

LEGEND

M Matched Chemicals/Industries**A** All Chemicals/Industries**4 North American Pollutant Releases and Transfers, 1996**

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- M** Matched Chemicals/Industries
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■ Key Findings

- Results in the matched 1996 data set show that facilities in the United States dominated releases and transfers of listed pollutants reported to North American PRTRs. Given the relative size of the two systems, however, Canadian reporting represented a larger percentage of the releases and transfers—specifically for emissions to air, transfers to treatment/destruction, and transfers to disposal/containment.
- Releases to air, surface water, underground injection and land disposal at the facility accounted for 67 percent of NPRI releases and transfers and 71 percent of those in TRI.
- Four states and provinces—Texas, Louisiana, Ohio, and Ontario—accounted for more than one-quarter of the North American releases reported in 1996. These four also accounted for more than one-quarter of the total releases and transfers reported in 1996, but ranked differently: Texas, Ontario, Louisiana, and Ohio.
- Fifty facilities reporting the largest amounts contributed one-third of total North American releases. They were responsible for more than 70 percent of the underground injection and on-site land releases reported. The 50 facilities with the largest total releases and transfers contributed one-quarter of the North American total. More of their transfers off-site were sent to disposal/containment than was the case for all other facilities in the matched data set.
- Methanol, used in many industrial processes and generated as a byproduct in others, topped the list of 164 chemical substances and groups in the matched data set, with 186 million kg of releases and transfers. One of every four PRTR forms submitted in 1996 was for a substance designated as a known or suspected carcinogen by the International Agency for Research on Cancer or by the US National Toxicological Program. Releases and transfers of these substances amounted to 189 million kg, about one-sixth of the total. Facilities reported 317 million kg of releases and transfers of metals—40 percent of this total was for zinc and its compounds.
- The chemical industry (US SIC code 28) ranked first for total releases and transfers with 404 million kg, followed by primary metal industries (US SIC code 33) with 312 million kg. Together, they accounted for more of the total releases and transfers than the other 19 industry groups combined.

4.1 Introduction

This chapter summarizes PRTR data for North America, using publicly available data collected by Canada and the United States for 1996. As explained in **Chapter 3**, it analyzes the data for industries and chemicals that must be reported in both countries (a matched data set).

In 1996, more than 20,000 North American facilities in industries covered by both the US TRI and the Canadian NPRI filed reports on the substances that are common to both PRTRs. On average, they reported on three substances each (**Table 4-1**, p. 38).

4.2 Overview, 1996

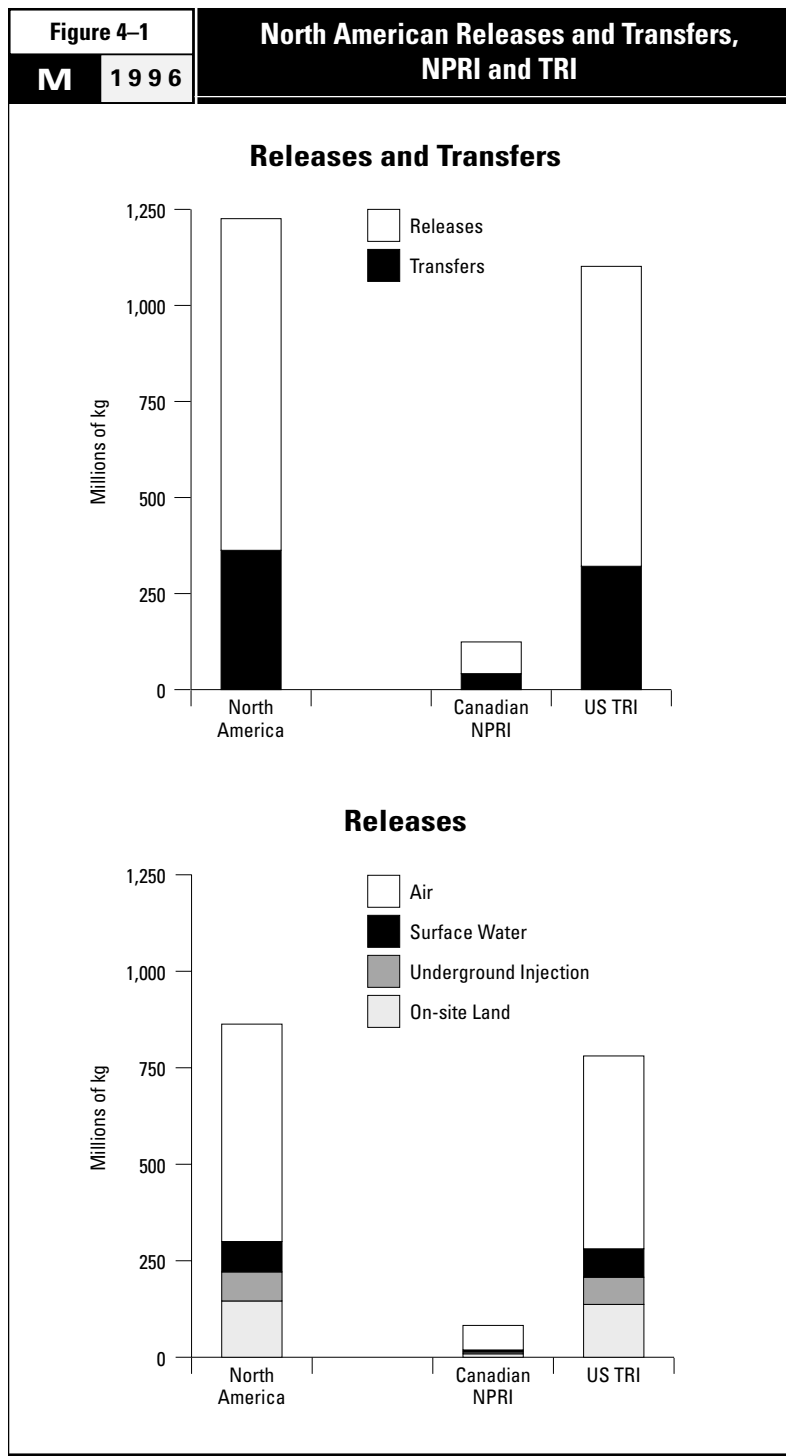
Releases and transfers in North America totaled 1.23 billion kg in 1996 for the matched data set. On-site releases to air, water, underground injection wells and land were 70 percent of this total (Table 4-1, p. 38).

Releases in North America were about two and one-half times larger than transfers in 1996, and the largest releases occurred to air (Figure 4-1). This has been the pattern throughout the history of the Canadian and US PRTRs.

Most of the North American reporting occurs in the United States, because of its larger industrial base. Thus, 93 percent of the North American facilities and forms in 1996 came from the US TRI and 7 percent from Canada's NPRI. Canadian facilities, however, reported a relatively larger percentage of the actual quantities of releases and transfers—10 percent of the total.

Emissions to air totaled 563 million kg, almost half of all releases and transfers reported. The percentage of air emissions was somewhat higher in Canada (51 percent) than in the United States (45 percent). Despite this, releases represented a larger proportion of reporting in TRI (71 percent) than in NPRI (67 percent). Disposal/containment received the largest transfers in both PRTRs, although the percentage in NPRI (19 percent) was considerably higher than in TRI (11 percent, see Table 4-1, p. 38 and Figure 4-2).

More of North American transfers to disposal/containment came from NPRI reporting (16 percent) than any other release or transfer category. At the same time, TRI reporting accounted for a larger percentage of transfers to sewage treatment plants (95 percent) than any other release or transfer type.

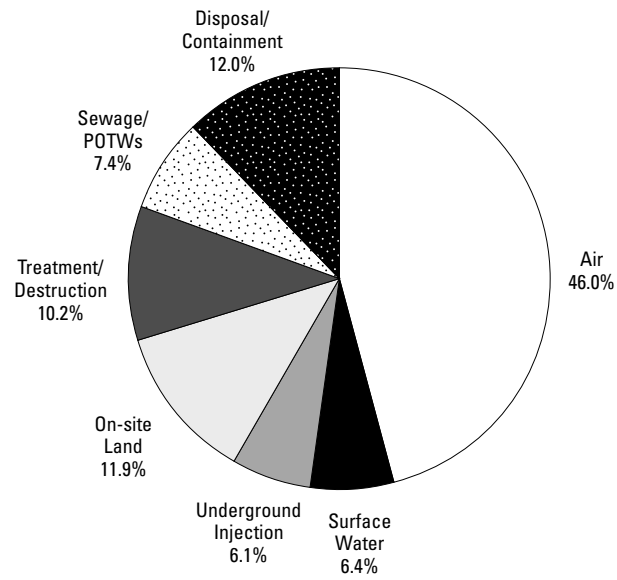


► Canada and US data only, Mexico data not collected for 1996.

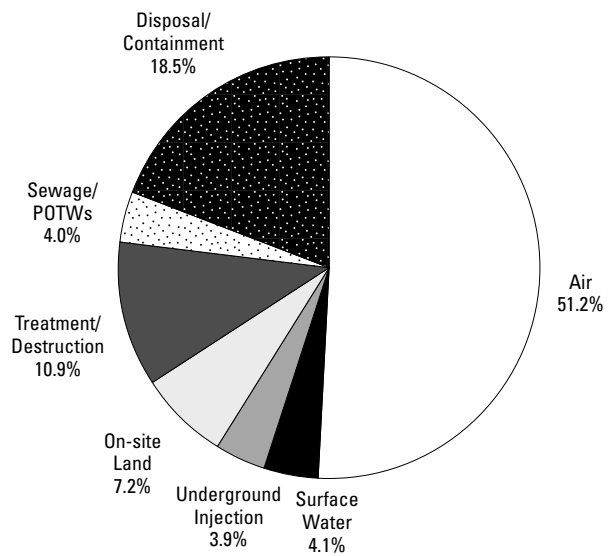
Figure 4-2

M 1996

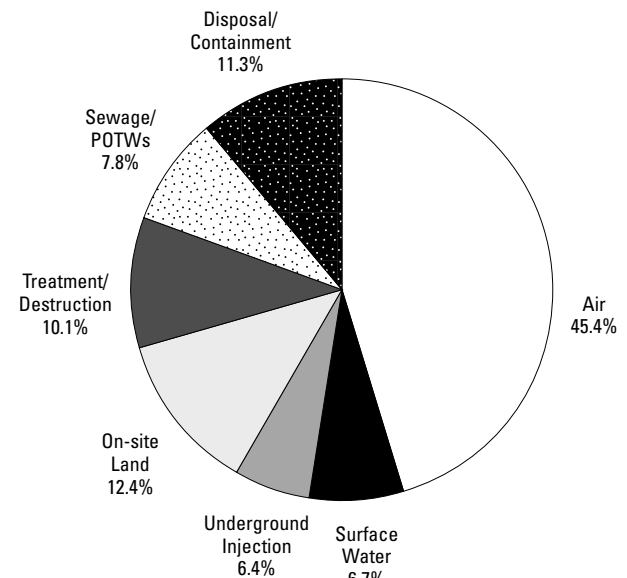
North American Releases and Transfers by Type, NPRI and TRI



North America



Canadian NPRI



US TRI

► Canada and US data only, Mexico data not collected for 1996.

Table 4-1		North American Releases and Transfers, NPRI and TRI							
M	1996	North America		Canadian NPRI		US TRI		NPRI as % of	TRI as % of
		Number		Number		Number		North American Total	North American Total
Total Facilities		20,534		1,344		19,190		6.5	93.5
Total Forms		62,225		4,298		57,927		6.9	93.1
		kg	%	kg	%	kg	%		
Total Air Emissions		563,269,177	45.9	63,590,706	51.2	499,678,471	45.4	11.3	88.7
Surface Water Discharges		78,742,497	6.4	5,128,134	4.1	73,614,363	6.7	6.5	93.5
Underground Injection		75,239,943	6.1	4,812,379	3.9	70,427,564	6.4	6.4	93.6
On-site Land Releases		145,838,045	11.9	8,936,491	7.2	136,901,554	12.4	6.1	93.9
Matched Releases		863,218,412	70.4	82,596,460	66.5	780,621,952	70.9	9.6	90.4
Treatment/Destruction		124,473,070	10.2	13,571,799	10.9	110,901,271	10.1	10.9	89.1
Sewage/POTWs		91,073,897	7.4	4,943,234	3.0	86,130,663	7.8	5.4	94.6
Disposal/Containment		147,065,311	11.0	23,017,654	18.5	124,047,657	11.3	15.7	84.3
Matched Transfers		362,612,278	29.6	41,532,687	33.5	321,079,591	29.1	11.5	88.5
Total Releases and Transfers		1,225,830,690	100.0	124,129,147	100.0	1,101,701,543	100.0	10.1	89.9

► Canada and US data only, Mexico data not collected for 1996.

4.3 Geographic Distribution

4.3.1 Releases

More than one-quarter of all North American releases in the matched data set originated in four states and provinces: Texas, Louisiana, Ohio, and Ontario (**Map 4-1**). The largest releases came from the two states on the Gulf of Mexico with significant oil and chemical production. Facilities in Texas reported more emissions to air, more underground injection and more total releases than any other state or province. Releases in Texas were far larger than those in other states and provinces—half again as much as in second-ranked Louisiana. However, Louisiana led all states and provinces for surface water discharges and also reported substantial underground injection (**Table 4-2**, p. 46).

Although it did not lead in any release category, Ohio ranked third for total releases, followed by Ontario, which had the second largest air emissions.

Air emissions, the largest single type of release or transfer, were reported in the largest amounts through the east and south (**Map 4-1a**).

Other release types were more concentrated. Three-quarters of each release type other than air occurred in a handful of US states and (for surface water discharges) one province. Drawing upon the data in **Table 4-2** (p. 46), these states/province can be listed alphabetically as follows:

- For surface water discharges—California, Georgia, Illinois, Louisiana, Mississippi, New Brunswick, New Jersey, New York, Ohio, Pennsylvania, Texas, South Dakota and West Virginia.

- For underground injection—Florida, Louisiana and Texas.
- For on-site land releases—Arizona, Florida, Idaho, Illinois, Missouri, Montana, New Mexico, North Carolina, Ohio, Texas and Utah.

Underground injection received the smallest amount of releases in both countries, but was more common in the United States than in Canada. Chemical manufacturers, including the large petrochemical industry in Louisiana and Texas, reported the great majority of underground injection. Geographically, surface water discharges and on-site land releases were more widely dispersed (**Maps 4-1b** through **4-1d**).

4.3.2 Releases and Transfers

States and provinces with large releases and transfers encircle the Great Lakes and extend through the eastern United States down to the Gulf of Mexico. A few are on the Southwestern plains (**Maps 4-2** and **4-2a**).

Primarily because of its releases, Texas also ranked first for total releases and transfers, with 10 percent of the total. Large off-site transfers influenced the ranking of some states and provinces. This is true for Ontario, which had the third-largest transfers and ranked second overall. In third-ranked Louisiana, releases accounted for almost all of its total releases and transfers. Transfers were larger than releases in only nine US states and territories (including the District of Columbia) and in no Canadian province (**Table 4-3**, p. 47).

Because releases, especially air emissions, dominate North American PRTR reporting, the geographic distribution of releases and transfers (**Map 4-2**) resembles the distribution of releases alone, especially in the east (**Map 4-1**).

[Text continues on p. 49.]

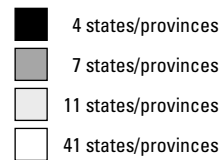
Map 4-1

M 1996

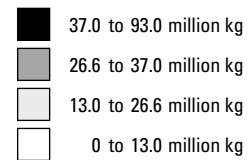
Largest Sources of North American Releases: States and Provinces



Each shade = one-quarter of total releases



Range in kilograms



Map 4-1a

M 1996

Largest Sources of North American Releases to Air: States and Provinces



Each shade = one-quarter of total releases

- 4 states/provinces
- 7 states/provinces
- 11 states/provinces
- 41 states/provinces

Range in kilograms

- 31.0 to 48.0 million kg
- 18.0 to 31.0 million kg
- 9.5 to 18.0 million kg
- 0 to 9.5 million kg

Map 4-1c

M 1996

Largest Sources of North American Underground Injection: States and Provinces



Each shade = one-quarter of total releases

- 1 states/provinces
- 1 states/provinces
- 4 states/provinces
- 57 states/provinces

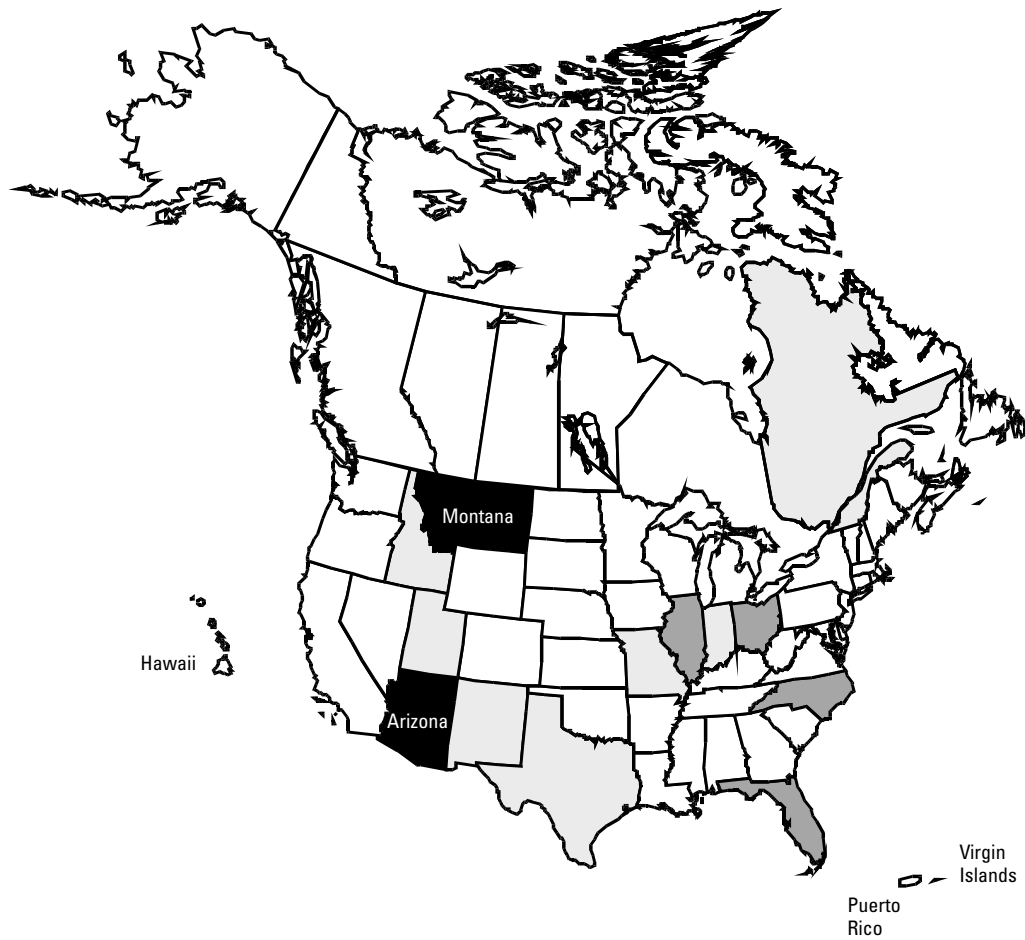
Range in kilograms

- 25.0 to 30.0 million kg
- 15.0 to 25.0 million kg
- 2.5 to 15.0 million kg
- 0 to 2.5 million kg

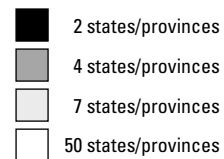
Map 4-1d

M 1996

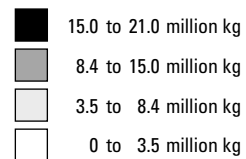
Largest Sources of North American Releases On-site Land: States and Provinces



Each shade = one-quarter of total releases



Range in kilograms



Map 4-2

M 1996

Largest Sources of North American Releases and Transfers: States and Provinces



Each shade = one-quarter of total releases and transfers

- 4 states/provinces
- 7 states/provinces
- 12 states/provinces
- 40 states/provinces

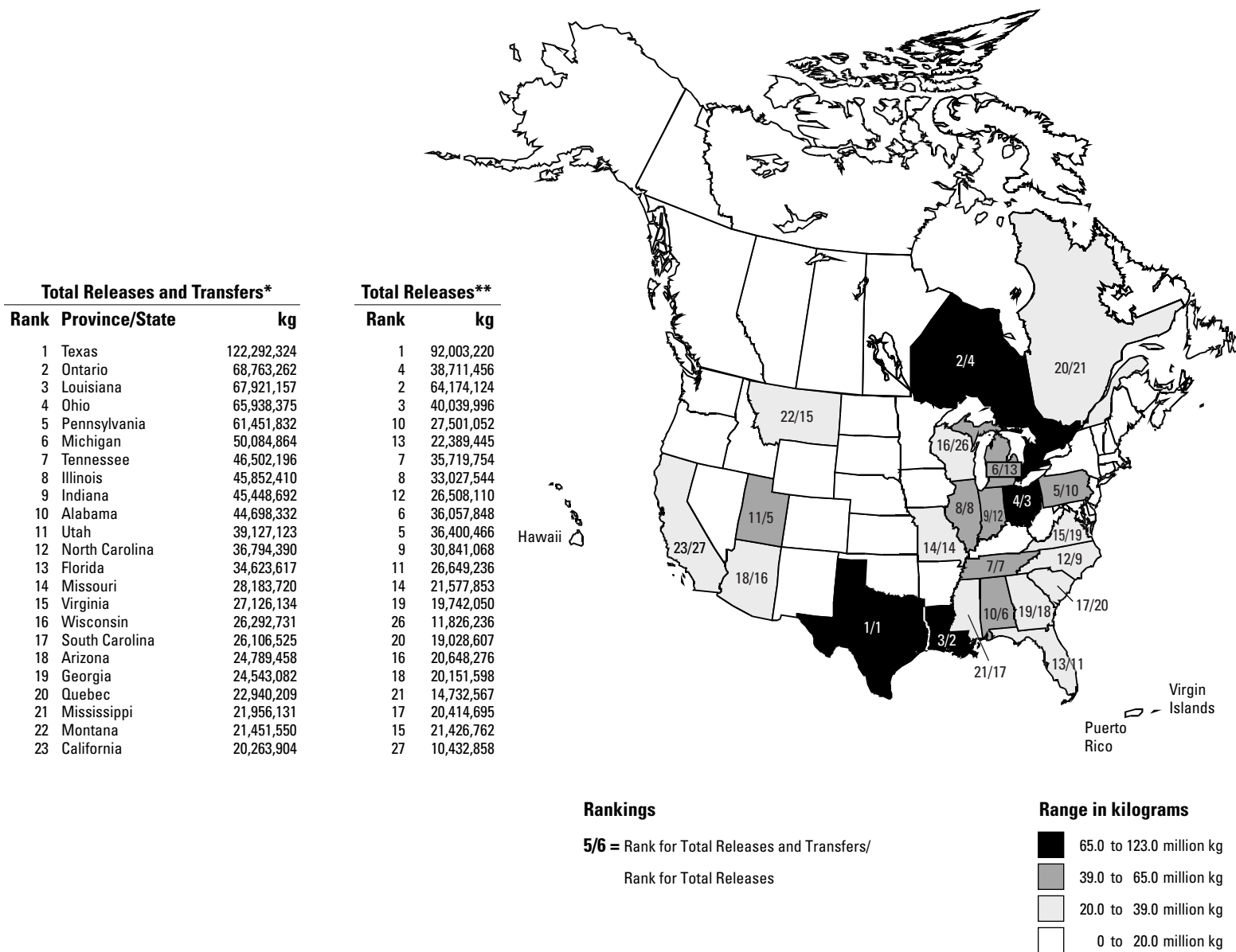
Range in kilograms

- 65.0 to 123.0 million kg
- 39.0 to 65.0 million kg
- 20.0 to 39.0 million kg
- 0 to 20.0 million kg

Map 4-2a

M 1996

Largest Sources of North American Releases and Transfers: States and Provinces



* See Table 4-3

** See Table 4-2

TAKING STOCK: North American Pollutant Releases and Transfers

Table 4-2		North American Releases, by Province and State									
Province/State	Total Air Emissions		Surface Water Discharges		Underground Injection		On-site Land Releases		Total Releases		
	kg	%	kg	%	kg	%	kg	%	kg	%	
Texas	47,593,046	8.4	8,314,441	10.6	29,226,586	38.8	6,869,147	4.7	92,003,220	10.7	
Louisiana	23,936,541	4.2	17,017,179	21.6	20,685,610	27.5	2,534,794	1.7	64,174,124	7.4	
Ohio	19,693,509	3.5	2,403,667	3.1	5,103,458	6.8	12,839,362	8.8	40,039,996	4.6	
Ontario	35,222,244	6.3	1,310,462	1.7	0	0.0	2,099,445	1.4	38,711,456	4.5	
Utah	30,786,938	5.5	6,583	0.0	0	0.0	5,606,945	3.8	36,400,466	4.2	
Alabama	31,455,659	5.6	1,318,413	1.7	5	0.0	3,283,771	2.3	36,057,848	4.2	
Tennessee	31,700,778	5.6	503,816	0.6	572,198	0.8	2,942,962	2.0	35,719,754	4.1	
Illinois	19,968,668	3.5	2,263,340	2.9	350	0.0	10,795,186	7.4	33,027,544	3.8	
North Carolina	21,784,191	3.9	626,917	0.8	0	0.0	8,429,960	5.8	30,841,068	3.6	
Pennsylvania	16,208,407	2.9	10,132,580	12.9	0	0.0	1,160,065	0.8	27,501,052	3.2	
Florida	9,483,892	1.7	202,991	0.3	7,885,535	10.5	9,076,818	6.2	26,649,236	3.1	
Indiana	21,756,464	3.9	998,925	1.3	92,181	0.1	3,660,540	2.5	26,508,110	3.1	
Michigan	17,494,151	3.1	835,446	1.1	2,441,460	3.2	1,618,388	1.1	22,389,445	2.6	
Missouri	12,924,617	2.3	1,138,571	1.4	0	0.0	7,514,665	5.2	21,577,853	2.5	
Montana	1,276,821	0.2	35,561	0.1	0	0.0	20,114,380	13.8	21,426,762	2.5	
Arizona	3,948,840	0.7	159	0.0	2	0.0	16,699,275	11.5	20,648,276	2.4	
Mississippi	14,615,845	2.6	3,264,420	4.1	34,751	0.1	2,499,679	1.7	20,414,695	2.4	
Georgia	16,082,307	2.9	2,989,514	3.8	0	0.0	1,079,777	0.7	20,151,598	2.3	
Virginia	18,861,490	3.3	427,916	0.5	5	0.0	452,639	0.3	19,742,050	2.3	
South Carolina	17,884,704	3.2	842,451	1.1	0	0.0	301,452	0.2	19,028,607	2.2	
Quebec	9,938,248	1.8	1,142,110	1.5	0	0.0	3,633,536	2.5	14,732,567	1.7	
Alberta	8,769,955	1.6	302,619	0.4	4,807,393	6.4	733,895	0.5	14,621,572	1.7	
Kentucky	11,286,339	2.0	610,612	0.8	0	0.0	816,812	0.6	12,713,763	1.5	
New York	10,120,889	1.8	1,684,244	2.1	1,166	0.0	489,946	0.3	12,296,245	1.4	
Oregon	9,679,802	1.7	1,120,834	1.4	0	0.0	1,072,653	0.7	11,873,289	1.4	
Wisconsin	10,412,187	1.8	1,228,610	1.6	0	0.0	185,439	0.1	11,826,236	1.4	
California	7,479,859	1.3	2,413,569	3.1	1,247	0.0	538,183	0.4	10,432,858	1.2	
Arkansas	8,184,598	1.5	555,704	0.7	721,849	0.9	521,356	0.4	9,983,507	1.2	
West Virginia	5,940,424	1.1	3,725,510	4.7	0	0.0	232,510	0.2	9,898,444	1.1	
Washington	8,121,176	1.4	926,607	1.2	0	0.0	60,561	0.0	9,108,344	1.1	
New Mexico	766,890	0.1	5	0.0	0	0.0	8,150,220	5.6	8,917,115	1.0	
Iowa	6,518,923	1.2	1,185,518	1.5	0	0.0	716,587	0.5	8,421,028	1.0	
Kansas	5,562,502	0.0	173,898	0.2	447,675	0.6	391,048	0.3	6,575,123	0.8	
Minnesota	6,256,417	1.1	22,680	0.0	0	0.0	33,228	0.0	6,312,325	0.7	
Oklahoma	5,193,399	0.9	236,690	0.3	442,021	0.6	41,190	0.0	5,913,300	0.7	
British Columbia	5,315,182	0.9	289,035	0.4	0	0.0	95,564	0.1	5,710,382	0.7	
New Jersey	3,502,921	0.6	1,772,559	2.3	2	0.0	166,347	0.1	5,441,829	0.6	
Idaho	905,932	0.2	468,450	0.6	0	0.0	3,884,991	2.7	5,259,373	0.6	
Maryland	2,599,111	0.5	735,594	0.9	0	0.0	833,560	0.6	4,168,265	0.5	
Wyoming	528,210	0.1	203	0.0	2,771,338	3.7	15,238	0.0	3,314,989	0.4	
New Brunswick	1,298,472	0.2	1,976,038	2.5	0	0.0	0	0.0	3,277,331	0.4	
Maine	2,787,043	0.5	255,305	0.3	0	0.0	87,337	0.1	3,129,685	0.4	
Manitoba	999,785	0.2	32,584	0.0	0	0.0	2,024,670	1.4	3,062,727	0.4	
Puerto Rico	2,994,729	0.5	31,368	0.0	0	0.0	1,517	0.0	3,027,614	0.4	
Connecticut	2,326,895	0.4	285,137	0.4	0	0.0	26,871	0.0	2,638,903	0.3	
Massachusetts	2,399,396	0.4	28,498	0.0	0	0.0	6,913	0.0	2,434,807	0.3	
Nebraska	2,179,434	0.4	119,579	0.2	0	0.0	20,987	0.0	2,320,000	0.3	
South Dakota	551,672	0.1	1,541,952	1.0	0	0.0	454	0.0	2,094,078	0.2	
Nevada	405,791	0.1	0	0.0	0	0.0	1,058,623	0.7	1,464,414	0.2	
Colorado	997,727	0.2	402,636	0.5	0	0.0	45,499	0.0	1,445,862	0.2	
Nova Scotia	889,150	0.2	43,272	0.1	0	0.0	343,551	0.2	1,278,806	0.1	
Delaware	939,119	0.2	100,452	0.1	0	0.0	11,902	0.0	1,051,473	0.1	
Alaska	579,358	0.1	458,168	0.6	122	0.0	2,237	0.0	1,039,885	0.1	
Rhode Island	967,628	0.2	3,910	0.0	0	0.0	9	0.0	971,547	0.1	
New Hampshire	862,005	0.2	7,612	0.0	0	0.0	4,805	0.0	874,422	0.1	
Saskatchewan	749,501	0.1	22,230	0.0	4,986	0.0	5,830	0.0	783,366	0.1	
Virgin Islands	555,685	0.1	3,121	0.0	0	0.0	2,960	0.0	561,766	0.1	
North Dakota	314,729	0.1	137,566	0.2	0	0.0	4	0.0	452,299	0.1	
Newfoundland	399,628	0.1	772	0.0	0	0.0	0	0.0	400,700	0.1	
Vermont	132,770	0.0	54,424	0.1	0	0.0	613	0.0	187,807	0.0	
Hawaii	168,043	0.0	458	0.0	3	0.0	1,152	0.0	169,656	0.0	
Prince Edward Island	8,541	0.0	9,012	0.0	0	0.0	0	0.0	17,553	0.0	
District of Columbia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Total	563,269,177	100.0	78,742,497	100.0	75,239,943	100.0	145,838,045	100.0	863,218,412	100.0	

➤ Canada and US data only. Mexico data not collected for 1996.

