

## APPENDIX E

### HAZMAT SHIPMENTS BY AIR

The mode share data in Table 2 and Appendix Table D1 indicate an estimated 43,750 daily hazmat shipments by air. This figure is an extrapolation from traffic level estimates for a select number of air carriers authorized to transport hazmat by air.<sup>2</sup> These companies estimated their respective hazmat shipment traffic at certain levels. With an assumption that these carriers' composite share of air hazmat traffic was similar to the companies' composite share of total air cargo traffic -- based on Bureau of Transportation Statistics (BTS) 1997 air cargo data, an estimate of the total air hazmat market was generated. For example, if 7 companies handled 35,000 daily hazmat shipments and those companies also had 70% of the total air cargo market, then a similar hazmat market share would suggest a total air hazmat market of 50,000 shipments per day. Based on the carriers, hazmat shipment levels, and cargo market percentages surveyed for this analysis, the total air hazmat shipment market was estimated at 43,750 daily shipments.

Hazmat *tonnage* estimates, Table 2 and Appendix Table D1, are also derived in part from the BTS 1997 air cargo industry figures, but they also include a currently used FAA assumption from the 1986 OTA hazmat study that 8% of total air cargo tonnage is hazardous materials. These data and the 8% assumption result in an estimate of 4,049 tons of hazardous materials shipped daily by air (Appendix Table E1). That figure may be compared with the OTA estimate for 1982 of 781 hazmat tons per day.<sup>3</sup> When the 4,049 level is divided by 43,750 daily shipments, the result is an average air hazmat shipment size of 185 pounds.

The 4,049 daily ton figure (1997) is considerably higher than the 781 daily ton figure (1982), and the 185 pound figure may appear high for an industry in which many shipments contain only small quantities of hazardous materials. However, enormous growth in the overall air cargo industry as well as the occurrence of a relatively small number of large, all-cargo hazmat flights could explain the various numbers. Unlike combined passenger/cargo flights on which both *individual shipment size* and the *total amount of hazmat* aboard an aircraft are limited to relatively small amounts, the regulated limits for individual shipments on all-cargo flights are typically several times larger, and total tonnage aboard the aircraft is generally not limited. Thus, a relatively small number of large, all-cargo flight hazmat shipments could result in large tonnage figures and in what might appear to be a relatively large average shipment size.<sup>4</sup>

---

<sup>2</sup> These companies' names, hazmat traffic levels, and respective air cargo market shares -- for confidentiality reasons -- are not identified herein.

<sup>3</sup> Office of Technology Assessment, Transportation of Hazardous Materials, (Washington, D.C., 1986), p 4.

<sup>4</sup> It is also possible that the 8% figure (hazmat air cargo/total air cargo) is too high, at least in terms of 1997 air cargo traffic levels. That OTA figure was based on the 1977 Commodity Flow Survey data. The 1977 CFS data had several shortcomings, including incomplete air traffic data.

**Appendix Table E1: HAZMAT TONNAGE BY AIR**

CATEGORY	MEASURE
1997 System CARGO Revenue Ton-miles (RTM) for Passenger and All-Cargo Carriers, both International and Domestic.	25,320,736,000
An estimated 8% of RTM = hazmat RTM --a	2,025,658,880
Domestic hazmat RTM for Passenger Carriers = --b	262,400,000
Avg trip length (miles) for Dom. hazmat Pass Carriers = --b	772
Annual Tons hazmat = RTM/ trip length or 262.4m/772 = --b	339,896
Domestic hazmat RTM for Cargo Carriers = --b	679,300,000
Avg trip length (miles) for Dom. hazmat Cargo Carriers = --b	597
Annual Tons hazmat = RTM/ trip length or 679.3m/597 = --b	1,137,856
Total Annual Domestic Tons of Hazmat = 339,896 + 1,137,856	1,477,752
If annual figure is divided by 365 days, daily tons =	<b>4,049</b>

-- a Figure used by FAA, from Office of Technology Assessment (OTA) 1985 report, "Transportation of Hazardous Materials," p. 55, citing the Bureau of Census 1977 Commodity Transportation Survey (CTS) that 8% of all air cargo tonnage is hazmat. The 1993 Commodity Flow Survey (CFS) provides negligible data on air cargo hazmat tonnage.

-- b FAA, Office of Aviation Policy and Plans, based on 1997 Bureau of Transportation Statistics (BTS) data.