United States

Hazardous Materials

1997

Issued December 1999

EC97TCF-US(HM)

1997 Economic Census

Transportation

1997 Commodity Flow Survey

U.S. Department of Transportation
BUREAU OF TRANSPORTATION STATISTICS

U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU

ACKNOWLEDGMENTS

This report was prepared in the Service Sector Statistics Division under the direction of **Thomas E. Zabelsky,** Assistant Chief for Current Service and Transportation Programs. Planning, implementation, and compiling of this report were under the supervision of **John L. Fowler,** Chief, Commodity Flow Survey Branch, assisted by **Wanda Dougherty, Debra Corbett, Bruce Dembroski, Shirley Gray, Michael Jones, Stephanie Kelley, Mabel Ocasio, Bonnie Opalko, Joyce Price, Barbara Selinske, Eli Serrano,** and **Michael Sprung.** Sample design and statistical methodology were developed under the general direction of **Howard Hogan** and **Carl A. Konschnik,** former Assistant Chiefs, and **Ruth E. Detlefsen,** current Assistant Chief, Research and Methodology. Sample design and estimation were under the supervision of **Patrick Cantwell,** former Chief, and **Jock Black,** current Chief, Program Research and Development Branch, assisted by **William C. Davie Jr., David L. Kinyon, Jacklyn R. Jonas,** and **M. Cristina Cruz.** Frame construction, sample control, imputation, and quality control procedures were developed under the supervision of **Carol King,** Chief, Statistical Methods Branch, assisted by **James Hunt.**

The processing system and computer programs were developed and implemented by the OAO programming group, led by **Jacques Wilmore** and assisted by **Harold N. Bobbitt** and **Robert J. Jeffrey. Steve G. McCraith,** Chief, Quinquennial Surveys Branch, Economic Statistical Methods and Programming Division and **Joseph F. Keehan** provided general support.

Coordination of data collection efforts was under the direction of **Judith N. Petty,** Chief, National Processing Center, assisted by **Matthew Aulbach, Linda Broadus, Grant Goodwin, Carlene Bottorff, Teresa Branstetter,** and **Jack Miller.**

The staff of the Administrative and Customer Services Division, **Walter C. Odom,** Chief, performed planning, design, composition, editorial review, and printing planning and procurement for the publications, Internet products, and report forms. **Margaret A. Smith** provided publication coordination and editing.

We also acknowledge the contributions of the following Department of Transportation (DOT) representatives in the overall planning and design of the survey: **Rolf Schmitt,** Associate Director for Transportation Studies, Bureau of Transportation Statistics, assisted by **Susan Lapham, Russ Capelle, Ronald J. Duych,** and **Felix Ammah-Tagoe.**

The Oak Ridge National Laboratory's Center for Transportation Analysis, under the former and current direction of **Mike Bronzini** and **David Greene,** respectively, provided all mileage data for this report, using its transportation network modeling system, under the supervision of **Frank Southworth** and assisted by **Shih-Miao Chin, Bruce Peterson, Jane Rollow,** and **Angela Gibson.**

Special acknowledgment is also due to the many businesses whose cooperation was essential to the publication of these data.

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Introduction to the Economic Census

PURPOSES AND USES OF THE ECONOMIC CENSUS

The economic census is the major source of facts about the structure and functioning of the Nation's economy. It provides essential information for government, business, industry, and the general public. Title 13 of the United States Code (Sections 131, 191, and 224) directs the Census Bureau to take the economic census every 5 years, covering years ending in 2 and 7.

The economic census furnishes an important part of the framework for such composite measures as the gross domestic product estimates, input/output measures, production and price indexes, and other statistical series that measure short-term changes in economic conditions. Specific uses of economic census data include the following:

- Policymaking agencies of the Federal Government use the data to monitor economic activity and assess the effectiveness of policies.
- State and local governments use the data to assess business activities and tax bases within their jurisdictions and to develop programs to attract business.
- Trade associations study trends in their own and competing industries, which allows them to keep their members informed of market changes.
- Individual businesses use the data to locate potential markets and to analyze their own production and sales performance relative to industry or area averages.

BASIS OF REPORTING

The economic census is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each store, factory, shop, or other location. Each establishment is assigned a separate industry classification based on its primary activity and not that of its parent company.

AVAILABILITY OF ADDITIONAL DATA

Reports in Print and Electronic Media

All results of the 1997 Economic Census are available on the Census Bureau Internet site (www.census.gov) and on compact discs (CD-ROM) for sale by the Census Bureau. Unlike previous censuses, only selected highlights are published in printed reports. For more information, including a description of electronic and printed reports being issued, see the Internet site, or write to U.S. Census Bureau, Washington, DC 20233-8300, or call Customer Services at 301-457-4100.

HISTORICAL INFORMATION

The economic census has been taken as an integrated program at 5-year intervals since 1967 and before that for 1954, 1958, and 1963. Prior to that time, individual components of the economic census were taken separately at varying intervals.

The economic census traces its beginnings to the 1810 Decennial Census, when questions on manufacturing were included with those for population. Coverage of economic activities was expanded for the 1840 Decennial Census and subsequent censuses to include mining and some commercial activities. The 1905 Manufactures Census was the first time a census was taken apart from the regular decennial population census. Censuses covering retail and wholesale trade and construction industries were added in 1930, as were some covering service trades in 1933. Censuses of construction, manufacturing, and the other business service censuses were suspended during World War II.

The 1954 Economic Census was the first census to be fully integrated: providing comparable census data across economic sectors, using consistent time periods, concepts, definitions, classifications, and reporting units. It was the first census to be taken by mail, using lists of firms provided by the administrative records of other Federal agencies. Since 1963, administrative records also have been used to provide basic statistics for very small firms, reducing or eliminating the need to send them census questionnaires.

The range of industries covered in the economic censuses expanded between 1967 and 1992. The census of construction industries began on a regular basis in 1967, and the scope of service industries, introduced in 1933, was broadened in 1967, 1977, and 1987. While a few transportation industries were covered as early as 1963, it was not until 1992 that the census broadened to include all of transportation, communications, and utilities. Also new for 1992 was coverage of financial, insurance, and real estate industries. With these additions, the economic census and the separate census of governments and census of agriculture collectively covered roughly 98 percent of all economic activity.

Printed statistical reports from the 1992 and earlier censuses provide historical figures for the study of long-term time series and are available in some large libraries. All of the census reports printed since 1967 are still available for sale on microfiche from the Census Bureau. CD-ROMs issued from the 1987 and 1992 Economic Censuses contain databases including nearly all data published in print, plus additional statistics, such as ZIP Code statistics, published only on CD-ROM.

SOURCES FOR MORE INFORMATION

More information about the scope, coverage, classification system, data items, and publications for each of the economic censuses and related surveys is published in the *Guide to the 1997 Economic Census and Related Statistics* at www.census.gov/econguide. More information on the methodology, procedures, and history of the censuses will be published in the *History of the 1997 Economic Census* at www.census.gov/econ/www/history.html.

1997 Commodity Flow Survey

GENERAL

The 1997 Commodity Flow Survey (CFS) is undertaken through a partnership between the Bureau of the Census, U.S. Department of Commerce, and the Bureau of Transportation Statistics, U.S. Department of Transportation. This survey produces data on the movement of goods in the United States. It provides information on commodities shipped, their value, weight, and mode of transportation, as well as the origin and destination of shipments of manufacturing, mining, wholesale, and selected retail establishments. The CFS was last conducted in 1993. See the Comparability With the 1993 Commodity Flow Survey table (Appendix A) for a comparison between the 1997 and 1993 surveys. The data from the CFS are used by public policy analysts and for transportation planning and decision-making to assess the demand for transportation facilities and services, energy use, and safety risk and environmental concerns.

This report presents data on hazardous material shipment characteristics. Additional reports will include data for the United States, census regions, divisions, states and selected metropolitan areas, as well as selected data on exports.

HAZARDOUS MATERIAL SHIPMENTS

The U.S. Department of Transportation defines hazardous materials as belonging to one of nine hazard classes, as shown below.

Hazardous Material Classes

- Class 1 - Explosives
- Class 2 - Gases
- Class 3 - Flammable liquids
- Class 4 - Flammable solids
- Class 5 - Oxidizers and Organic Peroxides
- Class 6 - Toxic Materials and Infectious Substances
- Class 7 - Radioactive Materials
- Class 8 - Corrosive Materials
- Class 9 - Miscellaneous Dangerous Goods

As part of the shipment characteristics collected in the 1997 CFS, we asked respondents to provide the four-digit United Nations (UN) or North American (NA) identification number. For the 1997 CFS data we used the UN/NA code to (1) identify the shipment as hazardous material, and (2) assign the shipment to one of the nine hazardous material classes for purposes of producing summary tabulations.

The data from the 1997 CFS for hazardous material shipments are aggregated to these nine classes, as well as their subcategories known as divisions. Data are also shown for selected UN/NA codes.

Please note that because of the industry coverage and shipment definitions of the CFS, certain hazardous materials such as infectious substances or radioactive wastes were not well represented in the CFS data.

The UN classification system has been adopted for worldwide use by the United Nations Committee of Experts on the Transport of Dangerous Goods. The UN system was incorporated into the Federal Code of Regulations by the U.S. Department of Transportation for domestic transportation in 1980. The NA system is a parallel hazard identification system used in North American when transporting hazardous materials that are not assigned a UN number or when transporting under specific North American exceptions. For additional information about the UN or NA codes, please refer to Title 49, Code of Federal Regulations, Part 172.101 or contact the Hazardous Materials Regulation Center, Research and Special Projects Administration, U.S. Department of Transportation, at telephone number 800-467-4922 or see the Internet site *http://hazmat.dot.gov.*

INDUSTRY COVERAGE

The 1997 CFS covers business establishments in mining, manufacturing, wholesale trade, and selected retail industries. The survey also covers selected auxiliary establishments (e.g., warehouses) of in-scope multiunit and retail companies. The survey coverage excludes establishments classified as farms, forestry, fisheries, governments, construction, transportation, foreign establishments, services, and most establishments in retail.

The industries covered, as defined in the 1987 Standard Industrial Classification Manual (SIC), are listed in the following table:

SIC code	Title
10, ex. 108	Metal mining (excluding metal mining services)
12, ex. 124	Coal mining (excluding coal mining services)
13	Oil and gas extraction[1]
14, ex. 148	Mining and quarrying of nonmetallic minerals, except fuels (excluding nonmetallic minerals services)
20	Food and kindred products
21	Tobacco products
22	Textile mill products
23	Apparel and other finished products made from fabrics and similar materials
24	Lumber and wood products, except furniture
25	Furniture and fixtures
26	Paper and allied products
27, ex. 279	Printing, publishing, and allied industries (excluding service industries for the printing trade)
28	Chemicals and allied products
29	Petroleum refining and related industries
30	Rubber and miscellaneous plastics products
31	Leather and leather products
32	Stone, clay, glass, and concrete products
33	Primary metal industries
34	Fabricated metal products, except machinery and transportation equipment
35	Industrial and commercial machinery and computer equipment
36	Electronic and other electrical equipment and components, except computer equipment
37	Transportation equipment
38	Measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks
39	Miscellaneous manufacturing industries
50	Wholesale trade—durable goods
51	Wholesale trade—nondurable goods
596	Catalog and mail-order houses

[1]We included establishments classified in SIC 13, Oil and Gas Extraction, in the initial coverage of the 1997 CFS. However, because of unresolved industry-wide reporting issues, we have removed shipments from these establishments from our 1997 CFS tabulations. The data collected from these establishments will be used as input to a special report at a later date.

Similarly, because establishments in SIC 13 are responsible for the overwhelming number of shipments classified in SCTG 16, Crude Petroleum, we have removed all shipments with SCTG 16 from the 1997 CFS publication results.

SHIPMENT COVERAGE

The CFS captures data on shipments originating from selected types of business establishments located in the 50 states and the District of Columbia. The data do not cover shipments originating from business establishments located in Puerto Rico and other U.S. possessions and territories. Shipments traversing the U.S. from a foreign location to another foreign location (e.g., from Canada to Mexico) are not included, nor are shipments from a foreign location to a U.S. location. Imported products are included in the CFS at the point that they left the importer's domestic location for shipment to another location. Shipments that are shipped through a foreign territory with both the origin and destination in the U.S. are included in the CFS data. The mileages calculated for these shipments exclude the international segments (e.g., shipments from New York to Michigan through Canada do not include any mileages for Canada). Export shipments are included, with the domestic destination defined as the port of exit from the U.S.

The "Industry Coverage" section of the text lists the SIC groups covered by the CFS. Other industry areas that are not covered, but may have significant shipping activity, include agriculture, government, and retail (other than warehouses and SIC 5961, Catalog and Mail-Order Houses). For agriculture specifically, this means that the CFS did not cover shipments of agricultural products from the farm site to the processing centers or terminal elevators (most likely short-distance local movements), but does cover the shipments of these products from the initial processing centers or terminal elevators onward.

MILEAGE CALCULATIONS

To compute shipment mileages for the 1997 CFS, The Center for Transportation Analysis (CTA) at Oak Ridge National Laboratory (ORNL) developed an integrated, intermodal transportation network modeling system. A secure data site was setup at ORNL to process census-supplied files containing data elements for individual CFS shipment records. Each record contained the ZIP Code of shipment origin and destination, and the mode or mode sequence reported. Each record also contained information on the type of commodity moved, its weight, dollar value and whether containerized or a hazardous material. Export shipments were also identified on the records, along with data on U.S. port of exit and foreign destination city and country. Encrypted data files were transmitted and returned from ORNL after processing, with turnaround of most files on a week-by-week basis. In this manner many shipment-specific data problems encountered by ORNL in their routing procedures were reported back to census in a timely fashion, allowing census to call back some shippers and thereby confirm, correct, or recover missing or otherwise unusable data. The ORNL system computed mileages, by mode, for all single modes and for any reported multimodal sequence. This was done for any origin-destination pair of domestic ZIP Code locations, and for any internal ZIP Code of origin, via U.S. export port, to foreign (export) destination. Mileages between origin-destination ZIP Code centroids were computed by finding the minimum impedance path over mathematical representations of the highway, rail, waterway, air, and pipeline

networks and then summing the lengths of individual links on these paths. Impedance is computed as a weighted combination of distance, time, and cost factors.

The ORNL multimodal network database is composed of individual modal-specific networks representing each of the major transportation modes—highway, rail, waterway, air, and pipeline. The links of these specific modal networks are the representation of line-haul transportation facilities. The nodes represent intersections and interchanges, and the access points to the transportation network. To simulate local access, test links are created from each five-digit ZIP Code centroid to nearby nodes on the network. For the truck network, local access is assumed to exist everywhere. For the other modes this is not true. Before any test links are created for these modes, a search procedure is used to determine if and where such networks are most likely to provide access to the ZIP Code. For shipments involving more than one mode, such as truck-rail or rail-water shipments, intermodal transfer links are added to the network database for the purpose of connecting the individual modal networks together for routing purposes. An intermodal terminals database and a number of terminal transfer models were developed at ORNL to identify likely transfer points for different classes of freight. A measure of link impedance was calculated for each access, line-haul, and intermodal transfer link traversed by a shipment. These impedances were mode specific and are based on various link characteristics. For example, the set of link characteristics for the highway network included speed impacting factors, such as the presence of divided or undivided roadway, the degree of access control, rural or urban setting, type of pavement, number of lanes, degree of urban congestion, and length of the link. Link impedance measures are also assigned to the local access links. Intermodal transfer link impedances are estimated in terms of the time it takes to move goods through such a transfer. In the case of rail and air freight, intercarrier transfer penalties are also considered in order to obtain proper route selections. A minimum path algorithm is used to find the minimum impedance path between a shipment's origin ZIP Code centroid and destination ZIP Code centroid. The cumulation length of the local access plus line-haul links on this path provides the estimated shipment distance. When rail was involved these shipment distances may be averaged over more than one path between an origin-destination pair.

Mileage Data for Pipeline Shipments

In the tables, we do not show ton-miles or average miles per shipment for pipeline shipments. For most of these shipments, the respondents reported the shipment destination as a pipeline facility on the main pipeline network. Therefore, for the majority of these shipments, the resulting mileage represented only the access distance through feeder pipelines to the main pipeline network, and not the actual distance through the main pipeline network. Pipeline shipments are included in the U.S. totals for ton-miles and average miles per shipment.

DISCLOSURE RULES

In accordance with Federal law governing Census Bureau reports, no data are published that would disclose the operations of an individual firm or establishment.

EXPLANATION OF TERMS

Average miles per shipment. For the 1993 CFS, we excluded shipments of STCC 27, Printed Matter, from our calculation of average miles per shipment. We made this decision after determining that respondents in the 1993 CFS shipping newspapers, magazines, catalogs, etc., had used widely varying definitions of the term "shipment."

For the 1997 CFS, we made numerous efforts throughout our data collection and editing to produce consistent results from establishments shipping SCTG 29, Printed Products. As a result, we have included printed products in the average miles per shipment calculations for the 1997 CFS.

Commodity. Products that an establishment produces, sells, or distributes. This does not include items that are considered as excess or byproducts of the establishment's operation. Respondents reported the description and the five-digit SCTG code for the major commodity contained in the shipment, defined as the commodity with the greatest weight in the total shipment.

Distance shipped. In some tables, shipment data are presented for various "distance shipped" intervals. Shipments were categorized into these "distance shipped" intervals based on the great circle distance between their origin and destination ZIP Code centroids. All other distance-related data in this and other tables (i.e., ton-miles and average miles per shipment) are based on the mileage calculations produced by Oak Ridge National Laboratories. (See the "Mileage Calculations" section for more details.)

Great circle distance. The shortest distance between two points on the earth's surface.

Mode of transportation. The type of transportation used for moving the shipment to its domestic destination. For exports, the domestic destination was the port of exit.

Mode Definitions

In the instructions to the respondent, we defined the possible modes as follows:

1. **Parcel delivery/courier/U.S. Postal Service.** Delivery services, parcels, packages, and other small shipments that typically weigh less than 100 pounds. Includes bus parcel delivery service.

2. **Private truck.** Trucks operated by a temporary or permanent employee of an establishment or the buyer/receiver of the shipment.

3. **For-hire truck.** Trucks that carry freight for a fee collected from the shipper, recipient of the shipment, or an arranger of the transportation.

4. **Railroad.** Any common carrier or private railroad.

5. **Shallow draft vessels.** Barges, ships, or ferries operating primarily on rivers and canals; in harbors, the Great Lakes, the Saint Lawrence Seaway; the Intracoastal Waterway, the Inside Passage to Alaska, major bays and inlets; or in the ocean close to the shoreline.

6. **Deep draft vessel.** Barges, ships, or ferries operating primarily in the open ocean. Shipping on the Great Lakes and the Saint Lawrence Seaway is classified with shallow draft vessels.

7. **Pipeline.** Movements of oil, petroleum, gas, slurry, etc., through pipelines that extend to other establishments or locations beyond the shipper's establishment. Aqueducts for the movement of water are not included.

8. **Air.** Commercial or private aircraft, and all air service for shipments that typically weigh more than 100 pounds. Includes air freight and air express.

9. **Other mode.** Any mode not listed above.

10. **Unknown.** The shipment was not carried by a parcel delivery/courier/U.S. Postal Service, and the respondent could not determine what mode of transportation was used.

In the tables, we have used additional terms for mode, which we define as follows:

1. **Air (includes truck and air).** Shipments that used air or a combination of truck and air.

2. **Single modes.** Shipments using only one of the above-listed modes, except parcel or other and unknown.

3. **Multiple modes.** Parcel, U.S. Postal Service or courier shipments or shipments for which two or more of the following modes of transportation were used:

   Private truck
   For-hire truck
   Rail
   Shallow draft vessel
   Deep draft vessel
   Pipeline

   We did not allow for multiple modes in combination with "parcel, U.S. Postal Service or courier," "unknown," or "other." By their nature, these shipments may already include various kinds of multiple-mode activity. For example, if the respondent reported a shipment's mode of transportation as parcel and air, we treated the shipment as parcel only.

4. **Other multiple modes.** Shipments using any other mode combinations not specifically listed in the tables.

5. **Other and unknown modes.** Shipments for which modes were not reported, or were reported by the respondent as "Other" or "Unknown."

6. **Truck.** Shipments using for-hire truck only, private truck only, or a combination of for-hire truck and private truck.

7. **Water.** Shipments using shallow draft vessel only, deep draft vessel only, or Great Lakes vessel only. Combinations of these modes, such as shallow draft vessel and Great Lakes vessel are included as "Other multiple modes."

8. **Great Lakes.** In the tables in this publication, "Great Lakes" appears as a single mode. ORNL's transportation network and mileage calculation system allowed for separate mileage calculations for Great Lakes between the origin and destination ZIP Codes (see the "Mileage Calculations" section for more details).

Other Definitions and Terms

Shipment. A shipment (or delivery) is an individual movement of commodities from an establishment to a customer or to another location of the originating company (including a warehouse, distribution center, retail or wholesale outlet). A shipment uses one or more modes of transportation including parcel delivery, U.S. Postal Service, courier, private truck, for-hire truck, rail, water, pipeline, air, and other modes.

Standard Classification of Transported Goods (SCTG). The commodities shown in this report are classified using the SCTG coding system. The SCTG coding system was developed jointly by agencies of the United States and Canadian governments based on the Harmonized System to address statistical needs in regard to products transported.

Ton-miles. The weight times the mileage for a shipment. The respondents reported shipment weight in pounds, as described below. Mileage was calculated as the distance between the shipment origin and destination ZIP Codes. For shipments by truck, rail, or shallow draft vessels, the mileage excludes international segments. For example, mileages from Alaska to the continental United States exclude any mileages through Canada (see the "Mileage Calculations" section for more details). Aggregated pound-miles were converted to ton-miles. The ton-miles data are displayed in millions.

Tons shipped. The total weight of the entire shipment. Respondents reported the weight in pounds. Aggregated pounds were converted to short-tons (2,000 pounds). The tons data are displayed in thousands.

Total modal activity. The overall activity (e.g., ton-miles) of a specific mode of transportation, whether used in a single-mode shipment, or as part of a multiple-mode shipment. For example, the total modal activity for private truck is the total ton-miles carried by private truck in single-mode shipments, combined with the total ton-miles carried by private truck in all multiple-mode shipments that include private truck (private truck and for-hire truck, private truck and rail, private truck and air, etc.)

Value of shipments. The dollar value of the entire shipment. This was defined as the net selling value, f.o.b. plant, exclusive of freight charges and excise taxes. The value data are displayed in millions of dollars.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in the tables for this publication:

D	Denotes figures withheld to avoid disclosing data for individual companies.
–	Represents zero or less than 1 unit of measure.
S	Data do not meet publication standards due to high sampling variability or other reasons.
CFS	Commodity Flow Survey.
lb	Pounds.
n.e.c.	Not elsewhere classified.
NA	Not applicable.
n.o.s.	Not otherwise specified.

OTHER TRANSPORTATION DATA

Users of transportation data may be especially interested in the following reports:

Economic Census: Transportation Sector covers establishments that provide passenger and freight transportation to the general public, government, or other businesses.

Published data include kind of business, geographic location, total operating revenue, annual and first quarter payroll, and number of employees for pay period including March 12.

Vehicle Inventory and Use Survey covers state and U.S. level statistics on the physical and operational characteristics of the Nation's truck, van, minivan, and sport utility vehicle population. Some of the types of data collected include number of vehicles, major use, body type, annual miles, model year, vehicle size, fuel type, operator classification, engine size, range of operation, weeks operated, products carried, and hazardous materials carried. This survey shows comparative statistics reflecting percent changes in number of vehicles between 1997 and 1992 for most characteristics.

Transportation Annual Survey covers firms with paid employees that provide commercial motor freight transportation and public warehousing services. Data collected include operating revenue and operating revenue by source, total expenses percentage of motor carrier freight revenue by commodity type, size of shipments handled, length of haul, and vehicle fleet inventory.

All results of the 1997 Economic Census are available on the Census Bureau Internet site *http://www.census.gov* and on compact discs (CD-ROM).

For more information on any Census Bureau product, including a description of electronic and printed reports being issued, see the web site or call Customer Services at 301-457-4100.