Table 4-3

M 1996

North American Releases and Transfers, by Province and State

Province/State	1996 Population	Land Area (sq km)	Facilities		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers		Total Releases and Transfers			
			Number	Rank			kg	Rank	Per Capita		Per Sq Km	
									kg	Rank	kg	Rank
Texas	19,091,207	691,031	1,074	5	92,003,220	30,289,104	122,292,324	1	5.9	15	615.0	4
Ontario	10,753,573	916,734	733	10	38,711,456	30,051,806	68,763,262	2	3.9	31	314.2	16
Louisiana	4,340,818	123,675	269	28	64,174,124	3,747,033	67,921,157	3	0.6	59	49.3	40
Ohio	11,162,797	107,045	1,462	1	40,039,996	25,898,379	65,938,375	4	5.1	24	523.7	6
Pennsylvania	12,040,084	117,348	1,083	4	27,501,052	33,950,780	61,451,832	5	6.4	13	176.0	25
Michigan	9,730,925	151,585	795	8	22,389,445	27,695,419	50,084,864	6	7.8	7	484.9	8
Tennessee	5,307,381	109,153	574	13	35,719,574	10,782,442	46,502,196	7	5.1	23	180.8	22
Illinois	11,845,316	145,934	1,165	2	33,027,544	12,824,866	45,852,410	8	5.1	22	330.4	14
Indiana	5,828,090	93,719	936	6	26,508,110	18,940,582	45,448,692	9	5.0	25	269.7	18
Alabama	4,287,178	133,916	443	17	36,057,848	8,640,484	44,698,332	10	6.4	14	75.0	33
Utah	2,017,573	219,889	128	38	36,400,466	2,726,657	39,127,123	11	3.3	34	160.9	27
North Carolina	7,309,055	136,413	769	9	30,841,068	5,953,322	36,794,390	12	1.1	53	156.3	28
Florida	14,418,917	151,940	447	16	26,649,236	7,974,381	34,623,617	13	8.8	5	426.0	11
Missouri	5,363,669	180,515	499	15	21,577,853	6,605,867	28,183,720	14	2.1	42	842.1	2
Virginia	6,666,167	105,587	395	21	19,742,050	7,384,084	27,126,134	15	5.3	21	156.1	29
Wisconsin	5,146,199	145,436	801	7	11,826,236	14,466,495	26,292,731	16	2.4	40	227.9	20
South Carolina	3,716,645	80,583	439	18	19,028,607	7,077,918	26,106,525	17	10.4	4	333.8	13
Arizona	4,434,340	295,260	172	33	20,648,276	4,141,182	24,789,458	18	7.0	10	323.0	15
Georgia	7,334,274	152,577	623	11	20,151,598	4,391,484	24,543,082	19	2.2	41	46.0	41
Quebec	7,138,795	1,357,812	336	24	14,732,567	8,207,642	22,940,209	20	1.3	51	379.3	12
Mississippi	2,710,750	123,515	274	27	20,414,695	1,541,436	21,956,131	21	4.1	30	256.9	19
Montana	876,684	380,850	21	55	21,426,762	24,788	21,451,550	22	4.4	28	164.8	26
California	31,857,646	411,049	1,137	3	10,432,858	9,831,046	20,263,904	23	4.6	26	89.7	31
New York	18,134,226	127,190	614	12	12,296,245	7,581,903	19,878,148	24	3.2	35	16.9	49
Oregon	3,196,313	251,419	222	32	11,873,289	6,527,813	18,401,102	25	5.3	20	96.3	30
Kentucky	3,882,071	104,659	380	22	12,713,763	4,533,978	17,247,741	26	1.9	44	465.3	9
New Jersey	8,001,850	20,168	514	14	5,441,829	11,541,705	16,983,534	27	8.1	6	177.8	24
Alberta	2,696,826	638,233	96	42	14,621,572	553,277	15,174,849	28	15.6	3	549.2	5
Arkansas	2,506,293	137,754	334	25	9,983,507	3,277,183	13,260,690	29	2.4	39	44.2	43
Iowa	2,848,033	145,752	353	23	8,421,028	4,658,833	13,079,861	30	4.1	29	50.1	39
West Virginia	1,820,407	62,758	121	40	9,898,444	3,094,407	12,992,851	31	1.0	43	61.1	36
Washington	5,519,525	176,478	249	31	9,108,344	1,670,102	10,778,446	32	5.8	16	73.2	34
Kansas	2,579,149	213,098	253	30	6,575,123	4,109,899	10,685,022	33	5.6	18	83.0	32
Minnesota	4,648,596	218,601	434	19	6,312,325	3,751,120	10,063,445	34	1.5	49	274.9	17
New Mexico	1,711,256	314,926	31	51	8,917,115	209,399	9,126,514	35	0.7	58	9.6	54
Massachusetts	6,085,395	21,456	428	20	2,434,807	5,703,905	8,138,712	36	1.7	47	711.4	3
Oklahoma	3,295,315	181,186	261	29	5,913,300	2,093,362	8,006,662	37	2.6	38	20.0	48
Maryland	5,060,296	27,091	162	34	4,168,265	3,279,374	7,447,639	38	19.4	2	177.9	23
Puerto Rico	3,782,862	9,104	140	36	3,027,614	3,448,516	6,476,130	39	1.4	50	430.5	10
British Columbia	3,724,500	892,677	70	44	5,710,382	561,021	6,271,403	40	7.1	9	207.0	21
Connecticut	3,267,293	12,997	285	26	2,638,903	3,407,867	6,046,770	41	1.1	52	53.6	38
Idaho	1,187,597	216,431	49	47	5,259,373	133,666	5,393,039	42	5.6	17	23.8	47
New Brunswick	738,133	71,569	21	56	3,277,331	1,575,434	4,852,765	43	3.1	36	44.4	42
Nebraska	1,648,696	200,350	137	37	2,320,000	1,884,339	4,204,339	44	1.7	48	7.0	55
Maine	1,238,566	86,156	73	43	3,129,685	691,665	3,821,350	45	3.7	33	502.1	7
Wyoming	480,011	253,326	25	53	3,314,989	15,193	3,330,182	46	3.7	32	13.6	50
Manitoba	1,113,898	547,704	39	49	3,062,727	245,373	3,308,100	47	4.5	27	24.9	46
South Dakota	737,561	199,731	60	46	2,094,078	627,189	2,721,267	48	0.9	54	5.3	57
Delaware	723,475	5,294	62	45	1,051,473	1,606,538	2,658,011	49	2.0	37	6.0	56
Colorado	3,816,179	269,596	151	35	1,445,862	1,148,379	2,594,241	50	0.5	60	12.5	52
Nova Scotia	909,282	52,841	25	54	1,278,806	322,158	1,600,964	51	5.3	19	28.0	45
Nevada	1,600,810	286,353	42	48	1,464,414	46,679	1,511,093	52	0.8	56	2.8	59
Rhode Island	988,283	3,139	125	39	971,547	379,877	1,351,424	53	6.9	11	13.1	51
New Hampshire	1,160,213	24,033	98	41	874,422	412,532	1,286,954	54	1.8	45	30.3	44
Alaska	604,966	1,530,702	8	59	1,039,885	60	1,039,945	55	24.5	1	56.3	37
Saskatchewan	990,237	570,113	15	57	783,366	15,955	799,321	56	6.6	12	67.8	35
Virgin Islands	101,809	342	2	61	561,766	171,183	732,949	57	0.8	55	1.4	60
North Dakota	642,633	183,121	29	52	452,299	58,958	511,257	58	0.1	61	10.3	53
Newfoundland	551,792	371,635	7	60	400,700	8	400,708	59	1.7	46	0.7	63
Vermont	586,461	24,900	32	50	187,807	122,568	310,375	60	0.7	57	1.1	61
Hawaii	1,182,948	16,760	9	58	169,656	3,535	173,191	61	7.2	8	2,143.9	1
Prince Edward Island	134,557	5,660	2	62	17,553	0	17,553	62	0.1	62	3.1	58
District of Columbia	539,279	163	1	63	0	115	115	63	0.0	63	0.7	62
Total	297,815,675	14,807,032	20,534	100.0	863,218,412	362,612,278	1,225,830,690	100.0	4.1		82.8	

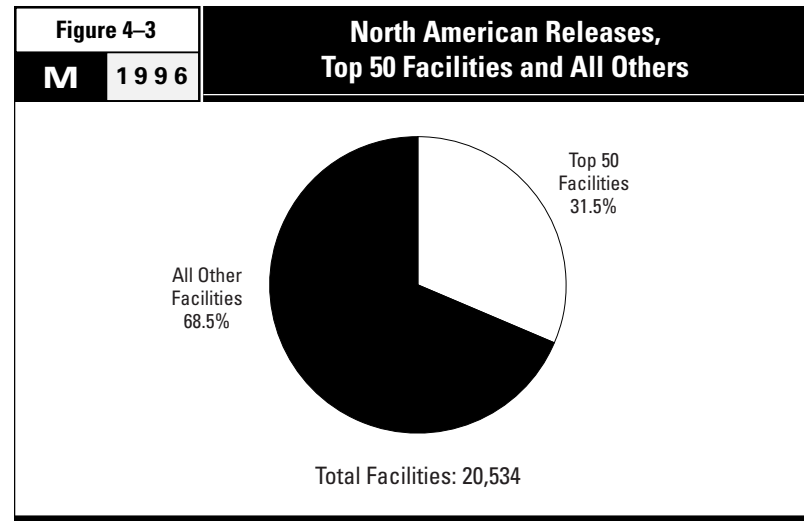
► Canada and US data only. Mexico data not collected for 1996.

4.4 Top Facilities

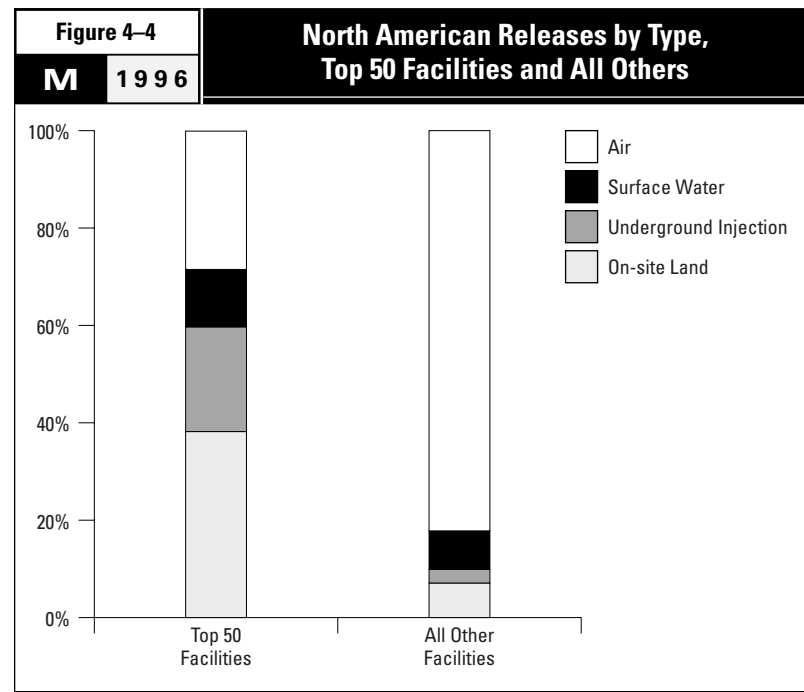
Among more than 20,000 reporting facilities, 50 contributed almost one-third of the North American releases (**Figure 4-3** and **Table 4-4**, pp. 52–53). For the top facilities, air emissions were markedly smaller, and underground injection and on-site land releases larger, than for all other facilities. Air emissions from the top 50 facilities represented 14 percent of the total while underground injection and on-site land releases represented more than 70 percent of those totals. Underground injection is practiced in limited geographical areas by relatively few facilities, most of which are among the top 50 facilities (**Figure 4-4**).

The 50 facilities with the largest total releases and transfers contributed one-quarter of the total North American releases and transfers in 1996 (**Figure 4-5** and **Table 4-5**, pp. 54–55). Here, too, air emissions were relatively smaller and underground injection and on-site land releases larger than for all facilities. Transfers of PRTR-listed substances to other sites for waste management also showed striking differences for the top facilities and other facilities. In particular, the top 50 facilities sent more of their substances in waste off-site to disposal/containment than did all other facilities (**Figure 4-6**). The facilities with the largest totals tended to be located in the Great Lakes and Gulf Coast areas; however, three of the top four facilities were located in western states (Utah, Montana and Arizona, see **Map 4-3**).

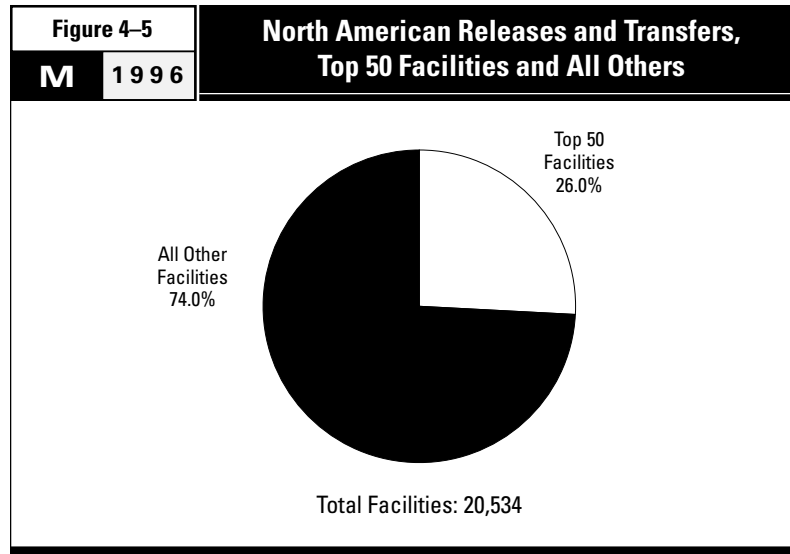
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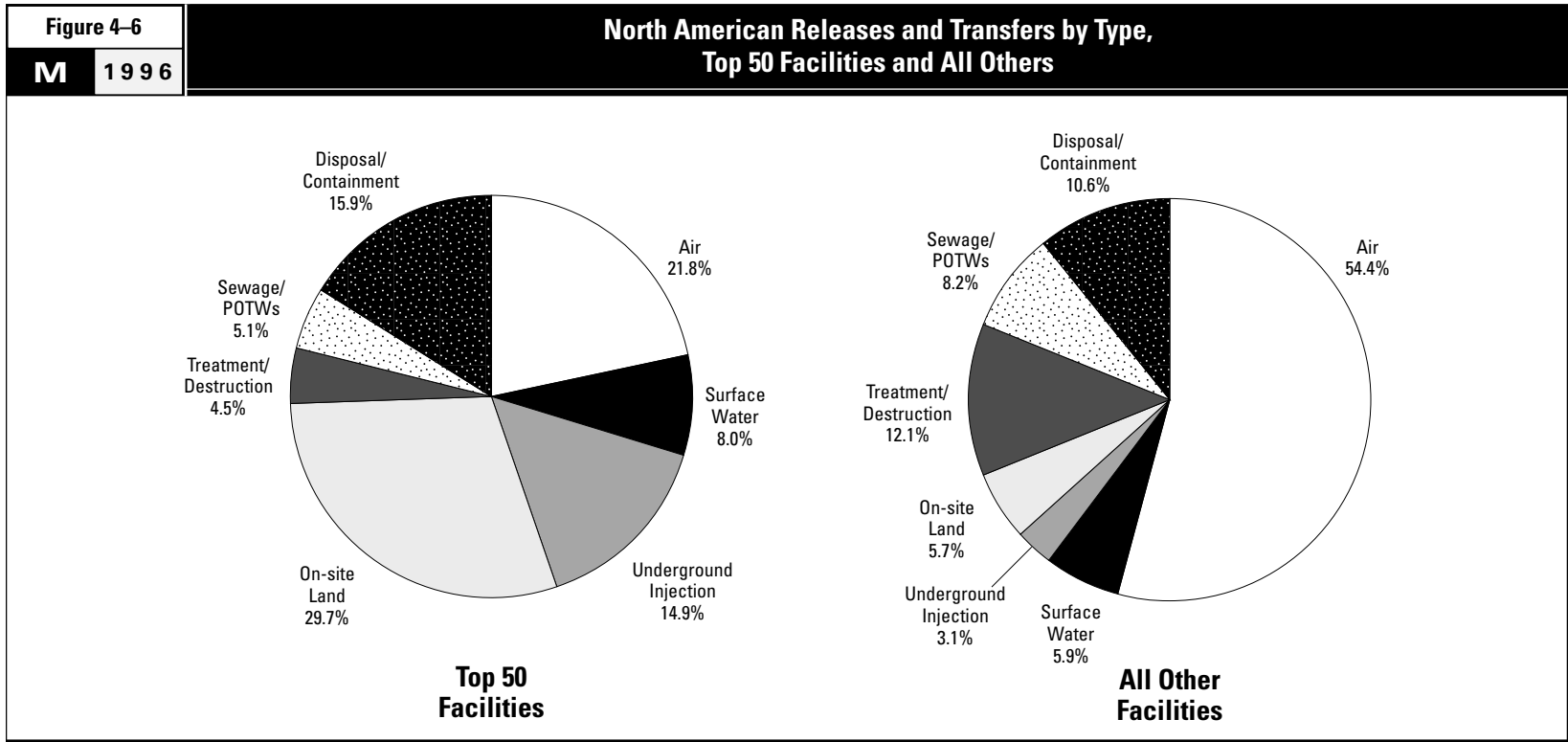
► Canada and US data only, Mexico data not collected for 1996.



► Canada and US data only, Mexico data not collected for 1996.



➤ Canada and US data only, Mexico data not collected for 1996.



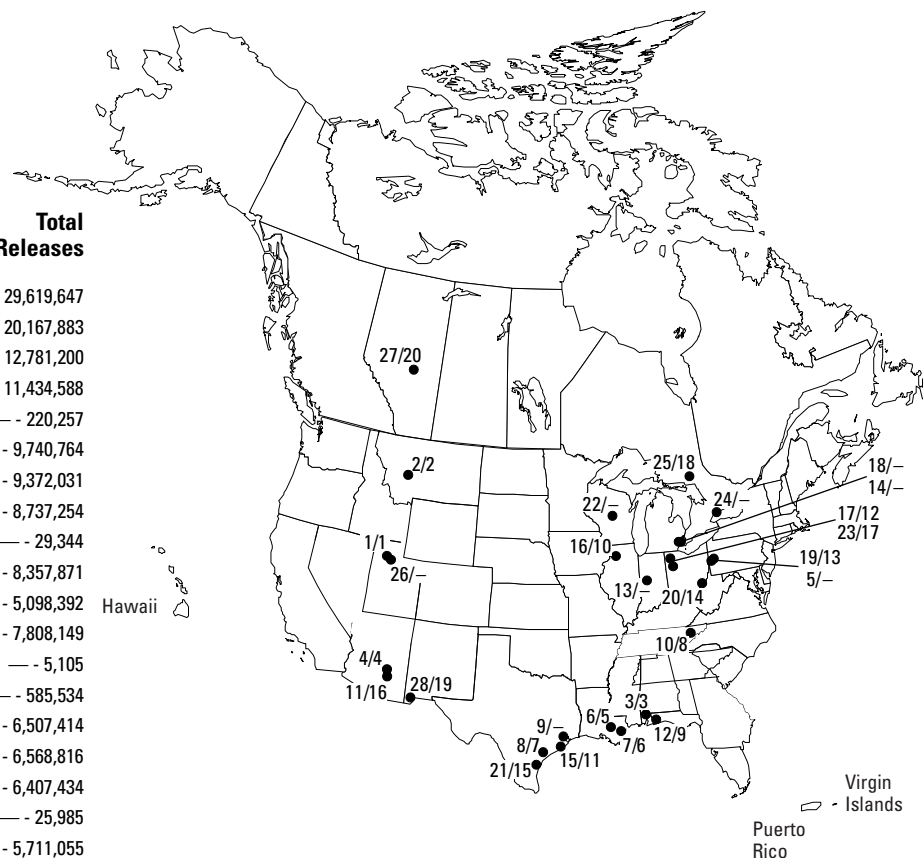
➤ Canada and US data only, Mexico data not collected for 1996.

Map 4-3

M 1996

Largest Sources of North American Releases and Transfers: Facilities (Total Releases and Transfers of more than 4.5 million kg; Total Releases of more than 4 million kg)

Facility	Total Releases and Transfers	Total Releases
1 Magnesium Corp. of America, Rowley, UT	29,619,647	1 - 29,619,647
2 ASARCO Inc., East Helena, MT	20,167,898	2 - 20,167,883
3 Courtaulds Fibers Inc., Axis, AL	12,781,200	3 - 12,781,200
4 Cyprus Miami Mining Corp., Claypool, AZ	11,434,588	4 - 11,434,588
5 Zinc Corp. of America, Monaca, PA	10,693,789	— - 220,257
6 PCS Nitrogen Fertilizer L.P., Geismar, LA	9,741,288	5 - 9,740,764
7 Cytec Industries Inc., Westwego, LA	9,382,053	6 - 9,372,031
8 DuPont, Victoria, TX	9,215,769	7 - 8,737,254
9 Air Products & Chemicals Inc., Pasadena, TX	8,373,980	— - 29,344
10 Lenzing Fibers Corp., Lowland, TN	8,357,871	8 - 8,357,871
11 ASARCO Inc., Hayden, AZ	8,131,927	16 - 5,098,392
12 Monsanto Co., Gonzalez, FL	7,810,317	9 - 7,808,149
13 Nucor Steel, Crawfordsville, IN	7,664,563	— - 5,105
14 National Steel Corp., Ecorse, MI	6,959,810	— - 585,534
15 BASF Corp., Freeport, TX	6,639,026	11 - 6,507,414
16 Northwestern Steel & Wire Co., Sterling, IL	6,633,986	10 - 6,568,816
17 General Motors Powertrain, Defiance, OH	6,411,050	12 - 6,407,434
18 Rouge Steel Co., Dearborn, MI	5,959,573	— - 25,985
19 Armco Inc., Butler, PA	5,711,055	13 - 5,711,055
20 Elkem Metals Co., Marietta, OH	5,352,625	14 - 5,309,087
21 American Chrome & Chemicals, Corpus Christi, TX	5,154,768	15 - 5,127,603
22 CPI, Consolidated Papers Inc., Wisconsin Rapids, WI	4,922,619	— - 1,167,326
23 BP Chemicals Inc., Lima, OH	4,886,965	17 - 4,875,406
24 Co-Steel Lasco, Whitby, ON	4,833,403	— - 1,254,893
25 Inco Limited, Copper Cliff, ON	4,773,818	18 - 4,773,818
26 Kennecott Utah Copper, Magna, UT	4,586,985	23 - 4,239,682
27 Celanese Canada Inc., Edmonton, AB	4,541,668	20 - 4,492,813
28 Phelps Dodge Hidalgo Inc., Playas, NM	4,537,040	19 - 4,537,040



Rankings

5/6 = Rank for Total Releases and Transfers
Rank for Total Releases (if reported more than 4.5 million kg total releases)

Facility List = Rank for Total Releases and Transfers; Facility, City, State or Province; Amount of Total Releases and Transfers
Rank for Total Releases (if more than 4.5 million kg); Amount of Total Releases

Table 4-4		The 50 North American Facilities with the Largest Total Releases									
M	1996	Rank	Facility	City, State	SIC Codes		Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
					Canada	US					
1	Magnesium Corp. of America, Renco Group	Rowley, UT		33	6	29,619,647	0	0	0	0	
2	ASARCO Inc.	East Helena, MT		33	10	53,133	926	0	20,113,824	0	
3	Courtaulds Fibers Inc., Courtaulds Finance U.S. Inc.	Axis, AL		28	4	12,559,013	16,155	0	206,032	0	
4	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	13	135,775	113	0	11,298,700	0	
5	PCS Nitrogen Fertilizer L.P., Potash Corp. of Saskatchewan	Geismar, LA		28	11	62,872	9,430,274	0	247,618	0	
6	Cytec Industries Inc.	Westwego, LA		28	23	61,923	3,318	9,306,790	0	0	
7	DuPont	Victoria, TX		28	29	163,006	625	8,568,203	5,420	0	
8	Lenzing Fibers Corp.	Lowland, TN		28	5	8,208,665	3,129	0	146,077	0	
9	Monsanto Co.	Gonzalez, FL		28	18	36,432	653	7,771,064	0	0	
10	Northwestern Steel & Wire Co.	Sterling, IL		33	7	70,984	1,224	0	6,496,608	0	
11	BASF Corp.	Freeport, TX		28	24	149,217	6,352,981	5,216	0	0	
12	General Motors Corp., Powertrain Defiance	Defiance, OH		33	17	331,912	6,461	0	6,069,061	0	
13	Armco Inc.	Butler, PA		33	14	112,906	5,444,361	0	153,788	0	
14	Elkem Metals Co.	Marietta, OH		33	6	218,375	326,987	0	4,763,725	0	
15	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	2	2,176	703	0	5,124,724	0	
16	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	9	542,461	0	0	4,555,931	0	
17	BP Chemicals Inc.	Lima, OH		28	27	115,258	0	4,760,148	0	0	
18	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	7	4,773,818	0	0	0	0	
19	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	2	275,871	0	0	4,261,169	0	
20	Celanese Canada Inc.	Edmonton, AB	37	28	10	395,362	0	4,081,300	16,150	0	
21	PCS Phosphate Co. Inc., Potash Corp. of Saskatchewan	Aurora, NC		28	6	164,776	3	0	4,196,711	0	
22	Huntsman Petrochemical Corp., Huntsman Corp.	Port Arthur, TX		28	19	4,256,988	0	0	0	0	
23	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	14	97,945	2,151	0	4,139,586	0	
24	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	2	2,969	15	0	4,081,774	0	
25	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,968	0	
26	DuPont	Beaumont, TX		28	19	183,382	184	3,716,892	0	0	
27	Hoechst-Celanese Chemical, Hoechst Corp., Clear Lake Plant	Pasadena, TX		28	20	350,749	0	3,479,003	0	0	
28	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	10	106,458	149	0	3,467,234	0	
29	FMC Corp.	Pocatello, ID		28	12	31,050	351	0	3,539,427	0	
30	Chino Mines Co.	Hurley, NM		33	2	81,697	0	0	3,457,668	0	
31	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	16	88,605	331	3,385,759	3,675	0	
32	US Steel Gary Works, USX Corp.	Gary, IN		33	34	774,919	14,068	0	2,600,141	0	
33	Eastman Kodak Co., Kodak Park	Rochester, NY		38	50	2,981,026	261,484	0	167	0	
34	Bayer Corp.	New Martinsville, WV		28	29	120,104	3,016,805	0	317	0	
35	Sterling Chemicals Inc.	Texas City, TX		28	36	476,419	558	2,595,334	0	0	
36	Rubicon Inc.	Geismar, LA		28	24	135,663	72	2,903,039	0	0	
37	PCS Phosphate, Potash Corp. of Saskatchewan	White Springs, FL		28	4	49,892	0	0	2,947,850	0	
38	Angus Chemical Co.	Sterlington, LA		28	11	70,561	80,632	2,684,452	0	0	
39	Coastal Chem Inc., Coastal Corp.	Cheyenne, WY		28	12	16,485	0	2,771,339	0	0	
40	Vicksburg Chemical Co.	Vicksburg, MS		28	3	33,986	2,713,007	0	0	0	
41	Granite City Steel, National Steel Corp.	Granite City, IL		33	22	114,722	5,616	0	2,593,382	0	
42	IMC-Agrico Co., IMC Global Inc., Faustina Plant	Saint James, LA		28	9	79,702	2,428,338	0	178,037	0	
43	Monsanto Co.	Luling, LA		28	13	20,699	73,261	2,579,638	0	0	
44	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	7	1,787,997	0	0	774,034	0	
45	International Paper	Hampton, SC		30	11	2,462,176	45	0	0	0	
46	Tennessee Eastman, Eastman Chemical	Kingsport, TN		28	56	2,316,748	73,219	0	38,450	0	
47	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS		28	5	5,217	11,211	0	2,335,785	0	
48	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400	0	
49	Nova Chemicals Ltd., St. Clair Site	Corunna, ON	37	28	8	2,186,200	820	0	0	0	
50	Irving Pulp & Paper Ltd./Irving Tissue Co.	Saint John, NB	27	26	4	249,591	1,933,834	0	0	0	
Subtotal							713	77,353,162	32,204,284	58,608,177	103,948,433
% of Total							1.1	13.7	40.9	77.9	71.3
Total							62,225	563,269,177	78,742,497	75,239,943	145,838,045

* Chemicals accounting for more than 70% of the total releases from the facility.

