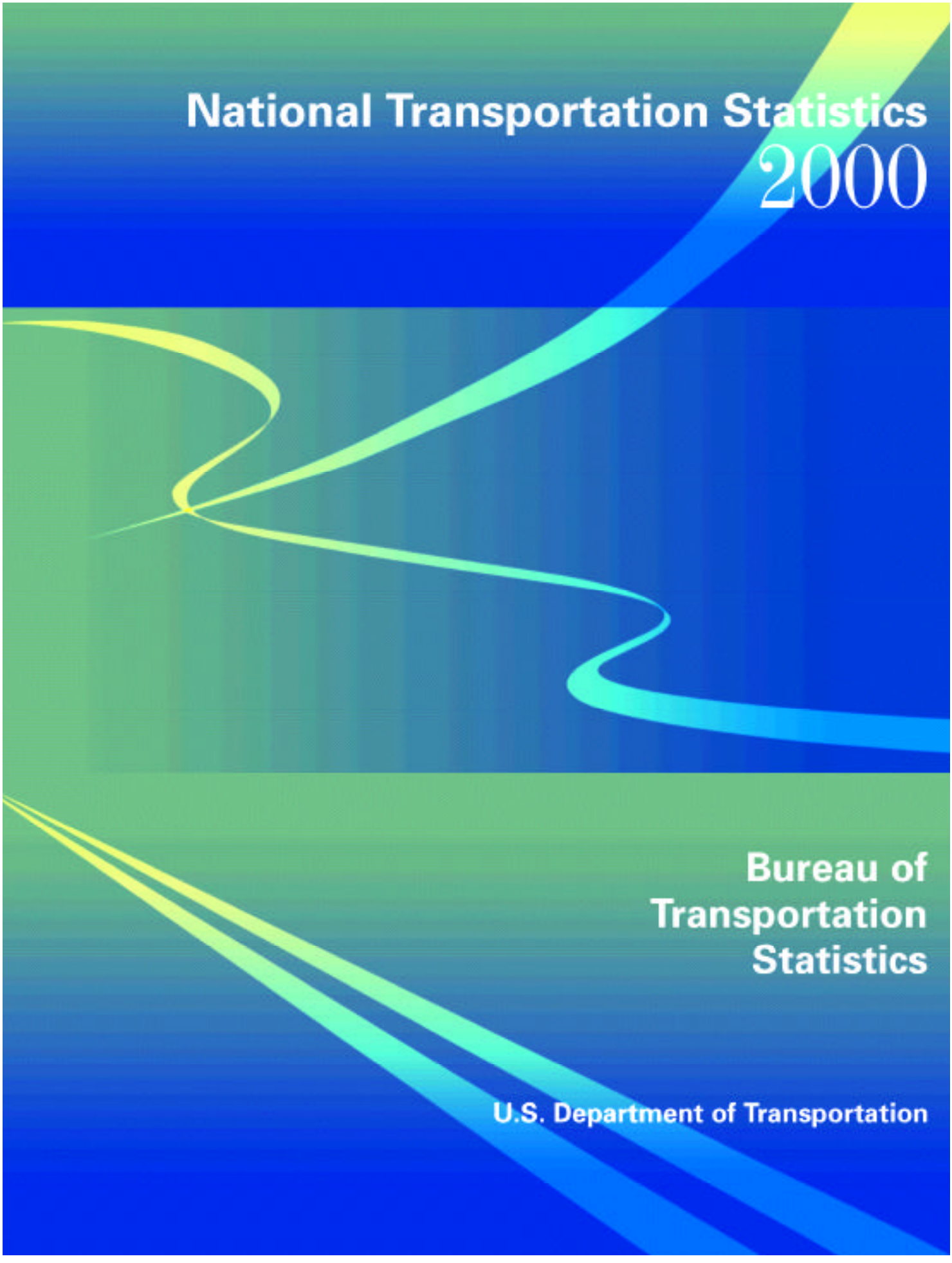
National Transportation Statistics 2000



Bureau of Transportation Statistics

U.S. Department of Transportation

National Transportation Statistics
2000

Bureau of Transportation Statistics

BTS01-01

U.S. Department of Transportation

Recommended citation

U.S. Department of Transportation
Bureau of Transportation Statistics
National Transportation Statistics 2000
BTS01-01 (Washington, DC,
U.S. Government Printing Office, April 2001)

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Introduction

Compiled and published by the Bureau of Transportation Statistics (BTS), U.S. Department of Transportation, *National Transportation Statistics 2000* presents information on the U.S. transportation system, including its physical components, safety record, economic performance, energy use, and environmental impacts. *National Transportation Statistics 2000* is a companion document to the *Transportation Statistics Annual Report*, which analyzes the data presented here.

The report has four chapters.

- Chapter 1 provides data on the extent, condition, use, and performance of the physical transportation network.
- Chapter 2 details transportation's safety record, giving data on accidents, crashes, fatalities, and injuries for each mode and for hazardous materials.
- Chapter 3 focuses on the relationship between transportation and the economy, presenting data on transportation's contribution to gross domestic product, employment by industry and occupation, and transportation-related consumer and government expenditures.
- Chapter 4 presents data on transportation energy use and transportation-related environmental impacts.

Data are presented in five-year increments from 1960 through 1995 and annually thereafter. For annual time-series statistics dating back to 1960, readers are referred to the 1993 edition of this report. Because many data series presented in the 1993 edition have since been revised, the reader should be careful when comparing this earlier data series to that found in this edition.

BTS obtained the data in this report from many sources, including federal government agencies, private industries, and associations. Some of the data are based on samples and are subject to sampling variability. Data from all sources may be subject to omissions and errors in reporting, recording, and processing. Documents cited as sources for the tables often provide detailed information about definitions, methodologies, and statistical reliability. In addition, as part of BTS's ongoing efforts to identify and assess the extent of data errors, *National Transportation Statistics 2000* includes a brief discussion of the quality of the data presented in many of the tables.

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Chapter 2. Transportation Safety

Chapter 3. Transportation and the Economy

Table A Social and Economic Characteristics of the United States

	1980	1985	1990	1995	1996	1997	1998	1999
Total U.S. resident population[a] (thousands)	**227,255**	**237,924**	**R248,791**	**R262,803**	**R265,229**	**R267,784**	**R270,248**	**272,691**
Age[b] (thousands)								
Under 18	63,754	62,623	R63,949	R68,555	R69,109	R69,603	R69,903	70,199
18-24 years	30,022	28,902	R26,961	R25,112	R24,843	R24,980	R25,476	26,011
25-34	37,082	41,696	R43,174	R40,730	R40,246	R39,559	R38,743	37,936
35-44	25,634	31,691	R37,444	R42,555	R43,365	R44,014	R44,498	44,813
45-54	22,800	22,460	R25,062	R31,100	R32,358	R33,625	R34,575	35,802
55-64	21,703	22,135	R21,116	R21,132	R21,353	R21,816	R22,666	23,389
65 and over	25,550	28,415	R31,083	R33,619	R33,957	R34,185	R34,385	34,540
Sex[c] (thousands)								
Male	110,053	116,160	R121,284	R128,294	R129,504	R130,783	R132,030	133,277
Female	116,493	122,576	R127,507	R134,510	R135,724	R137,001	R138,218	139,414
Metropolitan areas (population in millions)[d]								
Large (over 1 million)	119.0	U	R139	147	149	151	153	156
Medium (250,000-999,999)	41.0	U	R41	44	44	43	43	43
Small (less than 250,000)	17.0	U	R18	19	R19	20	20	20
Rural v. urban[e] (thousands)								
Rural	59,495	U	61,656	U	U	U	U	U
Urban	167,051	U	187,053	U	U	U	U	U
Regions[f] (millions)								
Northeast	49.1	49.9	50.8	51.4	51.6	51.6	R51.7	51.8
South	75.4	81.4	85.5	91.8	93.1	94.2	R95.3	96.5
Midwest	58.9	58.8	59.7	61.8	62.1	62.5	63.0	63.2
West	43.2	47.8	52.8	57.7	58.5	59.4	60.3	61.2
Immigrants admitted[g]	**530,639**	**570,009**	**1,536,483**	**720,461**	**915,900**	**798,378**	**660,477**	**U**
Total area (square miles)[h]	**3,618,770**	**U**	**3,717,796**	**U**	**U**	**U**	**U**	**U**

KEY: R = revised; U = data are not available

Continued next page

Table A Cont'd Social and Economic Characteristics of the United States

	1980	1985	1990	1995	1996	1997	1998	1999
Gross domestic product (chained $ 1996 billions)[i]	**4,900.9**	**5,717.1**	**6,707.9**	**7,543.8**	**7,813.2**	**8,144.8**	**8,495.7**	**8,848.2**
Agriculture, forestry, fishing	66.5	97.5	118.3	123.1	130.4	143.1	142.9	U
Manufacturing	832.3	987.9	1,102.3	1,284.7	1,316.0	1,385.0	1448.7	U
Mining	90.6	96.2	105.8	113.0	113.0	119.4	126.4	U
Construction	249.4	270.5	287.5	299.6	316.4	329.3	342.9	U
Transportation	154.0	170.9	180.6	225.1	243.4	256.8	261.6	U
Wholesale/retail trade	621.5	822.7	954.6	1,124.4	1,216.7	1,328.5	1459.7	U
Finance, insurance, real estate	1,003.1	1,125.5	1,250.6	1,393.0	1,436.8	1,510.5	1606.7	U
Services	928.1	1,103.3	1,361.9	1,510.4	1,564.2	1,634.4	1708.1	U
Total civilian labor force (thousands)	**106,940**	**115,461**	**125,840**	**132,304**	**133,943**	**136,297**	**137,673**	**139,368**
Participation rate of men	77.4%	76.3%	76.4%	75.0%	74.9%	75.0%	74.9%	74.7%
Participation rate of women	51.5%	54.5%	57.5%	58.9%	59.3%	59.8%	59.8%	60.0%
Number of households (thousands)	**80,776**	**86,789**	**93,347**	**98,990**	**99,627**	**101,018**	**102,528**	**U**
Average size of households	2.76	2.69	2.63	2.65	2.65	2.64	2.62	U
Median household income (chained $ 1996)[j]	**R$33,722**	**R$34,439**	**R$35,945**	**R$35,082**	**$35,492**	**R$36,175**	**R$37,430**	**U**
Average household expenditures (chained $ 1996)	**U**	**R$34,253**	**R$34,070**	**R$33,217**	**$33,797**	**R$34,038**	**R$34,205**	**U**

KEY: R = revised; U = data are not available

Continued next page

[a] Estimates as of July except 1980 and 1990, which are as of April 1.

[b] Total population count has been revised since the 1980 census. Numbers by age have not been corrected and may not sum to total.

[c] 1995 through 1999 data are estimates.

[d] Defined as Metropolitan Statistical Areas and Consolidated Metropolitan Statistical Areas, as of July 1, 1994.

[e] As of April 1 of year indicated. The Census Bureau only tabulates urban/rural numbers for the decennial census years.

[f] As of July 1 for all years except 1980 and 1990.

[g] Fiscal year ending September 30

[h] The Census Bureau tabulates area (square miles) data for the decennial census years only. Data for 1990 reflect the inclusion of the Great Lakes, inland water, and coastal water. Data for prior years included inland water only.

[i] Estimates for 1980 and 1985 are shown on the basis of the 1972 Standard Industrial Code (SIC); 1990-96 are based on the 1987 SIC.

[j] Households as of March of following year.

SOURCES:

U.S. resident population: 1980-90: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 2.

1995-99: Ibid., Population Estimates Program, Population Division, Internet website http://www.census.gov/populations/estimates/nation/intfile2-1.txt, as of April 27, 2000.

Age: 1980-90: *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 14.

1995-99: Ibid., Populations Estimates Program, Population Division, Internet website http://www.census.gov/populations/estimates/nation/intfile2-1.txt, as of April 27, 2000.

Sex: 1980-90: *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 19.

1995-99: Ibid., Populations Estimates Program, Population Division, Internet website http://www.census.gov/populations/estimates/nation/intfile2-1.txt, as of April 27, 2000.

Metropolitan areas: 1980: *Statistical Abstract of the United States 1995* (Washington, DC:1995), table 41.

1990-96: Ibid., *Statistical Abstract of the United States 1999* (Washington, DC: 1999), table 41.

Rural/urban: Ibid., table 46.

Regions: 1980-97: Ibid., table 29.

1998-99: Ibid., Internet site http://www.census.gov/population/estimates/state/st-99-1.txt, as of Apr. 27, 2000.

Immigrants: 1980-85: *Statistical Abstract of the United States 1990* (Washington, DC: 1990), table 6.

1990-96: Ibid., *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 6.

1997-98: U.S. Department of Justice, Immigration and Naturalization Service, Office of Policy and Planning, Statistics Branch, *Annual Report, Legal Immigration, Fiscal Year 1998*, No. 2, May 1999, Internet site http://www.ins.usdoj.gov/graphics/aboutins/statistics/index.htm, as of May 1, 2000.

Total area: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1998* (Washington, DC:1998), table 1.

Gross domestic product: 1980-90: Ibid., Survey of Current Business (Washington, DC: November 1997)

1995-97: Ibid., November 1998.

1998: Ibid., September 1999.

1999: Ibid., April 2000. Industry gross domestic products are expressed as chained 1996 dollars using industry-specific chain-type quantity indices from the Bureau of Economic Analysis.

Civilian labor force: 1980-85: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 644.

1990-99: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey, Internet site http://www.bls.gov, specific series data query, as of May 1, 2000.

Participation rates: 1985: U.S. U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 639.

1990-99: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey, Internet site http://www.bls.gov, specific series data queries, as of May 1, 2000.

Number and average size of households: 1980-97: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 69.

1998: Ibid., *Statistical Abstract of the United States 1999* (Washington, DC: 1999), table 70.

Median household income: Ibid., *Statistical Abstract of the United States 1999* (Washington, DC:1999), table 742. Converted to chained 1996 dollars using the chain-type price index for personal consumption expenditures from the Bureau of Economic Analysis.

Average household expenditures: Ibid., U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey, Internet site http://www.bls.gov/csxhome.htm. Converted to chained 1996 dollars using the chain-type price index for personal consumption expenditures from the Bureau of Economic Analysis.

The Transportation System

Section A
Physical Extent

Table 1-1 System Mileage Within the United States (Statute miles)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Highway [a]	3,545,693	3,689,666	3,730,082	3,838,146	3,859,837	3,863,912	3,866,926	3,912,226	3,919,450	3,944,597	3,948,893
Class I rail [b,c]	207,334	199,798	196,479	191,520	164,822	145,764	119,758	108,264	105,779	102,128	100,570
Amtrak [c]	N	N	N	N	24,000	24,000	24,000	24,000	25,000	25,000	22,000
Transit [d]											
Commuter rail [c]	N	N	N	N	N	3,574	4,132	4,160	3,682	4,417	5,172
Heavy rail	N	N	N	N	N	1,293	1,351	1,458	1,478	1,527	1,527
Light rail	N	N	N	N	N	384	483	568	638	659	676
Navigable channels [e]	25,000	25,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000
Oil pipeline [f]	190,944	210,867	218,671	225,889	218,393	213,605	208,752	R221,600	R177,535	179,873	178,648
Gas pipeline [g]	630,950	767,520	913,267	979,263	1,051,774	1,118,875	1,206,894	1,262,152	1,276,315	1,251,199R	1,279,714

KEY: N = data do not exist; R = revised

[a] All public road and street mileage. For years prior to 1980, some miles of nonpublic roadways are included. No consistent data on private road mileage are available. Includes District of Columbia. Beginning in 1996, mileage data for Puerto Rico are included.

[b] Data represent miles of road owned (aggregate length of road, excluding yard tracks, sidings, and parallel lines).

[c] Portions of Class I freight railroads, Amtrak, and commuter rail networks share common trackage. Amtrak data represent miles of track operated.

[d] Transit system mileage is measured in directional route-miles. A directional route-mile is the mileage in each direction over which public transportation vehicles travel while in revenue service. Directional route-miles are computed with regard to direction of service, but without regard to the number of traffic lanes or rail tracks existing in the right-of-way.

[e] The St. Lawrence Seaway is not included in this number because 3 of the 5 subsections are solely in Canadian waters, and the others are in international boundary waters. Of the 26,000 miles of navigable waterways, 10,867 miles are commercially significant shallow-draft inland waterways subject to fuel taxes.

[f] Includes trunk and gathering lines for crude-oil pipeline.

[g] Excludes service pipelines. Data not adjusted to common diameter equivalent. Mileage as of the end of each year. Includes field and gathering, transmission, and distribution mains. See table 1-8 for a more detailed breakout of oil and gas pipeline mileage.

NOTES: Total highway mileage in this table will not match that in tables 1-3 and 1-4 because of a change in the way the U.S. Department of Transportation, Federal Highway Administration (FHWA) creates mileage-based tables derived from the Highway Performance Monitoring System, beginning with the 1997 issue of FHWA's *Highway Statistics*. See the accuracy statement in the appendix for additional details.

SOURCES:

Highway: 1960-95: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: Annual issues), table HM-212.

1996-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table HM-12.

Class I rail: 1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 44.

Amtrak: 1980: Amtrak, Corporate Planning and Development, personal communication (Washington, DC).

1985-98: Amtrak, Corporate Planning and Development, *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues).

Transit: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database* (Washington, DC: Annual issues), table 18 (1996-1997) and table 19 (for 1998) and similar tables in earlier editions.

Navigable channels: 1960-96: U.S. Army Corps of Engineers, Ohio River Division, Huntington District, *Ohio River Navigation System Report, 1996, Commerce on the Ohio River and its Tributaries* (Fort Belvoir, VA: 1996), p. 2.

1997-1998: Waterborne Commerce Statistics Center Databases, personal communication, June 2000.

Oil pipeline: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1999), p. 64.

Gas pipeline: 1960-98: American Gas Association, *Gas Facts* (Arlington, VA : Annual issues), table 5-2 and similar tables in earlier editions.

Table 1-2 Number of Air Carriers, Railroads, Interstate Motor Carriers, Marine Vessel Operators, and Pipeline Operators

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Air Carriers[a]	**N**	**N**	**39**	**36**	**63**	**102**	**70**	**96**	**96**	**96**	**96**	**94**
Major Air Carriers	N	N	N	N	N	13	14	11	12	13	13	13
Other Air Carriers	N	N	N	N	N	89	56	85	84	83	83	81
Railroads	**607**	**568**	**517**	**477**	**480**	**500**	**530**	**541**	**553**	**550**	**559**	**555**
Class I Railroads	106	76	71	73	39	25	14	11	10	9	9	9
Other Railroads	501	492	446	404	441	[f]475	516	530	543	541	550	546
Interstate Motor Carriers[b]	[e]	[e]	[e]	[e]	**U**	**U**	**216,000**	**346,000**	**379,000**	**417,000**	**477,486**	**517,297**
Marine Vessel Operators[c]	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**2,519**	**2,505**	**2,494**	**2,534**	**2,502**
Pipeline Operators[d]	**N**	**N**	**1,123**	**1,682**	**2,243**	**2,204**	**2,212**	**2,378**	**2,338**	**2,282**	**2,225**	**2,196**
Hazardous Liquid	N	N	N	N	N	[f]222	187	209	215	217	225	237
Natural Gas Transmission	N	N	420	432	474	724	866	974	970	954	880	850
Natural Gas Distribution	N	N	938	[g]1,500	[g]1,932	1,485	1,382	1,444	1,397	1,363	1,366	1,351

KEY: N = data do not exist; U = data are not available

[a] Carrier groups are categorized based on their annual operating revenues as major, national, large regional, and medium regional. The thresholds were last adjusted July 1, 1999, and the threshold for major air carriers is currently $1 billion. The other air carrier category contains all national, large regional, and medium regional air carriers.

[b] Figures are for the fiscal year, October through September.

[c] The printed source materials do not contain totals for the number of operators and data files from which the figures can be determined are not available prior to 1993.

[d] There is some overlap among the operators for the pipeline modes so the total number of pipeline operators is lower than the sum for the the three pipeline modes.

[e] Prior to 1980, the source of motor carrier data was the Interstate Commerce Commission (ICC), which was abolished on Jan. 1, 1996. (Certain functions were transferred to the Surface Transportation Board and the Department of Transportation.) The system used by ICC to collect motor carrier data differs significantly from that used by the Federal Motor Carrier Safety Administration in its Motor Carrier Management Information System (MSMIS), which began operations in 1980. The MCMIS is updated weekly, but archive versions are not retained. Because of differences between the two systems, data are not comparable and thus are not included here.

[f] This value is for 1986. The number of hazardous liquid pipeline operators is not available for prior years.

[g] Includes master meter and mobile home park natural gas distribution operators. A master meter system is a pipeline system for distributing gas within, but not limited to, a definable area, such as a mobile home park, housing project, or apartment complex, where the operator purchases metered gas from an outside source for resale through a gas distribution pipeline system. The gas distribution pipeline system supplies the ultimate consumer who either purchases the gas directly through a meter or by other means, such as by rents.

SOURCES:

Air carriers: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Financial Statistics Quarterly* (Washington, DC: Fourth quarter issues), "Alphabetical List of Air Carriers by Carrier Group ...".

Railroads: 1999: Association of American Railroads, *Railroad Facts* (Washington, DC: 2000).

1989-1998: Ibid., *Railroad Ten-Year Trends,* Vol. 16 (Washington, DC: 1999), page 10.

1986: Ibid., Vol. 3 (Washington, DC), table I-2.

1960-1985: Ibid., Vol. 2 (Washington, DC), table I-2.

Interstate motor carriers: U.S. Department of Transportation, Federal Motor Carrier Safety Administration, Motor Carrier Management Information System (MCMIS) data, personal communication, Apr. 5, 2000.

Marine vessel operators: 1995-97: U.S. Army, Corps of Engineers, *Waterborne Transportation Lines of the United States, Volume 2, Vessel Company Summary*(New Orleans, LA: Annual issues), source data files obtained by personal communication, Apr. 12, 2000.

1998: Ibid., Internet site: http://www.wrsc.usace.army.mil/ndc/datavess.htm as of Apr. 10, 2000.

Pipeline Operators: U.S. Department of Transportation, Office of Pipeline Safety, personal communication, Jul. 28, 2000.

Table 1-3 Number of U.S. Airports[a]

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
TOTAL airports	**15,161**	**16,319**	**17,490**	**17,581**	**17,846**	**18,317**	**18,343**	**18,224**	**18,292**	**18,345**	**18,770**	**19,098**
Public use, total	**4,814**	**5,858**	**5,589**	**5,551**	**5,545**	**5,538**	**5,474**	**5,415**	**5,389**	**5,357**	**5,352**	**5,354**
% with lighted runways	66.2	68.1	71.4	71.9	72.3	72.8	73.5	74.3	74.5	74.6	74.8	76.2
% with paved runways	72.3	66.7	70.7	71.5	71.6	72.2	72.9	73.3	73.7	74.0	74.2	74.2
Private use, total	**10,347**	**10,461**	**11,901**	**12,030**	**12,301**	**12,779**	**12,869**	**12,809**	**12,903**	**12,988**	**13,418**	**13,774**
% with lighted runways	15.2	9.1	7.0	6.8	6.6	6.3	6.2	6.4	6.4	6.4	6.3	6.7
% with paved runways	13.3	17.4	31.5	32.0	32.2	32.7	33.0	33.0	32.9	33.0	33.2	31.8
TOTAL airports	**15,161**	**16,319**	**17,490**	**17,581**	**17,846**	**18,317**	**18,343**	**18,224**	**18,292**	**18,345**	**18,770**	**19,098**
Certificated[b], total	**730**	**700**	**680**	**669**	**664**	**670**	**672**	**667**	**671**	**660**	**660**	**655**
Civil	N	N	N	N	N	N	577	572	577	566	566	565
Civil-military	N	N	N	N	N	N	95	95	94	94	94	90
General aviation, total	**14,431**	**15,619**	**16,810**	**16,912**	**17,182**	**17,637**	**17,671**	**17,557**	**17,621**	**17,685**	**18,110**	**18,443**

KEY: N = data do not exist

[a] Includes civil and joint-use civil-military airports, heliports, STOLports, and seaplane bases in the United States and its territories.

[b] Certificated airports serve air-carrier operations with aircraft seating more than 30 passengers.

SOURCE: U.S. Department of Transportation, Federal Aviation Administration, *Administrator's Fact Book* (Washington, DC: Annual issues), Internet site http://www.ama500.jccbi.gov as of May 20, 2000.

Table 1-4 Public Road and Street Mileage in the United States by Type of Surface[a] (Millions of miles)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Paved[b]											
Low and intermediate type	0.672	0.758	0.897	0.967	1.041	1.015	1.025	1.062	1.066	N[d]	N[d]
High-type	0.558	0.696	0.762	0.888	1.032	1.099	1.230	1.316	1.314	N[d]	N[d]
Total	**1.230**	**1.455**	**1.658**	**1.855**	**2.073**	**2.114**	**2.255**	**2.378**	**2.380**	**2.410**	**2.420**
Unpaved[c] total	**2.315**	**2.235**	**2.072**	**1.983**	**1.787**	**1.750**	**1.612**	**1.534**	**1.554**	**1.548**	**1.529**
TOTAL paved and unpaved	**3.546**	**3.690**	**3.730**	**3.838**	**3.860**	**3.864**	**3.867**	**3.912**	**3.934**	**3.958**	**3.949**

KEY: N = data do not exist

[a] 1960-95 data include the 50 states and the District of Columbia; 1996-98 data include the 50 states, District of Columbia, and Puerto Rico.

[b] Paved mileage includes the following categories: low type (an earth, gravel, or stone roadway that has a bituminous surface course less than 1" thick) ; intermediate type (a mixed bituminous or bituminous penetration roadway on a flexible base having a combined surface and base thickness of less than 7"); high-type flexible (a mixed bituminous or bituminous penetration roadway on a flexible base having a combined surface and base thickness of 7" or more; high-type composite (a mixed bituminous or bituminous penetration roadway of more than 1" compacted material on a rigid base with a combined surface and base thickness of 7" or more; high-type rigid (Portland cement concrete roadway with or without a bituminous wearing surface of less than 1".

[c] Unpaved mileage includes the following categories: unimproved roadways using the natural surface and maintained to permit passability; graded and drained roadways of natural earth aligned and graded to permit reasonably convenient use by motor vehicles, and that have adequate drainage to prevent serious impairment of the road by normal surface water--surface may be stabilized; and soil, gravel, or stone, a graded and drained road with a surface of mixed soil, gravel, crushed stone, slag, shell, etc.--surface may be stabilized. The percentage of unpaved roads that are nonsurfaced, dropped from approximately 42% in the 1960s to about 37% in the first half of the 1970s, to about 32% in 1980 and has held at about 22% since 1985.

[d] Source no longer sorts data into these particular categories.

NOTES: A public road is any road under the jurisdiction of and maintained by a public authority (federal, state, county, town, or township, local government or instrumentality thereof) and open to public travel. No consistent data on private road mileage are available (although for years prior to 1980, some nonpublic roadway mileage are included). Some years contain U.S. Department of Transportation, Federal Highway Administration (FHWA) estimates for some states.

Numbers may not add due to rounding.

Beginning with the 1997 issue of *Highway Statistics*, FHWA has instituted a new method for creating mileage based tables derived from the Highway Performance Monitoring System (HPMS) data. Previously, adjustments to tables developed from sampled data were made using areawide mileage data provided by the States; these adjustments are now made using the universe totals from the HPMS data set. In addition, rounding and expansion related differences were spread across table cells so that all table-to-table mileage totals on related tables matched precisely. While this cosmetic step makes all functional system table totals match, an unintended result is that the tables are not reproducible from the data set by any other users. As a result, FHWA made a decision to discontinue the spreading process, and users may note minor differences in table-to-table mileage totals. For record purposes, FHWA considers the mileage totals from table HM-20, Public Road Length, Miles by Functional System in *Highway Statistics* to be the controlling totals should a single value be required. Thus, total mileage in this table does not match that in tables 1-1 and 1-4.

SOURCES: 1960-95: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table HM-212.

1996-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table HM-12.

Table 1-5 U.S. Public Road and Street Mileage by Functional System[a]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Urban mileage										
Principal arterials, Interstates	11,527	11,602	12,516	12,877	13,126	13,164	13,217	13,247	13,312	13,343
Principal arterials, other freeways and expressways	7,668	7,709	8,491	8,841	8,994	8,970	9,027	9,063	9,127	9,125
Principal arterials, other	51,968	52,515	51,900	52,708	53,110	52,796	52,983	53,223	53,132	53,206
Minor arterials	74,659	74,795	80,815	86,821	87,857	88,510	89,020	89,185	89,496	89,399
Collectors	78,254	77,102	82,784	84,854	86,089	87,331	87,790	88,049	88,071	88,008
Local	520,568	526,139	548,560	559,776	564,609	568,935	574,728	583,973	588,504	592,978
Total	**744,644**	**749,862**	**785,066**	**805,877**	**813,785**	**819,706**	**826,765**	**836,740**	**841,642**	**846,059**
Rural mileage										
Principal arterials, Interstates	33,547	33,677	32,951	32,631	32,457	32,580	32,820	32,817	32,813	32,974
Principal arterials, other	83,802	86,747	94,947	96,770	97,175	97,948	98,131	98,257	98,852	98,856
Minor arterials	144,774	141,795	137,685	137,577	138,120	137,151	137,359	137,497	137,308	137,463
Major collectors	436,352	436,746	434,072	432,222	431,115	431,712	432,117	432,714	432,408	432,954
Minor collectors	293,922	293,511	284,504	282,182	282,011	274,081	273,198	272,362	272,140	271,690
Local	2,129,885	2,141,582	2,131,856	2,117,952	2,111,932	2,119,048	2,119,262	2,135,485	2,091,127	2,097,244
Total	**3,122,282**	**3,134,058**	**3,116,015**	**3,099,334**	**3,092,810**	**3,092,520**	**3,092,887**	**3,109,132**	**3,064,648**	**3,071,181**
TOTAL urban and rural mileage	**3,866,926**	**3,883,920**	**3,901,081**	**3,905,211**	**3,906,595**	**3,912,226**	**3,919,652**	**3,945,872**	**3,906,290**	**3,917,240**

[a] Includes the 50 states and the District of Columbia. When states did not submit reports, data were estimated by the U.S. Department of Transportation, Federal Highway Administration.

