

LEGEND

M	Matched Chemicals/Industries
MY	Multi-year Matched Chemicals/Industries
A	All Chemicals/Industries

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■ Key Findings

- By far, more cross-border transfers were sent for recycling in 1995 than for any other waste management option: shipments to recycling amounted to 96 percent of US transfers sent outside the country and at least 72 percent of those were from Canada to the United States.
- Off-Site transfers in NPRI cannot be completely analyzed by their geographic destinations. Although NPRI requires that off-site transfers to treatment or disposal be reported, many reporting forms show transfers to more than one receiving site (e.g., two landfills). However, only the total sent off-site is required, not the specific amount to each site. Thus, the actual amount that Canadian facilities transport to other provinces or to individual US states cannot be precisely known, only a range of values. (Beginning with reporting year 1996, the quantity of pollutants transferred to each off-site location will be reported.)
- Excluding transfers to recycling and energy recovery, which are subject only to voluntary reporting in NPRI, transfers from Canada to sites in the United States and vice versa were approximately equal. Canadian facilities transferred between 1.1–1.5 million kg to US sites in 1995; while US facilities transferred 1.5 million kg to Canadian sites.
- Releases and transfers by facilities along the Canadian-US border were smaller than the numbers of such facilities would suggest. While 79 percent of NPRI facilities and 20 percent of TRI facilities were located within 100 kilometers of the border, their total releases and transfers represented, respectively, 66 percent and 13 percent of Canadian and US totals for 1995.
- The Great Lakes region overwhelmingly dominates any border analysis, containing 89 percent of all facilities that are located within 100 kilometers of the Canadian-US border. Here, unlike in other regions, TRI facilities outnumber those reporting to NPRI by a margin of almost six to one.

7.1 Introduction

Cross-boundary issues that can be examined with PRTR data include transfers of chemicals from facilities in one country to sites in another and releases and transfers reported by facilities located near borders. US TRI data supply information on transfers across the US-Mexican and US-Canadian borders, while Canadian NPRI data give an indication of pollutants in waste transferred into the United States. In addition, this chapter examines data from facilities located within 100 kilometers on either side of the US-Canadian border.

Table 7-1		TRI Off-Site Transfers to Other Countries from the United States				
A	1995					
Country	Transfers to Recycling (kg)	Transfers to Energy Recovery (kg)	Treatment/ Destruction (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Transfers Outside US
Belgium	58,840	0	12	0	58,852	0.1
Bermuda	32,653	0	0	0	32,653	0.0
Canada	44,164,957	88,073	1,770,740	118,810	46,142,579	61.3
Alberta	9,478	0	2	0	9,481	0.0
British Columbia	112,391	660	6,159	2,933	122,143	0.2
New Brunswick	113,379	0	0	0	113,379	0.2
Nova Scotia	196	0	0	0	196	0.0
Ontario	33,511,727	53,446	1,075,462	34,636	34,675,270	46.1
Quebec	10,417,785	33,967	689,117	81,240	11,222,110	14.9
Finland	17,746	0	0	0	17,746	0.0
France	182,052	0	0	0	182,052	0.2
Germany	930,868	0	0	0	930,868	1.2
Japan	466,782	0	0	0	466,782	0.6
Mexico	25,893,443	0	226,076	570,413	26,689,931	35.5
Monterrey	23,980,493	0	226,076	570,413	24,776,981	32.9
Other Cities	1,912,950	0	0	0	1,912,950	2.5
Netherlands	113,832	0	0	0	113,832	0.2
Singapore	9,572	0	0	0	9,572	0.0
Spain	43,265	0	0	0	43,265	0.1
Sweden	22,180	0	0	0	22,180	0.0
United Arab Emirates	176,589	0	0	0	176,589	0.2
United Kingdom	344,100	0	3	0	344,103	0.5
Total Transferred Outside US	72,456,880	88,073	1,996,830	689,222	75,231,005	100.0

7.2 Off-Site Transfers across Borders

The amount of chemicals in waste transferred from reporting facilities to off-site locations is reported to both NPRI and TRI, along with the address of the site to which the chemical waste stream is shipped. Most reported transfers occurred to sites within a nation's borders, but listed substances can also be shipped to a North American neighbor or to other countries. Transfers

to sewage/POTWs are not included in this analysis because they rarely cross national or even state/provincial boundaries. **Map 7-1** illustrates 1995 data for transfers across North American borders.

For data through 1995, it is not possible to know how much was transferred to individual provinces within Canada or from Canada to individual US states. Both PRTRs require facilities to report the amount

of transfer by type of waste management activity undertaken at the off-site location. Under TRI, each transfer is identified by off-site location, but in NPRI, the transfer amount has not been uniquely associated with the receiving site. For example, if a facility sends transfers to two landfills, NPRI lists the total amount sent to landfills and the names and addresses of the destinations, but not the amount directed to each. Because there are reports where

recipient sites, such as the landfills, are located in different provinces or in different countries, analysis of what is being transported between the countries is not possible. With the 1996 reporting year, NPRI facilities will begin specifying the amounts sent to each receiving location.

For the current analysis, however, data are presented as a range of values. The low end of the range is calculated by attributing to a given destination none of the amount reported to multiple destinations, and the high end by attributing all of the amount reported to individual sites.

7.2.1 Off-Site Transfers from TRI Facilities

In 1995, TRI facilities reported transferring 75 million kg of chemicals out of the country (see **Table 7-1**); these represented 5 percent of all US transfers. The majority of these transfers were sent for recycling to sites in Canada (59 percent) and Mexico (34 percent). Indeed, 96 percent of all transfers that US facilities sent outside the country were for recycling, compared to 66 percent of transfers that took place within US borders (see **Table 7-2** and **Figure 7-1**).

Facilities in 34 states sent transfers to six Canadian provinces (see **Table 7-3**). Sites in Ontario and Quebec received most of these. In fact, Ontario received 46 percent of all US transfers sent out of the country. Facilities located in Ohio and Arizona originated the most; even though Arizona is located on the US-Mexican border, all of its out-of-country transfers went north to Canada. Ten states did send transfers to Mexico (see **Table 7-4**), almost all of which were directed to several sites in the city of Monterrey. Specifically, TRI chemical waste sent to Monterrey came from nine states, with facilities located in Texas and Illinois originating the most.

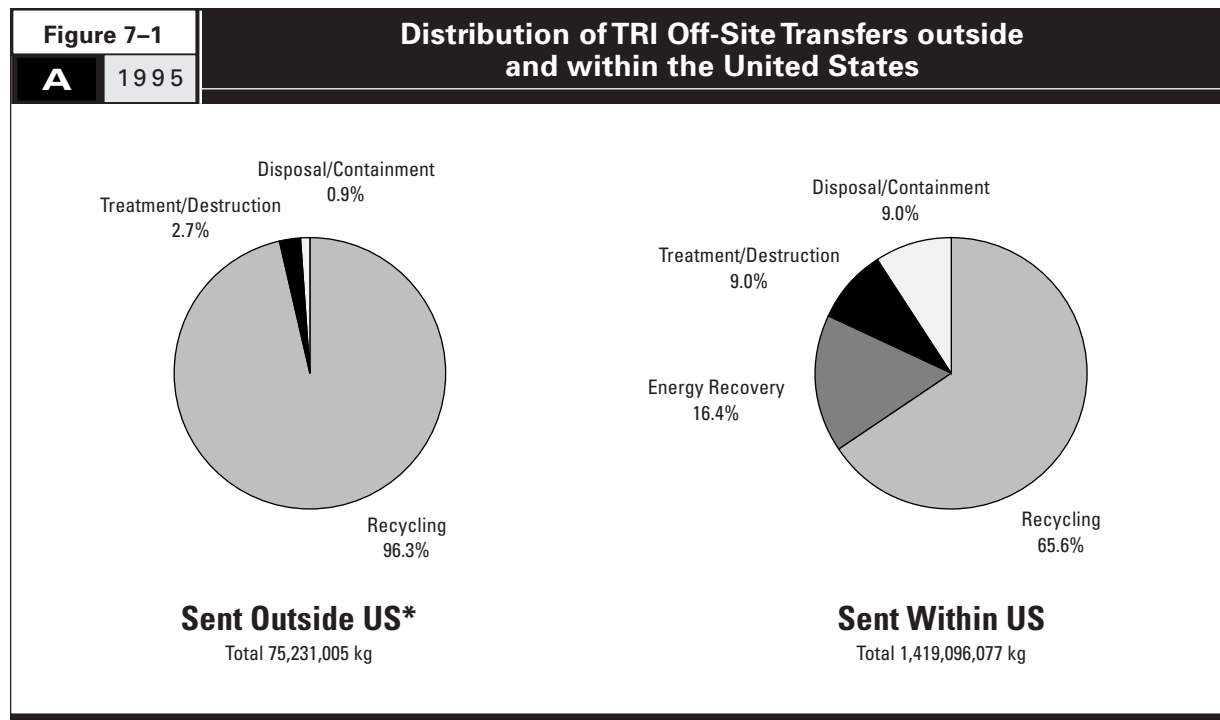
Map 7-1
A 1995
Off-Site Transfers across North American Borders



► Amounts appear in receiving countries. Mexico data not collected for 1995.