- One TRI facility reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese in error. This facility has been omitted from this table. Canada and US data only. Mexico data not collected for 1996.
- UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	29,619,647	Chlorine (air)
2	20,167,883	Zinc and compounds (land)
3	12,781,200	Carbon disulfide (air)
4	11,434,588	Copper and compounds, Zinc and compounds (land)
5	9,740,764	Phosphoric acid (water)
6	9,372,031	Acetonitrile, Acrylic acid (UIJ)
7	8,737,254	Nitric acid and nitrate compounds (UIJ)
8	8,357,871	Carbon disulfide (air)
9	7,808,149	Nitric acid and nitrate compounds (UIJ)
10	6,568,816	Zinc and compounds, Manganese and compounds (land)
11	6,507,414	Nitric acid and nitrate compounds (water)
12	6,407,434	Zinc and compounds (land)
13	5,711,055	Nitric acid and nitrate compounds (water)
14	5,309,087	Manganese and compounds (land)
15	5,127,603	Chromium and compounds (land)
16	5,098,392	Copper and compounds, Zinc and compounds (land)
17	4,875,406	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
18	4,773,818	Sulfuric acid (air)
19	4,537,040	Copper and compounds (land)
20	4,492,813	Methanol, Methyl ethyl ketone (UIJ)
21	4,361,490	Phosphoric acid (land)
22	4,256,988	Propylene (air)
23	4,239,682	Copper and compounds, Zinc and compounds (land)
24	4,084,758	Chromium and compounds (land)
25	4,030,233	Zinc and compounds, Lead and compounds (land)
26	3,900,458	Nitric acid and nitrate compounds (UIJ)
27	3,829,752	Ethylene glycol (UIJ)
28	3,573,841	Zinc and compounds (land)
29	3,570,828	Zinc and compounds, Phosphorus (land)
30	3,539,365	Copper and compounds (land)
31	3,478,370	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
32	3,389,128	Zinc and compounds, Manganese and compounds (land)
33	3,242,677	Dichloromethane, Hydrochloric acid, Methanol (air)
34	3,137,226	Nitric acid and nitrate compounds (water)
35	3,072,311	Acetonitrile, Nitric acid and nitrate compounds, Methanol, Acrylamide (UIJ)
36	3,038,774	Nitric acid and nitrate compounds, Methanol (UIJ)
37	2,997,742	Phosphoric acid (land)
38	2,835,645	Nitric acid and nitrate compounds, Formaldehyde (UIJ)
39	2,787,824	Nitric acid and nitrate compounds (UIJ)
40	2,746,993	Nitric acid and nitrate compounds (water)
41	2,713,720	Zinc and compounds (land)
42	2,686,077	Phosphoric acid (water)
43	2,673,598	Formaldehyde (UIJ)
44	2,562,031	Copper and compounds (air)
45	2,462,221	Methanol, Phenol (air)
46	2,428,417	Hydrochloric acid, Methanol, Toluene, Bromomethane, Hydrogen fluoride (air)
47	2,352,213	Manganese and compounds (land)
48	2,322,985	Zinc and compounds (land)
49	2,187,020	Cyclohexane (air)
50	2,183,425	Methanol (water)
	272,114,057	
	31.5	
	863,218,412	

Table 4-5		Top 50 North American Facilities with the Largest Total Releases and Transfers							
Rank	Facility	City, State	SIC Codes		Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
			Canada	US					
1	Magnesium Corp. of America, Renco Group	Rowley, UT		33	6	29,619,647	0	0	0
2	ASARCO Inc.	East Helena, MT		33	10	53,133	926	0	20,113,824
3	Courtaulds Fibers Inc., Courtaulds Finance U.S. Inc.	Axis, AL		28	4	12,559,013	16,155	0	206,032
4	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	13	135,775	113	0	11,298,700
5	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	9	219,985	272	0	0
6	PCS Nitrogen Fertilizer L.P., Potash Corp. of Saskatchewan	Geismar, LA		28	11	62,872	9,430,274	0	247,618
7	Cytec Industries Inc.	Westwego, LA		28	23	61,923	3,318	9,306,790	0
8	DuPont	Victoria, TX		28	29	163,006	625	8,568,203	5,420
9	Air Products & Chemicals Inc.	Pasadena, TX		28	10	29,344	0	0	0
10	Lenzing Fibers Corp.	Lowland, TN		28	5	8,208,665	3,129	0	146,077
11	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	9	542,461	0	0	4,555,931
12	Monsanto Co.	Gonzalez, FL		28	18	36,432	653	7,771,064	0
13	Nucor Steel, Nucor Corp.	Crawfordsville, IN		33	9	5,069	26	0	10
14	National Steel Corp., Great Lakes Div.	Ecorse, MI		33	17	85,676	499,858	0	0
15	BASF Corp.	Freeport, TX		28	24	149,217	6,352,981	5,216	0
16	Northwestern Steel & Wire Co.	Sterling, IL		33	7	70,984	1,224	0	6,496,608
17	General Motors Corp., Powertrain Defiance	Defiance, OH		33	17	331,912	6,461	0	6,069,061
18	Rouge Steel Co.	Dearborn, MI		33	7	23,355	2,630	0	0
19	Armco Inc.	Butler, PA		33	14	112,906	5,444,361	0	153,788
20	Elkem Metals Co.	Marietta, OH		33	6	218,375	326,987	0	4,763,725
21	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	2	2,176	703	0	5,124,724
22	CPI, Consolidated Papers Inc.	Wisconsin Rapids, WI		26	12	1,167,213	113	0	0
23	BP Chemicals Inc.	Lima, OH		28	27	115,258	0	4,760,148	0
24	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
25	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	7	4,773,818	0	0	0
26	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	14	97,945	2,151	0	4,139,586
27	Celanese Canada Inc.	Edmonton, AB	37	28	10	395,362	0	4,081,300	16,150
28	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	2	275,871	0	0	4,261,169
29	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	19	99,734	40,762	0	462,800
30	PCS Phosphate Co. Inc., Potash Corp. of Saskatchewan	Aurora, NC		28	6	164,776	3	0	4,196,711
31	Huntsman Petrochemical Corp., Huntsman Corp.	Port Arthur, TX		28	19	4,256,988	0	0	0
32	DuPont	Beaumont, TX		28	19	183,382	184	3,716,892	0
33	Pharmacia & Upjohn Co.	Portage, MI		28	23	141,111	67,803	1,565,804	0
34	Dominion Colour Corporation	Ajax, ON	37	28	6	0	0	0	0
35	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	2	2,969	15	0	4,081,774
36	Hoechst-Celanese Chemical, Hoechst Corp., Clear Lake Plant	Pasadena, TX		28	20	350,749	0	3,479,003	0
37	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,968
38	Warner-Lambert Co., Parke-Davis Div.	Holland, MI		28	12	80,292	0	875,518	0
39	Regal Ware Inc.	Kewaskum, WI		34	6	474	0	0	0
40	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	10	106,458	149	0	3,467,234
41	FMC Corp.	Pocatello, ID		28	12	31,050	351	0	3,539,427
42	Chino Mines Co.	Hurley, NM		33	2	81,697	0	0	3,457,668
43	Boise Cascade Corp.	Saint Helens, OR		26	8	227,512	0	0	0
44	Ameristeel Corp., Jacksonville Mill Div.	Baldwin, FL		33	6	8,662	0	0	0
45	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	16	88,605	331	3,385,759	3,675
46	Cerro Wire & Cable Co. Inc.	Hartselle, AL		33	3	120	6	0	0
47	US Steel Gary Works, USX Corp.	Gary, IN		33	34	774,919	14,068	0	2,600,141
48	Eastman Kodak Co., Kodak Park	Rochester, NY		38	50	2,981,026	261,484	0	167
49	USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock, PA		33	7	15,004	971	0	0
50	Bayer Corp.	New Martinsville, WV		28	29	120,104	3,016,805	0	317
Subtotal					643	69,403,950	25,496,225	47,515,697	94,522,205
% of Total					1.0	12.3	32.4	63.2	64.8
Total					62,225	563,269,177	78,742,497	75,239,943	145,838,045

* Chemicals accounting for more than 70% of the total releases and transfers from the facility.

- Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds in error. The facility has been omitted from this table. Canada and US data only. Mexico data not collected for 1996.
- UIJ=underground Injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	29,619,647	0	0	0	0	29,619,647	Chlorine (air)
2	20,167,883	0	15	0	15	20,167,898	Zinc and compounds (land)
3	12,781,200	0	0	0	0	12,781,200	Carbon disulfide (air)
4	11,434,588	0	0	0	0	11,434,588	Copper and compounds, Zinc and compounds (land)
5	220,257	48,557	0	10,424,975	10,473,532	10,693,789	Zinc and compounds, Manganese and compounds (transfers to disposal)
6	9,740,764	0	0	524	524	9,741,288	Phosphoric acid (water)
7	9,372,031	3,469	0	6,553	10,022	9,382,053	Acetonitrile, Acrylic acid (UIJ)
8	8,737,254	478,515	0	0	478,515	9,215,769	Nitric acid and nitrate compounds (UIJ)
9	29,344	6,499	8,338,137	0	8,344,636	8,373,980	Nitric acid and nitrate compounds (transfers to sewage)
10	8,357,871	0	0	0	0	8,357,871	Carbon disulfide (air)
11	5,098,392	3,033,408	127	0	3,033,535	8,131,927	Lead and compounds (transfers to treatment), Copper/Zinc and compounds (land)
12	7,808,149	0	0	2,168	2,168	7,810,317	Nitric acid and nitrate compounds (UIJ)
13	5,105	392	0	7,659,066	7,659,458	7,664,563	Zinc and compounds (transfers to disposal)
14	585,534	64,010	10,955	6,299,311	6,374,276	6,959,810	Zinc and compounds (transfers to disposal)
15	6,507,414	120,545	0	11,067	131,612	6,639,026	Nitric acid and nitrate compounds (water)
16	6,568,816	65,170	0	0	65,170	6,633,986	Zinc and compounds, Manganese and compounds (land)
17	6,407,434	2,350	1,266	0	3,616	6,411,050	Zinc and compounds (land)
18	25,985	0	0	5,933,588	5,933,588	5,959,573	Zinc and compounds (transfers to disposal)
19	5,711,055	0	0	0	0	5,711,055	Nitric acid and nitrate compounds (water)
20	5,309,087	0	0	43,538	43,538	5,352,625	Manganese and compounds (land)
21	5,127,603	24,036	0	3,129	27,165	5,154,768	Chromium and compounds (land)
22	1,167,326	3,755,293	0	0	3,755,293	4,922,619	Methanol (transfers to treatment)
23	4,875,406	10,929	0	630	11,559	4,886,965	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
24	1,254,893	0	10	3,578,500	3,578,510	4,833,403	Zinc and compounds (transfers to disposal)
25	4,773,818	0	0	0	0	4,773,818	Sulfuric acid (air)
26	4,239,682	0	0	347,303	347,303	4,586,985	Copper and compounds, Zinc and compounds (land)
27	4,492,813	0	0	48,855	48,855	4,541,668	Methanol, Methyl ethyl ketone (UIJ)
28	4,537,040	0	0	0	0	4,537,040	Copper and compounds (land)
29	603,307	0	0	3,814,700	3,814,700	4,418,007	Manganese and compounds (transfers to disposal)
30	4,361,490	0	0	0	0	4,361,490	Phosphoric acid (land)
31	4,256,988	20,581	0	11,517	32,098	4,289,086	Propylene (air)
32	3,900,458	271,136	0	12,890	284,026	4,184,484	Nitric acid and nitrate compounds (UIJ)
33	1,774,718	1,739,283	603,207	6,937	2,349,427	4,124,145	Methanol (UIJ), Dichloromethane (transfers to treatment)
34	50	0	3,870,000	229,400	4,099,400	4,099,450	Nitric acid and nitrate compounds (transfers to sewage)
35	4,084,758	4,535	0	0	4,535	4,089,293	Chromium and compounds (land)
36	3,829,752	15,328	200,266	41,544	257,138	4,086,890	Ethylene glycol (UIJ)
37	4,030,233	0	0	0	0	4,030,233	Zinc/Lead and compounds (land)
38	955,810	2,784,589	0	5	2,784,594	3,740,404	Methanol, Toluene (transfers to treatment, UIJ)
39	474	0	0	3,646,276	3,646,276	3,646,750	Aluminum oxide (transfers to disposal)
40	3,573,841	0	451	0	451	3,574,292	Zinc and compounds (land)
41	3,570,828	0	3	792	795	3,571,623	Zinc and compounds, Phosphorus (land)
42	3,539,365	0	0	0	0	3,539,365	Copper and compounds (land)
43	227,512	0	3,295,111	1,682	3,296,793	3,524,305	Methanol (transfers to sewage)
44	8,662	1,756,108	0	1,756,111	3,512,219	3,520,881	Zinc and compounds (transfers to treatment and to disposal)
45	3,478,370	12,310	0	0	12,310	3,490,680	Acetonitrile, Acrylamide, Acrylonitrile (UIJ)
46	126	0	0	3,440,012	3,440,012	3,440,138	Copper and compounds (transfers to disposal)
47	3,389,128	0	0	45,387	45,387	3,434,515	Zinc and compounds, Manganese and compounds (land)
48	3,242,677	137,186	571	11,545	149,302	3,391,979	Dichloromethane, Hydrochloric acid, Methanol (air)
49	15,975	0	0	3,260,898	3,260,898	3,276,873	Zinc and compounds (transfers to disposal)
50	3,137,226	1,397	0	19,860	21,257	3,158,483	Nitric acid and nitrate compounds (water)
	236,938,139	14,355,626	16,320,119	50,658,763	81,334,508	318,272,647	
	27.4	15.8	11.1	13.0	6.6	15.2	
	863,218,412	91,073,897	147,065,311	362,612,278	1,225,830,690	2,089,049,102	

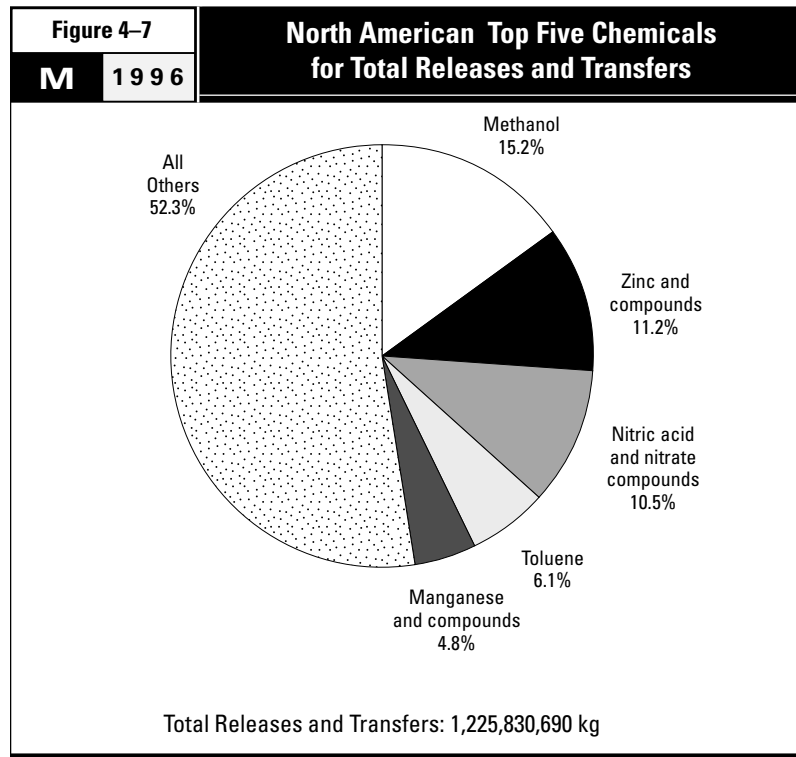
4.5 Chemical Distribution

Out of 164 chemical substances and groups on the matched list of NPRI and TRI chemicals, almost three-quarters of all reporting forms submitted were for the top 25 chemicals and the top five of these accounted for almost half of all releases and transfers reported in 1996 (Figure 4-7).

The chemical with the largest releases and transfers reported in North America was methanol, with 186 million kg. Two other chemicals also had more than 100 million kg each: zinc and its compounds and nitric acid and nitrate compounds (Table 4-6, p. 58).

Large methanol releases and transfers result primarily because the chemical is used in many industrial processes and generated as a byproduct in others. Because it is volatile, most methanol releases occur as emissions to air. Methanol rapidly oxidizes in the air to form formaldehyde, another PRTR-listed chemical and one that is also a designated carcinogen (discussed later in this chapter) and a contributor to smog formation.

Much of the methanol produced is used in the production of formaldehyde. In the United States, another large use is in the synthesis of methyl tert-butyl ether (MTBE), which in some countries is added to gasoline to boost octane levels and reduce hydrocarbons and carbon monoxide in combustion. Methanol also has many applications as a solvent and is used in coating wood and paper, in producing synthetic fibers (acetate and triacetate), and in manufacturing pharmaceuticals.



► Canada and US data only, Mexico data not collected for 1996.

A variety of processes generate methanol as a byproduct. Chemical pulping in paper manufacture is one example; production of anhydrous ammonia is another.

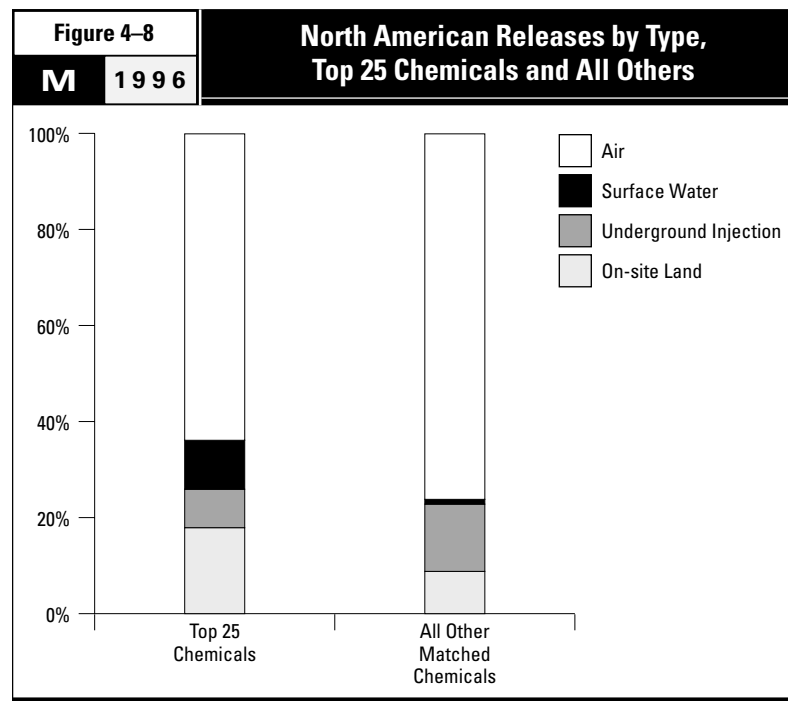
More zinc and zinc compounds were transferred off-site than any other chemical in the matched data set, chiefly to disposal or containment. The most common use of zinc is in coating metals, for example, galvanized steel. Zinc is also used in dry cell batteries and in alloys such as brass and bronze. Zinc compounds are widely used in paint, rubber, dye, wood preservatives, and ointments.

Table 4-7 (pp. 59-61) presents information on potential effects of these and other substances with large releases and transfers reported to the North American PRTRs, from the US Agency for Toxic Substances and Disease Registry, the US EPA's Office of Pollution Prevention and Toxics, and the New Jersey Department of Health and Senior Services.

Top Chemicals for Releases

The same 25 chemicals also had the largest releases in the matched data set. Most of the rankings varied, but methanol was first for releases, as for total releases and transfers (Table 4-8, pp. 62-63).

The ways in which these 25 chemicals were released differed significantly from the release types predominating for other PRTR substances in the matched data set. Air emissions and underground injection were smaller for the top 25 chemicals than for the others; surface water discharges and on-site land releases were larger (Figure 4-8).



► Canada and US data only, Mexico data not collected for 1996.

The two chemicals most responsible for these differences were nitric acid and nitrate compounds, with large surface water discharges, and zinc and its compounds, with large on-site land releases.

Nearly 71 percent of all surface water discharges reported in North America consisted of nitric acid and nitrate compounds. These releases were more than four times those of the next-to-largest surface water discharges (phosphoric acid). TRI facilities reported most of the releases of nitric acid and nitrate compounds—97 percent for this chemical compared to 90 percent for all chemicals on the matched PRTR list. The chief use of nitric acid is in producing ammonium nitrate fertilizer. Nitric acid is also used in the manufacture of cyclohexanone and as a raw material for adipic acid and caprolactam, both used in making nylon. Nitrates have long been used in producing explosives, including gunpowder. Phosphoric acid is used in fertilizers, phosphates (salts, soaps, detergents), yeasts, fire control agents, waxes and polishes, gelatin and soft drinks. It also is used in chemical production (of ethylbenzene, propylene and cumene) and as an antioxidant, acidulant and flavor agent in food products.

On-site land releases of zinc and its compounds amounted to 35 percent of the North American total in that release type, or twice as much as the next largest land releases (manganese and its compounds). The principal use of manganese is in steel production. Most manganese is used to produce ferromanganese, which improves hardness, stiffness, and strength in many types of steel. Manganese dioxide is commonly used in production of dry-cell batteries, matches, fireworks, porcelain and glass-bonding materials.

More than 99 percent of the releases of carbon disulfide (largely in air emissions), phosphoric acid (water and land releases) and acetonitrile (underground injection) originated with TRI facilities. The chemical with the greatest proportion of releases from NPRI reporting was sulfuric acid (entirely in air emissions), with 36 percent of the North American releases.

The largest use of carbon disulfide is in making rayon. Other uses include metal cleaning as well as production of agricultural fumigants, rubber chemicals, and cellulose. One principal use has been as a feedstock in the production of carbon tetrachloride, an ozone-depleting chemical. Under the Montreal Protocol, production and consumption of carbon tetrachloride and other ozone depleters were to be phased out by January 1996, except for uses deemed “essential.”

The largest use for acetonitrile is in extracting organic and inorganic chemicals, especially butadiene. It is also used in pesticide manufacture. Sulfuric acid is used predominantly in producing phosphate fertilizers. This acid is also employed in leaching copper from ore, purifying petroleum, pickling metal and electroplating. It is used in manufacturing lead-acid batteries for automobiles, explosives, other acids, and dyestuffs.

Top Chemicals for Transfers

Of the top 25 chemicals transferred off-site for treatment, to sewage, or for disposal, 17 were also among the top chemicals for total releases and transfers, including all of the top 10. Thus, the chemicals transferred in the largest amounts were essentially the same as those released in the largest amounts (Table 4-9, p. 64).

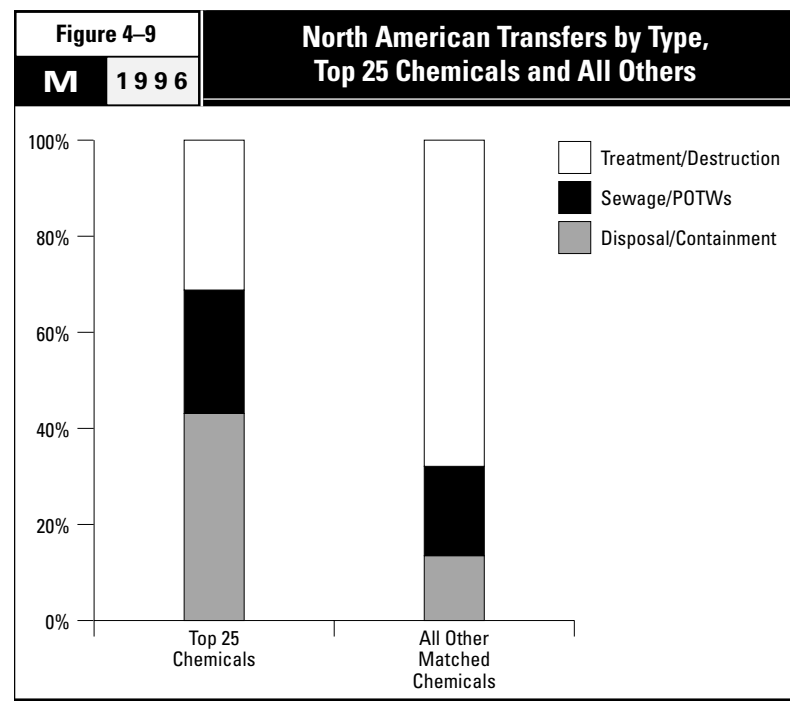
As with releases, the types of transfers reported for these chemicals differed substantially from the pattern for other PRTR substances on the matched list. The top 25 chemicals were three times more likely to be sent off-site for disposal/containment than were the other chemicals (Figure 4-9).

The chemical with the largest total transfers, zinc and its compounds, was also the chemical sent in the largest amount to disposal/containment—more than twice that of the chemical with the next largest transfers to disposal (manganese and its compounds).

