycling, blast furnaces and steel mills reported the



Table 8-4. TRI Other On-site Waste Management, 1996: Primary Metals, SIC Code 33 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total On-site Waste Management Pounds
	Multiple within SIC 33	778,473,601	17,623,145	45,910,361	842,007,107
3341	Secondary Nonferrous Metals	327,093,466	0	108,976,199	436,069,665
3339	Primary Nonferrous Metals, nec*	160,036,537	0	240,092,788	400,129,325
3351	Copper Rolling & Drawing	325,935,091	0	341,295	326,276,386
3312	Blast Furnaces & Steel Mills	83,413,823	3,804,673	118,747,400	205,965,896
3313	Electrometallurgical Products	103,881,994	0	162,565	104,044,559
3334	Primary Aluminum	64,706,648	7,778,770	7,601,247	80,086,665
3331	Primary Copper	63,440,113	0	1,000	63,441,113
3317	Steel Pipe & Tubes	35,725,268	443,607	4,759,979	40,928,854
3353	Aluminum Sheet, Plate, & Foil	6,237,233	15,460,330	18,949,042	40,646,605
3357	Nonferrous Wiredrawing & Insulating	13,392,150	4,657,935	18,131,581	36,181,666
3363	Aluminum Die-castings	30,440,128	0	105,471	30,545,599
3316	Cold Finishing of Steel Shapes	701,000	0	23,751,828	24,452,828
3325	Steel Foundries, nec*	23,976,223	0	79,878	24,056,101
3399	Primary Metal Products, nec*	10,076,103	0	11,795,538	21,871,641
3321	Gray & Ductile Iron Foundries	19,844,260	0	998,521	20,842,781
3366	Copper Foundries	18,270,757	0	0	18,270,757
3315	Steel Wire & Related Products	5,368,115	0	7,990,367	13,358,482
3356	Nonferrous Rolling & Drawing, nec*	2,415,801	0	7,550,741	9,966,542
3354	Aluminum Extruded Products	3,675,762	0	6,249,176	9,924,938
3369	Nonferrous Foundries, nec*	7,779,646	0	473,680	8,253,326
3365	Aluminum Foundries	5,306,555	0	524,725	5,831,280
3398	Metal Heat Treating	143,912	0	2,595,291	2,739,203
3324	Steel Investment Foundries	1,261,033	0	26,435	1,287,468
	Invalid SIC Code within SIC 33	663,664	0	0	663,664
3364	Nonferrous Die-casting Exc. Aluminum	226,469	0	18	226,487
3355	Aluminum Rolling & Drawing, nec*	0	0	29,000	29,000
3322	Malleable Iron Foundries	0	0	0	0
	Total for SIC Code 33	2,092,485,352	49,768,460	625,844,126	2,768,097,938

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the “multiple” category.

*nec: not elsewhere classified

largest total transfers off-site for further waste management. This industry’s total was 314.5 million pounds, or 35.9% of the sector’s total of 876.0 million pounds. Table 8-5 and Figure 8-5 provide data for off-site transfers for further waste management in the primary metals sector.

Transfers to treatment was 66.2 million pounds; two-thirds of this (43.7 million pounds, or 66.1%)

consisted of solidification/stabilization of metals and metal compounds, which prepares them for disposal. Therefore, ultimately, this 43.7 million pounds is released. Zinc compounds accounted for the largest portion of this amount, 24.9 million pounds in solidification/stabilization.

Reporting in other categories of transfers off-site for further waste management was small: transfers

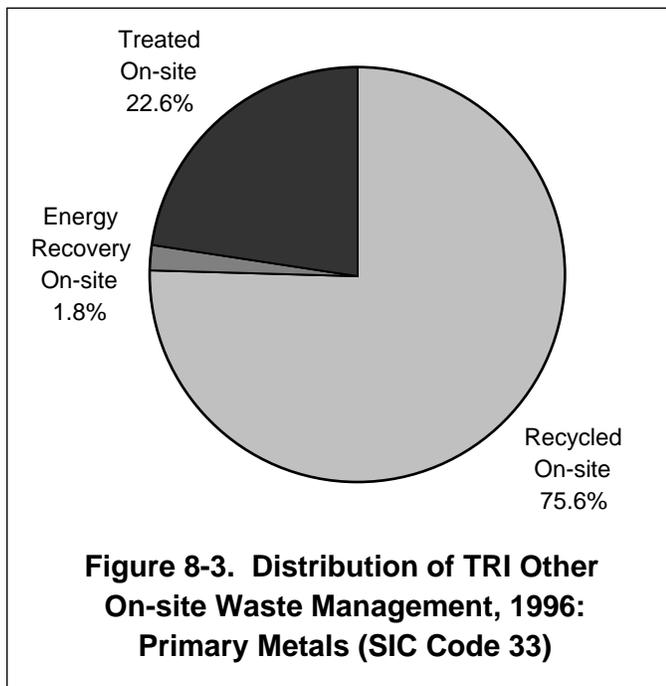


Figure 8-3. Distribution of TRI Other On-site Waste Management, 1996: Primary Metals (SIC Code 33)

Note: Data from Section 8 of Form R.

to POTWs was 7.9 million pounds, and transfers to energy recovery was 5.6 million pounds. Because metals do not degrade, treatment processes at POTWs and other off-site treatment facilities may remove them from wastes, with other solids, but cannot destroy them. In addition, metals and metal compounds were also 0.2% of the 5.6 million pounds of chemicals reported as transferred off-site to energy recovery; however, these amounts represent misreporting because metals do not burn or contribute heat value to energy recovery.

Figure 8-6 shows off-site transfers for further waste management for the four-digit SIC codes reporting the largest totals in this category in the primary metals sector.

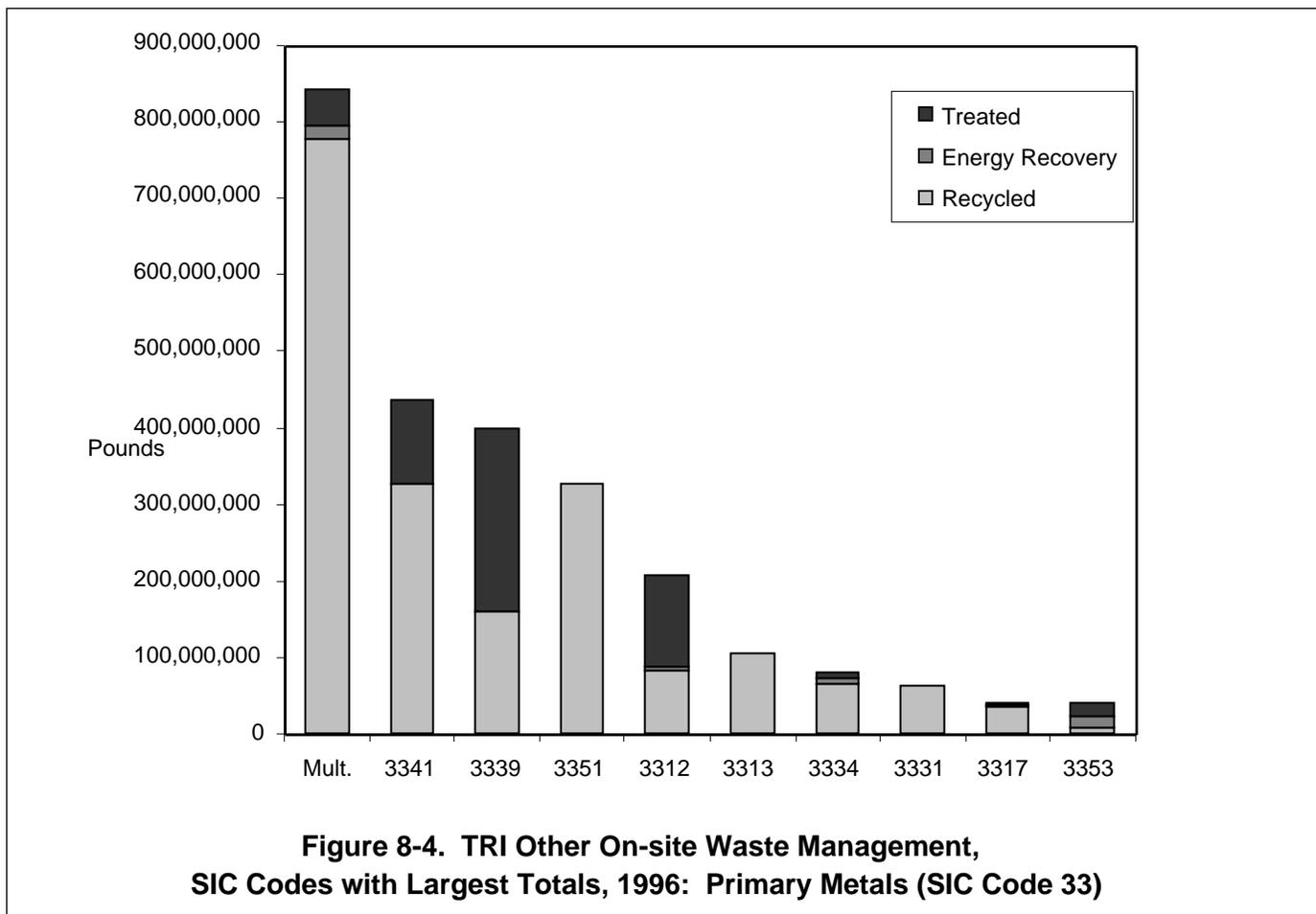


Figure 8-4. TRI Other On-site Waste Management, SIC Codes with Largest Totals, 1996: Primary Metals (SIC Code 33)

Note: Other On-site Waste Management from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.



Table 8-5. TRI Transfers Off-site for Further Waste Management, 1996: Primary Metals, SIC Code 33 (in Rank Order)

SIC Code	Industry	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Off-site Transfers for Further Waste Management Pounds
3312	Blast Furnaces & Steel Mills	277,425,228	64,427	35,944,491	791,030	260,671	314,485,847
3357	Nonferrous Wiredrawing & Insulating	179,482,543	2,205,343	418,298	46,301	250	182,152,735
	Multiple within SIC 33	105,199,906	1,245,825	8,925,774	3,273,991	0	118,645,496
3331	Primary Copper	44,592,387	0	6,876,151	315	0	51,468,853
3341	Secondary Nonferrous Metals	43,623,015	8,730	2,706,320	28,743	500	46,367,308
3351	Copper Rolling & Drawing	37,886,932	0	322,111	76,117	0	38,285,160
3316	Cold Finishing of Steel Shapes	25,205,106	0	4,257,351	1,002,200	0	30,464,657
3317	Steel Pipe & Tubes	11,952,200	55,792	2,264,835	106,278	5	14,379,110
3315	Steel Wire & Related Products	10,491,278	1,446	2,232,540	1,174,480	0	13,899,744
3363	Aluminum Die-castings	9,822,808	59,082	9,667	22,233	0	9,913,790
3321	Gray & Ductile Iron Foundries	7,251,847	181,282	465,423	120,801	2,024	8,021,377
3366	Copper Foundries	6,734,132	14,529	57,907	829	0	6,807,397
3325	Steel Foundries, nec*	4,832,058	1,323	403,371	1,047	0	5,237,799
3369	Nonferrous Foundries, nec*	4,643,623	0	127,788	7,916	0	4,779,327
3356	Nonferrous Rolling & Drawing, nec*	3,975,533	4,930	338,881	323,113	5	4,642,462
3399	Primary Metal Products, nec*	3,455,076	5,810	49,182	518,111	0	4,028,179
3353	Aluminum Sheet, Plate, & Foil	3,699,616	241,933	57,686	320	0	3,999,555
3354	Aluminum Extruded Products	2,010,038	1,495,394	162,900	12,850	0	3,681,182
3339	Primary Nonferrous Metals, nec*	3,097,640	0	34,045	1,856	250	3,133,791
3324	Steel Investment Foundries	2,705,889	491	63,670	1,258	0	2,771,308
3334	Primary Aluminum	2,692,028	500	40,816	0	0	2,733,344
3365	Aluminum Foundries	1,828,192	0	255	10,337	0	1,838,784
3313	Electrometallurgical Products	1,290,494	0	316,321	1,280	0	1,608,095
	Invalid SIC Code within SIC 33	1,167,982	3,600	0	261	0	1,171,843
3398	Metal Heat Treating	395,923	28,145	58,211	336,085	0	818,364
3364	Nonferrous Die-casting Exc. Aluminum	508,267	0	9,920	300	0	518,487
3322	Malleable Iron Foundries	108,867	57	9,812	1,005	0	119,741
3355	Aluminum Rolling & Drawing, nec*	0	24,945	0	0	0	24,945
	Total for SIC Code 33	796,078,608	5,643,584	66,153,726	7,859,057	263,705	875,998,680

Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.

1996 TRI Data by State for Primary Metals

What most influences the location of primary metal production is the location of the metal (in ore or other natural forms). Other factors are power, transportation, and water. Steel mills, for example, congregated along or near the Great Lakes, to obtain iron ore from Michigan while transporting coal (for coke) by rail from Pennsylvania and neighboring states. Primary aluminum production is concentrated in the Pacific Northwest, largely fueled by Bonneville Power Administration

hydropower; production of aluminum sheet, plate, and foil occurs principally in the Midwest. Copper mines in Arizona and other western states (Nevada, Utah) account for the location of primary copper production facilities there as well.

Metal mining and manufacture is more highly concentrated, corporately and geographically, than many other business sectors in the United States. For example, four U.S. companies dominate the U.S. aluminum industry along with one Canadian firm. Lead offers another example: deposits in Alaska, Idaho, Missouri, and Montana account for most U.S. lead mining; there are a total of 18 U.S. mines. Primary lead refineries—there are three—

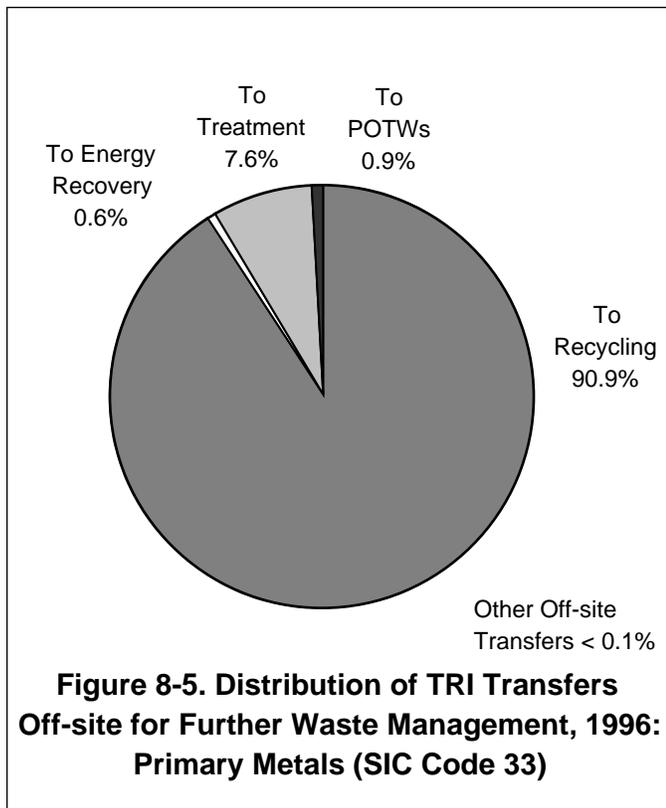


Figure 8-5. Distribution of TRI Transfers Off-site for Further Waste Management, 1996: Primary Metals (SIC Code 33)

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

are located in Missouri and Montana. Twelve states host 18 secondary smelting and refining facilities. Zinc production shows even more narrow concentration—15 mines produce 95% of the zinc, refined in three facilities (one each in Illinois, Tennessee, and Pennsylvania), with seven secondary smelters recovering zinc from waste and scrap.

This concentration is reflected in TRI reporting, where a single state may account for one-fifth to one-quarter of the sector’s national total in any one category. Table 8-6 provides TRI data by state for the primary metal industries.

Utah reported the largest total on- and off-site releases in 1996, 79.5 million pounds, or 14.1% of the U.S. total. Pennsylvania was second with 69.2 million pounds (12.3%). In Utah, most of this total was on-site releases (78.7 million pounds, 20.0% of all on-site releases in the sector), making Utah the state with the largest on-site releases. In

Pennsylvania, most of the releases were off-site (42.4 million pounds in transfers to disposal, or 24.8%), and Pennsylvania was the state with the largest amount in this release type. Map 8-1 illustrates the geographic distribution of total on- and off-site releases in this sector.