NOTES: A public road is any road under the ownership of and maintained by a public authority (federal, state, county, town, or township, local government, or instrumentality thereof) and open to public travel. No consistent data on private road mileage are available. For more detailed information, including breakouts of mileage by ownership and type of surface, see the source document.

SOURCES: 1990-95: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table HM-220.

1996-99: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table HM-20.

Table 1-6 Estimated U.S. Roadway Lane-Miles by Functional System[a]

	1980	1985	1990	1995	1996	1997[R]	1998[R]	1999
Urban								
Interstates	48,458	57,295	62,214	71,377	71,790	[R]72,966	73,729	74,038
Other arterials	333,673	371,649	399,376	445,828	449,480	[R]455,872	456,333	452,627
Collectors	145,128	162,377	167,770	185,032	186,923	[R]190,153	188,852	187,612
Local	867,986	951,018	1,041,136	1,137,870	1,149,456	[R]1,178,928	1,188,015	1,197,026
Total	**1,395,245**	**1,542,339**	**1,670,496**	**1,840,107**	**1,857,649**	**[R]1,897,919**	**1,906,929**	**1,911,303**
Rural								
Interstates	130,980	131,907	135,871	131,916	132,963	[R]133,165	133,640	134,611
Other arterials	507,098	510,005	517,342	530,706	532,856	[R]537,870	538,875	540,208
Collectors[a]	1,431,267	1,466,789	1,467,602	1,417,428	1,416,662	[R]1,421,568	1,418,733	1,416,962
Local	4,457,584	4,366,954	4,259,770	4,238,096	4,238,524	[R]4,282,216	4,193,555	4,205,960
Total	**6,526,929**	**6,475,655**	**6,380,585**	**6,318,146**	**6,321,005**	**[R]6,375,228**	**6,284,803**	**6,297,741**

KEY: R = revised

[a] Includes the 50 States, the District of Columbia, and Puerto Rico

[b] Includes minor and major collectors.

NOTE: In estimating rural and urban lane mileage, the U.S. Department of Transportation, Federal Highway Administration assumed that rural minor collectors and urban/rural local roads are two lanes wide.

SOURCES: 1980-95: U.S. Department of Transportation, Federal Highway Administration, Office of Highway Information Management, table HM-260 (unpublished).

1996: Ibid,. *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

1997-99: Ibid., Internet site www.fhwa.dot.gov/ohim.ohimstat.htm, as of Nov. 15, and Dec. 8, 2000.

Table 1-7 Number of Stations Served by Amtrak and Rail Transit, Fiscal Year

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Amtrak	503	516	523	524	535	540	530	542	516	508	510
Rail transit	1,895	2,169	2,192	2,240	2,286	2,376	2,382	2,587	2,391	2,524	U

KEY: U = data are not available

NOTE: Rail transit is sum of commuter rail, heavy rail, and light rail. In several large urban areas, Amtrak and commuter rail stations are shared.

SOURCES:

Amtrak: Amtrak, *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Rail transit: U.S. Department of Transportation, Federal Transit Administration, National Transit Database (Washington, DC: Annual issues), table 19 (for 1999 issue) and similar tables in earlier editions.

Table 1-8 U.S. Oil and Gas Pipeline Mileage

	1960	1965	1970	1975	1980	1985	1990	1991
Oil pipeline								
Crude lines[a]	141,085	149,424	146,275	145,679	129,831	117,812	118,805	115,860
Product lines	49,859	61,443	72,396	80,210	88,562	95,793	89,947	87,968
Total	**190,944**	**210,867**	**218,671**	**225,889**	**218,393**	**213,605**	**208,752**	**203,828**
Gas pipeline[b]								
Distribution mains	391,400	494,500	594,800	648,200	701,800	753,400	837,300	857,500
Transmission pipelines[c]	183,700	211,300	252,200	262,600	266,500	271,200	280,100	281,600
Field and gathering lines	55,800	61,700	66,300	68,500	83,500	94,300	89,500	86,300
Total	**630,950**	**767,520**	**913,267**	**979,263**	**1,051,774**	**1,118,875**	**1,206,894**	**1,225,358**

	1992	1993	1994	1995	1996	1997	1998
Oil pipeline							
Crude lines[a]	R110,651	R107,246	R103,277	R129,423	R92,610	91,523	87,663
Product lines	R85,894	R86,734	R87,073	R92,177	R84,925	88,350	90,985
Total	**R196,545**	**R193,980**	**R190,350**	**R221,600**	**R177,535**	**179,873**	**178,648**
Gas pipeline[b]							
Distribution mains	883,200	908,300	919,300	936,800	959,500	R957,100	980,800
Transmission pipelines[c]	284,500	269,600	268,300	263,900	259,300	R251,100	253,900
Field and gathering lines	86,200	73,100	70,400	60,400	57,500	R43,000	45,000
Total	**1,253,924**	**1,251,095**	**1,257,971**	**1,261,100**	**1,276,315**	**R1,251,200**	**1,279,700**

KEY: R = revised

[a] Includes trunk and gathering lines.

[b] Excludes service pipe. Data are not adjusted to common diameter equivalent. Mileage as of the end of each year.

[c] After 1975, includes 5,000-6,200 miles of underground storage pipe.

NOTE: Numbers may not add to totals due to rounding because the source provides exact numbers for totals, but rounded mileage for subtotals.

SOURCES:

Oil pipeline: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America, 1999* (Washington, DC: 1999), p. 64.

Gas pipeline: 1960-98: American Gas Association, *Gas Facts* (Arlington, VA: Annual issues), tables 5-1 and 5-3, and similar tables in earlier editions.

Section B
Vehicle, Aircraft, and Vessel Inventory

Table 1-9 Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Air carrier[a]	2,135	2,125	2,679	2,495	3,808	4,678	6,083	7,411	7,478	7,616	8,111
General aviation[b] (active fleet)	76,549	95,442	131,743	168,475	211,045	210,654	196,800	188,100	191,100	192,400	204,710
Highway (registered vehicles)											
Passenger car	61,671,390	75,257,588	89,243,557	106,705,934	121,600,843	127,885,193	133,700,496	128,386,775	129,728,341	129,748,704	131,838,538
Motorcycle	574,032	1,381,956	2,824,098	4,964,070	5,693,940	5,444,404	4,259,462	3,897,191	3,871,599	3,826,373	3,879,450
Other 2-axle 4-tire vehicle	N	[g]	14,210,591	20,418,250	27,875,934	37,213,863	48,274,555	65,738,322	69,133,913	70,224,082	71,330,205
Truck											
Single-unit 2-axle 6-tire or more truck	N	13,999,285	3,681,405	4,231,622	4,373,784	4,593,071	4,486,981	5,023,670	5,266,029	5,293,358	5,734,925
Combination truck	[h]11,914,249	786,510	905,082	1,130,747	1,416,869	1,403,266	1,708,895	1,695,751	1,746,586	1,789,968	1,997,345
Bus	272,129	314,284	377,562	462,156	528,789	593,485	626,987	685,503	694,781	697,548	715,540
Total highway	**74,431,800**	**91,739,623**	**111,242,295**	**137,912,779**	**161,490,159**	**177,133,282**	**193,057,376**	**205,427,212**	**210,441,249**	**211,580,033**	**215,496,003**
Transit[c]											
Motor bus	49,600	49,600	49,700	50,811	59,411	64,258	58,714	67,107	71,678	[R]72,770	[P]74,641
Light rail cars	2,856	1,549	1,262	1,061	1,013	717	913	999	1,140	1,229	[P]1,205
Heavy rail cars	9,010	9,115	9,286	9,608	9,641	9,326	10,419	10,157	10,201	10,242	[P]10,301
Trolley bus	3,826	1,453	1,050	703	823	676	832	885	871	859	[P]880
Commuter rail cars and locomotives	N	N	N	N	4,500	4,035	4,415	4,565	4,665	4,943	[P]4,907
Demand response	N	N	N	N	N	14,490	16,471	29,352	30,804	[R]32,509	[P]32,899
Other[d]	N	N	N	N	N	867	1,197	2,809	3,003	[R]3,808	[P]4,137
Rail											
Class I											
Freight cars	1,658,292	1,478,005	1,423,921	1,359,459	1,168,114	867,070	658,902	583,486	570,865	568,493	575,604
Locomotive	29,031	27,780	27,077	27,846	28,094	22,548	18,835	18,812	19,269	19,684	20,261
Nonclass I freight cars	32,104	37,164	29,787	29,407	102,161	111,086	103,527	84,724	87,364	116,108	121,659
Car companies and shippers freight cars	275,090	285,793	330,473	334,739	440,552	443,530	449,832	550,717	582,344	585,818	618,404
Amtrak											
Passenger train car	N	N	N	1,913	2,128	1,854	1,863	1,722	1,730	1,728	1,962
Locomotive	N	N	N	355	419	291	318	313	299	332	345
Water											
Nonself-propelled vessels[e]	16,777	17,033	19,377	25,515	31,662	33,597	31,209	31,360	32,811	33,011	33,509
Self-propelled vessels[f]	6,543	6,083	6,455	6,144	7,126	7,522	8,236	8,281	8,293	8,408	8,523
Oceangoing steam and motor ships (1,000 gross tons and over)	2,926	2,376	1,579	857	864	737	636	509	495	477	470
Recreational boats	2,500,000	6,400,000	7,400,000	[R]7,303,286	[R]8,577,857	9,589,483	10,996,253	11,734,710	11,877,938	12,312,982	12,565,930

KEY: N = data do not exist; P = preliminary; R = revised

Continued next page

Table 1-9 Cont'd Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances

[a] Air carrier aircraft are those carrying passengers or cargo for hire under 14 CFR 121 and 14 CFR 135. Beginning in 1990, the number of aircraft is the monthly average of the number of aircraft reported in use for the last three months of the year. Prior to 1990, it was the number of aircraft reported in use during December of a given year.

[b] 1991-94 data revised to reflect changes in adjustment for nonresponse bias with 1996 telephone survey factors; 1995-97 data may not be comparable to 1994 and earlier years due to changes in methodology. Includes air taxi aircraft.

[c] Prior to 1984, excludes most rural and smaller systems funded via Sections 18 and 16(b)(2), Urban Mass Transportation Act of 1964, as amended. Also prior to 1984, includes total vehicles owned and leased.

[d] Other includes aerial tramway, automated guideway transit, cablecar, ferry boat, inclined plane, monorail, and vanpool.

[e] Nonself-propelled vessels include dry-cargo barges, tank barges and railroad-car floats.

[f] Self-propelled vessels include dry-cargo and/or passenger, offshore supply vessels, rail road-car ferries, tankers and towboats.

[g] Included in single-unit truck.

[h] All trucks.

NOTES: Transit motor bus figure is also included as part of bus in the highway category.

For more detail on oceangoing vessels, see table 1-19

SOURCES:

Air:

Air carrier: 1960-65: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 1970* (Washington, DC : 1970), table 5.3.

1970-75: Ibid., *1979 edition* (Washington, DC: 1979), table 5.1.

1980-85: Ibid., *Calendar Year 1986* (Washington, DC: 1986), table 5.1.

1990-97: Ibid., *Calendar Year 1997* (Washington, DC: unpublished), table 5.1, personal communication, March 19, 1999.

1998: Aerospace Industries Association, *Aerospace Facts and Figures* (Washington DC: 1999/2000), "Active U.S. Air Carrier Fleet".

General aviation: 1960-65: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 1969* (Washington, DC: 1969), table 9.10.

1970-75: Ibid., *Calendar Year 1976* (Washington, DC: 1976), table 8-6.

1980: Ibid., *General Aviation Activity Survey, Calendar Year 1980* (Washington, DC: 1981), table 1-3.

1985:Ibid., *Calendar Year 1985* (Washington, DC: 1987), table 2-9.

1990-98: Ibid., *General Aviation and Air Taxi Activity Survey, Calendar Year 1998* (Washington, DC: unpublished), table 1.3.

Highway:

Passenger car: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MV-201.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MV-201.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicles: 1970-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit and combination trucks, and buses: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

1960-97: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1999), table 44.

1998: Ibid., P*ublic Transportation Fact Book* (Washington DC:2000), table 46.

Rail (all categories, except Amtrak): 1960-98: Association of American Railroads, *Railroad Facts 1999* (Washington, DC: 1999), pp. 48, 50-51.

Amtrak:

Passenger train-cars and locomotives: 1975-80: Amtrak, State and Local Affairs Department, personal communication.

1985-98: Ibid., *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues), p. 44.

Water transportation:

Nonself-propelled vessels and self-propelled vessels: 1960-98: U.S. Army, Corps of Engineers, *Waterborne Transportation Lines of the United States, Volume 1*, *National Summaries* (New Orleans, LA : Annual issues).

Oceangoing steam motor ships: 1960-98: U.S. Department of Transportation, Maritime Administration, *Merchant Fleets of the World* (Washington, DC: Annual issues).

Recreational boats: 1960-98: U.S. Department of Transportation, *U.S. Coast Guard, Boating Statistics* (Washington, DC: Annual issues).

Table 1-10 Sales or Deliveries of New Aircraft, Vehicles, Vessels, and other Conveyances

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Civilian aircraft (shipments)												
Transport[a]	245	233	311	315	387	278	521	256	269	374	R559	P620
Helicopters	N	598	482	864	1,366	384	603	292	278	346	R363	P342
General aviation	7,588	11,852	7,283	14,072	11,881	2,029	1,144	1,077	1,130	1,569	R2,213	P2,455
Highway												
Passenger car (new retail sales)	6,641,000	9,332,000	8,400,000	8,624,000	8,979,000	11,042,000	9,300,000	8,635,000	8,527,000	8,272,000	8,139,000	U
Motorcycle (new retail sales)[b]	N	N	1,125,000	940,000	1,070,000	710,000	303,000	309,000	330,000	356,000	432,000	U
Truck (factory sales, domestic)[c]	1,194,475	1,716,564	1,660,446	2,231,630	1,667,283	3,356,905	3,692,474	5,689,551	5,748,147	6,125,935	6,407,702	U
Bus (includes school bus) (factory sales)	I	35,241	31,994	40,530	34,385	33,533	32,731	23,918	27,583	26,882	27,483	U
Recreational vehicle (shipments)	N	192,830	380,300	339,600	178,500	351,700	347,300	475,200	466,800	438,800	441,300	U
Bicycle[d]	N	N	N	N	9,000,000	11,400,000	10,800,000	12,000,000	10,900,000	11,000,000	11,100,000	U
Transit (deliveries)												
Motor bus[e]	2,415	3,000	1,424	5,261	4,572	3,367	4,779	6,022	6,016	R6,329	P6,450	U
Light rail	0	0	0	0	32	63	55	38	39	76	P80	U
Heavy rail	416	580	308	127	130	441	10	72	10	34	P120	U
Trolley bus	0	0	0	1	98	0	118	3	3	0	P32	U
Commuter rail	214	666	302	2,165	152	179	83	38	111	198	P122	U
Class I rail (deliveries)												
Freight car[f]	57,047	77,822	66,185	72,392	85,920	12,080	32,063	60,853	57,877	50,396	75,685	74,223
Locomotive	389	1,387	1,029	772	1,480	522	530	928	761	743	889	709
Amtrak (deliveries)												
Passenger train car	N	N	N	109	109	N	58	76	92	10	0	0
Locomotive	N	N	N	30	17	10	0	10	0	111	35	0
Water transport												
Merchant vessel[g]	20	13	13	15	23	14	0	1	0	1	4	2
Recreational boat[h]	N	N	N	N	642,800	674,600	525,300	663,760	634,750	610,100	R571,100	605,500

KEY: N = data do not exist; P = preliminary;
R = revised; U = data are not available

Continued next page

Table 1-10 Cont'd Sales or Deliveries of New Aircraft, Vehicles, Vessels, and other Conveyances

[a] U.S.-manufactured fixed-wing aircraft over 33,000 pounds empty weight, including all jet transports plus the 4-engine turboprop-powered Lockheed L-100.

[b] Includes domestic and imported vehicles. Prior to 1985, all terrain vehicles (ATVs) were included in the motorcycle total. In 1995, the Motorcycle Industry Council revised its data for the years 1985 to present to exclude ATVs from its totals.

[c] Includes large passenger or utility vehicles that may be considered cars in other tables.

[d] Includes domestic and imported vehicles, wheel sizes 20 inches and over. 1997 and 1998 data are projections.

[e] Buses or bus-type vehicles only. Includes demand response. Excludes vanpool vans and most rural and smaller systems prior to 1984. Transit motor bus figure is also included as part of the bus total in the highway category.

[f] Includes all railroads and private car owners.

[g] Self-propelled, 1,000 or more gross tons.

[h] Retail unit estimates. Includes outboard, inboard, and sterndrive boats, jet boats (since 1995), personal watercraft (since 1991), sailboats and canoes. Also includes inflatable boats (until 1992) and sailboards (until 1990).

[i] Included in truck figure.

SOURCES:

Civilian aircraft: 1960-98: Aerospace Industries Association, *Aerospace Facts and Figures* (Washington, DC: Annual issues), "Civil Aircraft Shipments".

1999: Ibid., Internet site www.aia-aerospace.org/departments/stats/Table5.html, as of July 13, 2000.

Highway:

Passenger cars and trucks: 1960-97: American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures, 1998* (Southfield, MI: 1999), p. 21 (passenger car) and p. 6 (truck).

1998: Ward's Communications, *Motor Vehicle Facts & Figures, 1999* (Detroit, MI: 1998), p. 21 (passenger car) and p. 6 (truck).

Motorcycles: 1970-98: Motorcycle Industry Council, Inc., *Motorcycle Statistical Annual, 1999* (Irvine, CA: 1999), p. 5 and similar tables in earlier editions.

Buses: 1965-97: American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures, 1998* (Detroit, MI: 1998), p. 6 and similar tables in earlier editions.

1998: Ward's Communications, *Motor Vehicle Facts & Figures, 1999* (Detroit, MI: 1999), p. 6 and personal communication, July 14, 2000.

Recreational vehicles: 1965-97: Ibid., *Motor Vehicle Facts & Figures, 1998* (Detroit, MI: 1998), p. 12 and similar tables in earlier editions.

1998: Ward's Communications, *Motor Vehicle Facts & Figures, 1999* (Detroit, MI: 1998), p. 11.

Bicycles: 1980-98: National Bicycle Dealers Association, Internet site http://www.nbda.com as of Mar. 5, 1999, and personal communication, Sept. 24, 1996.

Transit: 1960-98: American Public Transit Association 2000, *Public Transportation Fact Book* (Washington, DC: March 2000), table 56 and similar tables in earlier editions.

Class I rail: 1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: 1999), p. 54 and similar tables in earlier editions.

Amtrak: 1975-80: Ibid., *Railroad Facts* (Washington, DC: 1997), p. 17 and similar tables in earlier editions.

1985-99: *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual Issues).

Water:

Merchant vessel: 1960-99: U.S. Department of Transprotation, Maritime Administration, *Merchant Fleets of the World* (Washington, DC: Annual issues).

Recreational boat: 1980-99: National Marine Manufacturers Association, *Boating 1999* (Chicago, IL: 2000), annual retail unit estimates.

Table 1-11 Active Air Carrier and General Aviation Fleet by Type of Aircraft

	1965	1970	1975	1980	[a]1985	[a]1990	1995	1996	1997	1998
AIR CARRIER[b]	**2,125**	**2,679**	**2,495**	**3,808**	**4,678**	**6,083**	**7,411**	**7,478**	**5,093**	**5,335**
Fixed Wing	**2,104**	**2,663**	**2,488**	**3,803**	**4,673**	**6,072**	**7,293**	**7,357**	**5,093**	**5,335**
Turbojet										
Four engine	511	931	602	436	322	432	435	440	427	414
Three engine	173	659	994	1,347	1,488	1,438	1,210	1,212	1,208	1,183
Two engine	41	546	518	743	1,354	2,278	3,189	3,270	3,458	3,738
Total turbojet	**725**	**2,136**	**2,114**	**2,526**	**3,164**	**4,148**	**4,834**	**4,922**	**5,093**	**5,335**
Turboprop										
Four engine	215	110	68	92	108	88	81	56	U	U
Two engine	89	259	192	590	965	1,507	1,634	1,639	U	U
One engine	8	5	N	N	N	N	0	5	U	U
Total turboprop	**312**	**374**	**260**	**682**	**1,073**	**1,595**	**1,715**	**1,700**	**U**	**U**
Piston										
Four engine	447	34	37	73	38	31	15	18	U	U
Three engine	590	110	69	N	4	6	1	7	U	U
Two engine	30	9	8	522	394	292	329	313	U	U
One engine	N	N	N	N	N	N	399	397	U	U
Total piston	**1,067**	**153**	**114**	**595**	**436**	**329**	**744**	**735**	**U**	**U**
Helicopter	**21**	**16**	**7**	**2**	**5**	**11**	**118**	**121**	**U**	**U**
GENERAL AVIATION (GENERAL FLEET)[c]	**95,442**	**161,743**	**168,475**	**211,043**	**196,500**	**198,000**	**188,089**	**191,129**	**192,414**	**204,710**
Fixed Wing	**[d]93,130**	**127,934**	**161,570**	**200,097**	**184,700**	**184,500**	**162,342**	**163,691**	**166,854**	**175,203**
Turbojet										
Two engine	N	[e]822	[e]1,742	2,551	3,600	3,700	4,071	4,077	4,638	5,513
Other	N	128	[f]34	441	50	400	488	347	539	552
Total turbojet	**N**	**950**	**1,776**	**2,992**	**4,100**	**4,100**	**4,559**	**4,424**	**5,178**	**6,066**
Turboprop										
Two engine	N	1,287	[e]2,486	3,966	4,900	4,900	4,295	4,917	4,939	5,076
One engine	N	138	33	N	N	N	668	719	650	1,033
Other	N	33	N	123	100	400	32	80	29	65
Total turboprop	**N**	**1,458**	**2,519**	**4,090**	**5,000**	**5,300**	**4,995**	**5,716**	**5,619**	**6,174**

KEY: N = data are not available; U = unavailable

Continued next page

Table 1-11 Cont'd Active Air Carrier and General Aviation Fleet by Type of Aircraft

	1965	1970	1975	1980	[a]1985	[a]1990	1995	1996	1997	1998
Fixed Wing (cont'd)										
Piston										
Two engine	[e]11,422	15,835	[e]20,331	24,366	22,100	21,100	15,706	16,082	15,938	18,659
One engine	81,134	109,492	136,944	168,435	153,400	154,000	137,049	137,401	140,038	144,234
Other	N	199	N	212	100	100	33	68	79	70
Total piston	**92,556**	**125,526**	**157,275**	**193,014**	**175,600**	**175,200**	**152,788**	**153,551**	**156,056**	**162,963**
Rotorcraft	**1,503**	**2,255**	**4,073**	**6,001**	**6,000**	**6,900**	**5,830**	**6,570**	**6,786**	**7,425**
Piston	N	1,666	2,499	2,794	2,700	3,200	1,863	2,507	2,259	2,545
Turbine										
Multi-engine	N	N	N	N	N	N	733	643	764	843
One engine	N	589	N	N	N	N	3,234	3,420	3,762	4,038
Total turbine	**N**	**589**	**1,574**	**3,207**	**3,300**	**3,700**	**3,967**	**4,063**	**4,527**	**4,881**
Other Aircraft	**809**	**1,554**	**2,832**	**4,945**	**5,800**	**6,600**	**4,741**	**4,244**	**4,092**	**5,580**
Gliders	N	N	N	N	N	N	2,182	1,934	2,016	2,105
Lighter-than-Air	N	N	N	N	N	N	2,559	2,310	2,075	3,475
Experimental	**N**	**N**	**N**	**N**	**N**	**N**	**15,176**	**16,625**	**14,680**	**16,502**
Amateur Built	N	N	N	N	N	N	9,328	11,566	10,261	13,189
Exhibition	N	N	N	N	N	N	2,245	2,094	1,798	1,630
Other	N	N	N	N	N	N	3,603	2,965	2,620	1,684

KEY: N = data are not available; U = unavailable

Continued next page

[a] Source reported rounded data for general aviation.

[b] Air carrier aircraft are aircraft carrying passengers or cargo for hire under 14 CFR 121 (large aircraft--more than 30 seats) and 14 CFR 135 (small aircraft--30 seats or less). This definition is more encompassing than that in the Federal Aviation Administration (FAA) Aviation Forecast--jet aircraft, 60 seats or more carrying passengers or cargo for hire. Beginning in 1990, the number of aircraft is the monthly average reported in use for the last three months of the year. Prior to 1990, it was the number of aircraft reported in use during December of a given year.

[c] Columns may not add to totals due to estimation procedures. Beginning in 1993, excludes commuters. Prior to 1993, single engine turboprops were included in "Other turboprops"; single and multi-engine turbine rotorcraft were not shown separately; gliders and lighter-than-air aircraft were combined into the "Other" category; and experi mental aircraft were included in the appropriate aircraft type. For example, prior to 1993, the single engine piston aircraft type included both experimental and non-experimental aircraft Starting in 1993, that aircraft type only includes non-experimental aircraft. Due to changes in methodology beginning in 1995, estimates may not be comparable to those for 1994 and earlier years. Values for 1991 through 1994 were revised to reflect changes in adjustment for nonresponse bias.

[d] Total includes 574 turbine aircraft of unspecified subtype.

[e] Multi-engine.

[f] Single-engine.

NOTES: Prior to 1970, aircraft counts included aircraft retained in FAA data systems until the owners requested that they be deregistered. As a result, thousands of aircraft that had been destroyed over the years remained in the system. Since 1970, annual verification of aircraft registrations is required. Failure to comply with this requirement leads to revocation of the registration certificate and exclusion of the aircraft from the official count of the following year. Listed engine configurations (e.g., two-, three-, multi-) represent all applicable combinations for each aircraft type. Totals may not agree with those in other tables as revisions to prior year data are reported at the aggregate level only.

SOURCES:

Air carriers: 1965: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 1966 Edition.* (Washington, DC: 1966), table 7.5.

1970: Ibid., *Calendar Year 1971.* (Washington, DC: 1972), table 5.5.

1975: Ibid., *Calendar Year 1975.* (Washington, DC: December 31, 1975), table 5.3.

1980: Ibid., *Calendar Year 1980.* (Washington, DC: December 31, 1980), table 5.2.

1985: Ibid., *Calendar Year 1993.* FAA-APO-95-5 (Washington, DC: 1995), table 5.2.

1990-96: Ibid., *Calendar Year 1996*, Internet site: http://www.api.faa.gov/handbook96/toc96.htm, as of March 31, 2000, table 5.2.

1997-98: Ibid., F*AA Aerospace Forecasts Fiscal Years 2000-2011 (March 2000)*, Internet site: http://api.hq.faa.gov/foreca00/tabv-1.pdf, as of May 18, 2000.

General aviation: 1965: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 1966 Edition.* (Washington, DC: 1966), table 5.1.

1970: Ibid., *Calendar Year 1971.* (Washington, DC: 1972), table 8.3.

1975: Ibid., *Calendar Year 1975.* (Washington, DC: December 31, 1975), table 8.4.

1980: Ibid., *General Aviation Activity and Avionics Survey, Annual Report Calendar Year 1980*, FAA-MS-81-5 (Washington, DC: December 1985), table 2-6.

1985: Ibid., *Annual Summary Report 1994 Data*, FAA-APO-95-10 (Washington, DC: 1996), table 1.2.

1990-1997: Ibid., *General Aviation and Air Taxi Activity Survey, Annual Summary Report 1997 Data*, FAA-APO-99-4 (Washington, DC: 1999), table 1.2.