Table 1. **Hazardous Material Shipment Characteristics by Mode of Transportation for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
All modes	**466 407**	**100.0**	**1 565 196**	**100.0**	**263 809**	**100.0**	**113**
Single modes	**452 727**	**97.1**	**1 541 716**	**98.5**	**258 912**	**98.1**	**95**
Truck[1]	298 173	63.9	869 796	55.6	74 939	28.4	73
For-hire truck	134 308	28.8	336 363	21.5	45 234	17.1	260
Private truck	160 693	34.5	522 666	33.4	28 847	10.9	35
Rail	33 340	7.1	96 626	6.2	74 711	28.3	853
Water	26 951	5.8	143 152	9.1	68 212	25.9	S
Air (includes truck and air)	8 558	1.8	66	–	95	–	1 462
Pipeline[2]	85 706	18.4	432 075	27.6	S	S	S
Multiple modes	**5 735**	**1.2**	**6 022**	**.4**	**3 061**	**1.2**	**645**
Parcel, U.S. Postal Service or courier	2 874	.6	143	–	78	–	697
Other multiple modes	2 861	.6	5 879	.4	2 982	1.1	S
Other and unknown modes	**7 945**	**1.7**	**17 459**	**1.1**	**1 837**	**.7**	**38**

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons. Some unpublished estimates can be derived from other data published in this table. However, figures obtained in this manner are subject to these same limitations.

[1]"Truck" as a single mode includes shipments which went by private truck only, for-hire truck only, or a combination of private truck and for-hire truck.
[2]CFS data for pipeline exclude most shipments of crude oil. See "Mileage Calculations" section for details of CFS coverage.

Table 2. **Hazardous Material Shipment Characteristics by Hazard Class for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class and description	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
Total	**466 407**	**100.0**	**1 565 196**	**100.0**	**263 809**	**100.0**	**113**
Class 1, Explosives	4 342	.9	1 517	.1	S	S	549
Class 2, Gases	40 884	8.8	115 021	7.3	21 842	8.3	66
Class 3, Flammable liquids	335 619	72.0	1 264 281	80.8	159 979	60.6	73
Class 4, Flammable solids	3 898	.8	11 804	.8	9 618	3.6	838
Class 5, Oxidizers and organic peroxides	4 485	1.0	9 239	.6	4 471	1.7	193
Class 6, Toxic (poison)	10 086	2.2	6 366	.4	2 824	1.1	402
Class 7, Radioactive materials	2 722	.6	87	–	48	–	445
Class 8, Corrosive materials	40 423	8.7	91 564	5.9	41 161	15.6	201
Class 9, Miscellaneous dangerous goods	23 946	5.1	65 317	4.2	22 727	8.6	323

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Table 3. **Hazardous Material Shipment Characteristics for Selected UN Numbers for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**466 407**	**100.0**	**1 565 196**	**100.0**	**263 809**	**100.0**	**113**
1005	Ammonia, anhydrous	2 426	.5	12 664	.8	3 877	1.5	74
1073	Oxygen, refrigerated liquid	470	.1	4 892	.3	445	.2	41
1075	Petroleum gases	13 092	2.8	40 780	2.6	5 025	1.9	35
1202	Gas oil, diesel fuel, heating oil, light	11 696	2.5	68 152	4.4	4 135	1.6	28
1203	Gasoline	190 583	40.9	786 109	50.2	90 537	34.3	47
1223	Kerosene	2 374	.5	12 097	.8	305	.1	23
1230	Methanol	1 970	.4	S	S	1 825	.7	280
1268	Petroleum distillates, n.o.s.	2 954	.6	8 848	.6	2 758	1.0	206
1805	Phosphoric acid	2 095	.4	4 836	.3	3 242	1.2	331
1824	Sodium hydroxide solution	5 057	1.1	27 409	1.8	13 581	5.1	270
1830	Sulfuric acid	1 210	.3	22 100	1.4	5 386	2.0	184
1863	Fuel, aviation, turbine engine	9 429	2.0	49 722	3.2	8 284	3.1	90
1962	Ethylene, compressed	3 267	.7	6 953	.4	216	–	222
1977	Nitrogen, refrigerated liquid	946	.2	10 021	.6	1 155	.4	81
1993	Flammable liquids, n.o.s.	62 210	13.3	282 035	18.0	29 576	11.2	41
2215	Maleic anhydride	S	S	S	S	S	S	925
2448	Sulfur, molten	338	–	9 371	.6	8 174	3.1	516
3077	Environmentally hazardous substance, solid, n.o.s.	3 751	.8	5 862	.4	2 816	1.1	286
3082	Environmentally hazardous substance, liquid, n.o.s.	6 852	1.5	7 585	.5	4 777	1.8	402
3257	Elevated temperature liquid, n.o.s.	6 150	1.3	49 697	3.2	14 236	5.4	205
	All other	136 115	29.2	142 678	9.1	58 338	22.1	193

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[1]UN numbers were selected based on estimated tons without regard to sampling variability.

Table 4. **Hazardous Versus Nonhazardous Material Shipment Characteristics by Mode of Transportation for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Mode of transportation	Tons					Ton-miles				
		Hazardous		Nonhazardous			Hazardous		Nonhazardous	
	Total (thousands)	Number (thousands)	Percent	Number (thousands)	Percent	Total (millions)	Number (millions)	Percent	Number (millions)	Percent
All modes	**11 089 733**	**1 565 196**	**14.1**	**9 524 537**	**85.9**	**2 661 363**	**263 809**	**9.9**	**2 397 554**	**90.1**
Single modes	**10 436 538**	**1 541 716**	**14.8**	**8 894 823**	**85.2**	**2 383 473**	**258 912**	**10.9**	**2 124 560**	**89.1**
Truck[1]	7 700 675	869 796	11.3	6 830 879	88.7	1 023 506	74 939	7.3	948 567	92.7
For-hire truck	3 402 605	336 363	9.9	3 066 242	90.1	741 117	45 234	6.1	695 884	93.9
Private truck	4 137 294	522 666	12.6	3 614 628	87.4	268 592	28 847	10.7	239 745	89.3
Rail	1 549 817	96 626	6.2	1 453 191	93.8	1 022 547	74 711	7.3	947 837	92.7
Water	563 369	143 152	25.4	420 217	74.6	261 747	68 212	26.1	193 534	73.9
Air (includes truck and air)	4 475	66	1.5	4 408	98.5	6 233	95	1.5	6 139	98.5
Pipeline[2]	618 202	432 075	69.9	186 127	30.1	S	S	S	S	S
Multiple modes	**216 673**	**6 022**	**2.8**	**210 652**	**97.2**	**204 514**	**3 061**	**1.5**	**201 454**	**98.5**
Parcel, U.S. Postal Service or courier	23 689	143	.6	23 547	99.4	17 994	78	.4	17 916	99.6
Other multiple modes	192 984	5 879	3.0	187 105	97.0	186 520	2 982	1.6	183 538	98.4
Other and unknown modes	**436 521**	**17 459**	**4.0**	**419 063**	**96.0**	**73 376**	**1 837**	**2.5**	**71 539**	**97.5**

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[1]"Truck" as a single mode includes shipments which went by private truck only, for-hire truck only, or a combination of private truck and for-hire truck.
[2]CFS data for pipeline exclude most shipments of crude oil. See "Mileage Calculations" section for details of CFS coverage.

Table 5a. **Hazardous Material Shipment Characteristics by Selected State of Origin: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

State of origin	Value		Tons[1]		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
Total	**466 407**	**100.0**	**1 565 196**	**100.0**	**263 809**	**100.0**	**113**
Texas	91 960	19.7	304 667	19.5	66 409	25.2	133
Louisiana	31 816	6.8	191 399	12.2	58 684	22.2	S
California	45 679	9.8	135 212	8.6	8 460	3.2	134
Illinois	23 538	5.0	87 585	5.6	9 999	3.8	S
Pennsylvania	17 676	3.8	56 505	3.6	3 549	1.3	57
Georgia	16 015	3.4	53 035	3.4	5 438	2.1	125
Ohio	19 174	4.1	51 212	3.3	4 463	1.7	98
Florida	13 802	3.0	49 777	3.2	5 014	1.9	62
New Jersey	16 153	3.5	48 685	3.1	S	S	165
Michigan	15 892	3.4	47 061	3.0	2 770	1.1	51
Washington	16 097	3.5	33 646	2.1	8 733	3.3	S
Minnesota	6 938	1.5	32 371	2.1	S	S	103
Indiana	8 154	1.7	31 979	2.0	3 347	1.3	51
New York	10 271	2.2	27 971	1.8	2 809	1.1	202
Wisconsin	8 126	1.7	26 487	1.7	2 536	1.0	87
North Carolina	8 926	1.9	25 879	1.7	2 748	1.0	59
Mississippi	8 496	1.8	24 781	1.6	4 703	1.8	161
Virginia	6 497	1.4	23 605	1.5	2 307	.9	47
Alabama	6 308	1.4	22 914	1.5	3 793	1.4	72
Tennessee	8 624	1.8	21 239	1.4	2 188	.8	142
All other states	86 264	18.5	269 186	17.2	48 050	18.2	147

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[1]Selected states are sorted in descending order of estimated tons without regard to sampling variability.

Table 5b. **Hazardous Material Shipment Characteristics by Selected State of Destination: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

State of destination	Value		Tons[1]		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
Total	**466 407**	**100.0**	**1 565 196**	**100.0**	**263 809**	**100.0**	**113**
Texas	79 158	17.0	283 043	18.1	34 662	13.1	135
California	51 567	11.1	139 615	8.9	16 249	6.2	142
Louisiana	22 015	4.7	119 160	7.6	6 142	2.3	75
Florida	19 842	4.3	81 766	5.2	29 716	11.3	146
Illinois	21 057	4.5	76 709	4.9	12 747	4.8	78
Michigan	23 116	5.0	59 689	3.8	15 392	5.8	117
Pennsylvania	17 328	3.7	59 321	3.8	5 718	2.2	64
Georgia	14 916	3.2	57 414	3.7	10 804	4.1	119
Ohio	18 154	3.9	53 846	3.4	6 589	2.5	87
New Jersey	13 336	2.9	40 890	2.6	8 408	3.2	97
Indiana	10 703	2.3	39 225	2.5	4 420	1.7	82
North Carolina	9 597	2.1	31 962	2.0	12 440	4.7	94
New York	12 531	2.7	31 601	2.0	3 273	1.2	133
Washington	9 761	2.1	30 525	2.0	6 850	2.6	S
Tennessee	10 401	2.2	29 709	1.9	7 351	2.8	133
Mississippi	7 233	1.6	28 323	1.8	3 507	1.3	120
Minnesota	6 800	1.5	26 570	1.7	3 620	1.4	S
Wisconsin	7 351	1.6	24 935	1.6	2 836	1.1	92
Alabama	7 537	1.6	22 819	1.5	2 962	1.1	97
Virginia	6 484	1.4	22 798	1.5	3 992	1.5	S
All other states	97 521	20.9	305 274	19.5	66 133	25.1	122

– Represents data cell equal to zero or less than 1 unit of measure.
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S Data do not meet publication standards because of high sampling variability or other reasons. Some unpublished estimates can be derived from other data published in this table. However, figures obtained in this manner are subject to these same limitations.

[1]Selected states are sorted in descending order of estimated tons without regard to sampling variability.

Table 6a. Hazardous Material Shipment Characteristics by Hazard Class and Mode of Transportation: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
HAZARD CLASS 1, EXPLOSIVES							
All modes	**4 342**	**100.0**	**1 517**	**100.0**	**S**	**S**	**549**
Single modes	**4 077**	**93.9**	**1 498**	**98.8**	**S**	**S**	**488**
Truck[1]	3 219	74.1	1 089	71.8	385	33.8	381
For-hire truck	2 392	55.1	271	17.8	176	15.4	925
Private truck	822	18.9	818	53.9	S	S	193
Rail	686	15.8	S	S	S	S	1 706
Water	–	–	–	–	–	–	–
Air (includes truck and air)	172	4.0	1	–	1	–	1 987
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**186**	**4.3**	**4**	**.3**	**2**	**.2**	**674**
Parcel, U.S. Postal Service or courier	186	4.3	3	.2	2	.2	674
Other multiple modes	S	S	S	S	S	S	518
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**936**
HAZARD CLASS 2, GASES							
All modes	**40 884**	**100.0**	**115 021**	**100.0**	**21 842**	**100.0**	**66**
Single modes	**39 225**	**95.9**	**111 107**	**96.6**	**21 440**	**98.2**	**57**
Truck[1]	21 892	53.5	54 393	47.3	6 448	29.5	50
For-hire truck	9 077	22.2	17 945	15.6	3 170	14.5	404
Private truck	12 720	31.1	36 122	31.4	3 209	14.7	27
Rail	5 162	12.6	15 203	13.2	11 447	52.4	749
Water	1 293	3.2	5 135	4.5	1 909	8.7	717
Air (includes truck and air)	477	1.2	4	–	S	S	1 531
Pipeline[2]	10 402	25.4	36 372	31.6	S	S	S
Multiple modes	**404**	**1.0**	**331**	**.3**	**100**	**.5**	**477**
Parcel, U.S. Postal Service or courier	249	.6	14	–	S	S	614
Other multiple modes	155	.4	317	.3	88	.4	S
Other and unknown modes	**1 255**	**3.1**	**S**	**S**	**301**	**1.4**	**S**
HAZARD CLASS 3, FLAMMABLE LIQUIDS							
All modes	**335 619**	**100.0**	**1 264 281**	**100.0**	**159 979**	**100.0**	**73**
Single modes	**328 674**	**97.9**	**1 249 038**	**98.8**	**157 508**	**98.5**	**65**
Truck[1]	215 432	64.2	714 713	56.5	45 003	28.1	60
For-hire truck	83 013	24.7	252 901	20.0	22 833	14.3	185
Private truck	130 026	38.7	453 056	35.8	21 505	13.4	30
Rail	10 866	3.2	26 642	2.1	19 548	12.2	829
Water	20 965	6.2	114 987	9.1	53 632	33.5	S
Air (includes truck and air)	S	S	32	–	49	–	1 292
Pipeline[2]	74 601	22.2	392 665	31.1	S	S	S
Multiple modes	**2 459**	**.7**	**4 407**	**.3**	**1 591**	**1.0**	**532**
Parcel, U.S. Postal Service or courier	558	.2	57	–	25	–	609
Other multiple modes	1 901	.6	4 350	.3	1 565	1.0	S
Other and unknown modes	**4 486**	**1.3**	**10 836**	**.9**	**880**	**.6**	**22**
HAZARD CLASS 4, FLAMMABLE SOLIDS							
All modes	**3 898**	**100.0**	**11 804**	**100.0**	**9 618**	**100.0**	**838**
Single modes	**3 681**	**94.4**	**11 655**	**98.7**	**9 493**	**98.7**	**681**
Truck[1]	2 767	71.0	4 763	40.4	819	8.5	601
For-hire truck	1 957	50.2	3 715	31.5	708	7.4	436
Private truck	798	20.5	843	7.1	106	1.1	733
Rail	854	21.9	6 477	54.9	8 639	89.8	1 392
Water	S	S	S	S	S	S	86
Air (includes truck and air)	14	.4	S	S	S	S	1 314
Pipeline[2]	S	S	390	3.3	S	S	S
Multiple modes	**148**	**3.8**	**S**	**S**	**S**	**S**	**1 129**
Parcel, U.S. Postal Service or courier	S	S	6	–	5	–	1 126
Other multiple modes	S	S	S	S	S	S	1 617
Other and unknown modes	**70**	**1.8**	**S**	**S**	**S**	**S**	**S**

See footnotes at end of table.

Table 6a. Hazardous Material Shipment Characteristics by Hazard Class and Mode of Transportation: 1997—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
HAZARD CLASS 5, OXIDIZERS AND ORGANIC PEROXIDES							
All modes	**4 485**	**100.0**	**9 239**	**100.0**	**4 471**	**100.0**	**193**
Single modes	**4 363**	**97.3**	**9 024**	**97.7**	**4 389**	**98.2**	**177**
Truck[1]	3 246	72.4	5 839	63.2	1 568	35.1	161
For-hire truck	1 969	43.9	2 954	32.0	1 163	26.0	490
Private truck	1 255	28.0	2 871	31.1	395	8.8	60
Rail	1 115	24.9	3 182	34.4	2 820	63.1	870
Water	S	S	S	S	S	S	S
Air (includes truck and air)	–	–	S	S	S	S	1 978
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**38**	**.8**	**S**	**S**	**S**	**S**	**432**
Parcel, U.S. Postal Service or courier	S	S	1	–	–	–	421
Other multiple modes	19	.4	S	S	S	S	2 307
Other and unknown modes	**84**	**1.9**	**S**	**S**	**S**	**S**	**74**
HAZARD CLASS 6, TOXIC (POISON)							
All modes	**10 086**	**100.0**	**6 366**	**100.0**	**2 824**	**100.0**	**402**
Single modes	**9 397**	**93.2**	**6 225**	**97.8**	**2 710**	**96.0**	**384**
Truck[1]	7 272	72.1	2 840	44.6	967	34.2	254
For-hire truck	4 426	43.9	1 875	29.4	827	29.3	505
Private truck	2 743	27.2	893	14.0	125	4.4	179
Rail	1 477	14.6	1 949	30.6	1 446	51.2	724
Water	S	S	S	S	S	S	268
Air (includes truck and air)	87	.9	S	S	S	S	1 523
Pipeline[2]	184	1.8	374	5.9	S	S	S
Multiple modes	**448**	**4.4**	**89**	**1.4**	**S**	**S**	**511**
Parcel, U.S. Postal Service or courier	338	3.4	3	–	2	–	504
Other multiple modes	109	1.1	86	1.3	S	S	1 361
Other and unknown modes	**241**	**2.4**	**52**	**.8**	**18**	**.6**	**97**
HAZARD CLASS 7, RADIOACTIVE MATERIALS							
All modes	**2 722**	**100.0**	**87**	**100.0**	**48**	**100.0**	**445**
Single modes	**2 169**	**79.7**	**67**	**76.5**	**32**	**68.0**	**447**
Truck[1]	1 456	53.5	56	64.4	17	36.2	77
For-hire truck	583	21.4	32	37.0	14	29.3	312
Private truck	873	32.1	24	27.4	S	S	27
Rail	S	S	S	S	S	S	1 462
Water	–	–	–	–	–	–	–
Air (includes truck and air)	462	17.0	7	8.4	10	21.9	1 468
Pipeline[2]	S	S	S	S	S	S	S
Multiple modes	**352**	**12.9**	**11**	**13.0**	**15**	**31.3**	**1 087**
Parcel, U.S. Postal Service or courier	352	12.9	11	13.0	15	31.3	1 087
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
HAZARD CLASS 8, CORROSIVE MATERIALS							
All modes	**40 423**	**100.0**	**91 564**	**100.0**	**41 161**	**100.0**	**201**
Single modes	**38 390**	**95.0**	**88 461**	**96.6**	**40 041**	**97.3**	**174**
Truck[1]	27 374	67.7	44 512	48.6	11 964	29.1	141
For-hire truck	19 279	47.7	29 948	32.7	10 212	24.8	419
Private truck	7 785	19.3	14 318	15.6	1 720	4.2	49
Rail	7 362	18.2	24 427	26.7	16 998	41.3	924
Water	3 089	7.6	17 822	19.5	11 061	26.9	469
Air (includes truck and air)	155	.4	3	–	5	–	1 526
Pipeline[2]	S	S	1 696	1.9	S	S	S
Multiple modes	**860**	**2.1**	**636**	**.7**	**690**	**1.7**	**604**
Parcel, U.S. Postal Service or courier	592	1.5	42	–	15	–	597
Other multiple modes	268	.7	594	.6	675	1.6	1 003
Other and unknown modes	**1 173**	**2.9**	**2 467**	**2.7**	**S**	**S**	**113**

See footnotes at end of table.

Table 6a. **Hazardous Material Shipment Characteristics by Hazard Class and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
HAZARD CLASS 9, MISCELLANEOUS DANGEROUS GOODS							
All modes	**23 946**	**100.0**	**65 317**	**100.0**	**22 727**	**100.0**	**323**
Single modes	**22 750**	**95.0**	**64 641**	**99.0**	**22 167**	**97.5**	**268**
Truck[1]	15 515	64.8	41 592	63.7	7 766	34.2	189
For-hire truck	11 611	48.5	26 722	40.9	6 132	27.0	324
Private truck	3 671	15.3	13 721	21.0	1 575	6.9	81
Rail	5 567	23.2	18 334	28.1	13 064	57.5	710
Water	S	S	S	S	S	S	402
Air (includes truck and air)	381	1.6	9	–	14	–	1 347
Pipeline[2]	S	S	S	S	S	S	S
Multiple modes	**841**	**3.5**	**418**	**.6**	**409**	**1.8**	**696**
Parcel, U.S. Postal Service or courier	465	1.9	4	–	2	–	686
Other multiple modes	376	1.6	414	.6	407	1.8	1 446
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**194**

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons. Some unpublished estimates can be derived from other data published in this table. However, figures obtained in this manner are subject to these same limitations.

[1]"Truck" as a single mode includes shipments which went by private truck only, for-hire truck only, or a combination of private truck and for-hire truck.
[2]CFS data for pipeline exclude most shipments of crude oil. See "Mileage Calculations" section for details of CFS coverage.

Table 6b. Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
DIVISION 1.1, EXPLOSIVES WITH A MASS EXPLOSION HAZARD							
All modes	**1 515**	**100.0**	**S**	**S**	**S**	**S**	**294**
Single modes	**1 509**	**99.6**	**S**	**S**	**S**	**S**	**319**
Truck[1]	1 060	69.9	326	45.6	S	S	316
For-hire truck	703	46.4	107	15.0	65	7.2	605
Private truck	357	23.5	S	S	S	S	152
Rail	S	S	S	S	S	S	1 744
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	177
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	S
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**67**
DIVISION 1.2, EXPLOSIVES WITH A PROJECTION HAZARD							
All modes	**S**	**S**	**16**	**100.0**	**15**	**100.0**	**853**
Single modes	**S**	**S**	**16**	**99.9**	**15**	**99.8**	**838**
Truck[1]	S	S	16	99.5	15	99.4	837
For-hire truck	S	S	15	98.1	15	99.4	873
Private truck	S	S	S	S	S	S	9
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	1 231
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**–**	**–**	**–**	**–**	**–**	**–**	**–**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**1 239**
DIVISION 1.3, EXPLOSIVES WITH PREDOMINANTLY A FIRE HAZARD							
All modes	**690**	**100.0**	**30**	**100.0**	**25**	**100.0**	**448**
Single modes	**631**	**91.5**	**23**	**76.1**	**21**	**83.0**	**729**
Truck[1]	629	91.1	23	76.1	21	82.9	704
For-hire truck	603	87.4	20	66.7	20	81.0	949
Private truck	25	3.7	S	S	S	S	333
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	2 364
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	S
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**293**
DIVISION 1.4, EXPLOSIVES WITH NO SIGNIFICANT BLAST HAZARD							
All modes	**1 521**	**100.0**	**138**	**100.0**	**100**	**100.0**	**734**
Single modes	**1 321**	**86.9**	**134**	**96.6**	**97**	**97.2**	**658**
Truck[1]	917	60.3	109	78.7	68	67.4	471
For-hire truck	712	46.8	71	51.4	56	55.7	1 293
Private truck	200	13.2	38	27.4	S	S	248
Rail	S	S	S	S	S	S	1 681
Water	–	–	–	–	–	–	–
Air (includes truck and air)	159	10.5	1	.4	1	.7	1 989
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**181**	**11.9**	**2**	**1.7**	**2**	**1.5**	**843**
Parcel, U.S. Postal Service or courier	181	11.9	2	1.7	2	1.5	843
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**1 101**

See footnotes at end of table.