Table 7-2		TRI Off-Site Transfers within the United States and to Other Countries					
A		1995					
	Location of Receiving Sites				Total Off-Site Transfers		
	Outside US		Within US		kg	%	
	kg	%	kg	%			
Transfers to:							
Recycling	72,456,880	96.3	931,502,934	65.6	1,003,959,814	67.2	
Energy Recovery	88,073	0.1	232,124,955	16.4	232,213,028	15.5	
Treatment/Destruction	1,996,830	2.7	128,423,516	9.0	130,420,346	8.7	
Disposal/Containment	689,222	0.9	127,044,772	9.0	127,733,994	8.5	
Total Transfers	75,231,005	100.0	1,419,096,177	100.0	1,494,327,182	100.0	
% of Total	5.0		95.0		100.0		

➤ Does not include transfers to sewage/POTWs.



* 0.1% for Energy Recovery does not appear.

➤ Does not include transfers to sewage/POTWs.

Table 7-3

A 1995

TRI Off-Site Transfers to Canada from the United States

To Canadian Province / From US State	Transfers to Recycling (kg)	Transfers to Energy Recovery (kg)	Treatment/ Destruction (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Transfers Outside US	To Canadian Province / From US State	Transfers to Recycling (kg)	Transfers to Energy Recovery (kg)	Treatment/ Destruction (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Transfers Outside US
Alberta							Ontario, continued						
Montana	8,163	0	2	0	8,166	0.0	Georgia	113,515	0	0	0	113,515	0.2
Ohio	1,315	0	0	0	1,315	0.0	Connecticut	109,441	0	0	0	109,441	0.2
British Columbia							Kansas						
Washington	64,352	0	5,894	0	70,247	0.2	Alabama	38,899	0	0	0	38,899	0.1
Texas	34,467	0	0	0	34,467	0.1	North Carolina	30,952	0	113	0	31,066	0.1
California	12,710	0	0	0	12,710	0.0	New Hampshire	17,071	0	0	8,765	25,836	0.1
North Carolina	0	0	0	2,933	2,933	0.0	Washington	16,426	0	0	0	16,426	0.0
Montana	862	0	104	0	966	0.0	South Carolina	14,516	0	0	0	14,516	0.0
Oregon	0	656	160	0	816	0.0	New Jersey	12,150	0	0	0	12,150	0.0
Alaska	0	5	0	0	5	0.0	Rhode Island	454	0	0	567	1,020	0.0
New Brunswick							Rhode Island						
California	113,379	0	0	0	113,379	0.2	Quebec						
Nova Scotia							Pennsylvania						
New York	196	0	0	0	196	0.0	New York	2,748,231	0	143,900	4,719	2,896,849	6.3
Ontario							Delaware						
Ohio	9,846,559	0	8	17,740	9,864,307	21.4	Arkansas	2,026,451	0	126,981	36,489	2,189,922	4.7
Arizona	7,627,387	0	0	579	7,627,966	16.5	Illinois	1,829,809	0	0	0	1,829,809	4.0
Mississippi	4,421,514	0	0	0	4,421,514	9.6	Kentucky	919,215	0	0	0	919,215	2.0
Michigan	1,784,168	22,907	849,101	5,081	2,661,258	5.8	Ohio	781,359	0	0	0	781,359	1.7
Indiana	1,785,422	30,539	162	7	1,816,130	3.9	Connecticut	772,979	0	0	1,043	774,022	1.7
Kentucky	1,524,293	0	0	0	1,524,293	3.3	Ohio	399,654	0	0	0	399,654	0.9
New York	996,209	0	225,986	491	1,222,686	2.6	Connecticut	276,272	0	69,330	24,278	369,880	0.8
Nebraska	984,735	0	0	0	984,735	2.1	Massachusetts	117,341	33,967	124,595	2,203	278,106	0.6
Texas	915,424	0	0	0	915,424	2.0	New Jersey	119,085	0	119,736	1,581	240,402	0.5
Wisconsin	829,639	0	0	0	829,639	1.8	Virginia	142,676	0	0	0	142,676	0.3
California	590,158	0	0	0	590,158	1.3	Georgia	116,532	0	7,279	0	123,811	0.3
Illinois	541,075	0	0	0	541,075	1.2	California	96,553	0	0	0	96,553	0.2
West Virginia	330,612	0	91	951	331,654	0.7	Maine	31	0	93,902	1,780	95,714	0.2
Virginia	295,194	0	0	0	295,194	0.6	Wisconsin	30,457	0	0	0	30,457	0.1
Massachusetts	195,523	0	0	0	195,523	0.4	Michigan	25,584	0	0	0	25,584	0.1
Arkansas	185,073	0	0	0	185,073	0.4	Rhode Island	0	0	383	8,341	8,724	0.0
Pennsylvania	180,239	0	0	456	180,695	0.4	Minnesota	6,122	0	0	0	6,122	0.0
Minnesota	124,444	0	0	0	124,444	0.3	North Carolina	4,989	0	0	69	5,058	0.0
							Mississippi						
							Louisiana						
							Washington						
							Texas						
							Total						
							44,164,957						
							88,073						
							1,770,740						
							118,810						
							46,142,579						
							100.0						

Table 7-4		TRI Off-Site Transfers to Mexico from the United States				
A	1995					
To Mexican City / From US State	Transfers to Recycling (kg)	Transfers to Energy Recovery (kg)	Treatment/ Destruction (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	% of Transfers Outside US
Monterrey, Nuevo León						
Alabama	2,576,289	0	0	0	2,576,289	9.7
Arkansas	3,754,044	0	0	0	3,754,044	14.1
Illinois	4,504,997	0	0	0	4,504,997	16.9
Mississippi	0	0	0	570,413	570,413	2.1
Missouri	1,326,848	0	0	0	1,326,848	5.0
Oklahoma	1,448,767	0	226,076	0	1,674,843	6.3
Oregon	1,091,043	0	0	0	1,091,043	4.1
Texas	9,064,876	0	0	0	9,064,876	34.0
Utah	213,629	0	0	0	213,629	0.8
Other Cities						
California	79,766	0	0	0	79,766	0.3
Texas	1,833,184	0	0	0	1,833,184	6.9
Total	25,893,443	0	226,076	570,413	26,689,931	100.0

7.2.2 Off-Site Transfers from NPRI Facilities

The majority of NPRI off-site transfers stayed within Canada. **Table 7-5** shows that 87 percent of off-site transfers reported to NPRI fell into this category, while 9 percent went to the United States. Because reporting off-site transfers to recycling and energy recovery is voluntary under NPRI, these numbers represent a lower-end estimate of off-site transfers.

Although the actual transfer amounts that Canadian facilities ship across borders cannot be determined, recycling appears to play a larger role in out-of-country transfers in Canada, as it does in the United States. Again, because reporting of off-site transfers for recycling and energy recovery is optional, the actual proportions of waste sent to various waste management options may well differ from the reported data. These data show, however, that off-site recycling sites received 72 percent of NPRI transfers sent to the United States, 84 percent of NPRI transfers to both US and Canadian destinations, and 74 percent of transfers within Canada (see **Tables 7-5** and **7-6**, graphed in **Figure 7-2**).