Table 1-12 U.S. Automobile and Truck Fleets by Use (Thousands)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Number of Automobiles in Fleets of 25 or more (10 or more cars for 1999)[a]										
Business[b]	2,889	2,628	2,492	1,751	1,722	1,326	1,295	1,188	1,159	3,195
Government[c]	538	504	516	401	428	1,214	1,209	1,218	1,030	885
Utilities	551	544	548	386	382	376	376	377	359	320
Police	249	250	264	264	266	269	274	280	289	302
Taxi (includes vans)	141	141	140	140	141	139	130	181	190	135
Rental (includes vans and SUVs)	990	1,160	1,448	1,501	1,473	1,518	1,590	1,608	1,602	1,733
Number of Automobiles in Fleets of 4-24 (4 to 9 cars for 1999)[a]	U	U	U	U	U	4,200	4,250	4,373	4,921	1,172
Total						**9,042**	**9,124**	**9,225**	**9,550**	**7,742**
Number of Trucks in fleets of 25 or more (10 or more trucks for 1999)[a]										
Business[d]	U	U	1,080	1,378	1,375	1,205	1,275	1,332	1,360	3,016
Government[c]	U	U	297	632	646	2,221	2,215	2,223	2,010	2,400
Utilities	U	U	593	493	487	480	482	483	459	499
Other (police, taxi, etc.)	U	U	7	7	7	7	7	7	8	8
Rental trucks (not vans and SUVs)	U	U	304	308	363	202	197	179	181	213
Number of Trucks in Fleets of 4-24 (4 to 9 trucks for 1999)[a]	U	U	U	U	U	2,100	2,270	2,420	3,311	1,652
Total						**6,215**	**6,446**	**6,644**	**7,329**	**7,788**
TOTAL automobiles and trucks in fleets						**15,257**	**15,570**	**15,869**	**16,879**	**15,530**

[a] The data source, Bobit Publishing, changed data collection categories for 1999.

[b] Includes driver schools.

[c] Includes military vehicles and federal, state, county, and local government vehicles.

[d] Businesses with 25 or more Class 1-5 trucks including leasing, construction, plumbing, heating, food distribution, pest control, cable TV, etc. (Also applies to 1999 data).

KEY: SUV = sport utility vehicles; U = data are not available

SOURCE: Bobit Publishing Company, *Automotive Fleet Fact Book* (Torrance, CA: Annual issues).

Table 1-13 Annual U.S. Motor Vehicle Production and Factory (Wholesale) Sales (Thousands)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Production											
Passenger cars	6,703	9,335	6,550	6,717	6,376	8,185	6,077	6,351	6,083	5,927	5,554
Commercial vehicles[a]	1,202	1,785	1,734	2,270	1,634	3,468	3,706	5,635	5,749	6,192	6,448
Total	**7,905**	**11,120**	**8,284**	**8,987**	**8,010**	**11,653**	**9,783**	**11,985**	**11,833**	**12,119**	**12,003**
Factory (wholesale) sales											
Passenger cars	6,675	9,306	6,547	6,713	6,400	8,002	6,050	6,310	6,140	6,070	5,677
Commercial vehicles[a]	1,194	1,752	1,692	2,272	1,667	3,464	3,725	5,713	5,776	6,153	6,435
Total	**7,869**	**11,057**	**8,239**	**8,985**	**8,067**	**11,467**	**9,775**	**12,023**	**11,916**	**12,223**	**12,112**

[a] Includes trucks under 10,000 pounds gross vehicle weight rating (gvwr), such as compact and conventional pickups, sport utility vehicles, minivans, and vans, and trucks and buses over 10,000 pounds gvwr.

NOTES: Factory sales can be greater than production total because of sales from previous year's inventory. Numbers may not add to totals due to rounding.

SOURCE: Ward's, *Motor Vehicle Facts & Figures 1999* (Southfield, MI: 1999), p. 3.

Table 1-14 Retail[a] New Passenger Car Sales (Thousands)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Domestic[b]	**7,119**	**7,053**	**6,581**	**8,205**	**6,897**	**7,129**	**7,254**	**6,917**	**6,761**
Imports									
Japan	313	808	1,906	2,218	1,719	982	727	726	691
Germany	750	493	305	424	265	207	238	297	367
Other	217	271	187	196	419	317	308	332	320
Total	**1,280**	**1,571**	**2,398**	**2,838**	**2,403**	**1,506**	**1,273**	**1,355**	**1,378**
TOTAL new passenger car sales	**8,400**	**8,624**	**8,979**	**11,042**	**9,300**	**8,635**	**8,527**	**8,272**	**8,139**

[a] Retail new car sales include both sales to individuals and to corporate fleets. It also includes leased cars.

[b] Includes cars produced in Canada and Mexico.

SOURCES: 1970: American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures 1992* (Detroit, MI: 1992), p. 16.

1980: Ibid., *Motor Vehicle Facts & Figures 1997* (Detroit, MI: 1997), p. 19.

1975, 1985-98: Ward's, *Motor Vehicle Facts & Figures 1999* (Southfield, MI: 1999), p. 21.

Table 1-15 New and Used Passenger Car Sales and Leases (Thousands)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
New passenger car sales[a]	**9,300**	**8,175**	**8,213**	**8,518**	**8,991**	**8,635**	**R8,526**	**8,272**	**R8,139**	**U**
Used passenger car sales[b]	**37,530**	**37,290**	**36,950**	**38,057**	**40,141**	**41,758**	**40,828**	**40,270**	**R40,220**	**40,890**
Value of transactions ($ billions)	219	230	247	279	312	338	337	338	R335	361
Average price (current $)	5,830	6,157	6,693	7,335	7,781	8,093	8,257	8,399	R8,341	8,828
Total new and used passenger car sales	**46,830**	**45,465**	**45,163**	**46,575**	**49,132**	**50,393**	**R49,354**	**48,542**	**R48,359**	**U**
New passenger car leases[c]	**534**	**667**	**882**	**1,197**	**1,715**	**1,795**	**R1,806**	**2,062**	**R2,174**	**2,271**

KEY: R = revised; U = data are not available

[a] Includes leased cars.

[b] Used car sales include sales from franchised dealers, independent dealers, and casual sales.

[c] Consumer leases only.

SOURCES:

New passenger car sales: 1994-98: Ward's, *Motor Vehicle Facts & Figures, 1999* (Southfield, MI: 1999)

Used passenger car sales: ADT Automotive, *2000 Used Car Market Report* (Nashville, TN: 2000), p. 5.

Leased passenger cars: CNW Marketing/Research, personal communication, May 31, 2000.

Table 1-16 Retail Sales of New Cars by Sector (Thousands)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	R1998	1999
Sales of new cars												
Consumer	5,645	7,103	6,252	5,907	6,100	7,092	5,677	4,341	4,052	3,875	3,988	4,364
Business	930	2,140	2,056	2,508	2,758	3,754	3,477	4,203	4,313	4,246	3,992	4,137
Government	66	89	94	123	124	132	147	144	134	112	161	194
Total	**6,641**	**9,333**	**8,402**	**8,538**	**8,982**	**10,978**	**9,300**	**8,688**	**8,499**	**8,232**	**8,142**	**8,695**
Percentage of total sales												
Consumer	85.0	76.1	74.4	69.2	67.9	64.6	61.0	50.0	47.7	47.1	49.0	50.2
Business	14.0	22.9	24.5	29.4	30.7	34.2	37.4	48.4	50.7	51.6	49.0	47.6

KEY: R = revised

NOTES: Includes imported cars, but not vans, trucks, or sport utility vehicles. Numbers may not add to totals due to rounding.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Wealth Division, unpublished data.

Table 1-17 Period Sales, Market Shares, and Sales-Weighted Fuel Economies of New Domestic and Imported Automobiles, Selected Sales Periods[a] (Thousands)

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Sales												
Total Units	9,095	10,969	9,224	8,380	8,107	8,388	8,916	8,725	8,652	8,261	8,071	8,646
Minicompact	428	52	77	96	108	84	57	45	34	40	12	13
Subcompact	3,441	2,382	2,030	2,256	2,074	1,945	2,015	1,518	1,315	1,510	1,491	1,622
Compact	599	3,526	3,156	2,425	2,451	2,655	3,077	3,290	3,492	2,937	2,309	2,367
Midsize	3,073	3,118	2,512	2,306	2,250	2,446	2,360	2,499	2,488	2,531	3,107	3,359
Large	1,336	1,516	1,279	1,161	1,141	1,187	1,340	1,321	1,259	1,162	1,050	1,181
Two-seater	216	374	170	135	83	70	67	53	62	81	101	103
Market share, %												
Minicompact	4.7	0.5	0.8	1.1	1.3	1.0	0.6	0.5	0.4	0.5	0.2	0.1
Subcompact	37.8	21.7	22.0	26.9	25.6	23.2	22.6	17.4	15.2	18.3	18.5	18.8
Compact	6.6	32.1	34.2	28.9	30.2	31.7	34.5	37.7	40.4	35.6	28.6	27.4
Midsize	33.8	28.4	27.2	27.5	27.7	29.2	26.5	28.6	28.8	30.6	38.5	38.9
Large	14.7	13.8	13.9	13.9	14.1	14.2	15.0	15.1	14.6	15.1	13.0	13.7
Two-seater	2.4	3.4	1.8	1.6	1.0	0.8	0.8	0.6	0.7	1.0	1.3	1.2
Fuel economy, mpg												
Fleet	23.2	27.0	27.6	27.7	27.7	27.8	27.8	28.0	28.3	28.3	28.3	28.0
Minicompact	29.4	32.7	26.4	29.3	30.6	29.9	27.8	27.0	27.2	26.3	23.9	24.8
Subcompact	27.3	30.1	31.3	31.6	31.8	31.9	31.3	31.7	32.1	32.6	31.3	31.0
Compact	22.3	29.6	28.9	28.8	28.7	29.3	29.8	30.2	30.4	30.0	30.8	30.2
Midsize	21.3	24.9	25.9	25.9	25.8	25.7	25.6	25.9	26.4	26.3	26.9	26.9
Large	19.3	22.3	23.5	23.3	23.7	24.0	24.2	24.1	24.2	24.5	24.6	24.4
Two-seater	21.0	27.6	28.0	27.3	25.9	24.8	23.9	24.7	25.4	26.3	25.4	25.3

KEY: mpg = miles per gallon

[a] These figures represent only those sales that could be matched to corresponding U.S. Environmental Protection Agency fuel economy values.

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCE: Light-Duty Vehicle MPG and Market Shares System Database, as cited in Oak Ridge National Laboratory, *Transportation Energy Data Book*, Edition 20, ORNL-6941 (Oak Ridge, TN: 2000), table 7.5, p. 7-6.

Table 1-18 Period Sales, Market Shares, and Sales-Weighted Fuel Economies of New Domestic and Imported Light Trucks, Selected Sales Periods[a] (Thousa

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Sales												
Total Units	2,217	4,235	4,515	4,048	4,392	5,056	5,724	5,934	6,237	6,527	7,138	8,002
Small pickups	516	864	678	628	587	332	365	357	[b]575	521	460	302
Large pickups	1,115	1,691	1,574	1,309	1,452	1,878	2,199	2,184	2,042	2,051	2,378	2,830
Small vans	14	438	933	888	968	1,129	1,264	1,257	1,230	1,216	1,224	1,319
Large vans	328	536	399	308	350	388	408	401	370	387	381	417
Small utility	76	478	738	783	868	949	1,043	1,225	1,379	1,715	762	942
Large utility	167	229	193	132	167	379	446	510	641	637	1,933	2,191
Market share, %												
Small pickups	23.3	20.4	15.0	15.5	13.4	6.6	6.4	6.0	9.2	8.0	6.4	3.8
Large pickups	50.3	39.9	34.9	32.3	33.1	37.1	38.4	36.8	32.7	31.4	33.3	35.4
Small vans	0.6	10.3	20.7	21.9	22.0	22.3	22.1	21.2	19.7	18.6	17.1	16.5
Large vans	14.8	12.7	8.8	7.6	8.0	7.7	7.1	6.8	5.9	5.9	5.3	5.2
Small utility	3.4	11.3	16.4	19.3	19.8	18.8	18.2	20.6	22.1	26.3	10.7	11.8
Large utility	7.5	5.4	4.3	3.3	3.8	7.5	7.8	8.6	10.3	9.8	27.1	27.1
Fuel economy, mpg												
Fleet	18.1	20.4	20.5	20.6	20.4	20.5	20.4	20.2	20.4	20.1	20.3	20.1
Small pickups	25.5	26.8	25.2	25.7	25.0	24.9	25.3	25.6	25.6	24.6	24.5	24.8
Large pickups	17.0	19.0	18.9	18.8	18.9	19.6	20.1	19.4	18.9	19.4	19.1	19.3
Small vans	19.6	23.9	23.1	22.6	22.5	22.9	22.1	22.8	22.8	22.9	23.3	23
Large vans	16.3	16.4	16.9	17.4	16.9	17.3	17.4	17.1	17.2	17.8	18.2	17.8
Small utility	16.9	22.1	21.9	21.1	20.9	21.3	20.7	20.8	21.1	19.6	22.9	23
Large utility	14.6	16.6	16.1	16.4	16.9	17.5	17.8	17.4	18.2	18.2	18.9	18.8

KEY: mpg = miles per gallon

[a] These figures represent only those sales that could be matched to corresponding U.S. Environmental Protection Agency fuel economy values.

[b] Some 4-wheel drive pickups previously classified as large pickups were correctly reclassified as small pickups.

NOTES: Numbers and percents may not add to totals due to rounding.

Fleet sales total cannot be compared with truck sales in table 1-10 for the following reasons: 1) this table includes both domestic and imported trucks, whereas the numbers in table 1-10 are for domestic trucks only; and 2) this table covers only light trucks, whereas the numbers in table 1-10 include heavy trucks.

SOURCE: Light-Duty Vehicle MPG and Market Shares System Database, as cited in Oak Ridge National Laboratory, *Transportation Energy Data Book, Edition 20*, ORNL-6941 (Oak Ridge, TN: 2000), table 7.6, p. 7-7.

Table 1-19 World Motor Vehicle Production, Selected Countries (Thousands)

	Passenger cars[a]								
	1961	**1971**	**1981**	**1991**	**1994**	**1995**	**1996**	**1997**	**1998**
Argentina	78	193	139	114	338	227	269	366	353
Australia	182	393	352	269	323	314	303	320	350
Austria	8	1	7	14	45	59	97	98	91
Belgium	N	279	216	253	409	386	368	356	319
Brazil	98	342	406	705	1,248	1,297	1,459	1,680	1,244
Canada	328	1,083	803	1,060	1,214	1,337	1,279	1,374	1,122
China	N	N	N	81	250	321	382	482	507
Czech Republic[c]	59	149	181	173	174	208	263	321	368
France	988	2,694	2,612	3,188	3,175	3,051	3,148	2,259	2,603
Germany	1,802	3,829	3,758	4,677	4,094	4,360	4,540	4,678	5,348
India	22	42	42	179	237	330	396	410	384
Italy	694	1,701	1,257	1,633	1,341	1,422	1,318	1,563	1,402
Japan	250	3,718	6,974	9,753	7,802	7,611	7,864	8,491	8,056
South Korea	N	N	69	1,158	1,806	2,003	2,265	2,308	1,625
Malaysia	N	N	N	102	137	164	176	280	126
Mexico	N	154	355	720	857	699	798	855	953
Netherlands	13	78	78	85	92	100	145	197	243
Poland	14	86	248	168	349	347	353	295	460
Portugal	N	N	N	N	38	41	119	186	181
Romania	N	N	N	84	85	71	76	108	104
Russia	149	518	1,324	1,308	796	838	868	982	U
Spain	55	453	855	1,943	1,974	2,131	2,213	2,342	2,217
Sweden	110	287	258	269	353	388	368	376	368
Taiwan	N	N	N	266	291	282	265	268	293
Turkey	N	13	25	196	213	233	208	243	U
United Kingdom	1,004	1,742	955	1,237	1,467	1,532	1,686	1,698	1,748
United States	5,522	8,584	6,253	5,439	6,614	6,351	6,083	5,927	5,554
Yugoslavia, Federal Republic of	15	114	240	213	8	8	9	11	U
Total world	**11,391**	**26,453**	**27,407**	**35,287**	**[R]35,730**	**36,111**	**37,318**	**38,474**	**37,286**
US % of world	**48%**	**32%**	**23%**	**15%**	**19%**	**18%**	**16%**	**15%**	**15%**

KEY: N = data do not exist; U = data are not available

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Table 1-19 Cont'd World Motor Vehicle Production, Selected Countries (Thousands)

	Commercial vehicles[b]								
	1961	**1971**	**1981**	**1991**	**1994**	**1995**	**1996**	**1997**	**1998**
Argentina	58	60	33	25	70	59	44	80	105
Australia	49	77	40	15	31	17	19	29	34
Austria	5	6	8	6	3	9	9	10	12
Belgium	1	17	41	84	70	82	69	74	87
Brazil	47	174	374	255	334	332	346	388	329
Canada	63	277	520	829	1,106	1,071	1,118	1,198	1,050
China	N	N	N	628	1,103	1,114	1,084	1,096	1,121
Czech Republic[c]	17	28	49	29	6	8	9	47	42
France	217	316	408	423	383	424	443	322	351
Germany	411	312	358	358	262	307	303	345	379
India	32	47	107	176	238	306	366	336	129
Italy	65	116	176	245	194	245	227	254	290
Japan	789	2,093	4,206	3,492	2,752	2,585	2,482	2,484	1,994
South Korea	N	N	65	340	506	523	548	510	329
Malaysia	N	N	N	0	0	0	0	0	7
Mexico	N	57	242	269	266	236	422	503	500
Netherlands	6	13	12	26	23	32	19	20	28
Poland	22	60	60	25	16	34	48	27	39
Portugal	N	N	N	26	87	16	13	81	90
Romania	N	N	N	10	5	22	23	21	23
Russia	406	612	874	744	206	156	136	192	U
Spain	20	79	132	139	168	203	199	220	609
Sweden	22	30	55	75	82	102	95	104	114
Taiwan	N	N	N	116	132	124	101	113	112
Turkey	N	12	22	46	31	49	69	102	U
United Kingdom	443	456	230	217	228	233	238	238	233
United States	1,131	2,088	1,690	3,372	5,649	5,635	5,716	6,192	6,452
Yugoslavia, Federal Republic of	5	18	27	26	2	2	1	2	U
Total world	**3,809**	**6,948**	**9,729**	**11,996**	**13,952**	**13,926**	**14,147**	**14,988**	**14,811**
US % of world	**30%**	**30%**	**17%**	**28%**	**40%**	**40%**	**40%**	**41%**	**44%**

KEY: N = data do not exist; U = data are not available

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Table 1-19 Cont'd World Motor Vehicle Production, Selected Countries (Thousands)

	Total								
	1961	**1971**	**1981**	**1991**	**1994**	**1995**	**1996**	**1997**	**1998**
Argentina	136	253	172	139	409	286	313	446	458
Australia	231	470	392	284	354	331	322	349	384
Austria	13	7	15	20	48	68	106	108	103
Belgium	1	296	257	337	479	468	437	430	406
Brazil	145	516	780	960	1,582	1,629	1,805	2,067	1,573
Canada	391	1,360	1,323	1,889	2,320	2,408	2,397	2,571	2,173
China	N	N	N	709	1,353	1,435	1,466	1,578	1,628
Czech Republic[c]	76	177	230	202	180	216	272	369	411
France	1,205	3,010	3,020	3,611	3,558	3,475	3,591	2,581	2,954
Germany	2,213	4,141	4,116	5,035	4,356	4,667	4,843	5,023	5,727
India	54	89	149	355	475	636	762	746	513
Italy	759	1,817	1,433	1,878	1,534	1,667	1,545	1,817	1,693
Japan	1,039	5,811	11,180	13,245	10,554	10,196	10,346	10,975	10,050
South Korea	N	N	134	1,498	2,312	2,526	2,813	2,818	1,954
Malaysia	N	N	N	102	137	164	176	280	134
Mexico	N	211	597	989	1,123	935	1,220	1,358	1,453
Netherlands	19	91	90	111	115	132	164	218	271
Poland	36	146	308	193	365	381	401	322	499
Portugal	N	N	N	26	125	57	132	267	271
Romania	N	N	N	94	90	93	99	129	127
Russia	555	1,130	2,198	2,052	1,002	994	1,004	1,174	U
Spain	75	532	987	2,082	2,142	2,334	2,412	2,562	2,826
Sweden	132	317	313	344	435	490	463	480	483
Taiwan	N	N	N	382	423	406	366	381	405
Turkey	N	25	47	242	244	282	277	344	U
United Kingdom	1,447	2,198	1,185	1,454	1,695	1,765	1,924	1,936	1,981
United States	6,653	10,672	7,943	8,811	12,263	11,986	11,799	12,119	12,006
Yugoslavia, Federal Republic of	20	132	267	239	9	10	10	14	U
Total world	**15,200**	**33,401**	**37,136**	**47,283**	**49,681**	**50,037**	**51,465**	**53,463**	**52,098**
US % of world	**44%**	**32%**	**21%**	**19%**	**25%**	**24%**	**23%**	**23%**	**23%**

KEY: N = data do not exist; U = data are not available

[a] Does not include minivans, pickups, and sport utility vehicles.

[b] Includes all trucks and buses. Light trucks, such as pickups, sport utility vehicles, and minivans, are included under commercial vehicles.

[c] Formerly Czechoslovakia.

NOTES: Production in this table refers to vehicles locally manufactured. Numbers may not add to totals due to rounding.

SOURCE: Ward's, *Motor Vehicle Facts & Figures* (Southfield, MI: 1999), p. 12.

Table 1-20 Number and Size of the U.S. Flag Merchant Fleet and Its Share of the World Fleet
(Oceangoing ships of 1,000 gross tons and over)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
World fleet	**17,317**	**18,329**	**19,980**	**22,872**	**24,867**	**25,555**	**23,596**	**25,608**	**26,858**	**27,557**	**27,825**	**28,259**
U.S. fleet	**2,926**	**2,376**	**1,579**	**857**	**864**	**737**	**636**	**509**	**495**	**477**	**470**	**463**
U.S. share of the world fleet	**17%**	**13%**	**8%**	**4%**	**3%**	**3%**	**3%**	**2%**	**2%**	**2%**	**2%**	**2%**
Freighters, Total	**2,138**	**1,747**	**1,076**	**511**	**471**	**417**	**367**	**295**	**292**	**288**	**289**	**284**
DWT (thousands)	**21,877**	**18,127**	**11,733**	**7,051**	**6,885**	**7,353**	**7,265**	**6,517**	**6,419**	**6,458**	**6,732**	**6,696**
General cargo[a]	N	N	N	356	259	209	166	142	146	142	140	137
DWT (thousands)	N	N	N	4,640	3,329	2,980	2,605	2,472	2,467	2,420	2,400	2,404
Containership	N	N	N	109	121	104	92	81	83	85	91	89
DWT (thousands)	N	N	N	1,773	2,289	2,651	2,856	2,600	2,639	2,743	3,096	3,056
Partial containerships	N	N	N	37	68	63	59	3	1	1	N	N
DWT (thousands)	N	N	N	510	940	904	836	57	17	17	N	N
RO/RO	N	N	N	9	23	41	50	69	62	60	58	58
DWT (thousands)	N	N	N	128	327	818	968	1,388	1,296	1,278	1,236	1,236
Tankers, Total	**422**	**341**	**294**	**267**	**308**	**258**	**233**	**181**	**173**	**161**	**154**	**154**
DWT (thousands)	**7,815**	**7,561**	**7,739**	**9,711**	**16,152**	**15,534**	**15,641**	**11,028**	**10,378**	**9,696**	**9,289**	**9,373**
Petroleum/chemical[b] ships	N	N	N	N	N	244	219	167	159	148	145	146
DWT (thousands)	N	N	N	N	N	14,574	14,681	10,123	9,473	8,857	8,737	8,845
Liquefied petroleum/ natural gas ships	N	N	N	N	N	14	14	14	14	13	9	8
DWT (thousands)	N	N	N	N	N	960	960	905	905	839	552	528
Combination/ passenger and cargo, Total	**309**	**227**	**171**	**60**	**65**	**37**	**10**	**13**	**15**	**14**	**12**	**11**
DWT (thousands)	**2,070**	**1,488**	**1,107**	**388**	**446**	**299**	**91**	**115**	**139**	**136**	**116**	**99**
Bulk carriers, Total	**57**	**61**	**38**	**19**	**20**	**25**	**26**	**20**	**15**	**14**	**15**	**14**
DWT (thousands)	**805**	**1,107**	**767**	**544**	**607**	**1,152**	**1,270**	**925**	**575**	**321**	**604**	**579**

KEY: DWT = deadweight tons; N = data do not exist; RO/RO = roll-on/roll-off vessels

[a] Includes barge carriers.

[b] Includes integrated tug/barges.

NOTES: Excludes nonmerchant type and/or U.S. Navy-owned vessels currently in the National Defense Reserve Fleet. Excludes ships operating exclusively on the Great Lakes and inland waterways and special types such as: channel ships, icebreakers, cable ships, and merchant ships owned by military forces. All data are as of December 31 of year shown.

SOURCES: 1960-1997: U.S. Department of Transportation, Maritime Administration, *Merchant Fleets of the World* (Washington, DC: Annual issues), and unpublished revisions.

1998-1999: Ibid., Personal communication, May 17, 2000.

Section C
Condition

Table 1-21 U.S. Airport Runway Pavement Conditions

	1986	1990	1993	1997	1999
NPIAS[a] airports, total	**3,243**	**3,285**	**3,294**	**3,331**	**3,344**
Condition (%)					
Good	61	61	68	72	72
Fair	28	29	25	23	23
Poor	11	10	7	5	5
Commercial service airports,[b] total	**550**	**568**	**554**	**566**	**547**
Condition (%)					
Good	78	78	79	79	78
Fair	15	17	18	19	20
Poor	7	5	3	2	22

KEY: NPIAS = National Plan of Integrated Airport Systems

[a] The U.S. Department of Transportation, Federal Aviation Administration's (FAA's) National Plan of Integrated Airport Systems is composed of all commercial service airports, all reliever airports, and selected general aviation airports. It does not include over 1,000 publicly owned public-use landing areas, privately owned public-use airports, and other civil landing areas not open to the general public. NPIAS airports account for 100% of all enplanements and serve 91.5% of all aircraft (based on an estimated fleet of 200,000 aircraft). In 1997, there were 14,961 non-NPIAS airports. See table 1-2 for more detail on airports.

[b] Commercial service airports are defined as public airports receiving scheduled passenger service, and having at least 2,500 enplaned passengers per year.

NOTES: Data are as of January 1 of each year. Runway pavement condition is classified by the FAA as follows:

Good: All cracks and joints are sealed.

Fair: Mild surface cracking, unsealed joints, and slab edge spalling.

Poor: Large open cracks, surface and edge spalling, vegetation growing through cracks and joints.

SOURCES:

Condition (%): 1986-90: U.S. Department of Transportation, Federal Aviation Administration, *National Plan of Integrated Airport Systems* (Washington DC:1991).

1993: Ibid., *National Plan of Integrated Airport Systems* (Washington DC: 1995).

1997: Ibid., Office of Airport Planning and Programming, National Planning Division, personal communication, 1997.

1999: Ibid., Office of Airport Planning and Programming, National Planning Division, personal communication, 2000.

Total number of airports: 1986-99: U.S. Department of Transportation, Federal Aviation Administration, Office of Airport Planning and Programming, National Planning Division, personal communication, June 23, 2000.

Table 1-22 Median Age of Automobiles and Trucks in Operation in the U.S.

	Automobiles	Trucks
1970	4.9	5.9
1975	5.4	5.8
1980	6.0	6.3
1985	6.9	7.6
1990	6.5	6.5
1991	6.7	6.8
1992	7.0	7.2
1993	7.3	7.5
1994	7.5	7.5
1995	7.7	7.6
1996	7.9	7.7
1997	8.1	7.8
1998	8.3	7.6
1999	8.3	7.2

NOTE: The National Personal Transportation Survey conducted by the U.S. Department of Transportation, Federal Highway Administration, estimates the mean age of automobiles, trucks, and vans for several years:

	1969	1977	1983	1990	1995	
Automobiles	5.1	5.5	6.7	7.6	8.2	
Trucks	N	6.4	7.9	9.0	8.3	(inc. vans)

KEY: N = data do not exist

SOURCE: The R.L. Polk Co., personal communication, Mar. 28, 2000.