For some of the top chemicals, all or nearly all the off-site transfers came from TRI facilities. These included dichloromethane, antimony and its compounds, and hydrogen fluoride. Dichloromethane is a solvent and degreasing agent and is widely used in paint strippers. It is also used as a blowing agent and metal-cleaning agent, as a propellant in aerosols, and as a process solvent in pharmaceutical manufacture. Antimony, a byproduct of smelting lead and other metals, is used in alloys for lead storage batteries, solder, sheet and pipe metal, bearings, castings and pewter. Antimony oxide is added as a fire retardant in textiles and plastics. It is also employed in paints, ceramics and fireworks, and in enameling plastics, metal and glass. Hydrogen fluoride is primarily used in the manufacture of aluminum and chlorofluorocarbons (CFCs), although production of the ozone-depleting CFCs has been curtailed under the Montreal Protocol.

NPRI facilities reported 30 percent or more of the transfers of xylene and asbestos. Xylene, a petroleum product, is used as a solvent and cleaning agent, as a paint thinner, and in producing paints and varnishes. Principal industrial users are the printing, rubber, and leather industries. The largest use of asbestos is in asbestos cement products. Resistant to heat and most chemicals, asbestos fibers are used in roofing shingles, ceiling and floor tiles, paper products, and friction products (automobile clutch, brake, and transmission parts).

[Text continues on p. 65.]



► Canada and US data only, Mexico data not collected for 1996.

Table 4-6		The 25 Chemicals with the Largest Total Releases and Transfers in North America									
M	1996										
CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	NPRI/TRI as % of North American Total				
		Number	%				Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)	
67-56-1	Methanol	2,540	4.1	129,227,278	56,839,199	186,066,477	9.6 / 90.4	16.0 / 84.0	4.0 / 96.0	12.4 / 87.6	
—	Zinc (and its compounds)	3,239	5.2	55,678,321	81,023,127	136,701,448	9.5 / 90.5	10.1 / 89.9	15.4 / 84.6	13.3 / 86.7	
—	Nitric acid and nitrate compounds	2,648	4.3	85,430,122	43,021,311	128,451,433	4.7 / 95.3	3.3 / 96.7	11.0 / 89.0	5.9 / 94.1	
108-88-3	Toluene	3,384	5.4	62,796,504	12,495,662	75,292,166	6.8 / 93.2	9.0 / 91.0	14.0 / 86.0	9.8 / 90.2	
—	Manganese (and its compounds)	2,787	4.5	29,632,346	28,671,571	58,303,917	8.4 / 91.6	6.4 / 93.6	23.0 / 77.0	14.5 / 85.5	
1330-20-7	Xylene (mixed isomers)	3,243	5.2	43,582,986	6,089,399	49,672,385	7.0 / 93.0	14.2 / 85.8	33.3 / 66.7	16.5 / 83.5	
—	Copper (and its compounds)	4,286	6.9	27,327,917	12,113,697	39,441,614	5.2 / 94.8	2.5 / 97.5	6.2 / 93.8	3.6 / 96.4	
78-93-3	Methyl ethyl ketone	2,191	3.5	32,322,559	3,418,027	35,740,586	5.9 / 94.1	17.1 / 82.9	24.2 / 75.8	17.8 / 82.2	
75-15-0	Carbon disulfide	99	0.2	33,058,434	162,431	33,220,865	6.1 / 93.9	0.1 / 99.9	6.1 / 93.9	0.1 / 99.9	
75-09-2	Dichloromethane	938	1.5	26,398,100	6,593,372	32,991,472	5.3 / 94.7	8.3 / 91.7	1.4 / 98.6	6.9 / 93.1	
7782-50-5	Chlorine	1,386	2.2	31,367,791	680,364	32,048,155	8.7 / 91.3	2.9 / 97.1	0.0 / 100.0	2.8 / 97.2	
7664-38-2	Phosphoric acid	2,869	4.6	27,686,395	3,511,961	31,198,356	7.0 / 93.0	0.3 / 99.7	11.4 / 88.6	1.5 / 98.5	
7647-01-0	Hydrochloric acid	961	1.5	29,973,355	0	29,973,355	7.4 / 92.6	4.4 / 95.6	— / —	4.4 / 95.6	
—	Lead (and its compounds)	1,770	2.8	9,030,613	19,501,982	28,532,595	7.3 / 92.7	15.4 / 84.6	11.6 / 88.4	12.8 / 87.2	
—	Chromium (and its compounds)	3,367	5.4	13,436,133	11,742,588	25,178,721	6.3 / 93.7	3.7 / 96.3	19.2 / 80.8	10.9 / 89.1	
100-42-5	Styrene	1,538	2.5	20,032,280	3,089,326	23,121,606	4.7 / 95.3	4.3 / 95.7	8.3 / 91.7	4.9 / 95.1	
107-21-1	Ethylene glycol	1,381	2.2	7,682,522	11,872,615	19,555,137	10.2 / 89.8	6.7 / 93.3	4.4 / 95.6	5.3 / 94.7	
74-85-1	Ethylene	331	0.5	18,448,717	506,071	18,954,788	11.8 / 88.2	12.2 / 87.8	0.0 / 100.0	11.9 / 88.1	
71-36-3	n-Butyl alcohol	1,105	1.8	12,560,495	1,925,282	14,485,777	7.0 / 93.0	8.8 / 91.2	20.2 / 79.8	10.3 / 89.7	
7664-93-9	Sulfuric acid	688	1.1	13,731,314	0	13,731,314	10.2 / 89.8	35.9 / 64.1	— / —	35.9 / 64.1	
75-05-8	Acetonitrile	102	0.2	10,840,070	2,460,128	13,300,198	2.0 / 98.0	0.2 / 99.8	4.5 / 95.5	1.0 / 99.0	
115-07-1	Propylene	372	0.6	12,961,972	127,269	13,089,241	9.1 / 90.9	7.7 / 92.3	0.0 / 100.0	7.6 / 92.4	
50-00-0	Formaldehyde	849	1.4	11,006,783	1,626,831	12,633,614	9.9 / 90.1	12.7 / 87.3	18.6 / 81.4	13.5 / 86.5	
79-01-6	Trichloroethylene	693	1.1	10,472,026	817,946	11,289,972	5.2 / 94.8	8.0 / 92.0	3.1 / 96.9	7.6 / 92.4	
108-10-1	Methyl isobutyl ketone	955	1.5	9,362,174	790,362	10,152,536	6.1 / 93.9	8.0 / 92.0	10.3 / 89.7	8.2 / 91.8	
	Subtotal	43,722	70.3	764,047,207	309,080,521	1,073,127,732	7.1 / 92.9	9.1 / 90.9	12.4 / 87.6	10.0 / 90.0	
	% of Total	70.3		88.5	85.2	87.5					
	Total for All Matched Chemicals	62,225	100.0	863,218,412	362,612,278	1,225,830,690	6.9 / 93.1	9.6 / 90.4	11.5 / 88.5	10.1 / 89.9	

► Canada and US data only. Mexico data not collected for 1996.

Table 4-7

1996

Human Health Effects of Chemicals on the "Top 25" Lists for Releases, Transfers, or Both

Note 1: Chemicals can have a variety of health and environmental effects, and the fact that a chemical is reported to NPRI or TRI does not mean that it is considered to pose toxic risks to humans. Sometimes of greater concern may be its effects on ecosystems. For example, a relatively non-toxic chemical may serve as an excess nutrient in aquatic systems, leading to an algae buildup that can deplete oxygen and kill fish and other aquatic life (eutrophication). Other chemicals may be of concern because of their contribution to acidic precipitation ("acid rain") or their role in the formation of tropospheric ozone (photochemical smog). Further, all effects are dose-dependent and may not occur at levels found in the environment or associated with PRTR releases. Effects shown in workers are likely to reflect exposures significantly higher than ambient levels. PRTRs do not collect data on exposure or risk associated with the releases they report.

Note 2: The health effects information in this table has been drawn from three sources:

- *ToxFAQs* distributed by the US Agency for Toxic Substances and Disease Registry (ATSDR)
- *Chemical Fact Sheets* distributed by the Office of Pollution Prevention and Toxics of the US Environmental Protection Agency
- *Hazardous Substance Fact Sheets* distributed by the New Jersey Department of Health and Senior Services

Information on exposure effects from these sources was extracted in the above order, such that if more than one source documented toxic effects, ATSDR information was taken as a first preference, followed by US EPA and then New Jersey information.

CAS Number	Name	Source	High Exposure Effects	Longer and Lower Exposure Effects
75-05-8	Acetonitrile	EPA	Range from abnormal salivation, vomiting, confusion, rapid breathing and heart rate to coma and death. Contact with liquid or vapor is irritating to skin, eyes, nose and throat.	Adverse effects on blood, nervous system, lungs, liver and thymus, as well as fetal toxicity in laboratory studies.
7429-90-5	Aluminum (fume or dust)	ATSDR	Inhalation effects include coughing and asthma. Large doses in medical settings have led to bone disease.	Delays in skeletal and neurological development in laboratory studies. Association with Alzheimer's disease uncertain.
1344-28-1	Aluminum oxide (fibrous forms)	NJDOH	Inhalation can irritate the lungs, can also irritate eyes, nose and throat.	Same as acute.
—	Antimony (and its compounds)	ATSDR	Inhalation effects include irritation (eyes and lung), heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers. Ingestion can cause vomiting.	Eye irritation, hair loss, lung damage, heart problems, and fertility problems in laboratory studies; liver and kidney damage and death at higher exposures. Skin irritation with prolonged contact.
—	Arsenic (and its compounds)	ATSDR	Ingestion of high levels can be fatal; damages nerves, digestive system, and skin. Inhalation effects include sore throat and irritated lungs.	May lead to pigmentation changes and appearance of small "warts" or "corns." A <i>known carcinogen</i> by inhalation (lung) and ingestion (skin, bladder, kidney, liver, and lung).
1332-21-4	Asbestos (friable)	ATSDR	Inhalation leads to asbestosis (scar tissue buildup in lungs and surrounding tissue).	A known carcinogen by inhalation: Lung cancer and mesothelioma (cancer of the tissues lining the chest cavity). Some evidence for <i>cancer</i> of stomach, intestines, esophagus, pancreas, and kidneys. Risks from ingestion unclear.
71-36-3	n-Butyl alcohol	EPA	Inhalation leads to headaches. Contact with liquid or vapor irritates eyes, nose, throat. Contact with liquid irritates skin.	Adverse eye effects and hearing loss in exposed workers. Adverse effects on thyroid, blood, lungs, intestine, liver, kidneys and nervous system in laboratory studies.
75-15-0	Carbon disulfide	ATSDR	Inhalation effects include headache, fatigue, sleep disturbance, breathing changes, and chest pains. Skin burns from dermal contact.	Nerve changes in workers. Effects on brain, liver, and heart, as well as fetal toxicity in laboratory studies.
7782-50-5	Chlorine	EPA	Effects range from coughing and chest pain to water retention in the lungs; irritation to skin, eyes, and respiratory system.	Adverse effects on immune system, blood, heart, and respiratory system in laboratory studies.

[Table continues on next page.]

Table 4-7 (cont.)		Human Health Effects of Chemicals on the "Top 25" Lists for Releases, Transfers, or Both		
1996				
CAS Number	Name	Source	High Exposure Effects	Longer and Lower Exposure Effects
—	Chromium (and its compounds)	ATSDR	Hexavalent forms (Cr VI) are more toxic than trivalent (Cr III). Inhalation effects include irritation/damage to nose, lungs, stomach, and intestines. Some persons are allergic and high exposure may trigger asthma. Ingestion effects include stomach upset and ulcers, convulsions, damage to kidneys and liver, and death.	Some Chromium VI compounds are <i>known human carcinogens</i> , based on both exposed workers and laboratory studies. Animal studies indicate reproductive effects and fetal toxicity.
—	Copper (and its compounds)	N/A	Report not available.	Report not available.
75-09-2	Dichloromethane	ATSDR	Inhalation effects include slower reaction time, loss of fine motor control, dizziness, nausea, tingling or numbness in fingers and toes, increasing up to unconsciousness or death. Dermal contact causes burning sensation and skin reddening; contact with eyes can burn cornea.	Impairment of hearing and vision. Causes <i>cancer</i> in laboratory studies.
74-85-1	Ethylene	NJDOH	Report not retrievable.	Report not retrievable.
107-21-1	Ethylene glycol	ATSDR	Ingestion can lead to nausea, convulsions, slurred speech, disorientation, heart and kidney problems, or death. Increased acidity of body tissues (metabolic acidosis).	Fetal toxicity at large doses in laboratory studies.
50-00-0	Formaldehyde	N/A	Report not available.	Report not available.
7647-01-0	Hydrochloric acid	NJDOH	Inhalation can irritate the lungs, as well as mouth, nose and throat; higher exposures can lead to fluid buildup (pulmonary edema), a medical emergency. Dermal contact can cause severe, permanent eye and skin damage.	Repeated inhalation can lead to bronchitis. Exposure to vapor may cause erosion of teeth. Some evidence of increased lung <i>cancer</i> in exposed workers.
7664-39-3	Hydrogen fluoride	ATSDR	Inhalation effects include damage to lungs and heart, death. Dermal contact will burn skin and eyes.	Irritation of eyes, skin, and lungs.
—	Lead (and its compounds)	ATSDR	Exposure can affect almost every organ and system; most sensitive is central nervous system, particularly in children. Kidneys and immune system also affected. Premature births, stunted growth and mental impairment in offspring of exposed mothers.	Effects are more commonly observed after higher exposures; effects of low levels in adults are uncertain.
—	Manganese (and its compounds)	N/A	Report not available.	Report not available.
67-56-1	Methanol	EPA	Ingestion effects range from headache and impaired coordination to severe pain in abdomen, legs, and back, and blindness following inebriation.	Headaches, sleep disorders, and gastrointestinal problems, ranging up to optic nerve damage in workers and in laboratory studies.
78-93-3	Methyl ethyl ketone	ATSDR	Inhalation effects include irritation of nose, throat, skin, and eyes. Laboratory studies have shown birth defects, unconsciousness, and death; neural impairment at lower levels.	Studies not reported.
108-10-1	Methyl isobutyl ketone	EPA	Range from headaches, dizziness, nausea and numbness in fingers and toes to unconsciousness and death. Vapor irritates eyes, nose and throat. Liquid irritates eyes and skin.	Nausea, headaches, weakness, and adverse liver effects in workers. Kidney and liver effects, as well as fetal toxicity, in laboratory studies.
—	Nickel (and its compounds)	ATSDR	Inhalation effects include bronchitis and reduced lung function. Ingestion leads to stomach problems, blood, and kidney effects, as well as liver, immune system, and reproductive effects in laboratory studies	Small amounts are essential for animal nutrition, maybe for humans. Allergic skin rashes. <i>Cancer</i> of lung and nasal passages seen in nickel workers, inhalation of insoluble nickel compounds caused cancer in laboratory studies.

Table 4-7 (cont.)		Human Health Effects of Chemicals on the "Top 25" Lists for Releases, Transfers, or Both		
1996				
CAS Number	Name	Source	High Exposure Effects	Longer and Lower Exposure Effects
—	Nitric acid and nitrate compounds	NJDOH	Inhalation of nitric acid can irritate the lungs, as well as mouth, nose and throat; higher exposures can lead to fluid buildup (pulmonary edema), a medical injury. Dermal contact can cause severe, permanent eye and skin damage.	Exposure to vapor may cause erosion of teeth.
108-95-2	Phenol	NJDOH	Can cause headaches, dizziness, fatigue, fainting, weakness, nausea, vomiting and lack of appetite; at high levels may lead to collapse and death. Inhalation can irritate mouth, nose, throat and lungs. Can irritate the skin, causing deep damage without immediate pain; even gangrene may result.	May damage liver, kidneys, and heart, is a mutagen (causes cell mutations) and may therefore be <i>carcinogenic</i> . May cause nervous system damage.
7664-38-2	Phosphoric acid	N/A	Report not available.	Report not available.
115-07-1	Propylene	NJDOH	May cause dizziness, unconsciousness or death (due to lack of oxygen).	Long-term exposure may cause liver damage and irregular heartbeat.
100-42-5	Styrene	ATSDR	Inhalation effects include depression, trouble concentrating, muscle weakness, fatigue, and nausea; possibly irritation of eye, nose, and throat. Laboratory studies show damage to nose and liver, reproductive and fetal toxicity. Ingestion has led to liver, kidney, brain, and lung damage in laboratory studies.	Studies not reported.
7664-93-9	Sulfuric acid	NJDOH	Inhalation can irritate the lungs; higher exposures can lead to fluid buildup (pulmonary edema), a medical injury. Contact with skin and eyes can cause third-degree burns and blindness.	Repeated inhalation can lead to bronchitis, and possibly emphysema. Exposure to vapor may cause chronic runny nose, tearing of the eyes, nose-bleed and stomach upset, as well as erosion and pitting of teeth. Some evidence of increased lung <i>cancer</i> in exposed workers.
108-88-3	Toluene	ATSDR	Dizziness, fatigue, unconsciousness and death. Permanent brain and nervous system damage from repeated high-level exposure, including speech damage, vision and hearing problems, loss of muscle control and poor balance. Also affects kidneys and leads to fetal toxicity.	Fatigue, confusion, weakness, appearance of intoxication, memory loss, nausea, loss of appetite, hearing loss.
79-01-6	Trichloroethylene	ATSDR	Inhalation leads to impaired heart function, coma, and death; prolonged exposure can cause nerve, lung, kidney and liver damage. Ingestion may cause nausea, liver and kidney damage, convulsions, impaired heart function, coma and death.	For even short durations, small amounts by inhalation can cause headaches, lung irritation, dizziness, poor coordination and difficulty concentrating. Ingestion can cause liver and kidney damage, nervous system effects, impaired immune function, and impaired fetal development. Some (inconclusive) evidence of <i>carcinogenicity</i> .
1330-20-7	Xylene (mixed isomers)	ATSDR	Effects include headaches, lack of coordination, dizziness, confusion, and changes in balance. Short high levels can also cause irritation of skin, eyes, nose, and throat, difficulty breathing, lung problems, delayed reaction time, memory difficulties, stomach discomfort, and possibly liver and kidney changes; highest levels produce unconsciousness and death.	Prolonged exposure can lead to headaches, lack of coordination, dizziness, confusion, and changes in balance. Fetal toxicity observed in high-dose laboratory studies.
—	Zinc (and its compounds)	ATSDR	Ingestion can lead to stomach cramps, nausea, and vomiting. Inhalation can cause "metal fume fever," probably an immune reaction of lungs and body temperature. Dermal exposure causes skin irritation in laboratory studies.	An essential element in the human diet. Prolonged ingestion of excessive levels, though, can cause anemia, damage to pancreas, and reduction of beneficial cholesterol. Laboratory studies indicate effects on fertility and fetal size.

Table 4-8		The 25 Chemicals with the Largest Releases in North America				
M	1996					
CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
67-56-1	Methanol	109,482,376	5,504,970	13,314,152	918,505	129,227,278
—	Nitric acid and nitrate compounds	1,655,394	55,595,793	26,399,648	1,777,546	85,430,122
108-88-3	Toluene	62,286,206	37,653	169,117	295,347	62,796,504
—	Zinc (and its compounds)	4,003,690	593,575	59,063	51,014,759	55,678,321
1330-20-7	Xylene (mixed isomers)	43,437,633	19,608	71,209	45,932	43,582,986
75-15-0	Carbon disulfide	33,026,310	30,184	1,718	122	33,058,434
78-93-3	Methyl ethyl ketone	30,919,639	34,195	1,296,268	65,491	32,322,559
7782-50-5	Chlorine	30,997,078	190,054	33,649	141,784	31,367,791
7647-01-0	Hydrochloric acid	29,973,355	0	0	0	29,973,355
—	Manganese (and its compounds)	4,128,747	1,147,327	8,025	24,339,392	29,632,346
7664-38-2	Phosphoric acid	535,729	12,874,958	4,406	14,268,801	27,686,395
—	Copper (and its compounds)	3,554,017	63,244	154,080	23,552,101	27,327,917
75-09-2	Dichloromethane	26,048,839	4,558	339,912	2,170	26,398,100
100-42-5	Styrene	19,796,427	5,864	104,013	120,197	20,032,280
74-85-1	Ethylene	18,434,687	11,441	484	127	18,448,717
7664-93-9	Sulfuric acid	13,731,314	0	0	0	13,731,314
—	Chromium (and its compounds)	420,094	339,375	17,176	12,653,586	13,436,133
115-07-1	Propylene	12,956,749	3,235	484	775	12,961,972
71-36-3	n-Butyl alcohol	11,412,030	28,110	1,112,021	2,812	12,560,495
50-00-0	Formaldehyde	6,256,589	378,379	4,317,104	52,035	11,006,783
75-05-8	Acetonitrile	482,401	5,397	10,352,250	22	10,840,070
79-01-6	Trichloroethylene	10,461,789	291	585	8,227	10,472,026
108-10-1	Methyl isobutyl ketone	9,275,032	10,282	73,469	2,232	9,362,174
—	Lead (and its compounds)	1,378,293	34,169	405	7,612,198	9,030,614
107-21-1	Ethylene glycol	3,147,789	841,838	3,492,357	196,868	7,682,522
	Subtotal	487,802,207	77,754,500	61,321,595	137,071,029	764,047,208
	% of Total	86.6	98.7	81.5	94.0	88.5
	Total	563,269,177	78,742,497	75,239,943	145,838,045	863,218,412

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of Total				
Total Air Emissions (%)	Surface Water Discharges (%)	Underground Injection (%)	On-site Land Releases (%)	Total Releases (%)
14.6 / 85.4	39.5 / 60.5	18.9 / 81.1	4.7 / 95.3	16.0 / 84.0
6.1 / 93.9	3.8 / 96.2	2.3 / 97.7	2.3 / 97.7	3.3 / 96.7
8.9 / 91.1	17.6 / 82.4	11.8 / 88.2	15.2 / 84.8	9.0 / 91.0
15.4 / 84.6	17.7 / 82.3	0.6 / 99.4	9.6 / 90.4	10.1 / 89.9
14.1 / 85.9	8.3 / 91.7	16.7 / 83.3	49.9 / 50.1	14.2 / 85.8
0.1 / 99.9	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.1 / 99.9
14.3 / 85.7	0.9 / 99.1	84.9 / 15.1	3.3 / 96.7	17.1 / 82.9
2.8 / 97.2	9.4 / 90.6	0.0 / 100.0	0.0 / 100.0	2.9 / 97.1
4.4 / 95.6	— / —	— / —	— / —	4.4 / 95.6
1.5 / 98.5	20.2 / 79.8	0.0 / 100.0	6.5 / 93.5	6.4 / 93.6
11.3 / 88.7	0.1 / 99.9	0.0 / 100.0	0.0 / 100.0	0.3 / 99.7
12.1 / 87.9	22.6 / 77.4	0.0 / 100.0	1.0 / 99.0	2.5 / 97.5
8.4 / 91.6	0.0 / 100.0	0.0 / 100.0	2.3 / 97.7	8.3 / 91.7
4.3 / 95.7	0.5 / 99.5	0.4 / 99.6	0.2 / 99.8	4.3 / 95.7
12.2 / 87.8	0.0 / 100.0	100.0 / 0.0	0.0 / 100.0	12.2 / 87.8
35.9 / 64.1	— / —	— / —	— / —	35.9 / 64.1
3.9 / 96.1	5.0 / 95.0	1.2 / 98.8	3.6 / 96.4	3.7 / 96.3
7.7 / 92.3	0.0 / 100.0	100.0 / 0.0	0.0 / 100.0	7.7 / 92.3
9.7 / 90.3	0.1 / 99.9	0.0 / 100.0	1.1 / 98.9	8.8 / 91.2
17.8 / 82.2	61.6 / 38.4	1.2 / 98.8	0.3 / 99.7	12.7 / 87.3
4.9 / 95.1	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.2 / 99.8
8.0 / 92.0	15.8 / 84.2	0.0 / 100.0	0.0 / 100.0	8.0 / 92.0
8.1 / 91.9	0.5 / 99.5	0.0 / 100.0	1.3 / 98.7	8.0 / 92.0
40.7 / 59.3	17.9 / 82.1	11.1 / 88.9	10.8 / 89.2	15.4 / 84.6
14.0 / 86.0	7.4 / 92.6	0.0 / 100.0	5.8 / 94.2	6.7 / 93.3
10.6 / 89.4	6.4 / 93.6	7.0 / 93.0	6.0 / 94.0	9.1 / 90.9
11.3 / 88.7	6.5 / 93.5	6.4 / 93.6	6.1 / 93.9	9.6 / 90.4

Table 4-9		The 25 Chemicals with the Largest Transfers in North America							
M	1996								
CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of Total			
						Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
—	Zinc (and its compounds)	22,322,324	205,190	58,495,617	81,023,131	12.6 / 87.4	5.4 / 94.6	16.6 / 83.4	15.4 / 84.6
67-56-1	Methanol	18,965,786	37,064,266	809,147	56,839,199	11.0 / 89.0	0.1 / 99.9	20.9 / 79.1	4.0 / 96.0
—	Nitric acid and nitrate compounds	7,682,953	33,363,546	1,974,813	43,021,311	0.6 / 99.4	13.7 / 86.3	6.0 / 94.0	11.0 / 89.0
—	Manganese (and its compounds)	3,991,694	183,570	24,496,307	28,671,571	12.9 / 87.1	2.3 / 97.7	24.8 / 75.2	23.0 / 77.0
—	Lead (and its compounds)	6,580,010	23,918	12,898,055	19,501,983	3.0 / 97.0	9.9 / 90.1	15.9 / 84.1	11.6 / 88.4
108-88-3	Toluene	11,715,697	273,292	506,674	12,495,662	14.8 / 85.2	0.5 / 99.5	4.7 / 95.3	14.0 / 86.0
—	Copper (and its compounds)	1,498,714	242,840	10,372,143	12,113,697	5.9 / 94.1	1.9 / 98.1	6.3 / 93.7	6.2 / 93.8
107-21-1	Ethylene glycol	3,078,467	7,579,136	1,215,013	11,872,615	12.5 / 87.5	0.7 / 99.3	6.6 / 93.4	4.4 / 95.6
—	Chromium (and its compounds)	2,367,651	141,783	9,233,154	11,742,588	24.3 / 75.7	5.2 / 94.8	18.1 / 81.9	19.2 / 80.8
75-09-2	Dichloromethane	5,429,483	295,180	868,708	6,593,372	1.6 / 98.4	1.6 / 98.4	0.0 / 100.0	1.4 / 98.6
1330-20-7	Xylene (mixed isomers)	5,597,285	221,340	270,773	6,089,399	35.4 / 64.6	0.0 / 100.0	16.8 / 83.2	33.3 / 66.7
—	Nickel (and its compounds)	1,543,336	92,835	3,996,361	5,632,532	14.1 / 85.9	12.3 / 87.7	6.8 / 93.2	8.9 / 91.1
1344-28-1	Aluminum oxide (fibrous forms)	16,497	602	4,360,558	4,377,657	0.2 / 99.8	0.0 / 100.0	2.7 / 97.3	2.7 / 97.3
108-95-2	Phenol	1,886,467	1,588,466	744,171	4,219,104	14.6 / 85.4	6.4 / 93.6	38.4 / 61.6	15.7 / 84.3
7429-90-5	Aluminum (fume or dust)	68,763	7,144	3,730,689	3,806,596	0.0 / 100.0	19.0 / 81.0	5.8 / 94.2	5.7 / 94.3
7664-38-2	Phosphoric acid	870,808	1,267,497	1,373,656	3,511,961	5.5 / 94.5	1.8 / 98.2	24.0 / 76.0	11.4 / 88.6
78-93-3	Methyl ethyl ketone	3,005,394	271,419	141,214	3,418,027	27.3 / 72.7	0.0 / 100.0	4.7 / 95.3	24.2 / 75.8
100-42-5	Styrene	1,436,201	120,179	1,532,946	3,089,326	13.4 / 86.6	0.2 / 99.8	4.1 / 95.9	8.3 / 91.7
—	Antimony (and its compounds)	409,226	53,111	2,012,381	2,474,718	0.0 / 100.0	0.1 / 99.9	0.4 / 99.6	0.3 / 99.7
75-05-8	Acetonitrile	1,802,105	409,410	248,614	2,460,128	6.1 / 93.9	0.0 / 100.0	0.0 / 100.0	4.5 / 95.5
1332-21-4	Asbestos (friable)	34	341	2,420,922	2,421,297	0.0 / 100.0	0.0 / 100.0	37.9 / 62.1	37.9 / 62.1
71-36-3	n-Butyl alcohol	923,215	855,106	146,962	1,925,282	40.5 / 59.5	1.2 / 98.8	2.6 / 97.4	20.2 / 79.8
50-00-0	Formaldehyde	535,427	908,585	182,819	1,626,831	40.6 / 59.4	5.7 / 94.3	18.3 / 81.7	18.6 / 81.4
—	Arsenic (and its compounds)	824,168	402	610,201	1,434,771	0.2 / 99.8	40.0 / 60.0	7.6 / 92.4	3.3 / 96.7
7664-39-3	Hydrogen fluoride	936,059	152,593	250,816	1,339,469	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
	Subtotal	103,487,764	85,321,751	142,892,714	331,702,229	12.3 / 87.7	5.8 / 94.2	16.0 / 84.0	12.2 / 87.8
	% of Total	83.1	93.7	97.2	91.5				
	Total for All Matched Chemicals	124,473,070	91,073,897	147,065,311	362,612,278	10.9 / 89.1	5.4 / 94.6	15.7 / 84.3	11.5 / 88.5

► Canada and US data only. Mexico data not collected for 1996.