Table 6b. **Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
DIVISION 1.5, VERY INSENSITIVE EXPLOSIVES, BLASTING AGENTS							
All modes	**260**	**100.0**	**620**	**100.0**	**98**	**100.0**	**102**
Single modes	**260**	**99.7**	**616**	**99.4**	**97**	**99.4**	**102**
Truck[1]	260	99.7	616	99.4	97	99.4	102
For-hire truck	20	7.7	58	9.3	20	20.1	334
Private truck	240	92.0	558	90.1	S	S	92
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**518**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	S	S	S	S	S	S	518
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**104**
DIVISION 2.1, FLAMMABLE GASES							
All modes	**24 674**	**100.0**	**66 109**	**100.0**	**9 390**	**100.0**	**67**
Single modes	**23 698**	**96.0**	**64 856**	**98.1**	**9 199**	**98.0**	**57**
Truck[1]	10 708	43.4	23 421	35.4	2 335	24.9	49
For-hire truck	3 813	15.5	11 941	18.1	1 616	17.2	416
Private truck	6 823	27.7	11 288	17.1	706	7.5	21
Rail	2 203	8.9	6 362	9.6	4 671	49.7	718
Water	881	3.6	2 878	4.4	1 002	10.7	405
Air (includes truck and air)	S	S	S	S	S	S	2 051
Pipeline[2]	9 904	40.1	32 194	48.7	S	S	S
Multiple modes	**205**	**.8**	**317**	**.5**	**80**	**.8**	**378**
Parcel, U.S. Postal Service or courier	75	.3	6	–	3	–	585
Other multiple modes	130	.5	311	.5	76	.8	S
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
DIVISION 2.2, NONFLAMMABLE, NONTOXIC COMPRESSED GASES							
All modes	**12 960**	**100.0**	**39 151**	**100.0**	**7 228**	**100.0**	**62**
Single modes	**12 418**	**95.8**	**37 762**	**96.5**	**7 076**	**97.9**	**53**
Truck[1]	10 433	80.5	29 883	76.3	3 968	54.9	49
For-hire truck	4 900	37.8	5 751	14.7	1 509	20.9	392
Private truck	5 510	42.5	23 997	61.3	2 403	33.2	30
Rail	813	6.3	3 075	7.9	1 836	25.4	608
Water	395	3.0	2 005	5.1	839	11.6	1 059
Air (includes truck and air)	473	3.7	3	–	3	–	1 309
Pipeline[2]	304	2.3	2 796	7.1	S	S	S
Multiple modes	**192**	**1.5**	**13**	**–**	**21**	**.3**	**623**
Parcel, U.S. Postal Service or courier	168	1.3	8	–	S	S	628
Other multiple modes	24	.2	S	S	S	S	S
Other and unknown modes	**350**	**2.7**	**S**	**S**	**S**	**S**	**S**
DIVISION 2.3, GASES TOXIC BY INHALATION							
All modes	**3 250**	**100.0**	**9 761**	**100.0**	**5 224**	**100.0**	**236**
Single modes	**3 109**	**95.6**	**8 489**	**87.0**	**5 165**	**98.9**	**220**
Truck[1]	752	23.1	1 089	11.2	146	2.8	108
For-hire truck	S	S	252	2.6	46	.9	479
Private truck	387	11.9	837	8.6	100	1.9	70
Rail	2 145	66.0	5 766	59.1	4 940	94.6	873
Water	S	S	S	S	S	S	509
Air (includes truck and air)	S	S	S	S	S	S	1 732
Pipeline[2]	193	5.9	S	S	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**1 178**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	1 184
Other multiple modes	S	S	S	S	S	S	477
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**

See footnotes at end of table.

Table 6b. **Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
DIVISION 4.1, FLAMMABLE SOLIDS							
All modes	**2 001**	**100.0**	**10 137**	**100.0**	**8 446**	**100.0**	**880**
Single modes	**1 864**	**93.2**	**10 037**	**99.0**	**8 338**	**98.7**	**775**
Truck[1]	1 575	78.7	3 718	36.7	488	5.8	682
For-hire truck	971	48.5	2 917	28.8	415	4.9	417
Private truck	593	29.7	599	5.9	67	.8	943
Rail	232	11.6	5 904	58.2	7 815	92.5	1 391
Water	S	S	S	S	S	S	108
Air (includes truck and air)	S	S	S	S	S	S	1 408
Pipeline[2]	S	S	390	3.8	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**1 010**
Parcel, U.S. Postal Service or courier	S	S	6	–	5	–	1 007
Other multiple modes	S	S	S	S	S	S	1 657
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**426**
DIVISION 4.2, SPONTANEOUSLY COMBUSTIBLE MATERIALS							
All modes	**909**	**100.0**	**843**	**100.0**	**747**	**100.0**	**202**
Single modes	**899**	**98.9**	**839**	**99.5**	**742**	**99.4**	**227**
Truck[1]	410	45.1	449	53.3	130	17.4	150
For-hire truck	349	38.4	335	39.7	110	14.7	448
Private truck	61	6.7	114	13.5	20	2.6	S
Rail	489	53.8	390	46.2	613	82.0	1 559
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	1 131
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**746**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	535
Other multiple modes	S	S	S	S	S	S	1 806
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**7**
DIVISION 4.3, DANGEROUS WHEN WET MATERIALS							
All modes	**989**	**100.0**	**824**	**100.0**	**424**	**100.0**	**1 049**
Single modes	**918**	**92.8**	**779**	**94.6**	**413**	**97.3**	**682**
Truck[1]	782	79.1	596	72.4	202	47.6	666
For-hire truck	637	64.4	463	56.3	182	42.9	506
Private truck	S	S	130	15.8	S	S	770
Rail	133	13.4	183	22.3	211	49.7	1 142
Water	S	S	S	S	S	S	71
Air (includes truck and air)	S	S	S	S	S	S	1 351
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**2 454**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	2 470
Other multiple modes	S	S	S	S	S	S	1 433
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**173**
DIVISION 5.1, OXIDIZERS							
All modes	**4 153**	**100.0**	**9 148**	**100.0**	**4 412**	**100.0**	**185**
Single modes	**4 039**	**97.3**	**8 935**	**97.7**	**4 332**	**98.2**	**169**
Truck[1]	2 922	70.4	5 750	62.9	1 511	34.3	154
For-hire truck	1 774	42.7	2 897	31.7	1 126	25.5	487
Private truck	1 138	27.4	2 845	31.1	384	8.7	55
Rail	1 115	26.9	3 182	34.8	2 820	63.9	870
Water	S	S	S	S	S	S	S
Air (includes truck and air)	S	S	–	–	S	S	814
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**35**	**.8**	**S**	**S**	**S**	**S**	**439**
Parcel, U.S. Postal Service or courier	S	S	S	S	–	–	427
Other multiple modes	S	S	S	S	S	S	2 359
Other and unknown modes	**79**	**1.9**	**S**	**S**	**S**	**S**	**75**

See footnotes at end of table.

Table 6b. **Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
DIVISION 5.2, ORGANIC PEROXIDES							
All modes	**332**	**100.0**	**92**	**100.0**	**60**	**100.0**	**324**
Single modes	**324**	**97.5**	**89**	**97.3**	**57**	**95.5**	**329**
Truck[1]	324	97.5	89	97.3	57	95.5	287
For-hire truck	195	58.8	57	61.9	37	61.9	531
Private truck	116	35.0	26	28.8	S	S	160
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	2 424
Pipeline[2]	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**353**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	344
Other multiple modes	S	S	S	S	S	S	1 718
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**37**

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons. Some unpublished estimates can be derived from other data published in this table. However, figures obtained in this manner are subject to these same limitations.

[1]"Truck" as a single mode includes shipments which went by private truck only, for-hire truck only, or a combination of private truck and for-hire truck.
[2]CFS data for pipeline exclude most shipments of crude oil. See "Mileage Calculations" section for details of CFS coverage.

Table 7. Hazardous Material Shipment Characteristics by Selected UN Numbers and Mode of Transportation: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1], description, and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
UN 1005, AMMONIA, ANHYDROUS							
All modes	**2 426**	**100.0**	**12 664**	**100.0**	**3 877**	**100.0**	**74**
Single modes	**2 260**	**93.1**	**11 157**	**88.1**	**3 819**	**98.5**	**80**
Truck[2]	1 358	56.0	5 793	45.7	S	S	49
For-hire truck	S	S	S	S	S	S	98
Private truck	634	26.1	2 187	17.3	162	4.2	32
Rail	565	23.3	2 717	21.5	1 591	41.0	589
Water	207	8.5	1 909	15.1	801	20.7	1 077
Air (includes truck and air)	S	S	S	S	S	S	561
Pipeline[3]	S	S	738	5.8	S	S	S
Multiple modes	**–**	**–**	**–**	**–**	**–**	**–**	**–**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
UN 1075, PETROLEUM GASES							
All modes	**13 092**	**100.0**	**40 780**	**100.0**	**5 025**	**100.0**	**35**
Single modes	**12 557**	**95.9**	**40 383**	**99.0**	**4 946**	**98.4**	**34**
Truck[2]	8 384	64.0	20 923	51.3	1 952	38.8	31
For-hire truck	2 819	21.5	11 382	27.9	1 400	27.9	212
Private truck	5 506	42.1	9 353	22.9	540	10.7	19
Rail	865	6.6	3 584	8.8	1 990	39.6	567
Water	402	3.1	1 456	3.6	347	6.9	335
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline[3]	2 906	22.2	14 420	35.4	S	S	S
Multiple modes	**84**	**.6**	**S**	**S**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	–	–	S	S	1 050
Other multiple modes	81	.6	S	S	S	S	S
Other and unknown modes	**S**	**S**	**160**	**.4**	**S**	**S**	**S**
UN 1202, GAS OIL, DIESEL FUEL, HEATING OIL, LIGHT							
All modes	**11 696**	**100.0**	**68 152**	**100.0**	**4 135**	**100.0**	**28**
Single modes	**11 357**	**97.1**	**66 533**	**97.6**	**4 078**	**98.6**	**28**
Truck[2]	2 623	22.4	11 606	17.0	511	12.3	28
For-hire truck	1 300	11.1	6 186	9.1	S	S	80
Private truck	1 318	11.3	5 401	7.9	144	3.5	15
Rail	S	S	S	S	S	S	2 183
Water	1 589	13.6	10 931	16.0	995	24.1	S
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline[3]	7 089	60.6	43 681	64.1	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**80**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	S	S	S	S	S	S	80
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**30**
UN 1203, GASOLINE							
All modes	**190 583**	**100.0**	**786 109**	**100.0**	**90 537**	**100.0**	**47**
Single modes	**188 420**	**98.9**	**780 108**	**99.2**	**89 755**	**99.1**	**46**
Truck[2]	138 277	72.6	504 732	64.2	28 477	31.5	45
For-hire truck	45 489	23.9	172 919	22.0	11 855	13.1	71
Private truck	90 920	47.7	324 680	41.3	16 086	17.8	35
Rail	1 231	.6	5 937	.8	2 919	3.2	897
Water	6 444	3.4	44 686	5.7	33 869	37.4	S
Air (includes truck and air)	15	–	S	S	S	S	1 262
Pipeline[3]	42 453	22.3	224 740	28.6	S	S	S
Multiple modes	**833**	**.4**	**2 026**	**.3**	**S**	**S**	**384**
Parcel, U.S. Postal Service or courier	33	–	S	S	S	S	898
Other multiple modes	800	.4	2 026	.3	S	S	S
Other and unknown modes	**1 330**	**.7**	**3 976**	**.5**	**127**	**.1**	**15**

See footnotes at end of table.

Table 7. **Hazardous Material Shipment Characteristics by Selected UN Numbers and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1], description, and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
UN 1223, KEROSENE							
All modes	**2 374**	**100.0**	**12 097**	**100.0**	**305**	**100.0**	**23**
Single modes	**2 359**	**99.4**	**12 052**	**99.6**	**302**	**99.2**	**23**
Truck[2]	1 112	46.9	4 152	34.3	169	55.6	23
For-hire truck	204	8.6	839	6.9	39	12.7	59
Private truck	903	38.1	3 291	27.2	129	42.2	20
Rail	–	–	–	–	–	–	–
Water	S	S	S	S	S	S	–
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline[3]	1 236	52.1	7 831	64.7	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**127**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	188
Other multiple modes	S	S	S	S	S	S	62
Other and unknown modes	**2**	**–**	**S**	**S**	**S**	**S**	**3**
UN 1824, SODIUM HYDROXIDE SOLUTION							
All modes	**5 057**	**100.0**	**27 409**	**100.0**	**13 581**	**100.0**	**270**
Single modes	**4 842**	**95.8**	**25 926**	**94.6**	**13 351**	**98.3**	**264**
Truck[2]	1 622	32.1	7 214	26.3	973	7.2	170
For-hire truck	850	16.8	3 847	14.0	754	5.6	288
Private truck	747	14.8	3 297	12.0	210	1.5	78
Rail	779	15.4	6 400	23.3	2 952	21.7	455
Water	S	S	11 640	42.5	9 421	69.4	574
Air (includes truck and air)	S	S	S	S	S	S	1 772
Pipeline[3]	70	1.4	672	2.5	S	S	S
Multiple modes	**S**	**S**	**17**	**–**	**2**	**–**	**406**
Parcel, U.S. Postal Service or courier	S	S	1	–	S	S	413
Other multiple modes	S	S	16	–	2	–	190
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
UN 1830, SULFURIC ACID							
All modes	**1 210**	**100.0**	**22 100**	**100.0**	**5 386**	**100.0**	**184**
Single modes	**1 163**	**96.1**	**21 635**	**97.9**	**4 919**	**91.3**	**170**
Truck[2]	826	68.2	12 482	56.5	1 372	25.5	145
For-hire truck	517	42.8	9 617	43.5	918	17.1	171
Private truck	305	25.2	S	S	S	S	108
Rail	202	16.7	6 632	30.0	3 250	60.4	439
Water	S	S	S	S	S	S	173
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline[3]	64	5.3	S	S	S	S	S
Multiple modes	**40**	**3.3**	**416**	**1.9**	**S**	**S**	**499**
Parcel, U.S. Postal Service or courier	9	.8	1	–	–	–	S
Other multiple modes	30	2.5	416	1.9	S	S	1 458
Other and unknown modes	**7**	**.6**	**S**	**S**	**S**	**S**	**49**
UN 1863, FUEL, AVIATION, TURBINE ENGINE							
All modes	**9 429**	**100.0**	**49 722**	**100.0**	**8 284**	**100.0**	**90**
Single modes	**9 340**	**99.1**	**49 494**	**99.5**	**8 267**	**99.8**	**93**
Truck[2]	1 514	16.1	6 634	13.3	336	4.1	54
For-hire truck	1 055	11.2	4 821	9.7	226	2.7	S
Private truck	453	4.8	1 797	3.6	S	S	66
Rail	195	2.1	1 127	2.3	478	5.8	423
Water	S	S	S	S	S	S	345
Air (includes truck and air)	3	–	S	S	S	S	1 452
Pipeline[3]	7 119	75.5	38 738	77.9	S	S	S
Multiple modes	**89**	**.9**	**229**	**.5**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	2 157
Other multiple modes	89	.9	229	.5	S	S	S
Other and unknown modes	**–**	**–**	**–**	**–**	**–**	**–**	**–**

See footnotes at end of table.

Table 7. **Hazardous Material Shipment Characteristics by Selected UN Numbers and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1], description, and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment
	Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
UN 1993, FLAMMABLE LIQUIDS, N.O.S.							
All modes	**62 210**	**100.0**	**282 035**	**100.0**	**29 576**	**100.0**	**41**
Single modes	**60 127**	**96.7**	**276 807**	**98.1**	**28 596**	**96.7**	**36**
Truck[2]	40 448	65.0	165 577	58.7	9 681	32.7	34
For-hire truck	13 592	21.8	54 631	19.4	5 443	18.4	119
Private truck	26 573	42.7	109 562	38.8	4 148	14.0	23
Rail	1 995	3.2	6 921	2.5	4 024	13.6	666
Water	5 043	8.1	33 314	11.8	8 668	29.3	212
Air (includes truck and air)	18	–	S	S	1	–	1 561
Pipeline[3]	12 622	20.3	70 993	25.2	S	S	S
Multiple modes	**833**	**1.3**	**1 521**	**.5**	**633**	**2.1**	**345**
Parcel, U.S. Postal Service or courier	135	.2	S	S	S	S	391
Other multiple modes	698	1.1	1 494	.5	623	2.1	S
Other and unknown modes	**1 250**	**2.0**	**3 707**	**1.3**	**347**	**1.2**	**26**
UN 3257, ELEVATED TEMPERATURE LIQUID, N.O.S.							
All modes	**6 150**	**100.0**	**49 697**	**100.0**	**14 236**	**100.0**	**205**
Single modes	**6 131**	**99.7**	**49 653**	**99.9**	**14 222**	**99.9**	**205**
Truck[2]	4 113	66.9	32 664	65.7	4 866	34.2	153
For-hire truck	2 475	40.2	20 490	41.2	3 536	24.8	190
Private truck	1 415	23.0	11 037	22.2	1 274	8.9	109
Rail	1 564	25.4	12 755	25.7	8 231	57.8	635
Water	S	S	S	S	S	S	243
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline[3]	S	S	S	S	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**824**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	S	S	S	S	S	S	824
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**15**
ALL OTHER							
All modes	**162 179**	**100.0**	**214 430**	**100.0**	**88 868**	**100.0**	**194**
Single modes	**154 170**	**95.1**	**207 968**	**97.0**	**86 655**	**97.5**	**161**
Truck[2]	97 896	60.4	98 019	45.7	25 589	28.8	116
For-hire truck	65 295	40.3	48 098	22.4	19 858	22.3	514
Private truck	31 919	19.7	49 210	22.9	5 593	6.3	44
Rail	25 888	16.0	50 238	23.4	48 557	54.6	1 050
Water	9 992	6.2	30 829	14.4	11 586	13.0	372
Air (includes truck and air)	8 446	5.2	47	–	72	–	1 454
Pipeline[3]	11 948	7.4	28 833	13.4	S	S	S
Multiple modes	**3 736**	**2.3**	**1 134**	**.5**	**1 182**	**1.3**	**715**
Parcel, U.S. Postal Service or courier	2 664	1.6	113	–	67	–	721
Other multiple modes	1 072	.7	1 021	.5	1 115	1.3	S
Other and unknown modes	**4 273**	**2.6**	**5 328**	**2.5**	**1 030**	**1.2**	**58**

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[1]UN numbers were selected based on estimated tons without regard to sampling variability.
[2]"Truck" as a single mode includes shipments which went by private truck only, for-hire truck only, or a combination of private truck and for-hire truck.
[3]CFS data for pipeline exclude most shipments of crude oil. See "Mileage Calculations" section for details of CFS coverage.

Table 8a. Hazardous Material Shipment Characteristics by For-Hire Truck for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**134 308**	**100.0**	**336 363**	**100.0**	**45 234**	**100.0**	**260**
1005	Ammonia, anhydrous	S	S	S	S	S	S	98
1075	Petroleum gases	2 819	2.1	11 382	3.4	1 400	3.1	212
1090	Acetone	497	.4	S	S	152	.3	294
1202	Gas oil, diesel fuel, heating oil, light	1 300	1.0	6 186	1.8	S	S	80
1203	Gasoline	45 489	33.9	172 919	51.4	11 855	26.2	71
1263	Paint	6 839	5.1	2 199	.7	1 178	2.6	545
1760	Corrosive liquids, n.o.s.	2 540	1.9	1 251	.4	649	1.4	437
1789	Hydrochloric acid	387	.3	1 199	.4	186	.4	379
1805	Phosphoric acid	788	.6	1 260	.4	350	.8	260
1824	Sodium hydroxide solution	850	.6	3 847	1.1	754	1.7	288
1830	Sulfuric acid	517	.4	9 617	2.9	918	2.0	171
1863	Fuel, aviation, turbine engine	1 055	.8	4 821	1.4	226	.5	S
1866	Resin solution (flammable)	3 111	2.3	1 710	.5	830	1.8	478
1993	Flammable liquids, n.o.s.	13 592	10.1	54 631	16.2	5 443	12.0	119
2215	Maleic anhydride	S	S	S	S	S	S	884
2448	Sulfur, molten	114	–	2 704	.8	285	.6	93
2794	Batteries, wet, filled with acid	2 283	1.7	1 379	.4	937	2.1	538
3077	Enivornmentally hazardous substances, solid, n.o.s.	1 529	1.1	2 322	.7	669	1.5	331
3082	Environmentally hazardous substances, liquid, n.o.s.	2 759	2.1	3 050	.9	1 322	2.9	496
3257	Elevated temperature liquid, n.o.s.	2 475	1.8	20 490	6.1	3 536	7.8	190
	All other	42 325	31.5	27 789	8.3	10 303	22.8	520

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[1]UN numbers were selected based on estimated tons without regard to sampling variability.

Table 8b. Hazardous Material Shipment Characteristics by Private Truck for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**160 693**	**100.0**	**522 666**	**100.0**	**28 847**	**100.0**	**35**
1005	Ammonia, anhydrous	634	.4	2 187	.4	162	.6	32
1072	Oxygen, compress	724	.5	1 590	.3	62	.2	25
1073	Oxygen, refrigerated liquid	401	.2	4 245	.8	381	1.3	38
1075	Petroleum gases	5 506	3.4	9 353	1.8	540	1.9	19
1202	Gas oil, diesel fuel, heating oil, light	1 318	.8	5 401	1.0	144	.5	15
1203	Gasoline	90 920	56.6	324 680	62.1	16 086	55.8	35
1223	Kerosene	903	.6	3 291	.6	129	.4	20
1263	Paint	4 132	2.6	1 291	.2	240	.8	27
1789	Hydrochloric acid	234	.1	1 441	.3	107	.4	72
1791	Hypochlorite solutions	298	.2	1 148	.2	87	.3	51
1824	Sodium hydroxide solution	747	.5	3 297	.6	210	.7	78
1830	Sulfuric acid	305	.2	S	S	S	S	108
1863	Fuel, aviation, turbine engine	453	.3	1 797	.3	S	S	66
1951	Argon, refrigerated liquid	473	.3	1 514	.3	256	.9	92
1977	Nitrogen, refrigerated liquid	754	.5	8 503	1.6	1 027	3.6	78
1993	Flammable liquids, n.o.s.	26 573	16.5	109 562	21.0	4 148	14.4	23
1999	Tars, liquid	265	.2	1 247	.2	85	.3	54
2187	Carbon dioxide, refrigerated liquid	264	.2	2 803	.5	291	1.0	S
2794	Batteries, wet, filled with acid	2 780	1.7	1 513	.3	352	1.2	S
3257	Elevated temperature liquid, n.o.s.	1 415	.9	11 037	2.1	1 274	4.4	109
	All other	21 594	13.4	23 916	4.6	2 707	9.4	56

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[1]UN numbers were selected based on estimated tons without regard to sampling variability.

Table 8c. Hazardous Material Shipment Characteristics by Rail for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**33 340**	**100.0**	**96 626**	**100.0**	**74 711**	**100.0**	**853**
1005	Ammonia, anhydrous	565	1.7	2 717	2.8	1 591	2.1	589
1017	Chlorine	670	2.0	3 514	3.6	2 165	2.9	623
1040	Ethylene oxide	S	S	S	S	S	S	1 246
1075	Petroleum gases	865	2.6	3 584	3.7	1 990	2.7	567
1086	Vinyl chloride, inhibited or vinyl chlorine, stabilized	470	1.4	1 105	1.1	1 075	1.4	972
1203	Gasoline	1 231	3.7	5 937	6.1	2 919	3.9	897
1268	Petroleum distillates, n.o.s.	531	1.6	1 248	1.3	1 273	1.7	941
1789	Hydrochloric acid	100	.3	1 617	1.7	928	1.2	572
1805	Phosphoric acid	638	1.9	2 654	2.7	2 783	3.7	1 040
1814	Potassium hydroxide, solution	S	S	S	S	S	S	752
1824	Sodium hydroxide, solution	779	2.3	6 400	6.6	2 952	4.0	455
1830	Sulfuric acid	202	.6	6 632	6.9	3 250	4.4	439
1863	Fuel, aviation, turbine engine	195	.6	1 127	1.2	478	.6	423
1993	Flammable liquid, n.o.s.	1 995	6.0	6 921	7.2	4 024	5.4	666
2055	Styrene monomer, inhibited	873	2.6	1 164	1.2	1 430	1.9	1 233
2215	Maleic anhydride	S	S	S	S	S	S	1 176
2448	Sulfur, molten	S	S	5 740	5.9	7 734	10.4	1 423
3077	Environmentally hazardous substances, solid, n.o.s.	1 596	4.8	2 622	2.7	1 784	2.4	627
3082	Environmentally hazardous substances, liquid, n.o.s.	2 256	6.8	2 893	3.0	2 904	3.9	984
3257	Elevated temperature liquid, n.o.s.	1 564	4.7	12 755	13.2	8 231	11.0	635
	All other	15 931	47.8	23 104	23.9	21 752	29.1	1 097

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[1]UN numbers were selected based on estimated tons without regard to sampling variability.

Table 8d. Hazardous Material Shipment Characteristics by Water for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**26 951**	**100.0**	**143 152**	**100.0**	**68 212**	**100.0**	**S**
1005	Ammonia, anhydrous	207	.8	1 909	1.3	801	1.2	1 077
1075	Petroleum gases	402	1.5	1 456	1.0	347	.5	335
1093	Acylonitrile, Inhibited	S	S	S	S	S	S	369
1114	Benzene	578	2.1	2 195	1.5	183	.3	S
1145	Cyclopentane	323	1.2	950	.7	288	.4	220
1202	Gas oil, diesel fuel, heating oil, light	1 589	5.9	10 931	7.6	995	1.5	S
1203	Gasoline	6 444	23.9	44 686	31.2	33 869	49.7	S
1230	Methanol	S	S	S	S	1 123	1.6	300
1268	Petroleum distillates, n.o.s.	S	S	S	S	S	S	259
1307	Xylenes	S	S	S	S	S	S	820
1760	Corrosive liquids, n.o.s.	S	S	S	S	S	S	S
1814	Potasium hydroxide, solution	S	S	S	S	S	S	619
1824	Sodium hydroxide solution	S	S	11 640	8.1	9 421	13.8	574
1830	Sulfuric acid	S	S	S	S	S	S	173
1831	Sulfuric acid, fuming	S	S	S	S	S	S	281
1863	Fuel, aviation, turbine engine	S	S	S	S	S	S	345
1918	Isopropylbenzene	S	S	S	S	S	S	494
1993	Flammable liquids, n.o.s.	5 043	18.7	33 314	23.3	8 668	12.7	212
2055	Styrene monomer, inhibited	1 462	5.4	2 511	1.8	675	1.0	309
3257	Elevated temperature liquid, n.o.s.	S	S	S	S	S	S	243
	All other	3 745	13.9	7 987	5.6	3 446	5.1	388

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[1]UN numbers were selected based on estimated tons without regard to sampling variability.