Table 1-23 Condition of U.S. Roadways by Functional System

	1990	1991	1992	1993	1994	1995	1996	1997	1998
RURAL									
Interstates									
Miles reported	**33,547**	**33,677**	**33,027**	**29,089**	**31,502**	**31,254**	**31,312**	**31,431**	**30,498**
Poor (%)	8.7	7.6	5.2	7.0	6.5	6.3	3.9	3.6	4.1
Mediocre (%)	[a]	[a]	14.1	27.7	26.5	20.7	19.1	19.1	16.5
Fair (%)	31.9	31.7	17.4	20.9	23.9	22.3	21.7	20.7	17.8
Good (%)	[a]	[a]	27.6	36.1	33.2	36.9	38.8	41.0	42.6
Very good (%)	59.5	60.7	35.6	8.3	9.9	13.9	16.6	15.7	19.0
Unpaved (%)	N	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**3,563**	**955**	**1,326**	**1,508**	**1,382**	**2,313**
Other principal arterials									
Miles reported	**83,802**	**85,729**	**94,798**	**78,296**	**89,506**	**89,265**	**92,103**	**92,170**	**93,333**
Poor (%)	3.4	3.6	3.3	2.9	2.4	4.4	1.4	1.6	1.4
Mediocre (%)	[a]	[a]	5.9	9.2	8.2	7.6	5.8	4.9	4.6
Fair (%)	42.6	44.5	34.6	54.8	57.4	51.1	49.1	47.7	43.3
Good (%)	[a]	[a]	28.5	26.7	26.6	27.9	34.4	37.2	38.3
Very good (%)	53.8	51.9	27.6	6.4	5.4	9.0	9.3	8.6	12.3
Unpaved (%)	N	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**17,905**	**7,489**	**8,683**	**6,028**	**6,083**	**5,524**
Minor arterials									
Miles reported	**144,735**	**142,866**	**137,637**	**134,837**	**124,877**	**121,443**	**126,381**	**126,525**	**130,591**
Poor (%)	4.6	4.3	3.9	3.9	3.5	3.7	2.3	2.3	1.9
Mediocre (%)	[a]	[a]	7.1	9.1	10.5	9.0	8.2	6.7	6.0
Fair (%)	48.2	47.3	36.4	53.5	57.9	54.7	50.7	50.4	47.2
Good (%)	[a]	[a]	25.3	25.0	23.6	23.9	31.0	33.6	34.3
Very good (%)	47.2	48.4	26.8	8.5	4.5	8.7	7.7	7.0	10.6
Unpaved (%)	—	—	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**12,740**	**13,294**	**15,708**	**11,201**	**10,978**	**6,664**
Major collectors									
Miles reported	**436,365**	**436,737**	**434,175**	**432,223**	**431,111**	**431,712**	**432,117**	**386,122**	**388,498**
Poor (%)	8.9	7.7	7.8	6.8	6.5	6.5	6.7	7.8	7.4
Mediocre (%)	[a]	[a]	11.0	12.4	11.3	11.4	10.3	12.3	11.9
Fair (%)	43.8	45.2	32.3	37.7	33.5	30.8	34.3	37.6	39.0
Good (%)	[a]	[a]	17.7	16.3	16.1	17.4	20.0	23.0	23.4

KEY: N = data do not exist; R = revised;
— =value too small to report

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Table 1-23 Cont'd Condition of U.S. Roadways by Functional System

	1990	1991	1992	1993	1994	1995	1996	1997	1998
RURAL (continued)									
Very good (%)	36.2	36.1	20.4	15.9	21.9	23.7	18.4	19.3	18.3
Unpaved (%)	11.1	11.0	10.7	10.9	10.7	10.2	10.1	N	N
Miles not reported	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**2,402**	**N**
URBAN									
Interstates									
Miles reported	**11,527**	**11,603**	**12,466**	**10,738**	**12,338**	**12,307**	**12,430**	**12,477**	**12,231**
Poor (%)	8.6	7.7	7.1	10.6	13.0	10.4	8.6	9.0	9.4
Mediocre (%)	[a]	[a]	13.2	30.9	29.9	26.8	28.3	27.0	25.5
Fair (%)	32.2	32.3	17.0	23.6	24.2	23.8	24.7	24.4	21.8
Good (%)	[a]	[a]	28.0	28.3	26.7	27.5	30.7	32.9	32.0
Very good (%)	59.1	60.0	34.7	6.5	6.2	11.4	7.6	6.7	11.4
Unpaved (%)	N	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**2,140**	**788**	**857**	**787**	**771**	**1,040**
Other freeways and expressways									
Miles reported	**7,670**	**7,714**	**8,465**	**7,011**	**7,618**	**7,804**	**8,410**	**8,480**	**8,772**
Poor (%)	2.2	2.3	2.6	3.8	5.3	4.8	3.4	[R]3.3	3.2
Mediocre (%)	[a]	[a]	5.9	9.4	12.7	9.8	8.7	[R]8.7	8.7
Fair (%)	43.9	44.2	32.4	60.6	58.1	54.7	54.7	[R]58.5	54.3
Good (%)	[a]	[a]	28.1	22.7	20.9	20.4	26.3	[R]25.2	27.1
Very good (%)	53.9	53.5	31.0	3.5	2.9	10.3	6.8	[R]4.2	6.6
Unpaved (%)	N	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**1,846**	**1,377**	**1,166**	**619**	**579**	**397**
Other principal arterials									
Miles reported	**51,987**	**52,349**	**52,165**	**30,337**	**38,598**	**41,444**	**44,498**	**45,009**	**44,886**
Poor (%)	5.9	6.6	6.8	9.2	12.5	12.4	11.8	[R]12.1	12.9
Mediocre (%)	[a]	[a]	11.5	13.3	16.3	14.7	14.1	[R]14.6	18.5
Fair (%)	49.0	49.1	34.8	55.0	50.8	47.2	48.9	[R]49.5	45.3
Good (%)	[a]	[a]	21.4	19.3	16.6	15.9	17.5	[R]17.8	17.6
Very good (%)	45.1	44.3	25.3	3.3	3.8	9.7	7.7	[R]6.0	5.8
Unpaved (%)	N	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**22,498**	**14,492**	**11,352**	**8,485**	**8,209**	**8,246**

KEY: N = data do not exist; R = revised;
— =value too small to report

Continued next page

Table 1-23 Cont'd Condition of U.S. Roadways by Functional System

	1990	1991	1992	1993	1994	1995	1996	1997	1998
URBAN (continued)									
Minor arterials									
Miles reported	**74,656**	**74,979**	**80,368**	**86,819**	**87,852**	**88,510**	**89,020**	**88,484**	**88,667**
Poor (%)	8.9	7.4	7.9	7.9	6.7	6.7	6.9	7.2	7.3
Mediocre (%)	[a]	[a]	14.3	13.8	12.3	13.6	13.0	13.0	12.2
Fair (%)	48.5	49.9	34.1	40.2	38.1	36.9	37.9	37.9	39.5
Good (%)	[a]	[a]	19.2	18.4	20.5	20.4	20.7	21.4	21.1
Very good (%)	42.1	42.1	24.0	19.4	22.1	22.1	21.1	20.6	19.9
Unpaved (%)	0.5	0.6	0.5	0.4	0.3	0.3	0.4	N	N
Miles not reported	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**374**	**N**
Collectors									
Miles reported	**78,248**	**77,097**	**82,657**	**84,856**	**86,098**	**87,331**	**87,790**	**86,666**	**86,705**
Poor (%)	16.5	11.2	10.5	10.6	9.8	9.7	9.7	10.6	10.4
Mediocre (%)	[a]	[a]	16.9	16.8	16.2	16.8	16.6	16.0	15.0
Fair (%)	50.4	53.5	35.2	40.0	40.0	39.0	39.2	39.0	39.9
Good (%)	[a]	[a]	17.3	16.1	17.0	17.2	18.2	18.4	17.6
Very good (%)	31.7	34.2	19.1	15.5	16.0	16.6	15.4	15.9	17.1
Unpaved (%)	1.3	1.1	1.1	1.0	0.9	0.8	0.9	N	N
Miles not reported	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**663**	**N**

NOTES: Structurally deficient bridges are defined as those needing significant maintenance attention, rehabilitation, or replacement. Functionally deficient bridges: those that do not have the lane widths, shoulder widths, or vertical clearances adequate to serve traffic demand; or the bridge may not be able to handle occasional roadway flooding. Table includes: rural--Interstate, principal arterial, minor arterial, major collector, minor collector and local roads; urban--Interstate, other freeways or expressways, other principal arterial, minor arterial, collector, and local roads. Data for 1990, 1992 and 1997-99 are as of December of those years; data for 1991, 1994-96 are as of June of those years; and data for 1993 is as of September of that year.

KEY: N = data do not exist; R = revised; — =value too small to report

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, National Bridge Inventory Database.

Table 1-24 Condition of U.S. Bridges

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Urban bridges	108,770	112,363	115,312	117,488	121,141	122,537	124,950	127,633	128,312	130,339
Rural bridges	463,435	461,673	456,885	456,228	455,319	458,598	456,913	455,118	454,664	455,203
Total	**572,205**	**574,036**	**572,197**	**573,716**	**576,460**	**581,135**	**581,863**	**582,751**	**582,976**	**585,542**
Urban deficient bridges										
Structurally	16,847	17,032	16,323	15,932	15,692	15,205	15,094	14,846	14,073	12,967
Functionally	30,266	30,842	26,243	26,511	27,024	27,487	28,087	26,865	27,588	29,065
Total	**47,113**	**47,874**	**42,566**	**42,443**	**42,716**	**42,692**	**43,181**	**41,711**	**41,661**	**42,032**
Rural deficient bridges										
Structurally	121,018	117,502	102,375	96,048	91,991	89,112	86,424	83,629	78,999	75,183
Functionally	70,089	66,751	54,150	53,489	52,808	53,463	53,121	50,545	51,912	52,835
Total	**191,107**	**184,253**	**156,525**	**149,537**	**144,799**	**142,575**	**139,545**	**134,174**	**130,911**	**128,018**
All deficient bridges										
Structurally	137,865	134,534	118,698	111,980	107,683	104,317	101,518	98,475	93,072	88,150
Functionally	100,355	97,593	80,393	80,000	79,832	80,950	81,208	77,410	79,500	81,900
Total	**238,220**	**232,127**	**199,091**	**191,980**	**187,515**	**185,267**	**182,726**	**175,885**	**172,572**	**170,050**

NOTES: Structurally deficient bridges are defined as those needing significant maintenance attention, rehabilitation, or replacement. Functionally deficient bridges: those that do not have the lane widths, shoulder widths, or vertical clearances adequate to serve traffic demand; or the bridge may not be able to handle occasional roadway flooding. Table includes: rural--Interstate, principal arterial, minor arterial, major collector, minor collector and local roads; urban--Interstate, other freeways or expressways, other principal arterial, minor arterial, collector, and local roads. Data for 1990, 1992 and 1997-99 are as of December of those years; data for 1991, 1994-96 are as of June of those years; and data for 1993 is as of September of that year.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division, National Bridge Inventory Database.

Table 1-25 Average Age of Urban Transit Vehicles (Years)

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Transit rail										
Commuter rail locomotives[a]	16.3	15.7	15.3	15.8	15.6	15.3	15.9	17.6	17.0	14.7
Commuter rail passenger coaches	19.1	17.6	17.3	19.3	18.6	20.1	21.4	24.1	21.6	19.4
Commuter rail self-propelled passenger cars	12.3	15.9	16.5	17.6	18.2	16.0	19.8	21.1	22.3	23.2
Heavy-rail passenger cars	17.1	16.2	16.9	17.7	17.8	15.8	19.3	20.2	21.1	22.0
Light rail vehicles (streetcars)	20.6	15.2	16.6	17.0	14.9	16.7	16.8	16.0	15.9	15.7
Transit bus[b]										
Articulated	3.4	7.6	8.2	9.1	9.5	9.1	10.9	11.5	11.9	11.3
Full-size	8.1	8.2	8.0	8.3	8.5	9.9	8.7	8.8	8.6	8.5
Mid-size	5.6	6.6	6.7	6.8	6.4	7.2	6.9	6.3	5.8	5.7
Small	4.8	3.9	4.0	4.1	4.0	4.4	4.1	4.1	4.0	4.0
Trolley	U	10.9	10.3	11.2	12.0	11.1	13.1	14.0	14.7	14.6
Other										
Vans	3.8	2.8	3.0	3.1	3.1	3.9	3.1	3.1	3.0	2.9
Ferry boats	U	21.7	19.6	22.7	24.7	23.5	23.4	25.3	25.4	25.8

KEY: U = data are not available

[a] Locomotives used in Amtrak intercity passenger services are not included.

[b] Full-size buses have more than 35 seats; mid-size buses have 25-35 seats; small buses have fewer than 25 seats.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database* (Washington, DC: Annual issues), table 28 and similar tables in earlier editions.

Table 1-26 Class I Railroad Locomotive Fleet by Year Built (Locomotive units)

Year built[a]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Before 1970	5,117	4,353	4,038	3,766	3,535	[b]	[b]	[b]	[b]	[b]
1970-74	3,852	3,617	3,384	3,248	3,184	[c]6,048	[c]5,783	[c]5,529	[c]5,565	[c]5,196
1975-79	4,432	4,375	4,292	4,352	4,275	4,254	4,274	4,219	4,116	4,000
1980-84	2,837	2,826	2,784	2,730	2,625	2,754	2,735	2,728	2,723	2,581
1985-89	1,989	1,985	1,970	1,968	1,971	1,890	1,866	1,829	1,830	1,779
1990	608	605	604	604	599	[d]2,965	[d]2,959	[d]2,958	[d]2,736	[d]2,688
1991		583	595	595	594	[e]	[e]	[e]	[e]	[e]
1992			337	340	339	[e]	[e]	[e]	[e]	[e]
1993				558	602	[e]	[e]	[e]	[e]	[e]
1994					781	[e]	[e]	[e]	[e]	[e]
1995						901	945	983	953	951
1996							707	696	708	706
1997								742	741	743
1998									889	890
1999										722
Total	**18,835**	**18,344**	**18,004**	**18,161**	**18,505**	**18,812**	**19,269**	**19,684**	**20,261**	**20,256**

[a] Disregards year of rebuilding.

[b] Included in 1970-74 category.

[c] Includes all locomotives built before 1975.

[d] Includes locomotives built between 1990-94.

[e] Included in 1990 figure.

SOURCE: Association of American Railroads, *Railroad Facts* (Washington, DC: Annual issues).

Table 1-27 Age and Availability of Amtrak Locomotive and Car Fleets

	1972	1975	1980	1985	1990	1995	1996	1997	1998	1999
Locomotives										
% available for service[a]	N	87	83	93	84	88	88	88	88	90
Average age (years)[b]	22.3	14.4	7.4	7.0	12.0	13.9	14.4	12.0	12.6	12.8
Passenger and other train cars										
% available for service[a]	N	82	77	90	90	90	90	91	93	91
Average age (years)[b]	22.0	24.7	14.3	14.2	20.0	21.8	20.7	20.2	17.3	17.2

KEY: N = data do not exist

[a] Year-end daily average. Active units less backshop units under going heavy maintenance less back-ordered units undergoing progressive maintenance and running repairs.

[b] Year-end average.

NOTE: 1972 was Amtrak's first full fiscal year of operation.

SOURCES: 1972-80: Amtrak, *Amtrak Annual Report* (Washington, DC: Annual issues).

1985-99: Ibid., *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues), pg. 44.

Table 1-28 U.S. Flag Vessels by Type and Age (Number of vessels)

	Vessel type							
Age[a]	Dry cargo	Tanker	Towboat	Passenger[b]	Offshore support/ crewboats[c]	Dry barge	Tank/ liquid barge[d]	Total[e]
1990-91								
<=5	80	6	132	151	85	2,335	162	2,951
6-10	161	38	706	120	318	4,570	316	6,229
11-15	212	50	1,029	110	474	7,639	829	10,343
16-20	141	35	844	80	144	6,374	750	8,368
21-25	82	38	750	65	84	2,607	759	4,385
>25	196	86	1,718	188	51	3,372	1,049	6,660
Total[e]	**900**	**257**	**5,210**	**721**	**1,168**	**27,110**	**3,874**	**39,342**
1992								
<=5	36	5	134	219	93	3,224	296	4,012
6-10	73	28	398	198	208	1,783	121	2,829
11-15	135	54	1,137	203	567	9,114	902	12,150
16-20	73	33	926	169	189	6,696	740	8,853
21-25	31	42	716	122	91	2,475	677	4,167
>25	124	82	1,874	287	53	3,496	1,123	7,049
Total[e]	**497**	**249**	**5,203**	**1,201**	**1,205**	**26,981**	**3,864**	**39,313**
1993								
<=5	25	3	135	207	103	3,558	325	4,356
6-10	67	22	205	221	107	1,070	68	1,764
11-15	135	43	1,221	211	597	8,810	869	11,894
16-20	70	33	968	164	218	6,772	791	9,019
21-25	41	31	674	129	106	2,904	655	4,543
>25	128	73	2,008	311	64	3,713	1,256	7,555
Total[e]	**470**	**205**	**5,219**	**1,243**	**1,197**	**26,982**	**3,970**	**39,306**
1994								
<=5	46	4	146	157	107	3,630	399	4,489
6-10	103	12	151	185	61	1,171	36	1,719
11-15	200	36	1,135	123	540	7,903	754	10,691
16-20	130	44	966	122	309	6,314	799	8,684
21-25	90	32	664	82	130	3,873	638	5,509
>25	206	74	2,107	259	86	3,706	1,327	7,765
Total[e]	**778**	**202**	**5,179**	**928**	**1,236**	**26,757**	**3,966**	**39,064**

Continued next page

Table 1-28 Cont'd U.S. Flag Vessels by Type and Age (Number of vessels)

	Vessel type							
Age[a]	Dry cargo	Tanker	Towboat	Passenger[b]	Offshore support/ crewboats[c]	Dry barge	Tank/ liquid barge[d]	Total[e]
1995								
<=5	38	5	168	149	119	3,975	489	4,943
6-10	90	8	134	195	58	1,483	46	2,014
11-15	168	34	959	133	463	6,387	611	8,760
16-20	135	38	988	121	412	6,507	736	8,939
21-25	80	29	726	91	141	4,897	697	6,661
>25	213	64	2,146	263	92	3,966	1,403	8,148
Total[e]	**726**	**178**	**5,127**	**954**	**1,288**	**27,375**	**3,985**	**39,641**
1996								
<=5	43	7	205	153	123	5,189	573	6,293
6-10	74	8	118	188	61	2,041	87	2,577
11-15	141	29	715	142	351	4,505	346	6,229
16-20	155	36	1,036	119	460	7,234	840	9,881
21-25	79	23	842	87	155	5,416	723	7,325
>25	229	62	2,386	290	144	4,766	1,576	9,453
Total[e]	**713**	**161**	**5,177**	**967**	**1,274**	**28,775**	**4,036**	**41,104**
1997								
<=5	52	8	227	150	122	5,515	519	6,593
6-10	66	2	118	187	94	2,582	181	3,230
11-15	96	27	396	152	223	1,800	137	2,831
16-20	183	36	1,173	131	588	8,943	928	11,982
21-25	84	21	918	102	177	5,772	727	7,801
>25	209	53	2,332	302	159	4,284	1,477	8,816
Total[e]	**692**	**147**	**5,173**	**1,025**	**1,369**	**29,040**	**3,971**	**41,419**
1998								
<=5	56	12	247	150	163	5,877	485	6,991
6-10	55	3	124	168	105	3,117	267	3,839
11-15	105	19	196	166	111	1,113	72	1,782
16-20	179	31	1,198	129	634	8,591	865	11,626
21-25	88	22	979	106	211	5,909	763	8,076
>25	230	48	2,487	292	195	4,817	1,499	9,573
Total[e]	**714**	**135**	**5,237**	**1,011**	**1,423**	**29,557**	**3,952**	**42,032**

[a] Age is based on the year the vessel was built or rebuilt.

[b] Includes passenger excursion/sightseeing, combination passenger and dry cargo vessels, and ferries.

[c] In 1992, offshore supply boats were designated as crewboats.

[d] In 1992, tank barges were designated as liquid barges.

[e] Totals may be greater than sum of columns because of unclassified vessels and vessels of unknown age; figures include vessels available for operation.

SOURCE: U.S. Army Corps of Engineers, *Waterborne Transportation Lines of the United States, Volume 1, National Summaries* (New Orleans, LA: Annual issues), Table 4 in 1998 and similar tables in previous years; also available on Internet site www.wrsc.usace.army.mil/ndc/wtlusvl1.pdf as of June 21, 2000.

Section D
Travel and Goods Movement

Table 1-29 U.S. Vehicle-Miles (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Air carrier, large certificated, domestic, all services	858	1,134	2,068	1,948	2,523	3,046	3,963	4,629	4,811	4,911	5,035
General aviation[a]	1,769	2,562	3,207	4,238	5,204	4,673	4,548	3,795	3,524	3,877	U
Highway[R]											
Passenger car[b,c]	587,012	722,696	916,700	1,033,950	1,111,596	1,246,798	1,408,266	1,428,497	1,469,854	1,502,556	1,549,577
Motorcycle[b]	[h]	[h]	2,979	5,629	10,214	9,086	9,557	9,797	9,920	10,081	10,283
Other 2-axle 4-tire vehicle[c]	[h]	[h]	123,286	200,700	290,935	390,961	574,571	790,029	816,540	850,739	868,275
Truck											
Single-unit 2-axle 6-tire or more truck	98,551	128,769	27,081	34,606	39,813	45,441	51,901	62,705	64,072	66,893	68,021
Combination truck	28,854	31,665	35,134	46,724	68,678	78,063	94,341	115,451	118,899	124,584	128,359
Bus	4,346	4,681	4,544	6,055	6,059	4,478	5,726	6,420	6,563	6,842	7,007
Total highway[c]	**718,763**	**887,811**	**1,109,724**	**1,327,664**	**1,527,295**	**1,774,827**	**2,144,362**	**2,412,899**	**2,485,848**	**2,561,695**	**2,631,522**
Transit											
Motor bus[d]	1,576	1,528	1,409	1,526	1,677	1,863	2,130	2,184	2,221	[R]2,245	[P]2,291
Light rail	75	42	34	24	18	17	24	35	38	41	[P]43
Heavy rail	391	395	407	423	385	451	537	537	543	558	[P]566
Trolley bus	101	43	33	15	13	16	14	14	14	14	[P]14
Commuter rail	N	N	N	173	179	183	213	238	242	251	[P]265
Demand responsive[d]	N	N	N	N	N	247	306	507	548	[R]585	[P]698
Ferry boat	N	N	N	N	[I]	[I]	2	3	3	2	2
Other	N	N	N	15	15	15	[R]18	[R]37	[R]45	[R]52	53
Total transit[e]	**2,143**	**2,008**	**1,883**	**2,176**	**2,287**	**2,791**	**3,242**	**3,550**	**3,650**	**[R]3,746**	**[P]3,932**
Rail											
Class I freight, train-miles	404	421	427	403	428	347	380	458	469	475	475
Class I freight, car-miles	28,170	29,336	29,890	27,656	29,277	24,920	26,159	30,383	31,715	31,660	32,657
Intercity/Amtrak[f], train-miles	209	172	93	30	30	30	33	32	30	32	33
Intercity/Amtrak[f], car-miles	2,208	1,775	690	253	235	251	301	292	[R]276	288	312
Total train-miles[g]	**613**	**593**	**520**	**433**	**458**	**377**	**413**	**490**	**499**	**507**	**508**

KEY: N = data do not exist; P = preliminary; R = revised; U = data are not available

Continued next page

Table 1-29 Cont'd U.S. Vehicle-Miles (Millions)

[a] All operations other than those operating under 14 CFR 121 and 14 CFR 135. Data for 1996 are estimated using new information on nonrespondents and are not comparable to earlier years. Mileage in source is multiplied by 1.151 to convert to nautical-miles for 1985-1997.

[b] U.S. Department of Transportation, Federal Highway Administration (FHWA), provides data separately for passenger car and motorcycle in its annual Highway Statistics series. However, the 1995 summary report provides updated data for passenger car and motor cycle combined. Passenger car figures in this table were computed by U.S. Department of Transportation, Bureau of Transportation Statistics by subtracting the most current motorcycle figures from the aggregate passenger car and motorcycle figures.

[c] In July 1997, the FHWA published revised vehicle-miles data for the highway modes for many years. The major change reflected the reassignment of some vehicles, such as sport utility vehicles and minivans, from the passenger car category to the other 2-axle 4-tire vehicle category.

[d] Motor bus and demand responsive figures are also included in the bus figure for highway.

[e] Prior to 1985, excludes demand responsive and most rural and smaller systems funded via Sections 18 and 16(b)2, Federal Transit Act. The series is not continuous between 1980 and 1985. Transit rail modes are measured in car-miles. Car-miles measure individual vehicle-miles in a train. A 10-car train traveling 1 mile would equal 1 train-mile and 10 car-miles.

[f] Amtrak began operations in 1971.

[g] Although both train-miles and car-miles are shown for rail, only train-miles are included in the total. A train-mile is the movement of a train, which can consist of multiple vehicles (cars), the distance of 1 mile. This differs from a vehicle-mile, which is the movement of 1 vehicle the distance of 1 mile. A 10-vehicle train traveling 1 mile would be measured as 1 train-mile and 10 vehicle-miles. Caution should be used when comparing train-miles with vehicle miles.

[h] 1960–65, motorcycle data are included in passenger car, and other 2-axle 4-tire vehicle data included in single-unit 2-axle 6-tire or more truck.

[i] Ferry boat included with other.

SOURCES:

Air:

Air carrier: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, table 2.

1965-70: Ibid., *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, table 2.

1975-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), p. 4 (December 1976) and p. 2 (December 1981).

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), p. 2, line 27 plus line 50.

General aviation: 1960-65: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation 1972* (Washington, DC: 1973), table 9.10.

1970-75: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation 1976* (Washington, DC: 1976), table 8-5.

1980: U.S. National Transportation Safety Board estimate, personal communication, Dec. 7, 1998.

1985-92: Ibid., *General Aviation Activity and Avionics Survey* (Washington, DC: Annual issues,) table 3.3.

1993-97: Ibid., *General Aviation and Air Taxi Activity and Avionics Survey* (Washington, DC: Annual issues), table 3.3.

Highway:

Passenger car and motorcycle: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1, sum of passenger car and motorcycle.

Motorcycle: 1970-80: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A.

1985-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit 2-axle 6-tires or more truck, combination truck, and bus: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

1960-98: American Public Transit Association, *Public Transportation Fact Book* (Washington, DC: 2000), table 42, 84, and similar tables in earlier editions.

Rail:

Class I rail freight train- and car-miles: 1960-98: Association of American Railroads, *Railroad Facts, 1998* (Washington, DC: 1999), p. 33 (train-miles) and p. 34 (car-miles).

Intercity/Amtrak train-miles: 1960-70: Association of American Railroads, *Yearbook of Railroad Facts* (Washington, DC: 1975), p. 39.

1975-98: Amtrak, *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Intercity/Amtrak car-miles: 1960-75: Association of American Railroads, *Yearbook of Railroad Facts* (Washington, DC: 1975), p. 40.

1980-98: Amtrak, Amtrak Corporate Reporting, Route Profitability System, personal communication, 1999.

Table 1-30 Roadway Vehicle-Miles Traveled (VMT) and VMT per Lane-Mile by Functional Class

	1980	1985	1990	1995	1996	1997	1998
VMT (millions)							
Urban							
Interstate	161,242	216,188	278,901	341,515	351,579	361,401	374,622
Other arterials[a]	484,189	578,270	699,233	815,102	834,623	846,659	862,994
Collector	83,043	89,578	106,297	126,883	129,310	130,143	131,919
Local	126,791	160,062	191,053	205,907	208,374	222,142	228,530
Total	**855,265**	**1,044,098**	**1,275,484**	**1,489,407**	**1,523,886**	**1,560,345**	**1,598,065**
Rural							
Interstate	135,084	154,357	200,173	223,382	232,565	240,255	251,520
Other arterials[a]	262,774	282,803	330,866	368,595	378,847	392,058	403,484
Collector[b]	189,468	206,669	240,460	236,148	241,030	254,364	257,858
Local	84,704	86,899	97,379	105,164	107,752	114,673	120,595
Total	**672,030**	**730,728**	**868,878**	**933,289**	**960,194**	**1,001,350**	**1,033,457**
VMT per lane-mile (thousands)							
Urban							
Interstate	3,327	3,773	4,483	4,785	R4,897	4,953	5,081
Other arterials[a]	1,451	1,556	1,751	1,828	R1,857	1,857	1,891
Collector	572	552	634	686	R692	694	699
Local	146	168	184	181	181	188	192
Total	**613**	**677**	**764**	**809**	R820	**822**	**838**
Rural							
Interstate	1,031	1,170	1,473	1,693	R1,749	1,804	1,882
Other arterials[a]	518	555	640	695	710	729	749
Collector[b]	132	141	164	167	170	179	182
Local	19	20	23	25	R25	27	29
Total	**103**	**113**	**136**	**148**	**151**	**157**	**164**

KEY: R = revised

[a] For urban: the sum of other freeways and expressways, other principal arterials, and minor arterials.

For rural: the sum of other principal arterials and minor arterials.

[b] Collector is the sum of major and minor collectors (rural only).

NOTE: See table 1-5 for estimated highway lane-miles by functional class.

SOURCES: 1980-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-202.

1995-97: Ibid., *Highway Statistics* (Washington, DC: Annual issues), tables VM-2 and VM-2A.

Lane-miles: 1980-95: Ibid., Office of Highway Information Management, unpublished data, 1997, table HM-260.