7.2.3 Off-Site Transfers between Canada and the United States

Taking the subset of reports for industries and chemicals for which reporting is required under both NPRI and TRI, **Table 7-7** shows the amounts transported across the border to and from US states and Canadian provinces, excluding transfers to recycling and energy recovery as well as to sewage/POTWs. US facilities reported a total of 1.5 million kg of transfers to sites in Canada, and Canadian facilities reported transfers in a range from 1.1–1.5 million kg to US sites. Some NPRI forms report shipments to multiple states, but because

Table 7-5		NPRI Off-Site Transfers within Canada and to Other Countries				
A	1995					
	Recycling* (kg)	Energy Recovery* (kg)	Treatment/ Destruction (kg)	Disposal/ Containment (kg)	Total Transfers (kg)	Percent of Total
Canada Only	141,325,471	2,027,960	15,608,757	31,897,342	190,859,530	87.0
Both US and Canada	6,402,080	696,981	81,326	487,029	7,667,416	3.5
United States Only	14,421,037	19,843	804,103	4,811,849	20,056,832	9.1
Other						
Japan	122,713	0	0	0	122,713	0.1
United Kingdom	84,000	0	0	0	84,000	0.0
Unknown	0	0	54,000	552,140	606,140	0.3
Total	162,355,301	2,744,784	16,548,186	37,748,360	219,396,632	100.0

* Voluntary reporting so may not represent all such transfers.

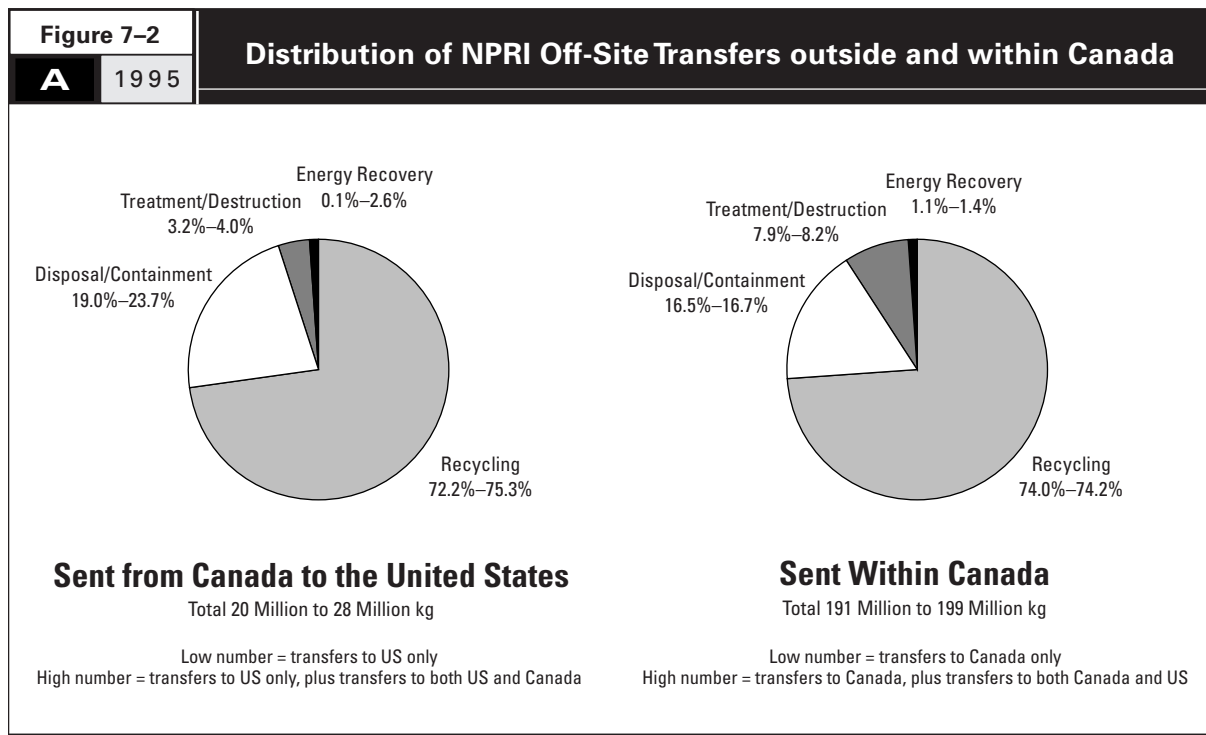
► Does not include transfers to sewage/POTWs.

Table 7-6		NPRI Off-Site Transfers within Canada and to Other Countries							
A		1995							
Transfers to:	Outside Canada		Both US and Canada		Within Canada**		Total NPRI Transfers		
	kg	%	kg	%	kg	%	kg	%	
Recycling*	14,627,750	72.2	6,402,080	83.5	141,325,471	74.0	162,355,301	74.0	
Energy Recovery*	19,843	0.1	696,981	9.1	2,027,960	1.1	2,744,784	1.3	
Treatment/Destruction	804,103	4.0	81,326	1.1	15,662,757	8.2	16,548,186	7.5	
Disposal/Containment	4,811,849	23.7	487,029	6.4	32,449,482	16.7	37,748,360	17.2	
Total Transfers	20,263,545	100.0	7,667,416	100.0	191,465,670	100.0	219,396,632	100.0	
% of Total	9.2		3.5		87.3		100.0		

* Voluntary reporting so may not represent all such transfers.

** Includes unknown.

► Does not include transfers to sewage/POTWs.



► Reporting of transfers to recycling and to energy recovery is voluntary; amounts given may not represent all such transfers. Does not include transfers to sewage/POTWs.

they do not specify the quantity for each state, amounts reported on these forms can only be assigned to the Canada-to-United States total; they cannot be allocated to any one state.

For transfers to treatment and to disposal, 20 US states reported sending off-site transfers to four Canadian provinces, led by shipments from Michigan to sites in Ontario. The province of Quebec received the second largest amount of transfers; facilities in three states (New York, Massachusetts, and New Jersey) sent more than 120,000 kg each to sites there. The same four Canadian provinces sent transfers to eight US states. Facilities located in Ontario sent the largest amounts, directed primarily to sites in Michigan, Illinois, Ohio and Pennsylvania. **Map 7-2** illustrates the flow of off-site transfers between the United States and Canada.

Among the NPRI transfers that can be identified as sent to the United States (from NPRI forms reporting only one transfer destination), transfers to disposal amounted to nearly 5 million kg (see **Table 7-5**, above). This is 40 times the amount of all transfers sent from the United States to Canada for disposal (119,000 kg, as shown in **Table 7-3**, above). One facility reported the majority of NPRI transfers in this category: Ethyl Canada in Corunna, Ontario, which transferred more than 4 million kg, mostly of sulfuric acid, to Ohio for underground injection, as shown in **Table 7-8**. In contrast, the largest US transfers for disposal in Canada represented smaller amounts of various chemicals, primarily to be landfilled. The largest transfer, 34,000 kg of zinc (and compounds) for “other land disposal” came from a General Electric facility in Waterford, New York.

Table 7-7		Off-Site Transfers across National Boundaries, between the United States and Canada									
M		1995									
US State	Canadian Province										
	Alberta		British Columbia		Ontario		Quebec		Total Cross-Boundary Transfers		
	To Alberta (kg)	From Alberta (kg)	To B. C. (kg)	From B. C. (kg)	To Ontario (kg)	From Ontario (kg)	To Quebec (kg)	From Quebec (kg)	To Canada (kg)	From Canada (kg)	
Alabama	0	0	0	0	113	0	0	0	113	0	
Arizona	0	0	0	0	579	0	0	0	579	0	
California	0	104,600	0	0	0	0	0	0	0	104,600	
Connecticut	0	0	0	0	0	0	92,200	0	92,200	0	
Illinois	0	0	0	0	0	151,844–154,151	0	0	0	151,844–154,151	
Indiana	0	0	0	0	165	0	0	0	165	0	
Kentucky	0	0	0	0	0	0	1,043	0	1,043	0	
Louisiana	0	0	0	0	0	0	2,895	0	2,895	0	
Maine	0	0	0	0	0	0	95,683	0	95,683	0	
Massachusetts	0	0	0	0	0	0	124,371	0	124,371	0	
Michigan	0	0	0	0	831,642	319,730–732,252	0	0–649	831,642	319,730–732,901	
Montana	2	0	104	0	0	0	0	0	106	0	
New Jersey	0	0	0	0	454	25,000	121,090	0	121,544	25,000	
New York	0	0	0	0	1,080	0–19,861	161,960	0	163,040	0–19,861	
North Carolina	0	0	2,933	0	8,765	0	69	0	11,767	0	
Ohio	0	0	0	0	14,664	131,000–143,380	0	213,182	14,664	344,182–356,562	
Oregon	0	0	147	90,042	0	0	0	0	147	90,042	
Pennsylvania	0	0	0	0	456	133,000	8,812	0	9,268	133,000	
Rhode Island	0	0	0	0	0	0	8,724	0	8,724	0	
Texas	0	0	0	0	0	0	57	0	57	0	
Washington	0	0	5,552	0	0	0	795	0	6,347	0	
West Virginia	0	0	0	0	990	0	0	0	990	0	
Total	2	104,600	8,736	90,042	858,907	760,913–1,202,576	617,700	213,182–213,831	1,485,345	1,067,256–1,508,058	