Table 8e. Hazardous Material Shipment Characteristics by Air (Includes Truck and Air) for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**8 558**	**100.0**	**66**	**100.0**	**95**	**100.0**	**1 462**
1062	Methyl bromide	S	S	S	S	S	S	3 012
1197	Extracts, flavoring, liquids	S	S	S	S	S	S	1 989
1203	Gasoline	15	.2	S	S	S	S	1 262
1210	Printing ink (flammable)	S	S	S	S	S	S	750
1263	Paint	S	S	S	S	S	S	866
1760	Corrosive liquids, n.o.s.	S	S	S	S	S	S	1 198
1824	Sodium hydroxide solution	S	S	S	S	S	S	1 772
1863	Fuel, aviation, turbine engine	3	–	S	S	S	S	1 452
1866	Resin solution (flammable)	36	.4	1	.9	1	1.0	1 293
1897	Tetrachloroethylene	S	S	S	S	S	S	2 590
1956	Compressed gases, n.o.s.	304	3.6	S	S	2	2.1	1 543
1977	Nitrogen, refrigerated liquid	S	S	–	.5	–	.1	464
1993	Flammable liquids, n.o.s.	18	.2	S	S	1	1.3	1 561
2794	Batteries, wet, filled with acid	S	S	S	S	S	S	3 223
2982	Radioactive material, n.o.s.	315	3.7	7	10.8	10	10.7	1 491
2990	Life-saving appliances, self-inflating	S	S	S	S	S	S	1 416
3089	Toxic solids, oxidizing, n.o.s.	S	S	S	S	S	S	S
3090	Lithium battery	S	S	S	S	S	S	665
3268	Air bag inflators	217	2.5	8	11.9	13	13.7	1 468
3320	Sodium borohydride and sodium hydroxide solution	S	S	S	S	S	S	253
	All other	739	8.6	5	7.5	7	7.2	1 434

UN number[2]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**8 558**	**100.0**	**66**	**100.0**	**95**	**100.0**	**1 462**
0323	Cartridges, power device	S	S	S	S	S	S	2 083
0410	Fuzes, detonating	S	S	S	S	–	–	1 754
1066	Nitrogen, compressed	S	S	S	S	S	S	929
1072	Oxygen, compressed	S	S	S	S	S	S	917
1197	Extracts, flavoring, liquid	S	S	S	S	S	S	1 989
1263	Paint	S	S	S	S	S	S	866
1588	Cyanides, inorganic, solid, n.o.s	S	S	S	S	S	S	1 056
1824	Sodium hydroxide solution	S	S	S	S	S	S	1 772
1866	Resin solution (flammable)	36	.4	1	.9	1	1.0	1 293
1956	Compressed gases, n.o.s.	304	3.6	S	S	2	2.1	1 543
1977	Nitrogen, refrigerated liquid	S	S	–	.5	–	.1	464
1993	Flammable liquids, n.o.s.	18	.2	S	S	1	1.3	1 561
2074	Acrylamide	S	S	S	S	S	S	2 527
2800	Batteries, wet, nonspillable	S	S	S	S	S	S	1 699
2910	Radioactive material	S	S	–	.3	–	.3	1 182
2982	Radioactive material, n.o.s.	315	3.7	7	10.8	10	10.7	1 491
2990	Life-saving appliances, self-inflating	S	S	S	S	S	S	1 416
3090	Lithium battery	S	S	S	S	S	S	665
3091	Lithium batteries, contained in equipment	S	S	–	.1	–	.1	1 430
3268	Air bag inflators	217	2.5	8	11.9	13	13.7	1 468
	All other	318	3.7	32	48.9	42	43.9	1 429

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[1]UN numbers were selected based on estimated tons without regard to sampling variability.
[2]UN numbers were selected based on estimated value without regard to sampling variability.

Table 8f. Hazardous Material Shipment Characteristics by Pipeline for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text. Detail may not add to total because of rounding]

UN number[1]	Description	Value		Tons		Ton-miles		Average miles per shipment
		Number (million dollars)	Percent	Number (thousands)	Percent	Number (millions)	Percent	
	Total	**85 706**	**100.0**	**432 075**	**100.0**	**S**	**S**	**S**
1005	Ammonia, anhydrous	S	S	738	.2	S	S	S
1010	Butadienes, inhibited	676	.8	1 688	.4	S	S	S
1011	Butane	248	.3	2 397	.6	S	S	S
1016	Carbon monoxide, compressed	S	S	S	S	S	S	S
1038	Ethylene, refrigerated liquid	S	S	S	S	S	S	S
1072	Oxygen, compressed	27	–	1 062	.2	S	S	S
1075	Petroleum gases	2 906	3.4	14 420	3.3	S	S	S
1077	Propylene	1 581	1.8	4 347	1.0	S	S	S
1114	Benzene	S	S	S	S	S	S	S
1202	Gas oil, diesel fuel, heating oil, light	7 089	8.3	43 681	10.1	S	S	S
1203	Gasoline	42 453	49.5	224 740	52.0	S	S	S
1223	Kerosene	1 236	1.4	7 831	1.8	S	S	S
1230	Methanol	S	S	S	S	S	S	S
1268	Petroleum distillates, n.o.s.	282	.3	1 605	.4	S	S	S
1824	Sodium hydroxide solution	70	–	672	.2	S	S	S
1830	Sulfuric acid	64	–	S	S	S	S	S
1863	Fuel, aviation, turbine engine	7 119	8.3	38 738	9.0	S	S	S
1962	Ethylene, compressed	3 250	3.8	6 951	1.6	S	S	S
1993	Flammable liquids, n.o.s.	12 622	14.7	70 993	16.4	S	S	S
3257	Elevated temperature liquid, n.o.s.	S	S	S	S	S	S	S
	All other	2 668	3.1	5 565	1.3	S	S	S

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons. Some unpublished estimates can be derived from other data published in this table. However, figures obtained in this manner are subject to these same limitations.

[1]UN numbers were selected based on estimated tons without regard to sampling variability.

Appendix A.
Comparability With the 1993 Commodity Flow Survey

The Commodity Flow Survey (CFS) restores a data program on commodity flows that the Census Bureau conducted as a part of its 5-year economic census program from 1963 through 1977. The CFS was first conducted in 1993. For the 1997 CFS, the Census Bureau incorporated improvements identified from the evaluation of previous surveys and additional research. The following table shows a comparison of the 1993 and 1997 surveys.

Item	1993	1997
1. Industry coverage	Manufacturers (minor exceptions)	Manufacturers (minor exceptions)
	Mining (except mining services and oil and gas extraction)	Mining (except mining services)
	All wholesale	All wholesale
	Video tape distributers	
	Catalog mail-order houses	Catalog mail-order houses
	Auxiliaries (e.g., warehouses)	Auxiliaries (e.g., warehouses)
2. Commodity classification system	Standard Transportation Commodity Classification (STCC), developed by the American Association of Railroads (AAR).	Standard Classification of Transported Goods (SCTG).
3. Sample size	Approximately 200,000 establishments were selected from a universe of about 800,000 in-scope establishments on the 1992 Standard Statistical Establishment List (SSEL).	Approximately 100,000 establishments were selected from a universe of about 800,000 in-scope establishments on the 1995 Standard Statistical Establishment List (SSEL).
4. Survey methodology	Respondents took a sample of their individual outbound shipments for a 2-week period during each of the four calendar quarters of 1993.	Respondents took a sample of their individual outbound shipments for a 1-week period during each of the four calendar quarters of 1997.
	Respondents reported key characteristics for each sampled shipment.	Respondents reported key characteristics for each sampled shipment.
5. Reported mode of transportation	Rail	Rail
	For-hire truck	For-hire truck
	Private truck	Private truck
	Air	Air
	Inland water and/or Great Lakes	Shallow draft vessel
	Deep sea water	Deep draft vessel
	Pipeline	Pipeline
	Parcel, U.S. Postal Service, or courier	Parcel, U.S. Postal Service, or courier
	Other	Other
	Unknown	Unknown

Item	1993	1997
6. Data items requested on questionnaire	For **each** shipment:	For **each** shipment:
	Total value	Total value
	Total weight	Total weight
	Major commodity (STCC)	**Major** commodity (SCTG)
	All modes of transportation	**All** modes of transportation
	Multiple origins (respondents specifically requested to report all shipment origins for the sampled establishment and report the appropriate origin for each shipment; assumed to always be the mailing address if no other origins listed).	Single origin (assumed to be the mailing address unless the respondent provided a different physical location address).
	Destination	Destination
	Containerized (Y/N)	Containerized (Y/N)
	Hazardous material (Y/N)	Hazardous material (UN/NA codes)
	Export (Y/N)	Export (Y/N)
	If export, mode of export, foreign country,and city of destination.	If export, mode of export, foreign country,and city of destination.

Appendix B. Reliability of the Estimates

An estimate based on a sample survey potentially contains two types of errors—sampling and nonsampling. Sampling error occurs because characteristics differ among sampling units and because only a subset of the entire population is measured in a sample survey. Nonsampling error encompasses all other factors that contribute to the total error of a sample survey estimate. The accuracy of a survey result may be affected by these two types of errors.

Sampling and nonsampling errors are often measured by the quantities, bias and variance. The bias of an estimator of an unknown population value is the difference, averaged over all possible samples of the same size and design, between the estimator and the unknown population value. Any systematic error, or inaccuracy that affects all samples of a specified design in a similar way, may bias the resulting estimates. Variance is the squared difference, averaged over all possible samples of the same size and design, between an estimator and its average value. Descriptions of sampling and nonsampling errors for the 1997 Commodity Flow Survey (CFS) are provided in the following sections.

SAMPLING ERROR

Because the estimates are based on a sample, exact agreement with the results that would be obtained from a complete enumeration of all the shipments made in 1997 from all establishments included on the CFS sampling frame is not expected. However, because probability sampling was used at each stage of selection, it is possible to estimate the sampling variability of the survey estimates. For CFS estimates, sampling variability arises from each of the three stages of sampling. (See Appendix C for a description of the sample design.)

The particular sample used in this survey is one of a large number of samples of the same size and design that could have been selected. If all possible samples had been surveyed, under the same conditions, an estimate of an unknown population value could have been obtained from each sample. The estimates obtained from these samples give rise to a distribution of estimates for the unknown population value. A statistical measure of the variability among these estimates is the standard error, which can be approximated from any one sample. The coefficient of variation (or relative standard error) of an estimate is the standard error of the estimate divided by the estimate. Measures of sampling variability, such as the standard error or coefficient of variation, are estimated from the sample and are also subject to sampling variability. (Technically, we should refer to the estimated standard error or the estimated coefficient of variation of an estimator. However, we have omitted this detail for the sake of brevity.) It is important to note that the standard error and coefficient of variation only measure sampling variability. They do not measure any biases in the estimates. All coefficients of variation are expressed as percents. Standard errors for the corresponding percentage estimates are also provided.

An estimate of an unknown population value and its approximate standard error can be used to construct a confidence interval. A confidence interval is a range about a given estimator that has a specified probability, or confidence, of containing the unknown population value. If, for each possible sample, an estimate of an unknown population value and the estimate's approximate standard error were obtained, then:

1. For approximately 90 percent of the possible samples, the interval from 1.65 standard errors below to 1.65 standard errors above the estimate would include the unknown population value.

2. For approximately 95 percent of the possible samples, the interval from two standard errors below to two standard errors above the estimate would include the unknown population value.

NONSAMPLING ERROR

Nonsampling error encompasses all other factors that contribute to the total error of a sample survey estimate and may also occur in censuses. It is often helpful to think of nonsampling error as arising from deficiencies or mistakes in the survey process. In the CFS, nonsampling error can be attributed to many sources: (1) nonresponse, (2) response errors, (3) differences in the interpretation of the questions, (4) mistakes in coding or keying the data obtained, and (5) other errors of collection, response, coverage, and processing. Although no direct measurement of the potential biases because of nonsampling error has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize its influence.

A potentially large source of bias in the estimates is due to nonresponse. Nonresponse is defined as the inability to obtain all the intended measurements or responses from all the selected establishments. Four levels of nonresponse can occur in the CFS: item, shipment, quarter (reporting week), and establishment. Item nonresponse

occurs either when a question is unanswered or the response to the question fails computer or analyst edits. Item nonresponse is corrected by imputation. (Imputation is the procedure by which a missing value is replaced by a predicted value obtained from an appropriate model.) Shipment, quarter, and establishment nonresponse are used to describe the inability to obtain sufficient information about a sampled shipment, quarter, or establishment, respectively, that prevents it from contributing to tabulations. Shipment and quarter nonresponse are corrected during the estimation procedure by reweighting. Reweighting allocates characteristics to the nonrespondents in proportion to the characteristics observed for the respondents. The amount of bias introduced by this nonresponse adjustment procedure depends on the extent to which the nonrespondents differ, characteristically, from the respondents. Establishment nonresponse is corrected during the estimation procedure by the SIC-level adjustment weight. (See Appendix C for a description of the estimation procedure.) In most cases of establishment nonresponse, none of the four questionnaires have been returned to the Census Bureau, after several attempts to elicit a response. Approximately 67 percent of the sampled establishments provided at least one quarter of data that contributed to tabulations.

Some possible sources of bias that are attributed to respondent-conducted sampling include misunderstanding the definition of a shipment, constructing an incomplete frame of shipments from which to sample, ordering the shipment sampling frame by selected shipment characteristics, and selecting shipment records by a method other than the one specified in the questionnaire's instructions. We often contacted respondents who reported shipments having atypically large value or weight when compared to the rest of their reported shipments. Upon contact, if we are able to collect information on all of a given respondent's large shipments made either for a particular reporting week or for the entire quarter, then we identify these large shipments as certainty shipments. (See Appendix C for a description of how certainty shipments are used in the estimation process.)

Table B–1. **Measures of Reliability for Hazardous Material Shipment Characteristics by Mode of Transportation for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
All modes	**3.6**	**–**	**4.3**	**–**	**7.9**	**–**	**8.5**
Single modes	**3.5**	**.2**	**4.4**	**.2**	**8.1**	**.4**	**6.7**
Truck	4.1	1.9	5.4	2.7	9.0	3.2	5.0
For-hire truck	7.4	1.4	9.1	1.7	13.8	2.6	6.0
Private truck	3.5	1.4	4.4	1.4	8.8	1.1	5.0
Rail	16.3	.8	9.2	.5	12.8	2.8	5.9
Water	11.2	.7	15.8	1.2	22.0	3.6	S
Air (includes truck and air)	46.5	.7	21.7	–	21.7	–	3.5
Pipeline	8.4	1.5	10.3	2.2	S	S	S
Multiple modes	**10.0**	**.1**	**13.4**	**–**	**25.2**	**.3**	**11.1**
Parcel, U.S. Postal Service or courier	13.7	–	16.8	–	20.6	–	9.2
Other multiple modes	12.0	–	13.9	–	25.9	.3	S
Other and unknown modes	**13.8**	**.2**	**10.9**	**.1**	**20.8**	**.2**	**32.2**

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–2. **Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class and description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
Total	**3.6**	**–**	**4.3**	**–**	**7.9**	**–**	**8.5**
Class 1, Explosives	10.5	.1	24.6	–	S	S	16.0
Class 2, Gases	7.6	.6	5.1	.5	12.8	1.0	12.7
Class 3, Flammable liquids	3.6	1.5	5.1	.9	12.3	3.6	6.8
Class 4, Flammable solids	9.0	–	20.1	.1	35.7	.8	15.7
Class 5, Oxidizers and organic peroxides	13.7	.1	12.1	–	18.7	.3	13.9
Class 6, Toxic (poison)	8.8	.2	16.4	–	10.9	.1	13.3
Class 7, Radioactive materials	20.9	.1	24.0	–	26.7	–	27.7
Class 8, Corrosive materials	20.9	1.4	9.7	.6	18.3	2.7	19.9
Class 9, Miscellaneous dangerous goods	7.6	.4	14.1	.6	12.7	1.0	8.8

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Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–3. **Measures of Reliability for Hazardous Material Shipment Characteristics for Selected UN Numbers for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**3.6**	**–**	**4.3**	**–**	**7.9**	**–**	**8.5**
1005	Ammonia, anhydrous	23.4	.1	23.0	.2	20.2	.3	23.4
1073	Oxygen, refrigerated liquid	25.9	–	36.0	.1	27.6	–	16.1
1075	Petroleum gases	18.9	.5	8.1	.3	9.3	.2	19.2
1202	Gas oil, diesel fuel, heating oil, light	27.3	.7	29.3	1.2	26.4	.4	20.3
1203	Gasoline	4.7	1.7	7.3	1.8	20.0	3.9	8.7
1223	Kerosene	18.3	.1	19.0	.2	24.4	–	13.0
1230	Methanol	39.6	.2	S	S	34.9	.3	20.0
1268	Petroleum distillates, n.o.s.	16.3	.1	24.8	.1	26.3	.3	25.0
1805	Phosphoric acid	23.4	.1	16.8	–	23.2	.4	14.0
1824	Sodium hydroxide solution	23.5	.3	17.7	.3	32.2	1.8	17.2
1830	Sulfuric acid	26.0	–	23.9	.3	25.0	.5	8.5
1863	Fuel, aviation, turbine engine	12.8	.3	12.8	.4	23.9	.8	29.5
1962	Ethylene, compressed	18.1	.1	15.7	–	29.4	–	49.8
1977	Nitrogen, refrigerated liquid	18.8	–	27.5	.1	27.8	.1	12.2
1993	Flammable liquids, n.o.s.	3.7	.7	5.6	1.1	12.3	1.6	8.4
2215	Maleic anhydride	S	S	S	S	S	S	20.2
2448	Sulfur, molten	31.6	–	26.1	.1	42.2	.8	18.9
3077	Environmentally hazardous substance, solid, n.o.s.	12.6	–	8.5	–	15.9	.2	12.2
3082	Environmentally hazardous substance, liquid, n.o.s.	23.0	.3	20.0	.1	29.5	.5	10.5
3257	Elevated temperature liquid, n.o.s.	16.3	.2	18.7	.6	19.4	.9	8.7
	All other	8.1	1.4	4.5	.5	8.9	2.1	13.2

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D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–4. **Measures of Reliability for Hazardous Versus Nonhazardous Material Shipment Characteristics by Mode of Transportation for the United States: 1997**

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Mode of transportation	Tons					Ton-miles				
		Hazardous		Nonhazardous			Hazardous		Nonhazardous	
	Coefficient of variation of number	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage
All modes	**1.3**	**4.3**	**.6**	**1.4**	**.6**	**2.3**	**7.9**	**.7**	**2.3**	**.7**
Single modes	**1.2**	**4.4**	**.6**	**1.3**	**.6**	**2.5**	**8.1**	**.8**	**2.6**	**.8**
Truck	1.3	5.4	.6	1.4	.6	1.0	9.0	.6	1.1	.6
For-hire truck	3.1	9.1	.8	3.2	.8	1.1	13.8	.8	1.2	.8
Private truck	2.2	4.4	.5	2.4	.5	2.8	8.8	.7	2.4	.7
Rail	4.5	9.2	.7	5.0	.7	5.6	12.8	1.0	6.3	1.0
Water	5.5	15.8	3.1	5.9	3.1	5.9	22.0	4.1	5.5	4.1
Air (includes truck and air)	5.1	21.7	.4	5.4	.4	5.7	21.7	.4	5.9	.4
Pipeline	8.1	10.3	5.4	23.0	5.4	S	S	S	S	S
Multiple modes	**6.7**	**13.4**	**.4**	**6.8**	**.4**	**9.2**	**25.2**	**.6**	**9.4**	**.6**
Parcel, U.S. Postal Service or courier	2.1	16.8	.1	2.1	.1	2.6	20.6	–	2.6	–
Other multiple modes	7.6	13.9	.5	7.7	.5	10.1	25.9	.7	10.4	.7
Other and unknown modes	**7.2**	**10.9**	**.7**	**7.7**	**.7**	**6.6**	**20.8**	**.5**	**6.7**	**.5**

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S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–5a. Measures of Reliability for Hazardous Material Shipment Characteristics by Selected State of Origin: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

State of origin	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
Total	**3.6**	**–**	**4.3**	**–**	**7.9**	**–**	**8.5**
Texas	11.6	1.7	9.2	1.8	15.1	3.1	38.5
Louisiana	7.8	.6	24.9	2.2	23.5	3.8	S
California	8.1	.7	6.3	.6	11.6	.5	29.0
Illinois	13.6	.7	18.1	1.1	26.2	1.3	S
Pennsylvania	9.1	.4	10.5	.4	16.1	.3	30.5
Georgia	23.6	.8	41.4	1.2	37.0	.9	16.8
Ohio	10.7	.5	11.6	.5	16.8	.4	12.4
Florida	8.2	.2	9.0	.3	15.0	.4	14.8
New Jersey	18.5	.7	33.9	1.0	S	S	29.2
Michigan	38.4	1.2	35.8	.9	20.1	.3	36.4
Washington	25.1	.7	14.3	.3	19.6	.8	S
Minnesota	34.9	.5	47.4	.9	S	S	24.5
Indiana	9.3	.1	13.1	.3	36.8	.4	33.5
New York	6.9	.2	15.2	.2	20.2	.3	40.5
Wisconsin	32.6	.6	42.3	.8	30.5	.4	25.1
North Carolina	8.4	.2	10.6	.2	21.6	.3	20.1
Mississippi	38.6	.6	26.4	.4	34.3	.7	25.9
Virginia	9.0	.1	8.6	.2	35.2	.4	15.3
Alabama	13.9	.2	14.8	.2	33.6	.6	41.8
Tennessee	12.7	.3	12.1	.2	10.9	.1	20.7
All other states	3.1	.5	4.3	.8	11.9	2.0	19.4

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–5b. Measures of Reliability for Hazardous Material Shipment Characteristics by Selected State of Destination: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

State of destination	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
Total	**3.6**	**–**	**4.3**	**–**	**7.9**	**–**	**8.5**
Texas	7.6	1.2	11.5	2.0	15.0	1.8	26.2
California	10.6	.9	6.2	.7	14.6	1.0	27.8
Louisiana	14.7	.6	29.3	1.6	7.3	.2	41.2
Florida	9.2	.3	17.7	.7	33.2	2.3	20.9
Illinois	9.8	.5	13.7	.8	16.7	1.0	22.5
Michigan	30.5	1.3	29.0	1.0	44.8	2.3	41.2
Pennsylvania	10.4	.4	12.0	.5	16.5	.4	28.2
Georgia	22.4	.7	34.2	1.1	23.7	1.0	17.7
Ohio	12.1	.5	13.1	.5	19.4	.7	16.2
New Jersey	14.6	.4	24.0	.6	27.1	.9	21.9
Indiana	9.2	.2	10.1	.3	18.6	.3	20.4
North Carolina	8.4	.2	8.7	.2	32.3	1.5	23.8
New York	12.3	.3	9.9	.2	12.0	.2	24.3
Washington	13.3	.3	16.6	.3	39.1	.6	S
Tennessee	10.9	.2	16.7	.3	25.9	.6	14.9
Mississippi	17.3	.2	19.0	.3	22.3	.3	14.0
Minnesota	23.3	.4	30.3	.5	24.3	.2	S
Wisconsin	32.1	.5	40.7	.7	23.8	.3	16.2
Alabama	12.5	.2	15.0	.2	14.1	.2	22.2
Virginia	5.8	–	8.7	.1	29.8	.4	S
All other states	3.7	.5	4.4	.9	8.2	1.9	12.5