4.5.1 Carcinogens

In the matched data set for 1996, one of every four PRTR reports that facilities submitted was for a substance designated as a known or suspected carcinogen by either the International Agency for Research on Cancer (IARC) <<http://www.iarc.fr>> or the US National Toxicological Program (NTP) <<http://ntp-server.niehs.nih.gov>>. The majority of the designated carcinogens appear on both agencies' lists, although the IARC list is the longer of the two. Of the 45 carcinogenic substances on the matched NPRI-TRI data set, 35 met the criteria of both IARC and NTP.

Facilities reported on 44 of the 45 carcinogens in the matched data set; only Michler's ketone had no reports. Releases and transfers reported for these substances amounted to 189 million kg, about one-sixth of the total (**Table 4-10**, p. 67). Thus, facilities generally reported smaller amounts of these potentially cancer-causing chemicals (average of 11,300 kg per reporting form) than the average for chemical reporting to the matched data set (19,700 kg per form). However, six of the carcinogens were also among the top 25 chemicals for total releases and transfers: chromium and its compounds, dichloromethane, formaldehyde, lead and its compounds, styrene and trichloroethylene (see **Table 4-6**, p. 58).

Chromium is used in making steel and other alloys, refractory bricks, and dyes and pigments. Other applications include chrome plating, leather tanning, and wood preserving. Chromium and its compounds are also used as cleaning agents in electroplating, as mordants in textile manufacture, and in other processes. The largest use of formaldehyde is in the production of resins (especially for foam insulations, adhesives in particleboard and plywood, and textile treatment). It is widely produced as a chemical intermediary in reactions, serves as a preservative in medical laboratories, and is used as an embalming fluid and sterilizer.

The most important use of lead is in producing batteries. Uses in gasoline, paint, and pipe solder have dramatically decreased in recent years. Lead compounds appear in dyes, explosives, asbestos brake linings, insecticides and rodenticides, ointments, and many other products. They are also used as catalysts, cathode materials, flame retardants, metal and wire coatings, agents or constituents in glass manufacture, and as agents for recovering precious metals, notably gold. Styrene is used in the production of plastics, synthetic rubber, resins, and insulators. ABS (acrylonitrile-butadiene-styrene) plastics are used in business machines, luggage, and construction materials; AS (acrylonitrile-styrene) plastics are used in automotive and household goods and packaging material. Most of these products contain polystyrene (styrene linked in a long chain polymer) along with some unlinked styrene. The primary use of trichloroethylene is to degrease metal parts. As a solvent, trichloroethylene is used with adhesives, lubricants, paints, varnishes, and pesticides. It is used in extraction (of greases, oils, fats, etc), in textile processing, and in chemical manufacture (for pharmaceuticals, polychlorinated aliphatic chemicals, flame retardants, and insecticides).

The reported carcinogens also included an ozone-depleting chemical, carbon tetrachloride, whose manufacture has been phased out under the Montreal Protocol. This chemical was used in producing refrigerants and aerosol propellants and was also widely applied, in industry and by consumers, as a cleaning fluid.

Releases of Carcinogens

Carcinogens reported to NPRI and TRI were more likely to be emitted to air than were other reportable substances. Surface water discharges were much smaller, however, making up just one percent of carcinogenic releases (**Figure 4-10**).

Dichloromethane and styrene had the largest releases, and almost all of these were air emissions. On-site land releases of third-ranked chromium and its compounds contributed to a larger role for land releases among carcinogens than among other PRTR substances (**Table 4-11**, pp. 68–69).

Transfers of Carcinogens

When facilities reported transferring carcinogens in waste off-site for further handling, the substances were much more likely to be sent to disposal/containment than was the case for other PRTR substances (**Figure 4-11**).

In part, this reflects a prevalence of metals among the carcinogenic substances with the largest transfers: lead, chromium and nickel and their compounds were three of the top four (**Table 4-12**, p. 71). Land disposal is the common disposition of metal-bearing waste. For these three metals and their compounds, however, North American facilities also reported transferring more than 10 million kg to treatment/destruction. This transfer type, however, represents processes that do not transform metals and must result in some type of release of these substances.

In alloys, nickel is used in making coins, jewelry, and metal parts. Nickel compounds are used in electroplating, in nickel-cadmium battery manufacture, as coloring agents for ceramics, and as catalysts.

Top Facilities for Releases and Transfers of Carcinogens

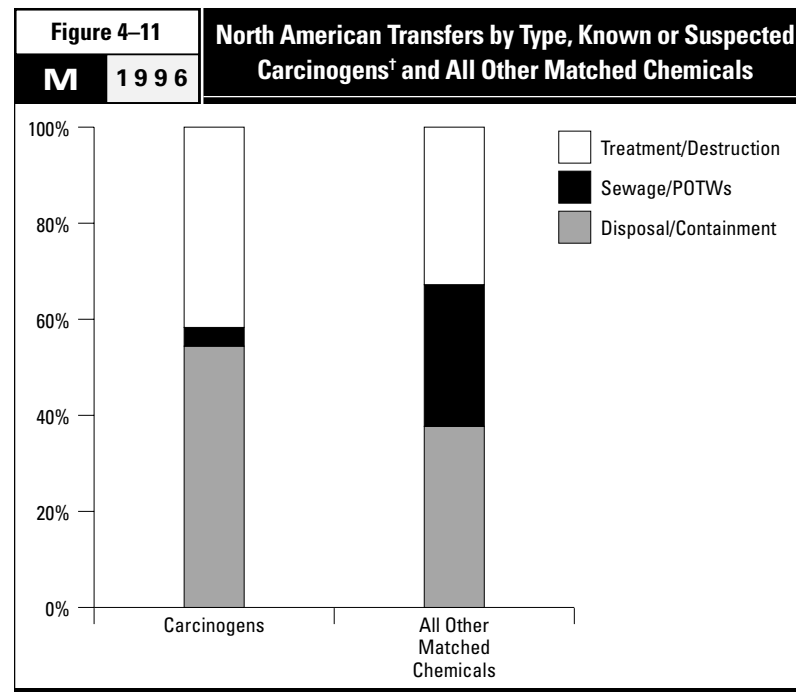
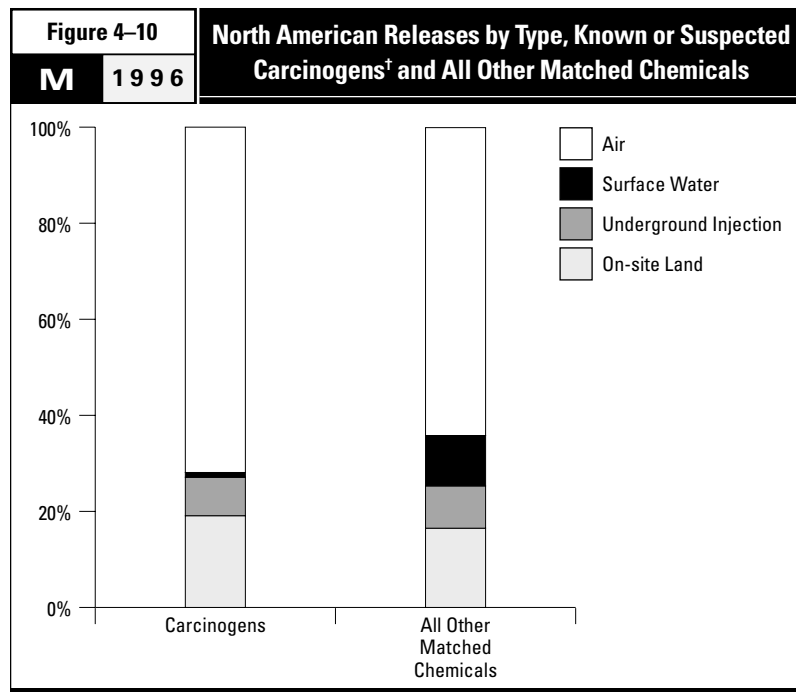
Releases and transfers of substances designated as known or suspected carcinogens were concentrated among a few facilities.

The 50 facilities with the largest releases of these substances reported 42 million kg of releases, 33 percent of the total (**Figure 4-12**). Air emissions and surface water discharges from the top 50 facilities were 15 percent and 13 percent, respectively, of such releases of carcinogens, while underground injection and on-site land releases were much larger, 92 percent and 78 percent, respectively (**Table 4-13**, pp. 72–73).

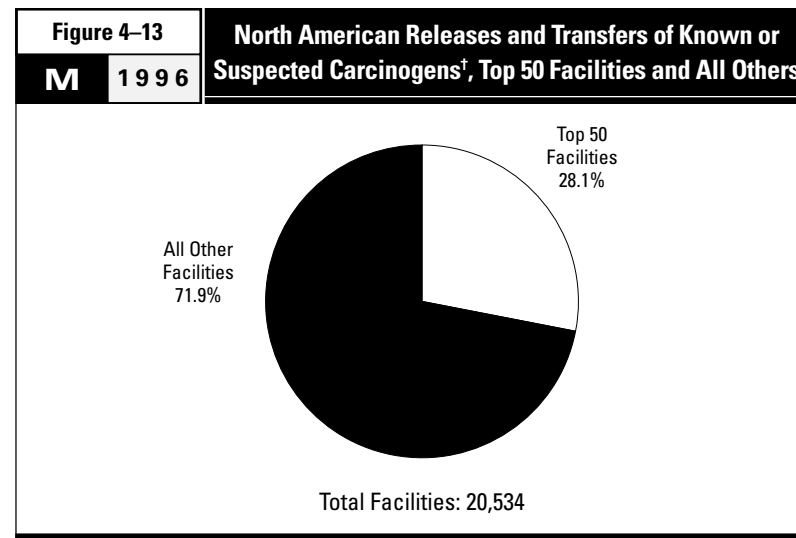
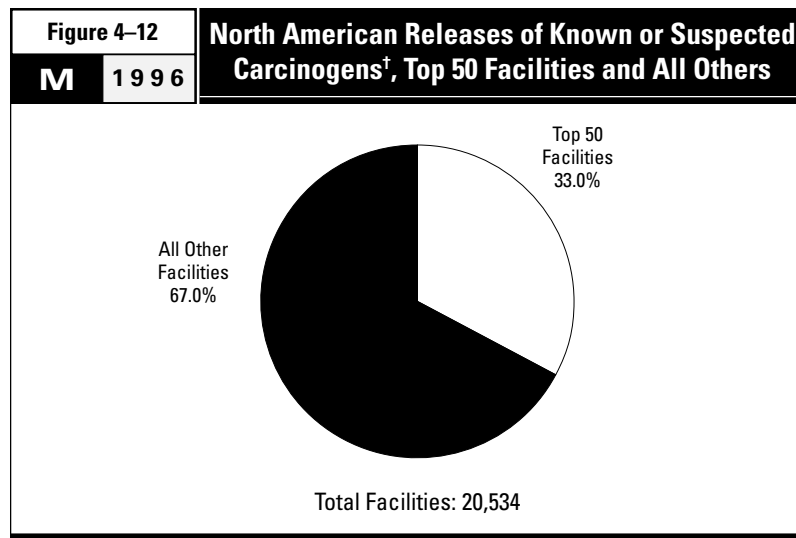
Many of the top 50 facilities were chemical manufacturers (19 facilities; US SIC code 28), which is consistent with that industry's role in North American PRTR reporting. Another 13 facilities produce rubber and plastics products (US SIC code 30). Twelve of the top 50 facilities for carcinogen releases reported in the primary metals sector (US SIC code 33).

Facilities in the chemical manufacturing and primary metals sectors also ranked high for total releases and transfers of the carcinogenic substances. The top 50 facilities totaled 53 million kg, 28 percent of the total (**Figure 4-13**). They reported less than 10 percent of air emissions, surface water discharges and transfers to sewage of all carcinogens, but more than 75 percent of underground injection and on-site land releases. They also reported 35 percent of transfers to treatment/destruction of all carcinogens (**Table 4-14**, pp. 74–75).

[Text continues on p. 76.]



† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.
 ➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.
 ➤ Canada and US data only. Mexico data not collected for 1996.



† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.
 ➤ A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.
 ➤ Canada and US data only. Mexico data not collected for 1996.

Table 4-10

M 1996

North American Releases and Transfers of Known or Suspected Carcinogens[†]

CAS Number	Chemical	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	NPRI/TRI as % of Total			
		Number	%				Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)
75-09-2	Dichloromethane	938	1.5	26,398,100	6,593,372	32,991,472	5.3 / 94.7	8.3 / 91.7	1.4 / 98.6	6.9 / 93.1
—	Lead (and its compounds)	1,770	2.8	9,030,614	19,501,983	28,532,597	7.3 / 92.7	15.4 / 84.6	11.6 / 88.4	12.8 / 87.2
—	Chromium (and its compounds)	3,367	5.4	13,436,133	11,742,588	25,178,721	6.3 / 93.7	3.7 / 96.3	19.2 / 80.8	10.9 / 89.1
100-42-5	Styrene	1,538	2.5	20,032,280	3,089,326	23,121,606	4.7 / 95.3	4.3 / 95.7	8.3 / 91.7	4.9 / 95.1
50-00-0	Formaldehyde	849	1.4	11,006,783	1,626,831	12,633,614	9.9 / 90.1	12.7 / 87.3	18.6 / 81.4	13.5 / 86.5
79-01-6	Trichloroethylene	693	1.1	10,472,026	817,946	11,289,973	5.2 / 94.8	8.0 / 92.0	3.1 / 96.9	7.6 / 92.4
—	Nickel (and its compounds)	2,897	4.7	2,591,316	5,632,532	8,223,848	4.7 / 95.3	15.3 / 84.7	8.9 / 91.1	10.9 / 89.1
75-07-0	Acetaldehyde	262	0.4	6,440,973	306,371	6,747,344	5.7 / 94.3	6.6 / 93.4	2.2 / 97.8	6.4 / 93.6
71-43-2	Benzene	496	0.8	5,645,658	876,423	6,522,081	8.7 / 91.3	31.8 / 68.2	8.5 / 91.5	28.7 / 71.3
67-66-3	Chloroform	167	0.3	4,625,354	1,015,045	5,640,399	6.6 / 93.4	4.5 / 95.5	0.4 / 99.6	3.8 / 96.2
127-18-4	Tetrachloroethylene	406	0.7	3,639,805	620,820	4,260,625	6.2 / 93.8	3.6 / 96.4	10.7 / 89.3	4.7 / 95.3
108-05-4	Vinyl acetate	188	0.3	2,187,614	967,768	3,155,382	5.3 / 94.7	14.8 / 85.2	0.7 / 99.3	10.4 / 89.6
79-06-1	Acrylamide	78	0.1	2,682,566	178,913	2,861,479	7.7 / 92.3	0.0 / 100.0	0.1 / 99.9	0.0 / 100.0
1332-21-4	Asbestos (friable)	104	0.2	373,933	2,421,297	2,795,229	30.8 / 69.2	41.5 / 58.5	37.9 / 62.1	38.4 / 61.6
107-13-1	Acrylonitrile	117	0.2	2,229,176	520,260	2,749,436	7.7 / 92.3	0.5 / 99.5	3.4 / 96.6	1.0 / 99.0
—	Arsenic (and its compounds)	425	0.7	1,064,108	1,434,771	2,498,879	7.8 / 92.2	11.8 / 88.2	3.3 / 96.7	6.9 / 93.1
106-99-0	1,3-Butadiene	195	0.3	1,366,431	49,285	1,415,716	5.1 / 94.9	9.1 / 90.9	10.3 / 89.7	9.1 / 90.9
117-81-7	Di(2-ethylhexyl) phthalate	337	0.5	271,536	952,973	1,224,509	8.9 / 91.1	10.6 / 89.4	4.4 / 95.6	5.8 / 94.2
107-06-2	1,2-Dichloroethane	83	0.1	505,659	464,496	970,155	4.8 / 95.2	3.4 / 96.6	0.0 / 100.0	1.8 / 98.2
56-23-5	Carbon tetrachloride	68	0.1	179,890	737,788	917,678	5.9 / 94.1	0.3 / 99.7	1.0 / 99.0	0.9 / 99.1
—	Cadmium (and its compounds)	154	0.2	292,338	533,083	825,421	7.1 / 92.9	6.5 / 93.5	0.5 / 99.5	2.6 / 97.4
106-89-8	Epichlorohydrin	71	0.1	160,655	661,801	822,456	2.8 / 97.2	0.1 / 99.9	0.0 / 100.0	0.0 / 100.0
—	Cobalt (and its compounds)	503	0.8	206,512	412,890	619,402	4.6 / 95.4	12.4 / 87.6	2.6 / 97.4	5.9 / 94.1
75-01-4	Vinyl chloride	55	0.1	483,219	35,256	518,475	14.5 / 85.5	4.2 / 95.8	0.0 / 100.0	3.9 / 96.1
123-91-1	1,4-Dioxane	48	0.1	165,856	300,206	466,062	4.2 / 95.8	3.7 / 96.3	0.0 / 100.0	1.3 / 98.7
75-56-9	Propylene oxide	122	0.2	301,121	112,393	413,514	3.3 / 96.7	3.8 / 96.2	0.0 / 100.0	2.8 / 97.2
75-21-8	Ethylene oxide	161	0.3	353,622	54,076	407,699	6.2 / 93.8	6.5 / 93.5	0.0 / 100.0	5.7 / 94.3
106-46-7	1,4-Dichlorobenzene	29	0.0	118,435	231,322	349,757	13.8 / 86.2	7.8 / 92.2	0.2 / 99.8	2.7 / 97.3
26471-62-5	Toluenediisocyanate (mixed isomers)	211	0.3	21,639	272,747	294,386	13.7 / 86.3	4.3 / 95.7	2.9 / 97.1	3.0 / 97.0
140-88-5	Ethyl acrylate	101	0.2	85,157	175,134	260,291	6.9 / 93.1	0.3 / 99.7	0.1 / 99.9	0.2 / 99.8
101-77-9	4,4'-Methylenedianiline	23	0.0	23,086	34,832	57,918	4.3 / 95.7	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
79-46-9	2-Nitropropane	5	0.0	16,940	5,654	22,594	20.0 / 80.0	0.7 / 99.3	0.0 / 100.0	0.6 / 99.4
302-01-2	Hydrazine	45	0.1	4,633	10,992	15,625	4.4 / 95.6	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
91-08-7	Toluene-2,6-diisocyanate	34	0.1	6,220	5,465	11,684	2.9 / 97.1	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
584-84-9	Toluene-2,4-diisocyanate	63	0.1	3,384	7,881	11,265	4.8 / 95.2	0.1 / 99.9	6.3 / 93.7	4.5 / 95.5
139-13-9	Nitrilotriacetic acid	23	0.0	1,366	9,722	11,088	65.2 / 34.8	47.3 / 52.7	16.0 / 84.0	19.9 / 80.1
62-56-6	Thiourea	25	0.0	3,084	6,312	9,396	4.0 / 96.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	24	0.0	575	5,129	5,703	4.2 / 95.8	0.9 / 99.1	0.0 / 100.0	0.1 / 99.9
64-67-5	Diethyl sulfate	32	0.1	1,455	2,651	4,106	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
96-45-7	Ethylene thiourea	10	0.0	122	3,123	3,245	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
77-78-1	Dimethyl sulfate	35	0.1	2,640	2	2,642	2.9 / 97.1	0.4 / 99.6	0.0 / 100.0	0.4 / 99.6
95-80-7	2,4-Diaminotoluene	1	0.0	714	127	841	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
96-09-3	Styrene oxide	9	0.0	551	0	551	44.4 / 55.6	97.5 / 2.5	— / —	97.5 / 2.5
94-59-7	Safrole	2	0.0	229	61	290	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
	Subtotal	16,764	26.9	126,433,507	62,431,647	188,865,154	6.5 / 93.5	8.7 / 91.3	11.1 / 88.9	9.5 / 90.5
	% of Total	26.9		14.6	17.2	15.4				
	Total for all Matched Chemicals	62,225	100.0	863,218,412	362,612,278	1,225,830,690	6.9 / 93.1	9.6 / 90.4	11.5 / 88.5	10.1 / 89.9

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

- A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.
- Canada and US data only. Mexico data not collected for 1996.

Table 4-11		Releases in North America of Known or Suspected Carcinogens [†]				
M	1996					
CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
75-09-2	Dichloromethane	26,048,839	4,558	339,912	2,170	26,398,100
100-42-5	Styrene	19,796,427	5,864	104,013	120,197	20,032,280
—	Chromium (and its compounds)	420,094	339,375	17,176	12,653,586	13,436,133
50-00-0	Formaldehyde	6,256,589	378,379	4,317,104	52,035	11,006,783
79-01-6	Trichloroethylene	10,461,789	291	585	8,227	10,472,026
—	Lead (and its compounds)	1,378,293	34,169	405	7,612,198	9,030,614
75-07-0	Acetaldehyde	5,977,467	93,342	362,545	7,619	6,440,973
71-43-2	Benzene	5,386,231	13,245	184,702	61,480	5,645,658
67-66-3	Chloroform	4,428,653	161,283	20,584	14,834	4,625,354
127-18-4	Tetrachloroethylene	3,618,341	561	6,093	13,880	3,639,805
79-06-1	Acrylamide	5,662	2,187	2,606,873	67,644	2,682,566
—	Nickel (and its compounds)	594,413	89,894	41,053	1,863,407	2,591,316
107-13-1	Acrylonitrile	597,894	268	1,630,493	137	2,229,176
108-05-4	Vinyl acetate	1,857,465	1,085	326,403	1,385	2,187,614
106-99-0	1,3-Butadiene	1,360,730	4,989	454	131	1,366,431
—	Arsenic (and its compounds)	193,474	3,607	27,791	838,905	1,064,108
107-06-2	1,2-Dichloroethane	490,394	879	2,325	12,061	505,659
75-01-4	Vinyl chloride	482,541	301	151	0	483,219
1332-21-4	Asbestos (friable)	1,438	1	0	372,494	373,933
75-21-8	Ethylene oxide	341,010	2,029	10,068	250	353,622
75-56-9	Propylene oxide	274,777	20,586	5,506	152	301,121
—	Cadmium (and its compounds)	38,006	2,619	37	250,996	292,338
117-81-7	Di(2-ethylhexyl) phthalate	239,455	124	0	31,923	271,536
—	Cobalt (and its compounds)	38,874	16,484	7,219	143,636	206,512
56-23-5	Carbon tetrachloride	159,577	126	20,188	0	179,890
123-91-1	1,4-Dioxane	55,356	108,047	0	2,453	165,856
106-89-8	Epichlorohydrin	150,124	9,404	0	1,000	160,655
106-46-7	1,4-Dichlorobenzene	116,357	853	907	218	118,435
140-88-5	Ethyl acrylate	84,652	90	0	234	85,157
101-77-9	4,4'-Methylenedianiline	4,427	10	18,649	0	23,086
26471-62-5	Toluenediisocyanate (mixed isomers)	20,635	0	0	160	21,639
79-46-9	2-Nitropropane	15,550	1,265	0	0	16,940
91-08-7	Toluene-2,6-diisocyanate	6,198	0	0	22	6,220
302-01-2	Hydrazine	4,509	10	0	113	4,633
584-84-9	Toluene-2,4-diisocyanate	3,295	0	0	87	3,384
62-56-6	Thiourea	550	154	2,268	113	3,084
77-78-1	Dimethyl sulfate	2,640	0	0	0	2,640
64-67-5	Diethyl sulfate	1,455	0	0	0	1,455
139-13-9	Nitrilotriacetic acid	30	35	680	0	1,366
95-80-7	2,4-Diaminotoluene	714	0	0	0	714
101-14-4	4,4'-Methylenebis(2-chloroaniline)	229	0	0	340	575
96-09-3	Styrene oxide	14	0	0	0	551
94-59-7	Safrole	229	0	0	0	229
96-45-7	Ethylene thiourea	122	0	0	0	122
	Subtotal	90,915,519	1,296,114	10,054,184	24,134,087	126,433,507
	% of Total	16.1	1.6	13.4	16.5	14.6
	Total	563,269,177	78,742,497	75,239,943	145,838,045	863,218,412

[†] Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

- A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.
- Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total				
Total Air Emissions (%)	Surface Water Discharges (%)	Underground Injection (%)	On-site Land Releases (%)	Total Releases (%)
8.4 / 91.6	0.0 / 100.0	0.0 / 100.0	2.3 / 97.7	8.3 / 91.7
4.3 / 95.7	0.5 / 99.5	0.4 / 99.6	0.2 / 99.8	4.3 / 95.7
3.9 / 96.1	4.0 / 95.0	1.2 / 98.8	3.6 / 96.4	3.7 / 96.3
17.8 / 82.2	61.6 / 38.4	1.2 / 98.8	0.3 / 99.7	12.7 / 87.3
7.0 / 92.0	15.8 / 84.2	0.0 / 100.0	0.0 / 100.0	7.0 / 92.0
40.7 / 59.3	17.9 / 82.1	11.1 / 88.9	10.8 / 89.2	15.4 / 84.6
4.6 / 95.4	3.6 / 96.4	41.4 / 58.6	0.0 / 100.0	6.6 / 93.4
32.0 / 67.0	7.1 / 92.9	23.3 / 76.7	47.4 / 52.6	31.8 / 68.2
4.5 / 95.5	4.3 / 95.7	0.0 / 100.0	0.0 / 100.0	4.5 / 95.5
3.6 / 96.4	14.3 / 85.7	0.0 / 100.0	0.5 / 99.5	3.6 / 96.4
6.3 / 93.7	24.2 / 75.8	0.0 / 100.0	0.0 / 100.0	0.0 / 99.0
46.4 / 53.6	55.6 / 44.4	0.0 / 99.0	3.6 / 96.4	15.3 / 84.7
1.7 / 98.3	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.5 / 99.5
7.1 / 92.9	0.0 / 100.0	58.2 / 41.8	7.2 / 92.8	14.8 / 85.2
9.1 / 90.9	0.0 / 100.0	0.0 / 100.0	9.2 / 90.8	9.1 / 90.9
63.7 / 36.3	43.8 / 56.2	0.0 / 100.0	0.0 / 100.0	11.8 / 88.2
3.4 / 96.6	4.7 / 95.3	0.0 / 100.0	5.1 / 94.9	3.4 / 96.6
4.2 / 95.8	46.5 / 53.5	0.0 / 100.0	— / —	4.2 / 95.8
12.9 / 87.1	0.0 / 100.0	— / —	41.6 / 58.4	41.5 / 58.5
6.7 / 93.3	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	6.5 / 93.5
4.1 / 95.9	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	3.8 / 96.2
46.7 / 53.3	19.9 / 80.1	0.0 / 100.0	0.0 / 100.0	6.5 / 93.5
12.0 / 87.0	0.0 / 100.0	— / —	0.1 / 99.9	10.6 / 89.4
26.2 / 73.8	11.2 / 88.8	0.0 / 100.0	9.3 / 90.7	12.4 / 87.6
0.3 / 99.7	22.2 / 77.8	0.0 / 100.0	— / —	0.3 / 99.7
1.7 / 98.3	4.7 / 95.3	— / —	0.0 / 100.0	3.7 / 96.3
0.0 / 100.0	0.0 / 100.0	— / —	0.0 / 100.0	0.1 / 99.9
7.8 / 92.2	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	7.8 / 92.2
0.1 / 99.9	0.0 / 100.0	— / —	0.0 / 100.0	0.3 / 99.7
0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	— / —	0.0 / 100.0
0.4 / 99.6	— / —	— / —	0.0 / 100.0	4.3 / 95.7
0.0 / 100.0	0.0 / 100.0	— / —	— / —	0.7 / 99.3
0.0 / 100.0	— / —	— / —	0.0 / 100.0	0.0 / 100.0
0.0 / 100.0	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
0.0 / 100.0	— / —	— / —	0.0 / 100.0	0.1 / 99.9
0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
0.4 / 99.6	— / —	— / —	0.4 / 99.6	— / —
0.0 / 100.0	— / —	— / —	0.0 / 100.0	— / —
83.3 / 16.7	0.0 / 100.0	0.0 / 100.0	— / —	47.3 / 52.7
0.0 / 100.0	— / —	— / —	0.0 / 100.0	— / —
0.0 / 100.0	— / —	— / —	0.0 / 100.0	0.9 / 99.1
0.0 / 100.0	— / —	— / —	97.5 / 2.5	— / —
0.0 / 100.0	— / —	— / —	0.0 / 100.0	— / —
0.0 / 100.0	— / —	— / —	0.0 / 100.0	— / —
9.6 / 90.4	25.3 / 74.7	4.3 / 95.7	6.4 / 93.6	8.7 / 91.3
11.3 / 88.7	6.5 / 93.5	6.4 / 93.6	6.1 / 93.9	9.6 / 90.4