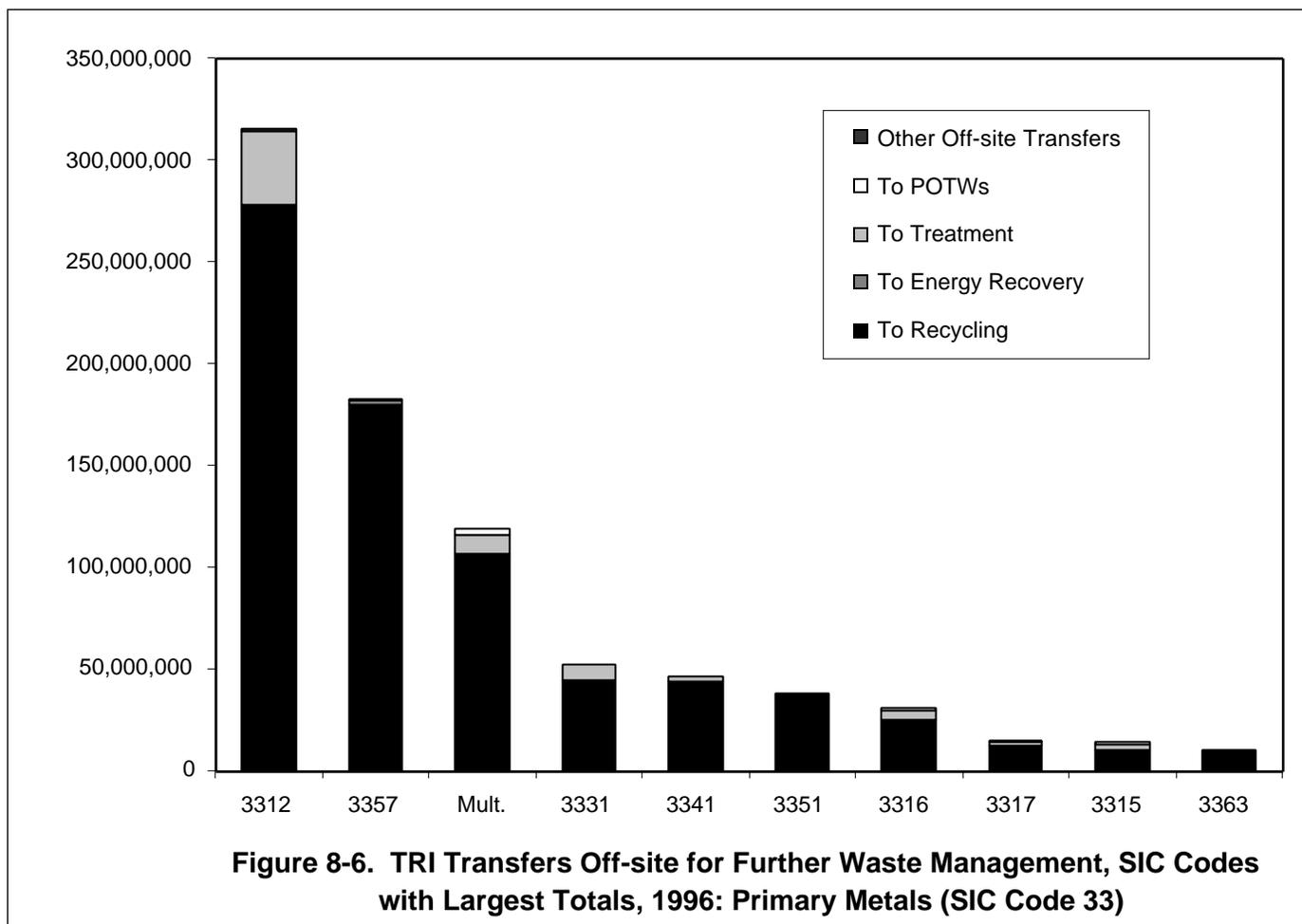
The largest quantities of on-site waste management and of total production-related waste were reported in Arizona. On-site waste management in Arizona was 604.8 million pounds, or 21.8% of that total; the state’s production-related waste totaled 716.8 million pounds, or 17.1%. Pennsylvania was second in both categories, with 310.7 million pounds of other on-site waste management (11.2%) and 472.9 million pounds of total production-related waste (11.3%). Indiana led total transfers off-site for further waste management with 104.1 million pounds (11.9%), followed by Texas with 99.1 million pounds (11.3%).

For on-site releases, off-site releases, other on-site waste management, and total production-related waste, amounts reported in the leading state were 43% to 95% higher than in the state that ranked second.

1996 TRI Data by Chemical for Primary Metals

As might well be expected, many chemicals that primary metal industries released on- and off-site in the largest amounts in 1996 were metals or metal compounds. (See explanation in Chapter 2 of TRI reporting of the metal component of compounds.) Ten of the top 15 chemicals in the sector, presented in Table 8-7, were metals or their compounds.

Zinc compounds had by far the largest total releases, 174.9 million pounds. Another 9.4 million pounds of releases of the metal zinc were also



Note: Off-site Transfers for Further Waste Management from Section 6 (excluding off-site transfers to disposal) of Form R. Other Off-site Transfers are transfers reported without a valid waste management code. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the “multiple” code category.

reported, 13th among TRI chemicals reported in this sector (only fume and dust forms of the metal zinc are reportable to TRI). Together, they represented 32.6% of all releases reported in the primary metals sector. Zinc is most commonly used as a protective coating for other metals. Zinc ammonium chloride and zinc fluoride are both used in galvanizing. Much of the scrap steel processed by secondary smelters is galvanized—a large source of releases of zinc compounds.

Second-ranked chlorine is used to “de-tin” and “de-zinc” iron. It is also a purifying agent in, for example, magnesium processing. Chlorine alone represented 41.3% (59.8 million pounds) of air emissions in the primary metals sector; almost all of this (59.2 million pounds) was reported by one

facility, the Magnesium Corporation of America, in Rowley, Utah. (As described later in this chapter, in the section on **Facilities with Large Increases and Decreases in Releases, 1988-1996.**)

Other chemicals with more than 10 million pounds of air emissions were ammonia (18.1 million pounds, 12.5% of all air emissions) and hydrochloric acid (10.9 million pounds, or 7.5%). Metals and metal compounds represented a smaller portion of air releases, but were still significant, including more than 1 million pounds each of copper (4.7 million pounds), zinc compounds (4.2 million pounds), copper compounds (1.5 million pounds), manganese compounds (1.3 million pounds), and aluminum, fume or dust (1.1 million pounds).



Table 8-6. Summary of TRI Information by State, 1996: Primary Metals, SIC Code 33

State	Total Facilities Number	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
Alabama	57	256	21	9,884,138	10,226,857	20,110,995	144,018,429	21,324,410	178,488,243	148
Arizona	20	82	12	42,828,276	59,111	42,887,387	604,763,405	69,121,937	716,810,564	531
Arkansas	34	98	7	2,928,922	99,062	3,027,984	98,346,120	31,692,953	124,623,924	78
California	96	229	14	1,387,773	5,034,316	6,422,089	17,710,853	12,699,264	36,423,673	9,240
Colorado	7	23	0	188,167	49,417	237,584	531,895	6,690,949	7,401,320	0
Connecticut	48	137	13	616,494	219,383	835,877	36,176,182	7,633,359	45,025,052	21
Delaware	3	11	1	39,344	14,943	54,287	13,000,000	3,179,007	16,233,240	5
Florida	15	46	3	126,401	4,110,181	4,236,582	1,585,581	7,081,464	8,933,050	0
Georgia	31	105	2	1,020,579	177,055	1,197,634	2,101,201	9,841,578	13,254,696	20,236
Illinois	136	470	33	28,714,958	3,834,490	32,549,448	66,971,389	42,861,308	140,089,258	154,349
Indiana	136	583	27	20,799,659	29,691,318	50,490,977	180,387,907	104,054,017	336,462,430	10,425
Iowa	26	96	2	5,992,507	877,262	6,869,769	108,625,916	4,703,065	120,173,535	0
Kansas	14	45	1	991,267	989,470	1,980,737	11,277,504	9,320,015	22,485,890	0
Kentucky	47	196	11	4,199,320	158,864	4,358,184	62,161,496	28,586,994	95,505,868	2,500
Louisiana	11	32	2	441,641	3,091	444,732	9,832,957	5,048,847	15,337,492	25,770
Maryland	8	41	5	1,940,627	394,078	2,334,705	10,501,033	1,087,177	13,867,926	0
Massachusetts	43	121	18	144,918	2,601,691	2,746,609	12,910,330	11,521,928	27,157,130	0
Michigan	104	335	18	6,143,903	29,074,648	35,218,551	48,749,663	24,452,047	108,815,289	440
Minnesota	27	67	8	370,618	349,396	720,014	113,987,116	4,952,686	119,580,215	6,069
Mississippi	19	64	2	5,445,573	192,045	5,637,618	3,087,606	5,226,734	14,409,758	10,189
Missouri	43	134	18	18,318,412	2,106,773	20,425,185	109,445,310	17,191,084	147,302,541	17,849
Montana	3	19	0	44,747,042	0	44,747,042	49,712,037	557,931	95,033,608	8,166
Nebraska	7	32	0	89,679	3,006,469	3,096,148	16,278,750	10,103,412	21,800,036	0
Nevada	5	19	6	305,491	0	305,491	1,243,000	242,627	2,031,848	85
New Hampshire	11	40	7	158,886	24,661	183,547	1,823,500	4,428,791	6,644,408	0
New Jersey	51	150	1	926,100	162,716	1,088,816	12,987,795	7,957,577	30,439,899	727,626
New Mexico	5	12	0	17,812,008	250	17,812,258	56,346	10,759	17,879,685	0
New York	67	216	23	2,245,805	1,372,555	3,618,360	119,091,459	23,636,168	148,000,793	7,468
North Carolina	35	105	4	958,585	269,113	1,227,698	9,054,330	10,144,619	23,357,146	0
Ohio	216	740	68	44,392,867	10,927,603	55,320,470	151,010,933	82,433,858	303,114,583	10,057
Oklahoma	30	88	14	351,115	1,989,250	2,340,365	204,748	5,466,527	8,043,238	0
Oregon	22	91	4	4,731,284	124,795	4,856,079	26,795,038	13,410,317	45,088,450	302,547
Pennsylvania	203	748	39	26,856,122	42,360,046	69,216,168	310,719,638	87,785,833	472,876,446	13,056,086
Puerto Rico	3	11	0	42,620	573	43,193	8,900	302,470	354,563	0
Rhode Island	15	43	5	58,937	48,655	107,592	3,417,501	4,271,206	7,774,713	0
South Carolina	27	104	7	1,521,623	3,922,435	5,444,058	1,907,016	34,951,201	41,861,707	202,278
South Dakota	1	7	0	81,160	0	81,160	184,900	95,200	359,520	0
Tennessee	51	180	13	3,881,488	4,158,875	8,040,363	32,597,865	23,057,109	62,634,555	16,388
Texas	73	241	21	4,662,739	1,013,330	5,676,069	41,165,313	99,106,102	116,539,367	9,204
Utah	16	92	9	78,677,680	772,853	79,450,533	247,461,080	6,972,306	334,294,471	704,205
Vermont	1	3	0	0	1,255	1,255	0	0	1,362	0
Virginia	15	57	3	840,381	681,942	1,522,323	19,427,770	6,001,743	26,972,789	0
Washington	25	83	9	4,529,322	1,043,637	5,572,959	38,966,168	7,981,081	51,685,499	15,000
West Virginia	13	71	1	1,970,305	2,236,818	4,207,123	5,024,525	6,217,941	15,387,159	0
Wisconsin	79	274	12	919,445	6,769,700	7,689,145	22,787,433	12,593,079	43,434,705	72,143
Wyoming	3	6	1	100,020	0	100,020	0	0	100,028	0
Total for SIC Code 33	1,902	6,603	465	393,384,201	171,150,982	564,535,183	2,768,097,938	875,998,680	4,184,091,672	15,389,103

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

Nitrate compounds (ranked fifth for total on- and off-site releases) accounted for most of the surface water discharges in the sector—27.7 million pounds out of 32.0 million pounds.

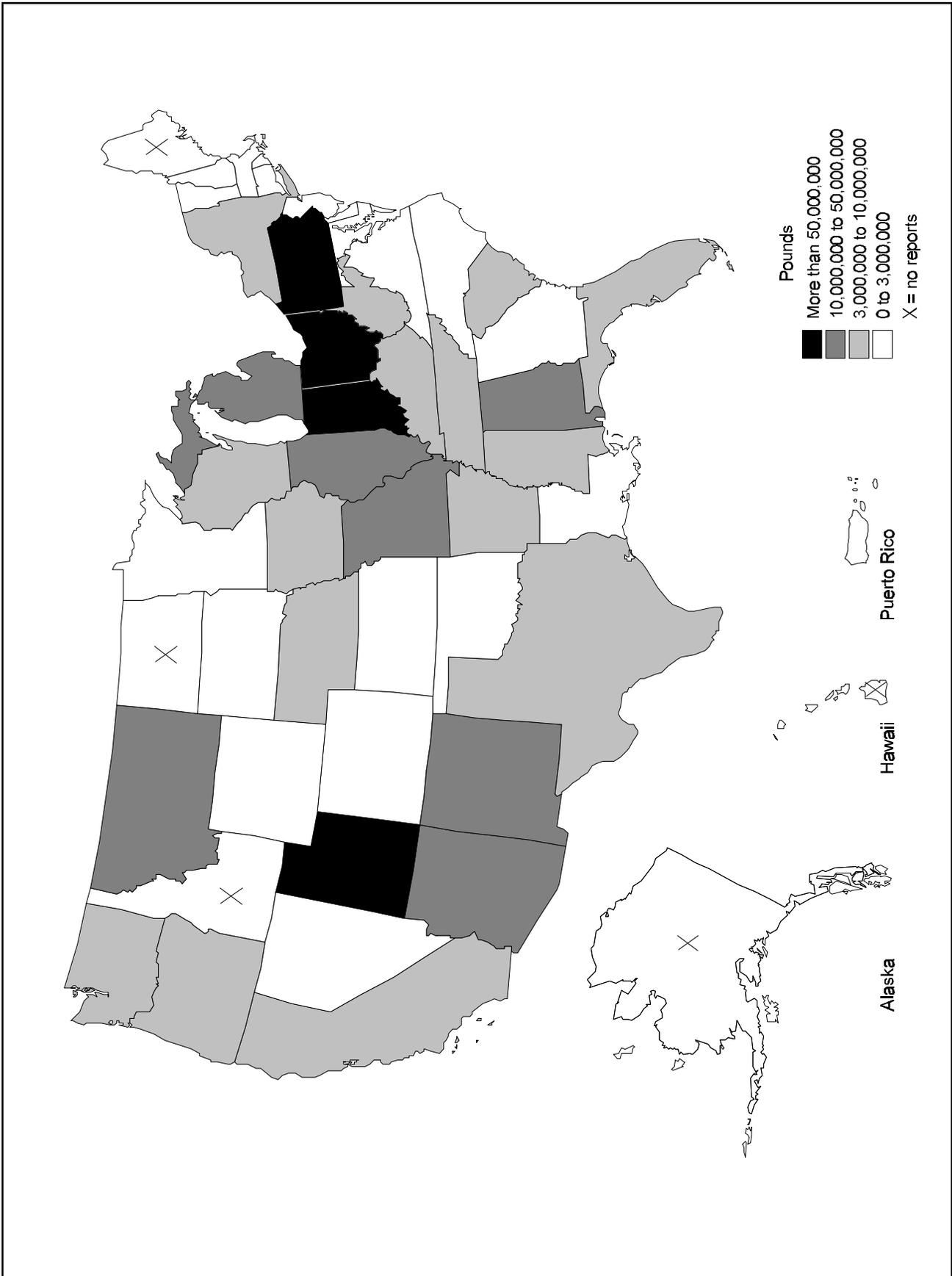
The top 15 chemicals in Table 8-7 accounted for 89.2% of all releases reported in this sector.

OSHA Carcinogens

Chemicals designated as OSHA carcinogens totaled 21.1 million pounds in releases reported by primary metal industries, as shown in Table 8-8. (OSHA carcinogens and the bases for their designation appear in Box 2.4 in Chapter 2.) The majority—7.5



Map 8-1. Total On- and Off-site Releases, 1996: Primary Metals, SIC Code 33



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



Table 8-7. The 15 Chemicals with the Largest Total On-site and Off-site Releases, 1996: Primary Metals, SIC Code 33 (in Rank Order)

CAS Number	Chemical	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- & Off-site Releases Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
—	Zinc compounds	4,205,919	164,572	2,605	0	14,127,597	71,737,744	90,238,437	84,624,864	174,863,301
7782-50-5	Chlorine	59,790,515	6,008	0	0	0	5	59,796,528	10	59,796,538
—	Copper compounds	1,527,817	23,036	143,098	0	98,816	46,798,417	48,591,184	4,329,203	52,920,387
—	Manganese compounds	1,275,109	896,367	2,900	0	4,567,109	27,966,965	34,708,450	13,827,724	48,536,174
—	Nitrate compounds	7,936	27,735,809	0	0	0	1,238,031	28,981,776	35,280	29,017,056
—	Lead compounds	946,878	31,735	768	0	1,550,822	9,699,909	12,230,112	10,175,799	22,405,911
7440-50-8	Copper	4,680,442	22,279	17	0	370,828	2,548,009	7,621,575	12,620,192	20,241,767
7664-41-7	Ammonia	18,088,687	734,588	474,179	0	16,000	691,758	20,005,212	186,186	20,191,398
7439-96-5	Manganese	353,452	32,328	1	0	25,609	6,624,150	7,035,540	10,916,446	17,951,986
7429-90-5	Aluminum (fume or dust)	1,080,451	40,775	0	0	52,700	3,798,795	4,972,721	7,140,499	12,113,220
—	Chromium compounds	209,469	48,549	2,900	0	683,464	3,513,186	4,457,568	7,271,419	11,728,987
7647-01-0	Hydrochloric acid	10,900,560	0	0	0	0	0	10,900,560	0	10,900,560
7440-66-6	Zinc (fume or dust)	922,190	7,096	0	0	2,750	6,534,452	7,466,488	1,891,304	9,357,792
463-58-1	Carbonyl sulfide	7,056,628	0	0	0	0	0	7,056,628	0	7,056,628
—	Nickel compounds	134,291	20,704	27,750	0	57,852	3,205,343	3,445,940	2,932,518	6,378,458
	Subtotal	111,180,344	29,763,846	654,218	0	21,553,547	184,356,764	347,508,719	155,951,444	503,460,163
	Total for SIC Code 33	144,680,864	31,988,843	930,779	0	22,192,029	193,591,686	393,384,201	171,150,982	564,535,183

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

million pounds, or 35.4%—were off-site releases (transfers off-site to disposal). Another 6.9 million pounds (32.7%) were reported as other on-site land releases. The third largest category was air emissions, with 6.4 million pounds (30.2%).

The chemical ranked 15th for total on- and off-site releases in this sector, nickel compounds, is an OSHA carcinogen. This chemical had 6.4 million pounds of releases, primarily released on-site to RCRA Subtitle C landfills and off-site (transfers to disposal); as shown in Table 8-7. Other OSHA carcinogens with large releases were lead (5.0 million pounds, also largely on-site to RCRA landfills and off-site to disposal), trichloroethylene (2.4 million pounds, almost entirely in air emissions), nickel (1.5 million pounds, mostly transferred off-site to disposal) and the chemical category of polycyclic aromatic compounds (1.5 million pounds, in transfers off-site to disposal and air emissions).