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–6a. Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class and Mode of Transportation: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
HAZARD CLASS 1, EXPLOSIVES							
All modes	**10.5**	**–**	**24.6**	**–**	**S**	**S**	**16.0**
Single modes	**10.4**	**1.7**	**25.0**	**.7**	**S**	**S**	**16.0**
Truck	10.1	5.8	21.1	9.7	34.3	17.3	12.9
For-hire truck	14.5	4.9	15.1	4.8	11.8	14.2	7.8
Private truck	10.2	3.6	26.8	7.7	S	S	13.0
Rail	49.2	5.1	S	S	S	S	22.9
Water	–	–	–	–	–	–	–
Air (includes truck and air)	39.0	1.4	35.0	–	35.9	.1	10.5
Pipeline	–	–	–	–	S	S	S
Multiple modes	**36.3**	**1.3**	**36.5**	**.1**	**27.2**	**.3**	**17.5**
Parcel, U.S. Postal Service or courier	36.2	1.3	39.8	–	25.2	.2	17.5
Other multiple modes	S	S	S	S	S	S	31.6
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**27.7**
HAZARD CLASS 2, GASES							
All modes	**7.6**	**–**	**5.1**	**–**	**12.8**	**–**	**12.7**
Single modes	**7.1**	**.8**	**4.6**	**1.5**	**13.2**	**.8**	**15.0**
Truck	11.0	2.3	9.1	2.5	12.1	1.8	12.7
For-hire truck	7.1	1.8	18.7	2.3	20.6	1.8	12.3
Private truck	19.3	3.3	10.0	2.4	12.9	1.8	5.1
Rail	18.9	2.0	12.8	1.5	19.9	3.9	7.2
Water	16.6	.6	22.5	1.0	41.9	3.8	22.9
Air (includes truck and air)	25.3	.4	30.8	–	S	S	11.4
Pipeline	11.4	3.0	8.8	3.5	S	S	S
Multiple modes	**19.4**	**.2**	**37.0**	**.1**	**38.5**	**.2**	**13.8**
Parcel, U.S. Postal Service or courier	18.2	.1	25.6	–	S	S	11.0
Other multiple modes	28.7	.1	37.8	.1	38.6	.2	S
Other and unknown modes	**34.7**	**.8**	**S**	**S**	**48.5**	**.9**	**S**
HAZARD CLASS 3, FLAMMABLE LIQUIDS							
All modes	**3.6**	**–**	**5.1**	**–**	**12.3**	**–**	**6.8**
Single modes	**3.6**	**.2**	**5.2**	**.1**	**12.7**	**.4**	**5.9**
Truck	5.0	2.5	5.5	3.1	7.4	4.4	5.9
For-hire truck	8.2	1.5	10.8	1.9	11.4	2.9	10.6
Private truck	3.7	1.5	4.2	1.8	9.8	1.7	4.5
Rail	8.9	.3	12.1	.2	11.3	2.0	3.8
Water	12.1	.7	17.3	1.2	28.7	4.8	S
Air (includes truck and air)	S	S	39.5	–	45.1	–	8.4
Pipeline	9.7	1.8	11.2	2.4	S	S	S
Multiple modes	**12.5**	**–**	**16.0**	**–**	**34.5**	**.4**	**11.2**
Parcel, U.S. Postal Service or courier	19.8	–	30.2	–	24.8	–	8.1
Other multiple modes	16.0	–	16.4	–	35.1	.4	S
Other and unknown modes	**15.3**	**.2**	**13.1**	**.1**	**19.3**	**.2**	**21.3**
HAZARD CLASS 4, FLAMMABLE SOLIDS							
All modes	**9.0**	**–**	**20.1**	**–**	**35.7**	**–**	**15.7**
Single modes	**8.7**	**1.7**	**20.4**	**.8**	**36.3**	**1.3**	**15.3**
Truck	10.9	2.5	3.6	6.1	12.3	4.1	19.2
For-hire truck	10.4	4.0	7.6	4.6	16.0	3.6	7.5
Private truck	26.9	3.5	21.7	3.0	26.3	1.0	28.9
Rail	14.0	2.8	37.0	6.4	39.7	4.5	9.9
Water	S	S	S	S	S	S	30.0
Air (includes truck and air)	45.9	.2	S	S	S	S	20.2
Pipeline	S	S	46.4	1.7	S	S	S
Multiple modes	**48.5**	**1.8**	**S**	**S**	**S**	**S**	**13.8**
Parcel, U.S. Postal Service or courier	S	S	42.3	–	48.0	–	14.1
Other multiple modes	S	S	S	S	S	S	26.1
Other and unknown modes	**38.4**	**.7**	**S**	**S**	**S**	**S**	**S**

See footnotes at end of table.

Table B–6a. **Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
HAZARD CLASS 5, OXIDIZERS AND ORGANIC PEROXIDES							
All modes	**13.7**	**–**	**12.1**	**–**	**18.7**	**–**	**13.9**
Single modes	**13.9**	**.6**	**12.1**	**1.0**	**18.8**	**.7**	**14.5**
Truck	14.7	5.4	14.1	4.5	18.7	6.0	15.1
For-hire truck	16.7	4.3	20.5	3.8	22.1	5.3	7.7
Private truck	13.7	2.6	12.6	3.1	15.5	1.2	18.1
Rail	40.2	5.4	21.2	4.5	26.1	5.9	11.4
Water	S	S	S	S	S	S	S
Air (includes truck and air)	46.3	–	S	S	S	S	23.9
Pipeline	–	–	–	–	S	S	S
Multiple modes	**35.6**	**.5**	**S**	**S**	**S**	**S**	**12.1**
Parcel, U.S. Postal Service or courier	S	S	47.7	–	34.4	–	9.2
Other multiple modes	43.8	.4	S	S	S	S	23.1
Other and unknown modes	**36.4**	**.5**	**S**	**S**	**S**	**S**	**42.0**
HAZARD CLASS 6, TOXIC (POISON)							
All modes	**8.8**	**–**	**16.4**	**–**	**10.9**	**–**	**13.3**
Single modes	**8.7**	**1.3**	**16.8**	**.7**	**10.8**	**1.4**	**13.0**
Truck	9.3	2.6	13.4	3.4	9.8	2.4	16.2
For-hire truck	10.5	3.0	11.3	3.1	10.6	2.3	7.8
Private truck	20.8	4.8	33.3	3.0	28.9	1.1	29.4
Rail	9.6	1.4	12.8	2.9	8.2	3.9	12.2
Water	S	S	S	S	S	S	24.6
Air (includes truck and air)	35.3	.3	S	S	S	S	9.4
Pipeline	30.0	.5	37.8	1.6	S	S	S
Multiple modes	**27.8**	**1.3**	**39.0**	**.6**	**S**	**S**	**23.0**
Parcel, U.S. Postal Service or courier	30.5	1.0	21.7	–	21.6	–	23.3
Other multiple modes	35.9	.3	40.2	.6	S	S	24.9
Other and unknown modes	**30.6**	**.6**	**31.5**	**.5**	**30.6**	**.2**	**23.7**
HAZARD CLASS 7, RADIOACTIVE MATERIALS							
All modes	**20.9**	**–**	**24.0**	**–**	**26.7**	**–**	**27.7**
Single modes	**21.7**	**3.5**	**23.3**	**3.1**	**21.5**	**8.1**	**26.7**
Truck	27.5	7.4	23.7	4.9	11.2	13.6	43.1
For-hire truck	19.3	4.3	23.0	7.0	15.2	12.2	49.1
Private truck	42.3	7.0	34.1	6.4	S	S	15.2
Rail	S	S	S	S	S	S	31.6
Water	–	–	–	–	–	–	–
Air (includes truck and air)	28.5	5.2	33.6	2.1	34.6	5.4	9.4
Pipeline	S	S	S	S	S	S	S
Multiple modes	**37.5**	**4.0**	**43.5**	**3.4**	**48.9**	**8.5**	**20.8**
Parcel, U.S. Postal Service or courier	37.5	4.0	43.5	3.4	48.9	8.5	20.8
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
HAZARD CLASS 8, CORROSIVE MATERIALS							
All modes	**20.9**	**–**	**9.7**	**–**	**18.3**	**–**	**19.9**
Single modes	**20.6**	**1.0**	**9.6**	**1.2**	**18.5**	**.8**	**21.5**
Truck	19.9	2.2	14.3	3.0	33.0	3.3	19.7
For-hire truck	29.1	2.7	20.0	3.1	39.3	3.3	7.0
Private truck	5.8	2.8	15.7	1.8	18.2	1.1	29.5
Rail	37.7	1.7	14.6	3.1	23.0	4.6	12.5
Water	35.6	2.5	26.5	5.1	38.5	7.1	46.1
Air (includes truck and air)	25.0	.1	27.2	–	31.6	–	9.4
Pipeline	S	S	30.5	.5	S	S	S
Multiple modes	**20.1**	**.6**	**32.4**	**.2**	**37.3**	**.4**	**16.1**
Parcel, U.S. Postal Service or courier	22.7	.5	27.5	–	24.1	–	16.8
Other multiple modes	32.1	.3	35.1	.2	38.1	.4	33.3
Other and unknown modes	**49.6**	**.7**	**42.3**	**1.1**	**S**	**S**	**28.0**

See footnotes at end of table.

Table B–6a. Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class and Mode of Transportation: 1997—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
HAZARD CLASS 9, MISCELLANEOUS DANGEROUS GOODS							
All modes	**7.6**	**–**	**14.1**	**–**	**12.7**	**–**	**8.8**
Single modes	**8.5**	**1.9**	**14.4**	**.4**	**13.1**	**.8**	**10.1**
Truck	7.3	3.5	12.6	4.5	10.5	5.7	15.2
For-hire truck	9.3	3.2	15.3	4.4	13.9	5.3	7.6
Private truck	19.7	2.8	20.2	3.4	21.2	1.5	13.2
Rail	19.9	3.7	24.2	3.9	18.9	5.5	8.7
Water	S	S	S	S	S	S	28.2
Air (includes truck and air)	33.5	.4	40.1	–	41.9	–	6.3
Pipeline	S	S	S	S	S	S	S
Multiple modes	**25.6**	**1.3**	**22.0**	**.3**	**19.9**	**.8**	**16.9**
Parcel, U.S. Postal Service or courier	36.2	1.0	28.9	–	31.9	–	18.0
Other multiple modes	28.9	.5	22.0	.3	19.9	.8	12.4
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**37.4**

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–6b. Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
DIVISION 1.1, EXPLOSIVES WITH A MASS EXPLOSION HAZARD							
All modes	**22.7**	**–**	**S**	**S**	**S**	**S**	**15.9**
Single modes	**22.8**	**.4**	**S**	**S**	**S**	**S**	**16.0**
Truck	22.7	10.2	38.3	15.5	S	S	16.4
For-hire truck	29.9	9.4	26.1	12.3	23.8	16.6	34.5
Private truck	16.0	8.9	S	S	S	S	21.4
Rail	S	S	S	S	S	S	27.6
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	31.6
Pipeline	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	S
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**44.0**
DIVISION 1.2, EXPLOSIVES WITH A PROJECTION HAZARD							
All modes	**S**	**S**	**42.8**	**–**	**48.7**	**–**	**21.5**
Single modes	**S**	**S**	**42.8**	**–**	**48.7**	**–**	**21.6**
Truck	S	S	43.0	3.8	49.0	4.5	21.5
For-hire truck	S	S	44.0	11.5	49.0	11.4	19.8
Private truck	S	S	S	S	S	S	31.6
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	31.6
Pipeline	–	–	–	–	S	S	S
Multiple modes	**–**	**–**	**–**	**–**	**–**	**–**	**–**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**31.6**
DIVISION 1.3, EXPLOSIVES WITH PREDOMINANTLY A FIRE HAZARD							
All modes	**40.1**	**–**	**30.3**	**–**	**26.1**	**–**	**39.9**
Single modes	**44.2**	**6.4**	**30.5**	**9.9**	**28.2**	**8.2**	**19.5**
Truck	44.4	7.0	30.5	9.9	28.2	8.2	20.4
For-hire truck	46.7	10.3	30.7	11.4	29.5	9.3	12.1
Private truck	41.7	8.2	S	S	S	S	27.4
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	29.8
Pipeline	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	S
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**29.8**
DIVISION 1.4, EXPLOSIVES WITH NO SIGNIFICANT BLAST HAZARD							
All modes	**21.7**	**–**	**24.4**	**–**	**27.5**	**–**	**13.6**
Single modes	**22.1**	**4.0**	**24.9**	**1.9**	**27.6**	**1.3**	**25.6**
Truck	14.7	5.7	22.5	5.8	17.1	8.6	30.7
For-hire truck	18.6	7.0	18.6	6.1	19.4	9.6	12.1
Private truck	24.3	4.3	42.3	5.2	S	S	26.4
Rail	S	S	S	S	S	S	29.5
Water	–	–	–	–	–	–	–
Air (includes truck and air)	42.7	2.5	41.7	.8	41.8	.4	10.3
Pipeline	–	–	–	–	S	S	S
Multiple modes	**37.1**	**4.1**	**20.6**	**1.7**	**19.7**	**1.4**	**14.9**
Parcel, U.S. Postal Service or courier	37.1	4.1	20.6	1.7	19.7	1.4	14.9
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**28.0**

See footnotes at end of table.

Table B–6b. **Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
DIVISION 1.5, VERY INSENSITIVE EXPLOSIVES, BLASTING AGENTS							
All modes	**13.4**	**–**	**18.8**	**–**	**41.6**	**–**	**11.7**
Single modes	**13.4**	**.3**	**18.8**	**.4**	**41.9**	**1.4**	**11.8**
Truck	13.4	.3	18.8	.4	41.9	1.4	11.8
For-hire truck	34.8	2.2	40.9	2.9	37.8	9.1	30.2
Private truck	13.5	2.3	20.1	3.1	S	S	14.5
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**31.6**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	S	S	S	S	S	S	31.6
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**31.6**
DIVISION 2.1, FLAMMABLE GASES							
All modes	**12.0**	**–**	**6.6**	**–**	**10.7**	**–**	**19.3**
Single modes	**11.0**	**1.3**	**6.7**	**.9**	**11.4**	**1.5**	**23.6**
Truck	20.4	3.4	12.8	3.2	10.9	3.4	20.3
For-hire truck	11.7	2.2	19.7	3.1	17.6	3.7	15.2
Private truck	32.4	4.5	15.9	2.2	19.1	1.3	9.3
Rail	12.9	1.4	14.9	1.5	21.2	6.3	9.1
Water	20.7	.9	18.9	.9	47.4	4.8	29.1
Air (includes truck and air)	S	S	S	S	S	S	25.9
Pipeline	11.6	4.1	9.4	3.7	S	S	S
Multiple modes	**27.4**	**.2**	**37.9**	**.2**	**42.7**	**.5**	**19.8**
Parcel, U.S. Postal Service or courier	30.0	–	38.5	–	36.3	–	10.3
Other multiple modes	33.0	.2	38.5	.2	44.1	.5	S
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
DIVISION 2.2, NONFLAMMABLE, NONTOXIC COMPRESSED GASES							
All modes	**4.1**	**–**	**10.8**	**–**	**12.6**	**–**	**13.0**
Single modes	**4.1**	**.8**	**9.7**	**1.5**	**13.0**	**1.2**	**16.5**
Truck	5.9	2.5	11.2	3.0	19.0	5.8	15.7
For-hire truck	11.2	3.3	33.8	4.1	43.4	5.1	12.7
Private truck	9.2	3.5	15.2	5.8	16.5	5.7	12.4
Rail	21.6	1.2	23.0	1.8	19.2	4.3	7.3
Water	48.2	1.8	45.8	2.1	42.8	4.0	26.0
Air (includes truck and air)	25.5	1.0	32.8	–	29.8	–	9.9
Pipeline	20.0	.5	29.8	1.7	S	S	S
Multiple modes	**21.6**	**.3**	**25.2**	**–**	**48.7**	**.1**	**13.5**
Parcel, U.S. Postal Service or courier	24.9	.3	34.8	–	S	S	13.1
Other multiple modes	42.5	–	S	S	S	S	S
Other and unknown modes	**23.1**	**.6**	**S**	**S**	**S**	**S**	**S**
DIVISION 2.3, GASES TOXIC BY INHALATION							
All modes	**33.9**	**–**	**21.7**	**–**	**41.1**	**–**	**20.2**
Single modes	**35.5**	**2.8**	**19.8**	**6.4**	**41.5**	**.7**	**20.6**
Truck	26.7	2.8	13.4	2.6	18.8	.9	14.0
For-hire truck	S	S	44.6	.5	23.1	.3	23.3
Private truck	7.4	3.2	12.6	2.6	22.7	.7	11.2
Rail	43.4	4.6	27.2	7.1	42.6	1.0	9.7
Water	S	S	S	S	S	S	29.0
Air (includes truck and air)	S	S	S	S	S	S	29.0
Pipeline	49.3	4.6	S	S	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**31.2**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	31.2
Other multiple modes	S	S	S	S	S	S	31.6
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**

See footnotes at end of table.

Table B–6b. **Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
DIVISION 4.1, FLAMMABLE SOLIDS							
All modes	**10.8**	**–**	**24.3**	**–**	**40.8**	**–**	**14.4**
Single modes	**12.2**	**3.3**	**24.6**	**.9**	**41.5**	**1.5**	**15.3**
Truck	15.0	4.6	4.9	7.0	18.9	4.6	19.5
For-hire truck	20.6	5.4	8.6	5.2	23.3	3.7	10.7
Private truck	22.5	5.4	25.4	3.3	30.8	1.5	28.2
Rail	41.3	4.1	40.6	7.2	43.8	4.9	18.8
Water	S	S	S	S	S	S	31.6
Air (includes truck and air)	S	S	S	S	S	S	26.8
Pipeline	S	S	46.4	2.1	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**13.9**
Parcel, U.S. Postal Service or courier	S	S	42.8	–	47.5	–	13.7
Other multiple modes	S	S	S	S	S	S	32.7
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**37.4**
DIVISION 4.2, SPONTANEOUSLY COMBUSTIBLE MATERIALS							
All modes	**13.3**	**–**	**14.4**	**–**	**10.7**	**–**	**27.8**
Single modes	**13.4**	**.9**	**14.5**	**.4**	**10.6**	**.4**	**37.0**
Truck	19.7	8.4	28.7	7.9	21.3	7.7	44.4
For-hire truck	22.7	7.7	34.5	8.1	21.0	6.4	16.9
Private truck	17.2	1.7	18.5	1.7	32.2	1.4	S
Rail	16.6	8.1	13.5	7.8	13.9	7.6	4.8
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	29.2
Pipeline	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**28.6**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	29.8
Other multiple modes	S	S	S	S	S	S	29.0
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**30.5**
DIVISION 4.3, DANGEROUS WHEN WET MATERIALS							
All modes	**25.0**	**–**	**24.5**	**–**	**27.6**	**–**	**19.9**
Single modes	**22.6**	**2.0**	**23.1**	**2.0**	**27.0**	**.8**	**14.2**
Truck	24.3	4.2	22.3	4.1	27.9	5.6	16.5
For-hire truck	20.8	5.1	26.3	6.6	28.5	6.2	7.2
Private truck	S	S	48.3	7.0	S	S	28.8
Rail	22.0	4.8	41.1	4.1	32.2	5.6	20.8
Water	S	S	S	S	S	S	31.6
Air (includes truck and air)	S	S	S	S	S	S	29.7
Pipeline	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**21.8**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	24.4
Other multiple modes	S	S	S	S	S	S	27.6
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**30.0**
DIVISION 5.1, OXIDIZERS							
All modes	**13.7**	**–**	**12.2**	**–**	**18.9**	**–**	**15.0**
Single modes	**14.0**	**.7**	**12.1**	**1.0**	**19.0**	**.7**	**16.0**
Truck	14.5	5.6	14.2	4.5	19.3	6.0	16.3
For-hire truck	17.1	4.5	20.8	3.9	23.0	5.3	8.1
Private truck	13.8	3.0	12.8	3.2	16.1	1.3	20.4
Rail	40.2	5.6	21.2	4.6	26.1	5.9	11.4
Water	S	S	S	S	S	S	S
Air (includes truck and air)	S	S	45.4	–	S	S	30.9
Pipeline	–	–	–	–	S	S	S
Multiple modes	**39.7**	**.5**	**S**	**S**	**S**	**S**	**11.0**
Parcel, U.S. Postal Service or courier	S	S	S	S	40.2	–	11.7
Other multiple modes	S	S	S	S	S	S	25.3
Other and unknown modes	**35.8**	**.5**	**S**	**S**	**S**	**S**	**44.2**

See footnotes at end of table.

Table B–6b. Measures of Reliability for Hazardous Material Shipment Characteristics by Hazard Class Division and Mode of Transportation: 1997—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

Hazard class division and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
DIVISION 5.2, ORGANIC PEROXIDES							
All modes	**23.8**	**–**	**19.9**	**–**	**23.7**	**–**	**18.9**
Single modes	**24.5**	**2.0**	**20.0**	**1.3**	**24.7**	**3.6**	**16.4**
Truck	24.5	2.0	20.0	1.3	24.7	3.6	21.3
For-hire truck	24.9	6.6	22.0	6.8	22.7	8.4	12.6
Private truck	43.4	7.0	41.2	7.3	S	S	13.7
Rail	–	–	–	–	–	–	–
Water	–	–	–	–	–	–	–
Air (includes truck and air)	S	S	S	S	S	S	31.6
Pipeline	–	–	–	–	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**46.9**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	41.3
Other multiple modes	S	S	S	S	S	S	31.6
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**26.8**

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–7. Measures of Reliability for Hazardous Material Shipment Characteristics by Selected UN Numbers and Mode of Transportation: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number, description, and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
UN 1005, AMMONIA, ANHYDROUS							
All modes	**23.4**	**–**	**23.0**	**–**	**20.2**	**–**	**23.4**
Single modes	**25.9**	**4.4**	**26.4**	**6.8**	**20.9**	**2.2**	**24.3**
Truck	27.6	5.6	31.1	7.2	S	S	22.9
For-hire truck	S	S	S	S	S	S	12.4
Private truck	21.7	6.5	22.2	6.3	22.4	3.1	36.2
Rail	33.8	3.3	26.5	3.2	21.2	7.8	8.2
Water	44.8	4.0	48.8	5.9	45.6	6.9	28.1
Air (includes truck and air)	S	S	S	S	S	S	31.6
Pipeline	S	S	48.2	4.0	S	S	S
Multiple modes	**–**	**–**	**–**	**–**	**–**	**–**	**–**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	–	–	–	–	–	–	–
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
UN 1075, PETROLEUM GASES							
All modes	**18.9**	**–**	**8.1**	**–**	**9.3**	**–**	**19.2**
Single modes	**16.6**	**1.3**	**8.2**	**.4**	**9.3**	**.8**	**18.6**
Truck	25.7	4.3	14.4	4.9	12.8	5.2	19.5
For-hire truck	14.7	4.0	20.8	4.8	18.8	5.5	23.0
Private truck	38.1	6.3	18.4	3.6	25.3	2.1	9.9
Rail	14.1	1.1	18.1	2.0	20.2	5.3	6.6
Water	38.9	1.4	39.4	1.3	34.5	2.9	23.3
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline	13.3	4.9	17.1	5.4	S	S	S
Multiple modes	**41.5**	**.4**	**S**	**S**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	46.2	–	S	S	23.9
Other multiple modes	43.7	.4	S	S	S	S	S
Other and unknown modes	**S**	**S**	**48.4**	**.2**	**S**	**S**	**S**
UN 1202, GAS OIL, DIESEL FUEL, HEATING OIL, LIGHT							
All modes	**27.3**	**–**	**29.3**	**–**	**26.4**	**–**	**20.3**
Single modes	**28.5**	**3.0**	**30.3**	**2.7**	**26.8**	**1.3**	**21.0**
Truck	17.7	6.6	18.6	6.7	45.7	5.3	20.3
For-hire truck	33.3	5.6	34.0	5.9	S	S	19.2
Private truck	11.4	2.5	11.8	1.7	10.8	5.5	26.3
Rail	S	S	S	S	S	S	31.4
Water	23.5	6.0	24.7	8.0	34.1	10.9	S
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline	44.2	9.6	46.3	10.6	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**29.8**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	S	S	S	S	S	S	29.8
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**26.5**
UN 1203, GASOLINE							
All modes	**4.7**	**–**	**7.3**	**–**	**20.0**	**–**	**8.7**
Single modes	**4.8**	**.2**	**7.4**	**.2**	**20.2**	**.8**	**5.6**
Truck	7.2	2.4	7.9	3.3	9.1	7.7	5.7
For-hire truck	11.8	1.7	14.0	2.3	14.3	4.4	9.2
Private truck	5.7	1.3	6.0	1.5	13.0	3.6	8.1
Rail	24.3	.1	22.7	.1	32.5	.7	15.2
Water	22.3	.8	38.1	1.5	46.3	7.6	S
Air (includes truck and air)	46.4	–	S	S	S	S	23.4
Pipeline	8.2	1.9	12.6	2.4	S	S	S
Multiple modes	**16.8**	**–**	**16.5**	**–**	**S**	**S**	**32.3**
Parcel, U.S. Postal Service or courier	43.4	–	S	S	S	S	17.6
Other multiple modes	17.4	–	16.5	–	S	S	S
Other and unknown modes	**25.0**	**.2**	**24.4**	**.1**	**23.3**	**–**	**16.3**

See footnotes at end of table.