Table 4-12

M 1996

Transfers in North America of Known or Suspected Carcinogens†

CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of Total			
						Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
—	Lead (and its compounds)	6,580,010	23,918	12,898,055	19,501,983	3.0 / 97.0	9.9 / 90.1	15.9 / 84.1	11.6 / 88.4
—	Chromium (and its compounds)	2,367,651	141,783	9,233,154	11,742,588	24.3 / 75.7	5.2 / 94.8	18.1 / 81.9	19.2 / 80.8
75-09-2	Dichloromethane	5,429,483	295,180	868,708	6,593,372	1.6 / 98.4	1.6 / 98.4	0.0 / 100.0	1.4 / 98.6
—	Nickel (and its compounds)	1,543,336	92,835	3,996,361	5,632,532	14.1 / 85.9	12.3 / 87.7	6.8 / 93.2	8.9 / 91.1
100-42-5	Styrene	1,436,201	120,179	1,532,946	3,089,326	13.4 / 86.6	0.2 / 99.8	4.1 / 95.9	8.3 / 91.7
1332-21-4	Asbestos (friable)	34	341	2,420,922	2,421,297	0.0 / 100.0	0.0 / 100.0	37.9 / 62.1	37.9 / 62.1
50-00-0	Formaldehyde	535,427	908,585	182,819	1,626,831	40.6 / 59.4	5.7 / 94.3	18.3 / 81.7	18.6 / 81.4
—	Arsenic (and its compounds)	824,168	402	610,201	1,434,771	0.2 / 99.8	40.0 / 60.0	7.6 / 92.4	3.3 / 96.7
67-66-3	Chloroform	847,839	149,448	17,758	1,015,045	0.5 / 99.5	0.0 / 100.0	0.7 / 99.3	0.4 / 99.6
108-05-4	Vinyl acetate	885,122	66,808	15,837	967,768	0.2 / 99.8	1.6 / 98.4	22.5 / 77.5	0.7 / 99.3
117-81-7	Di(2-ethylhexyl) phthalate	109,404	9,633	833,936	952,973	6.5 / 93.5	0.7 / 99.3	4.1 / 95.9	4.4 / 95.6
71-43-2	Benzene	750,222	97,387	28,813	876,423	9.9 / 90.1	0.0 / 100.0	2.5 / 97.5	8.5 / 91.5
79-01-6	Trichloroethylene	744,151	39,180	34,615	817,946	3.4 / 96.6	0.0 / 100.0	0.0 / 100.0	3.1 / 96.9
56-23-5	Carbon tetrachloride	733,377	218	4,193	737,788	1.0 / 99.0	0.0 / 100.0	0.0 / 100.0	1.0 / 99.0
106-89-8	Epichlorohydrin	654,723	5,202	1,876	661,801	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
127-18-4	Tetrachloroethylene	611,253	838	8,729	620,820	10.8 / 89.2	0.0 / 100.0	10.0 / 90.0	10.7 / 89.3
—	Cadmium (and its compounds)	103,225	1,435	428,423	533,083	0.0 / 100.0	0.6 / 99.4	0.6 / 99.4	0.5 / 99.5
107-13-1	Acrylonitrile	477,062	40,187	3,011	520,260	3.6 / 96.4	0.5 / 99.5	0.0 / 100.0	3.4 / 96.6
107-06-2	1,2-Dichloroethane	420,225	2,888	41,383	464,496	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
—	Cobalt (and its compounds)	59,707	6,344	346,839	412,890	4.0 / 96.0	0.2 / 99.8	2.4 / 97.6	2.6 / 97.4
75-07-0	Acetaldehyde	148,011	157,233	1,127	306,371	4.5 / 95.5	0.0 / 100.0	0.9 / 99.1	2.2 / 97.8
123-91-1	1,4-Dioxane	10,009	72,788	217,410	300,206	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
26471-62-5	Toluenediisocyanate (mixed isomers)	257,612	0	15,135	272,747	3.1 / 96.9	— / —	0.1 / 99.9	2.9 / 97.1
106-46-7	1,4-Dichlorobenzene	230,887	36	400	231,322	0.0 / 100.0	0.0 / 100.0	100.0 / 0.0	0.2 / 99.8
79-06-1	Acrylamide	12,402	29,664	136,847	178,913	0.0 / 100.0	0.2 / 99.8	0.1 / 99.9	0.1 / 99.9
140-88-5	Ethyl acrylate	149,364	10,925	14,845	175,134	0.1 / 99.9	0.0 / 100.0	0.0 / 100.0	0.1 / 99.9
75-56-9	Propylene oxide	849	93,753	17,791	112,393	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
75-21-8	Ethylene oxide	437	53,164	475	54,076	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
106-99-0	1,3-Butadiene	46,808	304	2,172	49,285	10.8 / 89.2	0.0 / 100.0	0.0 / 100.0	10.3 / 89.7
75-01-4	Vinyl chloride	26,027	333	8,896	35,256	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
101-77-9	4,4'-Methylenedianiline	25,030	917	8,885	34,832	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
302-01-2	Hydrazine	887	1,693	8,412	10,992	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
139-13-9	Nitrotriacetic acid	122	9,600	0	9,722	100.0 / 0.0	15.0 / 85.0	— / —	16.0 / 84.0
584-84-9	Toluene-2,4-diisocyanate	6,005	0	1,876	7,881	4.2 / 95.8	— / —	13.3 / 86.7	6.3 / 93.7
62-56-6	Thiourea	5,022	115	1,175	6,312	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
79-46-9	2-Nitropropane	5,654	0	0	5,654	0.0 / 100.0	— / —	— / —	0.0 / 100.0
91-08-7	Toluene-2,6-diisocyanate	5,058	0	407	5,465	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
101-14-4	4,4'-Methylenebis(2-chloroaniline)	5,124	2	2	5,129	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
96-45-7	Ethylene thiourea	1,277	0	1,846	3,123	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
64-67-5	Diethyl sulfate	685	1,945	21	2,651	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
95-80-7	2,4-Diaminotoluene	127	0	0	127	0.0 / 100.0	— / —	— / —	0.0 / 100.0
94-59-7	Safrole	0	61	0	61	— / —	0.0 / 100.0	— / —	0.0 / 100.0
77-78-1	Dimethyl sulfate	0	2	0	2	— / —	0.0 / 100.0	— / —	0.0 / 100.0
96-09-3	Styrene oxide	0	0	0	0	— / —	— / —	— / —	— / —
	Subtotal	26,050,017	2,435,326	33,946,301	62,431,647	6.6 / 93.4	3.3 / 96.7	15.1 / 84.9	11.1 / 88.9
	% of Total	20.9	2.7	23.1	17.2				
	Total for All Matched Chemicals	124,473,070	91,073,897	147,065,311	362,612,278	10.9 / 89.1	5.4 / 94.6	15.7 / 84.3	11.5 / 88.5

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

- A chemical (and its compounds) is included if the chemical or any of its compounds is designated carcinogenic.
- Canada and US data only. Mexico data not collected for 1996.

Table 4-13		The 50 North American Facilities with the Largest Total Releases of Known or Suspected Carcinogens†							
Rank	Facility	City, State/Province	SIC Codes		Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
			Canada	US					
1	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717
2	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769
3	Monsanto Co.	Luling, LA		28	2	8,753	0	2,540,363	0
4	ASARCO Inc.	East Helena, MT		33	4	29,062	596	0	1,866,876
5	ASARCO Inc., Glover Plant	Annapolis, MO		33	4	150,576	14	0	1,295,185
6	Angus Chemical Co.	Sterlington, LA		28	4	13,698	2,040	1,361,431	0
7	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	7	13,197	0	0	1,294,240
8	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	5	21,386	0	1,222,494	3
9	BP Chemicals Inc.	Lima, OH		28	10	43,701	0	1,151,760	0
10	Eastman Kodak Co., Kodak Park	Rochester, NY		38	9	1,119,503	22,802	0	39
11	Aquaglass Corp., Masco Corp.	Adamsville, TN		30	1	1,046,797	0	0	0
12	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	4	95,508	0	0	929,049
13	Cytec Industries Inc.	Westwego, LA		28	5	8,040	592	987,664	0
14	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR		33	1	17,061	7	0	905,522
15	Foamex L.P., Div. of Kihi	Corry, PA		30	2	756,420	0	0	0
16	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	5	9,776	454	0	731,642
17	Carpenter Co., Tupelo Div.	Verona, MS		30	2	689,399	0	0	0
18	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	6	92,688	75	0	596,449
19	Monsanto Co., Chocolate Bayou	Alvin, TX		28	3	12,307	0	645,125	0
20	FMC Corp.	Pocatello, ID		28	4	1,410	0	0	617,211
21	Abbott Chemicals Inc.	Barceloneta, PR		Mult.	1	585,261	0	0	0
22	Celanese Canada Inc.	Edmonton, AB	37	28	5	184,472	0	386,300	0
23	GE Plastics Co., General Electric Co.	Mount Vernon, IN		28	6	569,148	259	0	0
24	Northwestern Steel & Wire Co.	Sterling, IL		33	3	4,998	299	0	528,345
25	Elkem Metals Co.	Marietta, OH		33	4	14,521	5,896	0	441,723
26	General Electric Co.	Ottawa, IL		28	4	460,365	39	0	0
27	Dofasco Inc.	Hamilton, ON	29	33	5	456,937	542	0	51
28	Sterling Chemicals Inc.	Texas City, TX		28	10	69,611	0	387,913	0
29	Foamex International Inc.	Milan, TN		30	1	457,282	0	0	0
30	Upjohn Mfg. Co., Pharmacia & Upjohn Inc.	Arecibo, PR		28	2	455,125	0	0	0
31	Dow Chemical Co.	Freeport, TX		28	21	349,937	47,669	0	46,408
32	Nu-Foam Products, Ohio Decorative Products Inc.	Chattanooga, TN		30	2	420,896	0	0	0
33	Weyerhaeuser Co.	Longview, WA		Mult.	6	340,485	62,013	0	0
34	Aqua Glass West Inc., Masco Corp.	Klamath Falls, OR		30	1	395,697	0	0	0
35	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	5	389,700	4,000	0	0
36	Celanese Eng. Resins Inc., Hoechst Corp.	Bishop, TX		28	5	152,853	3,980	228,580	113
37	General Foam Corp., PMC Inc.	West Hazelton, PA		30	3	376,544	0	0	0
38	Carpenter Co.	Russellville, KY		Mult.	3	374,128	0	0	0
39	Novopharm Limited	Scarborough, ON	37	28	1	366,565	0	0	0
40	Tomkins Ind. Inc., Lasco Bathware Div.	Three Rivers, MI		30	1	362,998	0	0	0
41	General Electric Co.	Burkville, AL		28	2	358,731	1	0	0
42	Olympic Products Co., Cone Mills Corp.	Tupelo, MS		30	3	352,259	0	0	0
43	Boeing Co.	Wichita, KS		Mult.	6	350,141	231	0	0
44	Flexible Foam Products, Ohio Decorative Products	Elkhart, IN		30	2	339,873	0	0	0
45	Kimberly-Clark Corp.	Mobile, AL		26	2	320,181	12,698	0	0
46	General Foam Corp., PMC Inc.	Bridgeview, IL		30	3	322,330	0	0	0
47	Foamex L.P.	Morristown, TN		30	2	319,771	0	0	0
48	Tomkins Ind. Inc., Lasco Bathware Div.	Cordele, GA		30	1	309,375	0	0	0
49	Great Lakes Chemical Corp., Central Plant	El Dorado, AR		28	2	11,460	0	287,599	0
50	American Steel Foundries, Amsted Industries Inc.	Granite City, IL		33	2	3,302	0	0	293,424
Subtotal					194	13,609,254	164,335	9,199,230	18,752,767
% of Total					1.2	15.0	12.7	91.5	77.7
Total for All Matched Carcinogens					16,764	90,915,519	1,296,114	10,054,184	24,134,087

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

* Chemicals accounting for more than 70% of total releases of carcinogens from the facility.

➤ Canada and US data only, Mexico data not collected for 1996

➤ UIJ=underground injection

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	5,126,893	Chromium and compounds (land)
2	4,084,751	Chromium and compounds (land)
3	2,549,116	Formaldehyde (UIJ)
4	1,896,534	Lead and compounds (land)
5	1,445,775	Lead and compounds (land)
6	1,377,169	Formaldehyde (UIJ)
7	1,307,438	Lead/Chromium and compounds (land)
8	1,243,883	Acrylamide, Acrylonitrile (UIJ)
9	1,195,460	Acrylamide, Acrylonitrile (UIJ)
10	1,142,344	Dichloromethane (air)
11	1,046,797	Styrene (air)
12	1,024,557	Lead and compounds (land)
13	996,296	Acrylamide (UIJ)
14	922,590	Nickel and compounds (land)
15	756,420	Dichloromethane (air)
16	741,871	Lead/Arsenic and compounds (land)
17	689,399	Dichloromethane (air)
18	689,212	Lead and compounds (land)
19	657,431	Acrylonitrile (UIJ)
20	618,621	Chromium/Cadmium and compounds (land)
21	585,261	Dichloromethane (air)
22	570,772	Acetaldehyde (UIJ, air), Vinyl acetate (UIJ)
23	569,407	Dichloromethane (air)
24	533,642	Lead/Chromium and compounds (land)
25	462,140	Chromium and compounds (land)
26	460,404	Styrene, Acrylonitrile (air)
27	457,530	Benzene (air)
28	457,524	Acrylamide (UIJ)
29	457,282	Dichloromethane (air)
30	455,125	Dichloromethane (air)
31	444,015	Epichlorohydrin, 1,2-Dichloroethane, Dichloromethane, Benzene, Propylene oxide, 1,3-Butadiene (air)
32	420,896	Dichloromethane (air)
33	402,498	Acetaldehyde, Chloroform (air)
34	395,697	Styrene (air)
35	393,700	Lead and compounds (air)
36	385,526	Formaldehyde (UIJ, air)
37	376,544	Dichloromethane (air)
38	374,128	Dichloromethane (air)
39	366,565	Dichloromethane (air)
40	362,998	Styrene (air)
41	358,732	Dichloromethane (air)
42	352,259	Dichloromethane (air)
43	350,372	Tetrachloroethylene (air)
44	339,873	Dichloromethane (air)
45	332,880	Chloroform (air)
46	322,330	Dichloromethane (air)
47	319,771	Dichloromethane (air)
48	309,375	Styrene (air)
49	299,059	Dichloromethane (UIJ)
50	296,726	Chromium and compounds (land)
	41,725,586	
	33.0	
	126,433,506	

Table 4-14		Top 50 North American Facilities with the Largest Total Releases and Transfers of Known or Suspected Carcinogens†								
Rank	Facility	City, State	SIC Codes		Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	
			Canada	US						
1	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717	
2	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769	
3	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	4	95,508	0	0	929,049	
4	Monsanto Co.	Luling, LA		28	2	8,753	0	2,540,363	0	
5	Pharmacia & Upjohn Co.	Portage, MI		28	4	91,912	116	22,789	0	
6	ASARCO Inc.	East Helena, MT		33	4	29,062	596	0	1,866,876	
7	ASARCO Inc., Glover Plant	Annapolis, MO		33	4	150,576	14	0	1,295,185	
8	Angus Chemical Co.	Sterlington, LA		28	4	13,698	2,040	1,361,431	0	
9	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	7	13,197	0	0	1,294,240	
10	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	4	5,879	15	0	0	
11	BP Chemicals Inc. Green Lake, BP America Inc.	Port Lavaca, TX		28	5	21,386	0	1,222,494	3	
12	BP Chemicals Inc.	Lima, OH		28	10	43,701	0	1,151,760	0	
13	Eastman Kodak Co., Kodak Park	Rochester, NY		38	9	1,119,503	22,802	0	39	
14	Aquaglass Corp., Masco Corp.	Adamsville, TN		30	1	1,046,797	0	0	0	
15	General Battery Corp., Exide Corp.	Reading, PA		33	3	926	878	0	0	
16	Cytec Industries Inc.	Westwego, LA		28	5	8,040	592	987,664	0	
17	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR		33	1	17,061	7	0	905,522	
18	Dominion Castings Ltd.	Hamilton, ON	29	33	2	6,291	100	0	0	
19	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	5	9,776	454	0	731,642	
20	Quemetco Inc., RSR Corp.	City of Industry, CA		33	3	837	10	0	0	
21	Xerox Corp.	Webster, NY		35	3	21,698	0	0	0	
22	Upjohn Mfg. Co., Pharmacia & Upjohn Inc.	Arecibo, PR		28	2	455,125	0	0	0	
23	Foamex L.P., Div. of Kihi	Corry, PA		30	2	756,420	0	0	0	
24	DuPont Sabine River Works	Orange, TX		28	9	207,105	414	45,737	0	
25	Quemetco Inc., RSR Corp.	Indianapolis, IN		33	3	1,879	0	0	0	
26	Shell Oil Co.	Deer Park, TX		28	17	85,043	3	0	207	
27	Sequentia Inc.	Grand Junction, TN		30	1	40,710	0	0	0	
28	Carpenter Co., Tupelo Div.	Verona, MS		30	2	689,399	0	0	0	
29	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	6	92,688	75	0	596,449	
30	Monsanto Co., Chocolate Bayou	Alvin, TX		28	3	12,307	0	645,125	0	
31	Co-Steel Lasco	Whitby, ON	29	33	3	1,408	53	0	231,800	
32	Celanese Canada Inc.	Edmonton, AB	37	28	5	184,472	0	386,300	0	
33	FMC Corp.	Pocatello, ID		28	4	1,410	0	0	617,211	
34	Thomson Consumer Electronics Inc.	Circleville, OH		32	2	1,104	35	0	0	
35	GE Plastics Co., General Electric Co.	Mount Vernon, IN		28	6	569,148	259	0	0	
36	Abbott Chemicals Inc.	Barceloneta, PR		Mult.	1	585,261	0	0	0	
37	Dofasco Inc.	Hamilton, ON	29	33	5	456,937	542	0	51	
38	Noltex L.L.C., Mitsubishi Chemical America Inc.	La Porte, TX		28	1	4,036	0	0	0	
39	American Bumper & Mfg. Co.	Ionia, MI		34	3	1,844	0	0	0	
40	Northwestern Steel & Wire Co.	Sterling, IL		33	3	4,998	299	0	528,345	
41	Boeing Co.	Wichita, KS		Mult.	6	350,141	231	0	0	
42	Allegheny Ludlum Corp.	New Castle, IN		33	2	231	227	0	0	
43	Elkem Metals Co.	Marietta, OH		33	4	14,521	5,896	0	441,723	
44	Southwire Co.	Carrrollton, GA		Mult.	14	4,473	106	0	0	
45	Quality Chemicals Inc., Chemfirst Corp.	Tyrone, PA		28	1	1,503	0	0	0	
46	Hydrite Chemical Co.	Cottage Grove, WI		28	4	2,363	0	0	0	
47	Sterling Chemicals Inc.	Texas City, TX		28	10	69,611	0	387,913	0	
48	Stelco Inc., Hilton Works	Hamilton, ON	29	33	6	228,340	4,975	0	0	
49	General Electric Co.	Ottawa, IL		28	4	460,365	39	0	0	
50	Foamex International Inc.	Milan, TN		30	1	457,282	0	0	0	
Subtotal						212	8,449,752	40,905	8,751,576	18,644,828
% of Total						1.3	9.3	3.2	87.0	77.3
Total of All Matched Carcinogens						16,764	90,915,519	1,296,114	10,054,184	24,134,087

† Carcinogenic substances are those chemicals or chemical compounds listed in either the International Agency for Research on Cancer (IARC) Monographs or the US National Toxicological Program (NTP) Annual Report on Carcinogens.

* Chemicals accounting for more than 70% of total releases and transfers of carcinogens from the facility.

➤ One TRI facility reported in error. Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds. It has been omitted from this table.

➤ Canada and US data only. Mexico data not collected for 1996.

➤ UIJ = underground injection

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	5,126,893	24,036	0	3,129	27,166	5,154,059	Chromium and compounds (land)
2	4,084,751	4,535	0	0	4,535	4,089,286	Chromium and compounds (land)
3	1,024,557	2,593,802	9	0	2,593,811	3,618,368	Lead and compounds (transfers to treatment)
4	2,549,116	5,442	0	0	5,442	2,554,558	Formaldehyde (UIJ)
5	114,816	1,708,572	148,186	4,748	1,861,506	1,976,322	Dichloromethane (transfers to treatment)
6	1,896,534	0	7	0	7	1,896,541	Lead and compounds (land)
7	1,445,775	0	0	0	0	1,445,775	Lead and compounds (land)
8	1,377,169	33,046	0	0	33,046	1,410,215	Formaldehyde (UIJ)
9	1,307,438	0	0	0	0	1,307,438	Lead/Chromium and compounds (land)
10	5,894	3,935	0	1,261,751	1,265,686	1,271,580	Lead/Nickel and compounds (transfers to disposal)
11	1,243,883	328	0	0	328	1,244,211	Acrylamide, Acrylonitrile (UIJ)
12	1,195,460	5,018	0	290	5,308	1,200,769	Acrylamide, Acrylonitrile (UIJ)
13	1,142,344	4,537	0	58	4,595	1,146,940	Dichloromethane (air)
14	1,046,797	0	0	0	0	1,046,797	Styrene (air)
15	1,803	704,322	0	327,065	1,031,388	1,033,191	Lead and compounds (transfers to treatment, disposal)
16	996,296	625	0	2	628	996,924	Acrylamide (UIJ)
17	922,590	0	0	0	0	922,590	Nickel and compounds (land)
18	6,491	0	0	888,042	888,042	894,533	Chromium and compounds (transfers to disposal)
19	741,871	0	0	119,252	119,252	861,122	Lead/Arsenic and compounds (land)
20	847	0	72	847,166	847,238	848,084	Lead and compounds (transfers to disposal)
21	21,698	5,481	20	818,954	824,455	846,153	Dichloromethane (transfers to disposal)
22	455,125	340,136	21,814	0	361,950	817,075	Dichloromethane (air, transfers to treatment)
23	756,420	1,813	0	0	1,813	758,233	Dichloromethane (air)
24	253,255	105,937	0	388,305	494,242	747,497	Nickel and compounds (transfers to disposal), Vinyl acetate (air)
25	1,879	0	55	743,311	743,366	745,245	Lead and compounds (transfers to disposal)
26	85,253	634,932	0	177	635,109	720,362	Epichlorohydrin (transfers to treatment)
27	40,710	0	0	657,275	657,275	697,985	Styrene (transfers to disposal)
28	689,399	752	0	0	752	690,151	Dichloromethane (air)
29	689,212	0	369	0	369	689,581	Lead and compounds (land)
30	657,431	0	0	0	0	657,431	Acrylonitrile (UIJ)
31	233,261	0	8	397,200	397,208	630,469	Lead and compounds (transfers to disposal, land)
32	570,772	0	0	48,061	48,061	618,833	Acetaldehyde (UIJ, air), Vinyl acetate (UIJ)
33	618,621	0	0	24	24	618,645	Chromium/Cadmium and compounds (land)
34	1,139	168,317	0	439,312	607,629	608,768	Lead and compounds (transfers to disposal)
35	569,407	19,368	0	7,125	26,493	595,900	Dichloromethane (air)
36	585,261	1,533	16	0	1,549	586,810	Dichloromethane (air)
37	457,530	0	333	108,926	109,259	566,789	Benzene (air)
38	4,036	547,834	317	0	548,152	552,188	Vinyl acetate (transfers to treatment)
39	1,844	545,574	1,838	0	547,412	549,256	Nickel and compounds (transfers to treatment)
40	533,642	1,224	0	0	1,224	534,866	Lead/Chromium and compounds (land)
41	350,372	128,578	118	44,104	172,800	523,172	Tetrachloroethylene, Trichloroethylene (air)
42	458	0	0	512,472	512,472	512,930	Chromium/Nickel and compounds (transfers to disposal)
43	462,140	0	0	43,537	43,537	505,678	Chromium and compounds (land)
44	4,579	401,032	18	95,841	496,890	501,469	Lead and compounds (transfers to treatment)
45	1,503	497,742	0	0	497,742	499,245	Carbon tetrachloride (transfers to treatment)
46	2,363	476,259	0	0	476,259	478,621	Trichloroethylene, Dichloromethane (transfers to treatment)
47	457,524	10,657	61	9,311	20,029	477,553	Acrylamide, Acrylonitrile (UIJ)
48	234,615	0	0	238,340	238,340	472,955	Asbestos (transfers to disposal), Benzene (air)
49	460,404	0	0	116	116	460,520	Styrene, Acrylonitrile (air)
50	457,282	150	0	0	150	457,432	Dichloromethane (air)
	35,888,462	8,975,520	173,243	8,003,891	17,152,654	53,041,116	
	28.4	34.5	7.1	23.6	27.5	28.1	
	126,433,506	26,050,017	2,435,326	33,946,301	62,431,643	188,865,151	

4.5.2 Metals

Nineteen metals reportable to both NPRI and TRI accounted for one-third of the reporting forms and one-quarter of total releases and transfers in 1996. Predominant among them was zinc and its compounds. This substance had the largest releases and the largest transfers of the metals (**Table 4-15**, pp. 78-79). As seen earlier (**Table 4-6**, p. 58), zinc and its compounds ranked second among all matched chemicals for total releases and transfers.

A few metals are reported in Canada or in the United States to a greater extent than the average for all substances. Notably, more than 90 percent of vanadium was reported to NPRI, along with 27 percent of mercury and its compounds. TRI facilities accounted for nearly all the reporting of antimony and its compounds and titanium tetrachloride. Vanadium compounds are constituents of specialty steels used principally in automobile parts. Vanadium is also used in rubber, plastics and ceramics production. Mercury is used in making chlorine gas and caustic soda and in thermometers, batteries, mercury lamps and fluorescent lamps, and other products. Mercury salts are used in ointments. Mercury is also a catalyst for production of vinyl chloride monomer, urethane foam, and anthraquinone. Uses of titanium tetrachloride include manufacture of titanium metal and other titanium compounds. Among the latter is titanium dioxide, used as a white pigment and in the production of other chemicals.

Releases of Metals

By far the largest release of metals was the 126 million kg to on-site land disposal. For 13 of the 19 metals, this release type accounted for 70 percent or more of total releases (**Table 4-16**, pp. 80-81). It also accounted for 15 percent of all releases of all substances in the matched data set—a distinctly different pattern from that obtained for releases of non-metal substances (**Figure 4-14**).

Transfers of Metals

Disposal/containment was the largest type of off-site transfer for metals. Such transfers are generally made to landfills or other forms of land disposal, corresponding to on-site land releases. The 131 million kg of metals and their compounds sent off-site for disposal amounted to 36 percent of all transfers of all substances in the matched data set. Another 40 million kg, however, were reported as transfers for treatment or destruction. As noted above, treatment processes may modify metals, but do not destroy them or convert them to other substances. These transfers therefore result in some type of release of the metal. More than half the amount of metals sent for treatment/destruction consisted of zinc and its compounds (**Table 4-17**, p. 83).