Reported releases of OSHA carcinogens were highest in the primary nonferrous metals industry (SIC code 3339), 5.8 million pounds. The largest sources of air emissions were the steel pipe and

tubes industry (SIC code 3317) and the forms reporting multiple SIC codes in SIC code 33, with 1.1 million pounds each. Figure 8-7 displays releases of OSHA carcinogens by medium for the primary metal industries with the largest such releases.

1996 TRI Chemicals in Waste for Primary Metals

Table 8-9 presents waste management data for the four-digit SIC codes in the primary metals sector. Half (50.0%) of all production-related waste was recycled on-site, 2.09 billion pounds out of 4.18 billion pounds. Off-site recycling accounted for another 781.9 million pounds, or 18.7%. Figure 8-8 shows the distribution of on-site waste management, off-site waste management, and quantities released on- and off-site in this sector.

Forms reporting more than one code in SIC code 33 (multiple codes) accounted for the largest portion



Table 8-8. TRI On-site and Off-site Releases of OSHA Carcinogens by 4-digit SIC Code, 1996: Primary Metals, SIC Codes 33 (in Rank Order)

SIC Code	Industry	Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection		On-site Land Releases		Total On-site Releases Pounds	Off-site Releases	Total On- & Off-site Releases Pounds
				Class I Wells Pounds	Class II-V Wells Pounds	RCRA Subtitle C Landfills Pounds	Other On-site Land Releases Pounds		Transfers Off-site to Disposal Pounds	
3339	Primary Nonferrous Metals, nec*	392,632	722	0	0	0	5,403,890	5,797,244	18,991	5,816,235
	Multiple within SIC 33	1,121,113	10,568	0	0	52,225	952,717	2,136,623	1,864,090	4,000,713
3312	Blast Furnaces & Steel Mills	713,603	22,487	10,650	0	91,728	185,217	1,023,685	1,699,614	2,723,299
3334	Primary Aluminum	449,020	2,065	0	0	9,205	250	460,540	963,721	1,424,261
3341	Secondary Nonferrous Metals	139,364	6,096	82	0	53	12,906	158,501	1,073,580	1,232,081
3321	Gray & Ductile Iron Foundries	688,275	1,404	0	0	75,477	126,789	891,945	299,528	1,191,473
3317	Steel Pipe & Tubes	1,133,620	1,115	0	0	0	0	1,134,735	45,366	1,180,101
3369	Nonferrous Foundries, nec*	17,606	7	0	0	0	33,104	50,717	489,779	540,496
3398	Metal Heat Treating	416,528	0	0	0	0	0	416,528	52,450	468,978
3351	Copper Rolling & Drawing	341,502	557	0	0	762	15,068	357,889	19,680	377,569
3357	Nonferrous Wiredrawing & Insulating	255,589	96	0	0	0	0	255,685	100,073	355,758
3316	Cold Finishing of Steel Shapes	52,337	1,652	0	0	0	3,849	57,838	273,429	331,267
3399	Primary Metal Products, nec*	181,814	536	0	0	120	337	182,807	95,001	277,808
3356	Nonferrous Rolling & Drawing, nec*	150,440	128	95	0	0	13,402	164,065	72,700	236,765
3315	Steel Wire & Related Products	14,912	1,088	0	0	4,622	0	20,622	152,369	172,991
3325	Steel Foundries, nec*	31,834	1,818	0	0	0	6,286	39,938	130,637	170,575
3331	Primary Copper	27,775	250	32,000	0	0	87,251	147,276	12,150	159,426
3313	Electrometallurgical Products	3,451	3,021	0	0	0	61,000	67,472	32,122	99,594
3365	Aluminum Foundries	86,743	22	0	0	0	5	86,770	6,512	93,282
3354	Aluminum Extruded Products	76,068	13	0	0	0	0	76,081	12	76,093
3366	Copper Foundries	11,882	79	0	0	23,565	250	35,776	23,950	59,726
3324	Steel Investment Foundries	12,957	45	0	0	0	7,640	20,642	26,165	46,807
3322	Malleable Iron Foundries	27,740	0	0	0	0	371	28,111	12,317	40,428
3363	Aluminum Die-castings	32,025	10	0	0	0	0	32,035	1,929	33,964
	Invalid SIC Code within SIC 33	3,098	5	0	0	0	0	3,103	2,000	5,103
3364	Nonferrous Die-casting Exc. Aluminum	1,665	0	0	0	0	0	1,665	0	1,665
3353	Aluminum Sheet, Plate, & Foil	187	0	0	0	0	0	187	0	187
	Subtotal	6,383,780	53,784	42,827	0	257,757	6,910,332	13,648,480	7,468,165	21,116,645
	Total for SIC Code 33	144,680,864	31,988,843	930,779	0	22,192,029	193,591,686	393,384,201	171,150,982	564,535,183

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the “multiple” category.

*nec: not elsewhere classified.

of production-related waste in the sector. This was 1.05 billion pounds, or one-quarter (25.1%) of the total. As indicated earlier in this chapter, multiple-codes reporting also accounted for the largest portion of on-site recycling, 778.5 million pounds of the 2.09-billion-pound total.

Blast furnaces and steel mills (SIC code 3312) reported the largest quantities in off-site recycling (276.8 million pounds, 35.4% of the 781.9 million pounds in that category) and the largest off-site treatment (31.1 million pounds, out of 73.3 million pounds, or 42.4%). Miscellaneous primary nonferrous metals (SIC code 3339) accounted for 138.9

million pounds reported as quantities released on- and off-site, one-quarter (25.0%) of the total for this category of 556.2 million pounds.

Although the multiple-codes forms also supplied the largest reporting of on-site energy recovery (17.6 million pounds), aluminum sheet, plate, and foil producers (SIC code 3353) were second with 15.5 million pounds. These two groups accounted for two-thirds (66.5%) of the sector’s on-site energy recovery. In off-site energy recovery, producers of aluminum extruded products (SIC code 3354) were first, with 1.5 million pounds, or 32.6% of the total. As mentioned earlier in this

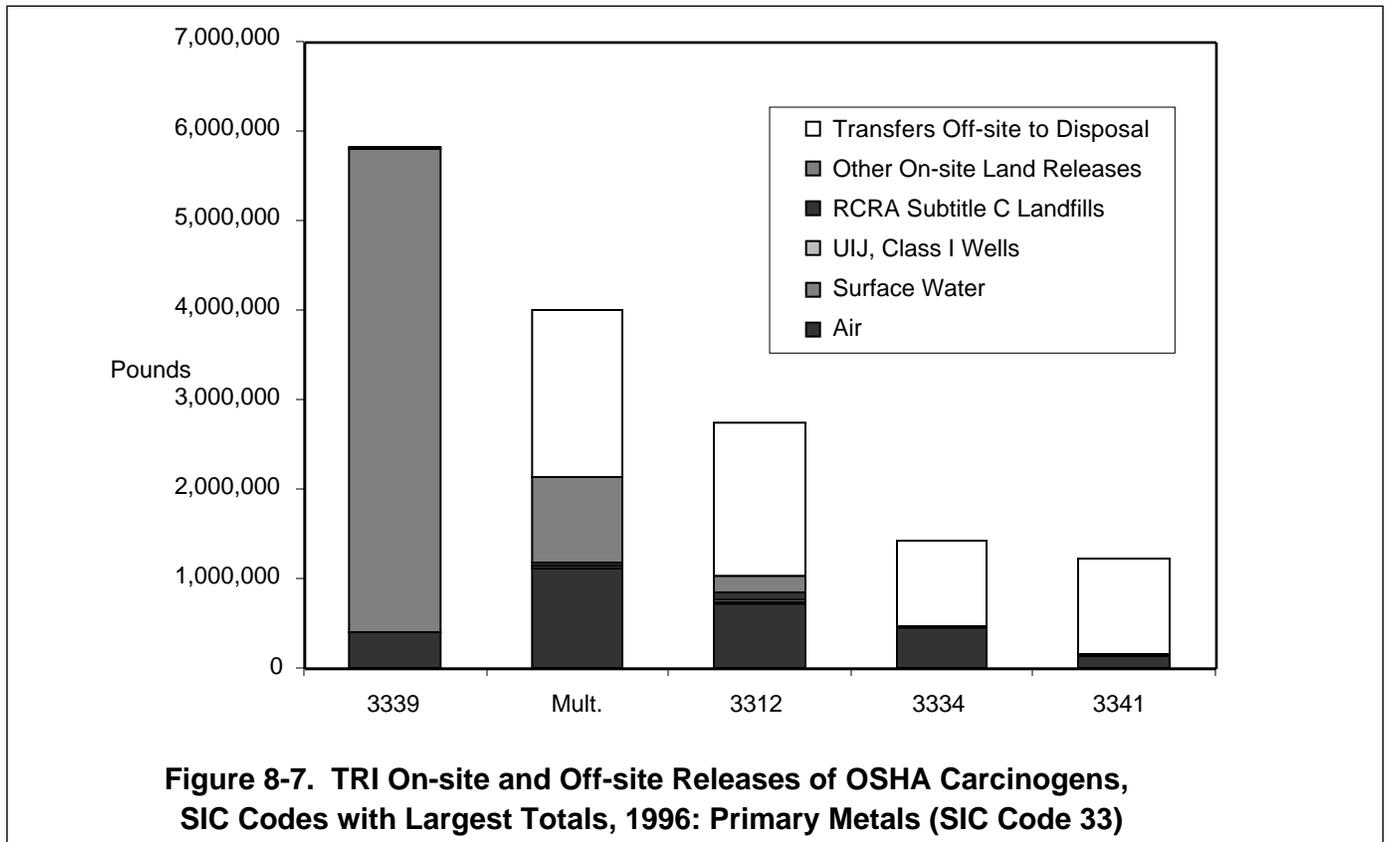


Figure 8-7. TRI On-site and Off-site Releases of OSHA Carcinogens, SIC Codes with Largest Totals, 1996: Primary Metals (SIC Code 33)

Note: On-site Releases from Section 5 of Form R. Off-site Releases from Section 6 (off-site transfers to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category. UIJ = underground injection.

chapter, energy recovery is not an appropriate characterization of the disposition of metals in waste because they are not burned and do not contribute to the combustion. Quantities reported for off-site energy recovery included 0.6% of metals and metal compounds, which represents misreporting because metals do not burn or contribute heat value to energy recovery.

The distribution of production-related waste reported by the primary metal industries with the largest totals appears in Figure 8-9.

Projected Quantities of TRI Chemicals in Waste

The primary metal industries' projections of waste management data through 1998 appear in Table 8-10. Off-site treatment was projected to increase

10.7% over this period; increases are also expected in on-site energy recovery (4.6%) and on-site treatment (3.8%). Decreases in other categories, however, contributed to an overall projected decrease of 2.0% by 1998. The largest percentage decreases appear in off-site energy recovery (7.3%) and off-site recycling (5.8%). On-site recycling is projected to decrease by 2.9% and quantities released by 2.2%. (As explained in Chapter 2, facilities not only report current data but project waste management quantities for the next two years in their TRI submissions.)

Overall, these projected changes show little difference in the primary metal industries' management of TRI chemicals in waste. On-site recycling would remain at half of the sector's total production-related waste, and quantities released at 13.3%. Thus, little movement up or down the waste



Table 8-9. Quantities of TRI Chemicals in Waste by 4-digit SIC Code, 1996: Primary Metals, SIC Code 33 (in Rank Order)

SIC Code	Industry	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Recycled Off-site Pounds	Energy Recovery Off-site Pounds	Treated Off-site Pounds	Quantity Released On- and Off-site Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
	Multiple within SIC 33	778,473,601	17,623,145	45,910,361	76,899,218	1,050,685	11,778,314	118,427,705	1,050,163,029	14,070,685
3312	Blast Furnaces & Steel Mills	83,413,823	3,804,673	118,747,400	276,780,609	63,831	31,059,407	114,165,710	628,035,453	322,543
3339	Primary Nonferrous Metals, nec*	160,036,537	0	240,092,788	3,107,600	0	34,698	138,897,494	542,169,117	8,729
3341	Secondary Nonferrous Metals	327,093,466	0	108,976,199	45,257,377	19,727	591,554	23,171,379	505,109,702	31,532
3351	Copper Rolling & Drawing	325,935,091	0	341,295	37,331,984	0	6,769,638	7,626,583	378,004,591	27
3357	Nonferrous Wiredrawing & Insulating	13,392,150	4,657,935	18,131,581	186,226,581	1,352,531	531,226	6,384,569	230,676,573	25,806
3331	Primary Copper	63,440,113	0	1,000	44,592,386	0	6,876,151	39,200,209	154,109,859	704,205
3313	Electrometallurgical Products	103,881,994	0	162,565	2,153,428	0	57,814	23,019,919	129,275,720	0
3334	Primary Aluminum	64,706,648	7,778,770	7,601,247	2,683,143	399	50,445	10,333,352	93,154,004	32,371
3321	Gray & Ductile Iron Foundries	19,844,260	0	998,521	8,160,820	193,395	388,751	32,668,115	62,253,862	48,057
3316	Cold Finishing of Steel Shapes	701,000	0	23,751,828	25,056,126	0	6,010,370	5,660,918	61,180,242	90,536
3317	Steel Pipe & Tubes	35,725,268	443,607	4,759,979	13,362,591	73,141	2,497,902	3,139,312	60,001,800	851
3325	Steel Foundries, nec*	23,976,223	0	79,878	5,297,245	1,123	404,072	16,959,169	46,717,710	21
3353	Aluminum Sheet, Plate, & Foil	6,237,233	15,460,330	18,949,042	3,699,034	241,933	48,602	1,978,762	46,614,936	25
3363	Aluminum Die-castings	30,440,128	0	105,471	11,368,817	6,968	26,275	661,916	42,609,575	0
3315	Steel Wire & Related Products	5,368,115	0	7,990,367	10,168,631	368	3,421,911	2,799,890	29,749,282	36,200
3399	Primary Metal Products, nec*	10,076,103	0	11,795,538	3,770,684	5,810	590,600	3,490,284	29,729,019	12,764
3366	Copper Foundries	18,270,757	0	0	8,208,216	14,600	84,099	638,415	27,216,087	0
3356	Nonferrous Rolling & Drawing, nec*	2,415,801	0	7,550,741	3,675,404	5,754	614,369	1,609,052	15,871,121	3,652
3354	Aluminum Extruded Products	3,675,762	0	6,249,176	2,264,639	1,495,020	146,852	1,070,145	14,901,594	0
3369	Nonferrous Foundries, nec*	7,779,646	0	473,680	4,528,658	0	242,287	499,541	13,523,812	12
3365	Aluminum Foundries	5,306,555	0	524,725	2,079,577	0	325,306	1,817,619	10,053,782	0
3398	Metal Heat Treating	143,912	0	2,595,291	377,684	28,145	627,137	1,341,917	5,114,086	1,087
3324	Steel Investment Foundries	1,261,033	0	26,435	3,007,475	600	64,098	276,047	4,635,688	0
	Invalid SIC Code within SIC 33	663,664	0	0	1,246,529	3,600	21	63,401	1,977,215	0
3364	Nonferrous Die-casting, Exc. Aluminum	226,469	0	18	508,185	0	9,905	18,905	763,482	0
3322	Malleable Iron Foundries	0	0	0	108,867	57	53,084	194,705	356,713	0
3355	Aluminum Rolling & Drawing, nec*	0	0	29,000	0	24,945	0	69,673	123,618	0
	Total for SIC Code 33	2,092,485,352	49,768,460	625,844,126	781,921,508	4,582,632	73,304,888	556,184,706	4,184,091,672	15,389,103

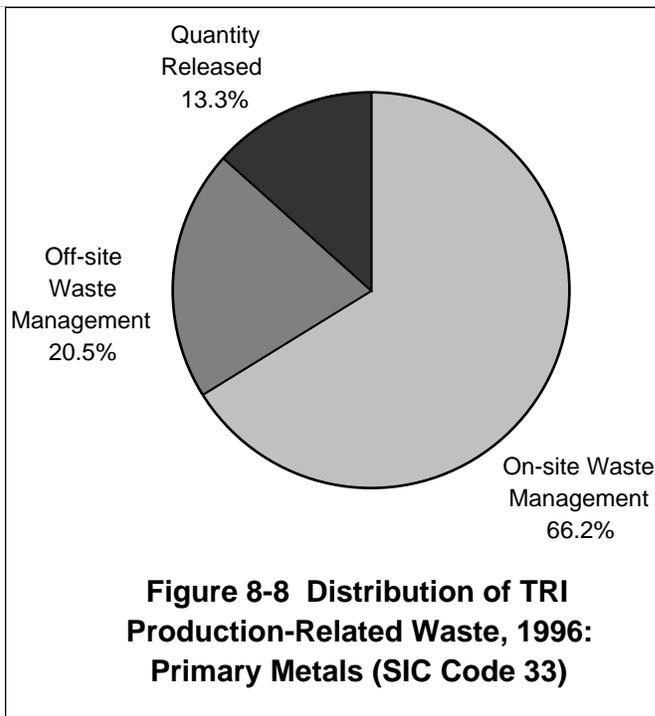
Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the “multiple” category.
*nec: not elsewhere classified.

management hierarchy, explained in Chapter 2, is expected in this sector.

Figure 8-10 shows the percentage change expected in on-site waste management, off-site waste management, quantities released, and total production-related waste for this sector, as projected for one and two years.

Source Reduction Activity

Almost 1,000 forms submitted in primary metals production indicated one or more source reduction activity in 1996, representing 14.6% of all forms submitted. The largest number, 172, came from nonferrous wiredrawing and insulating (SIC code 3357), and this was one third (33.1%) of the forms in that industry. Forms with multiple codes within SIC code 33 were second, with 133, or 17.0% of



Note: Data from Section 8 of Form R.