Table B–7. Measures of Reliability for Hazardous Material Shipment Characteristics by Selected UN Numbers and Mode of Transportation: 1997—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number, description, and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
UN 1223, KEROSENE							
All modes	**18.3**	**–**	**19.0**	**–**	**24.4**	**–**	**13.0**
Single modes	**18.5**	**.7**	**19.1**	**.5**	**24.6**	**.8**	**12.8**
Truck	20.1	8.8	18.5	10.1	24.4	10.1	12.8
For-hire truck	31.9	3.1	29.4	3.2	33.5	3.4	43.2
Private truck	25.4	8.2	23.8	8.8	26.3	9.8	12.3
Rail	–	–	–	–	–	–	–
Water	S	S	S	S	S	S	31.6
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline	26.5	9.3	26.2	10.9	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**29.5**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	31.6
Other multiple modes	S	S	S	S	S	S	30.5
Other and unknown modes	**49.6**	**.1**	**S**	**S**	**S**	**S**	**35.6**
UN 1824, SODIUM HYDROXIDE SOLUTION							
All modes	**23.5**	**–**	**17.7**	**–**	**32.2**	**–**	**17.2**
Single modes	**23.9**	**2.0**	**18.7**	**3.5**	**33.1**	**5.0**	**18.0**
Truck	12.4	8.4	16.2	5.5	18.8	4.4	10.0
For-hire truck	10.0	5.7	14.4	2.8	22.6	3.3	8.0
Private truck	20.5	4.1	24.2	3.4	17.7	1.5	15.8
Rail	16.5	2.9	12.5	5.4	12.4	10.0	7.3
Water	S	S	36.2	9.6	47.3	14.8	22.2
Air (includes truck and air)	S	S	S	S	S	S	21.3
Pipeline	40.6	.5	40.6	.7	S	S	S
Multiple modes	**S**	**S**	**30.3**	**–**	**28.7**	**–**	**21.2**
Parcel, U.S. Postal Service or courier	S	S	34.6	–	S	S	21.6
Other multiple modes	S	S	31.9	–	31.9	–	25.8
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**S**
UN 1830, SULFURIC ACID							
All modes	**26.0**	**–**	**23.9**	**–**	**25.0**	**–**	**8.5**
Single modes	**26.0**	**.8**	**24.1**	**.9**	**25.5**	**5.6**	**8.9**
Truck	27.6	4.2	26.1	4.9	31.1	3.7	9.9
For-hire truck	25.2	5.3	22.5	5.1	23.1	2.3	10.2
Private truck	41.6	3.4	S	S	S	S	11.7
Rail	37.9	3.8	29.4	6.1	31.8	10.0	14.6
Water	S	S	S	S	S	S	26.5
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline	48.4	2.2	S	S	S	S	S
Multiple modes	**37.6**	**.8**	**43.5**	**.8**	**S**	**S**	**32.6**
Parcel, U.S. Postal Service or courier	42.9	.4	47.6	–	39.7	–	S
Other multiple modes	49.3	.9	43.5	.8	S	S	26.5
Other and unknown modes	**41.1**	**.3**	**S**	**S**	**S**	**S**	**36.8**
UN 1863, FUEL, AVIATION, TURBINE ENGINE							
All modes	**12.8**	**–**	**12.8**	**–**	**23.9**	**–**	**29.5**
Single modes	**12.8**	**.3**	**12.9**	**.2**	**23.9**	**.2**	**29.1**
Truck	33.6	2.8	34.6	2.6	25.0	2.4	40.1
For-hire truck	36.0	2.5	38.3	2.5	28.2	2.3	S
Private truck	38.4	1.3	37.7	1.0	S	S	17.9
Rail	43.1	1.4	41.5	1.0	41.4	3.0	24.1
Water	S	S	S	S	S	S	27.9
Air (includes truck and air)	45.7	–	S	S	S	S	24.5
Pipeline	13.1	4.7	13.1	4.8	S	S	S
Multiple modes	**32.8**	**.3**	**35.6**	**.2**	**S**	**S**	**S**
Parcel, U.S. Postal Service or courier	S	S	S	S	S	S	31.6
Other multiple modes	32.8	.3	35.6	.2	S	S	S
Other and unknown modes	**–**	**–**	**–**	**–**	**–**	**–**	**–**

See footnotes at end of table.

Table B–7. **Measures of Reliability for Hazardous Material Shipment Characteristics by Selected UN Numbers and Mode of Transportation: 1997**—Con.

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number, description, and mode of transportation	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
UN 1993, FLAMMABLE LIQUIDS, N.O.S.							
All modes	**3.7**	**–**	**5.6**	**–**	**12.3**	**–**	**8.4**
Single modes	**3.8**	**.5**	**5.7**	**.4**	**12.9**	**1.4**	**8.3**
Truck	3.4	2.0	3.8	3.0	10.6	6.0	8.1
For-hire truck	4.9	1.2	8.4	1.2	15.3	4.1	9.7
Private truck	6.0	2.2	6.6	3.1	6.5	2.2	5.6
Rail	12.3	.4	25.9	.6	18.8	3.3	10.8
Water	17.8	1.4	25.7	2.4	30.6	6.2	21.7
Air (includes truck and air)	29.7	–	S	S	45.6	–	18.7
Pipeline	9.7	1.4	11.6	1.7	S	S	S
Multiple modes	**22.3**	**.3**	**41.1**	**.2**	**41.5**	**1.0**	**15.5**
Parcel, U.S. Postal Service or courier	39.5	–	S	S	S	S	20.8
Other multiple modes	28.9	.4	41.9	.2	42.2	1.0	S
Other and unknown modes	**20.7**	**.4**	**24.6**	**.3**	**38.6**	**.5**	**27.3**
UN 3257, ELEVATED TEMPERATURE LIQUID, N.O.S.							
All modes	**16.3**	**–**	**18.7**	**–**	**19.4**	**–**	**8.7**
Single modes	**16.5**	**.3**	**18.7**	**.2**	**19.4**	**.1**	**8.7**
Truck	13.6	4.4	15.7	6.0	16.6	9.0	9.7
For-hire truck	15.4	5.0	20.0	5.4	22.5	7.3	8.7
Private truck	26.2	4.1	23.1	4.5	25.2	3.4	12.7
Rail	29.4	3.6	33.1	5.0	25.1	7.9	14.4
Water	S	S	S	S	S	S	30.5
Air (includes truck and air)	–	–	–	–	–	–	–
Pipeline	S	S	S	S	S	S	S
Multiple modes	**S**	**S**	**S**	**S**	**S**	**S**	**37.8**
Parcel, U.S. Postal Service or courier	–	–	–	–	–	–	–
Other multiple modes	S	S	S	S	S	S	37.8
Other and unknown modes	**S**	**S**	**S**	**S**	**S**	**S**	**28.8**
ALL OTHER							
All modes	**9.7**	**–**	**7.2**	**–**	**12.5**	**–**	**13.0**
Single modes	**9.8**	**.5**	**6.7**	**.5**	**12.6**	**.3**	**12.1**
Truck	6.8	2.5	7.9	1.5	17.1	1.9	11.7
For-hire truck	10.7	1.7	11.9	1.4	22.0	1.9	5.2
Private truck	5.0	1.8	9.0	1.7	8.8	.7	9.2
Rail	21.5	1.3	10.6	1.5	14.3	2.5	5.6
Water	15.9	1.1	17.9	2.1	25.3	2.8	33.0
Air (includes truck and air)	47.0	1.6	16.7	–	21.9	–	3.3
Pipeline	22.5	1.4	11.8	1.8	S	S	S
Multiple modes	**10.6**	**.3**	**10.9**	**–**	**13.9**	**.3**	**10.1**
Parcel, U.S. Postal Service or courier	14.3	.3	14.3	–	21.4	–	10.0
Other multiple modes	9.7	.1	11.8	–	13.9	.2	S
Other and unknown modes	**19.6**	**.4**	**28.6**	**.5**	**24.8**	**.2**	**30.7**

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–8a. Measures of Reliability for Hazardous Material Shipment Characteristics by For-Hire Truck for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**7.4**	**–**	**9.1**	**–**	**13.8**	**–**	**6.0**
1005	Ammonia, anhydrous	S	S	S	S	S	S	12.4
1075	Petroleum gases	14.7	.4	20.8	.9	18.8	.9	23.0
1090	Acetone	48.1	.2	S	S	32.9	.1	23.3
1202	Gas oil, diesel fuel, heating oil, light	33.3	.3	34.0	.4	S	S	19.2
1203	Gasoline	11.8	2.3	14.0	2.2	14.3	2.6	9.2
1263	Paint	10.9	.5	8.8	–	10.8	.4	8.3
1760	Corrosive liquids, n.o.s.	19.7	.3	19.2	–	12.9	.3	6.7
1789	Hydrochloric acid	30.2	.1	13.0	–	17.3	.1	16.4
1805	Phosphoric acid	49.8	.2	27.7	.1	34.1	.2	16.0
1824	Sodium hydroxide solution	10.0	–	14.4	.2	22.6	.4	8.0
1830	Sulfuric acid	25.2	–	22.5	.5	23.1	.5	10.2
1863	Fuel, aviation, turbine engine	36.0	.3	38.3	.5	28.2	.1	S
1866	Resin solution (flammable)	29.6	.6	32.3	.1	32.6	.5	12.2
1993	Flammable liquids, n.o.s.	4.9	.8	8.4	1.8	15.3	1.1	9.7
2215	Maleic anhydride	S	S	S	S	S	S	23.0
2448	Sulfur, molten	31.9	–	9.8	.1	30.1	.2	18.1
2794	Batteries, wet, filled with acid	15.5	.4	16.2	.1	18.4	.7	15.5
3077	Enivornmentally hazardous substances, solid, n.o.s.	16.8	.2	11.7	.1	25.2	.3	16.4
3082	Environmentally hazardous substances, liquid, n.o.s.	16.2	.3	17.7	.2	18.9	.5	8.2
3257	Elevated temperature liquid, n.o.s.	15.4	.3	20.0	1.1	22.5	1.6	8.7
	All other	9.0	1.4	8.5	.6	12.2	1.4	5.9

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–8b. Measures of Reliability for Hazardous Material Shipment Characteristics by Private Truck for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**3.5**	**–**	**4.4**	**–**	**8.8**	**–**	**5.0**
1005	Ammonia, anhydrous	21.7	.1	22.2	.1	22.4	.2	36.2
1072	Oxygen, compress	17.6	–	18.8	–	20.8	–	6.4
1073	Oxygen, refrigerated liquid	27.2	–	35.8	.2	30.0	.3	19.4
1075	Petroleum gases	38.1	1.2	18.4	.3	25.3	.5	9.9
1202	Gas oil, diesel fuel, heating oil, light	11.4	–	11.8	.1	10.8	–	26.3
1203	Gasoline	5.7	1.6	6.0	1.3	13.0	2.2	8.1
1223	Kerosene	25.4	.2	23.8	.2	26.3	.2	12.3
1263	Paint	10.2	.3	12.0	–	17.4	.2	23.3
1789	Hydrochloric acid	19.9	–	35.5	–	32.2	.1	11.5
1791	Hypochlorite solutions	12.6	–	12.8	–	11.3	–	8.1
1824	Sodium hydroxide solution	20.5	–	24.2	.1	17.7	.1	15.8
1830	Sulfuric acid	41.6	–	S	S	S	S	11.7
1863	Fuel, aviation, turbine engine	38.4	.1	37.7	.1	S	S	17.9
1951	Argon, refrigerated liquid	34.7	.1	37.8	.1	37.5	.2	15.9
1977	Nitrogen, refrigerated liquid	17.8	–	26.4	.3	26.6	.7	14.7
1993	Flammable liquids, n.o.s.	6.0	1.2	6.6	1.6	6.5	1.3	5.6
1999	Tars, liquid	30.5	–	22.3	–	20.9	–	46.4
2187	Carbon dioxide, refrigerated liquid	29.2	–	31.9	.1	32.7	.3	S
2794	Batteries, wet, filled with acid	18.1	.4	24.4	–	40.9	.6	S
3257	Elevated temperature liquid, n.o.s.	26.2	.2	23.1	.5	25.2	1.1	12.7
	All other	8.3	1.1	8.4	.4	6.7	.9	17.3

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–8c. Measures of Reliability for Hazardous Material Shipment Characteristics by Rail for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**16.3**	**–**	**9.2**	**–**	**12.8**	**–**	**5.9**
1005	Ammonia, anhydrous	33.8	.6	26.5	.8	21.2	.8	8.2
1017	Chlorine	13.9	.4	14.6	.6	20.1	.6	8.6
1040	Ethylene oxide	S	S	S	S	S	S	17.5
1075	Petroleum gases	14.1	.4	18.1	.6	20.2	.5	6.6
1086	Vinyl chloride, inhibited or vinyl chlorine, stabilized	17.0	.3	17.6	.3	28.1	.5	17.5
1203	Gasoline	24.3	1.0	22.7	1.2	32.5	.9	15.2
1268	Petroleum distillates, n.o.s.	32.1	.6	36.9	.5	40.5	.7	16.5
1789	Hydrochloric acid	23.6	–	18.5	.4	23.3	.4	8.4
1805	Phosphoric acid	17.6	.4	19.2	.6	24.2	1.0	9.5
1814	Potassium hydroxide, solution	S	S	S	S	S	S	24.0
1824	Sodium hydroxide, solution	16.5	.5	12.5	1.0	12.4	.7	7.3
1830	Sulfuric acid	37.9	.3	29.4	2.2	31.8	1.0	14.6
1863	Fuel, aviation, turbine engine	43.1	.3	41.5	.6	41.4	.4	24.1
1993	Flammable liquid, n.o.s.	12.3	1.0	25.9	1.7	18.8	.8	10.8
2055	Styrene monomer, inhibited	35.8	.8	28.3	.3	33.2	.6	8.3
2215	Maleic anhydride	S	S	S	S	S	S	18.5
2448	Sulfur, molten	S	S	42.0	1.6	44.4	2.8	19.0
3077	Environmentally hazardous substances, solid, n.o.s.	17.1	.8	11.1	.3	24.1	.5	12.7
3082	Environmentally hazardous substances, liquid, n.o.s.	45.6	1.6	36.1	.8	38.1	1.0	5.2
3257	Elevated temperature liquid, n.o.s.	29.4	1.7	33.1	3.3	25.1	2.1	14.4
	All other	17.0	2.5	7.3	2.4	10.8	3.6	7.3

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–8d. Measures of Reliability for Hazardous Material Shipment Characteristics by Water for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**11.2**	**–**	**15.8**	**–**	**22.0**	**–**	**S**
1005	Ammonia, anhydrous	44.8	.7	48.8	1.5	45.6	1.5	28.1
1075	Petroleum gases	38.9	.6	39.4	.4	34.5	.4	23.3
1093	Acylonitrile, Inhibited	S	S	S	S	S	S	32.1
1114	Benzene	21.0	.5	22.1	.4	22.5	.1	S
1145	Cyclopentane	36.5	.5	35.8	.3	45.5	.3	23.5
1202	Gas oil, diesel fuel, heating oil, light	23.5	1.4	24.7	2.0	34.1	.7	S
1203	Gasoline	22.3	4.7	38.1	6.6	46.3	9.3	S
1230	Methanol	S	S	S	S	46.4	1.7	34.7
1268	Petroleum distillates, n.o.s.	S	S	S	S	S	S	44.8
1307	Xylenes	S	S	S	S	S	S	27.9
1760	Corrosive liquids, n.o.s.	S	S	S	S	S	S	S
1814	Potasium hydroxide, solution	S	S	S	S	S	S	29.1
1824	Sodium hydroxide solution	S	S	36.2	2.4	47.3	6.6	22.2
1830	Sulfuric acid	S	S	S	S	S	S	26.5
1831	Sulfuric acid, fuming	S	S	S	S	S	S	30.0
1863	Fuel, aviation, turbine engine	S	S	S	S	S	S	27.9
1918	Isopropylbenzene	S	S	S	S	S	S	30.7
1993	Flammable liquids, n.o.s.	17.8	2.3	25.7	3.5	30.6	5.1	21.7
2055	Styrene monomer, inhibited	35.7	1.8	30.4	.6	37.0	.4	32.4
3257	Elevated temperature liquid, n.o.s.	S	S	S	S	S	S	30.5
	All other	21.4	2.8	16.3	1.3	26.1	1.5	46.6

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–8e. Measures of Reliability for Hazardous Material Shipment Characteristics by Air (Includes Truck and Air) for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**46.5**	**–**	**21.7**	**–**	**21.7**	**–**	**3.5**
1062	Methyl bromide	S	S	S	S	S	S	31.6
1197	Extracts, flavoring, liquids	S	S	S	S	S	S	29.7
1203	Gasoline	46.4	.5	S	S	S	S	23.4
1210	Printing ink (flammable)	S	S	S	S	S	S	24.0
1263	Paint	S	S	S	S	S	S	18.2
1760	Corrosive liquids, n.o.s.	S	S	S	S	S	S	30.3
1824	Sodium hydroxide solution	S	S	S	S	S	S	21.3
1863	Fuel, aviation, turbine engine	45.7	–	S	S	S	S	24.5
1866	Resin solution (flammable)	42.0	.3	33.2	.5	47.3	.4	19.5
1897	Tetrachloroethylene	S	S	S	S	S	S	31.6
1956	Compressed gases, n.o.s.	45.9	7.9	S	S	45.0	4.2	14.3
1977	Nitrogen, refrigerated liquid	S	S	34.8	.1	42.7	–	27.7
1993	Flammable liquids, n.o.s.	29.7	.4	S	S	45.6	1.9	18.7
2794	Batteries, wet, filled with acid	S	S	S	S	S	S	28.3
2982	Radioactive material, n.o.s.	32.0	6.2	34.3	5.3	35.0	5.7	16.1
2990	Life-saving appliances, self-inflating	S	S	S	S	S	S	26.6
3089	Toxic solids, oxidizing, n.o.s.	S	S	S	S	S	S	S
3090	Lithium battery	S	S	S	S	S	S	34.4
3268	Air bag inflators	42.8	2.8	46.3	5.5	46.3	5.9	17.9
3320	Sodium borohydride and sodium hydroxide solution	S	S	S	S	S	S	31.6
	All other	27.6	10.3	15.6	2.5	15.6	2.9	4.6

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**46.5**	**–**	**21.7**	**–**	**21.7**	**–**	**3.5**
0323	Cartridges, power device	S	S	S	S	S	S	22.2
0410	Fuzes, detonating	S	S	S	S	49.8	–	25.1
1066	Nitrogen, compressed	S	S	S	S	S	S	23.8
1072	Oxygen, compressed	S	S	S	S	S	S	30.8
1197	Extracts, flavoring, liquid	S	S	S	S	S	S	29.7
1263	Paint	S	S	S	S	S	S	18.2
1588	Cyanides, inorganic, solid, n.o.s	S	S	S	S	S	S	28.3
1824	Sodium hydroxide solution	S	S	S	S	S	S	21.3
1866	Resin solution (flammable)	42.0	.3	33.2	.5	47.3	.4	19.5
1956	Compressed gases, n.o.s.	45.9	7.9	S	S	45.0	4.2	14.3
1977	Nitrogen, refrigerated liquid	S	S	34.8	.1	42.7	–	27.7
1993	Flammable liquids, n.o.s.	29.7	.4	S	S	45.6	1.9	18.7
2074	Acrylamide	S	S	S	S	S	S	27.9
2800	Batteries, wet, nonspillable	S	S	S	S	S	S	28.1
2910	Radioactive material	S	S	45.2	.1	43.8	.2	17.4
2982	Radioactive material, n.o.s.	32.0	6.2	34.3	5.3	35.0	5.7	16.1
2990	Life-saving appliances, self-inflating	S	S	S	S	S	S	26.6
3090	Lithium battery	S	S	S	S	S	S	34.4
3091	Lithium batteries, contained in equipment	S	S	46.8	.1	45.3	.2	27.1
3268	Air bag inflators	42.8	2.8	46.3	5.5	46.3	5.9	17.9
	All other	11.7	4.9	46.8	10.7	42.3	10.1	5.9

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Table B–8f. Measures of Reliability for Hazardous Material Shipment Characteristics by Pipeline for Selected UN Numbers for the United States: 1997

[For explanation of terms and meaning of abbreviations and symbols, see introductory text]

UN number	Description	Value		Tons		Ton-miles		Average miles per shipment—coefficient of variation
		Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	Coefficient of variation of number	Standard error of percentage	
	Total	**8.4**	**–**	**10.3**	**–**	**S**	**S**	**S**
1005	Ammonia, anhydrous	S	S	48.2	.1	S	S	S
1010	Butadienes, inhibited	24.3	.2	25.5	.1	S	S	S
1011	Butane	37.6	.1	41.2	.3	S	S	S
1016	Carbon monoxide, compressed	S	S	S	S	S	S	S
1038	Ethylene, refrigerated liquid	S	S	S	S	S	S	S
1072	Oxygen, compressed	40.6	–	43.0	.1	S	S	S
1075	Petroleum gases	13.3	.5	17.1	.6	S	S	S
1077	Propylene	22.3	.5	25.9	.3	S	S	S
1114	Benzene	S	S	S	S	S	S	S
1202	Gas oil, diesel fuel, heating oil, light	44.2	3.1	46.3	3.5	S	S	S
1203	Gasoline	8.2	2.5	12.6	3.2	S	S	S
1223	Kerosene	26.5	.5	26.2	.7	S	S	S
1230	Methanol	S	S	S	S	S	S	S
1268	Petroleum distillates, n.o.s.	47.1	.1	48.9	.1	S	S	S
1824	Sodium hydroxide solution	40.6	–	40.6	–	S	S	S
1830	Sulfuric acid	48.4	–	S	S	S	S	S
1863	Fuel, aviation, turbine engine	13.1	.8	13.1	.8	S	S	S
1962	Ethylene, compressed	18.3	.9	15.7	.4	S	S	S
1993	Flammable liquids, n.o.s.	9.7	1.3	11.6	1.6	S	S	S
3257	Elevated temperature liquid, n.o.s.	S	S	S	S	S	S	S
	All other	27.4	.7	13.5	.2	S	S	S

– Represents data cell equal to zero or less than 1 unit of measure.
D Denotes figures withheld to avoid disclosing data for individual companies.
S Data do not meet publication standards because of high sampling variability or other reasons.

Note: For description of development and uses of measures of reliability, see Appendix B, Reliability of the Estimates.

Appendix C.
Sample Design, Data Collection, and Estimation

INTRODUCTION

The primary goal for the 1997 Commodity Flow Survey (CFS) is to estimate shipping volumes (value, tons, and ton-miles) by commodity and mode of transportation at varying levels of geographic detail. A detailed description of the sample design for the 1997 CFS is provided below.

SAMPLE DESIGN

The sample for the 1997 CFS is selected using a stratified three-stage design in which the first-stage sampling units are establishments, the second-stage sampling units are groups of four 1-week periods (reporting weeks) within the survey year, and the third-stage sampling units are shipments.

First Stage

To create the first-stage sampling frame, we extracted a subset of establishment records from the 1995 Standard Statistical Establishment List (SSEL). The SSEL is a database, maintained by the Bureau of the Census, that contains a record for each establishment with employees. (An establishment is a single physical location where business transactions take place.) Establishments having nonzero payroll in 1994 and classified in the mining, manufacturing, wholesale, or selected retail industries, as defined by the 1987 Standard Industrial Classification (SIC) Manual, are included on the sampling frame. Auxiliary establishments (e.g. warehouses and central administrative offices) with shipping activity are also included. Auxiliary establishments are establishments that are primarily involved in rendering support services for other establishments within the same company, instead of for the public, government, or other business firms. All other establishments contained on the sampling frame are referred to as nonauxiliary establishments. For each establishment we extracted sales, payroll, number of employees, name and address information, as well as a primary identifier. We also computed a measure of size for each establishment. The measure of size for a particular establishment is designed to approximate the establishment's total value of shipments for 1994.

To reduce the amount of sampling variability and because estimates are desired for each commodity, we used a stratified design with a certainty component for each three-digit SIC. To accomplish this, each establishment on the sampling frame is classified into a three-digit SIC grouping. For each group of establishments, a boundary (or cutoff) that divides the certainty establishments from the noncertainty establishments is determined using the Lavallee-Hidiroglou algorithm. If an establishment's measure of size is greater than the cutoff, the establishment is selected "with certainty". Establishments selected "with certainty" were assured of being selected and represented only themselves (i.e., have a selection probability of one and a sampling weight of one). No certainty cutoffs are set for auxiliary establishments because they only make up a small portion of the estimated total value of shipments for all establishments on the sampling frame.