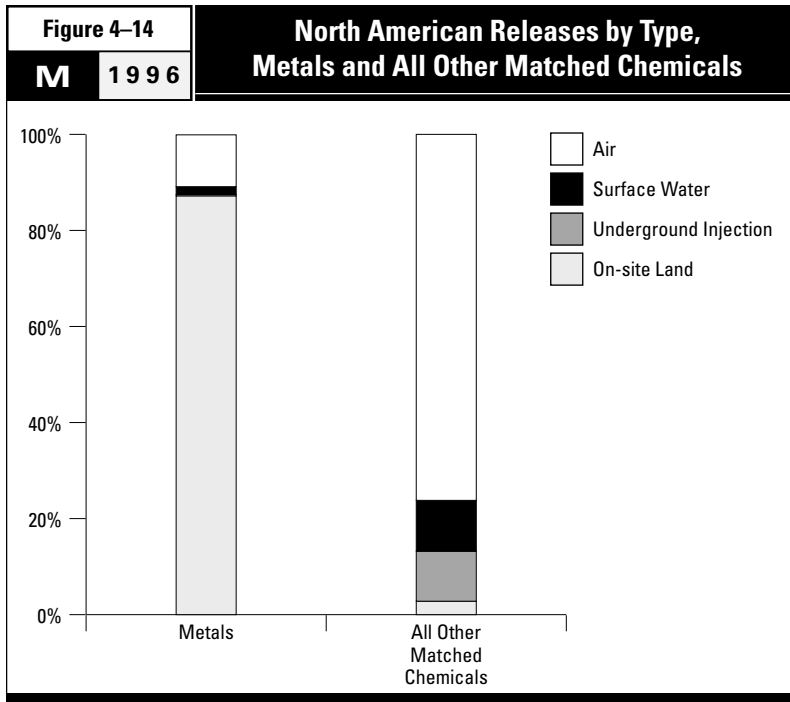
As with releases, the disposition of metals sent off-site differed distinctly from the overall pattern of transfers (**Figure 4-15**). In particular, very little was reported as transferred to sewage, which is not surprising as metals generally cannot be treated by sewage treatment plants.

Top Facilities for Releases and Transfers of Metals

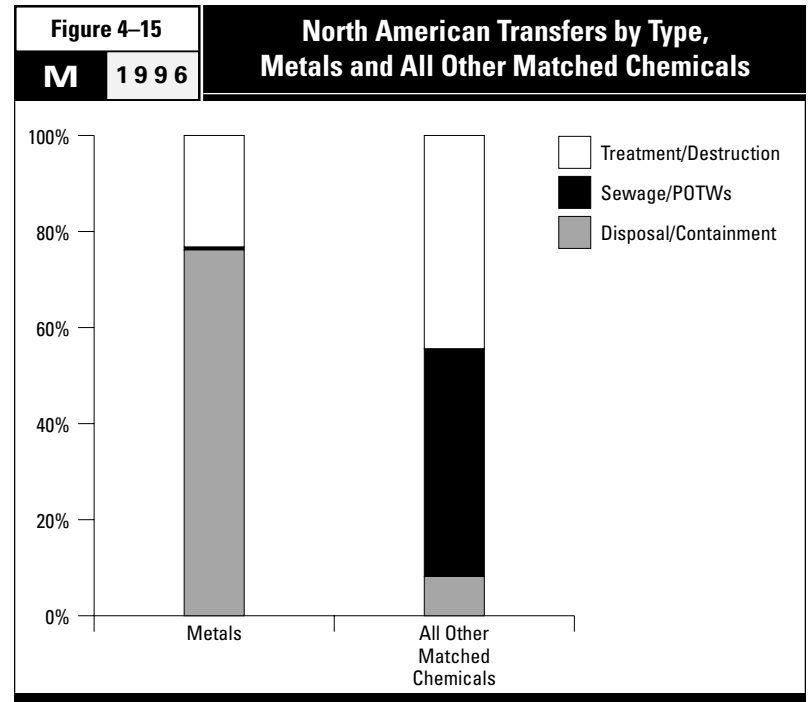
Fifty facilities reported the bulk of the releases of metals and their compounds, totaling 84 percent of all such releases (**Figure 4-16**). These facilities submitted only one percent of the forms for metals and their compounds; however, their reporting represented 91 percent of all on-site land releases of the metals and their compounds reported in North America. This is a much greater concentration of releases in few facilities than occurred with other listed substances (**Table 4-18**, pp. 84-85).

For total releases and transfers of metals and their compounds, the top 50 facilities reported 61 percent of all such releases and transfers, representing 82 percent of on-site land releases of metals and their compounds (**Figure 4-17**). In addition, these facilities reported about half of the amounts for metals in transfers, except transfers to sewage. As might be expected, 43 of the 50 facilities with the largest totals were primary metals producers (US SIC code 33, see **Table 4-19**, pp. 86-87).

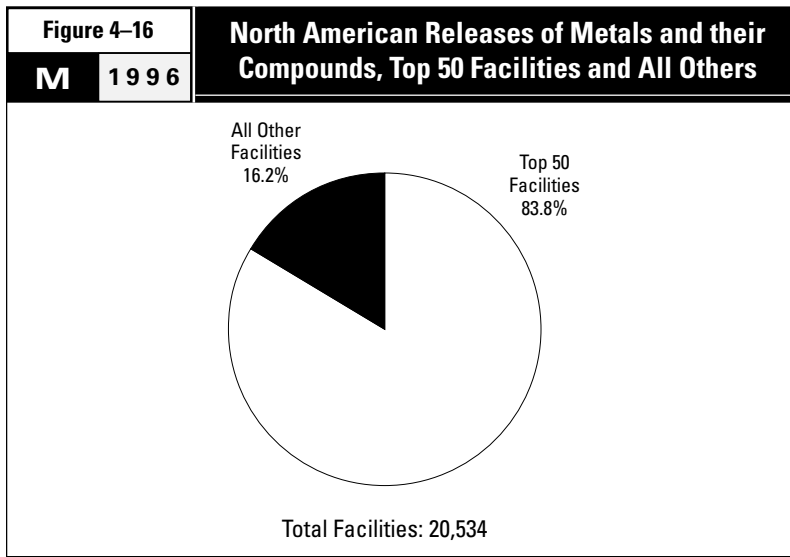
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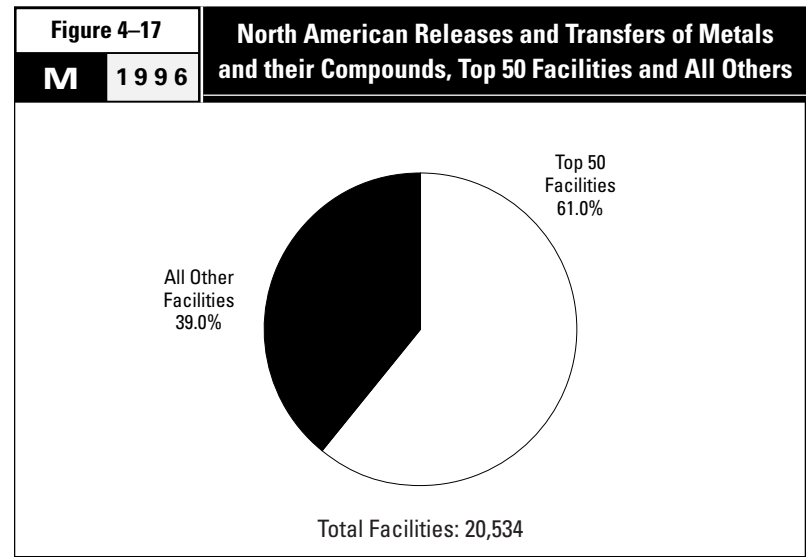
► Canada and US data only, Mexico data not collected for 1996.



► Canada and US data only, Mexico data not collected for 1996.



► Canada and US data only, Mexico data not collected for 1996.



► Canada and US data only, Mexico data not collected for 1996.

Table 4-15		North American Releases and Transfers of Metals and their Compounds				
M	1996			Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
CAS Number	Chemical	Forms				
		Number	%			
—	Zinc (and its compounds)	3,239	5.2	55,678,321	81,023,131	136,701,452
—	Manganese (and its compounds)	2,787	4.5	29,632,346	28,671,571	58,303,917
—	Copper (and its compounds)	4,286	6.9	27,327,917	12,113,697	39,441,614
—	Lead (and its compounds)	1,770	2.8	9,030,614	19,501,983	28,532,597
—	Chromium (and its compounds)	3,367	5.4	13,436,133	11,742,588	25,178,721
—	Nickel (and its compounds)	2,897	4.6	2,591,316	5,632,532	8,223,848
7429-90-5	Aluminum (fume or dust)	346	0.6	3,041,103	3,806,596	6,847,699
1344-28-1	Aluminum oxide (fibrous forms)	58	0.1	211,221	4,377,657	4,588,878
—	Antimony (and its compounds)	699	1.1	983,308	2,474,718	3,458,026
—	Arsenic (and its compounds)	425	0.7	1,064,108	1,434,771	2,498,879
—	Cadmium (and its compounds)	154	0.2	292,338	533,083	825,421
1313-27-5	Molybdenum trioxide	170	0.3	231,176	495,463	726,639
—	Cobalt (and its compounds)	503	0.8	206,512	412,890	619,402
—	Selenium (and its compounds)	51	0.1	125,297	87,260	212,558
7440-62-2	Vanadium (fume or dust)	26	0.0	190,306	18,389	208,696
7550-45-0	Titanium tetrachloride	38	0.1	14,077	91,040	105,118
—	Silver (and its compounds)	145	0.2	39,871	32,127	71,998
—	Mercury (and its compounds)	36	0.1	8,281	27,908	36,189
1314-20-1	Thorium dioxide	1	0.0	0	998	998
	Subtotal	20,998	33.6	144,104,245	172,478,402	316,582,647
	% of Total	33.7		16.7	47.6	25.8
	Total for All Matched Chemicals	62,225	100.0	863,218,412	362,612,278	1,225,830,690

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of Total			
Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)
9.5 / 90.5	10.1 / 89.9	15.4 / 84.6	13.3 / 86.7
8.4 / 91.6	6.4 / 93.6	23.0 / 77.0	14.5 / 85.5
5.2 / 94.8	2.5 / 97.5	6.2 / 93.8	3.6 / 96.4
7.3 / 92.7	15.4 / 84.6	11.6 / 88.4	12.8 / 87.2
6.3 / 93.7	3.7 / 96.3	19.2 / 80.8	10.9 / 89.1
4.7 / 95.3	15.3 / 84.7	8.9 / 91.1	10.9 / 89.1
10.4 / 89.6	16.4 / 83.6	5.7 / 94.3	10.5 / 89.5
17.2 / 82.8	0.2 / 99.8	2.7 / 97.3	2.6 / 97.4
3.7 / 96.3	1.0 / 99.0	0.3 / 99.7	0.5 / 99.5
7.8 / 92.2	11.8 / 88.2	3.3 / 96.7	6.9 / 93.1
7.1 / 92.9	6.5 / 93.5	0.5 / 99.5	2.6 / 97.4
7.1 / 92.9	0.8 / 99.2	3.6 / 96.4	2.7 / 97.3
4.6 / 95.4	12.4 / 87.6	2.6 / 97.4	5.9 / 94.1
7.8 / 92.2	4.4 / 95.6	39.6 / 60.4	18.8 / 81.2
46.2 / 53.8	99.6 / 0.4	0.0 / 100.0	90.8 / 9.2
10.5 / 89.5	0.6 / 99.4	0.0 / 100.0	0.1 / 99.9
4.8 / 95.2	3.0 / 97.0	0.7 / 99.3	2.0 / 98.0
5.6 / 94.4	0.4 / 99.6	34.4 / 65.6	26.7 / 73.3
0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
6.8 / 93.2	7.9 / 92.1	14.7 / 85.3	11.6 / 88.4
6.9 / 93.1	9.6 / 90.4	11.5 / 88.5	10.1 / 89.9

Table 4-16		Releases in North America of Metals and their Compounds				
M	1996					
CAS Number	Chemical	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
—	Zinc (and its compounds)	4,003,690	593,575	59,063	51,014,759	55,678,321
—	Manganese (and its compounds)	4,128,747	1,147,327	8,025	24,339,392	29,632,346
—	Copper (and its compounds)	3,554,017	63,244	154,080	23,552,101	27,327,917
—	Chromium (and its compounds)	420,094	339,375	17,176	12,653,586	13,436,133
—	Lead (and its compounds)	1,378,293	34,169	405	7,612,198	9,030,614
7429-90-5	Aluminum (fume or dust)	781,985	22,217	0	2,233,720	3,041,103
—	Nickel (and its compounds)	594,413	89,894	41,053	1,863,407	2,591,316
—	Arsenic (and its compounds)	193,474	3,607	27,791	838,905	1,064,108
—	Antimony (and its compounds)	59,386	18,272	6,307	898,317	983,308
—	Cadmium (and its compounds)	38,006	2,619	37	250,996	292,338
1313-27-5	Molybdenum trioxide	90,567	12,700	95,193	32,496	231,176
1344-28-1	Aluminum oxide (fibrous forms)	48,667	229	0	162,201	211,221
—	Cobalt (and its compounds)	38,874	16,484	7,219	143,636	206,512
7440-62-2	Vanadium (fume or dust)	188,466	102	0	1,186	190,306
—	Selenium (and its compounds)	24,755	3,112	1,406	95,812	125,297
—	Silver (and its compounds)	12,166	3,788	168	23,592	39,871
7550-45-0	Titanium tetrachloride	14,077	0	0	0	14,077
—	Mercury (and its compounds)	7,780	251	4	244	8,281
1314-20-1	Thorium dioxide	0	0	0	0	0
	Subtotal	15,577,457	2,350,965	417,927	125,716,548	144,104,245
	% of Total	2.8	3.0	0.6	86.2	16.7
	Total for All Matched Chemicals	563,269,177	78,742,497	75,239,943	145,838,045	863,218,412

► Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total				
Total Air Emissions (%)	Surface Water Discharges (%)	Underground Injection (%)	On-site Land Releases (%)	Total Releases (%)
15.4 / 84.6	17.7 / 82.3	0.6 / 99.4	9.6 / 90.4	10.1 / 89.9
1.5 / 98.5	20.2 / 79.8	0.0 / 100.0	6.5 / 93.5	6.4 / 93.6
12.1 / 87.9	22.6 / 77.4	0.0 / 100.0	1.0 / 99.0	2.5 / 97.5
3.9 / 96.1	5.0 / 95.0	1.2 / 98.8	3.6 / 96.4	3.7 / 96.3
40.7 / 59.3	17.9 / 82.1	11.1 / 88.9	10.8 / 89.2	15.4 / 84.6
2.4 / 97.6	0.0 / 100.0	— / —	21.4 / 78.6	16.4 / 83.6
46.4 / 53.6	55.6 / 44.4	0.0 / 100.0	3.6 / 96.4	15.3 / 84.7
63.7 / 36.3	43.8 / 56.2	0.0 / 100.0	0.0 / 100.0	11.8 / 88.2
13.7 / 86.3	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	1.0 / 99.0
46.7 / 53.3	19.9 / 80.1	0.0 / 100.0	0.0 / 100.0	6.5 / 93.5
1.7 / 98.3	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.8 / 99.2
0.4 / 99.6	0.0 / 100.0	— / —	0.0 / 100.0	0.2 / 99.8
26.2 / 73.8	11.2 / 88.8	0.0 / 100.0	9.3 / 90.7	12.4 / 87.6
99.6 / 0.4	98.0 / 2.0	— / —	99.4 / 0.6	99.6 / 0.4
13.3 / 86.7	63.6 / 36.4	0.0 / 100.0	0.0 / 100.0	4.4 / 95.6
8.3 / 91.7	0.7 / 99.3	0.0 / 100.0	0.0 / 100.0	3.0 / 97.0
0.6 / 99.4	— / —	— / —	— / —	0.6 / 99.4
0.3 / 99.7	2.4 / 97.6	0.0 / 100.0	0.0 / 100.0	0.4 / 99.6
— / —	— / —	— / —	— / —	— / —
15.0 / 85.0	18.3 / 81.7	0.1 / 99.9	6.8 / 93.2	7.9 / 92.1
11.3 / 88.7	6.5 / 93.5	6.4 / 93.6	6.1 / 93.9	9.6 / 90.4

Table 4-17		Transfers in North America of Metals and their Compounds							
M	1996								
CAS Number	Chemical	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of North American Total			
						Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
—	Zinc (and its compounds)	22,322,324	205,190	58,495,616	81,023,131	12.6 / 87.4	5.4 / 94.6	16.6 / 83.4	15.4 / 84.6
—	Manganese (and its compounds)	3,991,694	183,570	24,496,307	28,671,571	12.9 / 87.1	2.3 / 97.7	24.8 / 75.2	23.0 / 77.0
—	Lead (and its compounds)	6,580,010	23,918	12,898,055	19,501,983	3.0 / 97.0	9.9 / 90.1	15.9 / 84.1	11.6 / 88.4
—	Copper (and its compounds)	1,498,714	242,840	10,372,143	12,113,697	5.9 / 94.1	1.9 / 98.1	6.3 / 93.7	6.2 / 93.8
—	Chromium (and its compounds)	2,367,651	141,783	9,233,154	11,742,588	24.3 / 75.7	5.2 / 94.8	18.1 / 81.9	19.2 / 80.8
—	Nickel (and its compounds)	1,543,336	92,835	3,996,361	5,632,532	14.1 / 85.9	12.3 / 87.7	6.8 / 93.2	8.9 / 91.1
1344-28-1	Aluminum oxide (fibrous forms)	16,497	602	4,360,558	4,377,657	0.2 / 99.8	0.0 / 100.0	2.7 / 97.3	2.7 / 97.3
7429-90-5	Aluminum (fume or dust)	68,763	7,144	3,730,689	3,806,596	0.0 / 100.0	19.0 / 81.0	5.8 / 94.2	5.7 / 94.3
—	Antimony (and its compounds)	409,226	53,111	2,012,381	2,474,718	0.0 / 100.0	0.1 / 99.9	0.4 / 99.6	0.3 / 99.7
—	Arsenic (and its compounds)	824,168	402	610,201	1,434,771	0.2 / 99.8	40.0 / 60.0	7.6 / 92.4	3.3 / 96.7
—	Cadmium (and its compounds)	103,225	1,435	428,423	533,083	0.0 / 100.0	0.6 / 99.4	0.6 / 99.4	0.5 / 99.5
1313-27-5	Molybdenum trioxide	178,954	29,569	286,940	495,463	8.5 / 91.5	1.9 / 98.1	0.6 / 99.4	3.6 / 96.4
—	Cobalt (and its compounds)	59,707	6,344	346,839	412,890	4.0 / 96.0	0.2 / 99.8	2.4 / 97.6	2.6 / 97.4
7550-45-0	Titanium tetrachloride	75,615	0	15,425	91,040	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
—	Selenium (and its compounds)	20,453	10,014	56,793	87,260	0.0 / 100.0	98.1 / 1.9	43.5 / 56.5	39.6 / 60.4
—	Silver (and its compounds)	16,128	1,389	14,610	32,127	0.0 / 100.0	13.5 / 86.5	0.3 / 99.7	0.7 / 99.3
—	Mercury (and its compounds)	10,989	7	16,912	27,908	40.4 / 59.6	0.0 / 100.0	30.6 / 69.4	34.4 / 65.6
7440-62-2	Vanadium (fume or dust)	773	91	17,525	18,389	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
1314-20-1	Thorium dioxide	0	998	0	998	— / —	0.0 / 100.0	— / —	0.0 / 100.0
	Subtotal	40,088,227	1,001,242	131,388,932	172,478,402	11.0 / 89.0	5.3 / 94.7	15.9 / 84.1	14.7 / 85.3
	% of Total	32.2	1.1	89.3	47.6				
	Total for All Matched Chemicals	124,473,070	91,073,897	147,065,311	362,612,278	10.9 / 89.1	5.4 / 94.6	15.7 / 84.3	11.5 / 88.5

► Canada and US data only. Mexico data not collected for 1996.

Table 4-18		The 50 North American Facilities with the Largest Total Releases of Metals and their Compounds							
Rank	Facility	City, State/Province	SIC Codes		Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
			Canada	US					
1	ASARCO Inc.	East Helena, MT		33	9	45,844	927	0	20,113,797
2	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	11	21,941	113	0	11,298,685
3	Northwestern Steel & Wire Co.	Sterling, IL		33	4	47,510	1,224	0	6,496,599
4	General Motors Corp., Powertrain Defiance	Defiance, OH		33	6	35,786	734	0	6,006,304
5	Elkem Metals Co.	Marietta, OH		33	5	218,149	326,984	0	4,763,719
6	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717
7	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	8	484,619	0	0	4,555,926
8	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	1	117,531	0	0	4,261,163
9	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	8	64,265	1,927	0	4,121,891
10	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769
11	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,963
12	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	9	106,342	149	0	3,467,229
13	Chino Mines Co.	Hurley, NM		33	1	18,380	0	0	3,457,663
14	US Steel Gary Works, USX Corp.	Gary, IN		33	12	131,202	7,900	0	2,599,909
15	Granite City Steel, National Steel Corp.	Granite City, IL		33	6	21,822	5,397	0	2,592,722
16	FMC Corp.	Pocatello, ID		28	9	2,139	351	0	2,586,124
17	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	5	1,787,997	0	0	774,034
18	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS		33	3	3,583	11,211	0	2,335,782
19	Sidbec-Dosco (Ispat) Inc., acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
20	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	4	22,367	0	0	2,008,700
21	USS Fairfield Works, USX Corp.	Fairfield, AL		33	8	6,323	2,681	0	1,859,434
22	Chemetals Inc., Comilog	New Johnsonville, TN		28	1	38,983	759	0	1,645,950
23	Louisiana Pigment Co. L.P., Kronos Louisiana Inc.	Westlake, LA		28	2	375	110	0	1,269,841
24	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
25	General Motors Corp., GMTG Saginaw Metal Casting	Saginaw, MI		33	6	19,257	1	0	999,955
26	Kerr-McGee Chemical Corp.	Henderson, NV		28	2	6,259	0	0	949,116
27	Glenbrook Nickel Co., Cominco American Inc.	Riddle, OR		33	1	17,061	7	0	905,522
28	Geneva Steel	Vineyard, UT		33	8	1,720	667	0	811,276
29	Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria, IL		33	3	597,497	542	0	165,402
30	Métallurgie Noranda Inc., Fonderie Horne	Rouyn-Noranda, QC	29	33	10	657,650	18,900	0	0
31	Austeel Lemont Co. Inc.	Lemont, IL		33	5	23,420	227	0	644,666
32	Griffin Wheel Co. Columbus Plant, Amsted Ind. Inc.	Groveport, OH		33	2	8,163	0	0	639,904
33	Imco Recycling Inc.	Morgantown, KY		33	5	5,490	0	0	615,964
34	AltaSteel Ltd.	Edmonton, AB	29	33	5	11,216	37	0	597,088
35	Bethlehem Steel Corp.	Sparrows Point, MD		33	6	7,937	21,638	0	514,104
36	American Steel Foundries, Amsted Industries Inc.	Granite City, IL		33	5	27,628	0	0	474,376
37	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	8	15,660	2,769	0	462,800
38	Griffin Wheel Co., Amsted Industries Inc.	Keokuk, IA		33	2	8,163	0	0	461,723
39	Sidbec-Dosco (Ispat) Inc., Sidbec-Feruni (Ispat)	Contrecoeur, QC	29	33	5	0	0	0	457,180
40	General Electric Co., Silicone Products	Waterford, NY		28	2	680	4,762	0	430,844
41	Inco Limited, Copper Cliff Smelter Complex	Copper Cliff, ON	29	33	6	427,818	0	0	0
42	Hudson Bay Mining and Smelting Co. Ltd., Metallurgical Complex	Flin Flon, MB	29	33	5	413,595	3,327	0	0
43	AK Steel Corp., AK Steel Holding	Middletown, OH		33	11	25,737	148	0	359,819
44	Griffin Wheel Co., Amsted Industries Inc.	Bessemer, AL		33	2	3,583	0	0	359,274
45	LTV Steel Co. Inc.	Cleveland, OH		33	5	8,039	2,187	0	350,753
46	Gulf States Steel Inc., GSS Holding Corp.	Gadsden, AL		33	7	19,549	13,673	0	304,308
47	Sydney Steel Corporation	Sydney, NS	29	33	8	0	300	0	330,200
48	WCI Steel Inc.	Warren, OH		33	5	4,404	358	0	324,649
49	Griffin Wheel Co., Amsted Industries Inc.	Kansas City, KS		33	2	3,583	0	0	315,904
50	Metal Mark Inc., Imco Recycling Inc.	Chicago Heights, IL		33	6	5,108	0	0	282,976
Subtotal					263	5,729,733	430,657	0	114,557,025
% of Total					1.3	36.8	18.3	0.0	91.1
Total for All Matched Metals					20,998	15,577,457	2,350,965	417,927	125,716,548

* Chemicals accounting for more than 70% of total releases of metals from the facility.

- Two TRI facilities reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese and Tennessee Aluminum Processor Inc., Maury, PA, reported 720,000 kg of on-site releases to land of aluminum. They have been omitted from this table.
- Canada and US data only, Mexico data not collected for 1996.

Rank	Total Releases (kg)	Major Chemicals Reported (Primary Media)*
1	20,160,568	Zinc and compounds (land)
2	11,320,739	Copper/Zinc and compounds (land)
3	6,545,333	Zinc/Manganese and compounds (land)
4	6,042,824	Zinc and compounds (land)
5	5,308,852	Manganese and compounds (land)
6	5,126,893	Chromium and compounds (land)
7	5,040,544	Copper/Zinc and compounds (land)
8	4,378,694	Copper and compounds (land)
9	4,188,084	Copper/Zinc and compounds (land)
10	4,084,751	Chromium and compounds (land)
11	4,030,228	Zinc/Lead and compounds (land)
12	3,573,720	Zinc and compounds (land)
13	3,476,044	Copper and compounds (land)
14	2,739,011	Zinc/Manganese and compounds (land)
15	2,619,941	Zinc and compounds (land)
16	2,588,615	Zinc and compounds (land)
17	2,562,031	Copper and compounds (air)
18	2,350,576	Manganese and compounds (land)
19	2,322,985	Zinc and compounds (land)
20	2,031,067	Zinc and compounds (land)
21	1,868,437	Zinc and compounds (land)
22	1,685,692	Manganese and compounds (land)
23	1,270,326	Manganese and compounds (land)
24	1,254,893	Zinc/Lead and compounds (land)
25	1,019,212	Zinc/Manganese and compounds (land)
26	955,374	Manganese and compounds (land)
27	922,590	Nickel and compounds (land)
28	813,663	Manganese/Zinc and compounds (land)
29	763,441	Zinc and compounds (air)
30	676,550	Lead/Copper/Zinc and compounds (air)
31	668,313	Zinc and compounds (land)
32	648,068	Manganese and compounds (land)
33	621,454	Aluminum (land)
34	608,341	Zinc/Manganese and compounds (land)
35	543,678	Manganese and compounds (land)
36	502,005	Chromium and compounds/Aluminum (land)
37	481,240	Manganese and compounds (land)
38	469,887	Manganese and compounds (land)
39	457,180	Zinc/Lead and compounds (land)
40	436,286	Copper and compounds (land)
41	427,818	Copper/Nickel and compounds (air)
42	416,922	Zinc/Lead and compounds (air)
43	385,704	Manganese and compounds (land)
44	362,857	Manganese and compounds (land)
45	360,980	Zinc/Manganese and compounds (land)
46	337,531	Zinc/Manganese and compounds (land)
47	331,280	Zinc/Manganese and compounds (land)
48	329,411	Manganese and compounds (land)
49	319,487	Manganese and compounds (land)
50	288,085	Aluminum (land)
	120,718,206	
	83.8	
	144,104,244	