1996-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

Table 1-31 U.S. Passenger-Miles (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Air carrier, certificated, domestic, all services	R31,099	R53,226	R108,442	136,000	R204,368	R277,836	R345,873	R403,888	R434,652	R450,612	463,262
General aviation[a]	2,300	4,400	9,100	11,400	14,700	12,300	13,000	R10,800	R12,000	12,500	13,300
Highway[R]											
Passenger car[b,c]	1,144,673	1,394,803	1,750,897	1,954,166	2,011,989	2,094,621	2,281,391	2,271,310	2,337,068	2,389,064	2,463,827
Motorcycle[b,c]	g	g	3,277	6,192	12,257	11,812	12,424	11,560	11,706	11,896	12,134
Other 2-axle 4-tire vehicle[c]	h	h	225,613	363,267	520,774	688,091	999,754	1,295,648	1,339,126	1,395,212	1,423,971
Truck											
Single-unit 2-axle 6-tire or more truck	98,551	128,769	27,081	34,606	39,813	45,441	51,901	62,705	64,072	66,893	67,021
Combination truck	28,854	31,665	35,134	46,724	68,678	78,063	94,341	115,451	118,899	124,584	128,359
Bus[d]	N	N	N	N	N	94,925	121,398	136,104	138,613	145,060	148,325
Total[c]	**1,272,078**	**1,555,237**	**2,042,002**	**2,404,954**	**2,653,510**	**3,012,953**	**3,561,209**	**3,892,778**	**4,009,484**	**4,132,709**	**4,243,637**
Transit											
Motor bus[d]	N	N	N	N	R21,790	R21,161	R20,981	R18,818	R19,096	R19,604	P20,602
Light rail	N	N	N	N	381	350	571	860	957	R1,035	P1,118
Heavy rail	N	N	N	N	R10,558	R10,427	R11,475	R10,559	R11,530	R12,056	P12,284
Trolley bus	N	N	N	N	219	306	193	187	184	189	P182
Commuter rail[R]	4,197	4,128	4,592	4,513	6,516	6,534	7,082	8,244	8,351	8,038	P8,716
Demand responsive[d]	N	N	N	N	N	364	431	607	656	R754	P1,012
Ferry boat	N	N	N	N	i	i	286	260	256	349	P345
Other	N	N	N	N	390	439	124	273	348	R314	P397
Total[R,e]	**j4,197**	**j4,128**	**j4,592**	**j4,513**	**39,854**	**39,581**	**41,143**	**39,808**	**41,378**	**R42,339**	**P44,656**
Rail											
Intercity/Amtrak[f,R]	17,064	13,260	6,179	3,931	4,503	4,825	6,057	5,545	5,050	5,166	5,304

KEY: N = data do not exist; P = preliminary; R = revised

Continued next page

[a] All operations other than those operating under 14 CFR 121 and 14 CFR 135.

[b] U.S. Department of Transportation, Federal Highway Administration (FHWA), provides data separately for passenger car and motorcycle in its annual Highway Statistics series. However, the 1995 summary report provides updated data for passenger car and motorcycle combined. Passenger car figures in this table were computed by U.S. Department of Transportation, Bureau of Transportation Statistics by subtracting the most current motorcycle figures from the aggregate passenger car and motorcycle figures.

[c] In July 1997, FHWA published revised passenger-miles data for the highway modes for a number of years. The major change reflected the reassignment of some vehicles from the passenger car category to the other 2-axle 4-tire vehicle category. Passenger-miles for passenger car, motorcycle, and other 2-axle 4-tire vehicles were derived by multiplying vehicle-miles for these vehicles by average vehicle occupancy rates, provided by the Nationwide Personal Transportation Survey, 1977, 1983, and 1995.

[d] Motor bus and demand responsive figures are also included in the bus figure for highway.

[e] Prior to 1985, excludes demand responsive and most rural and smaller systems funded via Sections 18 and 16(b)2, Federal Transit Act. The series is not continuous between 1980 and 1985. Transit rail modes are measured in car-miles. Car-miles measure individual vehicle-miles in a train. A 10-car train traveling 1 mile would equal 1 trainmile and 10 car-miles.

[f] Amtrak began operations in 1971. Does not include contract commuter passengers.

[g] Included in passenger car.

[h] Included in other single-unit 2-axle 6-tire or more truck.

[i] Ferry boat included in other.

[j] Includes commuter rail figures only.

NOTES: Air carrier passenger-miles are computed by summing of the products of the aircraft-miles flown on each interairport segment multiplied by the number of passengers carried on that segment. Highway passenger-miles are calculated by multiplying vehicle-miles of travel as cited by FHWA by the average number of occupants for each vehicle type. Average vehicle occupancy rates are based on various sources, such as the Nationwide Personal Transportation Survey, conducted by the Federal Highway Administration, and the Truck Inventory and Use Survey, conducted by the Bureau of the Census. Transit passenger-miles are the cumulative sum of the distances ridden by each passenger. Rail passenger-miles represent the movement of 1 passenger for 1 mile.

SOURCES:

Air:

Air carrier, domestic, all services: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, table 2.

1965-70: Ibid., *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, table 2.

1975-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), p. 4 (December 1976) and p. 2 (December 1981).

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), page 2, line 1.

General aviation: 1960-97: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 47.

Highway:

Passenger car and motorcycle: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1, sum of passenger car and motorcycle.

Motorcycle: 1970-80: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A.

1985-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970-94: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics Summary to 1995 (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit 2-axle 6-tires or more truck, combination truck, and bus: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

Ferry boat and other: 1992: American Public Transit Association, personal communication, July 19, 2000.

All other data: 1960-98: American Public Transit Association, *Transit Fact Book* (Washington, DC: 2000), table 30 and similar tables in earlier editions.

Rail, Intercity/Amtrak: 1960-80: Association of American Railroads, Railroad Facts (Washington, DC: Annual issues).

1985: Amtrak, *Amtrak FY95 Annual Report Statistical Appendix (Washington, DC: 1996), p. 4.*

1990-98: Ibid., *Amtrak FY99 Annual Report Statistical Appendix* (Washington, DC: 2000), p. 43.

Table 1-32 Principal Means of Transportation to Work (Thousands)

	1985		1989		1993		1997		1999	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All workers	99,592	100.0	106,630	100.0	103,741	100.0	116,469	100.0	118,041	100
Automobile	86,148	86.5	93,943	88.1	91,301	88.0	101,907	87.5	103,466	87.7
Drives self	72,137	72.4	81,322	76.3	79,449	76.6	90,207	77.5	92,363	78.2
Carpool	14,011	14.1	12,621	11.8	11,852	11.4	11,700	10.0	11,103	9.4
2 person	10,381	10.4	9,708	9.1	9,105	8.8	9,294	8.0	8,705	7.4
3 person	2,024	2.0	1,748	1.6	1,684	1.6	1,526	1.3	1,454	1.2
4+ person	1,606	1.6	1,165	1.1	1,063	1.0	881	0.8	945	0.8
Public transportation[a]	5,091	5.1	4,880	4.6	4,740	4.6	5,337	4.6	5,779	4.9
Taxicab	129	0.1	152	0.1	117	0.1	139	0.1	144	0.1
Bicycle or motorcycle	958	1.0	795	0.7	744	0.7	738	0.6	749	0.6
Walks only	4,032	4.0	3,634	3.4	3,227	3.1	3,869	3.3	3,627	3.1
Other means[b]	286	0.3	491	0.5	474	0.5	867	0.7	987	0.8
Works at home	2,947	3.0	2,736	2.6	3,137	3.0	3,611	3.1	3,288	2.8

[a] Public transportation refers to bus, streetcar, subway, or elevated trains.

[b] Other means include ferryboats, surface trains, and van service.

NOTES: Principal means of transportation refers to the mode used most often, when different means of transportation were used on different days of the week, or the mode used for the longest distance during the trip to work, when more than one mode is used to get to work each day.

SOURCE: U.S. Department of Housing and Urban Development, *American Housing Survey* (Washington, DC: Various years).

Table 1-33 Long-Distance Travel in the United States by Selected Trip Characteristics: 1995

(Roundtrips of 100 miles or more, one way, U.S. destinations only)

	Household trips (thousands)		Person trips (thousands)		Person-miles (millions)		Personal-use vehicle trips (thousands)		Personal-use vehicle miles (millions)	
	Number	%	Number	%	Number	%	Number	%	Number	%
TOTAL	**656,462**	**100.0**	**1,001,319**	**100.0**	**826,804**	**100.0**	**505,154**	**100.0**	**280,127**	**100.0**
Principal means of transportation										
Personal-use vehicle	505,154	77.0	813,858	81.3	451,590	54.6	505,154	100.0	280,127	100.0
Airplane	129,164	19.7	161,165	16.1	355,286	43.0	NA	NA	NA	NA
Commercial airplane	124,884	19.0	155,936	15.6	347,933	42.1	NA	NA	NA	NA
Bus	17,340	2.6	20,445	2.0	13,309	1.6	NA	NA	NA	NA
Intercity	2,755	0.4	3,244	0.3	2,723	0.3	NA	NA	NA	NA
Charter or tour	11,890	1.8	14,247	1.4	9,363	1.1	NA	NA	NA	NA
Train	4,200	0.6	4,994	0.5	4,356	0.5	NA	NA	NA	NA
Ship, boat, or ferry	391	0.1	614	0.1	1,834	0.2	NA	NA	NA	NA
Other	213	—	243	—	429	0.1	NA	NA	NA	NA
Roundtrip distance										
Less than 300 miles	194,098	29.6	306,433	30.6	74,658	9.0	185,418	36.7	45,159	16.1
300-499 miles	174,389	26.6	274,045	27.4	106,007	12.8	159,743	31.6	61,779	22.1
500-999 miles	140,046	21.3	214,006	21.4	146,631	17.7	106,846	21.2	72,114	25.7
1,000-1,999 miles	76,110	11.6	108,331	10.8	153,316	18.5	36,722	7.3	49,952	17.8
2,000 miles or more	71,819	10.9	98,503	9.8	346,192	41.9	16,425	3.3	51,123	18.3
Mean (miles)	872	NA	826	NA	NA	NA	555	NA	NA	NA
Median (miles)	438	NA	425	NA	NA	NA	368	NA	NA	NA
Calendar quarter										
1st quarter	130,963	19.9	200,331	20.0	155,603	18.8	99,549	19.7	50,801	18.1
2nd quarter	168,669	25.7	258,400	25.8	208,256	25.2	130,135	25.8	72,421	25.9
3rd quarter	193,913	29.5	304,542	30.4	261,463	31.6	152,862	30.3	90,558	32.3
4th quarter	162,917	24.8	238,047	23.8	201,471	24.4	122,607	24.3	66,346	23.7

KEY: — = rounds to or represents zero; NA = not applicable

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Table 1-33 Cont'd
Long-Distance Travel in the United States by Selected Trip Characteristics: 1995
(Roundtrips of 100 miles or more, one way, U.S. destinations only)

	Household trips (thousands)		Person trips (thousands)		Person-miles (millions)		Personal-use vehicle trips (thousands)		Personal-use vehicle miles (millions)	
	Number	%	Number	%	Number	%	Number	%	Number	%
Main purpose of trip										
Business	192,537	29.3	224,835	22.5	212,189	25.7	125,036	24.8	61,929	22.1
Pleasure	372,586	56.8	630,110	62.9	506,971	61.3	305,571	60.5	177,698	63.4
Visit relatives or friends	195,468	29.8	330,755	33.0	264,769	32.0	159,981	31.7	92,190	32.9
Leisure[a]	177,119	27.0	299,355	29.9	242,201	29.3	145,590	28.8	85,508	30.5
Rest or relaxation	65,017	9.9	115,154	11.5	100,838	12.2	53,780	10.6	33,598	12.0
Sightseeing	24,272	3.7	42,649	4.3	50,781	6.1	18,069	3.6	14,654	5.2
Outdoor recreation	39,899	6.1	65,418	6.5	41,620	5.0	35,987	7.1	19,407	6.9
Entertainment	37,456	5.7	58,757	5.9	42,929	5.2	27,920	5.5	14,531	5.2
Personal business	91,319	13.9	146,338	14.6	107,621	13.0	74,532	14.8	40,490	14.5
Other	19	—	36	—	23	—	16	—	9	—
Vacation or weekend trips										
Vacation trip	301,197	45.9	515,383	51.5	484,144	58.6	236,055	46.7	154,167	55.0
Weekend trip	400,755	61.0	621,948	62.1	475,269	57.5	310,379	61.4	169,309	60.4
1 or 2 nights away from home	240,808	36.7	377,893	37.7	222,418	26.9	199,831	39.6	94,865	33.9
3-5 nights away from home	159,946	24.4	244,055	24.4	252,851	30.6	110,548	21.9	74,444	26.6
Travel party type										
One adult, no children under 18	386,479	58.9	386,510	38.6	352,350	42.6	275,034	54.4	144,795	51.7
Two or more adults, no children under 18	155,147	23.6	299,485	29.9	248,762	30.1	133,163	26.4	79,273	28.3
One adult, children under 18	29,436	4.5	67,959	6.8	48,083	5.8	24,879	4.9	13,827	4.9
Two or more adults, children under 18	66,086	10.1	225,875	22.6	158,334	19.2	60,497	12.0	34,759	12.4
No adult, one or more children under 18	19,313	2.9	21,489	2.1	19,275	2.3	11,581	2.3	7,473	2.7
Mean travel party size	1.6	NA	2.2	NA	NA	NA	1.7	NA	NA	NA

KEY: — = rounds to or represents zero; NA = not applicable

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Table 1-33 Cont'd

Long-Distance Travel in the United States by Selected Trip Characteristics: 1995

(Roundtrips of 100 miles or more, one way, U.S. destinations only)

	Household trips (thousands)		Person trips (thousands)		Person-miles (millions)		Personal-use vehicle trips (thousands)		Personal-use vehicle miles (millions)	
	Number	%	Number	%	Number	%	Number	%	Number	%
Nights away from home										
None	164,032	25.0	239,727	23.9	104,444	12.6	140,914	27.9	49,619	17.7
1-3 nights	321,227	48.9	502,465	50.2	331,504	40.1	259,354	51.3	131,559	47.0
4-7 nights	121,279	18.5	184,766	18.5	243,546	29.5	76,380	15.1	61,318	21.9
8 or more nights	49,924	7.6	74,361	7.4	147,309	17.8	28,506	5.6	37,631	13.4
Mean, excluding none (nights)	4.4	NA	4.3	NA	NA	NA	4.0	NA	NA	NA
Type of lodging at destination										
Friend's or relative's home	211,832	43.6	345,506	45.9	290,428	41.0	170,271	47.3	103,180	45.7
Hotel, motel, or resort	201,264	41.4	282,929	37.6	318,323	44.9	126,160	35.1	82,447	36.5
Rented cabin, condo, or vacation home	20,205	4.2	38,572	5.1	26,269	3.7	18,103	5.0	9,819	4.3
Owned cabin, condo, or vacation home	17,607	3.6	30,648	4.1	31,161	4.4	14,631	4.1	10,809	4.8
Camper, trailer, recreational vehicle, tent	11,944	2.5	22,208	3.0	15,836	2.2	11,663	3.2	8,204	3.6
Other type of lodging	23,452	4.8	32,095	4.3	27,080	3.8	18,917	5.3	11,542	5.1
Nights at destination										
Mean nights at destination	4.20	NA	4.0	NA	NA	NA	3.8	NA	NA	NA
Friend's or relative's home	4.33	NA	4.0	NA	NA	NA	3.6	NA	NA	NA
Hotel, motel, or resort	3.05	NA	3.0	NA	NA	NA	2.8	NA	NA	NA

KEY: — = rounds to or represents zero; NA = not applicable

[a] Includes other leisure purposes not shown separately.

NOTES: Numbers and percentages may not add to totals due to rounding. See glossary for definitions of categories.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *1995 American Travel Survey Profile*, BTS/ATS95-US (Washington, DC: October 1997).

Table 1-34 Long-Distance Travel in the United States by Selected Traveler Characteristics: 1995 (Roundtrips of 100 miles or more, one way)

	Person trips (thousands)		Person-miles (millions)		Personal-use vehicle trips (thousands)		Personal-use vehicle miles (millions)	
	Number	%	Number	%	Number	%	Number	%
TOTAL all person trips	**1,001,319**	**100**	**834,676**	**100**	**813,858**	**100**	**454,787**	**100**
Age and sex								
Under 18 years	159,779	16.0	115,869	13.9	139,360	17.1	78,517	17.3
18-24 years	92,129	9.2	67,224	8.1	79,810	9.8	43,821	9.6
25-29 years	80,060	8.0	64,009	7.7	66,510	8.2	35,809	7.9
30-39 years	189,917	19.0	167,583	20.1	146,527	18.0	78,970	17.4
40-49 years	199,991	20.0	170,379	20.4	157,063	19.3	83,046	18.3
50-59 years	137,841	13.8	118,433	14.2	110,208	13.5	61,856	13.6
60-64 years	48,683	4.9	43,574	5.2	40,647	5.0	25,258	5.6
65 years and over	92,919	9.3	87,603	10.5	73,733	9.1	47,512	10.4
Total	**1,001,319**	**100**	**834,676**	**100**	**813,858**	**100**	**454,787**	**100**
Median (years)	38				38			
Female								
Under 18 years	79,580	7.9	58,716	7.0	68,650	8.4	39,122	8.6
18-24 years	42,743	4.3	32,706	3.9	36,161	4.4	19,702	4.3
25-29 years	36,422	3.6	29,473	3.5	29,986	3.7	16,077	3.5
30-39 years	82,471	8.2	70,360	8.4	65,056	8.0	34,606	7.6
40-49 years	84,135	8.4	70,696	8.5	67,855	8.3	36,039	7.9
50-59 years	59,721	6.0	50,449	6.0	48,867	6.0	27,483	6.0
60-64 years	21,310	2.1	19,576	2.3	17,217	2.1	10,942	2.4
65 years and over	44,129	4.4	41,278	4.9	33,409	4.1	20,513	4.5
Total	**450,512**	**45.0**	**373,254**	**44.7**	**367,203**	**45.1**	**204,485**	**45.0**
Median (years)	37				37			
Race								
White	891,443	89.0	739,444	88.6	726,632	89.3	403,045	88.6
Black	59,923	6.0	44,935	5.4	49,175	6.0	28,115	6.2
Asian or Pacific Islander	22,922	2.3	28,690	3.4	15,954	2.0	10,570	2.3
American Indian, Eskimo, or Aleutian	10,707	1.1	8,103	1.0	8,807	1.1	5,233	1.2
Other	16,324	1.6	13,504	1.6	13,290	1.6	7,825	1.7
Total	**1,001,319**	**100**	**834,676**	**100**	**813,858**	**100**	**454,788**	**100**
Ethnicity								
(Hispanic origin)	52,822	5.3	38,177	4.6	44,219	5.4	23,183	5.1
(Not of Hispanic origin)	948,497	94.7	796,499	95.4	769,640	94.6	431,605	94.9
Total	**1,001,319**	**100**	**834,676**	**100**	**813,858**	**100**	**454,788**	**100**

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Table 1-34 Cont'd Long-Distance Travel in the United States by Selected Traveler Characteristics: 1995 (Roundtrips of 100 miles or more, one way)

	Person trips (thousands)		Person-miles (millions)		Personal-use vehicle trips (thousands)		Personal-use vehicle miles (millions)	
	Number	%	Number	%	Number	%	Number	%
Household income								
Less than $25,000	155,555	15.5	112,236	13.4	131,901	16.2	71,556	15.7
$25,000-$39,999	200,981	20.1	148,185	17.8	175,186	21.5	98,074	21.6
$40,000-$49,999	166,699	16.6	125,296	15.0	144,160	17.7	78,294	17.2
$50,000-$59,999	143,946	14.4	118,691	14.2	117,579	14.4	66,363	14.6
$60,000-$74,999	134,348	13.4	118,169	14.2	106,083	13.0	61,169	13.5
$75,000-$99,999	104,698	10.5	102,112	12.2	79,397	9.8	45,406	10.0
$100,000 or more	95,092	9.5	109,987	13.2	59,553	7.3	33,925	7.5
Household type								
Family household	840,438	83.9	693,794	83.1	692,146	85.0	388,534	85.4
Married-couple household	726,982	72.6	606,630	72.7	597,863	73.5	335,980	73.9
With children under 18 years	379,139	37.9	302,958	36.3	313,451	38.5	172,014	37.8
Female householder	76,942	7.7	60,665	7.3	62,583	7.7	35,023	7.7
With children under 18 years	43,389	4.3	31,963	3.8	35,986	4.4	19,421	4.3
Male householder	36,515	3.6	26,499	3.2	31,700	3.9	17,531	3.9
With children under 18 years	13,226	1.3	9,845	1.2	11,207	1.4	6,583	1.4
Nonfamily household	160,881	16.1	140,881	16.9	121,712	15.0	66,254	14.6
Educational attainment (Persons 16 years and over)								
Less than high school graduate	68,338	7.9	48,533	6.6	59,159	8.6	33,428	8.7
High school graduate	219,549	25.5	165,361	22.6	187,762	27.2	105,957	27.6
Some college, no degree	182,146	21.2	146,379	20.0	153,399	22.3	86,304	22.5
Associate's degree	58,431	6.8	46,401	6.3	49,081	7.1	26,264	6.8
Bachelor's degree	193,651	22.5	181,233	24.8	145,438	21.1	79,779	20.8
Some grad school or grad degree	137,513	16.0	144,155	19.7	94,221	13.7	52,678	13.7
Total	**859,629**	**100**	**732,062**	**100**	**689,060**	**100**	**384,409**	**100**
Activity status (Persons 16 years and over)								
Working full time	547,232	63.7	470,855	64.3	428,319	62.2	228,969	59.6
Retired	95,039	11.1	88,837	12.1	77,921	11.3	52,589	13.7
Other	217,357	25.3	172,371	23.5	182,820	26.5	102,851	26.8
Total	**859,629**	**100**	**732,062**	**100**	**689,060**	**100**	**384,409**	**100**

NOTE: This table excludes travel outside the United States. Numbers and percents may not add to totals due to rounding.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, 1995 American Travel Survey data.

Table 1-35 U.S. Air Carrier Aircraft Departures, Enplaned Revenue Passengers, and Enplaned Revenue Tons

	1975	1980	1985	1990	1995	1996	1997	1998
AIRCRAFT DEPARTURES								
Total performed	**4,555,516**	**5,156,848**	**5,505,659**	**6,641,681**	**8,030,530**	**8,204,674**	**8,095,888**	**8,248,269**
Total scheduled	**4,530,535**	**5,204,564**	**5,591,596**	**6,758,571**	**7,920,467**	**8,064,653**	**7,907,554**	**8,094,020**
Large Hubs								
Performed	2,437,958	2,887,239	3,439,446	4,167,868	5,162,534	5,257,541	5,266,560	5,416,158
Scheduled	2,409,874	2,905,923	3,487,660	4,237,466	5,147,875	5,243,646	5,219,161	5,405,728
Medium Hubs								
Performed	902,652	1,048,726	1,185,008	1,394,833	1,439,639	1,425,280	1,430,537	1,429,730
Scheduled	899,543	1,058,438	1,201,540	1,417,762	1,387,833	1,356,162	1,352,944	1,345,197
Small Hubs								
Performed	640,589	598,559	514,176	669,450	738,231	754,914	695,841	714,920
Scheduled	644,133	608,738	524,048	679,103	711,947	722,170	660,685	674,812
Nonhubs								
Performed	574,317	622,324	367,029	409,530	690,126	766,939	702,950	687,461
Scheduled	576,985	631,465	378,348	424,240	672,812	742,675	674,764	668,283
ENPLANED REVENUE								
PASSENGERS[a]	**196,782,144**	**281,408,852**	**363,341,497**	**438,544,001**	**526,055,483**	**558,183,741**	**568,615,687**	**588,335,318**
Large Hubs	133,975,900	197,679,376	264,507,144	317,595,099	392,601,890	417,339,694	426,246,423	442,402,443
Medium Hubs	36,539,613	51,664,627	65,770,376	80,466,373	85,929,285	89,018,764	90,779,705	91,755,793
Small Hubs	19,406,607	23,393,324	24,240,726	30,771,383	33,561,098	37,122,974	36,298,979	37,675,305
Nonhubs	6,860,024	8,671,525	8,823,251	9,711,146	13,963,210	14,702,309	15,290,580	16,501,777
ENPLANED REVENUE								
TONS[b]	**3,661,061**	**5,088,313**	**4,024,470**	**6,298,824**	**9,365,017**	**10,333,298**	**13,520,228**	**14,083,769**
Freight								
Large Hubs	2,265,664.95	3,008,311.25	2,047,988.46	3,001,216.68	4,402,326.87	4,653,189.06	5,691,362.80	6,208,629.28
Medium Hubs	358,043.56	414,324.74	469,057.09	1,446,744.12	1,950,317.96	2,169,411.17	3,855,449.23	3,897,241.73
Small Hubs	99,132.62	73,795.49	48,126.59	191,357.90	541,061.90	755,232.44	963,093.25	1,019,615.11
Nonhubs	41,922.32	65,755.91	35,854.90	93,407.35	310,772.09	469,962.24	653,542.47	659,027.77
Total Freight	**2,764,763.45**	**3,562,187.39**	**2,601,027.04**	**4,732,726.05**	**7,204,478.82**	**8,047,794.91**	**11,163,447.75**	**11,784,513.89**
Mail								
Large Hubs	677,179.12	1,091,059.45	1,082,566.55	1,146,589.25	1,546,567.80	1,630,444.73	1,699,154.46	1,662,642.74
Medium Hubs	151,498.13	255,929.13	268,179.14	292,898.69	442,814.10	466,583.26	473,576.72	482,710.49
Small Hubs	48,486.07	148,115.76	59,916.57	108,655.74	136,007.69	157,137.07	138,817.86	127,747.78
Nonhubs	19,134.42	31,020.96	12,780.74	17,954.39	35,148.83	31,338.10	45,231.57	26,153.61
Total Mail	**896,297.74**	**1,526,125.30**	**1,423,443.00**	**1,566,098.07**	**2,160,538.42**	**2,285,503.16**	**2,356,780.61**	**2,299,254.62**

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Table 1-35 Cont'd U.S. Air Carrier Aircraft Departures, Enplaned Revenue Passengers, and Enplaned Revenue Tons

[a] The number of persons receiving air transportation from an air carrier for which renumeration is received by the carrier, excluding persons receiving reduced rate charges, such as air carrier employees, infants, and others (except ministers of religion, elderly individuals, and handicapped individuals).

[b] The number of short tons of freight transported by an air carrier aboard an aircraft.

NOTES: Data are for all scheduled and nonscheduled service by large certificated U.S. air carriers at all airports served within the 50 states, the District of Columbia, and other U.S. areas designated by the Federal Aviation Administration. Not all scheduled service is actually performed; however, because nonscheduled service is counted, the performed service than scheduled service for some years. Prior to 1993, all scheduled and some nonscheduled enplanements for certificated air carriers were included; no enplanements were included for air carriers offering charter service only. Prior to 1990, Freight includes both freight and express shipments and Mail includes priority and nonpriority U.S. mail and foreign mail; beginning in 1990 only aggregate numbers are reported. Large certificated air carriers hold Certificates of Public Convenience and Necessity issued by the U.S. Department of Transportation authorizing the performance of air transportation. Large certificated air carriers operate aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds. Data for commuter, intrastate, and foreign-flag air carriers are not included. Air traffic hubs are designated as geographical areas based on the percentage of total passengers enplaned in the area. A hub may have more than one airport in it. This definition of hub should not be confused with the definition being used by the airlines in describing their "hub-and-spoke" route structures. Individual communities fall into four hub classifications as determined by each community's percentage of the total enplaned revenue passengers in all services and all operations of U.S. certificated route carriers within the 50 states, the District of Columbia, and other U.S. areas. Classifications are based on the percentage of total enplaned revenue passengers for each year according to the following: one percent or more - large, 0.25 to 0.9999 percent - medium, 0.05 to 0.249 percent - small, less than 0.05 - nonhub.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Airport Activity Statistics of Certified Route Air Carriers* (Washington, DC: Annual issues), tables 2-5.