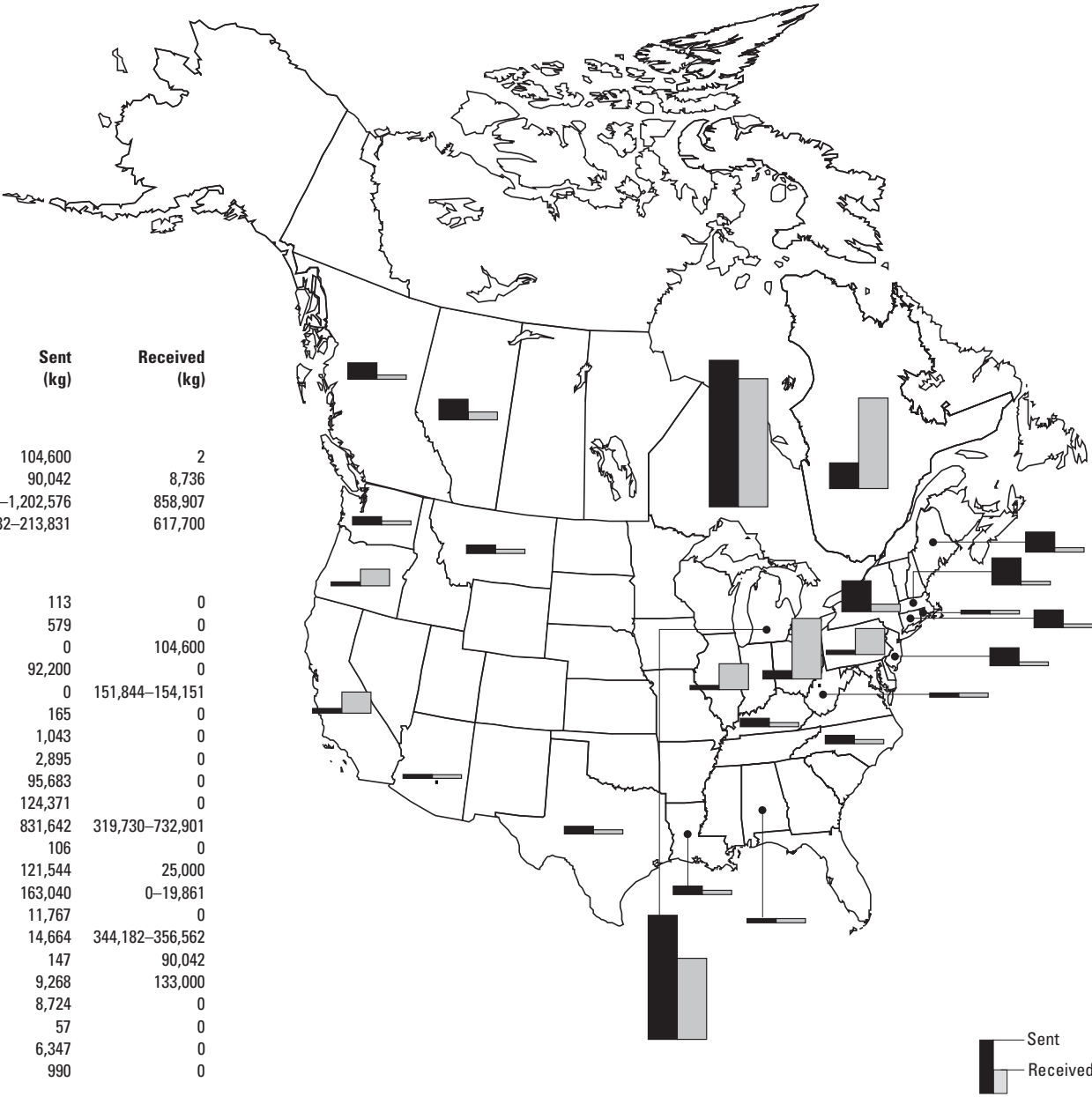
► Does not include transfers to sewage/POTWs, recycling or energy recovery.

Rows and columns of Canadian data do not add to the totals presented because data from NPRI forms that report transfers to multiple states cannot be allocated to any one state. See explanation in text.

Map 7-2

Off-Site Transfers between the United States and Canada

M 1995



Canadian Provinces

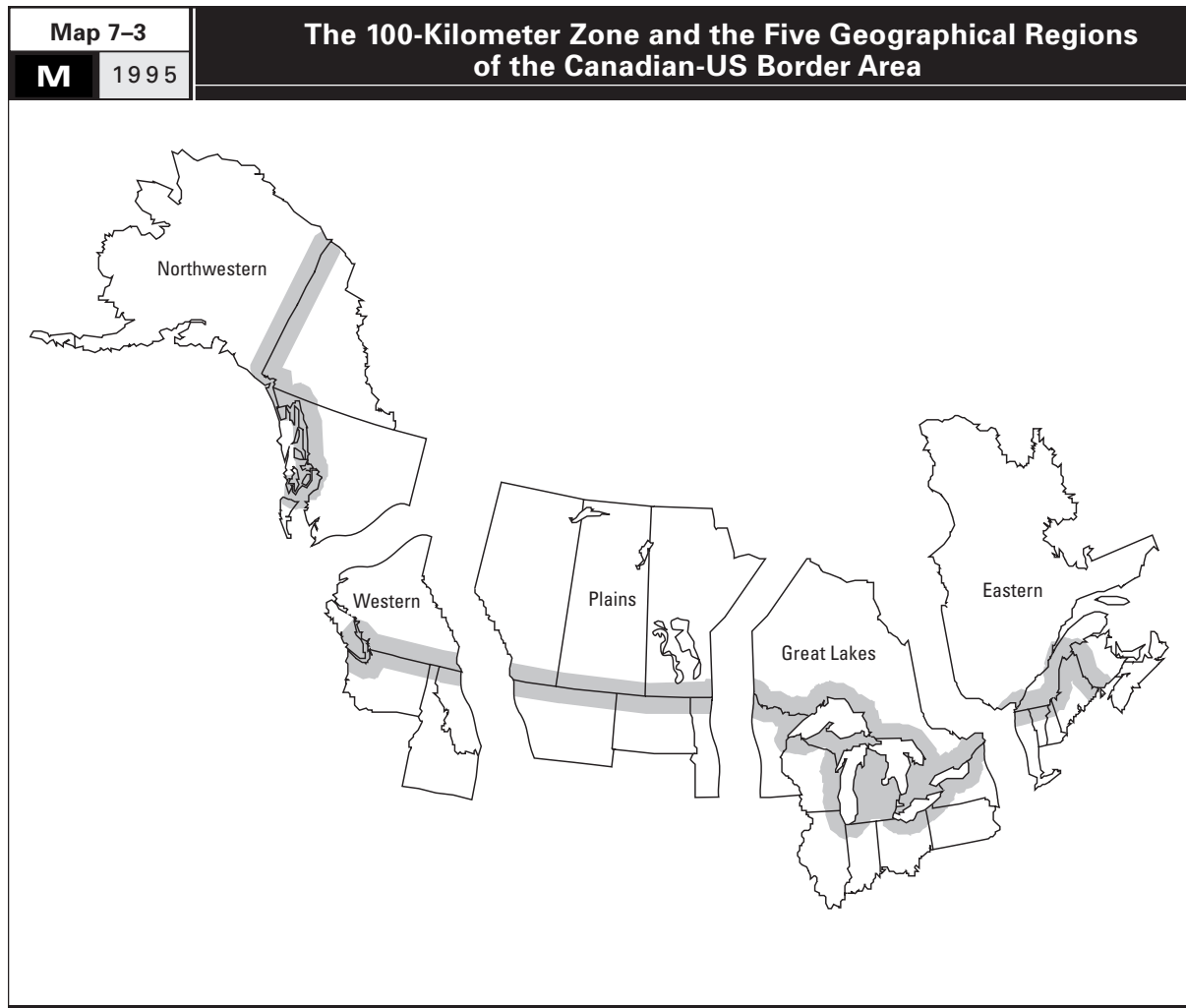
	Sent (kg)	Received (kg)
Alberta	104,600	2
British Columbia	90,042	8,736
Ontario	760,913–1,202,576	858,907
Quebec	213,182–213,831	617,700