Establishments not selected with certainty makeup the noncertainty universe. We stratify the noncertainty universe by SIC recode, National Transportation Analysis Region (NTAR), and a flag used to differentiate auxiliary establishments from nonauxiliary establishments. Each SIC recode is constructed from a group of related three-digit SIC codes. The NTARs, developed by the Department of Transportation as combinations of Bureau of Economic Analysis (BEA) Areas, collectively provide a mutually exclusive and exhaustive coverage of the United States. Finally, the auxiliary stratification came about because establishments with different types of operation may have different shipping practices. We refer to a particular SIC recode-NTAR-auxiliary flag combination as a primary stratum.

We further stratify the noncertainty establishments within each primary stratum using the measure of size previously described. We refer to these measure-of-size strata as substrata of the primary strata. The measure of size stratification increases the efficiency of the sample design. The Dalenius-Hodges cumulative rule is used to set the substratum boundaries. We then use Neyman allocation to determine the sample size required within each substratum to meet a coefficient of variation constraint on the primary stratum total measure of size. Within each substratum, a simple random sample of establishments is selected without replacement.

To arrive at the final sample size, we allocated additional establishments to some of the strata so that the probability of selecting any establishment is no less than 1 in 100. In total, the first-stage sample comprises 102,739 establishments.

Second Stage

The frame for the second stage of sampling consists of 52 one-week reporting periods (reporting weeks) during the interval from December 29, 1996, to December 26,

1997. Each establishment selected for the 1997 CFS was systematically assigned to report for a group of four reporting weeks throughout the survey year. The four reporting weeks in a given group are separated by 12 weeks. For example, an establishment might be requested to report data for the 5th, 18th, 31st, and 44th weeks of the survey year.

Third Stage

For each of the four reporting weeks in which an establishment is asked to report, we request the respondent to construct a sampling frame that consists of all shipments made by their establishment in each particular reporting week. For any particular reporting week, if an establishment makes 40 or fewer shipments during that week, we ask the respondent to provide information about all of their establishment's shipments from that week, i.e., no sampling is required. For establishments making more than 40 shipments in a given reporting week, we ask the respondent to select a systematic sample of these shipments and to provide us with information only about the selected shipments. The size of a particular respondent's sample for a given reporting week should be between 20 and 40 shipments, depending on the total number of shipments the establishment made during that reporting week.

DATA COLLECTION

Each establishment selected into the CFS sample is mailed a questionnaire for each of its four reporting weeks. For a given establishment, we request the respondent to provide the following information about their establishment's shipments: domestic destination or port of exit, commodity, value, weight, mode(s) of transportation, the date on which the shipment was made, and an indication of whether the shipment was an export, hazardous material, or containerized. For shipments that include more than one commodity, respondents are instructed to report the commodity that makes up the greatest percentage of the shipment's weight. For exports, we also ask the respondent to provide the mode of export and the foreign destination city and country.

We used two versions of the questionnaire to collect data from the sampled establishments—the CFS-1000 and the CFS-2000. Each establishment received the CFS-1000 in each of its first three reporting weeks. However, for the fourth reporting week, a subsample of approximately 25,000 establishments received the CFS-2000, while the remaining establishments received the CFS-1000. The CFS-2000 requests the respondent to provide additional information about their establishment's access to on-site and off-site shipping facilities, as well as transportation equipment. See Appendix E for a copy of each questionnaire.

ESTIMATION

Each shipment has associated with it a single tabulation weight, that is used in computing all estimates to which the shipment contributes. The tabulation weight is a product of seven different weights. A description of each weight follows.

CFS respondents provide data for a sample of shipments made by their respective establishments in the survey year. For each establishment, we produce an estimate of that establishment's total value of shipments for the entire survey year. To do this, we use four different weights, the shipment weight, the shipment nonresponse weight, the quarter weight, and the quarter nonresponse weight.

Like establishments, we identify shipments as either certainty or noncertainty. (See the Nonsampling Error section in Appendix B for a description of how certainty shipments are identified.) For noncertainty shipments, the shipment weight is defined as the ratio of the total number of noncertainty shipments (as reported by the respondent) made by an establishment in a reporting week to the number of sampled noncertainty shipments for the same week. This weight uses the data from the sampled shipments to represent all the establishment's shipments made in the reporting week. However, some respondents fail to provide sufficient information about a sampled shipment. For example, a respondent may not be able to provide value, weight, or a destination ZIP Code for some of the sampled shipments. If these data items cannot be imputed, then these shipments would not contribute to tabulations and are deemed "unusable." (A usable shipment is one that has valid entries for value, weight, and origin and destination ZIP Codes.) To account for these "unusable" shipments, we apply the shipment nonresponse weight. For noncertainty shipments from a particular establishment's reporting week, this weight is equal to the ratio of the number of sampled shipments for the reporting week to the number of "usable" shipments for the same week. The shipment weight and shipment nonresponse weight for certainty shipments from a particular establishment's reporting week are both equal to one.

The quarter weight inflates an establishment's estimate for a particular reporting week to an estimate for the corresponding quarter. For noncertainty shipments, the quarter weight is equal to 13. The quarter weight for most certainty shipments is also equal to 13. However, if a respondent is able to provide information about all large (or certainty) shipments made in the quarter containing the reporting week, then the quarter weight for each of these shipments would be one. For each establishment, the quarterly estimates are added to produce an estimate of the establishment's value of shipments for the entire survey year. Whenever an establishment does not provide the Census Bureau with a response for each of its four reporting weeks, we compute a quarter nonresponse weight. The quarter nonresponse weight for a particular establishment is defined as the ratio of the number of

quarters for which the establishment was in business in the survey year to the total number of quarters (reporting weeks) for which we received usable shipment data from the establishment.

Using these four component weights, we compute an estimate of each establishment's value of shipments for the entire survey year. We then multiply this estimate by a weight that adjusts the estimate using value of shipments and sales data obtained from other Census Bureau surveys and preliminary results of the 1997 Economic Census. This weight, called the establishment-level adjustment weight, attempts to correct for any sampling or nonsampling errors that occur during the sampling of shipments by the respondent.

The adjusted value of shipments estimate for an establishment is then weighted by the establishment weight. This weight is equal to the inverse of the establishment's probability of being selected into the sample.

A final adjustment weight, called the SIC-level adjustment weight, uses preliminary results of the 1997 Economic Census to account for establishments from which we did not receive a response (including establishments from which we did not receive any usable shipment data) and for changes in the population of establishments between the time the first-stage sampling frame was constructed (1995) and the year in which the data were collected (1997). Separate SIC-level adjustment weights are determined for nonauxiliary and auxiliary establishments.

Appendix D.
Standard Classification of Transported Goods Code Information

The commodities shown in this report are classified using the Standard Classification of Transported Goods (SCTG) coding system. The SCTG coding system was created jointly by agencies of the United States and Canadian governments based on the Harmonized System (HS) of product classification which is used worldwide. The purpose of the SCTG coding system was to specifically address statistical needs in regard to products transported.

In the past, Commodity Flow Survey (CFS) data have been collected and reported using product classifications found in the Standard Transportation Commodity Classification (STCC) system. These classifications were developed in the early 1960s by the American Association of Railroads (AAR) to analyze commodity movements by rail. The original purpose of the STCC was for identification of commodities for purposes of assigning rates for Interstate Commerce Commission (ICC) regulated rail carriers. The STCC continues to be used by the AAR as a tariff mechanism.

At the time that the Commodity Transportation Survey (CTS) (the CTS—the predecessor of the CFS) was first conducted in 1963, STCC codes were still useful for analyzing most important aspects of the U.S. transportation system. Since then, many changes have taken place that have gradually made the STCC code less useful for tracking domestic product movements across all modes (although it remains perfectly functional for tracking rail-only movements). These include the deregulation of trucking, the enactment of North American Free Trade Agreement (NAFTA), changes in logistics practices, the emergence of plastics and composite materials to replace metals and glass, the obsolescence of many categories of wood products, and the very rapid recent development of high-tech electronic goods. Because the CFS is a shipper survey, the CFS collects information about shipments moving on all modes. As a consequence, STCC classifications frequently provide inadequate detail for identifying products that are significant for modes, such as truck and air. It is for these reasons that the Bureau of Transportation Statistics (BTS) has sponsored the development of a new product code to collect and report CFS data.

In 1997 the CFS provided respondents with a listing of SCTG codes and descriptions at the five-digit level to use in assigning a commodity code for each shipment. For shipments of more than one commodity, we instructed respondents to use the five-digit code for the major commodity, defined as the commodity of greatest total weight in the shipment.

Additional information on the SCTG system can be found on the Internet through the BTS web page at *http://www.bts.gov.* Comments or questions on the SCTG should be directed to *http://cfs@bts.gov.*

Appendix E.
Sample Report Forms and Instructions

The sample report forms and instructions are shown on the following pages.

Note: The CFS-2000 was sent to a subsample of establishments to obtain additional information about the use of transportation equipment and facilities.

OMB No. 0607-0828: Approval Expires 10/31/99

FORM **CFS-1000**
(11-1-96)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

1997 COMMODITY FLOW SURVEY
CENSUS OF TRANSPORTATION

Reporting period:

Please return by:

RETURN TO

BUREAU OF THE CENSUS
1201 East 10th Street
Jeffersonville IN 47132-0001

(Please correct any error in name, address, and ZIP Code)

BEFORE COMPLETING YOUR REPORT, please read the accompanying instruction guide. If book figures are not available for requested data, please provide estimates. If you have any questions, please call 1–800–772–7851.

Through this survey, we are requesting data on a representative sample of your outbound shipments, to help us produce key statistics used by transportation planners and managers. We greatly appreciate your assistance in this program.

Item A Is the establishment name shown in the mailing address correct?

1 ☐ Yes
2 ☐ No — *Enter correct name.* ↙

Item B *Mark (X) the **ONE** box which best describes this establishment during the one-week period shown above.*

1 ☐ In operation
2 ☐ Temporarily or seasonally inactive
3 ☐ Ceased operation — *Give date* →

Month	Day	Year

Item C Is this establishment's physical location the same as the address shown in the label? (PO boxes or rural routes are not physical locations.)

1 ☐ Yes
2 ☐ No — *Enter physical location below.* ↙

Number and street		
City, town, village, etc.	State	ZIP Code

NOTE — The rest of this questionnaire requests information about shipments (or deliveries) from the establishment located at the address in the mailing label.

If you entered a different address in item C — *Please complete the form for shipments originating from the location listed in item C.*

Item D Please enter the **total number** of outbound shipments (or deliveries), including customer pick-up, for the one-week reporting period shown above. If book figures are not available, please provide your best estimate.

This number should reflect all shipments and deliveries leaving this location during the one-week reporting period. *Please see Instruction Guide for a definition of "shipment."*

DO NOT PROCEED UNTIL YOU HAVE COMPLETED ITEM D.

YOUR RESPONSE IS REQUIRED BY LAW. Title 13, United States Code, requires businesses and other organizations that receive this questionnaire to answer the questions and return the report to the Census Bureau. By the same law, **YOUR CENSUS REPORT IS CONFIDENTIAL.** It may be seen only by Census Bureau employees and may be used only for statistical purposes. Further, copies retained in respondents' files are immune from legal process.

Item E SAMPLING INSTRUCTIONS

Our goal in this section is to identify a sample of your shipments that you will provide data on. Through the use of a sample, we can avoid asking you for information on all of your shipments, while still obtaining statistically accurate information.

FINDING YOUR SELECTION RATE

If you reported 40 or fewer shipments in item D, please enter "1" as your selection rate in the box below, then go directly to item F and enter the information for each of your shipments.

If you reported 41 or more shipments in item D, we will now ask you to select and report on a sample of your shipments. Following the steps below will result in a sample of 20 to 40 shipments to report on in item F.

In the table at right, identify the selection rate that corresponds to the number you entered in item D, and enter it in the box below.

Please enter your selection rate. →

Number of shipments entered in item D	Selection rate
1— 40	1
41— 80	2
81— 100	3
101— 200	5
201— 400	10
401— 800	20
801— 1600	40
1601— 3200	80
3201— 6400	160
6401—12800	320
More than 12800	Call Census at 1–800–772–7851

CONTINUE ON NEXT PAGE.

Item F SHIPMENT CHARACTERISTICS

Line No. (a)	Shipment ID Number (b)	Shipment date (c) Month	Shipment date (c) Day	Shipment value (excluding shipping costs) in whole dollars (d)	Shipment weight in pounds (e)	Commodity code from SCTG Manual (f)	Commodity description (g)	If a hazardous material, enter the "UN" or "NA" number (h)
0	123-5	4	26	4,235	140	3 5 1 2 0	Electrical transformers	
00	402H	4	26	125,300	626,500	1 7 1 0 0	Gasoline	1 2 0 3
1								
2								
3								
4								
5								
6								
7								
8								
9								

Mode of transport codes for columns (k) and (n) ▶ **1** — Parcel delivery, courier, or U.S. Postal Service; **2** — Private truck; **3** — For-hire truck; **4** — Railroad

Continued →

FORM CFS-1000 (11-1-96)

SELECTING YOUR SAMPLE OF SHIPMENTS

1. Use the file or combination of files that best reflects your full range of outbound shipping activities.

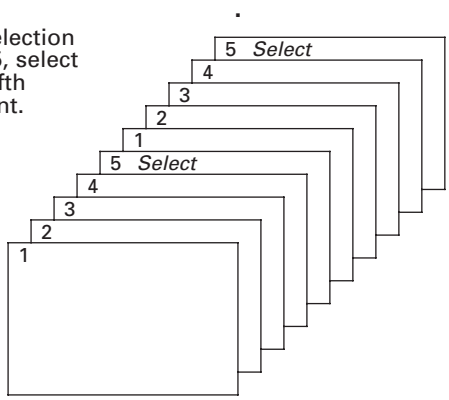
2. Begin with the first shipment. Count the shipments until you reach your selection rate. Select this shipment to report on in item F.

3. Continue counting with the next shipment. Count this shipment as 1 and continue until you reach the selection rate again. Select this shipment to report on in item F.

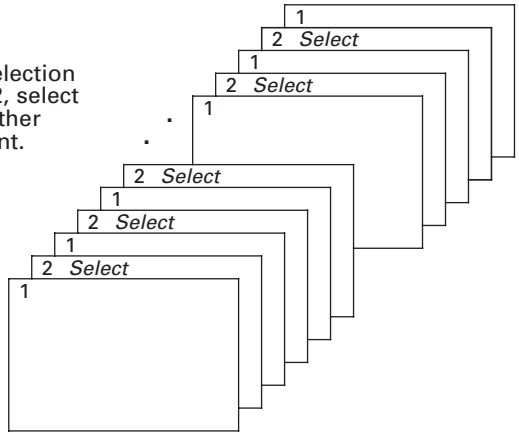
4. Repeat step 3 until you reach the last shipment for the one-week period. If the last shipment is counted as the selection rate, select this shipment to report on in item F. If the last shipment is not counted as the selection rate, do not report this shipment.

In the following examples, each rectangle represents one shipment.

If the selection rate is 5, select every fifth shipment.



If the selection rate is 2, select every other shipment.



Once you have selected your sample of shipments, please proceed to item F and enter the requested information for each selected shipment. Examples of completed lines for two shipments are provided on lines "0" and "00" below.

If you have difficulties constructing a file of shipments or have questions about how to select the sample of your shipments, please call our toll-free number for assistance: 1–800–772–7851.

Containerized? (Y/N) (i)	U.S. destination *(Complete for all shipments.)* (j) City	State	ZIP Code	Mode(s) of transport to U.S. destination *Enter all that apply in order used. Use codes below.* (k)	Export? (Y/N) (l)	Foreign destination (for export shipments only) **Note:** In column (j) enter the U.S. port, airport, or border crossing of exit. (m) City	Country	Export mode (n)	Line No. (o)
N	Los Angeles	CA	90040	2, 4, 3	N				0
N	New York	NY	10454	5	Y	London	England	6	00
									1
									2
									3
									4
									5
									6
									7
									8
									9

5 — Shallow draft vessel
6 — Deep draft vessel
7 — Pipeline
8 — Air
9 — Other mode
0 — Unknown

FORM CFS-1000 (11-1-96)

PLEASE CONTINUE ON PAGE 4.

Item F **SHIPMENT CHARACTERISTICS — Continued**

Line No. (a)	Shipment ID Number (b)	Shipment date (c) Month	Shipment date (c) Day	Shipment value (excluding shipping costs) in whole dollars (d)	Shipment weight in pounds (e)	Commodity code from SCTG Manual (f)	Commodity description (g)	If a hazardous material, enter the "UN" or "NA" number (h)
10								
11								
12								
13								
14								
15								
16								
17								
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23								
24								
25								
26								
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31								
32								
33								
34								

Mode of transport codes for columns (k) and (n) ▶ **1** — Parcel delivery, courier, or U.S. Postal Service **2** — Private truck **3** — For-hire truck **4** — Railroad

Continued →

FORM CFS-1000 (11-1-96)

Containerized? *(Y/N)* (i)	U.S. destination ***(Complete for all shipments.)*** (j)			Mode(s) of transport to U.S. destination *Enter all that apply in order used. Use codes below.* (k)	Export? *(Y/N)* (l)	Foreign destination (for export shipments only) **Note:** In column (j) enter the U.S. port, airport, or border crossing of exit. (m)		Export mode (n)	Line No. (o)
	City	State	ZIP Code			City	Country		
									10
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29
									30
									31
									32
									33
									34

5 — Shallow draft vessel
6 — Deep draft vessel
7 — Pipeline
8 — Air
9 — Other mode
0 — Unknown

FORM CFS-1000 (11-1-96)

PLEASE CONTINUE ON PAGE 6.

Item F **SHIPMENT CHARACTERISTICS — Continued**

Line No. (a)	Shipment ID Number (b)	Shipment date (c) Month	Shipment date (c) Day	Shipment value (excluding shipping costs) in whole dollars (d)	Shipment weight in pounds (e)	Commodity code from SCTG Manual (f)	Commodity description (g)	If a hazardous material, enter the "UN" or "NA" number (h)
35								
36								
37								
38								
39								
40								

Mode of transport codes for columns (k) and (n) ▶ **1** — Parcel delivery, courier, or U.S. Postal Service **2** — Private truck **3** — For-hire truck **4** — Railroad

Continued →

Item G

1. Do this establishment's outbound shipments leave more than one site within this physical location?

☐ Yes

☐ No

2. Are the records for outbound shipments from this location maintained in a number of separate files (e.g., separate files for each commodity, or for each shipping site) at this location?

☐ Yes

☐ No

If yes to item G1 or item G2:

3. Would it be easier to receive a separate questionnaire for each file or each shipment site?

☐ Yes

☐ No

Item H

Enter the total value of shipments for the one-week reporting period. This figure should represent all products leaving this establishment for the one-week period. An estimate is acceptable.

Total value in whole dollars

Item I

In the last three months did this location have any individual shipments with a value over $2,000,000?

☐ Yes

☐ No

Item J **CERTIFICATION**

Name of person to contact regarding this report – *Please print*	Telephone number – *Include area code*	Date

Signature	Title

Containerized? (Y/N) (i)	U.S. destination **(Complete for all shipments.)** (j) City	State	ZIP Code	Mode(s) of transport to U.S. destination *Enter all that apply in order used. Use codes below.* (k)	Export? (Y/N) (l)	Foreign destination (for export shipments only) **Note:** In column (j) enter the U.S. port, airport, or border crossing of exit. (m) City	Country	Export mode (n)	Line No. (o)
									35
									36
									37
									38
									39
									40

5 — Shallow draft vessel
6 — Deep draft vessel
7 — Pipeline
8 — Air
9 — Other mode
0 — Unknown

Remarks

THANK YOU FOR COMPLETING YOUR REPORT

FORM CFS-1000 (11-1-96)

Page 7

OMB No. 0607-0828: Approval Expires 10/31/99

FORM **CFS-2000**
(6-9-97)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

1997 COMMODITY FLOW SURVEY
CENSUS OF TRANSPORTATION

Reporting period:

Please return by:

RETURN TO

BUREAU OF THE CENSUS
1201 East 10th Street
Jeffersonville IN 47132-0001

(Please correct any error in name, address, and ZIP Code)

BEFORE COMPLETING YOUR REPORT, please read the accompanying instruction guide. If book figures are not available for requested data, please provide estimates. If you have any questions, please call 1–800–772–7851.

Through this survey, we are requesting data on a representative sample of your outbound shipments, to help us produce key statistics used by transportation planners and managers. We greatly appreciate your assistance in this program.

Item A Is the establishment name shown in the mailing address correct?

1 ☐ Yes
2 ☐ No — *Enter correct name.* ↙

Item B *Mark (X) the **ONE** box which best describes this establishment during the one-week period shown above.*

1 ☐ In operation
2 ☐ Temporarily or seasonally inactive
3 ☐ Ceased operation — *Give date* →

Month	Day	Year

Item C Is this establishment's physical location the same as the address shown in the label? (PO boxes or rural routes are not physical locations.)

1 ☐ Yes
2 ☐ No — *Enter physical location below.* ↙

Number and street		
City, town, village, etc.	State	ZIP Code

NOTE — The rest of this questionnaire requests information about shipments (or deliveries) from the establishment located at the address in the mailing label.

If you entered a different address in item C — *Please complete the form for shipments originating from the location listed in item C.*

Item D Please enter the **total number** of outbound shipments (or deliveries), including customer pick-up, for the one-week reporting period shown above. If book figures are not available, please provide your best estimate.

This number should reflect all shipments and deliveries leaving this location during the one-week reporting period. *Please see Instruction Guide for a definition of "shipment."*

DO NOT PROCEED UNTIL YOU HAVE COMPLETED ITEM D.

YOUR RESPONSE IS REQUIRED BY LAW. Title 13, United States Code, requires businesses and other organizations that receive this questionnaire to answer the questions and return the report to the Census Bureau. By the same law, **YOUR CENSUS REPORT IS CONFIDENTIAL.** It may be seen only by Census Bureau employees and may be used only for statistical purposes. Further, copies retained in respondents' files are immune from legal process.

Item E SAMPLING INSTRUCTIONS

Our goal in this section is to identify a sample of your shipments that you will provide data on. Through the use of a sample, we can avoid asking you for information on all of your shipments, while still obtaining statistically accurate information.

FINDING YOUR SELECTION RATE

If you reported 40 or fewer shipments in item D, please enter "1" as your selection rate in the box below, then go directly to item F and enter the information for each of your shipments.

If you reported 41 or more shipments in item D, we will now ask you to select and report on a sample of your shipments. Following the steps below will result in a sample of 20 to 40 shipments to report on in item F.

In the table at right, identify the selection rate that corresponds to the number you entered in item D, and enter it in the box below.

Please enter your selection rate. →

Number of shipments entered in item D	Selection rate
1— 40	1
41— 80	2
81— 100	3
101— 200	5
201— 400	10
401— 800	20
801— 1600	40
1601— 3200	80
3201— 6400	160
6401—12800	320
More than 12800	Call Census at 1–800–772–7851

CONTINUE ON NEXT PAGE. →

Item F SHIPMENT CHARACTERISTICS

Line No. (a)	Shipment ID Number (b)	Shipment date (c) Month	Shipment date (c) Day	Shipment value (excluding shipping costs) in whole dollars (d)	Shipment weight in pounds (e)	Commodity code from SCTG Manual (f)	Commodity description (g)	If a hazardous material, enter the "UN" or "NA" number (h)
0	123-5	4	26	4,235	140	3 5 1 2 0	Electrical transformers	
00	402H	4	26	125,300	626,500	1 7 1 0 0	Gasoline	1 2 0 3
1								
2								
3								
4								
5								
6								
7								
8								
9								

Mode of transport codes for columns (k) and (n) ▶ **1** — Parcel delivery, courier, or U.S. Postal Service; **2** — Private truck; **3** — For-hire truck; **4** — Railroad

Continued →

SELECTING YOUR SAMPLE OF SHIPMENTS

1. Use the file or combination of files that best reflects your full range of outbound shipping activities.

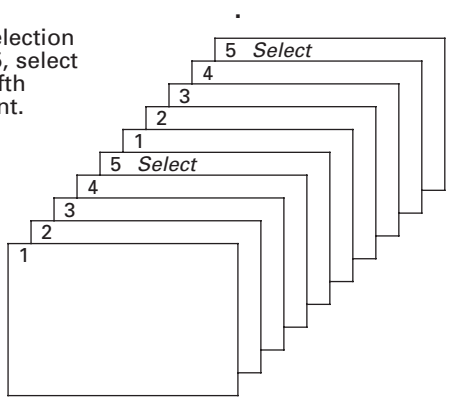
2. Begin with the first shipment. Count the shipments until you reach your selection rate. Select this shipment to report on in item F.