Table 1-36 Passengers Boarded at the Top 50 U.S. Airports[a]

	Rank	1999 total enplaned passengers	Rank	1989 total enplaned passengers	% change 1989-99
Atlanta, GA (William B Hartsfield)	1	37,223,698	3	20,397,697	82
Chicago, IL (O'Hare Intl.)	2	31,656,550	1	25,664,266	23
Dallas/Ft.Worth, TX (Dallas/Ft.Worth Intl.)	3	27,592,733	2	22,623,065	22
Los Angeles, CA (Los Angeles Intl.)	4	24,024,215	4	18,583,292	29
Denver, CO (Denver Intl.)	5	17,492,801	6	12,320,246	42
Detroit, MI (Wayne County)	6	16,564,799	11	9,739,265	70
San Francisco, CA (San Francisco Intl.)	7	16,540,786	5	13,326,085	24
Phoenix, AZ (Phoenix Sky Harbor Intl.)	8	16,082,657	8	10,166,095	58
Minneapolis, MN (Minneapolis-St. Paul Intl.)	9	15,390,488	16	8,460,115	82
Las Vegas, NV (McCarran Intl.)	10	15,361,009	21	7,026,900	119
St Louis, MO (Lambert-St. Louis Muni)	11	14,929,506	13	9,396,335	59
Newark, NJ	12	14,904,697	10	9,822,419	52
Houston, TX (Houston International)	13	14,734,821	20	7,030,001	110
Seattle, WA (Seattle-Tacoma Intl.)	14	13,062,413	19	7,059,777	85
Miami, FL (Miami Intl.)	15	12,721,257	15	8,591,936	48
Orlando, FL (Orlando Intl.)	16	12,539,071	18	7,373,449	70
Boston, MA (Logan Intl.)	17	11,078,408	12	9,661,258	15
New York, NY (LaGuardia)	18	10,780,340	7	12,320,246	-12
Philadelphia, PA	19	10,341,666	24	6,247,489	66
New York, NY (JFK)	20	10,138,272	9	10,081,490	1
Charlotte, NC (Douglas Muni)	21	9,442,197	22	6,903,482	37
Salt Lake City, UT	22	8,715,175	26	5,244,238	66
Honolulu, Hawaii	23	8,013,533	14	8,943,521	-10
Pittsburgh, PA	24	8,013,533	17	7,940,962	1
Baltimore, MD	25	8,002,750	28	4,446,139	80
Cincinatti, OH	26	7,610,889	34	3,770,623	102
San Diego, CA (Intl.-Lindbergh)	27	7,248,022	25	5,317,177	36
Tampa, FL	28	6,912,195	29	4,409,261	57
Washington, DC (Dulles Intl.)	29	6,830,051	27	4,543,530	50
Washington, DC (Reagan National)	30	6,656,776	23	6,895,563	-3
Portland, OR	31	6,510,393	42	3,054,925	113
Miami/Ft. Lauderdale	32	6,223,731	37	3,645,786	71
Chicago, IL (Midway)	33	6,137,747	38	3,409,726	80
Cleveland, OH (Hopkins Intl.)	34	5,921,396	36	3,722,208	59
Kansas City, MO	35	5,601,189	30	4,356,991	29
San Jose, CA (San Jose Muni)	36	5,486,390	41	3,093,643	77
Oakland, CA (Oakland Metropolitan Intl.)	37	4,737,711	53	2,030,847	133
New Orleans, LA	38	5,468,799	40	3,170,967	72
San Juan, PR (Luis Munoz Marin Intl.)	39	4,531,970	39	3,268,644	39
Memphis, TN	40	4,523,926	32	3,989,814	13
Houston, TX (William P. Hobby)	41	4,214,715	33	3,927,329	7
Nashville, TN	42	4,062,749	35	3,746,367	8
Raleigh, NC (Raleigh-Durham)	43	4,025,045	31	4,116,520	-2

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Table 1-36 Cont'd Passengers Boarded at the Top 50 U.S. Airports[a]

	Rank	1999 total enplaned passengers	Rank	1989 total enplaned passengers	% change 1989-99
Sacramento, CA	44	3,658,043	56	1,800,078	103
Los Angeles, CA (Orange County)	45	3,642,214	50	2,173,502	68
Indianapolis, IN	46	3,539,375	44	2,522,944	40
Dallas, TX (Love Field)	47	3,414,265	43	2,773,836	23
San Antonio, TX	48	3,340,285	46	2,493,393	34
Austin, TX (Robert Muller Muni)	49	3,291,848	54	2,022,269	63
Columbus, OH (Port Columbus Intl.)	50	3,120,242	58	1,662,389	88
Top 50 Airports		**512,057,341**		**351,910,836**	
All Airports		**611,299,415**		**455,263,066**	

[a] Rank order by total enplaned passengers on large certificated U.S. air carriers, scheduled and nonscheduled operations, at all airports served within the 50 states, the District of Columbia, and other U.S. areas designated by the Federal Aviation Administration. Prior to 1993, all scheduled and some nonscheduled enplanements for certificated air carriers were included; no enplanements were included for air carriers offering charter service only.

Large certificated air carriers hold Certificates of Public Convenience and Necessity issued by the U.S. Department of Transportation authorizing the performance of air transportation. Large certificated air carriers operate aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds. Data for commuter, intrastate, and foreign-flag air carriers are not included.

NOTES: In 1989, Ontario, CA ranked 45th (2,608,588); West Palm Beach, FL ranked 47th (2,403,585); Albuquerque, NM ranked 48th (2,336,577); and Hartford, CT ranked 49th (2,269,982).

SOURCES:

All airports, total enplaned passengers: 1989: U.S. Department of Transportation, Federal Aviation Administration and Research and Special Programs Administration, *Airport Activity Statistics of Certificated Route Air Carriers, 12 Months Ending December 31, 1989 (Washington, DC: 1989)*, table 1.

1999:U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Airport Activity Statistics of Certificated Air Carriers: Summary Tables,Twelve Months Ending December 31, 1999* (Washington, DC), table 1.

Airport ranking: 1989: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook, Calendar Year 1989* (Washington, DC: 1989), table 4.11.

1999: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Airport Activity Statistics of Certificated Air Carriers: Summary Tables,Twelve Months Ending December 31, 1999* (Washington, DC), tables 3-4.

Table 1-37 Air Passenger Travel Arrivals in the United States from Selected Foreign Countries (Thousands)

	1975	1980	1985	1990	1995	1996	1997	1998
Flag of carrier								
United States	6,502	10,031	11,798	19,145	24,582	25,148	26,744	27,390
Foreign	6,144	10,231	12,357	17,269	22,328	24,704	27,571	28,791
Total arriving passengers	**12,646**	**20,262**	**24,156**	**36,414**	**46,910**	**49,853**	**54,315**	**56,181**
Country of embarkation[a]								
Australia	106	227	277	495	581	622	618	613
Bahama Islands	758	1,123	1,503	1,679	1,433	1,487	1,530	1,396
Barbados	76	135	216	228	222	212	203	195
Belgium	144	242	281	417	379	407	589	715
Bermuda	398	497	434	487	426	363	425	407
Brazil	212	300	352	584	1,112	1,176	1,388	1,377
Canada[b]	N	N	N	6,870	7,417	8,501	8,895	9,333
China/Taiwan	50	113	206	325	972	1,017	1,068	1,080
Colombia	173	315	279	286	481	499	586	606
Denmark	222	267	241	313	221	236	252	225
Dominican Republic	336	468	606	948	1,136	1,168	1,168	1,251
France	512	689	955	1,777	2,045	2,178	2,323	2,523
Germany	622	1,175	1,582	2,466	3,125	3,173	3,545	3,558
Grand Cayman	25	121	173	273	314	323	328	370
Greece	121	208	187	132	220	235	186	192
Haiti	91	133	192	233	314	303	289	293
Hong Kong	98	228	270	356	658	668	589	592
Ireland	220	220	274	448	642	721	716	775
Israel	84	189	294	204	412	483	482	502
Italy	431	537	662	792	1,007	1,047	1,097	1,078
Jamaica	457	429	707	975	1,124	1,136	1,162	1,219
Japan	1,095	1,624	2,435	4,528	5,676	6,349	6,736	6,630
Korea, Republic of	105	234	390	826	1,335	1,514	1,625	1,184
Mexico	1,626	2,886	2,719	4,313	4,884	5,591	6,124	6,318
Netherlands	312	427	583	837	1,580	1,774	2,074	2,213
Netherland Antilles	213	327	407	388	339	305	368	382
Panama Republic	97	150	180	153	225	229	227	267
Philippines	108	194	145	246	397	379	410	275
Spain	306	312	419	558	604	618	675	732
Switzerland	236	312	452	616	733	790	910	1,068
United Kingdom	1,549	2,973	3,460	5,166	6,648	7,131	7,935	8,640
Venezuela	205	533	248	458	786	659	709	810
Total	**10,988**	**17,588**	**21,129**	**38,377**	**47,448**	**51,294**	**55,232**	**56,819**

KEY: N = data do not exist

[a] Country where passenger boarded a direct flight to the United States.

[b] Canadian figure represents number of revenue passengers on scheduled commercial and charter flights. Does not include foreign (non-Canadian, non-U.S.) scheduled carriers.

NOTES: Includes passengers on international commercial flights arriving at U.S. airports and travelers between U.S. airports in the 50 states, Puerto Rico, Guam, or the Virgin Islands, and other U.S. territories. Data compiled from flight reports required by the U.S. Immigration and Naturalization Service. Table includes a selected sample of countries of embarkation for passengers arriving in the United States. Because two different data sources are used, the total number of departing passengers may be less than the total for "country of embarkation" listed here.

SOURCES: 1975-90: U.S. Department of Transportation, Research and Special Programs Administration, Volpe National Transportation Systems Center, *U.S. International Air Travel Statistics* (Cambridge, MA: Annual issues), table IIa.

1995: U.S. Department of Commerce, International Trade Administration, *U.S. International Air Passenger Statistics Report, Calendar Year 1995* (Washington, DC: 1996), table IIa.

1996-98: Ibid., *U.S. International Air Travel Statistics Report* (Washington, DC: Annual issues), table IIa. Canada: Statistics Canada, *Air Carrier Traffic at Canadian Airports* (Canada: Annual issues) and personal communication, March 28, 2000.

Table 1-38 Air Passenger Travel Departures from the United States to Selected Foreign Countries (Thousands)

	1975	1980	1985	1990	1995	1996	1997	1998
Flag of carrier								
United States	5,912	9,369	10,696	17,628	22,231	22,901	24,302	24,513
Foreign	6,141	9,886	11,791	16,418	20,795	22,884	25,382	26,350
Total departing passengers	**12,053**	**19,256**	**22,487**	**34,046**	**43,026**	**45,785**	**49,684**	**50,863**
Country of debarkation[a]								
Australia	103	245	232	540	560	614	606	607
Bahama Islands	704	1,006	1,151	1,279	1,024	994	983	955
Barbados	74	126	204	230	217	210	200	196
Belgium	134	231	249	395	340	380	513	622
Bermuda	372	467	389	277	199	196	215	207
Brazil	206	291	322	560	1,024	1,135	1,292	1,297
Canada[b]	N	N	N	6,870	7,405	8,477	8,890	9,381
China/Taiwan	41	90	187	337	891	945	939	934
Colombia	171	299	294	277	461	467	567	588
Denmark	188	254	254	307	229	227	259	217
Dominican Republic	322	443	528	896	995	1,057	1,070	1,108
France	470	635	894	1,626	1,868	2,021	2,147	2,289
Germany	649	1,178	1,539	2,339	2,883	2,978	3,178	3,210
Grand Cayman	26	112	161	250	264	285	290	305
Greece	123	190	210	129	194	206	192	181
Haiti	81	124	169	201	292	288	284	295
Hong Kong	59	152	238	310	640	651	610	621
Ireland	163	212	233	311	409	449	488	554
Israel	105	186	255	259	426	492	499	488
Italy	409	495	660	731	955	1,006	1,055	1,041
Jamaica	416	382	607	888	987	988	1,018	1,018
Japan	1,183	1,602	2,255	4,471	5,452	6,187	6,796	6,487
Korea, Republic of	60	186	333	723	1,252	1,382	1,461	1,032
Mexico	1,525	2,886	2,671	4,136	4,568	5,133	5,613	5,771
Netherlands	304	409	562	777	1,444	1,636	1,920	1,933
Netherland Antilles	184	282	395	377	295	288	319	340
Panama Republic	100	142	209	183	214	221	240	272
Philippines	81	160	165	195	281	275	306	218
Spain	260	273	397	540	573	577	615	669
Switzerland	224	306	434	600	712	760	811	906
United Kingdom	1,446	2,840	3,322	4,903	6,372	6,693	7,475	8,143
Venezuela	198	518	245	444	778	644	698	782
Total	**10,381**	**16,722**	**19,764**	**36,361**	**44,204**	**47,862**	**51,549**	**52,667**

KEY: N = data do not exist

[a] Country where passenger deboarded a direct flight from the United States.

[b] Canadian figure represents number of revenue passengers on scheduled commercial and charter flights. Does not include foreign (non-Canadian, non-U.S.) scheduled carriers.

NOTES: Includes passengers on international commercial flights departing U.S. airports, and Travelers between U.S. ports in the 50 states, Puerto Rico, Guam, or the Virgin Islands, and other U.S. territories. Data compiled from flight reports required by the U.S. Immigration and Naturalization Service. Table includes a selected sample of countries of debarkation for passengers boarding in the United States. Because two different data sources are used, the total number of departing passengers may be less than the total for "country of debarkation" listed here.

SOURCES: 1975-94: U.S. Department of Transportation, Research and Special Programs Administration, Volpe National Transportation Systems Center, *U.S. International Air Travel Statistics* (Cambridge, MA: Annual issues), table IId.

1995: U.S. Department of Commerce, International Trade Administration, *U.S. International Air Passenger Statistics Report, Calendar Year 1995* (Washington, DC: 1996), table IId.

1996-98: Ibid., *U.S. International Air Travel Statistics Report* (Washington, DC: Annual issues), table IId. Canada: Statistics Canada, Air Carrier Traffic at Canadian Airports (Canada: Annual issues) and personal communication, March 28, 2000.

Table 1-39 U.S.-Canadian Border Land-Passenger Gateways: 1999

	Entering the U.S.
All U.S.-Canadian Land Gateways	
All personal vehicles	34,519,136
All personal vehicle passengers	87,691,325
All buses	181,581
All bus passengers	4,805,421
All train passengers	183,728
All pedestrians	586,765
Personal vehicles – top 5 gateways	
Detroit, MI	8,919,145
Buffalo-Niagara Falls, NY	7,441,950
Blaine, WA	3,312,775
Port Huron, MI	2,150,304
Calias, ME	1,427,853
Personal vehicle passengers – top 5 gateways	
Detroit, MI	19,382,235
Buffalo-Niagara Falls, NY	16,531,915
Blaine, WA	8,442,615
Sault Ste. Marie, MI	5,765,704
Port Huron, MI	4,308,549
Buses – top 5 gateways	
Buffalo-Niagara Falls, NY	61,507
Detroit, MI	39,455
Blaine, WA	20,478
Champlain-Rouses Point, NY	9,570
Skagway, AK	8,996
Bus passengers – top 5 gateways	
Buffalo-Niagara Falls, NY	1,795,942
Detroit, MI	624,974
Blaine, WA	469,659
Champlain-Rouses Point, NY	281,021
Skagway, AK	137,717
Train passengers – top 5 gateways	
Buffalo-Niagara Falls, NY	35,305
Blaine, WA	31,496
Port Huron, MI	28,795
Skagway, AK	28,166
Champlain-Rouses Point, NY	25,618
Pedestrians – top 5 gateways	
Buffalo-Niagara Falls, NY	305,775
Calais, ME	51,003
Sumas, WA	35,941
Portland, ME[a]	29,883
International Falls-Ranier, MN	24,733

Continued next column

[a] Gateway is a pedestrian/ferry combination crossing.

NOTE: Data reflect all personal vehicles, buses, passengers and pedestrians entering the United States across the U.S.-Canadian border, regardless of nationality.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, August 2000. Based on the following primary data source: U.S. Department of Treasury, U.S. Customs Service. Office of Field Operations. Operations Management Database. (Washington, DC: 1999).

Table 1-40 U.S.-Mexican Border Land-Passenger Gateways: 1999

	Entering the U.S.
All U.S.-Mexican Land Gateways	
All personal vehicles	89,638,656
All personal vehicle passengers	242,613,249
All buses	295,429
All bus passengers	3,495,414
All train passengers	16,535
All pedestrians	48,186,155
Personal vehicles – top 5 gateways	
El Paso, TX	16,001,926
San Ysidro, CA	15,269,561
Hildago, TX	8,319,581
Brownsville, TX	7,579,231
Laredo, TX	6,894,982
Personal vehicle passengers – top 5 gateways	
El Paso, TX	46,397,134
San Ysidro, CA	33,593,034
Hildago, TX	29,118,835
Calexico, CA	20,372,381
Brownsville, TX	18,948,078
Buses – top 5 gateways	
San Ysidro, CA	108,025
Hildalgo, TX	61,550
Otay Mesa, CA	46,142
Laredo, TX	31,371
Brownsville, TX	12,702
Bus passengers – top 5 gateways	
Hildago, TX	1,384,270
San Ysidro, CA	854,098
Laredo, TX	379,425
Otay Mesa, CA	312,342
Brownsville, TX	145,298
Train passengers – top 5 gateways	
Tecate, CA	7,392
Eagle Pass, TX	5,756
Calexico East, CA	1,743
Nogales, AZ	900
San Ysidro, CA	384
Pedestrians – top 5 gateways	
Calexico, CA	8,099,253
San Ysidro, CA	7,558,174
Laredo, TX	6,674,293
El Paso, TX	5,666,477
Nogales, AZ	4,806,076

Continued next column

NOTE: Data reflect all personal vehicles, buses, passengers and pedestrians entering the United States across the U.S.-Mexican border, regardless of nationality.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, August 2000. Based on the following primary data source: U.S. Department of Treasury, U.S. Customs Service. Office of Field Operations. Operations Management Database. (Washington, DC: 1999).

Table 1-41 U.S. Ton-Miles of Freight (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air carrier, domestic, all services[a]	**553**	**1,353**	**2,709**	**3,470**	**4,528**	**5,156**	**9,064**	**12,520**	**12,861**	**13,601**	**13,756**
Intercity truck	**285,000**	**359,000**	**412,000**	**454,000**	**555,000**	**610,000**	**735,000**	**921,000**	**972,000**	**R996,000**	**1,027,000**
Class I rail[b]	**572,309**	**697,878**	**764,809**	**754,252**	**918,958**	**876,984**	**1,033,969**	**1,305,688**	**1,355,975**	**1,348,926**	**1,376,802**
Domestic water transportation											
Coastwise	U	302,546	359,784	315,846	[d]631,149	610,977	479,134	440,345	408,086	349,843	314,864
Lakewise	U	75,918	79,416	68,517	61,747	48,184	60,930	59,704	58,335	62,166	61,654
Internal	U	109,701	155,816	180,399	227,343	232,708	292,393	306,329	296,791	294,023	294,896
Intraport	U	1,638	1,179	1,222	1,596	1,102	1,087	1,350	1,475	1,378	1,381
Total domestic water transportation[c]	**U**	**489,803**	**596,195**	**565,984**	**921,835**	**892,970**	**833,544**	**807,728**	**764,687**	**707,410**	**672,795**
Oil pipeline	**229,000**	**306,000**	**431,000**	**507,000**	**588,200**	**564,300**	**584,100**	**601,100**	**619,200**	**616,500**	**619,800**
TOTAL	**1,562,000**	**1,854,000**	**2,207,000**	**2,285,000**	**R2,989,000**	**2,949,000**	**3,196,000**	**3,648,000**	**3,725,000**	**R3,682,000**	**3,710,000**

KEY: R = revised; U = data are not available

[a] Includes freight, express, and mail revenue ton-miles as reported on U.S. DOT Form 41.

[b] Revenue ton-miles.

[c] Excludes intraterritorial traffic, for which ton-miles were not compiled.

[d] Reflects startup between 1975 and 1980 of Alaska pipeline and consequent water transportation of crude petroleum from Alaskan ports to mainland United States for refining.

NOTE: Domestic water transportation numbers may not add to totals due to rounding.

SOURCES:

Air carrier, domestic, all services: 1960-65: Civil Aeronautics Board, *Handbook of Airline Statistics, 1969* (Washington, DC: 1970).

1970-80: Ibid., A*ir Carrier Traffic Statistics* (Washington, DC: Annual issues), p. 2, line 3.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual issues), p. 2, line 3.

Intercity truck: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1999), p. 44.

Class I rail: 1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: 1999), p. 27.

Domestic water transportation: 1965-98: U.S. Army Corps of Engineers, *Waterborne Commerce of the U.S.* (New Orleans, LA: Annual issues), part 5, section 1, table 1-4, and similar tables in earlier editions.

Oil pipeline: 1960-70: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 44.

1975: Association of Oil Pipe Lines, *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 4.

1980-98: Ibid., S*hifts in Petroleum Transportation* (Washington, DC: Annual issues), table 1.

Table 1-42 Average Length of Haul, Domestic Freight and Passenger Modes (Miles)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Freight											
Air carrier	953	943	1,014	1,082	1,052	1,157	1,389	R1,069	R1,075	903	890
Truck[a]	272	259	263	286	363	366	391	416	R426	435	444
Class I rail	461	503	515	541	616	665	726	843	842	851	835
Water											
Coastwise	1,496	1,501	1,509	1,362	1,915	1,972	1,604	1,652	1,526	1,330	1,261
Lakewise	522	494	506	530	536	524	553	514	508	R507	505
Internal	282	297	330	358	405	435	R470	494	477	R466	472
Intraport	U	U	U	16	17	15	13	16	17	15	15
Oil pipeline											
Crude	325	320	300	633	871	777	805	R747	R779	713	689
Petroleum products	269	335	357	516	414	391	389	R393	R393	393	393
Passenger											
Air carrier, domestic, scheduled	583	614	678	698	736	758	803	791	802	R817	813
Bus, intercity	79	94	106	113	125	121	141	140	143	144	144
Commuter rail	21	21	22	23	23	24	22	R24	24	23	U
Amtrak[b]	N	N	N	236	216	231	273	268	257	256	252

KEY: N = data do not exist; R = revised; U = data are not available

[a] Total Class I and Class II motor carriers of freight (less-than-truckload, specialized carrier for truckload, and others).

[b] Amtrak began operations in 1971. Data are reported for fiscal years.

NOTES: Average length of haul for freight is calculated by dividing ton-miles in the previous table by estimates of tonnage from the various data sources. The calculation of average length of haul for passenger trips varies by mode: for air carrier it is calculated by dividing revenue passenger-miles by revenue passenger enplanements; for commuter rail, intercity bus, and Amtrak it is calculated by dividing passenger-miles by number of passengers.

SOURCES:

Freight:

Air carrier, truck: Eno Transportation Foundation, Inc., T*ransportation In America, 1999* (Washington, DC: 1999), p. 71.

Class I rail: Association of American Railroads, *Railroad Facts* (Washington, DC: 1999), p. 36.

Water: U.S. Army Corps of Engineers, *Waterborne Commerce of the United States, Part 5* (New Orleans, LA: Annual issues), section 1, Table 1-4.

Oil pipeline: 1960-70: Transportation Policy Associates, Washington, DC, personal communication.

1975-98: Eno Transportation Foundation, Inc., T*ransportation in America, 1999* (Washington, DC: 1999), p. 71.

Passenger:

Air carrier: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual issues).

Intercity bus and commuter rail: Eno Transportation Foundation, Inc., *Transportation in America, 1999* (Washington, DC: 1999), p. 70.

Amtrak: 1970-85: Amtrak, corporate communication, Jan. 26, 1999.

1990-98: Amtrak, *Amtrak Annual Report* (Washington, DC: 1999), Statistical Appendix, p. III.

Table 1-43 Top U.S. Foreign Trade Freight Gateways by Value of Shipments: 1998 (1998 $ billions)

	Rank	Exports	Imports	Total
JFK International Airport, (a)	1	44.4	60.6	105.0
Port of Detroit, MI (l)	2	48.5	44.1	92.6
Port of Long Beach, CA (w)	3	14.3	75.2	89.5
Port of Los Angeles, CA (w)	4	14.1	69.1	83.2
Port of New York, NY and NJ (w)	5	17.9	54.2	72.1
San Francisco Airport, CA (a)	6	32.1	39.8	71.9
Port of Buffalo-Niagra Falls, NY (l)	7	35.2	35.6	70.8
Los Angeles International Airport, CA (a)	8	35.9	31.3	67.2
Port of Laredo, TX (l)	9	29.8	34.9	64.7
Port of Huron, MI (l)	10	17.3	32.4	49.7
Chicago, IL (a)	11	18.1	21.5	39.6
Port of Houston, TX (w)	12	16.6	17.3	33.9
Port of El Paso, TX (l)	13	13.8	19.0	32.8
Port of Seattle, WA (w)	14	5.5	26.2	31.7
Port of Charleston, SC (w)	15	11.2	18.3	29.5
Port of Oakland, CA (w)	16	10.1	14.9	25.0
Port of Norfolk Harbor, VA (w)	17	11.4	13.3	24.7
New Orleans, LA. (a)	18	10.4	12.8	23.2
Miami International Airport, FL (a)	19	15.1	8.0	23.1
Anchorage, AK (a)	20	6.3	15.4	21.7
Port of Baltimore, MD (w)	21	5.3	14.1	19.4
Cleveland, OH (a)	22	8.1	9.3	17.4
Port of Tacoma, WA (w)	23	3.8	13.1	16.9
Port of Otay Mesa Station, CA (l)	24	6.2	9.5	15.7
Port of Miami, FL (w)	25	7.1	8.4	15.5
Port of Champlain-Rouses Pt., NY (l)	26	5.7	9.5	15.2
Dallas-Fort Worth, TX (a)	27	6.2	7.8	14.0
Atlanta, GA (a)	28	6.8	7.1	13.9
Port of New Orleans, LA (w)	29	5.6	8.2	13.8
Port of Savannah, GA (w)	30	5.1	8.4	13.5
Port of Blaine, WA (l)	31	5.3	6.4	11.7
Newark N.J. (a)	32	5.1	5.8	10.9
Port of Port Everglades, FL (w)	33	4.8	5.7	10.5
Port of Nogales, AZ (l)	34	4.2	6.4	10.6
Port of Brownsville-Cameron, TX (l)	35	5.6	4.9	10.5

KEY: a = air; l = land; w = water

Continued next page

Table 1-43 Cont'd
Top U.S. Foreign Trade Freight Gateways by Value of Shipments: 1998
(1998 $ billions)

	Rank	Exports	Imports	Total
Port of South Louisiana, LA, Port of (w)	36	7.7	2.8	10.5
Port of Alexandria Bay, NY (l)	37	4.0	6.0	10.0
Port of Jacksonville, FL (w)	38	1.9	7.9	9.8
Port of Hildago, TX (l)	39	4.5	5.1	9.6
Port of Portland, OR (w)	40	2.7	6.8	9.5
Boston Logan Airport, MA (a)	41	5.6	3.7	9.3
Seattle-Tacoma International Airport, WA (a)	42	3.3	5.3	8.6
Port of Calexico-East, CA (l)	43	3.4	4.3	7.7
Port of Highgate Springs-Alburg, VT (l)	44	3.0	4.6	7.6
Port of Pembina, ND (l)	45	3.7	3.8	7.5
Port of Eagle Pass, TX (l)	46	3.6	3.5	7.1
Port of Corpus Christi, TX (w)	47	1.5	4.9	6.4
Port of Sweetgrass, MT (l)	48	2.8	3.4	6.2
Port of Beaumont, TX (w)	49	0.6	5.6	6.2
Port of Philadelphia, PA (w)	50	0.5	5.4	5.9
Total top 50 gateways		**541.7**	**841.6**	**1383.3**

KEY: a = air; l = land; w = water

NOTES:

All data: Trade levels reflect the mode of transportation as a shipment enters or exits at a border port. Flows through individual ports are based on reported data collected from U.S. trade documents. Trade does not include low-value shipments. (In general, these are imports valued at less than $1,250 and exports that are valued at less than $2,500).

Air data: Data for all air gateways include a low level (generally less than 2%-3% of the total value) of small user-fee airports located in the same region. Air gateways not identified by airport name (e.g., Chicago, IL, and others) include major airport(s) in that geographic area in addition to small regional airports. In addition, due to Bureau of Census confidentiality regulations, data for courier operations are included in the airport totals for JFK International Airport, New Orleans, Los Angeles, Cleveland, Chicago, Miami, and Anchorage.

Numbers may not add to totals due to rounding.

SOURCES:

(a) Air: U.S. Department of Commerce, Bureau of the Census, Foreign Trade Division, special tabulation, November 2000 .

(w) Water: U.S. Department of Transportation, Maritime Administration, Office of Statistical and Economic Analysis, U.S. Waterborne Exports and General Imports, Annual 1998 (Washington, DC: July 2000), and personal communication, December 20, 2000.

(l) Land: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 2000.

Table 1-44 U.S.-Canadian Border, Land Freight Gateways: 1999 (Number of Truck or Railcar Crossings)

Port Name	
Truck	
US-Canadian Border, Total	**6,809,270**
Detroit, MI	1,758,752
Buffalo-Niagara Falls, NY	1,187,707
Port Huron, MI	791,203
Blaine, WA	491,885
Champlain-Rouses Point, NY	398,385
Rail (number of full and empty railcars)	
US-Canadian Border, Total	**1,475,131**
Port Huron, MI	337,519
Detroit, MI	262,084
International Falls, MN	181,457
Buffalo-Niagara Falls, NY	159,647
Portal, ND	129,671

NOTES:

Truck: Data represent the number of truck crossings, not the number of unique vehicles. Data are for both loaded and empty trucks.

Rail: Data includes both loaded and unloaded railcars.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, August 2000. Based on the following primary data source: U.S. Department of Treasury, U.S. Customs Service, Office of Field Operations, Operations Management Database, special tabulation (Washington, DC: 1999).

Table 1-45 U.S.-Mexican Border, Land Freight Gateways: 1999 (Number of Truck or Railcar Crossings)

Port Name	
Truck	
US-Mexican Border, Total	**4,267,259**
Laredo, TX	1,486,489
El Paso, TX	673,003
Otay Mesa/San Ysidro, CA	545,724
Hildago, TX	325,225
Brownsville, TX	303,540
Rail (number of full and empty railcars)	
US-Mexican Border, Total	**496,671**
Laredo, TX	213,653
Brownsville, TX	119,590
Eagle Pass, TX	90,470
Nogales, AZ	33,692
El-Paso, TX	32,683

NOTES:

Truck: Data represent the number of truck crossings, not the number of unique vehicles. Data are for both loaded and empty trucks.

Rail: Data includes both loaded and unloaded rail cars.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, special tabulation, August 2000. Based on the following primary data source: U.S. Department of Treasury, U.S. Customs Service, Office of Field Operations, Operations Management Database, special tabulation (Washington, DC: 1999).