US States

	Sent (kg)	Received (kg)
Alabama	113	0
Arizona	579	0
California	0	104,600
Connecticut	92,200	0
Illinois	0	151,844–154,151
Indiana	165	0
Kentucky	1,043	0
Louisiana	2,895	0
Maine	95,683	0
Massachusetts	124,371	0
Michigan	831,642	319,730–732,901
Montana	106	0
New Jersey	121,544	25,000
New York	163,040	0–19,861
North Carolina	11,767	0
Ohio	14,664	344,182–356,562
Oregon	147	90,042
Pennsylvania	9,268	133,000
Rhode Island	8,724	0
Texas	57	0
Washington	6,347	0
West Virginia	990	0

Table 7-8		Largest North American Off-Site Transfers to Disposal across Canada-US Border				
A	1995					
Sending Facility	City, State/Province	Receiving Site	City, State/Province	Chemical	Transfer Amount (kg)	Type of Disposal
Ethyl Canada Inc.	Corunna, ON	Chemical Waste Management	Vickery, OH	Sulfuric acid*	4,350,000	Underground injection
				Nitric acid and nitrate compounds	131,000	Underground injection
				Total	4,481,000	
General Electric Co.	Waterford, NY	Noranda Copper Smelting	Rouyn-Noranda, QC	Zinc (and its compounds)	33,560	Other land disposal
Summit Corp. of America	Thomaston, CT	Stablex Canada Inorganic Waste	Ste-Thérèse-de-Blainville, QC	Copper (and its compounds)	5,170	Landfill
				Lead (and its compounds)	1,587	Landfill
				Nickel (and its compounds)	5,760	Landfill
				Cyanide compounds	32	Landfill
				Total	12,549	
Reilly Ind. Inc.	Cleveland, OH	Laidlaw Env. Services	Corunna, ON	Anthracene	608	Landfill
				Phenanthrene*	2,210	Landfill
				Benzene	276	Landfill
				Xylene (mixed isomers)	276	Landfill
				Styrene	83	Landfill
				Phenol	553	Landfill
				Cresol (mixed isomers)	276	Landfill
				Naphthalene	6,079	Landfill
				Biphenyl	553	Landfill
Total	10,914					

* Not a matched chemical.



7.3 Canadian-US Border Regions

The border area in this analysis is taken as the 100 kilometers on either side of the border (see the shaded area in **Map 7-3**) and is divided into five regions from west to east: the Northwestern region, comprising the Alaskan panhandle and northern British Columbia; the Western region, extending from the Pacific coast to the continental divide; the Plains and northern Mississippi basin; the Great Lakes and

Lake of the Woods area; and the Eastern region, encompassing the Saint Lawrence River to the Atlantic. Facilities report their latitude and longitude to TRI and either their latitude and longitude or their Universal Transverse Mercator (UTM) coordinates to NPRI. These data were used to determine if the given facility was located within 100 kilometers of the border. In cases where geographic coordinates were not given, the city or postal code where the facility is located was used.

Seventy-nine percent of NPRI facilities and 20 percent of TRI facilities were located within 100 kilometers of the Canadian-US border (see **Table 7-9**). Their total releases and transfers, however, represented a smaller percentage of the databases: 66 percent for NPRI and 13 percent for TRI. Thus, although NPRI facilities generally cluster near the border, for both NPRI and TRI the facilities reporting the largest amounts of releases and transfers were not necessarily located in the border area.

7.3.1 Releases and Transfers in the Border Regions

The five border regions vary substantially (see **Map 7-4**). Eighty-nine percent of all border facilities were located in the area surrounding the Great Lakes, and this region contained almost six times as many TRI facilities as NPRI facilities (3,773 TRI and 657 NPRI). In the Eastern region, the ratio was reversed: four times as many facilities reported to NPRI as to TRI. In the Plains, the ratio was three NPRI facilities for each TRI facility (see **Figure 7-3**).

Total releases and transfers from NPRI and TRI facilities within each border region show roughly similar patterns. TRI facilities accounted for 138 million kg, or 67 percent of the total for the Great Lakes region (versus 85 percent of the facilities). However, for the Eastern region, NPRI facilities reported 28 million kg or 90 percent of that region's total (with 82 percent of the facilities). For the Plains region, NPRI facilities accounted for the majority of releases and transfers—1.7 million kg or 88 percent of the total (with 76 percent of the facilities—see **Figure 7-4**).

As **Figures 7-3** and **7-4** show, the NPRI portion of total releases and transfers in each border region exceeds NPRI's share of facilities reporting in the region, as it does in North America as a whole. (The one exception, the Northwestern region, was where just one facility each in NPRI and TRI reported, with approximately equal releases.)

Emissions to air tended to be more prominent in the border regions than for the national databases as a whole (see **Table 7-10** and **Figure 7-5**). This was particularly true in the Great Lakes, Plains and Western regions, where air emissions amounted to more than 75 percent of the total releases for both

Table 7-9		Releases and Transfers for Border Regions					
M	1995						
	Facilities		Total Releases	Total Transfers	Total Releases and Transfers		
	Number	%	(kg)	(kg)	kg	%	
NPRI-Canadian Facilities							
Eastern	290	22.2	18,877,271	8,936,406	27,813,677	17.9	
Great Lakes	657	50.2	44,056,078	23,590,440	67,646,518	43.6	
Plains	32	2.4	1,362,734	307,416	1,670,150	1.1	
Western	53	4.0	1,353,640	2,675,522	4,029,162	2.6	
Northwestern	1	0.1	562,000	0	562,000	0.4	
Subtotal	1,033	78.9	66,211,723	35,509,784	101,721,507	65.6	
Total for All Canada	1,309	100.0	116,744,327	38,259,733	155,004,060	100.0	
TRI-US Facilities							
Eastern	65	0.3	2,428,172	557,945	2,986,117	0.3	
Great Lakes	3,773	19.1	79,138,714	59,044,858	138,183,572	12.0	
Plains	10	0.1	223,146	11,187	234,333	0.0	
Western	69	0.3	2,802,871	193,457	2,996,328	0.3	
Northwestern	1	0.0	577,234	0	577,234	0.0	
Subtotal	3,918	19.8	85,170,137	59,807,446	144,977,583	12.6	
Total for All US	19,786	100.0	836,981,403	317,684,439	1,154,665,842	100.0	
Totals for US and Canadian Facilities							
Eastern	355	1.7	21,305,443	9,494,351	30,799,794	2.4	
Great Lakes	4,430	21.0	123,194,792	82,635,298	205,830,090	15.7	
Plains	42	0.2	1,585,880	318,603	1,904,483	0.1	
Western	122	0.6	4,156,511	2,868,979	7,025,490	0.5	
Northwestern	2	0.0	1,139,234	0	1,139,234	0.1	
Subtotal	4,951	23.5	151,381,860	95,317,230	246,699,090	18.8	
Total for All Canada and US	21,095	100.0	953,725,730	355,944,172	1,309,669,902	100.0	

NPRI and TRI facilities. Underground injection, on the other hand, is not widely practiced in the border regions; only TRI facilities in the Great Lakes region reported this release. Discharges to surface water formed a greater part of releases in the Eastern (25 percent) and Northwestern (36 percent) regions.