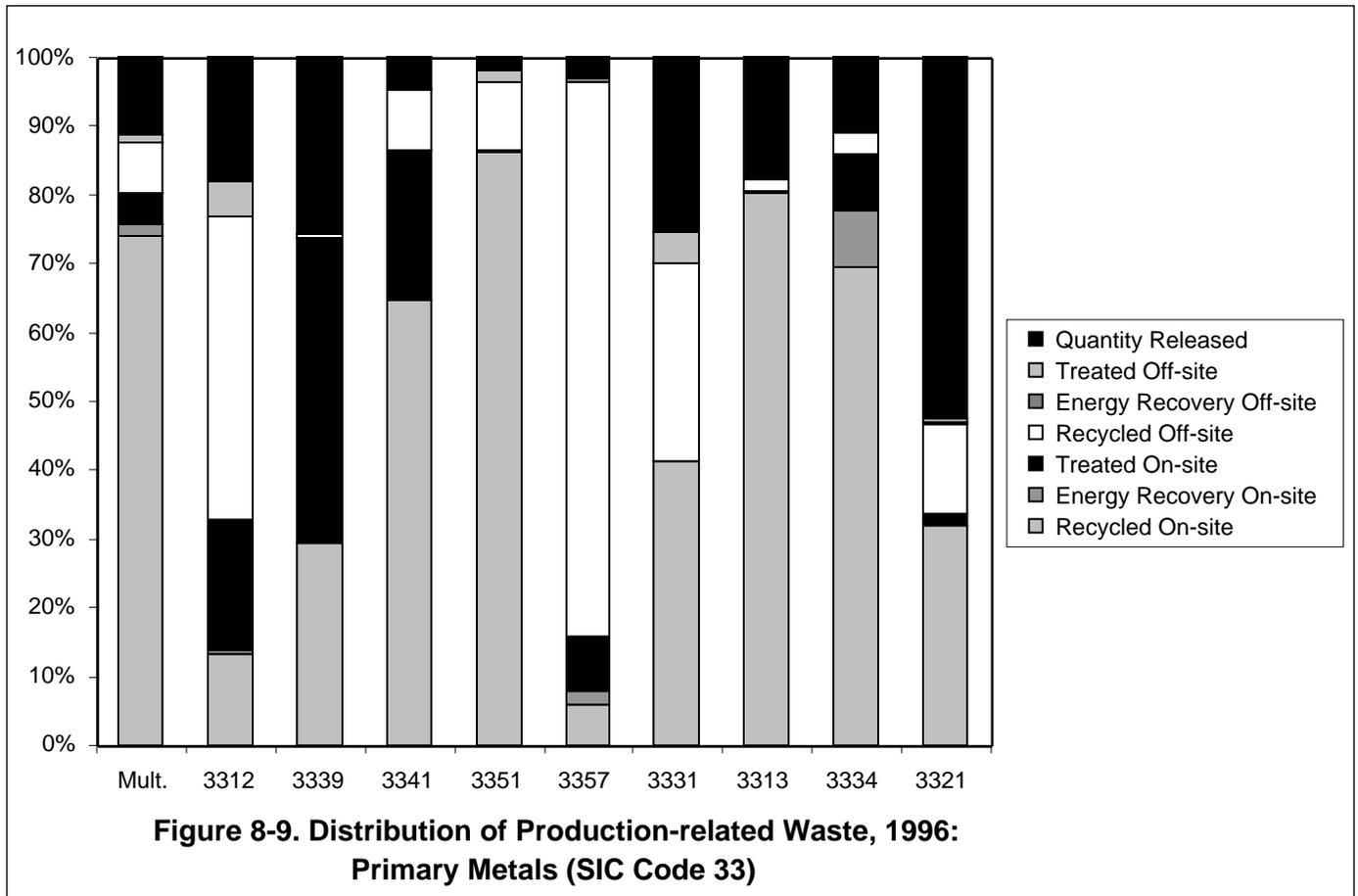


this group's total forms. Steel pipe and tubes production (SIC code 3317) also had a relatively high percentage of forms reporting source reduction activity, compared to other primary metal industries; 20.9% of the 230 forms submitted in SIC code 3317 indicated such activity. Table 8-11 shows the number of forms reporting source reduction activities, by category, for the sector. Good operating practices were the activity most commonly indicated.

Year-to-Year Comparisons for Primary Metals

1995-1996 TRI Data for Primary Metals

From 1995 to 1996, very little change occurred in the total number of TRI forms submitted in the primary metals sector—a 0.3% decrease—but the number of Form A certification statements submitted increased by 22.0% (see Table 8-12). Thus, Form A certification statements represented a small, but increasing, portion of the sector's submissions to TRI. Reporting year 1996 was the second year the Form A certification statement was available, as described in Chapter 1.



Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.



Table 8-10. Current Year and Projected Quantities of TRI Chemicals in Waste, 1996-1998: Primary Metals, SIC Code 33

Waste Management Activity	Current Year 1996		Projected 1997		Projected 1998	
	Total Pounds	Percent of Total	Total Pounds	Percent of Total	Total Pounds	Percent of Total
<u>On-site Waste Management</u>						
Recycled On-site	2,092,485,352	50.0	2,078,788,001	50.0	2,030,876,756	49.5
Energy Recovery On-site	49,768,460	1.2	51,500,077	1.2	52,056,021	1.3
Treated On-site	625,844,126	15.0	637,803,164	15.3	649,500,613	15.8
<u>Off-site Waste Management</u>						
Recycled Off-site	781,921,508	18.7	730,248,561	17.6	736,688,116	18.0
Energy Recovery Off-site	4,582,632	0.1	4,369,808	0.1	4,246,864	0.1
Treated Off-site	73,304,888	1.8	84,694,424	2.0	81,177,694	2.0
Quantity Released On- and Off-site	556,184,706	13.3	570,042,820	13.7	544,224,247	13.3
Total Production-related Waste for SIC Code 33	4,184,091,672	100.0	4,157,446,855	100.0	4,098,770,311	100.0
Waste Management Activity	Projected Change 1996-1997		Projected Change 1997-1998		Projected Change 1996-1998	
	Percent		Percent		Percent	
<u>On-site Waste Management</u>						
Recycled On-site	-0.7		-2.3		-2.9	
Energy Recovery On-site	3.5		1.1		4.6	
Treated On-site	1.9		1.8		3.8	
<u>Off-site Waste Management</u>						
Recycled Off-site	-6.6		0.9		-5.8	
Energy Recovery Off-site	-4.6		-2.8		-7.3	
Treated Off-site	15.5		-4.2		10.7	
Quantity Released On- and Off-site	2.5		-4.5		-2.2	
Total Production-related Waste for SIC Code 33	-0.6		-1.4		-2.0	

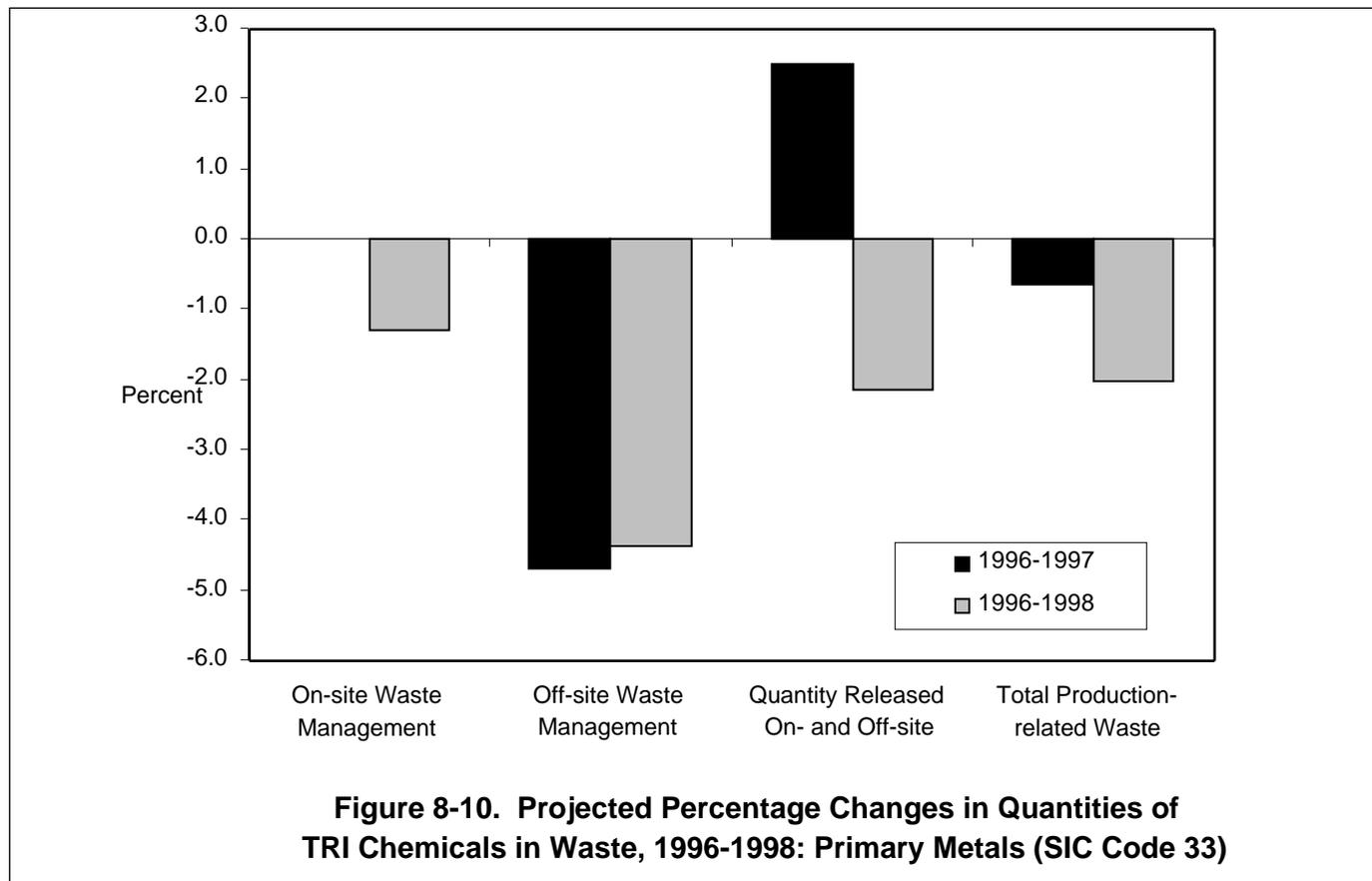
Note: Current year and projected year amounts are all taken from Section 8 of Form R for 1996.

On- and Off-site Releases

Releases on- and off-site increased by 7.7% from 1995 to 1996 in primary metals, as shown in Table 8-12. This was an increase of 40.5 million pounds. All types of on- and off-site releases were larger in 1996 than in 1995. An increase of 28.9 million pounds (15.5%) in on-site land releases was the largest absolute change (13.8 million pounds of this was reported on forms with multiple SIC codes, including 7.3 million pounds of copper compounds and 5.5 million pounds of zinc compounds).

Fugitive air emissions increased by 15.6%, or 5.2 million pounds (including a 3.7 million pound

increase in copper from forms with multiple SIC codes). Surface water discharges increased by 16.7%, or 4.6 million pounds (including a 2.4-million-pound increase in nitrate compounds and 1.0 million pounds in ethylene glycol). Small percentage changes occurred in point-source air emissions (0.8% or 862,000 pounds) and in off-site transfers to disposal (0.4% or 657,000 pounds). The largest percentage increase—44.7%—was reported in underground injection, but this release type remained a small portion overall of the sector's reporting.



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

Figure 8-11 shows the 1995-1996 percentage change in releases by medium for the primary metals sector.

Other On-site Waste Management

Table 8-12 also shows the changes from 1995 to 1996 in primary metal industries' on-site waste management. A small net increase (1.0%) in total other on-site waste management represents quite different changes in waste management methods. On-site recycling, the largest on-site method reported, decreased by 1.6%, a reduction of 33.6 million pounds. On-site treatment increased 49.3 million pounds, which was an 8.5% increase.

The smallest on-site method reported, energy recovery, increased by 12.1 million pounds, but this represented a 32.2% increase; this resulted principally from reported increases of 5.1 million pounds of polycyclic aromatic compounds in

primary aluminum production (SIC code 3334) and 3.1 million pounds of methyl ethyl ketone in aluminum sheet, plate, and foil production (SIC code 3353).

Transfers Off-site for Further Waste Management

An increase of 33.8 million pounds in off-site transfers for further waste management for the primary metals sector, from 1995 to 1996, represented a 4.0% increase. These data also appear on Table 8-12. Less than 1% change occurred in transfers to recycling (0.7% increase, 5.6 million pounds) and transfers to POTWs (0.9% increase, 73,000 pounds). Large percentage increases were reported in transfers to energy recovery (46.0%, or 1.8 million pounds) and transfers to treatment (74.3%, or 28.2 million pounds). This increase in transfers to treatment was the largest difference, in pounds, from 1995 to 1996.



Table 8-11. Number of Forms Reporting Source Reduction Activity, 1996: Primary Metals, SIC Code 33

SIC Code	Industry	Total Forms Number	Category of Source Reduction Activity									
			Forms Reporting Source Reduction Activities		Good Operating Practices			Spill and Leak Prevention		Raw Material Modifications	Process Modifications	Cleaning and Degreasing
			Number	Percent	Number	Number	Number	Number	Number	Number	Number	Number
3312	Blast Furnaces & Steel Mills	1,093	125	11.4	68	1	22	8	58	0	3	0
3313	Electrometallurgical Products	51	8	15.7	5	1	0	0	2	0	0	0
3315	Steel Wire & Related Products	224	25	11.2	9	0	6	4	5	2	4	2
3316	Cold Finishing of Steel Shapes	146	17	11.6	10	8	2	0	1	1	0	5
3317	Steel Pipe & Tubes	230	48	20.9	22	0	4	4	17	6	2	2
3321	Gray & Ductile Iron Foundries	740	47	6.4	16	2	19	9	12	0	1	2
3322	Malleable Iron Foundries	22	1	4.5	1	0	0	0	0	0	0	0
3324	Steel Investment Foundries	96	14	14.6	9	0	0	1	4	1	2	0
3325	Steel Foundries, nec*	383	52	13.6	18	6	8	7	32	0	3	2
3331	Primary Copper	48	8	16.7	0	0	0	0	8	0	0	0
3334	Primary Aluminum	93	12	12.9	8	0	0	3	3	0	0	0
3339	Primary Nonferrous Metals, nec*	96	17	17.7	15	0	8	0	1	0	0	0
3341	Secondary Nonferrous Metals	519	68	13.1	48	8	22	22	28	1	0	1
3351	Copper Rolling & Drawing	150	20	13.3	14	0	1	2	5	4	0	0
3353	Aluminum Sheet, Plate, & Foil	97	15	15.5	14	0	2	1	0	0	0	1
3354	Aluminum Extruded Products	173	31	17.9	25	1	2	1	6	0	2	0
3355	Aluminum Rolling & Drawing, nec*	4	2	50.0	1	0	0	0	1	0	1	0
3356	Nonferrous Rolling & Drawing, nec*	126	20	15.9	9	0	1	6	5	1	0	2
3357	Nonferrous Wiredrawing & Insulating	519	172	33.1	102	4	3	26	64	4	10	11
3363	Aluminum Die-castings	158	23	14.6	19	6	1	0	5	0	0	2
3364	Nonferrous Die-casting, Exc. Aluminum	22	2	9.1	0	0	0	1	0	0	0	1
3365	Aluminum Foundries	98	13	13.3	6	1	6	4	6	2	0	0
3366	Copper Foundries	132	19	14.4	8	0	3	3	10	1	0	1
3369	Nonferrous Foundries, nec*	136	20	14.7	14	0	9	2	12	0	0	1
3398	Metal Heat Treating	161	13	8.1	9	0	3	1	5	1	0	0
3399	Primary Metal Products, nec*	260	40	15.4	29	5	8	2	16	0	0	0
	Multiple within SIC 33	784	133	17.0	47	3	41	18	57	5	8	10
	Invalid SIC Code within SIC 33	42	1	2.4	0	0	0	1	1	0	0	1
	Total for SIC Code 33	6,603	966	14.6	526	46	171	126	364	29	36	44

Note: Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.

1988-1996 TRI Data for Primary Metals

As explained in Chapter 3, comparisons from the 1988 TRI baseline year to the current year rely on the list of "core" TRI chemicals that were reportable, with the same reporting definition, in all years. These multi-year comparisons also review only the data elements that were collected in all years, which excludes from this section any

analysis that distinguishes RCRA subtitle C landfills from other land releases as well as analysis based on the types of underground injection wells. On-site waste management data and transfers off-site to recycling and to energy recovery have been collected only since 1991; these data are included, but cannot be compared across the full 1988-1996 period.

