

APPENDIX G

OTHER HAZARDOUS MATERIALS

Hazardous Wastes. Appendix Table G1 provides data on the amounts of waste tonnage produced by EPA-defined *generators*; on amounts shipped off-site; and on the number of shipments. The shipment number is assumed to be identical to EPA's estimated number of manifests associated with transporting the waste material that is shipped off-site.⁵

Information on tons generated and tons shipped off-site are from the National Biennial RCRA Hazardous Waste Report covering 1995 data and apply to amounts for *large quantity generators*. Tonnage figures for small quantity and other types of generators are not available. Shipment count or manifest data are from EPA's Office of Solid Waste, and the manifest estimates cover large, small, and other generators.

Figures regarding truck and rail mode share are taken in part from the 1993 Commodity Flow Survey data covering STCC 48 (waste hazardous materials or waste hazardous substances) and available statistics on the size of shipments for truck and rail cargoes generally.

Medical Wastes and Other Infectious Substances. Appendix Table G2 provides data on the number of medical facilities in the U.S., virtually all of which are potential generators of medical waste and other kinds of infectious substances, e.g., diagnostic specimens. Many of the materials generated by these facilities are also covered by OSHA and EPA regulations. Estimates of medical waste tonnage generated and shipped off-site are given. Depending on the size of individual shipments, various levels of daily traffic could result, and a range of possible daily shipment counts is presented in Table G2.

A more formal estimate of daily medical waste and other medical industry shipments would require clarification of data in several areas. First, the medical facility count would need to be updated. Second, because of changing EPA requirements regarding incineration of waste materials on site, amounts of medical waste shipped off-site would need reevaluation. Third, more complete information about shipping practices from these facilities is necessary. For example, it is not well understood at this time whether facilities tend to ship items on a weekly, daily, or even more frequent basis. Shipments of blood and urine samples, for example, might be sent from clinics to labs several times per day. In contrast, gloves, swabs, bandages, and other materials might be treated or at least accumulated and grouped for weekly shipment in small, medium, or large packagings. Without greater understanding of these distribution patterns, it is difficult to estimate the size of average shipments and, therefore, the number of shipments for a given tonnage of medical waste or other regulated medical industry materials.

⁵ While a single manifest generally represents a single shipment, consolidation of multiple shipments under a single manifest can occur and suggests a shipment-to-manifest ratio that would exceed 1.0. Similarly, some interlining (truck transfers) and truck-rail intermodal shipments occur within the industry. As a result, the number of waste hazmat *movements* is somewhat higher than the number of *shipments*. No attempt has been made to estimate a shipment-to-manifest or movement-to-shipment ratio, and factors of 1.0 are used for both measures.

Finally, because of the different jurisdictional roles of OSHA, EPA, and U.S. DOT, further clarification of which jurisdiction affects which types of products and product distribution phases is also warranted. Because of the current uncertainty about each of these items, the various shipment estimates provided in Table G2 have not been factored into this report's daily shipment, movement, or tonnage estimates.

Alternative SIC Codes. There are many products shipped daily in the United States which, while classified as hazardous materials, would be captured by survey data in SIC or STCC code groupings that are not typically hazmat groupings. For example, automotive batteries, which are regularly shipped to automotive plants, are normally captured in STCC 37: *Transportation Equipment*.⁶ Other examples exist as well. Besides for waste hazmat (for which EPA manifest data suggest shipment counts), however, this report has not attempted to estimate shipment counts for these potentially numerous products that would be itemized in commodity groupings outside Chemicals & Allied (SIC 28) or Petroleum Products (SIC 29). If and when tallies of such products became readily available, they would be included in the estimate of daily shipments.

Excluded Items. There are also several hazmat traffic categories which have been excluded from the estimates compiled in this report, not merely because of difficulty in estimating the component totals, but because of certain qualitative differences in the nature of the traffic itself. Materials of trade (MOTs), for example, include such materials as those carried by plumbers, roofers, and lawn service personnel used in application of their trade services. The MOTs category also includes items such as spare batteries and emergency starter fluids used for operation of vehicles, and items such as self contained breathing devices for the health and safety of drivers. While having certain safety implications, these materials are not quite the same as packaged, boxed or truckload (for example) goods hauled as commercial freight. Similarly, company materials (COMAT) hauled by air carriers are generally used by the crew, aircraft personnel, or for the health of passengers. Unless transported as commercial freight, these items would more closely resemble materials of trade. Finally, chemical residues in the bottom of rail cargo tanks may have important safety implications, but in terms of tonnage, commercial value, etc. the materials are quite unlike commercial shipments of packaged, boxed, or containerized goods.

⁶ A strong year for automotive sales (cars and trucks) sees more than 15 million vehicles sold in the U.S., or roughly 41,000 per day. All have batteries, many of which are shipped to assembly plants, rather than "consumed" on the plant site.