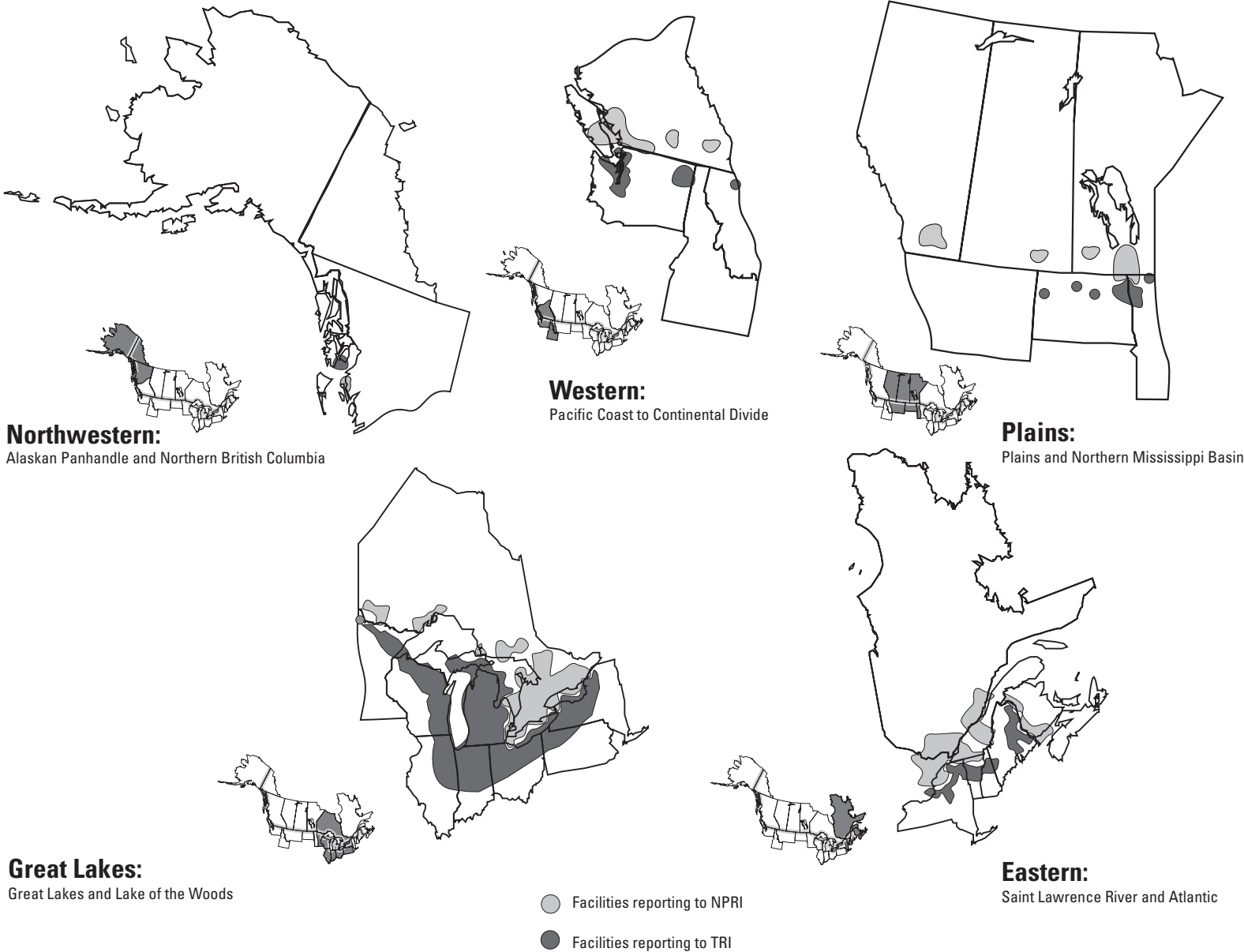
Transfer patterns varied by border region and, except in the Great Lakes region, did not resemble national patterns (see **Table 7-11** and **Figure 7-6**):

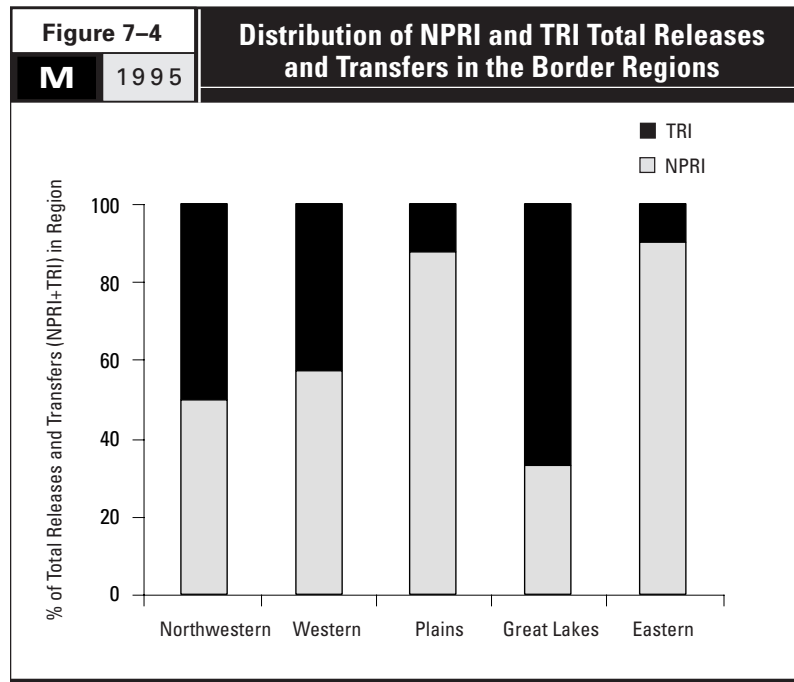
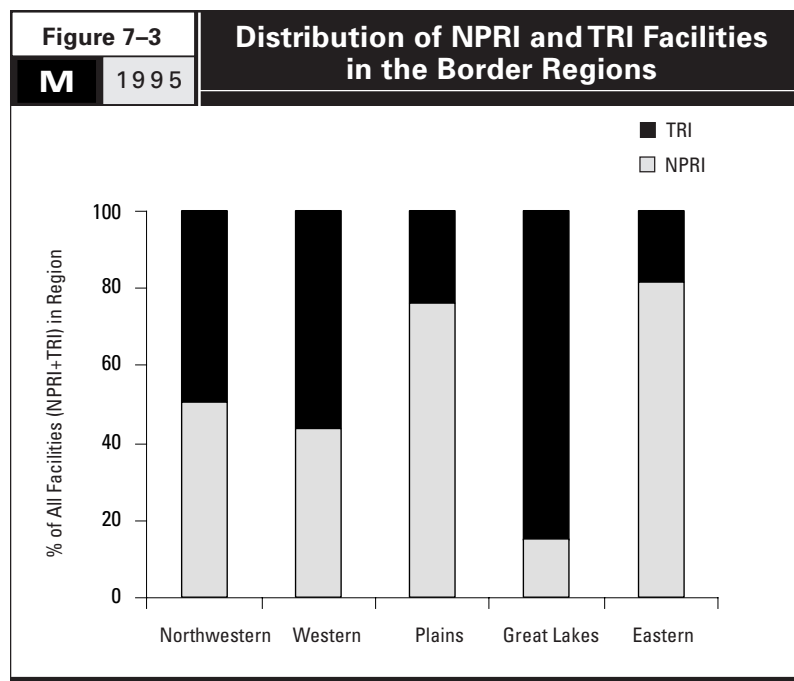
- In the Eastern region, transfers to treatment/destruction accounted for 61 percent of the total for NPRI facilities, while for TRI facilities, transfers to disposal represented 56 percent of all transfers.
- In the Great Lakes region, both NPRI and TRI transfers to disposal represented more than half of all transfers, and transfers to sewage/POTWs from TRI facilities were greater than for NPRI facilities, as was true for the overall databases.
- In the Plains region, NPRI facilities predominantly reported transfers to treatment/destruction, while more TRI transfers were sent to sewage/POTWs.
- In the Western region, disposal/containment represented 98 percent of all NPRI transfers, but TRI transfers were more evenly distributed among transfer types.