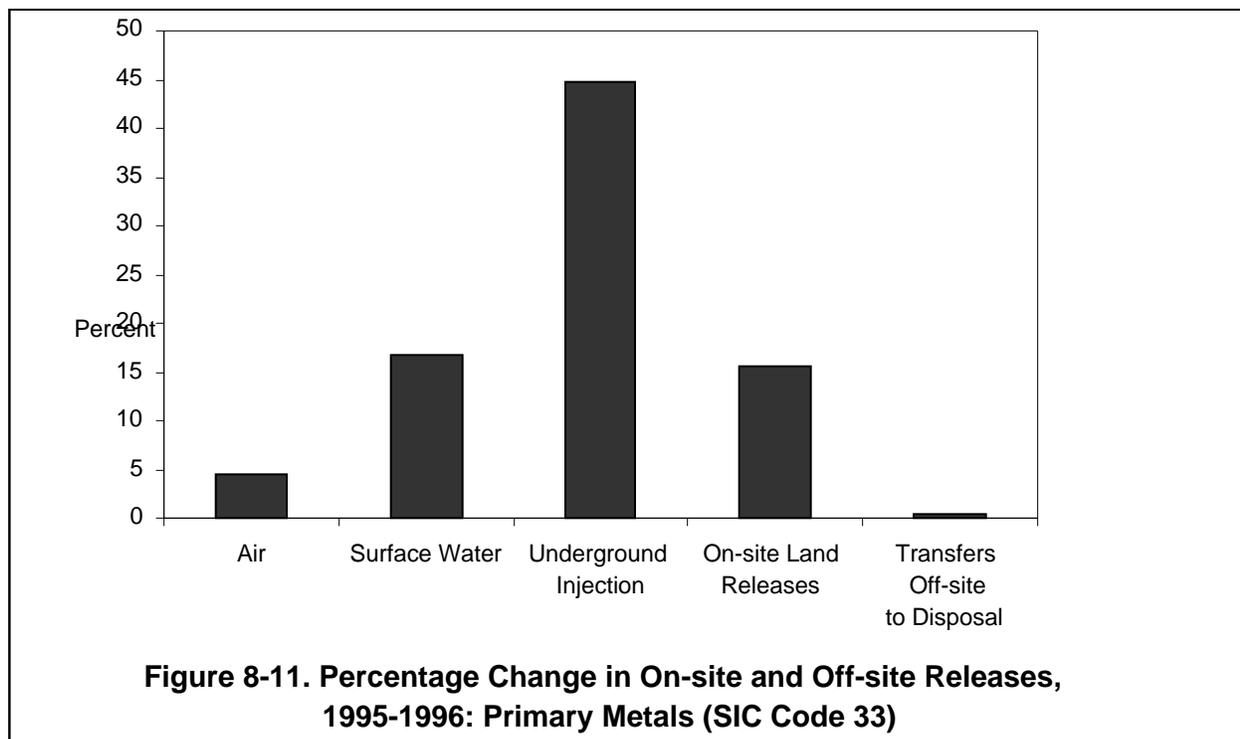
From 1988 to 1996, primary metals reporting of on- and off-site releases of the "core" chemicals



Table 8-12. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1995-1996: Primary Metals, SIC Code 33

	1995 Number	1996 Number	Change 1995 to 1996 Percent
Total Facilities	1,918	1,902	-0.8
Total Forms	6,625	6,603	-0.3
Form Rs	6,244	6,138	-1.7
Form As	381	465	22.0
	Pounds	Pounds	Percent
<u>On-site Releases</u>			
Total Air Emissions	138,586,653	144,680,864	4.4
Fugitive Air	33,490,963	38,722,723	15.6
Point Source Air	105,095,690	105,958,141	0.8
Surface Water Discharges	27,413,980	31,988,843	16.7
Underground Injection	643,374	930,779	44.7
On-site Land Release	186,902,139	215,783,715	15.5
Total On-site Releases	353,546,146	393,384,201	11.3
<u>Off-site Releases</u>			
Transfers Off-site to Disposal	170,494,473	171,150,982	0.4
Total On- and Off-site Releases	524,040,619	564,535,183	7.7
<u>Other On-site Waste Management</u>			
Recycled On-site	2,126,095,519	2,092,485,352	-1.6
Energy Recovery On-site	37,646,972	49,768,460	32.2
Treated On-site	576,557,298	625,844,126	8.5
Total Other On-site Waste Management	2,740,299,789	2,768,097,938	1.0
<u>Transfers Off-site for Further Waste Management</u>			
Transfers to Recycling	790,487,124	796,078,608	0.7
Transfers to Energy Recovery	3,864,615	5,643,584	46.0
Transfers to Treatment	37,963,394	66,153,726	74.3
Transfers to POTWs	7,786,083	7,859,057	0.9
Other Off-site Transfer	2,089,432	263,705	-87.4
Total Transfers Off-site for Further Waste Management	842,190,648	875,998,680	4.0

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



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

decreased by 21.1%, a reduction of 132.7 million pounds, as shown in Table 8-13. The largest decrease, in percentage and pounds, was reported in air emissions, a 94.2-million-pound decrease or 45.8%. This reflected substantial reductions from 1988 to 1996 in fugitive air emissions of 1,1,1-trichloroethane (14.5-million-pound decrease) and in point source air emissions of chlorine (44.0-million-pound decrease). Decreases occurred in all release types except off-site releases (transfers to disposal), which increased 6.6%, or 10.3 million pounds.

The reduction in surface water discharges was 9.0% (or 321,000 pounds), and in underground injection, it was 41.8% (or 328,000 pounds). On-site land releases were reported as 18.4% less in 1996 than in 1988, a reduction of 48.1 million pounds.

As Table 8-13 shows, however, all categories of releases have increased over the last three

years. As noted earlier in this chapter, steel production dropped sharply in the 1980s but has been recovering in this decade. Such changes, in steel and other metal production, are likely influences on the release data. As noted earlier, aged coke ovens are top pollutant sources and concerns about their emissions are heightened because of the emitted chemicals' cancer-causing potential. Alternatives to the use of coke may present more economically feasible alternatives than replacing the outdated facilities. Metals themselves—environmentally recalcitrant—present a different challenge, arguing for more effective use and recovery of the materials themselves. The value of the metals themselves also supports this direction.

On-site waste management data and transfers off-site for recycling or energy recovery were not collected in 1988. For the 1994-1996 period, on-site recycling increased 48.2 million pounds and transfers off-site to recycling decreased 42.1



Table 8-13. Comparison of TRI On-site and Off-site Releases, Other On-site Waste Management, and Transfers Off-site for Further Waste Management, 1988 and 1994-1996: Primary Metals, SIC Code 33

	1988 Number	1994 Number	1995 Number	1996 Number	Change 1988 to 1996 Percent
Total Facilities	1,578	1,803	1,793	1,787	13.2
Total Forms	5,402	5,912	5,869	5,895	9.1
Form Rs	5,402	5,912	5,561	5,507	1.9
Form As	NA	NA	308	388	NA
	Pounds	Pounds	Pounds	Pounds	Percent
<u>On-site Releases</u>					
Total Air Emissions	205,709,250	100,413,995	106,640,916	111,481,430	-45.8
Fugitive Air	55,206,075	20,730,230	20,135,598	24,883,097	-54.9
Point Source Air	150,503,175	79,683,765	86,505,318	86,598,333	-42.5
Surface Water Discharges	3,552,854	1,658,054	1,086,730	3,231,569	-9.0
Underground Injection	784,604	292,868	352,624	456,600	-41.8
On-site Land Releases	261,634,596	172,165,293	184,419,842	213,489,081	-18.4
Total On-site Land Releases	471,681,304	274,530,210	292,500,112	328,658,680	-30.3
<u>Off-site Releases</u>					
Transfers Off-site to Disposal	157,672,647	159,355,439	162,529,241	168,003,961	6.6
Total On- and Off-site Releases	629,353,951	433,885,649	455,029,353	496,662,641	-21.1
<u>Other On-site Waste Management</u>					
Recycled On-site	NA	1,513,279,562	1,547,382,144	1,561,479,306	NA
Energy Recovery On-site	NA	28,435,206	30,580,825	37,175,005	NA
Treated On-site	NA	330,031,172	349,525,323	321,821,258	NA
Total Other On-site Waste Management	NA	1,871,745,940	1,927,488,292	1,920,475,569	NA
<u>Transfers Off-site for Further Waste Management</u>					
Transfers to Recycling	NA	823,742,756	763,629,448	781,639,908	NA
Transfers to Energy Recovery	NA	3,593,384	3,718,565	5,492,991	NA
Transfers to Treatment	46,106,054	23,294,952	31,775,498	62,569,458	35.7
Transfers to POTWs	4,993,085	2,952,419	3,260,183	3,395,489	-32.0
Other Off-site Transfers	8,830,043	2,107,539	1,928,899	263,705	-97.0
Total Transfers Off-site for Further Waste Management	NA	855,691,050	804,312,593	853,361,551	NA

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



million pounds, as shown on Table 8-13 . Other categories showed increases, except for on-site treatment.

For categories reported across the full comparison period, transfers off-site to treatment increased 35.7%, or 16.5 million pounds (including a 12.1-million-pound increase in zinc compounds), from 1988 to 1996, while transfers to POTWs decreased 32.0%, or 1.6 million pounds.

1988-1996 Data for Four-Digit Industries in Primary Metals

Tables 8-14 through 8-16, summarize data for 1988 and 1994-1996 for industries at the four-digit SIC code level within SIC code 33. The tables present, respectively, on- and off-site releases, other on-site waste management, and transfers off-site for further waste management.

On- and Off-site Releases

Three industries in the primary metals sector recorded decreases of more than 50 million pounds in on- and off-site releases from 1988 to 1996. These were blast furnaces and steel mills (SIC code 3312), with a 58.1-million-pound reduction (39.2% decrease); primary copper refiners and smelters (SIC code 3331), with a 54.7-million-pound reduction (58.0%); and primary smelters and refiners of nonferrous metals other than copper and aluminum (SIC code 3339), with a 52.6-million-pound reduction (29.2%).

Forms with multiple codes in SIC code 33 had the largest increase for 1988 to 1996: 41.9 million pounds, or 60.4%. This was more than three times the next-largest increase, which was reported in electrometallurgical products (SIC code 3313), of 12.8 million pounds. This was a 272.5% increase in this industry, occurring principally in reporting of on-site land releases of manganese compounds. The

multiple-codes forms showed increases in all media except air.

No other industry reported a net change—increase or decrease—of more than 10 million pounds for the 1988-1996 period. As is true in the overall numbers, some industries, especially those reporting relatively large amounts, show increases in the more recent years.

Table 8-14 provides release data for all four-digit SIC codes in the primary metals sector, for 1988-1996. Percentage changes by medium appear in Figure 8-12.

Other On-site Waste Management

Aluminum extruded products (SIC code 3354) reported the largest net decrease in other on-site waste management since 1994 (on-site waste management data were not collected in 1988): 81.3 million pounds, a 92.8% reduction. This was largely the result of decreased on-site treatment. Primary copper refiners (SIC code 3331) reported a 63.2-million-pound decrease, or 50.0%, predominantly in on-site recycling.

Secondary refiners and smelters of nonferrous metals (SIC code 3341) reported the largest increase for 1994-1996. This was 79.5 million pounds, an increase of 27.9%, and it resulted largely from increases in on-site recycling and to a lesser degree in on-site treatment. Electrometallurgical products (SIC code 3313) reported an increase of 51.6 million pounds, or 98.2%, the result of an increase in on-site recycling.

On-site waste management data for 1994 through 1996 appear in Table 8-15 for primary metal industries.

Transfers Off-site for Further Waste Management

As shown in Table 8-16 , blast furnaces and steel mills (SIC code 3312) reported the largest



Chapter 8 — Toxics Release Inventory Data for Primary Metals

Table 8-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33

SIC Code	Industry	Year	On-Site Releases				Total On-site Releases Pounds	Off-site Releases	Total On- & Off-site Releases Pounds
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds		Transfers Off-site to Disposal Pounds	
3312	Blast Furnaces & Steel Mills	96	7,655,589	1,118,889	203,200	21,796,481	30,774,159	59,128,809	89,902,968
		95	9,540,762	503,642	174,400	18,784,231	29,003,035	37,573,670	66,576,705
		94	9,921,525	563,544	129,800	10,694,054	21,308,923	31,203,817	52,512,740
		88	28,109,078	2,274,214	644,569	62,183,212	93,211,073	54,774,326	147,985,399
3313	Electrometallurgical Products	96	561,231	748,031	0	16,063,508	17,372,770	141,236	17,514,006
		95	412,557	191,387	0	10,906,401	11,510,345	104,487	11,614,832
		94	872,564	136,292	0	11,117,566	12,126,422	84,731	12,211,153
		88	72,425	48,817	0	2,773,778	2,895,020	1,807,121	4,702,141
3315	Steel Wire & Related Products	96	354,855	11,078	0	111,459	477,392	993,664	1,471,056
		95	562,383	14,682	0	119,476	696,541	1,500,768	2,197,309
		94	520,460	15,046	0	103,046	638,552	1,296,213	1,934,765
		88	1,027,717	5,034	0	87,559	1,120,310	2,867,585	3,987,895
3316	Cold Finishing of Steel Shapes	96	288,738	6,674	250	318,287	613,949	1,325,842	1,939,791
		95	268,810	20,144	250	202,244	491,448	3,590,254	4,081,702
		94	146,310	21,622	250	208,905	377,087	518,653	895,740
		88	650,382	2,229	750	15,690	669,051	974,613	1,643,664
3317	Steel Pipe & Tubes	96	2,497,776	6,561	0	49,659	2,553,996	796,681	3,350,677
		95	2,118,124	4,498	0	43,113	2,165,735	1,432,276	3,598,011
		94	1,730,266	5,027	0	51,031	1,786,324	1,100,789	2,887,113
		88	2,589,817	42,191	0	39,865	2,671,873	545,075	3,216,948
3321	Gray & Ductile Iron Foundries	96	4,518,726	13,310	0	16,326,226	20,858,262	10,530,513	31,388,775
		95	4,420,746	14,369	0	16,499,841	20,934,956	12,017,312	32,952,268
		94	4,734,990	10,717	0	7,960,688	12,706,395	12,554,705	25,261,100
		88	13,820,242	224,123	0	10,954,692	24,999,057	8,301,055	33,300,112
3322	Malleable Iron Foundries	96	38,750	11,770	0	24,122	74,642	150,260	224,902
		95	89,971	2,590	0	43,800	136,361	235,963	372,324
		94	97,430	10,950	0	32,180	140,560	198,171	338,731
		88	28,220	131	0	44,626	72,977	673,415	746,392
3324	Steel Investment Foundries	96	32,357	65	0	20,815	53,237	51,741	104,978
		95	49,531	290	0	1,365	51,186	108,655	159,841
		94	44,619	45	0	1,250	45,914	93,404	139,318
		88	985,980	255	0	31,807	1,018,042	273,640	1,291,682
3325	Steel Foundries, nec*	96	1,470,065	6,138	0	5,287,934	6,764,137	9,232,614	15,996,751
		95	1,549,405	3,761	0	5,143,085	6,696,251	8,529,227	15,225,478
		94	1,259,960	6,560	0	4,581,717	5,848,237	6,306,047	12,154,284
		88	994,995	2,502	1,000	1,690,637	2,689,134	5,280,284	7,969,418
3331	Primary Copper	96	1,880,735	4,500	251,535	36,157,129	38,293,899	1,417,770	39,711,669
		95	1,723,086	3,800	175,855	39,692,372	41,595,113	707,850	42,302,963
		94	1,352,756	4,550	159,865	43,054,411	44,571,582	1,115,860	45,687,442
		88	3,132,810	54,650	0	91,253,754	94,441,214	11,200	94,452,414
3334	Primary Aluminum	96	7,996,237	5,063	0	12,215	8,013,515	143,642	8,157,157
		95	6,368,681	8,325	0	24,125	6,401,131	94,443	6,495,574
		94	5,689,202	3,567	0	24,130	5,716,899	116,188	5,833,087
		88	7,163,220	40,304	0	23,826	7,227,350	215,430	7,442,780
3339	Primary Nonferrous Metals, nec*	96	60,248,846	8,710	0	63,044,804	123,302,360	4,250,840	127,553,200
		95	59,052,870	11,075	0	55,191,159	114,255,104	4,158,956	118,414,060
		94	50,941,093	14,630	0	60,207,483	111,163,206	6,544,693	117,707,899
		88	104,467,111	50,085	39,320	73,365,711	177,922,227	2,253,874	180,176,101

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 8-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33, Continued

SIC Code	Industry	Year	On-site Releases				Total On-site Releases Pounds	Off-site Releases Transfers Off-site to Disposal Pounds	Total On- & Off-site Releases Pounds
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds			
3341	Secondary Nonferrous Metals	96	936,479	43,314	1,493	4,232,442	5,213,728	16,731,093	21,944,821
		95	1,254,728	38,005	1,821	1,733,590	3,028,144	13,126,817	16,154,961
		94	1,991,395	464,473	2,775	1,377,863	3,836,506	23,906,556	27,743,062
		88	1,102,347	28,173	0	1,044,704	2,175,224	20,485,182	22,660,406
3351	Copper Rolling & Drawing	96	694,161	8,728	0	230,095	932,984	200,096	1,133,080
		95	648,593	4,975	0	27,648	681,216	958,228	1,639,444
		94	833,573	5,304	0	5,530	844,407	1,317,405	2,161,812
		88	1,641,183	22,903	0	309,818	1,973,904	1,406,515	3,380,419
3353	Aluminum Sheet, Plate, & Foil	96	1,518,439	397	0	2,500	1,521,336	312,365	1,833,701
		95	1,341,743	447	0	2,700	1,344,890	258,188	1,603,078
		94	1,303,327	1,859	0	2,250	1,307,436	432,497	1,739,933
		88	9,599,231	5,679	0	99,679	9,704,589	201,771	9,906,360
3354	Aluminum Extruded Products	96	1,014,501	2,530	5	4	1,017,040	79,185	1,096,225
		95	1,679,464	37	14	8	1,679,523	42,905	1,722,428
		94	1,913,340	26	11	8	1,913,385	37,564	1,950,949
		88	2,450,700	4,250	0	69,891	2,524,841	1,135,959	3,660,800
3355	Aluminum Rolling & Drawing, nec*	96	69,633	0	0	0	69,633	0	69,633
		95	65,459	0	0	0	65,459	0	65,459
		94	40,182	0	0	0	40,182	0	40,182
		88	228,529	750	0	0	229,279	500	229,779
3356	Nonferrous Rolling & Drawing, nec*	96	392,365	433	113	60,302	453,213	719,723	1,172,936
		95	420,273	1,226	279	56,405	478,183	644,644	1,122,827
		94	615,523	481	162	115,400	731,566	596,606	1,328,172
		88	691,847	1,555	113	44,356	737,871	905,358	1,643,229
3357	Nonferrous Wiredrawing & Insulating	96	2,424,517	2,430	0	20,333	2,447,280	11,019,088	13,466,368
		95	2,553,698	4,955	0	0	2,558,653	9,183,510	11,742,163
		94	3,401,982	4,686	0	3,203	3,409,871	8,077,464	11,487,335
		88	3,775,523	6,145	250	4,051	3,785,969	3,382,377	7,168,346
3363	Aluminum Die-castings	96	513,912	61	0	4,833	518,806	145,203	664,009
		95	364,754	1,278	0	255	366,287	242,159	608,446
		94	307,680	822	0	1,000	309,502	185,093	494,595
		88	161,632	24,089	0	0	185,721	271,575	457,296
3364	Nonferrous Die-casting Exc. Aluminum	96	10,519	0	0	90	10,609	8,291	18,900
		95	11,445	0	0	0	11,445	90	11,535
		94	23,784	0	0	0	23,784	191	23,975
		88	60,787	0	0	0	60,787	42,091	102,878
3365	Aluminum Foundries	96	258,481	528	0	24,575	283,584	1,015,186	1,298,770
		95	243,806	536	0	12,150	256,492	1,349,748	1,606,240
		94	299,207	1,010	0	8,950	309,167	1,123,055	1,432,222
		88	146,422	4,754	0	250	151,426	123,076	274,502
3366	Copper Foundries	96	197,923	1,797	0	141,178	340,898	753,939	1,094,837
		95	161,583	2,260	0	215,299	379,142	762,480	1,141,622
		94	300,733	3,024	5	112,049	415,811	682,402	1,098,213
		88	226,040	1,255	0	72,973	300,268	221,679	521,947
3369	Nonferrous Foundries, nec*	96	212,539	292	0	39,962	252,793	689,713	942,506
		95	197,814	80	0	13,280	211,174	1,303,541	1,514,715
		94	200,410	378	0	47,013	247,801	865,505	1,113,306
		88	492,787	750	0	58,983	552,520	328,850	881,370

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.