Table 1-46 U.S. Waterborne Freight (Million short tons)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Foreign	339.3	443.7	581.0	748.7	921.4	774.3	1,041.6	1,147.4	1,183.4	1,220.6	1,245.4
Imports	211.3	269.8	339.3	476.6	517.5	412.7	600.0	672.7	732.6	788.3	840.7
Exports	128.0	173.9	241.6	272.1	403.9	361.6	441.6	474.7	450.8	432.3	404.7
Domestic	760.6	829.2	950.7	946.3	1,077.5	1,014.1	1,122.3	1,093.0	1,100.7	1,112.5	1,094.1
Inland	291.1	369.6	472.1	503.9	535.0	534.7	622.6	620.3	622.1	630.6	625.0
Coastal	209.2	201.5	238.4	231.9	329.6	309.8	298.6	266.6	267.4	263.1	249.6
Great Lakes	155.1	153.7	157.1	129.3	115.1	92.0	110.2	116.1	114.9	122.7	122.2
Intraport	104.2	102.9	81.5	78.3	94.2	74.3	86.4	83.1	89.0	89.8	90.1
Intraterritory	1.0	1.5	1.6	2.9	3.6	3.4	4.5	6.9	7.3	6.3	7.2
Total	**1,099.9**	**1,272.9**	**1,531.7**	**1,695.0**	**1,998.9**	**1,788.4**	**2,163.9**	**2,240.4**	**2,284.1**	**2,333.1**	**2,339.5**

NOTE: Beginning in 1996, shipments of fish are excluded from domestic tonnage totals.

SOURCE: U.S. Army Corps of Engineers, *Waterborne Commerce of the United States* (New Orleans, LA: March 2000). Part 5, section 1.

Table 1-47 Tonnage of Top 50 U.S. Water Ports, Ranked by Total Tons[a] (Millions)

	1999		1990		% change
	Rank	Total tons	Rank	Total tons	1990-99
South Louisiana, LA	1	214.2	1	194.2	10.3
Houston, TX	2	158.8	3	126.2	25.9
New York, NY and NJ	3	133.7	2	140.0	-4.5
New Orleans, LA	4	87.5	6	62.7	39.5
Corpus Christi, TX	5	78.1	7	62.0	25.9
Beaumont, TX	6	69.5	23	26.7	160.0
Baton Rouge, LA	7	63.7	5	78.1	-18.5
Plaquemine, LA	8	62.4	8	56.6	10.3
Long Beach, CA	9	60.9	10	52.4	16.2
Valdez, AK	10	53.4	4	96.0	-44.3
Pittsburgh, PA	11	52.9	19	35.5	49.0
Tampa, FL	12	51.5	11	51.6	-0.2
Lake Charles, LA	13	50.8	16	40.9	24.3
Texas City, TX	14	49.5	12	48.1	3.0
Mobile, AL	15	45.5	15	41.1	10.6
Duluth-Superior, MN and WI	16	42.3	17	40.8	3.8
Los Angeles, CA	17	42.3	13	46.4	-8.7
Norfolk Harbor, VA	18	40.8	9	53.7	-24.1
Philadelphia, PA	19	39.3	14	41.8	-6.0
Baltimore, MD	20	37.3	18	39.5	-5.7
St. Louis, MO and IL	21	32.7	22	27.1	20.6
Portland, OR	22	29.3	21	27.5	6.6
Pascagoula, MS	23	28.1	24	26.5	6.1
Freeport, TX	24	28.1	40	14.5	93.9
Paulsboro, NJ	25	26.9	27	23.3	15.3
Chicago, IL	26	26.0	28	22.5	15.3
Huntington, WV	27	24.7	34	17.3	42.7
Seattle, WA	27	25.5	30	21.6	18.2
Richmond, CA	28	22.4	32	21.2	5.9
Boston, MA	30	22.1	29	21.9	0.9

Continued next page

Table 1-47 Cont'd Tonnage of Top 50 U.S. Water Ports, Ranked by Total Tons[a] (Millions)

	1999		1990		% change
	Rank	Total tons	Rank	Total tons	1990-99
Port Everglades, FL	31	22.1	42	14.1	56.2
Tacoma, WA	32	21.1	31	21.4	-1.6
Portland, ME	33	20.4	51	10.8	89.4
Charleston, SC	34	19.9	54	9.7	105.2
Marcus Hook, PA	35	19.3	25	25.9	-25.4
Jacksonville, FL	36	19.3	36	15.1	27.6
Port Arthur, TX	37	18.3	20	30.7	-40.4
Savannah, GA	38	18.2	44	13.6	34.1
Detroit, MI	39	16.9	33	17.7	-4.7
Memphis, TN	40	16.6	47	12.4	34.3
San Juan, PR	42	15.6	39	14.5	7.3
Cleveland, OH	43	15.5	41	14.4	7.9
Indiana Harbor, IN	44	15.1	37	14.7	2.9
Newport News, VA	45	14.3	26	24.9	-42.7
Cincinnati, OH	46	14.3	46	12.6	13.3
Lorain, OH	47	13.0	43	14.0	-6.9
Toledo, OH	48	12.3	38	14.7	-16.1
Honolulu, HI	49	12.2	50	11.3	7.6
Two Harbors, MN	50	11.9	48	12.3	-3.3
Total top 50		**2,016.5**		**1,862.5**	**8.3**
All ports		**2,326.9**		**2,163.9**	**7.5**

[a] Tonnage totals include both domestic and foreign waterborne trade.

NOTE: In 1990, Grays Harbor, Washington, ranked 45th (12.8) and Anacortes, Washington, ranked 35th (15.4).

SOURCES: 1990: U.S. Army Corps of Engineers, *Waterborne Commerce of the United States, Calendar Year 1990, Part 5, National Summaries* (New Orleans, LA :1993), table 5-2.

1999: Ibid., *Waterborne Commerce of the United States, Calendar Year 1998, Part 5, National Summaries* (New Orleans, LA :2000), tables 1-1 and 5-2.

Table 1-48 Growth of Freight Activity in the United States: Comparison of the 1997 and 1993 Commodity Flow Surveys

Mode of Transportation	Value			Tons			Ton-Miles		
	1997 (billion $ 1997)	1993 (billion $ 1997)	Percent change	1997 (millions)	1993 (millions)	Percent change	1997 (billions)	1993 (billions)	Percent change
All modes	**6,944.0**	**6,360.8**	**9.2**	**11,089.7**	**9,688.5**	**14.5**	**2,661.4**	**2,420.9**	**9.9**
Single Modes	**5,719.6**	**5,376.3**	**6.4**	**10,436.5**	**8,922.3**	**17.0**	**2,383.5**	**2,136.9**	**11.5**
Truck[a]	4,981.5	4,791.0	4.0	7,700.7	6,385.9	20.6	1,023.5	869.5	17.7
For-hire truck	2,901.3	2,856.1	1.6	3,402.6	2,808.3	21.2	741.1	629.0	17.8
Private truck[b]	2,036.5	1,910.4	6.6	4,137.3	3,543.5	16.8	268.6	235.9	13.9
Rail	319.6	269.2	18.7	1,549.8	1,544.1	0.4	1,022.5	942.6	8.5
Water	75.8	67.1	13.1	563.4	505.4	11.5	261.7	272.0	-3.8
Shallow draft	53.9	44.3	21.7	414.8	362.5	14.4	189.3	164.4	15.2
Great Lakes	1.5	1.3	15.4	38.4	33.0	16.4	13.4	12.4	8.2
Deep draft	20.4	21.5	-4.9	110.2	109.9	0.2	59.0	95.2	-38.0
Air (includes truck and air)	229.1	151.3	51.4	4.5	3.1	42.6	6.2	4.0	55.5
Pipeline[c]	113.5	97.8	16.1	618.2	483.6	27.8	S	S	S
Multiple Modes	**945.9**	**720.9**	**31.2**	**216.7**	**225.7**	**-4.0**	**204.5**	**191.5**	**6.8**
Parcel, U.S. Postal Service or courier	855.9	612.8	39.7	23.7	18.9	25.4	18.0	13.2	36.8
Truck and rail	75.7	90.4	-16.3	54.2	40.6	33.5	55.6	37.7	47.5
Truck and water	8.2	10.2	-19.4	33.2	68.0	-51.2	34.8	40.6	-14.4
Rail and water	1.8	4.0	-55.2	79.3	79.2	0.1	77.6	70.2	10.5
Other multiple modes	4.3	3.5	22.0	26.2	18.9	38.6	18.6	S	S
Other/unknown modes	**278.6**	**263.6**	**5.7**	**436.5**	**540.5**	**-19.2**	**73.4**	**92.6**	**-20.7**
All modes	**6,944.0**	**6,360.8**	**9.2**	**11,089.7**	**9,688.5**	**14.5**	**2,661.4**	**2,420.9**	**9.9**

[a] Truck as a single mode includes shipments that went by private truck only, for-hire truck only, or a combination of both.

[b] Private truck refers to a truck operated by a temporary or permanent employee of an establishment or the buyer/receiver of the shipment.

[c] Excludes most shipments of crude oil.

NOTE: Numbers and percents may not add to totals due to rounding.

Key: S = Data are not published because of high sampling variability or other reasons

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and U.S. Department of Commerce, Census Bureau 1997 Economic Census, *Transportation, 1997 Commodity Flow Survey* (Washington, DC: December 1999), table 1b; the Bureau of Transportation Statistics converted the value of 1993 commodities from 1993 current dollars to 1997 constant dollars using Bureau of Economic Analysis' chain-type price deflators.

Table 1-49 Value, Tons, and Ton-Miles of Freight Shipments within the United States by Domestic Establishments, 1997

SCTG	Commodity description	Value ($billions)	Tons (millions)	Ton-miles (billions)	Value per Ton ($)	Average Miles per Shipment
01	Live animals and live fish	6.2	5.9	1.5	1,042	272
02	Cereal grains	59.6	489.7	200.6	122	125
03	Other agricultural products	102.3	201.7	80.8	508	438
04	Animal feed and products of animal origin (NEC)	66.8	219.7	46.8	304	79
05	Meat, fish, seafood, and their preparations	183.8	79.5	36.4	2,312	137
06	Milled grain products and preparations, and bakery products	109.9	102.7	48.5	1,069	122
07	Other prepared foodstuffs and fats and oils	346.4	396.9	124.1	873	127
08	Alcoholic beverages	87.9	81.1	27.8	1,085	58
09	Tobacco products	56.4	4.1	1.0	13,661	296
10	Monumental or building stone	2.7	15.9	1.5	172	115
11	Natural sands	4.3	442.5	25.5	10	46
12	Gravel and crushed stone	11.5	1,814.8	92.9	6	36
13	Nonmetallic minerals (NEC)	11.3	235.7	52.2	48	174
14	Metallic ores and concentrates	12.6	90.7	47.7	139	303
15	Coal	25.5	1,217.0	542.3	21	81
17	Gasoline and aviation turbine fuel	217.1	962.8	136.6	225	45
18	Fuel oils	94.3	481.7	51.2	196	28
19	Coal and petroleum products (NEC)	74.9	475.1	81.9	158	85
20	Basic chemicals	159.6	296.1	136.8	539	332
21	Pharmaceutical products	224.4	9.9	5.6	22,678	692
22	Fertitizers	27.3	179.1	43.6	153	116
23	Chemical products and preparations (NEC)	209.5	92.0	45.0	2,276	333
24	Plastics and rubber	278.8	130.4	69.1	2,138	451
25	Logs and other wood in the rough	15.1	370.7	28.1	41	85
26	Wood products	126.4	329.1	96.9	384	287
27	Pulp, newsprint, paper, and paperboard	106.6	152.3	83.7	700	194
28	Paper or paperboard articles	98.3	73.5	22.0	1,338	307
29	Printed products	260.3	78.1	22.8	3,335	431
30	Textiles, leather, and articles of textiles or leather	379.2	45.9	24.7	8,266	912
31	Nonmetallic mineral products	109.2	910.1	91.4	120	401
32	Base metal in primary or semifinished forms and in finished basic shapes	285.7	335.9	117.5	851	276
33	Articles of base metal	227.2	106.5	48.7	2,133	403
34	Machinery	417.1	49.9	27.0	8,356	356
35	Electronic and other electrical equipment and components and office equipment	869.7	39.6	27.1	21,955	640

KEY: NEC = not elsewhere classified; SCTG = Standard Classification of Transportation Goods

Continued next page

Table 1-49 Cont'd
Value, Tons, and Ton-Miles of Freight Shipments within the United States by Domestic Establishments, 1997

SCTG	Commodity description	Value ($billions)	Tons (millions)	Ton-miles (billions)	Value per Ton ($)	Average Miles per Shipment
36	Motorized and other vehicles (including parts)	571.0	98.1	45.9	5,822	278
37	Transportation equipment (NEC)	129.2	5.5	3.8	23,587	796
38	Precision instruments and apparatus	157.9	2.9	2.2	53,741	840
39	Furniture, mattresses and mattress supports, lamps, lighting fittings, and illuminated signs	97.3	19.9	11.6	4,885	625
40	Miscellaneous manufactured products	420.9	112.5	39.9	3,741	860
41	Waste and scrap	32.7	177.8	40.1	184	164
43	Mixed freight	230.4	110.3	17.2	2,090	252
	Commodity unknown	36.5	46.2	11.8	791	499

KEY: NEC = not elsewhere classified; SCTG = Standard Classification of Transportation Goods

NOTE: The 1997 Commodity Flow Survey data reported in this table are based on SCTG code, which differs from the code used in the 1993 CFS. Therefore, data in this table are not directly comparable to the 1993 data reported in the 1998 edition of this report.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, U.S. Department of Commerce, Census Bureau, 1997 Economic Census, Transportation, *1997 Commodity Flow Survey* (Washington, DC: December 1999), table 7.

Table 1-50 Value of U.S. Land Exports to and Imports from Canada and Mexico by Mode ($ millions)

	1994	1995	1996	1997	1998	1999
Exports to Canada						
Truck	R89,151.1	97,423.4	102,743.0	111,173.8	114,806.1	123,140.0
Rail	R13,593.9	15,271.9	R15,678.7	13,255.6	12,279.6	11,754.6
Pipeline	R133.8	R121.3	162.2	180.6	93.4	113.9
Other[a]	R21,753.2	17,010.5	R20,467.5	9,336.1	10,559.5	11,360.0
Mail	R69.3	R57.0	R58.3	24.1	6.8	5.6
Total	**R124,701.3**	**R129,884.1**	**R139,109.7**	**R133,970.2**	**137,745.4**	**146,374.1**
To Mexico						
Truck	R39,066.5	35,914.2	R44,091.8	55,592.6	60,432.1	66,923.8
Rail	4,192.0	4,694.4	5,119.2	5,648.0	6,188.8	5,710.6
Pipeline	0.4	1.0	2.3	68.3	73.4	144.2
Other[a]	3,238.9	2,025.8	R2,540.1	2,860.5	3,470.0	3,349.6
Mail[b]	R5.5	26.8	—	0.1	0.1	0.7
Total	**R46,503.3**	**R42,662.2**	**51,753.4**	**64,169.5**	**70,164.4**	**76,129.0**
Imports from Canada						
Truck	R79,456.4	88,964.9	R98,400.8	99,814.8	108,856.7	118,901.4
Rail	R30,322.8	39,996.9	R39,811.0	38,293.0	37,374.1	46,255.4
Pipeline	R9,728.6	10,606.6	12,796.2	13,879.5	11,120.1	12,055.5
Other[a]	R3,991.6	3,888.2	R4,968.4	3,572.5	4,575.1	6,386.9
Mail	R5.5	5.2	R6.9	0.4	1.7	13.1
FTZ[c]	U	207.6	223.4	122.4	177.9	111.2
Total	**123,504.9**	**R143,669.4**	**R156,206.7**	**155,682.6**	**162,105.7**	**183,723.5**
From Mexico						
Truck	35,013.9	43,014.3	R48,350.0	56,716.5	65,883.7	76,448.0
Rail	7,769.0	R9137.9	12,297.7	12,646.9	12,029.7	14,693
Pipeline	187.9	R27.4	8.1	3.6	2.4	1.5
Other[a]	643.5	R768.9	639.2	668.2	917.8	1,255.8
Mail	1.9	R1.3	1.5	0.2	0.2	0.2
FTZ[c]	U	1,099.2	2,015.6	2,119.6	2,886.7	2,624.4
Total	**43,616.2**	**R54,049.0**	**R63,312.1**	**72,155.0**	**81,720.3**	**95,023.4**

KEY: — = value too small to report; R = revised; U = data are not available

[a] Other includes "flyaway aircraft" or aircraft moving under their own power (i.e., aircraft moving from the manufacturer to a customer and not carrying any freight), powerhouse (electricity), vessels moving under their own power, pedestrians carrying freight, and unknown and miscellaneous.

[b] Beginning in January 1996, new edit checks were added to the processing of the Transborder Surface Freight Data. Because of these checks, the number of mail export shipments from the United States to Mexico declined sharply between 1995 and 1996. The Census Bureau found that a number of rail shipments were misidentified as mail shipments in 1994 and 1995, although the exact proportion of these is unknown.

[c] Foreign Trade Zones (FTZs) were added as a mode of transport for land import shipments beginning in April 1995. Although FTZs are being treated as a mode of transportation in the Transborder Surface Freight Data, the actual mode for a specific shipment into or out of an FTZ is unknown because U.S. Customs does not collect this information.

NOTES: Shipments that neither originate nor terminate in the United States (i.e., in transit, in-bond shipments) are not included here, although they use the U.S. transportation system. These shipments are usually part of Mexico-Canada trade, and simply pass through the United States. Transshipments, however, are included between 1994, 1995, and 1996; these are shipments that entered or exited the United States by way of a Customs port on the northern or southern border, but whose origin or destination was a country other than Canada or Mexico. Starting in 1997, transshipments are excluded. Users should note these differences before comparing figures for 1994-96 with 1997 and subsequent year data. Data exclude export shipments valued at less than $2,500 and import shipments valued at less than $1,250.

Individual modal totals may not sum to exact export or import totals due to rounding.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, available at www.bts.gov/transborder, 2000.

Table 1-51 Crude Oil and Petroleum Products Transported in the United States by Mode

	1975	1980	1985	1990	1995	1996	1997	1998
Crude Oil Ton-miles (billions)								
Pipelines[a]	288.0	362.6	334.4	334.8	335.9	338.3	337.4	334.1
Water carriers	40.6	[c]387.4	449.2	291.2	247.7	202.4	147.3	117.9
Motor carriers[b]	1.4	2.5	1.8	1.5	1.7	1.7	1.7	1.6
Railroads	1.5	0.5	0.8	0.7	0.8	0.8	0.5	0.5
Total	**331.5**	**753.0**	**786.2**	**628.2**	**586.0**	**543.2**	**486.9**	**454.1**
% of total								
Pipelines[a]	86.9	48.2	42.5	53.3	57.3	62.3	69.3	73.6
Water carriers	12.2	51.4	57.2	46.4	42.3	37.3	30.3	26.0
Motor carriers[b]	0.4	0.3	0.2	0.2	0.3	0.3	0.3	0.3
Railroads	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Refined Petroleum Products Ton-miles (billions)								
Pipelines[a]	219.0	225.6	229.9	249.3	265.2	280.9	279.1	285.7
Water carriers	257.4	230.4	141.2	157.8	153.2	154.1	148.3	147.1
Motor carriers[b]	26.2	24.3	26.9	28.2	24.6	28.0	26.0	26.7
Railroads	12.6	12.0	11.3	13.3	15.9	16.0	16.2	16.2
Total	**515.2**	**492.3**	**409.3**	**448.6**	**458.9**	**479.0**	**469.6**	**475.7**
% of total								
Pipelines[a]	66.1	30.0	29.2	39.7	45.3	51.7	57.3	62.9
Water carriers	77.6	30.6	18.0	25.1	26.1	28.4	30.5	31.0
Motor carriers[b]	7.9	5.0	3.4	4.5	5.3	5.9	5.3	5.9
Railroads	3.8	1.6	2.7	2.1	2.7	2.9	3.5	3.4
Combined Crude and Petroleum Products Ton-miles (billions)								
Pipelines[a]	507.0	588.2	564.3	584.1	601.1	619.2	616.5	619.8
Water carriers	298.0	[c]617.8	590.4	449.0	400.9	356.5	295.6	265.0
Motor carriers[b]	27.6	26.8	28.7	29.7	26.3	29.7	27.7	28.3
Railroads	14.1	12.5	12.1	14.0	16.6	16.8	16.7	16.7
Total	**846.7**	**1,245.3**	**1,195.5**	**1,076.8**	**1,044.9**	**1,022.2**	**956.5**	**929.8**
% of total								
Pipelines[a]	59.9	47.2	47.2	54.2	57.5	60.6	64.5	66.7
Water carriers	35.2	49.6	49.4	41.7	38.4	34.9	30.9	28.5
Motor carriers[b]	3.3	2.2	2.4	2.8	2.5	2.9	2.9	3.0
Railroads	1.7	1.0	1.0	1.3	1.6	1.6	1.8	1.8

[a] The amount carried by pipeline is based on ton-miles of crude and petroleum products for federally regulated pipelines (84%), plus an estimated breakdown of crude and petroleum products for the ton-miles for pipelines not federally regulated (16%).

[b] The amount carried by motor carriers is estimated.

[c] Reflects the entrance between 1975 and 1980 of the Alaska pipeline, moving crude petroleum for water transportation to U.S. refineries.

SOURCES: 1975: Association of Oil Pipe Lines, *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 6.

1980-98: Ibid., *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 3.

Table 1-52 U.S. Hazardous Materials Shipments by Mode of Transportation, 1997

Mode of Transportation	Value ($ million)	Percent	Tons (thousands)	Percent	Ton-miles (millions)	Percent
Single modes	**452.7**	**97.1**	**1,541.7**	**98.5**	**258.9**	**98.1**
Truck[a]	298.2	63.9	869.8	55.6	74.9	28.4
For-hire	134.3	28.8	336.4	21.5	45.2	17.1
Private[b]	160.7	34.5	522.7	33.4	28.8	10.9
Rail	33.3	7.1	96.6	6.2	74.7	28.3
Water	27.0	5.8	143.2	9.1	68.2	25.9
Air	8.6	1.8	0.1	–	0.1	–
Pipeline[c]	85.7	18.4	432.1	27.6	S	S
Multiple modes	**5.7**	**1.2**	**6.0**	**0.4**	**3.1**	**1.2**
Parcel, U.S. Postal Service or Courier	2.9	0.6	0.1	–	0.1	–
Other	2.9	0.6	5.9	0.4	3.0	1.1
Unknown and other modes	**7.9**	**1.7**	**17.5**	**1.1**	**1.8**	**0.7**
All modes	**466.4**	**100.0**	**1,565.2**	**100.0**	**263.8**	**100.0**

[a] Truck as a single mode includes shipments that went by private truck only, for-hire truck only, or a combination of both.

[b] Private truck refers to a truck operated by a temporary or permanent employee of an establishment or the buyer/receiver of the shipment.

[c] Excludes most shipments of crude oil. See previous table for the estimated amount of crude oil and petroleum products transported in the United States.

NOTE: Numbers and percents may not add to totals due to rounding.

KEY: S = data are not published because of high sampling variability or other reasons; – less than 1 unit of measure or equal to zero

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, U.S. Department of Commerce, Census Bureau, 1997 Economic Census *1997 Commodity Flow Survey, Hazardous Materials* (Washington, DC: December 1999), table 1.

Table 1-53 U.S. Hazardous Materials Shipments by Hazard Class, 1997

Hazard Class and Description	Value ($ billion)	Percent	Tons (thousands)	Percent	Ton-miles (millions)	Percent	Average miles per shipment
Class 1. Explosives	4.3	0.9	1.5	0.1	S	S	549
Class 2. Gases	40.9	8.8	115.0	7.3	21.8	8.3	66
Class 3. Flammable liquids	335.6	72.0	1,264.3	80.8	160.0	60.6	73
Class 4. Flammable solids	3.9	0.8	11.8	0.8	9.6	3.6	838
Class 5. Oxidizers and organic peroxides	4.5	1.0	9.2	0.6	4.5	1.7	193
Class 6. Toxics (poison)	10.1	2.2	6.4	0.4	2.8	1.1	402
Class 7. Radioactive materials	2.7	0.6	0.9	0.1	–	–	445
Class 8. Corrosive materials	40.4	8.7	91.6	5.9	41.2	15.6	201
Class 9. Miscellaneous dangerous goods	23.9	5.1	65.3	4.2	22.7	8.6	323
Total	**466.4**	**100.0**	**1,565.2**	**100.0**	**263.8**	**100.0**	**113**

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and U.S. Department of Commerce, Census Bureau, 1997 Economic Census, *1997 Commodity Flow Survey, Hazardous Materials* (Washington, DC: December 1999), table 2.

KEY: S = data were not published because of high sampling variability or other reasons; – less than 1 unit of measure or equal to zero

Table 1-54 Worldwide Commercial Space Launches

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total	1990-99
United States												
Athena	0	0	0	0	0	1	0	0	0	3		4
Atlas	0	2	3	1	3	5	6	6	3	3		32
Conestoga	0	0	0	0	0	1	0	0	0	0		1
Delta	4	4	3	1	1	1	2	7	11	5		39
Pegasus	0	0	0	1	0	0	0	3	3	1		8
Taurus	0	0	0	0	0	0	0	0	0	1		1
Titan	3	0	0	0	0	0	0	0	0	0		3
Total	**7**	**6**	**6**	**3**	**4**	**8**	**8**	**16**	**17**	**13**		**88**
Europe												
Ariane 4	5	6	6	6	8	8	9	11	9	8		76
Total	**5**	**6**	**6**	**6**	**8**	**8**	**9**	**11**	**9**	**8**		**76**
Russia												
Cosmos	0	0	0	0	0	0	0	0	0	1		1
Dnepr	0	0	0	0	0	0	0	0	0	1		1
Proton	0	0	0	0	0	0	2	6	4	5		17
Shtil	0	0	0	0	0	0	0	0	1	0		1
Soyuz	0	0	0	0	0	0	0	0	0	6		6
Start	0	0	0	0	0	0	0	1	0	0		1
Total	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**7**	**5**	**13**		**27**
Ukraine												
Zenit	0	0	0	0	0	0	0	0	1	0		1
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**		**1**
China												
Long March 2C	0	0	0	0	0	0	0	1	4	1		6
Long March 2E	0	0	2	0	1	3	0	0	0	0		6
Long March 3	1	0	0	0	1	0	1	0	0	0		3
Long March 3B	0	0	0	0	0	0	1	2	0	0		3
Total	**1**	**0**	**2**	**0**	**2**	**3**	**2**	**3**	**4**	**1**		**18**
Sea Launch[a]												
Zenit	0	0	0	0	0	0	0	0	0	1		1
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**		**1**
TOTAL space launches	**13**	**12**	**14**	**9**	**14**	**19**	**21**	**37**	**36**	**36**		**211**

[a] Sea Launch is an international venture involving organizations in four countries and uses its own launch facility outside national borders. Their first commercial launch, in 1999, was licensed by the Federal Aviation Administration.

NOTES: A commercial launch is a launch that is internationally competed, i.e., available in principle to international launch providers, or whose primary payload is commercial in nature. Data are for orbital launches only.

SOURCES: 1990-98: U.S. Department of Transportation, Federal Aviation Administration, Associate Administrator for Commercial Space Transportation, personal communication, Feb. 25, 1999.

1999: Ibid., *Commercial Space Transportation: 1999 Year in Review* (Washington, DC: January 2000), Internet site http://ast.faa.gov/launch_info/ as of Apr. 12, 2000, tables 1 and 4 (with supporting text).

Section E
Physical Performance

Table 1-55 Passengers Denied Boarding by the Largest U.S. Air Carriers[a]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Boarded (millions)	421	429	445	449	457	460	481	503	514	523
Denied boarding[b] (thousands)										
Voluntary	561	599	718	632	771	794	899	1,018	1,081	1,024
Involuntary	67	47	46	51	53	49	58	54	45	46
Total	**628**	**646**	**764**	**683**	**824**	**843**	**957**	**1,072**	**1,126**	**1,070**

[a] Data are for nonstop scheduled service flights between points within the United States (including territories) by the 10 largest U.S. air carriers, i.e., those with at least 1% of total domestic scheduled-service passenger revenues (Alaska, America West, American, Continental, Delta, Northwest, Southwest, TWA, United, and US Airways). Before 1994, carriers included both majors and national airlines, i.e., airlines with over $100 million in revenue.

[b] Number of passengers who hold confirmed reservations and are denied boarding ("bumped") from a flight because it is oversold. These figures include only passengers whose oversold flight departs without them; they do not include passengers affected by canceled, delayed, or diverted flights.

SOURCE: U.S. Department of Transportation, Office of the Secretary, *Air Travel Consumer Report* (Washington, DC: Annual April issues).

Table 1-56 Mishandled-Baggage Reports Filed by Passengers with the Largest U.S. Air Carriers[a]

	1990 [b]	1991 [c]	1992	1993	1994	1995	1996	1997	1998	1999
Total mishandled-baggage reports (millions)	**2.66**	**2.20**	**2.45**	**2.28**	**2.32**	**2.28**	**2.46**	**2.28**	**2.48**	**2.54**
Enplaned passengers (domestic) (millions)	395.7	408.5	417.0	407.5	435.7	439.8	464.0	459.8	481.7	499.1
Reports per 1,000 passengers	6.73	5.38	5.87	5.60	5.33	5.18	5.30	4.96	5.16	5.08

[a] Data include nonstop, scheduled service between points within the United States (including territories) by the 10 largest U.S. air carriers, i.e., those with at least 1% of the total domestic scheduled service passenger revenues (Alaska, America West, American, Continental, Delta, Northwest, Southwest, TWA, United, and US Airways).