7.3.2 Bioaccumulating Chemicals in the Great Lakes Region

The Great Lakes region is the site of more facilities than any other border region, as noted in **Chapter 3**, and thus it is not unexpected that total releases and transfers from facilities in the states and provinces surrounding the Great Lakes were among the largest found anywhere.

Map 7-4
M 1995
NPRI and TRI Facilities in the Canada-US Border Regions





In addition, bioaccumulating chemicals have been identified as a special class of substances of concern in this area under the International Joint Commission (IJC). The IJC is an independent agency established by the Boundary Waters Treaty of 1909 between Canada and the United States for prevention and resolution of disputes, primarily those involving water quantity and quality. Although all water bodies along the Canada-US border fall within the IJC mandate, the Great Lakes programs are the largest and most comprehensive.

Bioaccumulating chemicals considered by the IJC include 13 persistent, bioaccumulative and toxic substances that are of immediate concern in the Great Lakes system and another 26 substances that have a demonstrated potential to impair the Great Lakes basin ecosystem (see the Environment Canada Web page on the Canada-Ontario Agreement: <<http://www.cciw.ca/glimr/data/canada-ontario-agreement>>). Five of these 39 substances are on the NPRI list and 13 appear on the TRI list, as shown in **Table 7-12**. The other substances on the IJC list include dioxins, furans, polycyclic aromatic hydrocarbons (which are combustion by-products and not manufactured), and DDT and related compounds (which, though no longer manufactured in the United States or Canada, continue to be in Mexico).

While few direct discharges of these substances to water were reported in the PRTR data, releases to the other environmental media can end up in lakes and rivers through air deposition or via groundwater. Data on current releases also do not measure existing concentrations of these persistent substances, and for some, such as

metals, local releases may be less important than major sources located outside and upwind of the immediate area. Furthermore, PRTR data do not include non-manufacturing uses of these chemicals in the United States, and pesticides are not listed on Canada's NPRI.

7.3.3 Industries in the Border Regions

As for the PRTRs as a whole, two industrial sectors accounted for one-half or more of total releases and transfers in each region (see **Table 7-13**). The industries dominant on one side of the border, however, were not necessarily so on the other. In the Eastern region, paper products led both NPRI and TRI reporting, but the chemical industry was second for NPRI and the much smaller lumber industry second for TRI. In the Plains region, the chemical industry reported the largest releases and transfers among NPRI facilities, while the transportation equipment industry dominated TRI reporting.

Chemical and paper production led the Western region for NPRI, whereas paper was first and transportation equipment second for TRI. Only in the Great Lakes were the two top industries for total releases and transfers the same in NPRI and TRI: primary metals products, followed by chemical manufacture, as was true for the border area as a whole. The only two facilities reporting in the Northwestern region were both paper facilities.

Of all these industries, only food products and lumber fell outside the top six in the combined rankings for Canada and the United States, as shown in **Chapter 3** (see **Table 3-15**).

Table 7-10		Releases for Border Regions				
M	1995	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-Site Land Releases (kg)	Total Releases (kg)
NPRI-Canadian Facilities						
Eastern		11,548,488	4,970,621	0	2,331,885	18,877,271
Great Lakes		34,270,494	5,125,345	0	4,571,659	44,056,078
Plains		1,175,660	105,710	0	76,530	1,362,734
Western		1,185,624	71,890	0	89,434	1,353,640
Northwestern		562,000	0	0	0	562,000
Subtotal		48,742,266	10,273,566	0	7,069,508	66,211,723
% of Subtotal		73.6	15.5	0.0	10.7	100.0
Total for All Canada		79,547,053	15,419,582	9,937,227	11,690,712	116,744,327
% of Total		68.1	13.2	8.5	10.0	100.0
TRI-US Facilities						
Eastern		2,151,264	262,566	0	14,342	2,428,172
Great Lakes		62,051,152	1,719,372	2,940,845	12,427,345	79,138,714
Plains		214,457	8,349	0	340	223,146
Western		2,147,263	652,476	0	3,133	2,802,871
Northwestern		162,277	414,943	0	14	577,234
Subtotal		66,726,412	3,057,706	2,940,845	12,445,173	85,170,137
% of Subtotal		78.3	3.6	3.5	14.6	100.0
Total for All US		560,407,943	60,570,521	92,783,273	123,219,666	836,981,403
% of Total		67.0	7.2	11.1	14.7	100.0
Totals for Canadian and US Facilities						
Eastern		13,699,752	5,233,187	0	2,346,227	21,305,443
Great Lakes		96,321,646	6,844,717	2,940,845	16,999,004	123,194,792
Plains		1,390,117	114,059	0	76,870	1,585,880
Western		3,332,887	724,366	0	92,567	4,156,511
Northwestern		724,277	414,943	0	14	1,139,234
Subtotal		115,468,678	13,331,272	2,940,845	19,514,681	151,381,860
% of Subtotal		76.3	8.8	1.9	12.9	100.0
Total		639,954,996	75,990,103	102,720,500	134,910,378	953,725,730
% of Total		67.1	8.0	10.8	14.1	100.0

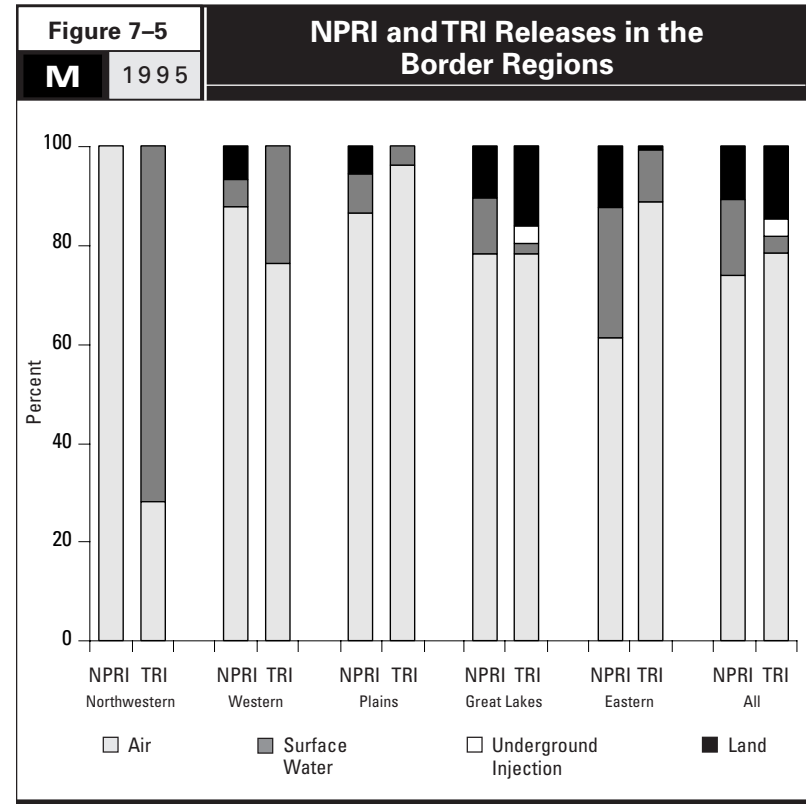


Table 7-11				
Transfers for Border Regions				
M	1995			
	Treatment/ Destruction (kg)	Sewage/ POTWs (kg)	Disposal/ Containment (kg)	Total Transfers (kg)
NPRI-Canadian Facilities				
Eastern	5,423,540	371,788	3,141,078	8,936,406
Great Lakes	5,944,041	3,936,854	13,709,545	23,590,440
Plains	223,823	7,280	76,313	307,416
Western	34,328	15,096	2,626,098	2,675,522
Northwestern	0	0	0	0
Subtotal	11,625,732	4,331,018	19,553,034	35,509,784
% of Subtotal	32.7	12.2	55.1	100.0
Total for All Canada	13,148,001	4,457,382	20,654,350	38,259,733
% of Total	34.4	11.7	54.0	100.0
TRI-US Facilities				
Eastern	210,778	37,292	309,874	557,945
Great Lakes	14,292,910	14,862,758	29,889,190	59,044,858
Plains	2,290	8,556	340	11,187
Western	78,788	69,263	45,405	193,457
Northwestern	0	0	0	0
Subtotal	14,584,767	14,977,870	30,244,810	59,807,446
% of Subtotal	24.4	25.0	50.6	100.0
Total for All US	103,959,767	95,796,854	117,927,818	317,684,439
% of Total	32.7	30.2	37.1	100.0
Totals for Canadian and US Facilities				
Eastern	5,634,318	409,080	3,450,952	9,494,351
Great Lakes	20,236,951	18,799,612	43,598,735	82,635,298
Plains	226,113	15,836	76,653	318,603
Western	113,116	84,359	2,671,503	2,868,979
Northwestern	0	0	0	0
Subtotal	26,210,499	19,308,888	49,797,844	95,317,230
% of Subtotal	27.5	20.3	52.2	100.0
Total	117,107,768	100,254,236	138,582,168	355,944,172
% of Total	32.9	28.2	38.9	100.0