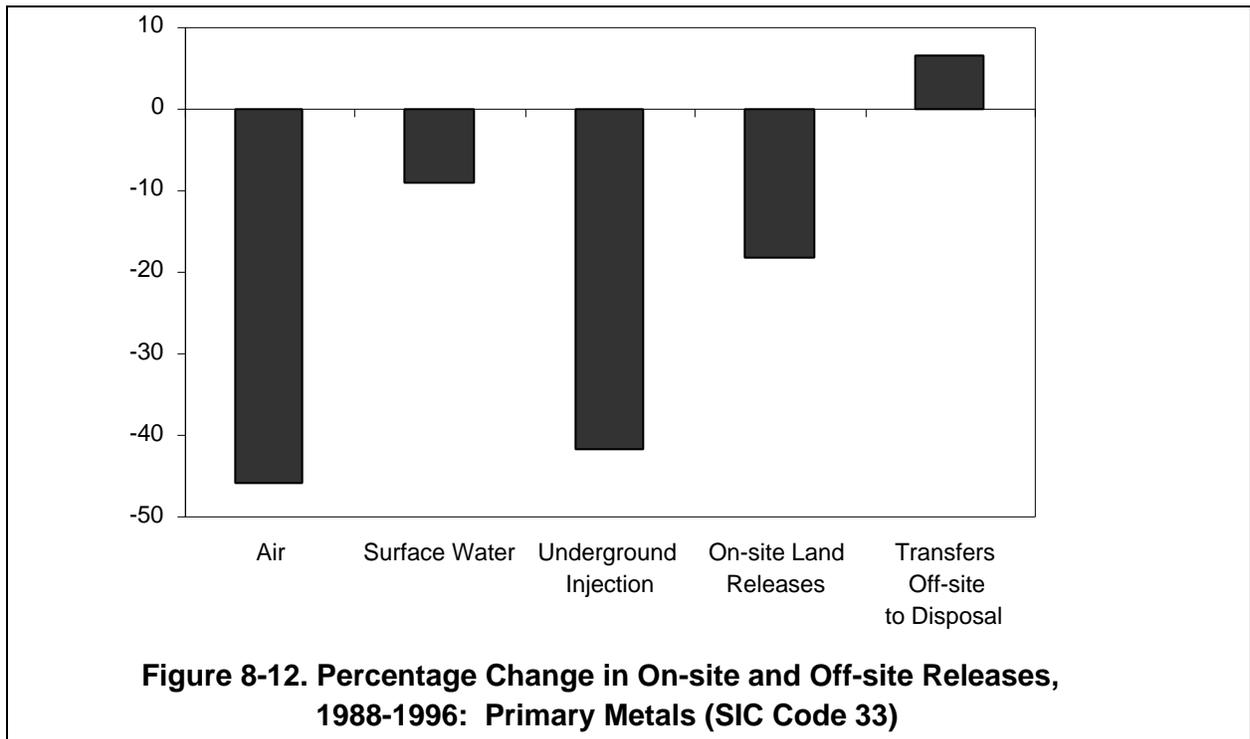


Table 8-14. TRI On-site and Off-site Releases by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33, Continued

SIC Code	Industry	Year	On-site Releases				Total On-site Releases Pounds	Off-site Releases		Total On- & Off-site Releases Pounds
			Total Air Emissions Pounds	Surface Water Discharges Pounds	Underground Injection Pounds	Releases to Land Pounds		Transfers Off-site to Disposal Pounds		
3398	Metal Heat Treating	96	528,961	10	0	0	528,971	278,089	807,060	
		95	756,828	0	0	0	756,828	234,142	990,970	
		94	825,789	7	0	0	825,796	502,453	1,328,249	
		88	883,642	0	50,000	0	933,642	131,488	1,065,130	
3399	Primary Metal Products, nec*	96	813,947	9,407	4	254,385	1,077,743	1,334,223	2,411,966	
		95	836,724	15,093	5	255,695	1,107,517	1,697,182	2,804,699	
		94	891,684	54,455	0	269,313	1,215,452	1,641,560	2,857,012	
		88	672,480	11,747	0	81,729	765,956	289,491	1,055,447	
	Multiple within SIC Code 33	96	14,321,997	1,220,280	0	49,264,891	64,807,168	46,549,511	111,356,679	
		95	9,786,124	237,517	0	35,450,514	45,474,155	62,151,549	107,625,704	
		94	9,997,354	328,173	0	32,154,940	42,480,467	58,521,194	101,001,661	
		88	16,267,080	387,410	2	12,356,307	29,010,799	40,429,525	69,440,324	
	Invalid SIC Code within SIC 33	96	29,151	573	0	852	30,576	4,644	35,220	
		95	160,954	1,758	0	1,086	163,798	520,197	683,995	
		94	156,857	806	0	31,313	188,976	332,623	521,599	
		88	4,267,023	308,859	48,600	5,026,698	9,651,180	10,339,592	19,990,772	
	Total for SIC Code 33	96	111,481,430	3,231,569	456,600	213,489,081	328,658,680	168,003,961	496,662,641	
		95	106,640,916	1,086,730	352,624	184,419,842	292,500,112	162,529,241	455,029,353	
		94	100,413,995	1,658,054	292,868	172,165,293	274,530,210	159,355,439	433,885,649	
		88	205,709,250	3,552,854	784,604	261,634,596	471,681,304	157,672,647	629,353,951	

Note: On-site Releases from Section 5 of Form R and Off-site Releases from Section 6 (transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.



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



Table 8-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3312	Blast Furnaces & Steel Mills	96	60,869,980	3,737,684	90,270,099	154,877,763
		95	60,271,235	2,872,804	41,092,804	104,236,843
		94	97,361,641	3,887,285	43,027,067	144,275,993
		88	NA	NA	NA	NA
3313	Electrometallurgical Products	96	103,881,994	0	145,565	104,027,559
		95	121,019,260	0	53,681	121,072,941
		94	51,829,119	3,600	643,341	52,476,060
		88	NA	NA	NA	NA
3315	Steel Wire & Related Products	96	13,609	0	1,355,402	1,369,011
		95	69,592	0	1,489,732	1,559,324
		94	109,620	0	1,395,688	1,505,308
		88	NA	NA	NA	NA
3316	Cold Finishing of Steel Shapes	96	0	0	21,354,655	21,354,655
		95	0	0	17,261,196	17,261,196
		94	1,483,300	0	13,240,163	14,723,463
		88	NA	NA	NA	NA
3317	Steel Pipe & Tubes	96	34,673,216	0	2,771,541	37,444,757
		95	34,423,000	0	3,354,673	37,777,673
		94	13,329,000	0	3,054,804	16,383,804
		88	NA	NA	NA	NA
3321	Gray & Ductile Iron Foundries	96	19,844,260	0	450,443	20,294,703
		95	14,922,373	0	787,301	15,709,674
		94	20,392,952	0	400,396	20,793,348
		88	NA	NA	NA	NA
3322	Malleable Iron Foundries	96	0	0	0	0
		95	0	0	9,696	9,696
		94	1,953,000	0	34,992	1,987,992
		88	NA	NA	NA	NA
3324	Steel Investment Foundries	96	1,261,033	0	26,035	1,287,068
		95	3,067,473	0	24,470	3,091,943
		94	789,638	0	47,994	837,632
		88	NA	NA	NA	NA
3325	Steel Foundries, nec*	96	23,976,223	0	50,306	24,026,529
		95	31,514,085	0	12,347	31,526,432
		94	14,272,095	0	1,529	14,273,624
		88	NA	NA	NA	NA
3331	Primary Copper	96	63,190,113	0	0	63,190,113
		95	68,124,204	0	0	68,124,204
		94	126,383,578	0	9,000	126,392,578
		88	NA	NA	NA	NA
3334	Primary Aluminum	96	64,610,698	0	7,279,689	71,890,387
		95	54,194,907	0	6,451,050	60,645,957
		94	39,635,294	0	20,414,126	60,049,420
		88	NA	NA	NA	NA
3339	Primary Nonferrous Metals, nec*	96	158,106,267	0	67,390,754	225,497,021
		95	155,803,566	0	58,828,714	214,632,280
		94	175,881,652	0	43,550,334	219,431,986
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.
 *nec: not elsewhere classified.



Table 8-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3341	Secondary Nonferrous Metals	96	318,079,966	0	46,326,753	364,406,719
		95	246,643,664	0	45,354,190	291,997,854
		94	246,643,664	0	45,354,190	291,997,854
		88	NA	NA	NA	NA
3351	Copper Rolling & Drawing	96	325,900,391	0	332,175	326,232,566
		95	281,476,767	0	404,997	281,881,764
		94	312,105,658	0	377,280	312,482,938
		88	NA	NA	NA	NA
3353	Aluminum Sheet, Plate, & Foil	96	6,237,233	15,460,330	16,863,591	38,561,154
		95	13,610,949	11,233,296	13,356,333	38,200,578
		94	12,781,359	10,545,225	10,597,916	33,924,500
		88	NA	NA	NA	NA
3354	Aluminum Extruded Products	96	2,902,706	0	3,369,538	6,272,244
		95	4,054,618	15,017	97,710,335	101,779,970
		94	3,396,562	113,611	84,071,575	87,581,748
		88	NA	NA	NA	NA
3355	Aluminum Rolling & Drawing, nec*	96	0	0	29,000	29,000
		95	0	32,700	56,200	88,900
		94	0	730,000	759,000	1,489,000
		88	NA	NA	NA	NA
3356	Nonferrous Rolling & Drawing, nec*	96	2,415,801	0	7,280,901	9,696,702
		95	13,340,985	0	6,949,037	20,290,022
		94	14,111,016	0	5,279,971	19,390,987
		88	NA	NA	NA	NA
3357	Nonferrous Wiredrawing & Insulating	96	13,392,150	4,524,860	15,870,044	33,787,054
		95	14,100,955	4,744,757	14,847,831	33,693,543
		94	10,142,671	4,484,090	15,082,861	29,709,622
		88	NA	NA	NA	NA
3363	Aluminum Die-castings	96	30,440,128	0	40,971	30,481,099
		95	46,597,930	10,632	773,403	47,381,965
		94	19,560,026	0	848,466	20,408,492
		88	NA	NA	NA	NA
3364	Nonferrous Die-casting Exc. Aluminum	96	226,469	0	18	226,487
		95	113,009	0	100	113,109
		94	1,074,000	0	0	1,074,000
		88	NA	NA	NA	NA
3365	Aluminum Foundries	96	5,306,555	0	192,064	5,498,619
		95	8,255,161	0	124,315	8,379,476
		94	6,761,341	0	152,158	6,913,499
		88	NA	NA	NA	NA
3366	Copper Foundries	96	18,270,757	0	0	18,270,757
		95	17,661,213	0	10,641	17,671,854
		94	18,037,541	0	0	18,037,541
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 8-15. TRI Other On-site Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33, Continued

SIC Code	Industry	Year	Recycled On-site Pounds	Energy Recovery On-site Pounds	Treated On-site Pounds	Total Other On-site Waste Management Pounds
3369	Nonferrous Foundries, nec*	96	7,779,646	0	473,680	8,253,326
		95	5,923,600	0	342,239	6,265,839
		94	4,562,508	0	233,000	4,795,508
		88	NA	NA	NA	NA
3398	Metal Heat Treating	96	143,912	0	1,178,471	1,322,383
		95	240,236	250	521,371	761,857
		94	3,697,631	0	444,372	4,142,003
		88	NA	NA	NA	NA
3399	Primary Metal Products, nec*	96	9,906,103	0	55,003	9,961,106
		95	18,935,275	0	9,033	18,944,308
		94	18,804,550	0	378,614	19,183,164
		88	NA	NA	NA	NA
	Multiple within SIC Code 33	96	289,386,432	13,452,131	38,714,560	341,553,123
		95	324,223,224	11,671,369	39,699,594	375,594,187
		94	274,244,093	8,671,395	45,753,532	328,669,020
		88	NA	NA	NA	NA
	Invalid SIC Code within SIC 33	96	663,664	0	0	663,664
		95	8,794,863	0	40	8,794,903
		94	24,410,475	0	1,483,080	25,893,555
		88	NA	NA	NA	NA
	Total for SIC Code 33	96	1,561,479,306	37,175,005	321,821,258	1,920,475,569
		95	1,547,382,144	30,580,825	349,525,323	1,927,488,292
		94	1,513,279,562	28,435,206	330,031,172	1,871,745,940
		88	NA	NA	NA	NA

Note: Data from Section 8 of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.

decreases since 1994 in transfers off-site for further waste management (data for some types of off-site transfers were not collected in 1988). This reduction was 71.9 million pounds, or 19.1%.

Transfers to recycling was the largest component of this reduction. Miscellaneous primary nonferrous metal refiners (SIC code 3339) were second with a 19.4-million-pound decrease, or 86.1%, also chiefly in transfers to recycling.

Multiple-codes forms carried the largest increase in transfers off-site for further waste management: 45.3 million pounds, or 62.6%, and this reflected increases in all transfer types except to POTWs. Second was primary copper refining (SIC code 3331) with 30.4 million pounds or 144.3%. This was from increases in transfers to recycling and to treatment. Secondary nonferrous metal refiners (SIC code 3341) reported 16.2 million pounds more

in off-site transfers in 1996 than in 1994, a 57.6% increase. Transfers to recycling also increased in this industry.

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

The release of zinc compounds plays a large role in the rankings of all five of the top increasers for total on- and off-site releases from 1988 to 1996. Zinc Corporation of America in Monaca, Pennsylvania (SIC code 3333), ranked first with a total increase of 20.8 million pounds. The zinc smelter reported no transfers off-site for disposal for zinc compounds in 1988 and 16.0 million pounds in 1996. Smelting is not 100% efficient and the slag by-product contains residual zinc. During a clean-up operation that lasted from 1993 to 1996, slag was removed from the facility grounds and