Appendix Table G1: WASTE HAZARDOUS MATERIALS -- a

Material Produced & Amounts Shipped	Annual	Daily	Shipment Size (tons)
WASTE FROM LARGE GENERATORS -- b			
TONS of hazardous wastes generated (1995 annual data).	214,000,000	586,301	
TONS shipped off site (implying 5% of tons generated is amount shipped off site).	10,700,000	29,315	
MANIFESTS: EPA figure, for shipments from approximately 21,575 "Large Generators."	884,575	2,423	
SHIPMENTS: Assumed equal to the number of manifests.	884,575	2,423	
AVERAGE SHIPMENT SIZE: @ 10,700,000 tons / 884,575 manifests			12.1
WASTE FROM OTHER GENERATORS			
TONS of Hazardous Wastes Generated	na	na	
TONS Shipped Off site.	na	na	
MANIFESTS: EPA figure, for shipments from estimated 192,820 other generators.	1,736,012	4,756	
SHIPMENTS: Assumed equal to the number of manifests.	1,736,012	4,756	
AVERAGE SHIPMENT SIZE: Avg. shipment size unavailable without tonnage figure.			na
TOTAL SHIPMENTS: annual figures of 884,575 + 1,736,012 = 2,620,587	2,620,587	7,180	
Estimating Shipment Size & Number of Manifests for Truck and Rail Modes			
Total Number of Large Generator Manifests:	884,575	2,423	
Total Large Generator Tonnage:	10,700,000	29,315	
If 1993 CFS data relationship holds, with 91% of tonnage truck, then truck tons =	9,737,000	26,677	
If 1993 CFS data relationship holds, with 9% of tonnage rail, then rail tons =	963,000	2,638	
If average rail shipment is 5 times truck, then average truck shipment (tons) =			11.23
If average rail shipment is 5 times truck, then average rail shipment (tons) =			56.13
If tonnage and shipment size relationships hold, then truck manifests, @ 98% total =	867,053	2,375	
If tonnage and shipment size relationships hold, then rail manifests, @ 2% total =	17,522	48	
If truck tonnage share, manifest share, and shipment size for remainder of traffic is same as for large generator traffic, then total truck manifests, @ 98% =	2,568,175	7,036	
and, total rail manifests, @ 2% =	52,412	144	

- a Waste figures correspond to EPA definitions and are not necessarily the same as Bureau of Census (STCC 48) hazardous waste definitions.
- b Tons generated and tons shipped off-site data are from the National Biennial RCRA Hazardous Waste Report, based on 1995 data. Manifest data are from EPA's Office of Solid Waste. Tonnage estimates for small and other generators not available. EPA Office of Solid Waste internal data differ slightly from the National Biennial RCRA Report. The Report indicates 20,497 large generators as shipping 10,700,000 tons off site, while the internal figures show an estimate of 884,575 manifests coming implicitly from 21,575 large generator shippers -- but without a specific tonnage figure. Large generator figures used in table above combine manifest figure with the 10.7 million tonnage figure.

ADDITIONAL NOTES: The 1993 CFS (p. 23) cites only 813,000 tons of "hazardous wastes" shipped that year, an amount equal to only about 5% of the 17,000,000 tons estimated by EPA as shipped off-site in 1993, and equal to about only 8% of the 10,700,000 tons shipped off-site in 1995. Cause of the large discrepancy is not clear. One possibility is that many CFS surveyed shippers listed their waste tonnage under other product categories.

The 1993 CFS data also indicate that about 91% of waste tonnage is carried by truck, with 9% carried by rail.

Average rail shipment is assumed by RSPA to be 5 times larger than average truck shipment.

Appendix Table G2: MEDICAL WASTES

TYPE OF WASTE GENERATING FACILITY	Number Of Facilities -- a		
Hospital Generating Facilities -- a			
Federal and Long-term Care Hospitals	6,201		
Non-hospital Generating Facilities -- b			
Private Physicians Offices	180,000		
Dentists Offices	98,400		
Veterinarians Offices	38,000		
Medical Clinics	15,500		
Long-term Care Facilities	12,700		
Labs	4,300		
Free Standing Blood Banks	900		
Subtotal, Non-hospital Generating Facilities	349,800		
Total Generating Facilities	356,001		
WASTE CATEGORY and TONS	Annual Tons	Daily Tons	Daily Shipments
Hospital Wastes@ 15 pounds/person/day -- b, c	2,434,550	6,670	
Amount Considered Infectious: @15% -- b	365,183	1,001	
Amount Potentially Transported: @7%-36% -- d	73,037	200	
Infectious Medical Wastes From Other, i.e., Non-Hospital, Facilities -- e	73,037	200	
Total "Infectious" Medical Wastes Transported	146,073	400	
If average shipment size is 1,000 lbs., daily shipments equal			800
If average shipment size is 500 lbs., daily shipments equal			1,600
If average shipment size is 200 lbs., daily shipments equal			4,000
If average shipment size is 10 lbs., daily shipments equal			80,000

-- a American Hospital Association, 1996 Survey of Hospitals.

-- b Society For Hospital Epidemiology Of America (SHEA) position paper, 1991.
William A. Rutala, PhD, MPH; C.Glen Mayhall, MD. Based on 1987-88 data.

-- c Daily total of 6,670 tons provided; annual figures derived @ 365 days.

-- d The 7%-36% figure from SHEA; a 20% figure presently assumed by RSPA.

-- e Non-hospital level assumed equal to the hospital-generated figure.

NOTE: None of the daily shipment estimates in this table are used elsewhere in the report's totals, other than to suggest that the daily level is likely to be over 4,000 and that such a level would raise the "Other" category (Tables 1, 2 and elsewhere) to well over 10,000 shipments per day.