3. Continue counting with the next shipment. Count this shipment as 1 and continue until you reach the selection rate again. Select this shipment to report on in item F.

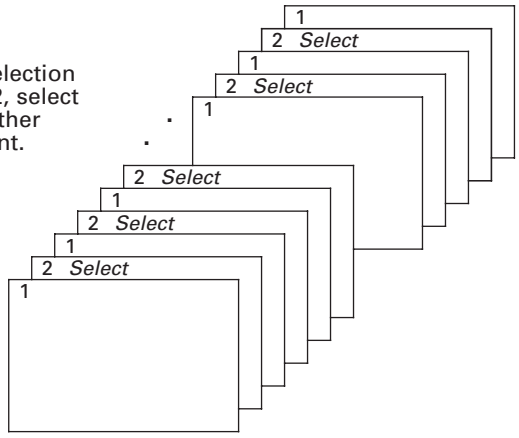
4. Repeat step 3 until you reach the last shipment for the one-week period. If the last shipment is counted as the selection rate, select this shipment to report on in item F. If the last shipment is not counted as the selection rate, do not report this shipment.

In the following examples, each rectangle represents one shipment.

If the selection rate is 5, select every fifth shipment.



If the selection rate is 2, select every other shipment.



Once you have selected your sample of shipments, please proceed to item F and enter the requested information for each selected shipment. Examples of completed lines for two shipments are provided on lines "0" and "00" below.

If you have difficulties constructing a file of shipments or have questions about how to select the sample of your shipments, please call our toll-free number for assistance: 1–800–772–7851.

Containerized? (Y/N) (i)	U.S. destination *(Complete for all shipments.)* (j) City	State	ZIP Code	Mode(s) of transport to U.S. destination *Enter all that apply in order used. Use codes below.* (k)	Export? (Y/N) (l)	Foreign destination (for export shipments only) **Note:** In column (j) enter the U.S. port, airport, or border crossing of exit. (m) City	Country	Export mode (n)	Line No. (o)
N	Los Angeles	CA	90040	2, 4, 3	N				0
N	New York	NY	10454	5	Y	London	England	6	00
									1
									2
									3
									4
									5
									6
									7
									8
									9

5 — Shallow draft vessel
6 — Deep draft vessel
7 — Pipeline
8 — Air
9 — Other mode
0 — Unknown

FORM CFS-2000 (6-9-97)

PLEASE CONTINUE ON PAGE 4.

Item F **SHIPMENT CHARACTERISTICS — Continued**

Line No. (a)	Shipment ID Number (b)	Shipment date (c) Month	Shipment date (c) Day	Shipment value (excluding shipping costs) in whole dollars (d)	Shipment weight in pounds (e)	Commodity code from SCTG Manual (f)	Commodity description (g)	If a hazardous material, enter the "UN" or "NA" number (h)
10								
11								
12								
13								
14								
15								
16								
17								
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19								
20								
21								
22								
23								
24								
25								
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31								
32								
33								
34								

Mode of transport codes for columns (k) and (n) ▶ **1** — Parcel delivery, courier, or U.S. Postal Service **2** — Private truck **3** — For-hire truck **4** — Railroad

Continued →

Containerized? *(Y/N)* (i)	U.S. destination ***(Complete for all shipments.)*** (j)			Mode(s) of transport to U.S. destination *Enter all that apply in order used. Use codes below.* (k)	Export? *(Y/N)* (l)	Foreign destination (for export shipments only) **Note:** In column (j) enter the U.S. port, airport, or border crossing of exit. (m)		Export mode (n)	Line No. (o)
	City	State	ZIP Code			City	Country		
									10
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29
									30
									31
									32
									33
									34

5 — Shallow draft vessel
6 — Deep draft vessel
7 — Pipeline
8 — Air
9 — Other mode
0 — Unknown

FORM CFS-2000 (6-9-97)

PLEASE CONTINUE ON PAGE 6.

Item F **SHIPMENT CHARACTERISTICS — Continued**

Line No. (a)	Shipment ID Number (b)	Shipment date (c) Month	Shipment date (c) Day	Shipment value (excluding shipping costs) in whole dollars (d)	Shipment weight in pounds (e)	Commodity code from SCTG Manual (f)	Commodity description (g)	If a hazardous material, enter the "UN" or "NA" number (h)
35								
36								
37								
38								
39								
40								

Mode of transport codes for columns (k) and (n) ▶ **1** — Parcel delivery, courier, or U.S. Postal Service **2** — Private truck **3** — For-hire truck **4** — Railroad

Continued →

Item G Enter the total dollar value of **all** shipments for the one-week reporting period. This figure should represent all products leaving this establishment for the one-week period. An estimate is acceptable.

Total value in whole dollars

Item H In the last three months did this location have any individual shipments with a value over $2,000,000?

☐ Yes

☐ No

Item I **AVAILABILITY AND USE OF ON-SITE SHIPPING FACILITIES**

In column (b), check "Yes" or "No" for each type of shipping facility to indicate whether or not this type of facility existed **on-site** during 1997. For each "Yes" in column (b), check "Yes" or "No" in column (c) to indicate whether or not you used the facility on your premises for **outbound shipments** during 1997.

Type of shipping facility (a)	Was a shipping facility of this type on your premises during 1997? (b)	Did you **use** this facility on your premises for **outbound shipments** during 1997? (c)
1. Rail siding	1 ☐ Yes → 2 ☐ No	1 ☐ Yes 2 ☐ No
2. Dock on the Great Lakes	1 ☐ Yes → 2 ☐ No	1 ☐ Yes 2 ☐ No
3. Dock on inland water	1 ☐ Yes → 2 ☐ No	1 ☐ Yes 2 ☐ No
4. Dock on deep sea water	1 ☐ Yes → 2 ☐ No	1 ☐ Yes 2 ☐ No
5. Airport/landing strip capable of handling your shipments	1 ☐ Yes → 2 ☐ No	1 ☐ Yes 2 ☐ No
6. Pipeline terminal	1 ☐ Yes → 2 ☐ No	1 ☐ Yes 2 ☐ No

Containerized? (Y/N) (i)	U.S. destination *(Complete for all shipments.)* (j) City	State	ZIP Code	Mode(s) of transport to U.S. destination *Enter all that apply in order used. Use codes below.* (k)	Export? (Y/N) (l)	Foreign destination (for export shipments only) **Note:** In column (j) enter the U.S. port, airport, or border crossing of exit. (m) City	Country	Export mode (n)	Line No. (o)
									35
									36
									37
									38
									39
									40

5 — Shallow draft vessel
6 — Deep draft vessel
7 — Pipeline
8 — Air
9 — Other mode
0 — Unknown

Item J USE OF OFF-SITE SHIPPING FACILITIES

In column (b), check "Yes" or "No" for each type of shipping facility to indicate whether or not you used an **off-site** facility of that type for **outbound shipments** during 1997. For each "Yes", enter the miles to that off-site facility in column (c), and the mode of transport used to reach that facility in column (d). The modes are listed below.

Type of shipping facility (a)	Did you **use** this type of off-site facility for **outbound shipments** during 1997? (b)	Distance to the off-site facility of this type that you used most in 1997 *(Report in miles – estimates are acceptable)* (c)	Mode of transport used to reach that facility *(Enter a code from the list below)* (d)
1. Rail siding	1 ☐ Yes → 2 ☐ No		
2. Dock on the Great Lakes	1 ☐ Yes → 2 ☐ No		
3. Dock on inland water	1 ☐ Yes → 2 ☐ No		
4. Dock on deep sea water	1 ☐ Yes → 2 ☐ No		
5. Airport/landing strip capable of handling your shipments	1 ☐ Yes → 2 ☐ No		
6. Pipeline terminal	1 ☐ Yes → 2 ☐ No		

1 – Trailer on Flat Car (TOFC)
2 – Private Truck
3 – For-Hire Truck
4 – Rail
5 – Water
6 – Pipeline
7 – Air
8 – Other

PLEASE CONTINUE ON PAGE 8.

Item K USE AND AVAILABILITY OF TRANSPORTATION EQUIPMENT

During 1997, did this location use any of the following types of equipment for outbound shipments? Please check "Yes" or "No." For rail cars reported in number 1 below, enter the approximate percentage of your total outbound rail shipments that used that type of rail car. These percentages should add to 100%. If you had no rail shipments, leave the percentages blank.

Equipment (a)	Was this type of equipment used for outbound shipments during 1993? (b)	Percentage of total rail shipments (c)
1. Rail cars that:		
a. Your company owned/leased	1 ☐ Yes → 2 ☐ No	
b. A common carrier owned/leased	1 ☐ Yes → 2 ☐ No	
c. Another party owned/leased (e.g. receiver)	1 ☐ Yes → 2 ☐ No	
2. Trucks with 6 or more tires or truck-tractors that:		
a. Your company owned	1 ☐ Yes 2 ☐ No	
b. Your company leased, with driver	1 ☐ Yes 2 ☐ No	
c. Your company leased, without driver	1 ☐ Yes 2 ☐ No	
3. Truck trailers that your company owned or leased	1 ☐ Yes 2 ☐ No	
4. Aircraft that your company owned or leased	1 ☐ Yes 2 ☐ No	
5. Barges that your company owned or leased	1 ☐ Yes 2 ☐ No	
6. Other equipment that your company owned or leased – *Specify* ↙	1 ☐ Yes 2 ☐ No	

Item L TRANSPORTATION DECISIONS

During 1997, who generally decided on the mode of transportation for your outbound shipments? *Check the appropriate box.*

1 ☐ Your company 2 ☐ Receiver of shipment 3 ☐ Other

Remarks

Item M CERTIFICATION

Name of person to contact regarding this report – *Please print*	Telephone number – *Include area code*	Date
Signature	Title	

Instructions for Completing the Commodity Flow Survey

TIPS FOR COMPLETING THE CFS QUESTIONNAIRE

Please read all instructions.

You may use estimates if book figures are not readily available.

If you have questions about completing the survey, a Census Bureau representative will be glad to assist you. You can call us at 1-800-772-7851.

Some instructions are included on the questionnaire itself. However, due to space limitations, most of the instructions and definitions are included in separate reference materials. These include this instruction guide, and a listing of commodity codes to be used for classifying individual shipments in this survey.

PART I – GENERAL INFORMATION

Frequently Asked Questions About the Commodity Flow Survey (CFS)

Why are you conducting the CFS?

The CFS produces valuable measures of the demands on the nation's transportation system.

The results of the CFS are used by transportation policy makers to analyze future transportation needs.

Who reports in the CFS?

The CFS covers a sample of establishments in the mining, manufacturing, wholesale, and selected retail industries.

Why is my participation important?

Your establishment was selected as part of a sample designed to represent a wide range of industries and geographic regions.

Your report helps ensure quality results.

Is this survey mandatory?

Yes. The CFS is mandatory under the authority of Title 13, United States Code (USC).

Will my data be kept confidential?

Yes. The same law that requires your participation, Title 13, USC, also guarantees your data will be kept strictly confidential.

The reports you provide the Census Bureau cannot be used for purposes of taxation, regulation, or investigation.

Your report is used only to develop summary data that do not reveal the activities of individual firms or establishments.

How often must I report?

You will be sent four questionnaires in all: one during each quarter of 1997.

The CFS will not be conducted again until 2002.

PART II – INSTRUCTIONS FOR COMPLETING YOUR QUESTIONNAIRE

Items A – C

Please enter the information requested on your establishment's name, operational status, and physical location.

Item D

Enter in the space provided your total number of outbound shipments **for the one week reporting period** on the front of the questionnaire.

Please include in this count any materials picked up by the customer ("customer pick-up").

What we mean by a "shipment":

For the purposes of this survey, a shipment is a single movement of goods, commodities, products, etc. from your location to a customer or to another location of your company.

"Commodities" refer to items that your location produces, sells, or distributes, *not* to items that are considered by-products of your location's operation.

What we don't mean by a "shipment":

Do *not* include as shipments items such as inter-office memos, payroll checks, business correspondence, etc.

Do *not* include as shipments items such as refuse, scrap paper, waste, and recyclable materials **unless** your location is in the business of selling or providing these materials to others.

A special note about "shipments":

A full, or partial, truckload should be counted as a single shipment only if all the commodities on the truck are destined for one location.

If a truck makes multiple deliveries on a route, **please count each stop as one shipment.**

Item E: Sampling Instructions

If you reported 40 or fewer shipments in Item D, complete Item F (Shipment Characteristics) for all of your shipments covered by the one-week reporting period.

If you reported more than 40 shipments in Item D, follow the instructions in Item E in order to select a sample of shipments on which to report in Item F.

By asking you to select a sample of your shipments for the one-week reporting period, we avoid asking you for information on all your shipments, while still obtaining statistically accurate information.

Reminder: The files you are sampling from should reflect the full range of your location's shipping activities in terms of modes of transportation used, commodities shipped, and destinations.

We're here to answer your questions! If you have questions about the sampling process (or any part of the questionnaire) please call us at 1-800-772-7851.

PART II – INSTRUCTIONS FOR COMPLETING YOUR QUESTIONNAIRE – Continued

Item F: Shipment Characteristics

- **Shipment ID Number (column b) –** Enter the invoice number, shipment number, or some other unique identification number that your establishment could use to find this particular shipping document if questions arise regarding your report.
- **Shipment Date (column c) –** Enter the month and day of the shipment. If shipment date is not available, use the invoice/shipping document date. Use numbers only.
- **Shipment Value (column d) –** Enter the dollar value, in whole dollars, of the entire shipment. The value should not include freight charges or excise taxes (i.e., report the net selling value, f.o.b. plant). If the value is not readily available from your records, please estimate.
- **Shipment Weight (column e) –** Enter the weight of the total shipment in whole pounds. If weight is not readily available from your records, please estimate.
- **Commodity Code (column f) –** Please use the list of Standard Classification of Transported Goods (SCTG) Codes in the enclosed SCTG Manual to select the proper code. For shipments with more than one commodity, enter only the code for the commodity with the greatest weight.
- **Commodity Description (column g) –** Enter a brief description of the commodity shipped. For shipments with more than one commodity, describe only the commodity with the greatest weight. Do not use trade names, catalog numbers, or other codes not familiar to persons outside your business.

Item F **SHIPMENT CHARACTERISTICS**

Line No. (a)	Shipment ID Number (b)	Shipment date (c) Month	Shipment date (c) Day	Shipment value (excluding shipping costs) in whole dollars (d)	Shipment weight in pounds (e)	Commodity code from SCTG Manual (f)	Commodity description (g)
0	123-5	4	26	4,235	140	3 6 1 2 0	Electrical transformers
00	123-6	4	26	125,300	626,500	1 7 1 0 0	Gasoline
1							
2							
3							
4							

Mode of transport codes for columns (k) and (n) ▶ **1** — Parcel delivery, courier, or U.S. Postal Service **2** — Private truck **3** — For-hire truck **4** — Railroad

Continued →

PART II – INSTRUCTIONS FOR COMPLETING YOUR QUESTIONNAIRE – Continued

Item F: Shipment Characteristics – Continued

- **For Hazardous Materials (column h) –** If shipment is a hazardous material, enter the 4-digit United Nations or North American number.
- **Containerized (column i) –** Indicate whether or not the shipment was containerized by entering "Y" or "N" (yes or no). Containerized means that the shipment **left your establishment** in an intermodal container or stackable tank without permanently attached wheels. These containers typically vary from 20 to 53 feet in length, and are carried on truck chassis, trains, and ships.
- **U.S. Destination: City, State, and ZIP Code (column j) –** For domestic shipments, enter the city, state, and 5-digit ZIP Code of the buyer/receiver as it appears on the shipping document. Use the **"ship to"** address. Use the two letter state abbreviation shown in Part IV.

  For **export shipments,** report the U.S. **port of exit** as the destination city. The port of exit is the port or airport from which the shipment left the country. In case of land shipments into Mexico or Canada, it is the border crossing.
- **Mode(s) of Transport (column k) –** Enter the code(s) for **all** modes of transport used for the shipment to its U.S. destination (i.e., the destination reported in column j). Codes are located on the bottom of pages 2, 3, 4, and 5 of the questionnaire. Enter in the sequence used, all that apply. See Part III for definitions of each mode.

  For Customer Pick-up: Report the mode(s) of transportation used, if known. Otherwise, report mode as "0" (unknown).

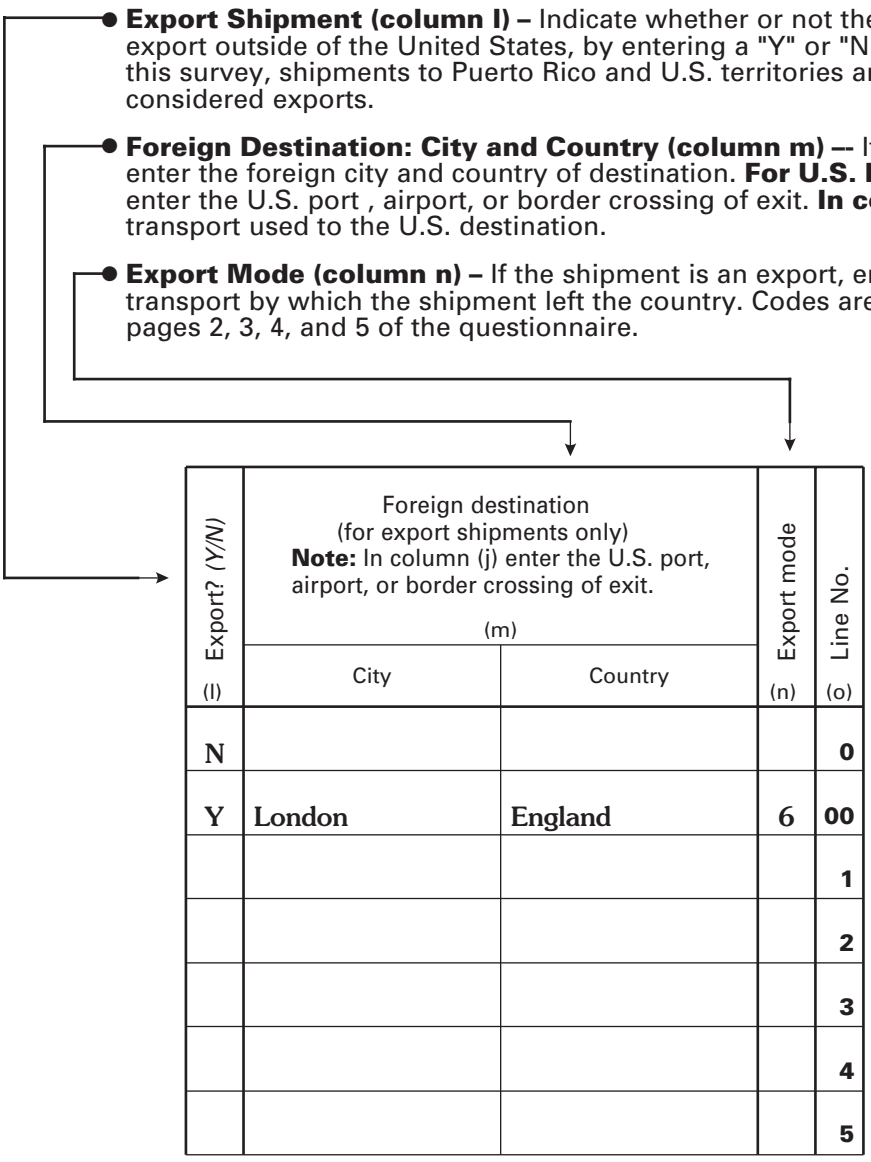
  For Export Shipments: List only the mode(s) of transport used to reach the port, airport, or border crossing of exit.

If a hazardous material, enter the "UN" or "NA" number (h)	Containerized? (Y/N) (i)	U.S. destination (j)			Mode(s) of transport to U.S. destination *Enter all that apply using codes shown below.* (k)
		City	State	ZIP Code	
	N	Los Angeles	CA	90040	2, 4, 3
	N	New York	NY	10454	5

PART II – INSTRUCTIONS FOR COMPLETING YOUR QUESTIONNAIRE – Continued

Item F: Shipment Characteristics – Continued

- **Export Shipment (column l) –** Indicate whether or not the shipment is intended for export outside of the United States, by entering a "Y" or "N" (yes or no). For purposes of this survey, shipments to Puerto Rico and U.S. territories and possessions are considered exports.
- **Foreign Destination: City and Country (column m) –-** If the shipment is an export, enter the foreign city and country of destination. **For U.S. Destination (column j),** enter the U.S. port , airport, or border crossing of exit. **In column (k),** enter the mode of transport used to the U.S. destination.
- **Export Mode (column n) –** If the shipment is an export, enter the code for the mode of transport by which the shipment left the country. Codes are located at the bottom of pages 2, 3, 4, and 5 of the questionnaire.



Export? *(Y/N)* (l)	Foreign destination (for export shipments only) **Note:** In column (j) enter the U.S. port, airport, or border crossing of exit. (m)		Export mode (n)	Line No. (o)
	City	Country		
N				0
Y	London	England	6	00
				1
				2
				3
				4
				5

Items G – I

Please enter the information requested.

Item J: Certification

Please enter the name and telephone number of the person to contact in the event that we have a question about your report.

PART III – MODE DEFINITIONS

Parcel delivery/Courier/U.S. Postal Service – Delivery services that carry letters, parcels, packages, and other small shipments that typically weigh less than 100 pounds. Includes bus parcel delivery service.

Private truck – Trucks operated by a temporary or permanent employee of this establishment or the buyer/receiver of the shipment.

For-hire truck – Trucks that carry freight for a fee collected from the shipper, recipient of the shipment, or an arranger of the transportation.

Railroad– Any common carrier or private railroad.

Shallow draft vessel – Barges, ships, or ferries operating primarily on rivers and canals; in harbors, the Great Lakes, the Saint Lawrence Seaway; the Intracoastal Waterway, the Inside Passage to Alaska, major bays and inlets; or in the ocean close to the shoreline.

Deep draft vessel – Barges, ships, or ferries operating primarily in the open ocean. Shipping on the Great Lakes and the Saint Lawrence Seaway is classified with shallow draft vesels.

Pipeline – Movements of oil, petroleum, gas, slurry, etc. through pipelines that extend to other establishments or locations beyond the shipper's establishment. Aqueducts for the movement of water are not included.

Air – Commercial or private aircraft, and all air service for shipments that typically weigh more than 100 pounds. Includes air freight and air express.

Other mode – Any mode not listed above.

Unknown – The shipment was not carried by a parcel delivery/courier/U.S. Postal service, and you cannot determine what mode of transportation is used.

Note: Commodities that are "shipped" under their own power, such as boats, barges, ferries, ships, aircraft, trucks, and trains **should be classified with the appropriate mode above.** Commodities shipped under their own power for which an appropriate mode is not listed (e.g., buses, recreational vehicles) should be listed as **"other" mode.**

PART IV -- STATE ABBREVIATION LIST

State	Abbrev.	State	Abbrev.
Alabama	AL	Montana	MT
Alaska	AK	Nebraska	NE
Arizona	AZ	Nevada	NV
Arkansas	AR	New Hampshire	NH
California	CA	New Jersey	NJ
Colorado	CO	New Mexico	NM
Connecticut	CT	New York	NY
Delaware	DE	North Carolina	NC
Dist. of Col.	DC	North Dakota	ND
Florida	FL	Ohio	OH
Georgia	GA	Oklahoma	OK
Hawaii	HI	Oregon	OR
Idaho	ID	Pennsylvania	PA
Illinois	IL	Rhode Island	RI
Indiana	IN	South Carolina	SC
Iowa	IA	South Dakota	SD
Kansas	KS	Tennessee	TN
Kentucky	KY	Texas	TX
Louisiana	LA	Utah	UT
Maine	ME	Vermont	VT
Maryland	MD	Virginia	VA
Massachusetts	MA	Washington	WA
Michigan	MI	West Virginia	WV
Minnesota	MN	Wisconsin	WI
Mississippi	MS	Wyoming	WY
Missouri	MO		

NOTICE - We estimate that it will take an average of 2 hours to complete this form. This includes time to read instructions, assemble and review information, and record answers on the form. If you have any comments regarding this estimate or any other aspect of this survey, send them to the Associate Director for Administration, Attn: Paperwork Reduction Project 0607-0189, Room 3104, Federal Building 3, Bureau of the Census, Washington, DC 20233-0001. Respondents are not required to respond to any information collection unless it displays a valid approval number in the top right corner on the front of the questionnaire.