Table 8-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3312	Blast Furnaces & Steel Mills	96	268,823,209	64,427	34,308,418	723,823	260,671	304,180,548
		95	306,654,969	21,818	10,505,775	597,547	1,852,705	319,632,814
		94	367,666,708	22,159	7,971,086	398,041	0	376,057,994
		88	NA	NA	19,326,580	1,874,273	8,151,206	NA
3313	Electrometallurgical Products	96	1,290,494	0	316,321	1,280	0	1,608,095
		95	698,366	0	452,469	55	0	1,150,890
		94	1,096,811	0	188,499	145	0	1,285,455
		88	NA	NA	118,885	1,434	250	NA
3315	Steel Wire & Related Products	96	7,965,305	1,200	962,334	6,990	0	8,935,829
		95	5,013,717	3,520	1,253,512	35,634	750	6,307,133
		94	4,320,402	10,712	622,860	8,222	9,604	4,971,800
		88	NA	NA	237,682	126,029	4,116	NA
3316	Cold Finishing of Steel Shapes	96	24,522,053	0	4,174,001	2,195	0	28,698,249
		95	12,948,404	0	2,026,954	1,764	0	14,977,122
		94	23,504,968	0	743,847	1,815	1,676,000	25,926,630
		88	NA	NA	174,128	9,979	63,390	NA
3317	Steel Pipe & Tubes	96	11,952,200	55,792	2,133,577	106,278	5	14,247,852
		95	14,241,632	95,334	3,343,428	20,686	5	17,701,085
		94	17,218,027	92,027	401,653	15,960	0	17,727,667
		88	NA	NA	1,144,426	32,019	250	NA
3321	Gray & Ductile Iron Foundries	96	6,858,912	175,229	183,886	105,341	2,024	7,325,392
		95	7,384,362	126,102	358,835	42,510	0	7,911,809
		94	7,561,687	145,926	27,340	30,823	71,810	7,837,586
		88	NA	NA	2,103,747	105,671	29,262	NA
3322	Malleable Iron Foundries	96	108,867	0	9,812	1,005	0	119,684
		95	103,041	0	0	1,390	0	104,431
		94	66,399	0	0	2,980	0	69,379
		88	NA	NA	0	29,577	0	NA
3324	Steel Investment Foundries	96	2,705,889	491	63,670	879	0	2,770,929
		95	2,602,628	0	5,804	5,948	0	2,614,380
		94	3,772,440	171	19,325	4,224	0	3,796,160
		88	NA	NA	39,169	32,268	17,001	NA
3325	Steel Foundries, nec*	96	4,832,058	250	402,954	1,047	0	5,236,309
		95	8,045,934	250	525,052	32,030	250	8,603,516
		94	5,789,173	0	314,006	13,330	0	6,116,509
		88	NA	NA	172,227	58,748	3,250	NA
3331	Primary Copper	96	44,592,387	0	6,876,151	315	0	51,468,853
		95	24,733,569	0	4,822,340	565	0	29,556,474
		94	19,641,455	0	1,423,049	565	0	21,065,069
		88	NA	NA	29,011	10,400	0	NA
3334	Primary Aluminum	96	2,692,028	500	38,499	0	0	2,731,027
		95	1,118,908	0	7,915	0	0	1,126,823
		94	4,381,161	0	55,483	0	0	4,436,644
		88	NA	NA	501,659	0	0	NA
3339	Primary Nonferrous Metals, nec*	96	3,097,640	0	34,045	1,856	250	3,133,791
		95	13,551,556	0	36,371	25,029	5	13,612,961
		94	22,432,554	0	121,462	29,308	0	22,583,324
		88	NA	NA	62,920	6,079	0	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 8-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3341	Secondary Nonferrous Metals	96	41,515,735	8,730	2,680,431	9,028	500	44,214,424
		95	30,564,906	4,941	2,740,920	12,293	5	33,323,065
		94	25,059,316	5,356	2,767,720	15,616	206,250	28,054,258
		88	NA	NA	2,312,732	28,926	130,157	NA
3351	Copper Rolling & Drawing	96	37,886,932	0	322,111	76,117	0	38,285,160
		95	41,609,193	0	87,467	53,899	75,174	41,825,733
		94	36,257,143	0	83,753	51,083	0	36,391,979
		88	NA	NA	823,027	59,752	0	NA
3353	Aluminum Sheet, Plate, & Foil	96	3,699,616	241,933	57,686	320	0	3,999,555
		95	6,238,488	402,172	84,852	298	0	6,725,810
		94	8,170,589	612,960	200,028	305	0	8,983,882
		88	NA	NA	342,764	1,266	0	NA
3354	Aluminum Extruded Products	96	2,009,788	1,495,394	53,900	2,100	0	3,561,182
		95	2,229,805	1,403,644	57,381	1,623	0	3,692,453
		94	1,950,654	1,437,354	63,392	4,584	0	3,455,984
		88	NA	NA	557,904	957,842	129,660	NA
3355	Aluminum Rolling & Drawing, nec*	96	0	24,945	0	0	0	24,945
		95	24,000	261,129	11,000	5	0	296,134
		94	30,000	48,231	12,505	5	1,010	91,751
		88	NA	NA	18,066	0	0	NA
3356	Nonferrous Rolling & Drawing, nec*	96	3,975,533	4,930	338,881	4,279	5	4,323,628
		95	14,930,862	0	312,945	4,627	0	15,248,434
		94	11,769,884	9,700	386,269	3,847	0	12,169,700
		88	NA	NA	464,363	71,556	0	NA
3357	Nonferrous Wiredrawing & Insulating	96	179,466,898	2,069,048	395,517	28,338	250	181,960,051
		95	175,301,822	928,154	499,046	3,816	0	176,732,838
		94	173,100,805	849,749	456,205	13,614	129,697	174,550,070
		88	NA	NA	1,064,494	27,769	101,776	NA
3363	Aluminum Die-castings	96	9,822,808	56,813	9,667	22,233	0	9,911,521
		95	9,414,442	0	29,519	936	0	9,444,897
		94	9,852,956	1	21,641	1,879	250	9,876,727
		88	NA	NA	574,593	193,485	2,900	NA
3364	Nonferrous Die-casting Exc. Aluminum	96	508,267	0	9,920	300	0	518,487
		95	259,681	0	6,700	55	0	266,436
		94	2,220,189	0	2,150	255	0	2,222,594
		88	NA	NA	0	81,398	0	NA
3365	Aluminum Foundries	96	1,731,046	0	255	10,337	0	1,741,638
		95	1,535,974	0	0	7,466	0	1,543,440
		94	1,647,469	0	5	5,670	0	1,653,144
		88	NA	NA	4,189	1,750	0	NA
3366	Copper Foundries	96	6,734,132	14,529	57,907	829	0	6,807,397
		95	5,916,697	16,428	27,899	308	0	5,961,332
		94	3,995,407	9,055	36,626	555	12,418	4,054,061
		88	NA	NA	78,098	535	0	NA
3369	Nonferrous Foundries, nec*	96	4,643,623	0	125,528	7,916	0	4,777,067
		95	4,128,113	0	42,878	1,565	5	4,172,561
		94	2,241,972	0	71,991	1,591	0	2,315,554
		88	NA	NA	10,040	11,042	500	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.



Table 8-16. TRI Transfers Off-site for Further Waste Management by 4-digit SIC Code, 1988 and 1994-1996: Primary Metals, SIC Code 33, Continued

SIC Code	Industry	Year	Transfers to Recycling Pounds	Transfers to Energy Recovery Pounds	Transfers to Treatment Pounds	Transfers to POTWs Pounds	Other Off-site Transfers Pounds	Total Transfers Off-site for Further Waste Management Pounds
3398	Metal Heat Treating	96	395,923	28,145	58,211	26,420	0	508,699
		95	340,938	12,264	189,654	1,526	0	544,382
		94	211,918	25,135	99,950	36,299	250	373,552
		88	NA	NA	50,559	78,275	19,000	NA
3399	Primary Metal Products, nec*	96	3,455,076	5,810	41,642	28,611	0	3,531,139
		95	3,172,141	7,940	46,287	37,250	0	3,263,618
		94	2,925,849	6,123	58,661	32,787	250	3,023,670
		88	NA	NA	60,590	7,265	41	NA
Multiple within SIC Code 33		96	105,185,507	1,241,225	8,914,134	2,227,391	0	117,568,257
		95	64,860,247	430,514	4,246,229	2,370,533	0	71,907,523
		94	62,590,031	317,225	7,114,472	2,270,961	0	72,292,689
		88	NA	NA	14,999,967	839,033	19,013	NA
Invalid SIC Code within SIC 33		96	1,167,982	3,600	0	261	0	1,171,843
		95	6,005,053	4,355	54,266	825	0	6,064,499
		94	4,266,789	1,500	30,974	7,955	0	4,307,218
		88	NA	NA	834,234	346,714	158,271	NA
Total for SIC Code 33		96	781,639,908	5,492,991	62,569,458	3,395,489	263,705	853,361,551
		95	763,629,448	3,718,565	31,775,498	3,260,183	1,928,899	804,312,593
		94	823,742,756	3,593,384	23,294,952	2,952,419	2,107,539	855,691,050
		88	NA	NA	46,106,054	4,993,085	8,830,043	NA

Note: Transfers Off-site for Further Waste Management from Section 6 (excluding transfers off-site to disposal) of Form R. Forms with more than one 4-digit SIC code within SIC code 33 are assigned to the "multiple" category.

*nec: not elsewhere classified.

disposed of in an off-site landfill. This accounted for a majority of the facility's increase in releases. The number two facility for increases was Nucor Steel in Crawfordsville, Indiana (SIC code 3312 reported in 1996). A 15.5-million-pound increase in transfers off-site for disposal of zinc compounds in 1996 made up 91.8% of the facility's 16.9 million-pound overall increase. The Nucor Steel facility was being built in 1988 and did not go into production until mid-1989. The facility began reporting on zinc compounds in 1990. Rouge Steel in Dearborn, Michigan (SIC code 3312), was third in releases with a 13.0-million-pound net increase. Transfers of zinc compounds off-site for disposal increased from 250 pounds in 1988 to 12.0 million pounds in 1996. (This facility also ranked fourth in decreases of production-related waste for 1991 to 1996). Asarco Inc., East Helena, Montana (SIC code 3339), had an 11.5-million-pound total increase in releases, 59.6% of which was due to an increase in the amount of zinc compounds released on-site to land (a 6.9 million-pound increase).

GM Powertrain Defiance in Defiance, Ohio (SIC code 3321), was fifth in increases of releases with a net increase of 11.3 million pounds. This foundry reported an 11.8-million-pound increase in zinc compounds released on-site to land. The facility receives galvanized sheet scrap metal for melting and recasting for automobile production. Zinc, being the primary component of the protective coating on galvanized metals, vaporizes during the melting process and is captured in wet-dust collectors. The aqueous waste from the dust collectors is sent to settling ponds. The GM facility attributes the increase in zinc compound releases to an increase in the amount of galvanized scrap metal received.

The top facility for decreases in releases, Magnesium Corporation of America in Rowley, Utah (SIC code 3339), reported a 43.0-million-pound decrease in total releases. The facility produces elemental magnesium from magnesium chloride. At one point in the process, a magnesium



oxide by-product is treated with chlorine as a purifying agent and excess chlorine is emitted to air. The facility has reduced the amount of chlorine in its air emissions by improving the efficiency of the process involving chlorine and by installing a chlorine reduction burner which controls about 90% of the chlorine leaving the stack. Reduction of chlorine in point source air emissions accounted for all of the facility's decrease.

Zinc compounds were primarily responsible for four of the top five facility decreases in releases. The second-ranked facility, Asarco, Inc., a copper smelter in Hayden, Arizona (SIC code 3331), reported a 15.0 million-pound reduction in releases of zinc compounds, 60.4% of the facility's total releases (24.8 million pounds). The reduction was partly accounted for by a process change in which slag is reprocessed to recover zinc left over from prior smelting of raw material. According to Asarco, a small part of the reduction may be due to a decrease in the amount of zinc compounds present in the raw material. Third in decreases, Doe Run Company in Herculaneum, Missouri (SIC code 3339), a lead smelter, reported a 15.4-million-pound reduction in zinc compounds, 73.2% of the 21.0 million-pound overall decrease. Nearly all of this reduction was in the category of on-site releases to land. The reduction was partly due to a decreased amount of zinc present in the raw material. This facility was a participant in EPA's 33/50 Program, as documented in *EPA's 33/50 Program Success Story: The Doe Run Company, Reducing Land Releases from Lead Production by Improving Concentrate Quality* (EPA 745-K-96-065, December 1996). Doe Run's project to reduce lead in wastes included a change in mining and milling operations that provide the raw material sent to the smelter. The changes included instituting tighter process controls, and conducting training to improve the efficiency of the materials separation process and provide raw materials with fewer impurities.

Phelps Dodge Hidalgo, Inc., in Playas, New Mexico (SIC code 3331 in 1988) ranked fourth for decreases in releases with a 12.7 million-pound

total reduction. Eleven million pounds of zinc compounds were reported in 1988, primarily in on-site releases to land, and no zinc releases were reported in 1996. The copper smelter ceased using a water treatment chemical that contained zinc. Part of the decrease may also be due to a reduction in the amount of zinc present in the concentrate (which results from initial processing of copper ore) that is brought on-site for smelting. Fifth in decreases, Republic Engineered Steels in Canton, Ohio (SIC code 3312), reduced transfers of zinc compounds off-site for disposal by over 6 million pounds between 1988 and 1996. This accounted for 52.8% of the total decrease (11.4 million pounds). The alloy and stainless steel manufacturer uses 100% scrap metal as raw material. A large portion of this is galvanized metal that contains zinc compounds. This minimill melts scrap in an electric arc furnace, which produces zinc-laden dust. The dust is collected and sent off-site for recycling.

The top facility for decreases in releases, Magnesium Corporation of America in Rowley, Utah (SIC code 3339), reported a 43.0-million-pound decrease in total releases. The facility produces elemental magnesium from magnesium chloride. At one point in the process, a magnesium oxide by-product is treated with chlorine as a purifying agent and excess chlorine is emitted to air. The facility has reduced the amount of chlorine in its air emissions by improving the efficiency of the process involving chlorine and by installing a chlorine reduction burner which controls about 90% of the chlorine leaving the stack.

1991-1996 Waste Management Data for Primary Metals

Table 8-17 summarizes on- and off-site waste management data for the primary metals sector for 1991, when TRI began collecting this information, and the three most recent years (1994-1996). Total production-related waste increased from 2.31 billion pounds to 3.25 billion pounds from 1991 to 1996, an increase of 40.8%. All categories increased except off-site energy recovery, which



decreased 52.1%, from 9.2 million pounds to 4.4 million pounds. (As noted earlier, energy recovery represents a small portion of overall waste management in primary metals production.)

The largest component of the overall increase was on-site recycling, which increased 666.8 million pounds, followed by off-site recycling, with a 134.0-million-pound increase. The increase in on-site energy recovery was 4.7 million pounds. On-site treatment increased by 69.2 million pounds and off-site treatment by 24.5 million pounds.

Quantities released on- and off-site increased 47.2 million pounds from 1991 to 1996.

Figure 8-13 shows the percentage changes for on- and off-site waste management types.

TRI facilities report absolute amounts of waste managed and of environmental releases, not adjusted for changes in production levels. Increases in production in this sector since 1991 may account for some of the increases in waste management quantities reported to TRI. As noted in the descriptions below, the facility with the largest increase in waste management for 1991-1996 came on line during this period. Some facilities, however, attribute their large increases to changes in what they consider recycling rather than to changes in production or in actual quantities of TRI chemicals in waste managed.¹

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

Four of the top five facilities for increases in production-related waste reported increases in on-site recycling of copper compounds. The number-one facility was PMX Industries, Inc., in Cedar Rapids, Iowa (multiple codes 3341, 3351, and 3398). The copper alloy production facility came on-line in 1991 and did not achieve full production capacity until 1996, which accounts for its 99.0-million-pound increase in the amount of copper recycled on-site (95.1% of the 104.1 million-pound

overall increase). The recycling activity consists of returning waste copper from casting and rolling processes to furnaces for re-melting. Other facilities with large increases in on-site recycling of copper compounds cited changes in interpretation and procedures regarding this reporting. The third facility for overall increases was Revere Copper Products, Inc., Rome, New York (SIC code 3351), with 99.0 million pounds. The facility, whose primary business is recycling copper for sale to other business entities, changed its interpretation of on-site recycling² between the comparison years, resulting in an increase of 90.2 million pounds. This was also the case for the fourth-ranked increaser, Halstead Metal Products, Inc., Wynne, Arkansas (SIC code 3351). Halstead's reported 68.6-million-pound increase in on-site recycling of copper was also attributed to a change in the facility's interpretation of the reporting requirements for on-site recycling. The facility had a total net increase of 62.7 million pounds. The fifth-ranked facility, BHP Copper Metals Company, San Manuel, Arizona (multiple SIC codes 3331 and 3351), reported a 64.5-million-pound increase in on-site recycling of copper and a total net increase of 57.9 million pounds. The increase was due to a change in reporting procedure regarding how recycling applies to slag.

The second-ranked facility for increases reported an overall increase of 102.2 million pounds, the majority due to a 101.7-million-pound increase in the amount of manganese compounds recycled on-site. Elkem Metals Company in Marietta, Ohio (SIC code 3313), described the increase as attributable to increased accuracy about how to report under TRI.

¹ There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.

² There are no TRI regulatory definitions of recycling. Facilities may use their own interpretations for purposes of reporting to TRI. Changes in these interpretations do not represent a change in guidance by EPA on how to report recycling.



Table 8-17. TRI Waste Management Data, 1991, 1994-1996: Primary Metals, SIC Code 33

Waste Management Activity	1991 Pounds	1994 Pounds	1995 Pounds	1996 Pounds
<u>On-site Waste Management</u>				
Recycled On-site	894,659,655	1,513,279,562	1,547,386,744	1,561,479,306
Energy Recovery On-site	32,481,224	28,435,206	30,580,825	37,175,005
Treated On-site	252,659,916	330,031,172	349,525,323	321,825,158
Total On-site Waste Management	1,179,800,795	1,871,745,940	1,927,492,892	1,920,479,469
<u>Off-site Waste Management</u>				
Recycled Off-site	633,148,871	814,388,973	798,464,174	767,099,207
Energy Recovery Off-site	9,248,040	3,641,774	3,752,971	4,434,404
Treated Off-site	40,257,219	30,142,438	51,264,638	64,763,111
Total Off-site Waste Management	682,654,130	848,173,185	853,481,783	836,296,722
Quantity Released On- and Off-site	443,834,329	405,236,340	420,674,033	491,005,091
Total Production-related Waste	2,306,289,254	3,125,155,465	3,201,648,708	3,247,781,282
Non- Production-related Waste	473,183	23,922,491	17,995,211	15,226,628
Waste Management Activity	Change 1994-1995 Percent	Change 1995-1996 Percent	Change 1991-1996 Percent	
<u>On-site Waste Management</u>				
Recycled On-site	2.3	0.9	74.5	
Energy Recovery On-site	7.5	21.6	14.5	
Treated On-site	5.9	-7.9	27.4	
Total On-site Waste Management	3.0	-0.4	62.8	
<u>Off-site Waste Management</u>				
Recycled Off-site	-2.0	-3.9	21.2	
Energy Recovery Off-site	3.1	18.2	-52.1	
Treated Off-site	70.1	26.3	60.9	
Total Off-site Waste Management	0.6	-2.0	22.5	
Quantity Released On- and Off-site	3.8	16.7	10.6	
Total Production-related Waste	2.4	1.4	40.8	
Non- Production-related Waste	-24.8	-15.4	3,117.9	