Table 4-19		Top 50 North American Facilities with Largest Total Releases and Transfers of Metals and their Compounds							
Rank	Facility	City, State/Province	SIC Codes		Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)
			Canada	US					
1	ASARCO Inc.	East Helena, MT		33	9	45,844	927	0	20,113,797
2	Cyprus Miami Mining, Cyprus Amax Minerals Co.	Claypool, AZ		33	11	21,941	113	0	11,298,685
3	Zinc Corp. of America, Horsehead Industries Inc.	Monaca, PA		33	9	219,985	272	0	0
4	ASARCO Inc., Ray Complex/Hayden Smelter	Hayden, AZ		33	8	484,619	0	0	4,555,926
5	Nucor Steel, Nucor Corp.	Crawfordsville, IN		33	6	959	26	0	11
6	Northwestern Steel & Wire Co.	Sterling, IL		33	4	47,510	1,224	0	6,496,599
7	National Steel Corp., Great Lakes Div.	Ecorse, MI		33	4	53,904	766	0	0
8	General Motors Corp., Powertrain Defiance	Defiance, OH		33	6	35,786	734	0	6,006,304
9	Rouge Steel Co.	Dearborn, MI		33	7	23,356	2,630	0	0
10	Elkem Metals Co.	Marietta, OH		33	5	218,149	326,984	0	4,763,719
11	American Chrome & Chemicals, Harrisons & Crossfield	Corpus Christi, TX		28	1	2,063	113	0	5,124,717
12	Co-Steel Lasco	Whitby, ON	29	33	6	12,695	298	0	1,241,900
13	Kennecott Utah Copper, Kennecott Holdings Corp.	Magna, UT		33	8	64,265	1,927	0	4,121,891
14	Phelps Dodge Hidalgo Inc., Phelps Dodge Corp.	Playas, NM		33	1	117,531	0	0	4,261,163
15	Lake Erie Steel Company Ltd.	Nanticoke, ON	29	33	8	15,660	2,769	0	462,800
16	Occidental Chemical Corp., Occidental Petroleum Corp.	Castle Hayne, NC		28	1	2,967	15	0	4,081,769
17	ASARCO Inc., Glover Plant	Annapolis, MO		33	6	158,230	35	0	3,871,963
18	Regal Ware Inc.	Kewaskum, WI		34	6	472	0	0	0
19	Doe Run Co., Herculaneum Smelter, Renco Group Inc.	Herculaneum, MO		33	9	106,342	149	0	3,467,229
20	Ameristeel Corp., Jacksonville Mill Div.	Baldwin, FL		33	6	8,663	0	0	0
21	Chino Mines Co.	Hurley, NM		33	1	18,380	0	0	3,457,663
22	Cerro Wire & Cable Co. Inc.	Hartselle, AL		33	3	120	7	0	0
23	USS Mon Valley Works Edgar Thomson Plant, USX Corp.	Braddock, PA		33	5	4,732	971	0	0
24	Keystone Steel & Wire Co., Keystone Consolidated Industries	Peoria, IL		33	3	597,497	542	0	165,402
25	Stelco McMaster Ltée	Contrecoeur, QC	29	33	5	16,280	0	0	0
26	US Steel Gary Works, USX Corp.	Gary, IN		33	12	131,202	7,900	0	2,599,909
27	Granite City Steel, National Steel Corp.	Granite City, IL		33	6	21,822	5,397	0	2,592,722
28	FMC Corp.	Pocatello, ID		28	9	2,139	351	0	2,586,124
29	BHP Copper Metals Co., BHP Copper Co.	San Manuel, AZ		33	5	1,787,997	0	0	774,034
30	Dofasco Inc.	Hamilton, ON	29	33	7	8,360	7,549	0	0
31	Kerr-McGee Chemical Corp. Electrolytic Plant, Kerr-McGee Corp	Hamilton, MS		33	3	3,583	11,211	0	2,335,782
32	Sidbec-Dosco (Ispat) Inc. Acierie	Contrecoeur, QC	29	33	5	59,400	185	0	2,263,400
33	Nucor-Yamato Steel Co., Nucor Corp.	Blytheville, AR		33	6	13,870	0	0	0
34	Steel Dynamics Inc.	Butler, IN		33	4	2,415	0	0	0
35	Gerdau MRM Steel Inc.	Selkirk, MB	29	33	4	22,367	0	0	2,008,700
36	Oregon Steel Mills Inc.	Portland, OR		33	6	3,461	108	0	0
37	Nucor Steel, Nucor Corp.	Plymouth, UT		33	7	5,388	0	0	4,838
38	USS Fairfield Works, USX Corp.	Fairfield, AL		33	8	6,323	2,681	0	1,859,434
39	Nucor Steel, Nucor Corp.	Darlington, SC		33	7	49,219	342	0	2,354
40	Chemetals Inc., Comilog	New Johnsonville, TN		28	1	38,983	759	0	1,645,950
41	Ameristeel Corp.	Jackson, TN		33	7	11,625	1,014	0	0
42	Ivaco Rolling Mills	L'Orignal, ON	29	33	7	10,087	2	0	0
43	Ameristeel Corp.	Charlotte, NC		33	6	19,637	0	0	0
44	ASARCO Inc.	Omaha, NE		33	5	19,665	1,842	0	1,136
45	Louisiana Pigment Co. L.P., Kronos Louisiana Inc.	Westlake, LA		28	2	375	110	0	1,269,841
46	Slater Steels, Hamilton Specialty Bar Division	Hamilton, ON	29	33	9	8,728	0	0	200
47	SCM Chemicals Americas Plant II, SCM Chemicals Inc.	Ashtabula, OH		28	2	10	68,481	0	0
48	Quemetco Inc., RSR Corp.	Indianapolis, IN		33	6	2,197	0	0	0
49	General Battery Corp., Exide Corp.	Reading, PA		33	6	954	1,306	0	0
50	Quemetco Inc., RSR Crop.	City of Industry, CA		33	5	989	12	0	0
Subtotal					283	4,508,747	449,753	0	103,435,962
% of Total					1.3	28.9	19.1	0.0	82.3
Total for All Matched Metals					20,998	15,577,457	2,350,965	417,927	125,716,548

* Chemicals accounting for more than 70% of total releases and transfers from the facility.

➤ Three TRI facilities reported in error. Gunderson Inc., Portland, OR, reported 2.8 million kg of air emissions of manganese and Tennessee Aluminum Processor Inc., Maury, PA, reported 720,000 kg of on-site releases to land and 165,000 kg of transfers to disposal of aluminum and Thomson Consumer Electronics, Dunmore, PA, reported 3.1 million kg of transfers to disposal of lead compounds. They have been omitted from this table.

➤ Canada and US data only. Mexico data not collected for 1996.

Rank	Total Releases (kg)	Treatment/ Destruction (kg)	Sewage/ POTW (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	Major Chemicals Reported (Primary Media/Transfers)*
1	20,160,568	0	17	0	17	20,160,585	Zinc and compounds (land)
2	11,320,739	0	0	0	0	11,320,739	Copper/, Zinc and compounds (land)
3	220,257	48,556	0	10,424,925	10,473,482	10,693,738	Zinc/Manganese and compounds (transfers to disposal)
4	5,040,544	3,033,400	129	0	3,033,529	8,074,073	Lead and compounds (transfers to treatment), Copper/Zinc and compounds (land)
5	996	392	0	7,659,029	7,659,422	7,660,418	Zinc and compounds (transfers to disposal)
6	6,545,333	65,170	0	0	65,170	6,610,503	Zinc/Manganese and compounds (land)
7	54,670	46,776	425	6,299,280	6,346,480	6,401,151	Zinc and compounds (transfers to disposal)
8	6,042,824	0	410	0	410	6,043,234	Zinc and compounds (land)
9	25,986	0	0	5,933,560	5,933,560	5,959,546	Zinc and compounds (transfers to disposal)
10	5,308,852	0	0	43,537	43,537	5,352,390	Manganese and compounds (land)
11	5,126,893	24,036	0	3,129	27,166	5,154,059	Chromium and compounds (land)
12	1,254,893	0	10	3,578,500	3,578,510	4,833,403	Zinc and compounds (transfers to disposal)
13	4,188,084	0	0	347,302	347,302	4,535,385	Copper/Zinc and compounds (land)
14	4,378,694	0	0	0	0	4,378,694	Copper and compounds (land)
15	481,240	0	0	3,814,700	3,814,700	4,295,940	Manganese and compounds (transfers to disposal)
16	4,084,751	4,535	0	0	4,535	4,089,286	Chromium and compounds (land)
17	4,030,228	0	0	0	0	4,030,228	Zinc/Lead and compounds (land)
18	472	0	0	3,646,259	3,646,259	3,646,730	Aluminum oxide (transfers to disposal)
19	3,573,720	0	452	0	452	3,574,172	Zinc and compounds (land)
20	8,663	1,756,102	0	1,756,102	3,512,205	3,520,868	Zinc and compounds (transfers to treatment, disposal)
21	3,476,044	0	0	0	0	3,476,044	Copper and compounds (land)
22	127	0	0	3,439,996	3,439,996	3,440,123	Copper and compounds (transfers to disposal)
23	5,703	0	0	3,260,882	3,260,882	3,266,585	Zinc and compounds (transfers to disposal)
24	763,441	2,351,084	0	0	2,351,084	3,114,526	Zinc and compounds (transfers to treatment)
25	17,410	3,054,700	0	0	3,054,700	3,072,110	Zinc and compounds (transfers to treatment)
26	2,739,011	0	0	45,387	45,387	2,784,398	Zinc/Manganese and compounds (land)
27	2,619,941	544	0	0	544	2,620,484	Zinc and compounds (land)
28	2,588,615	0	3	793	795	2,589,410	Zinc and compounds (land)
29	2,562,031	0	0	816	816	2,562,847	Copper and compounds (air)
30	15,909	0	1,677	2,539,176	2,540,853	2,556,762	Zinc/Manganese and compounds (transfers to disposal)
31	2,350,576	0	0	0	0	2,350,576	Manganese and compounds (land)
32	2,322,985	0	0	0	0	2,322,985	Zinc and compounds (land)
33	13,870	2,096,133	0	1,172	2,097,305	2,111,176	Zinc and compounds (transfers to treatment)
34	2,415	0	2	2,055,950	2,055,952	2,058,367	Zinc and compounds (transfers to disposal)
35	2,031,067	0	0	0	0	2,031,067	Zinc and compounds (land)
36	3,569	1,932,004	0	96	1,932,100	1,935,668	Zinc and compounds (transfers to treatment)
37	10,226	1,893,347	0	1	1,893,348	1,903,574	Zinc and compounds (transfers to treatment)
38	1,868,437	0	0	0	0	1,868,437	Zinc and compounds (land)
39	51,915	0	0	1,645,528	1,645,528	1,697,443	Zinc and compounds (transfers to disposal)
40	1,685,692	0	0	0	0	1,685,692	Manganese and compounds (land)
41	12,639	1,601,938	0	0	1,601,938	1,614,576	Zinc and compounds (transfers to treatment)
42	11,020	0	0	1,559,360	1,559,360	1,570,380	Zinc and compounds (transfers to disposal)
43	19,637	1,430,806	0	0	1,430,806	1,450,444	Zinc and compounds (transfers to treatment)
44	22,643	0	26	1,329,875	1,329,901	1,352,544	Zinc/Lead and compounds (transfers to disposal)
45	1,270,326	68	0	169	237	1,270,563	Manganese and compounds (land)
46	10,428	542	1,036	1,256,701	1,258,279	1,268,707	Zinc/Lead and compounds (transfers to disposal)
47	68,491	0	0	1,170,941	1,170,941	1,239,431	Manganese and compounds (transfers to disposal)
48	2,197	0	357	1,234,014	1,234,371	1,236,567	Lead/Antimony and compounds (transfers to disposal)
49	2,260	852,044	0	368,927	1,220,971	1,223,231	Lead and compounds (transfers to treatment, disposal)
50	1,001	0	254	1,196,372	1,196,626	1,197,627	Lead/Antimony and compounds (transfers to disposal)
	108,398,034	20,192,179	4,799	64,612,478	84,809,456	193,207,490	
	75.2	50.4	0.5	49.2	49.2	61.0	
	144,104,244	40,088,227	1,011,242	131,388,932	172,478,394	316,582,638	

4.6 Industry Distribution

North American PRTR reporting was dominated by chemical manufacturing, followed by primary metal industries. Chemical manufacturing facilities reported 404 million kg of total releases and transfers in the matched data set for 1996 and the primary metal industry 312 million kg, one-third and one-quarter, respectively, of the total. These two sectors accounted for more of the total releases and transfers than the other 19 industry groups combined. Releases and transfers totaled more than 100 million kg in one other sector—pulp and paper products with 138 million kg (Table 4–20, pp. 90–91 and Figure 4–18). (Industry groups are designated in the tables by US Standard Industrial Classification [SIC] codes, which are reported in both countries.)

Both primary metals and paper products had percentages of total releases and transfers that were two and one-half to three times higher than these industries' percentages of all forms submitted. Primary metals producers, for example, submitted 11 percent of all forms, but reported 26 percent of the releases and transfers. This indicates that the industry reported larger amounts of each substance on average than was the case with other industries, such as chemical manufacturing or rubber and plastics products manufacturing.

Facilities that report more than one SIC code to describe their operations are designated "Multiple Codes 20–39" in the tables. This group, responsible for the fourth-largest amount of total releases and transfers, consists entirely of US facilities, as Canadian facilities report only one SIC code each.

The prominent role of two industries in North American PRTR reporting arose from relatively few dominant facilities. Of the 50 facilities with the largest total releases and transfers, 24 reported in primary metals and 22 in chemical manufacturing (Table 4–5, pp. 54–55).

Releases by Industry

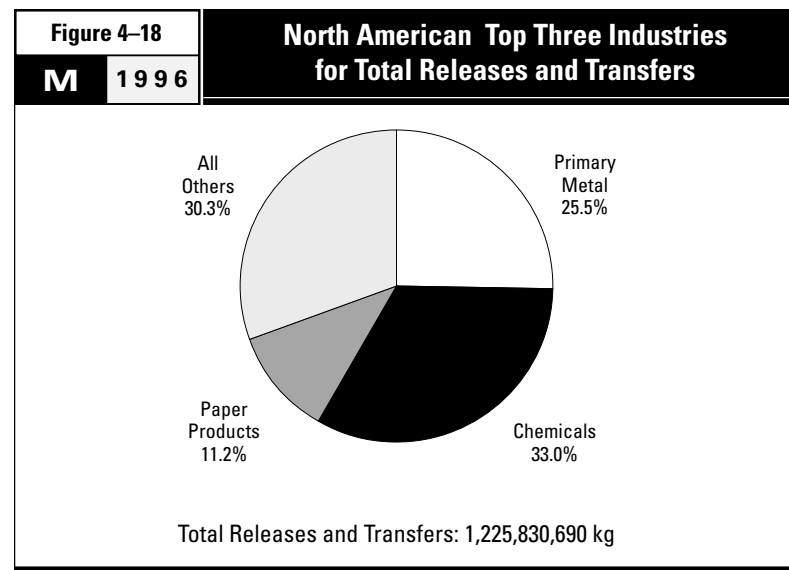
For all but three industries, emissions to air constituted 80 percent or more of all releases. The exceptions were chemical manufacturing, primary metals, and food products. For chemical manufacturing, air emissions amounted to about one-half of total releases, largely because the industry also reported substantial amounts of underground injection. For primary metals and food products, air emissions amounted to one-third of the releases. For primary metals producers, on-site land releases were the largest release type. For food processors, discharges to surface waters were the largest release type (Table 4–21, pp. 92–93).

Transfers by Industry

Transfers in the industrial sectors were less dominated by one type, as was true of the matched data set as a whole. For example, chemical manufacturing, ranking second among industries for total transfers, sent large amounts off-site to both treatment/destruction services and sewage treatment plants. Although most of the transfers by top-ranked primary metal industries went to disposal/containment, that sector also sent substantial amounts to treatment/destruction (Table 4–22, p. 94).

Information on chemical uses from:

- Air CHIEF, ver. 4.0. US EPA, EFIG/EMAD/OAQPS, July 1995.
- Chemical Backgrounders, Environment Writer, US National Safety Council Environmental Health Center, <<http://www.nsc.org>>.
- Chemical Substances, US Department of Labor, Occupational Safety and Health Administration <<http://www.osha-slc.gov/SLTC/chemicals.html>>.
- *Kirk-Othmer Concise Encyclopedia of Chemical Technology*. New York and Toronto: John Wiley & Sons, 1985.
- OPPT Chemical Fact Sheets, Office of Pollution Prevention and Toxics, US EPA, <<http://www.epa.gov/opptintr/chemfact>>.
- *Profile of the Pulp and Paper Industry*, Sector Notebook Project, US EPA, Office of Enforcement and Compliance Assurance, office of Compliance, EPA/310-R-95-015, September 1995, <<http://es.epa.gov/oeca/sector/index.html>>.
- ToxFAQs, US Agency for Toxic Substances and Disease Registry, <<http://atsdr1.atsdr.cdc.gov:8080/toxfaq.html>>.



► Canada and US data only, Mexico data not collected for 1996.

Table 4-20		Total Releases and Transfers in North America by Industry (US SIC Code)						
M	1996							
Rank	US SIC Code	Industry	Forms		Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers	
			Number	%			kg	%
1	28	Chemicals	17,594	28.3	282,390,621	121,865,854	404,256,475	33.0
2	33	Primary Metal Industries	6,505	10.5	182,857,523	129,118,893	311,976,416	25.5
3	26	Paper Products	2,295	3.7	112,806,059	24,784,749	137,590,808	11.2
4		Multiple Codes 20-39*	3,816	6.1	41,605,997	15,106,395	56,712,392	4.6
5	30	Rubber and Plastics Products	3,318	5.3	48,103,260	7,660,134	55,763,394	4.5
6	37	Transportation Equipment	4,062	6.5	46,784,366	7,247,183	54,031,549	4.4
7	34	Fabricated Metal Products	6,954	11.2	24,265,367	16,844,254	41,109,621	3.4
8	29	Petroleum and Coal Products	3,057	4.9	28,147,865	4,434,109	32,581,974	2.7
9	36	Electronic/Electrical Equipment	2,638	4.2	8,353,174	13,081,288	21,434,462	1.7
10	20	Food Products	2,700	4.3	8,009,675	8,437,294	16,446,969	1.3
11	25	Furniture and Fixtures	1,177	1.9	15,952,765	374,423	16,327,188	1.3
12	32	Stone/Clay/Glass Products	1,513	2.4	11,479,230	4,129,742	15,608,972	1.3
13	24	Lumber and Wood Products	1,738	2.8	13,674,521	231,345	13,905,866	1.1
14	27	Printing and Publishing	393	0.6	12,752,205	443,274	13,195,479	1.1
15	35	Industrial Machinery	2,475	4.0	7,193,825	4,104,585	11,298,410	0.9
16	22	Textiles Mill Products	502	0.8	7,162,676	1,121,924	8,284,600	0.7
17	38	Measurement/Photographic Instruments	564	0.9	5,466,011	1,749,468	7,215,479	0.6
18	39	Misc. Manufacturing Industries	742	1.2	4,425,191	996,714	5,421,905	0.4
19	31	Leather Products	127	0.2	542,790	851,561	1,394,351	0.1
20	23	Apparel and Other Textile Products	37	0.1	649,281	28,897	678,178	0.1
21	21	Tobacco Products	18	0.0	596,013	181	596,194	0.0
Total for All Matched Industries			62,225	100.0	863,218,412	362,612,278	1,225,830,690	100.0

* Multiple SIC codes reported only in US data.

► Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total

Forms (%)	Total Releases (%)	Total Transfers (%)	Total Releases and Transfers (%)
7.8 / 92.2	7.5 / 92.5	9.6 / 90.4	8.2 / 91.8
9.1 / 90.9	10.5 / 89.5	16.8 / 83.2	13.1 / 86.9
13.8 / 86.2	15.5 / 84.5	8.1 / 91.9	14.1 / 85.9
— / 100.0	— / 100.0	— / 100.0	— / 100.0
8.1 / 91.9	12.4 / 87.6	14.5 / 85.5	12.7 / 87.3
8.7 / 91.3	13.7 / 86.3	15.1 / 84.9	13.8 / 86.2
5.5 / 94.5	8.4 / 91.6	10.5 / 89.5	9.2 / 90.8
10.9 / 89.1	16.7 / 83.3	11.7 / 88.3	16.0 / 84.0
3.6 / 96.4	1.0 / 99.0	2.8 / 97.2	2.1 / 97.9
4.3 / 95.7	4.6 / 95.4	4.4 / 95.6	4.5 / 95.5
2.1 / 97.9	3.0 / 97.0	2.5 / 97.5	3.0 / 97.0
6.1 / 93.9	8.0 / 92.0	5.9 / 94.1	7.4 / 92.6
8.2 / 91.8	12.7 / 87.3	24.5 / 75.5	12.9 / 87.1
5.9 / 94.1	5.3 / 94.7	41.5 / 58.5	6.5 / 93.5
2.6 / 97.4	5.8 / 94.2	4.2 / 95.8	5.3 / 94.7
3.2 / 96.8	4.6 / 95.4	0.5 / 99.5	4.1 / 95.9
0.2 / 99.8	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
14.4 / 85.6	12.1 / 87.9	20.3 / 79.7	13.6 / 86.4
1.6 / 98.4	1.1 / 98.9	0.9 / 99.1	1.0 / 99.0
2.7 / 97.3	0.1 / 99.9	0.0 / 100.0	0.1 / 99.9
0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
6.9 / 93.1	9.6 / 90.4	11.5 / 88.5	10.1 / 89.9

Table 4-21			Releases in North America by Industry				
M	1996						
Rank	SIC Code	Industry	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-site Land Releases (kg)	Total Releases (kg)
1	28	Chemicals	136,657,633	39,694,377	74,517,585	31,454,404	282,390,621
2	33	Primary Metal Industries	62,602,168	14,828,923	207,075	105,199,782	182,857,523
3	26	Paper Products	101,265,705	9,260,386	0	2,278,037	112,806,059
4	30	Rubber and Plastics Products	47,905,261	10,255	0	180,739	48,103,260
5	37	Transportation Equipment	46,383,172	87,963	0	306,704	46,784,366
6		Multiple Codes 20-39*	34,472,473	4,597,117	231	2,536,176	41,605,997
7	29	Petroleum and Coal Products	22,574,694	4,405,682	514,200	650,416	28,147,865
8	34	Fabricated Metals Products	23,772,192	145,204	259	334,612	24,265,367
9	25	Furniture and Fixtures	15,947,409	20	0	4,826	15,952,765
10	24	Lumber and Wood Products	13,642,966	26,549	0	4,462	13,674,521
11	27	Printing and Publishing	12,739,272	6,243	0	6,190	12,752,205
12	32	Stone/Clay/Glass Products	10,404,929	27,975	454	1,044,215	11,479,230
13	36	Electronic/Electrical Equipment	7,538,917	651,767	12	160,438	8,353,174
14	20	Food Products	2,571,614	4,170,693	118	1,267,250	8,009,675
15	35	Industrial Machinery	6,874,207	5,038	0	312,462	7,193,825
16	22	Textile Mill Products	6,930,701	152,862	0	78,813	7,162,676
17	38	Measurement/Photographic Instr.	4,900,649	564,214	0	1,148	5,466,011
18	39	Misc. Manufacturing Industries	4,406,421	893	9	14,420	4,425,191
19	23	Apparel and Other Textile Products	646,672	2,367	0	242	649,281
20	21	Tobacco Products	514,743	81,270	0	0	596,013
21	31	Leather Products	517,378	22,701	0	2,711	542,790
		Total for All Matched Industries	563,269,177	78,742,497	75,239,943	145,838,045	863,218,412

* Multiple SIC codes reported only in US data.

➤ Canada and US data only. Mexico data not collected for 1996.

NPRI/TRI as % of North American Total				
Total Air Emissions (%)	Surface Water Discharges (%)	Underground Injection (%)	On-site Land Releases (%)	Total Releases (%)
11.1 / 88.9	2.8 / 97.2	6.4 / 93.6	0.7 / 99.3	7.5 / 92.5
16.5 / 83.5	5.3 / 94.7	0.0 / 100.0	7.7 / 92.3	10.5 / 89.5
14.2 / 85.8	31.2 / 68.8	— / —	7.2 / 92.8	15.5 / 84.5
12.4 / 87.6	6.1 / 93.9	— / —	8.1 / 91.9	12.4 / 87.6
13.8 / 86.2	0.3 / 99.7	— / —	0.9 / 99.1	13.7 / 86.3
0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
19.9 / 80.1	0.5 / 99.5	13.4 / 86.6	16.7 / 83.3	16.7 / 83.3
8.5 / 91.5	0.3 / 99.7	0.0 / 100.0	3.1 / 96.9	8.4 / 91.6
3.0 / 97.0	0.0 / 100.0	— / —	0.0 / 100.0	3.0 / 97.0
12.6 / 87.4	73.0 / 27.0	— / —	3.4 / 96.6	12.7 / 87.3
5.2 / 94.8	89.8 / 10.2	— / —	0.0 / 100.0	5.3 / 94.7
8.7 / 91.3	33.8 / 66.2	0.0 / 100.0	0.5 / 99.5	8.0 / 92.0
1.0 / 99.0	0.5 / 99.5	0.0 / 100.0	2.8 / 97.2	1.0 / 99.0
2.2 / 97.8	7.0 / 93.0	0.0 / 100.0	1.6 / 98.4	4.6 / 95.4
2.4 / 97.6	0.5 / 99.5	— / —	81.9 / 18.1	5.8 / 94.2
4.8 / 95.2	0.0 / 100.0	— / —	0.1 / 99.9	4.6 / 95.4
0.0 / 100.0	0.0 / 100.0	— / —	0.0 / 100.0	0.0 / 100.0
12.0 / 88.0	0.0 / 100.0	100.0 / 0.0	37.5 / 62.5	12.1 / 87.9
0.1 / 99.9	0.0 / 100.0	— / —	0.0 / 100.0	0.1 / 99.9
0.0 / 100.0	0.0 / 100.0	— / —	— / —	0.0 / 100.0
1.1 / 98.9	0.0 / 100.0	— / —	0.0 / 100.0	1.1 / 98.9
11.3 / 88.7	6.5 / 93.5	6.4 / 93.6	6.1 / 93.9	9.6 / 90.4

Table 4-22		Transfers in North America by Industry								
M		1996								
Rank	US SIC Code	Industry	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	NPRI/TRI as % of North American Total			
							Treatment/ Destruction (%)	Sewage/ POTWs (%)	Disposal/ Containment (%)	Total Transfers (%)
1	33	Primary Metal Industries	31,982,219	3,177,377	93,959,298	129,118,893	11.7 / 88.3	7.1 / 92.9	18.9 / 81.1	16.8 / 83.2
2	28	Chemicals	63,218,229	45,049,955	13,597,676	121,865,854	9.1 / 90.9	8.8 / 91.2	15.0 / 85.0	9.6 / 90.4
3	26	Paper Products	5,967,061	17,153,251	1,664,437	24,784,749	26.3 / 73.7	0.0 / 100.0	26.3 / 73.7	8.1 / 91.9
4	34	Fabricated Metals Products	5,267,737	1,563,593	10,012,926	16,844,254	11.4 / 88.6	8.3 / 91.7	10.3 / 89.7	10.5 / 89.5
5		Multiple Codes 20-39*	5,767,650	5,090,165	4,248,580	15,106,395	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
6	36	Electronic/Electrical Equipment	2,185,387	3,619,677	7,276,224	13,081,288	3.4 / 96.6	0.3 / 99.7	3.9 / 96.1	2.8 / 97.2
7	20	Food Products	387,715	7,876,628	172,951	8,437,294	6.9 / 93.1	4.4 / 95.6	0.2 / 99.8	4.4 / 95.6
8	30	Rubber and Plastics Products	1,910,444	805,716	4,943,976	7,660,134	30.6 / 69.4	4.3 / 95.7	10.0 / 90.0	14.5 / 85.5
9	37	Transportation Equipment	2,680,767	1,376,258	3,190,160	7,247,183	24.6 / 75.4	7.5 / 92.5	10.4 / 89.6	15.1 / 84.9
10	29	Petroleum and Coal Products	1,088,708	1,958,139	1,387,262	4,434,109	17.9 / 82.1	0.9 / 99.1	22.3 / 77.7	11.7 / 88.3
11	32	Stone/Clay/Glass Products	1,225,458	324,351	2,579,933	4,129,742	4.3 / 95.7	6.8 / 93.2	6.5 / 93.5	5.9 / 94.1
12	35	Industrial Machinery	507,599	1,362,138	2,234,848	4,104,585	10.4 / 89.6	0.0 / 100.0	5.4 / 94.6	4.2 / 95.8
13	38	Measurement/Photographic Instr.	1,064,029	403,328	282,111	1,749,468	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
14	22	Textile Mill Products	237,233	697,111	187,580	1,121,924	2.3 / 97.7	0.0 / 100.0	0.3 / 99.7	0.5 / 99.5
15	39	Misc. Manufacturing Industries	252,401	322,731	421,582	996,714	14.6 / 85.4	30.4 / 69.6	15.9 / 84.1	20.3 / 79.7
16	31	Leather Products	7,964	180,733	662,864	851,561	54.0 / 46.0	1.8 / 98.2	0.0 / 100.0	0.9 / 99.1
17	27	Printing and Publishing	336,219	69,745	37,310	443,274	54.6 / 45.4	0.0 / 100.0	0.0 / 100.0	41.5 / 58.5
18	25	Furniture and Fixtures	280,247	41,434	52,742	374,423	3.3 / 96.7	0.0 / 100.0	0.3 / 99.7	2.5 / 97.5
19	24	Lumber and Wood Products	105,580	1,452	124,313	231,345	34.2 / 65.8	3.0 / 97.0	16.6 / 83.4	24.5 / 75.5
20	23	Apparel and Other Textile Products	243	116	28,538	28,897	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0	0.0 / 100.0
21	21	Tobacco Products	181	0	0	181	0.0 / 100.0	— / —	— / —	0.0 / —
Total for All Matched Industries			124,473,070	91,073,897	147,065,311	362,612,278	10.9 / 89.1	5.4 / 94.6	15.7 / 84.3	11.5 / 88.5

* Multiple SIC codes reported only in US data.

➤ Canada and US data only. Mexico data not collected for 1996.