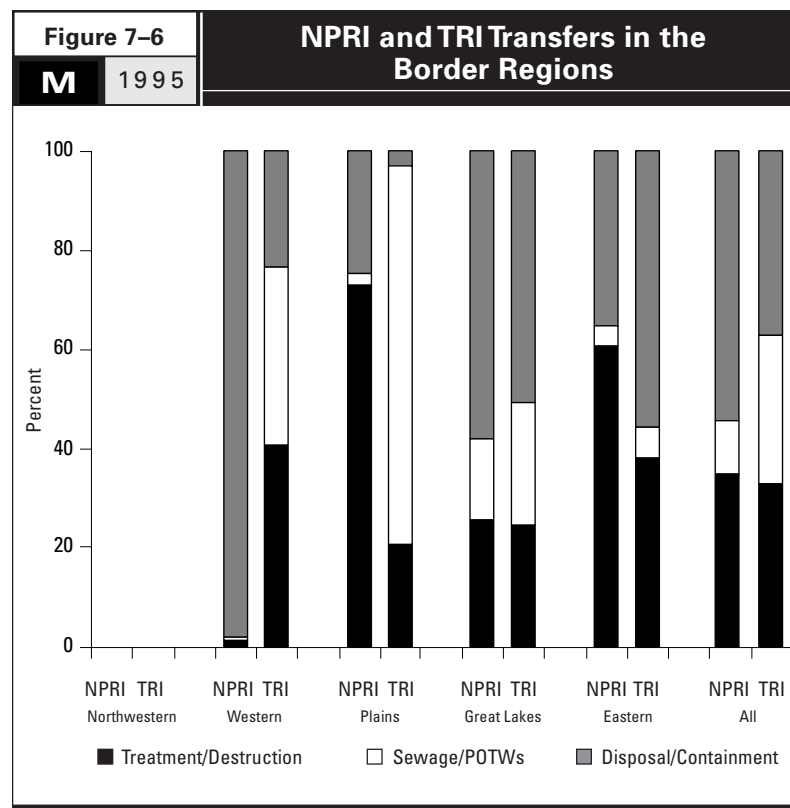


Table 7-12

Releases of Bioaccumulators from Great Lakes Region Facilities

M 1995

CAS Number	Chemical	Number of Forms	Total Air Emissions (kg)	Surface Water Discharges (kg)	Underground Injection (kg)	On-Site Land Releases (kg)	Total Releases (kg)
NPRI-Canadian Great Lakes Facilities							
120-12-7	Anthracene	5	1,190	0	0	10	1,200
—	Cadmium (and its compounds)	7	135	4	0	6,600	6,967
106-46-7	1,4-Dichlorobenzene	1	0	0	0	0	0
—	Mercury (and its compounds)	1	0	0	0	12	12
101-14-4	4,4'-Methylene- bis(2-chloroaniline)	1	0	0	0	0	4
Total for NPRI Chemicals		15	1,325	4	0	6,622	8,183
TRI-US Great Lakes Facilities							
309-00-2	Aldrin	0	0	0	0	0	0
120-12-7	Anthracene	8	23,999	1,945	0	0	25,944
—	Cadmium (and its compounds)	28	4,609	3	0	0	4,612
57-74-9	Chlordane	0	0	0	0	0	0
106-46-7	1,4-Dichlorobenzene	1	3,261	0	0	0	3,261
91-94-1	3,3'-Dichlorobenzidine	1	5	0	0	0	5
118-74-1	Hexachlorobenzene	0	0	0	0	0	0
319-84-6	alpha-Hexachlorocyclohexane	0	0	0	0	0	0
—	Mercury (and its compounds)	5	757	2	0	395	1,154
101-14-4	4,4'-Methylene- bis(2-chloroaniline)	8	116	0	0	0	116
87-86-5	Pentachlorophenol	1	0	0	0	0	0
1336-36-3	Polychlorinated biphenyls (PCBs)	4	0	0	0	0	0
8001-35-2	Toxaphene	0	0	0	0	0	0
Total for TRI Chemicals		56	32,746	1,951	0	395	35,091

Table 7-13		NPRI and TRI Releases and Transfers for Border Regions, for Top Industries							
M 1995		NPRI			TRI				
US SIC Code	Industry	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)	US SIC Code	Industry	Total Releases (kg)	Total Transfers (kg)	Total Releases and Transfers (kg)
Eastern					Eastern				
26	Paper	7,434,078	1,747,487	9,181,565	26	Paper	2,025,339	468,154	2,493,493
28	Chemicals	4,068,771	1,880,779	5,949,550	24	Lumber	140,641	0	140,641
	Subtotal	11,502,849	3,628,266	15,131,115		Subtotal	2,165,980	468,154	2,634,134
	% of Total	60.9	40.6	54.4		% of Total	89.2	83.9	88.2
	Total for Region	18,877,271	8,936,406	27,813,677		Total for Region	2,428,172	557,945	2,986,117
Great Lakes					Great Lakes				
33	Primary Metals	8,097,401	12,934,094	21,031,495	33	Primary Metals	20,307,795	22,543,052	42,850,847
28	Chemicals	10,948,536	6,831,599	17,780,135	28	Chemicals	10,733,887	14,416,655	25,150,541
	Subtotal	19,045,937	19,765,693	38,811,630		Subtotal	31,041,682	36,959,707	68,001,389
	% of Total	43.2	83.8	57.4		% of Total	39.2	62.6	49.2
	Total for Region	44,056,078	23,590,440	67,646,518		Total for Region	79,138,714	59,044,858	138,183,572
Plains					Plains				
28	Chemicals	1,093,536	173,311	1,266,847	37	Transportation	90,345	2,290	92,635
20	Food	138,710	6,280	144,990	20	Food	71,791	8,216	80,008
	Subtotal	1,232,246	179,591	1,411,837		Subtotal	162,136	10,507	172,643
	% of Total	90.4	58.4	84.5		% of Total	72.7	93.9	73.7
	Total for Region	1,362,734	307,416	1,670,150		Total for Region	223,146	11,187	234,333
Western					Western				
28	Chemicals	31,382	2,054,345	2,085,727	26	Paper	1,000,790	470	1,001,260
26	Paper	823,198	97,200	920,398	37	Transportation	408,084	66,086	474,170
	Subtotal	854,580	2,151,545	3,006,125		Subtotal	1,408,874	66,556	1,475,430
	% of Total	63.1	80.4	74.6		% of Total	50.3	34.4	49.2
	Total for Region	1,353,640	2,675,522	4,029,162		Total for Region	2,802,871	193,457	2,996,328
Northwestern					Northwestern				
26	Paper	562,000	0	562,000	26	Paper	577,234	0	577,234
Total for Border Area					Total for Border Area				
33	Primary Metals	10,346,514	17,100,793	27,447,307	33	Primary Metals	20,711,835	22,569,808	43,281,644
28	Chemicals	16,142,225	10,940,034	27,082,259	28	Chemicals	10,767,675	14,445,230	25,212,905
	Subtotal	26,488,739	28,040,827	54,529,566		Subtotal	31,479,510	37,015,039	68,494,549
	% of Total	40.0	79.0	53.6		% of Total	37.0	61.9	47.2
	Total	66,211,723	35,509,784	101,721,507		Total	85,170,137	59,807,446	144,977,583