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

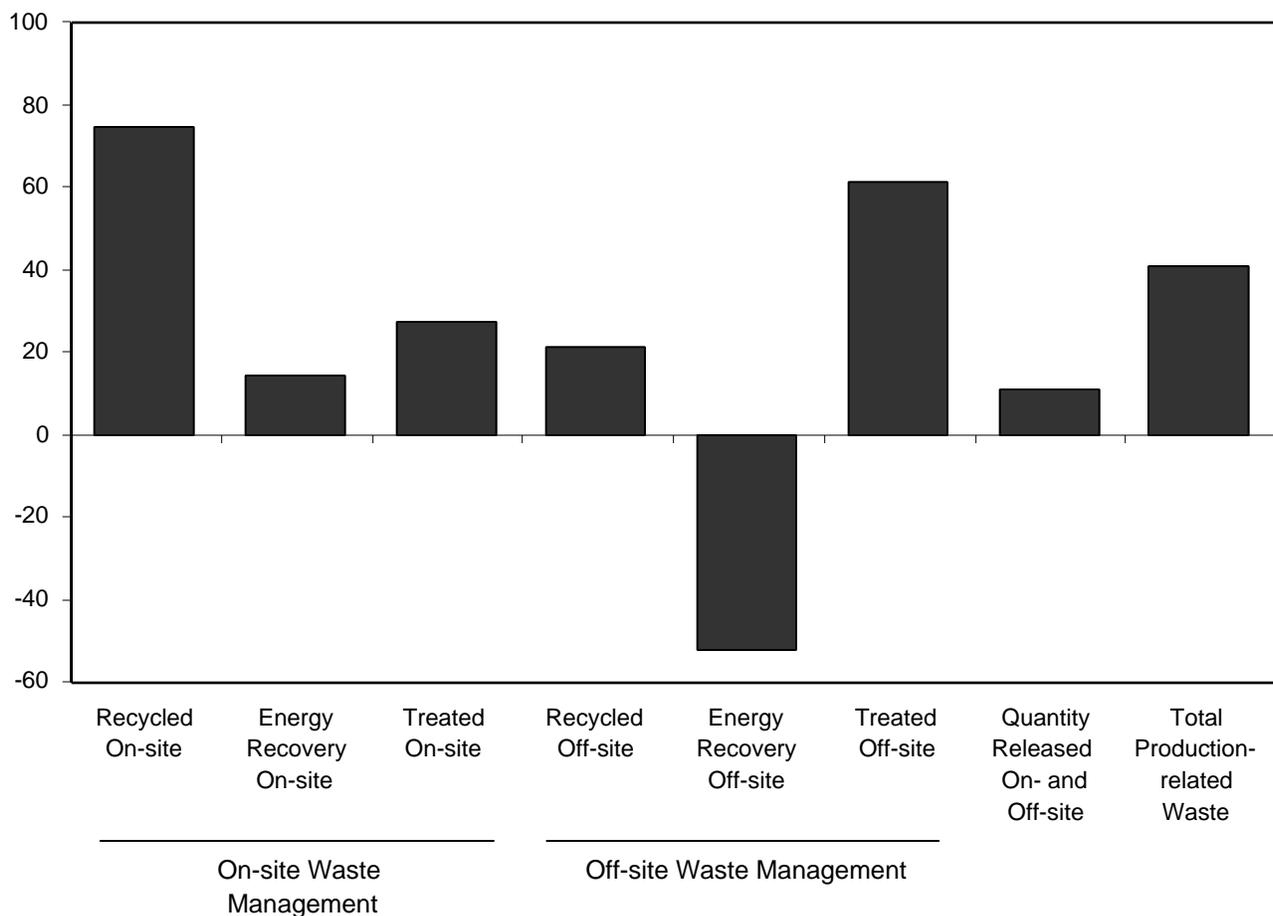


Figure 8-13. Percentage Change in Quantities of TRI Chemicals in Waste, 1991-1996: Primary Metals (SIC Code 33)

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

Doe Run Company in Boss, Missouri (multiple SIC codes 3339 and 3341 reported in 1991 and SIC code 3341 in 1996), was first for decreases in production-related waste. This lead smelter had a total decrease of 48.5 million pounds, over 99% attributable to a decrease in on-site recycling of lead compounds. In 1994, the facility was given approval by EPA to utilize slag as a feedstock substitute at its Herculaneum sister facility (see the number two facility for decreases in on- and off-site releases, above). The Boss smelter initiated an in-line process whereby a sulfide reagent is combined with slag as it is generated, rendering some of the constituent metal compounds, including lead, unleachable. The treated slag is, therefore, no

longer a hazardous waste by RCRA standards, and the facility no longer reports the lead compounds to TRI.

GNB Technologies, Inc., in Vernon, California was second for decreases with 47.6 million pounds. This facility, a secondary lead smelter (SIC 3341), reported 47.0 million pounds in on-site recycling of lead compounds in 1991 and no on-site recycling of lead compounds in 1996. The third-ranked facility for decreases in production-related waste, Wolverine Tube, Inc. in Decatur, Alabama (multiple codes 3351, 3354, 3365, and 3366 in 1991 and multiple codes 3351, 3355, and 3366 in 1996), accounts for its 43.0-million-pound decrease



in on-site recycling of copper by a change in how they reported. Copper tubing that did not meet specification at the copper and copper alloy tubing manufacturing facility is remelted and recast. This was historically reported as on-site recycling but is no longer designated by the facility as on-site recycling³. The facility had a 44.5 million-pound total decrease.

The fourth-ranked facility, Rouge Steel Company in Dearborn, Michigan (SIC code 3312), had a total decrease in production-related waste of 43.3 million pounds. About three-fourths of the reduction was due to a drop in the amount of aluminum (fume or dust) reported to off-site recycling. Rouge Steel used to report the constituents of its slag to TRI and no longer does. The slag contains large amounts of aluminum and was interpreted by the facility to be in the form of fume or dust in the 1988 report.

Facilities Contacted for Explanations (alphabetical by facility):

Asarco Inc., East Helena, Montana (no explanation provided)

Asarco, Inc., Hayden, Arizona: Ed Riege, March 20, 1998 (explanation provided)

BHP Copper Metals Company, San Manuel, Arizona: Brent Fletcher, March 20, 1998 (explanation provided)

Doe Run Company, Boss, Missouri: Doug Bice, April 9, 1998 (explanation provided)

Doe Run Company, Herculaneum, Missouri: Gary Walker, March 20, 1998 (explanation provided)

Elkem Metals Company, Marietta, Ohio: Rod Dement, March 20, 1998 (explanation provided)

GM Powertrain Defiance, Defiance, Ohio: Gary Nobler, March 20, 1998 (explanation provided)

GNB Technologies, Vernon, California (no explanation provided)

Halstead Metal Products, Inc., Wynne, Arkansas: Charles Blanton, March 20, 1998 (explanation provided)

Magnesium Corporation of America, Rowley, Utah: Chris Menefee, March 19, 1998 (explanation provided)

Nucor Steel, Crawfordsville, Indiana: Dave Sulc, April 6, 1998 (explanation provided)

Phelps Dodge Hidalgo, Inc., Playas, New Mexico: Gerry Roose, March 25, 1998 (explanation provided)

PMX Industries, Inc., Cedar Rapids, Iowa: Jim Howes, March 20, 1998 (explanation provided)

Republic Engineered Steels, Canton, Ohio: Eric Howland, March 24, 1998 (explanation provided)

Revere Copper Products, Inc., Rome, New York: Doug Bailey, March 24, 1998 (explanation provided)

Rouge Steel Company, Dearborn, Michigan: Charles B. Johnson, April 6, 1998 (explanation provided)

Wolverine Tube, Inc., Decatur, Alabama: Ralph Campbell, March 20, 1998 (explanation provided)

Zinc Corporation of America, Monaca, Pennsylvania: Joe Uriah, March 19, 1998 (explanation provided)

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



Sources

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

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

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

U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Office of Compliance, *Profile of the Iron and Steel Industry*, Sector Notebook Project, EPA/310-R-95-005, September 1995; *Profile of the Nonferrous Metals Industry*, EPA/310-R-95-010, September 1995 <<http://es.epa.gov/oeca/sector/index.html>>: industry processes and technologies, pollutant sources, and selected economic data.

1996 Toxics Release Inventory: Public Data Release—Errata

In Chapter 8 of the first volume of the *1996 Toxics Release Inventory Public Data Release* (published May 1998), the table that presented data from TRI forms reporting more than one SIC code in SIC code 33 in 1996 (Table 8-2 on page 291) contained incorrect data. The total row in Table 8-2 was correct, but the detailed data were not. This errata sheet presents the correct data in Table 8-2, on the following pages.

Text on pages 292-293 reflected the incorrect data, beginning with the first full paragraph on page 292. The corrected text follows on this page.

Reporting on forms with multiple SIC codes within the sector is further examined in Table 8-2. Secondary smelters and refiners of nonferrous metals (SIC code 3341) appear most often (in 19 of the 99 combinations). Secondary smelting generally recovers metals and alloys from scrap. This activity most often combines with further processing of the metal (rolling, drawing, extruding, in SIC code 335).

Forms with multiple SIC codes had the largest on-site waste management (842.0 million pounds) and the largest total production-related waste (1.05 billion pounds) [in SIC code 33, see Table 8-1]. Forms with multiple SIC codes also had the second or third largest amounts in the other categories (on- and off-site releases and transfers off-site for further waste management). As shown in Table 8-2, the multiple code combination with the largest total on- and off-site releases was primary production of copper (SIC code 3331) with rolling and drawing of copper (SIC code 3351). This combination had total on- and off-site releases of 31.5 million pounds. This combination also accounted for 547.6 million pounds of other on-site waste management and 591.5 million pounds of total production-related waste.

1996 Toxics Release Inventory: Public Data Release—Errata

Table 8-2. Multiple SIC Codes, 1996: Primary Metals, SIC Code 33

SIC Codes	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3312 3313 3315	13	6	23,886	0	23,886	550,000	418,564	817,626	0
3312 3313 3316	10	3	843,460	1,232,352	2,075,812	41,000	0	2,084,200	0
3312 3313 3341	5	0	1,293	0	1,293	1,291	0	2,583	727,600
3312 3315	14	0	16,190,589	0	16,190,589	10,029,548	5,329,441	31,594,716	753
3312 3315 3398	15	0	42,749	424,170	466,919	1,744,339	2,027,792	4,235,742	0
3312 3316	41	2	3,079,908	17,690,451	20,770,359	3,211,148	3,946,119	27,873,536	0
3312 3316 3317	1	0	35,414	0	35,414	16,133	0	35,414	0
3312 3316 3398	36	0	3,514,695	2,132,736	5,647,431	25,455,355	8,879,222	39,972,923	1,849
3312 3317 3325	25	0	1,926,635	0	1,926,635	8,049,384	56	9,971,286	0
3312 3321 3366	3	0	57,405	0	57,405	0	2,150	59,303	0
3312 3354	5	0	19,264	0	19,264	785,322	3	824,257	0
3312 3356	5	0	25	1,250	1,275	0	25	70	0
3312 3356 3398	3	0	2,769	0	2,769	0	242,589	245,358	0
3312 3398	16	0	372,974	68,605	441,579	2,654,085	17,500,804	20,602,262	0
3313 3316	3	1	30,450	96,200	126,650	0	2,663	128,713	0
3313 3341	12	0	3,351	0	3,351	2,246,840	584,781	2,846,662	0
3315 3316	12	0	91	0	91	0	212,142	212,231	0
3315 3316 3357	3	0	1,930	0	1,930	0	65,013	66,930	0
3315 3351 3355	4	0	101,725	0	101,725	0	69,199	170,713	0
3315 3351 3356	5	0	54	0	54	0	0	8,724	0
3315 3355 3398	3	0	0	4,100	4,100	10	6,555	13,400	0
3315 3398	5	0	4,616	40,444	45,060	997,400	174	1,042,559	0
3316 3351 3356	7	0	151,049	7,512	158,561	13,000	4,000	175,532	20
3317 3322 3325	12	5	264,892	0	264,892	0	13,546	291,207	0
3317 3356 3399	5	0	2,975	505	3,480	111,903	113,468	228,276	0
3321 3322	4	0	1,751	230,120	231,871	0	2,786,004	2,986,673	0
3321 3322 3365	3	1	1,000	255	1,255	12,000	0	13,060	0
3321 3322 3365 3366	3	0	3,341	0	3,341	0	4,519	7,860	0
3321 3324 3369	2	0	361	0	361	104	30,603	31,069	0
3321 3325	13	3	9,333	1,515	10,848	431,996	10	442,422	0
3321 3341	3	0	19,828	0	19,828	12,512	7,430	39,770	0
3321 3365	20	2	2,428,729	3,875	2,432,604	340,000	504,391	3,258,489	0
3321 3365 3369	1	0	46	0	46	0	118,849	118,895	0
3321 3369	6	0	10,127	6	10,133	0	10,412	20,545	0
3322 3325 3369	2	1	500	0	500	18,000	0	18,500	0
3324 3325	5	0	2,015	35,700	37,715	0	178	36,775	0
3324 3325 3365	3	0	28,522	0	28,522	0	0	28,521	0
3324 3365	1	0	0	65	65	0	184	349	0
3324 3365 3366	11	0	69	35,562	35,631	9,505	351,988	419,382	0
3324 3365 3366 3369	2	1	780	0	780	590,000	334,671	920,851	0
3324 3369	10	0	22,471	17,774	40,245	2,554,800	1,360,565	3,952,796	0
3325 3365	4	0	538	0	538	0	0	538	0
3325 3365 3366	1	0	5	0	5	0	0	5	0
3325 3366 3369	6	0	2,002	0	2,002	0	0	661	0
3325 3369	5	0	2,010	4,905	6,915	227,850	34,510	266,170	0
3331 3351	23	0	31,487,709	1,799	31,489,508	547,632,371	12,379,845	591,500,408	531
3334 3341	8	0	549,250	37,499	586,749	463,825	264,998	1,013,075	302,497
3334 3353	33	0	2,974,394	162,873	3,137,267	34,639,975	1,712,577	39,275,090	0
3334 3353 3355	9	0	1,003,881	182,550	1,186,431	15,526,340	2,240,002	18,949,022	0
3334 3354 3355	10	0	756,123	706	756,829	9,046,060	0	9,800,392	16

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

1996 Toxics Release Inventory: Public Data Release—Errata

Table 8-2. Multiple SIC Codes, 1996: Primary Metals, SIC Code 33, Continued

SIC Codes	Total Forms Number	Form As Number	Total On-site Releases Pounds	Total Off-site Releases Pounds	Total On- and Off-site Releases Pounds	Total Other On-site Waste Management Pounds	Total Transfers Off-site for Further Waste Management Pounds	Total Production-related Waste Pounds	Non-Production-related Waste Pounds
3334 3355	16	0	813,016	18,750	831,766	2,973,250	143,204	3,947,207	2,500
3334 3399	1	0	3,150	0	3,150	3,800	0	4,300	0
3339 3341	11	0	511,566	22,986,960	23,498,526	42,000	107,067	23,646,321	12,962,592
3339 3351	6	1	667,786	45,929	713,715	886,072	2,203,202	3,749,074	0
3339 3356	12	1	1,528,200	48,864	1,577,064	17,559,435	250	19,087,835	50
3341 3351	1	1	0	0	0	0	0	0	0
3341 3351 3366	9	3	237,442	166,034	403,476	11,139	97,215	510,941	0
3341 3351 3398	14	0	138,257	771,459	909,716	103,080,400	6,038,557	109,980,964	0
3341 3353	20	0	542,014	22,836	564,850	6,388,540	31,426,836	7,822,547	0
3341 3354	14	6	1,860	56	1,916	2,324,091	30,286	2,353,348	0
3341 3354 3355 3356	6	0	2,800	2,636	5,436	0	323,212	324,851	0
3341 3354 3356 3365	3	0	62	0	62	0	132	193	0
3341 3355	6	0	3,700	2,000	5,700	200,000	128,600	334,550	0
3341 3356	11	1	1,334	755	2,089	2,848,278	449,305	3,297,216	0
3341 3356 3399	11	0	176,598	0	176,598	614,969	2,161,466	2,951,672	0
3341 3363 3365 3398	3	0	3,770	0	3,770	4,700	50,800	58,887	0
3341 3369	5	0	1,050	5	1,055	202,170	34,125	237,433	0
3341 3398	5	0	1,478	0	1,478	560,657	0	562,114	0
3341 3399	4	0	555,978	152	556,130	362,427	113	918,670	151
3351 3355	2	0	0	5	5	0	985,219	1,314,402	0
3351 3355 3356 3398 3399	3	0	52,505	0	52,505	0	59,400	103,650	0
3351 3355 3366	3	0	14,673	179	14,852	0	181	1,276,761	0
3351 3356	4	0	57,097	500	57,597	0	458,590	515,793	0
3351 3356 3357	3	0	275	760	1,035	0	8,090	180,042	0
3351 3356 3357 3398 3399	1	0	505	0	505	0	135,000	135,400	0
3351 3357	7	0	38,436	0	38,436	1,631,524	56,285	1,724,075	0
3351 3362	4	1	7,041	1,139	8,180	0	3,547,200	3,555,490	72,126
3351 3366	14	0	16,252	250	16,502	26,716,514	5,335,068	32,001,920	0
3351 3399	2	0	632	0	632	0	13	658	0
3353 3355	10	0	543,060	3,787	546,847	38,000	101,750	653,123	0
3354 3355	8	0	43,324	666	43,990	0	155	44,151	0
3354 3365	2	0	4,321	0	4,321	0	0	4,171	0
3355 3398	3	0	500	1,751	2,251	1,100	4,965	7,633	0
3356 3357 3399	2	0	29,254	0	29,254	25,000	110	54,143	0
3356 3369	4	1	4,536	0	4,536	5,300	105,410	115,334	0
3356 3398 3399	1	0	550	0	550	0	367,000	367,800	0
3356 3399	3	3	0	0	0	0	0	0	0
3357 3399	1	0	1	0	1	0	2	3	0
3362 3369	1	0	1,611	0	1,611	0	0	1,611	0
3363 3364	21	3	9,655	9,210	18,865	173,500	233,233	424,433	0
3363 3365	6	0	243	57,100	57,343	7,662,403	594,846	8,314,477	0
3363 3369	1	0	30	0	30	11,000	255	16,116	0
3364 3365	1	0	591	0	591	0	0	341	0
3364 3366 3369	1	0	33	3,497	3,530	75,205	0	78,735	0
3365 3366	42	6	49,742	5,524	55,266	17,137	1,374,265	2,116,037	0
3365 3366 3369	9	0	9,961	500	10,461	133,400	414,712	557,967	0
3365 3369	7	1	2,015	5	2,020	0	67,529	68,642	0
3365 3398	6	0	50,607	523	51,130	43,000	41,806	136,415	0
3365 3399	3	2	260	0	260	0	0	42	0
Total for SIC Code 33	784	55	72,104,755	46,565,361	118,670,116	842,007,107	118,645,496	1,050,163,029	14,070,685

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