[b] Includes Pan Am.

[c] Includes Pan Am and Midway.

NOTES: Domestic system only. Based on passenger reports of mishandled baggage, including those that did not subsequently result in claims for compensation.

SOURCE: U.S. Department of Transportation, Office of the Secretary, *Air Travel Consumer Report* (Washington, DC: Annual compilation, February).

Table 1-57 Flight Operations Arriving On Time by the Largest U.S. Air Carriers[a] (Percent)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
On-time flight operations	79.4	82.5	82.3	81.6	81.5	78.6	74.5	77.7	77.2	76.1

[a] Data include nonstop, scheduled service between points within the United States (including territories) by the 10 largest U.S. air carriers, i.e., those with at least 1% of the total domestic scheduled service passenger revenues (Alaska, America West, American, Continental, Delta, Northwest, Southwest, TWA, United, and US Airways).

NOTES: A flight is considered on time if it arrived less than 15 minutes after the scheduled time shown in the carriers' Computerized Reservations Systems. Canceled and diverted operations are counted as late.

SOURCE: U.S. Department of Transportation, Office of the Secretary, *Air Travel Consumer Report* (Washington, DC: Annual compilation, February), table 1a, 12-month column.

Table 1-58 U.S. Air Carrier Delay Greater Than 15 Minutes by Cause

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Operations delayed (thousands)	356	338	394	393	298	281	276	248	237	272	245	306	374
Cause (%)													
Weather	67	70	57	56	65	65	72	75	72	75	68	74	68
Airport terminal volume	11	9	29	35	27	27	22	19	18	18	22	15	20
ARTCC volume	13	12	8	2	0	0	0	0	0	0	0	0	2
Closed runways/taxiways	4	5	3	3	3	3	3	2	3	3	3	3	3
NAS equipment	4	3	2	1	2	2	2	2	3	2	3	2	2
Other	1	1	1	4	3	3	2	2	4	2	4	6	5

SOURCE: U.S. Department of Transportation, Federal Aviation Administration, *Aviation Capacity Enhancement Plan* (Washington, DC: Annual issues), figure 3-2 and similar tables in earlier editions, and personal communications, July 6, 2000, and Dec. 5, 2000.

KEY: ARTCC = Air Route Traffic Control Center; NAS = National Airspace System

Table 1-59 Major U.S. Air Carrier Delays, Cancellations, and Diversions

	1988	1989	1990	1991[a]	1992	1993	1994[a]	1995	1996	1997	1998	1999	2000[a]
Late Departures	730,712	883,167	753,182	520,491	617,148	661,056	670,218	919,839	1,102,484	944,633	1,014,904	1,091,584	1,157,577
Late Arrivals	1,042,452	1,208,470	1,087,774	748,842	902,567	931,437	884,317	1,141,647	1,362,702	1,193,678	1,227,741	1,320,591	1,378,040
Cancellations	50,163	74,165	52,458	34,736	52,836	59,845	61,533	91,905	128,536	97,763	144,509	154,311	158,816
Diversions	14,436	14,839	15,954	10,279	11,384	10,333	11,245	10,492	14,121	12,081	13,161	13,555	12,774
Total Operations	5,202,096	5,041,200	5,270,893	4,259,689	5,092,157	5,070,501	4,744,532	5,327,435	5,351,983	5,411,843	5,384,721	5,527,884	5,196,611

[a] Data are incomplete; December data not yet available.

NOTES: Late departures and arrivals are strongly seasonal and are affected by weather and the heavy demand in winter and summer months. The term "late" is defined as 15 minutes after the scheduled departure or arrival time. Major air carriers are the 10 largest U.S. air carriers. A cancelled flight is one that was not operated, but was listed in a carrier's computer reservation system within seven calendar days of the scheduled departure. A diverted flight is one that left from the scheduled departure airport but flew to a destination point other than the scheduled destination point. The total for late departures includes flights that were cancelled. The total for late arrivals includes both cancelled and diverted flights, in addition to flights that arrived at the destination airport at least 15 minutes past scheduled arrival, and therefore measures all flights with arrival problems.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Airline Service Quality Performance data.

Table 1-60 Annual Person-Hours of Delay Per Eligible Driver[R]

Urban area	1982	1986	1990	1992	1995	1996	1997	% change Short-term 1992-1997 %	Short-term 1992-1997 Rank	Long-term 1982-1997 %	Long-term 1982-1997 Rank
Albany-Schenectady-Troy, NY	1	3	7	7	8	9	8	14	55	700	12
Albuquerque, NM	4	9	15	18	31	34	39	117	6	875	8
Atlanta, GA	16	33	27	30	53	61	68	127	4	325	39
Austin, TX	11	18	20	29	38	40	53	83	15	382	32
Bakersfield, CA	1	3	5	6	7	8	8	33	41	700	12
Baltimore, MD	13	20	36	33	44	45	47	42	35	262	45
Beaumont, TX	1	3	5	7	10	8	12	71	19	1,100	3
Boston, MA	19	32	43	48	61	64	66	38	39	247	47
Boulder, CO	1	2	3	4	5	5	6	50	31	500	22
Brownsville, TX	1	1	3	3	4	4	3	0	64	200	52
Buffalo-Niagara Falls, NY	2	3	5	5	7	7	7	40	38	250	46
Charlotte, NC	9	11	22	24	28	30	41	71	19	356	36
Chicago, IL-Northwestern, IN	13	26	31	34	38	41	44	29	44	238	48
Cincinnati, OH-KY	5	8	18	21	26	28	31	48	33	520	19
Cleveland, OH	2	4	9	10	16	19	20	100	8	900	5
Colorado Springs, CO	2	4	6	10	14	14	16	60	25	700	12
Columbus, OH	3	6	16	17	26	26	30	76	18	900	5
Corpus Christi, TX	6	6	6	6	6	7	8	33	41	33	68
Dallas, TX	15	35	35	39	49	49	58	49	32	287	41
Denver, CO	10	15	22	28	40	43	45	61	23	350	38
Detroit, MI	23	30	48	52	53	58	62	19	51	170	55
El Paso, TX-NM	2	4	7	11	12	10	12	9	56	500	22
Eugene-Springfield, OR	1	2	3	4	4	6	8	100	8	700	12
Fort Worth, TX	8	18	23	24	32	34	38	58	26	375	33
Fresno, CA	7	11	20	15	15	15	19	27	47	171	54
Fort Lauderdale-Hollywood-Pompano Beach, FL	5	9	11	22	26	27	31	41	36	520	19
Hartford-Middletown, CT	6	14	25	23	18	20	23	0	64	283	42
Honolulu, HI	14	20	25	29	30	29	29	0	64	107	63
Houston, TX	37	40	35	36	40	47	58	61	23	57	67
Indianapolis, IN	3	7	11	16	44	46	52	225	1	1633	1
Jacksonville, FL	11	14	21	23	31	35	35	52	29	218	51
Kansas City, MO-KS	3	6	11	11	20	24	28	155	3	833	9

KEY: R = revised

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Table 1-60 Cont'd Annual Person-Hours of Delay Per Eligible Driver[R]

Urban area	1982	1986	1990	1992	1995	1996	1997	% change Short-term 1992-1997 %	Short-term 1992-1997 Rank	Long-term 1982-1997 %	Long-term 1982-1997 Rank
Laredo, TX	2	2	2	2	5	6	6	200	2	200	52
Las Vegas, NV	7	11	28	23	35	37	34	48	33	386	31
Los Angeles, CA	41	61	79	79	79	81	82	4	60	100	64
Louisville, KY-IN	4	7	11	24	32	37	40	67	21	900	5
Memphis, TN-AR-MS	4	5	10	15	26	28	29	93	10	625	17
Miami-Hialeah, FL	22	29	48	54	54	50	57	6	59	159	56
Milwaukee, WI	5	8	15	21	28	26	25	19	51	400	30
Minneapolis-St. Paul, MN	4	8	15	18	27	28	34	89	11	750	11
Nashville, TN	8	13	22	21	36	39	46	119	5	475	27
New Orleans, LA	12	20	24	24	28	26	25	4	60	108	62
New York, NY-Northeastern, NJ	15	22	31	27	32	34	38	41	36	153	57
Norfolk, VA	9	17	22	22	26	32	34	55	28	278	43
Oklahoma City, OK	2	4	8	10	13	16	18	80	17	800	10
Omaha, NE-IA	5	9	18	24	30	33	31	29	44	520	19
Orlando, FL	9	15	14	27	30	35	41	52	29	356	36
Philadelphia, PA-NJ	16	20	21	21	23	26	27	29	49	69	65
Phoenix, AZ	16	25	29	28	28	33	35	25	50	119	60
Pittsburgh, PA	6	9	13	13	15	15	15	15	54	150	59
Portland-Vancouver, OR-WA	9	18	27	38	50	55	52	37	40	478	26
Providence-Pawtucket, RI-MA	5	10	20	16	20	22	21	31	43	320	40
Rochester, NY	1	2	6	7	10	11	11	57	27	1,000	4
Sacramento, CA	8	14	33	30	35	40	38	27	47	375	33
Salem, OR	1	3	6	8	11	12	15	88	12	1,400	2
Salt Lake City, UT	3	3	8	14	22	24	23	64	22	667	16
San Antonio, TX	7	19	12	14	21	24	26	86	13	271	44
San Bernardino-Riverside, CA	7	21	38	43	47	50	47	9	56	571	18
San Diego, CA	6	18	34	35	35	36	36	3	62	500	22
San Francisco-Oakland, CA	35	56	62	58	59	60	58	0	64	66	66
San Jose, CA	14	28	49	48	47	47	45	-6	68	221	50
Seattle-Everett, WA	21	36	53	68	61	62	69	1	63	229	49
Spokane, WA	2	4	5	6	7	9	11	83	15	450	29
St. Louis, MO-IL	11	16	24	28	50	50	52	86	13	373	35

KEY: R = revised

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Table 1-60 Cont'd Annual Person-Hours of Delay Per Eligible Driver[R]

Urban area	1982	1986	1990	1992	1995	1996	1997	% change Short-term 1992-1997 %	Short-term 1992-1997 Rank	% change Long-term 1982-1997 %	Long-term 1982-1997 Rank
Tacoma, WA	5	13	29	27	26	26	29	7	58	480	25
Tampa, FL	19	24	28	35	40	39	41	17	53	116	61
Tucson, AZ	5	5	13	13	18	20	28	115	7	460	28
Washington, DC-MD-VA	30	45	58	60	70	76	76	27	47	153	57

KEY: R = revised

NOTES: An eligible driver is someone 16 years of age and older who is eligible for a driver's license. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the Texas Transportation Institute study on mobility. Due to changes in methodology, data for all years shown were revised. For a detailed explanation of the formulas used, see the source document.

SOURCE: 1982-97: Texas Transportation Institute, *The 1999 Annual Urban Mobility Report* (College Station, TX: 1999), table 4.

Table 1-61 Roadway Congestion Index[R]

Urban area	1982	1986	1990	1992	1995	1996	1997	% change Short-term 1992-1997 %	Short-term 1992-1997 Rank	Long-term 1982-1997 %	Long-term 1982-1997 Rank
Albany-Schenectady-Troy, NY	0.48	0.56	0.68	0.69	0.72	0.74	0.75	9	35	56	60
Albuquerque, NM	0.69	0.84	0.85	0.87	0.98	1.01	1.05	21	64	52	56
Atlanta, GA	0.85	1.01	0.95	0.97	1.12	1.17	1.23	27	68	45	51
Austin, TX	0.78	0.86	0.89	0.92	0.94	0.96	1.03	12	46	32	32
Bakersfield, CA	0.47	0.57	0.66	0.69	0.72	0.74	0.75	9	35	60	63
Baltimore, MD	0.78	0.81	0.94	0.95	1.03	1.04	1.05	11	41	35	38
Beaumont, TX	0.67	0.74	0.75	0.81	0.82	0.84	0.90	11	41	34	35
Boston, MA	0.91	1.01	1.08	1.12	1.19	1.22	1.24	11	41	36	42
Boulder, CO	0.64	0.71	0.71	0.73	0.74	0.75	0.80	10	39	25	20
Brownsville, TX	0.53	0.54	0.62	0.64	0.70	0.69	0.71	11	41	34	35
Buffalo-Niagara Falls, NY	0.60	0.57	0.64	0.67	0.72	0.73	0.72	7	22	20	14
Charlotte, NC	1.08	1.00	0.97	0.91	0.96	0.97	1.04	14	50	-4	1
Chicago, IL-Northwestern, IN	0.94	1.06	1.15	1.18	1.24	1.26	1.28	8	26	36	42
Cincinnati, OH-KY	0.81	0.78	0.89	0.91	1.00	1.02	1.08	19	62	33	33
Cleveland, OH	0.75	0.77	0.89	0.90	0.98	0.99	1.01	12	46	35	38
Colorado Springs, CO	0.62	0.63	0.66	0.67	0.75	0.74	0.77	15	54	24	19
Columbus, OH	0.61	0.72	0.87	0.88	0.99	1.00	1.04	18	61	70	68
Corpus Christi, TX	0.67	0.70	0.69	0.62	0.62	0.67	0.72	16	56	7	4
Dallas, TX	0.77	0.97	0.99	1.01	0.98	1.00	1.04	3	13	35	38
Denver, CO	0.77	0.84	0.91	0.92	1.03	1.07	1.08	17	57	40	45
Detroit, MI	0.98	1.02	1.08	1.16	1.15	1.15	1.18	2	11	20	14
El Paso, TX-NM	0.66	0.75	0.77	0.82	0.84	0.83	0.86	5	17	30	29
Eugene-Springfield, OR	0.54	0.54	0.63	0.72	0.78	0.82	0.84	17	57	56	60
Fort Lauderdale-Hollywood-Pompano Beach, FL	0.70	0.76	0.79	0.95	1.02	1.04	1.08	14	50	54	58
Fort Worth TX	0.73	0.86	0.92	0.90	0.87	0.90	0.91	1	8	25	20
Fresno, CA	0.81	0.89	0.93	0.85	0.87	0.84	0.90	6	21	11	8
Hartford-Middletown, CT	0.69	0.79	0.87	0.86	0.87	0.88	0.90	5	17	30	29
Honolulu, HI	0.86	0.99	1.04	1.07	1.07	1.07	1.06	-1	5	23	18
Houston, TX	1.09	1.12	1.00	0.99	0.98	1.02	1.07	8	26	-2	2
Indianapolis, IN	0.62	0.76	0.81	0.84	1.01	1.00	1.05	25	67	69	67
Jacksonville, FL	0.84	0.87	0.87	0.84	0.88	0.92	0.93	11	41	11	8
Kansas City, MO-KS	0.56	0.62	0.66	0.65	0.72	0.75	0.76	17	57	36	42

KEY: R = revised

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Table 1-61 Cont'd Roadway Congestion Index[R]

Urban area	1982	1986	1990	1992	1995	1996	1997	% change Short-term 1992-1997 %	Short-term 1992-1997 Rank	Long-term 1982-1997 %	Long-term 1982-1997 Rank
Laredo, TX	0.52	0.56	0.61	0.51	0.54	0.56	0.61	20	63	17	11
Las Vegas, NV	0.67	0.79	0.95	0.98	1.09	1.10	1.07	9	35	60	63
Los Angeles, CA	1.39	1.46	1.56	1.54	1.50	1.54	1.51	-2	3	9	6
Louisville, KY-IN	0.72	0.74	0.80	0.89	0.99	1.02	1.04	17	57	44	49
Memphis, TN-AR-MS	0.76	0.73	0.84	0.85	0.93	0.95	0.96	13	49	26	22
Miami-Hialeah, FL	0.97	1.05	1.23	1.24	1.28	1.22	1.26	2	11	30	29
Milwaukee, WI	0.76	0.82	0.93	1.02	1.02	1.01	1.01	-1	5	33	33
Minneapolis-St. Paul, MN	0.70	0.83	0.89	0.93	1.06	1.08	1.13	22	66	61	65
Nashville, TN	0.71	0.82	0.85	0.86	0.93	0.92	0.96	12	46	35	38
New Orleans, LA	0.89	0.93	1.01	0.98	1.02	0.99	0.99	1	8	11	8
New York, NY-Northeastern, NJ	0.94	0.98	1.05	1.01	1.04	1.06	1.11	10	39	18	12
Norfolk, VA	0.75	0.86	0.92	0.89	0.93	0.97	0.97	9	35	29	28
Oklahoma City, OK	0.57	0.62	0.73	0.74	0.82	0.84	0.85	15	54	49	53
Omaha, NE-IA	0.67	0.74	0.87	0.96	0.99	1.02	1.00	4	16	49	53
Orlando, FL	0.65	0.80	0.76	0.86	0.84	0.87	0.93	8	26	43	48
Philadelphia, PA-NJ	0.98	1.01	0.99	0.98	1.00	1.03	1.05	7	22	7	4
Phoenix, AZ	0.94	1.04	1.04	1.06	1.06	1.11	1.13	7	22	20	14
Pittsburgh, PA	0.72	0.73	0.75	0.74	0.76	0.76	0.76	3	13	6	3
Portland-Vancouver, OR-WA	0.79	0.98	1.02	1.07	1.15	1.20	1.22	14	50	54	58
Providence-Pawtucket, RI-MA	0.79	0.87	0.91	0.83	0.84	0.87	0.87	5	17	10	7
Rochester, NY	0.53	0.58	0.72	0.74	0.79	0.79	0.78	5	17	47	52
Sacramento, CA	0.71	0.86	1.06	1.06	1.12	1.15	1.14	8	26	61	65
Salem, OR	0.57	0.67	0.72	0.76	0.77	0.80	0.82	8	26	44	49
Salt Lake City, UT	0.68	0.66	0.78	0.91	1.04	1.05	1.04	14	50	53	57
San Antonio, TX	0.73	0.85	0.75	0.76	0.88	0.89	0.92	21	64	26	22
San Bernardino-Riverside, CA	0.73	0.83	1.06	1.15	1.16	1.17	1.15	0	7	58	62
San Diego, CA	0.80	1.02	1.15	1.15	1.13	1.14	1.12	-3	1	40	45
San Francisco-Oakland, CA	1.04	1.26	1.36	1.32	1.34	1.36	1.33	1	8	28	27
San Jose, CA	0.76	0.87	1.07	1.11	1.08	1.08	1.08	-3	1	42	47
Seattle-Everett, WA	1.05	1.22	1.21	1.17	1.20	1.22	1.26	8	26	20	14
Spokane, WA	0.64	0.72	0.76	0.75	0.76	0.77	0.81	8	26	27	24
St. Louis, MO-IL	0.81	0.84	0.93	0.95	1.00	1.01	1.03	8	26	27	24

KEY: R = revised

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Table 1-61 Cont'd Roadway Congestion Index[R]

Urban area	1982	1986	1990	1992	1995	1996	1997	% change Short-term 1992-1997 %	Short-term 1992-1997 Rank	Long-term 1982-1997 %	Long-term 1982-1997 Rank
Tacoma, WA	0.77	0.91	1.06	1.12	1.10	1.11	1.15	3	13	49	53
Tampa, FL	0.91	0.91	1.02	1.09	1.11	1.09	1.07	-2	3	18	12
Tucson, AZ	0.79	0.73	0.89	0.93	0.94	0.95	1.00	8	26	27	24
Washington, DC-MD-VA	0.99	1.16	1.21	1.24	1.32	1.32	1.33	7	22	34	35

KEY: R = revised

NOTES: The roadway congestion index (RCI) is a measure of vehicle travel density on major roadways in an urban area. An RCI exceeding 1.0 indicates an undesirable congestion level, on average, on the freeways and principal arterial street system during the peak period. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the Texas Transportation Institute study on mobility.

Due to changes in methodology, data for all years shown were revised. For a detailed explanation of the formulas used, see the source document.

SOURCE: 1982-97: Texas Transportation Institute, *The 1999 Annual Urban Mobility Report* (College Station, TX: 1999), Appendix A-4.

Table 1-62 Congestion Index and Cost Values

Urban area	Annual congestion cost per driver ($)						Annual congestion cost ($ millions)					
	1994 value	1996 value	1997 value	1994 rank	1996 rank	1997 rank	1994 value	1996 value	1997 value	1994 rank	1996 rank	1997 rank
Albany-Schenectady-Troy, NY	270	295	140	62	61	62	105	115	55	59	61	59
Albuquerque, NM	585	700	650	22	25	24	240	300	285	46	47	45
Atlanta, GA	850	1,095	1,125	8	4	4	1,595	2,110	2,270	9	9	8
Austin, TX	805	970	880	10	11	12	370	465	430	34	36	34
Bakersfield, CA	220	270	155	64	65	61	55	70	40	63	63	61
Baltimore, MD	565	715	780	25	23	16	950	1,205	1,330	17	16	14
Beaumont, TX	150	180	225	66	68	56	15	20	25	67	67	63
Boston, MA	720	900	1,095	14	14	5	1,725	2,170	2,635	8	8	7
Boulder, CO	125	125	110	68	70	65	10	10	10	69	70	66
Brownsville, TX	110	165	50	70	69	68	10	15	5	69	69	68
Buffalo-Niagara Falls, NY	215	285	115	65	63	64	180	240	95	53	52	55
Charlotte, NC	450	590	680	41	37	21	190	260	300	52	50	44
Chicago, IL-Northwestern, IN	545	670	720	26	26	20	3,225	4,005	4,400	3	3	3
Cincinnati, OH-KY	460	590	525	39	37	35	445	570	515	27	28	28
Cleveland, OH	305	390	345	57	58	51	435	570	505	28	28	29
Colorado Springs, CO	375	450	275	51	52	54	105	135	85	59	58	58
Columbus, OH	410	505	515	47	45	36	320	400	405	40	41	37
Corpus Christi, TX	240	285	110	63	63	65	50	65	25	64	64	63
Dallas, TX	845	1,015	975	9	10	8	1,410	1,765	1,715	12	12	12
Denver, CO	635	825	760	18	18	19	815	1,115	1,050	20	18	17
Detroit, MI	860	1,095	1,010	7	4	6	2,655	3,165	3,145	6	6	5
El Paso, TX-NM	280	290	205	59	62	58	115	125	90	58	60	57
Eugene-Springfield, OR	125	220	120	68	66	63	20	35	20	66	66	65
Fort Lauderdale-Hollywood-Pompano Beach, FL	495	625	515	32	30	36	515	730	605	26	25	25
Fort Worth, TX	655	840	640	16	15	27	610	805	625	22	22	24
Fresno, CA	280	350	315	59	59	52	100	130	120	61	59	54
Hartford-Middletown, CT	490	640	390	33	29	49	240	320	195	46	46	53
Honolulu, HI	465	520	510	37	43	38	250	285	280	45	48	46
Houston, TX	935	1,055	960	5	7	9	2,040	2,405	2,210	7	7	9
Indianapolis, IN	360	505	865	52	45	13	275	400	665	44	41	23

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Table 1-62 Cont'd Congestion Index and Cost Values

Urban area	Annual congestion cost per driver ($)						Annual congestion cost ($ millions)					
	1994 value	1996 value	1997 value	1994 rank	1996 rank	1997 rank	1994 value	1996 value	1997 value	1994 rank	1996 rank	1997 rank
Jacksonville, FL	600	830	580	19	17	30	355	505	360	35	32	41
Kansas City, MO-KS	425	610	475	44	33	42	435	630	485	28	27	31
Laredo, TX	150	200	90	66	67	67	15	20	10	67	67	66
Las Vegas, NV	425	510	575	44	44	32	300	420	505	41	40	29
Los Angeles, CA	1,035	1,205	1,370	1	2	1	9,185	10,805	12,405	1	1	1
Louisville, KY-IN	540	720	680	27	22	21	340	475	455	38	34	32
Memphis, TN-AR-MS	425	505	480	44	45	41	290	365	350	43	44	42
Miami-Hialeah, FL	780	905	930	12	13	10	1,195	1,460	1,515	13	13	13
Milwaukee, WI	405	495	425	48	49	46	385	475	410	31	34	36
Minneapolis - St. Paul, MN	465	575	570	37	40	33	795	1,020	1,030	21	20	19
Nashville, TN	730	920	765	13	12	17	350	450	375	36	37	39
New Orleans, LA	440	500	400	43	48	47	375	430	350	32	39	42
New York, NY-Northeastern, NJ	590	705	640	21	24	27	8,235	9,810	8,885	2	2	2
Norfolk, VA	460	645	570	39	28	33	350	505	450	36	32	33
Oklahoma City, OK	325	460	305	54	51	53	210	345	235	49	45	49
Omaha, NE-IA	500	595	510	31	36	38	205	250	215	50	51	52
Orlando, FL	505	660	670	30	27	23	375	535	555	32	31	27
Philadelphia, PA-NJ	385	445	445	49	53	44	1,585	1,825	1,825	10	10	10
Phoenix, AZ	580	590	580	24	37	30	950	1,070	1,050	17	19	17
Pittsburgh, PA	385	485	245	49	50	55	595	755	370	23	24	40
Portland-Vancouver, OR-WA	585	765	885	22	20	11	545	765	930	24	23	21
Providence-Pawtucket, RI-MA	480	615	360	36	32	50	335	435	255	39	38	47
Rochester, NY	280	405	200	59	56	59	135	190	95	57	57	55
Sacramento, CA	595	730	645	20	21	26	540	670	595	25	26	26
Salem, OR	310	395	215	56	57	57	40	55	30	65	65	62
Salt Lake City, UT	315	430	400	55	54	47	195	270	255	51	49	47
San Antonio, TX	450	605	435	41	35	45	405	550	395	30	30	38
San Bernardino-Riverside, CA	890	1,030	815	6	9	15	855	990	790	19	21	22
San Diego, CA	520	620	635	28	31	29	1,015	1,200	1,265	14	17	16
San Francisco-Oakland, CA	975	1,055	995	4	7	7	3,000	3,250	3,065	4	5	6

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Table 1-62 Cont'd Congestion Index and Cost Values

Urban area	Annual congestion cost per driver ($)						Annual congestion cost ($ millions)					
	1994 value	1996 value	1997 value	1994 rank	1996 rank	1997 rank	1994 value	1996 value	1997 value	1994 rank	1996 rank	1997 rank
San Jose, CA	805	1,070	765	10	6	17	955	1,315	955	16	14	20
Seattle-Everett, WA	995	1,155	1,165	3	3	3	1,495	1,780	1,805	11	11	11
Spokane, WA	290	340	200	58	60	59	70	85	50	62	62	60
St. Louis, MO-IL	650	825	845	17	18	14	995	1,280	1,310	15	15	15
Tacoma, WA	510	535	500	29	42	40	220	240	225	48	52	50
Tampa, FL	490	610	650	33	33	24	300	395	430	41	43	34
Tucson, AZ	360	420	450	52	55	43	170	210	225	55	54	50
Washington, DC-MD-VA	1,030	1,290	1,260	2	1	2	2,930	3,655	3,560	5	4	4

NOTES: The roadway congestion index (RCI) is a measure of vehicle travel density on major roadways in an urban area. An RCI exceeding 1.0 indicates an undesirable congestion level, on average, on the freeways and principal arterial street system during the peak period. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the Texas Transportation Institute study on mobility. The cost of congestion is estimated with a value for each hour of travel time and each gallon of fuel. For a more detailed explanation of the formulas used, see the source document.

SOURCE: 1994-97: Texas Transportation Institute, *The 1999 Annual Urban Mobility Report* (College Station, TX: 1999), tables 7 and 8.

Table 1-63 Amtrak On-Time Performance Trends and Hours of Delay by Cause

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
On-time performance, total % (weighted)	69	81	76	77	77	72	72	76	71	74	79	79
Short distance (<400 miles)	71	82	82	82	82	79	78	81	76	79	81	80
Long distance (>=400 miles)	64	78	53	59	61	[a]47	49	57	49	53	59	61
Hours of delay by cause												
Amtrak[a]	N	N	3,565	5,915	6,433	8,488	8,538	5,527	5,193	5,310	4,796	4,891
Freight[b]	N	N	4,244	7,743	8,229	12,827	14,319	11,224	11,438	12,904	14,202	16,158
Other[c]	N	N	4,316	7,426	8,185	11,675	11,871	8,497	8,425	7,611	8,291	8,203
Total[d]	**N**	**N**	**12,126**	**21,084**	**22,847**	**32,991**	**34,729**	**25,248**	**25,056**	**25,825**	**27,289**	**29,252**

KEY: N = data do not exist

[a] Amtrak delays include equipment malfunctions, train servicing in stations, and passenger-related delays.

[b] Freight delays include maintenance of way/slow orders, freight train interference, and signal delays.

[c] Other delays include passenger train interference, waiting for connections, running time, weather-related delays, and miscellaneous.

[d] Numbers may not add to totals due to rounding.

NOTES: All percentages are based on Amtrak's fiscal year (October 1-September 30). Amtrak trips are considered delayed based on the following chart:

Trip length (miles)	Delayed departure time (minutes)
0-250	10
251-350	15
351-450	20
451-550	25
≥ 551	30

SOURCES: 1980: Amtrak, *National Railroad Passenger Corporation Annual Report* (Washington, DC: 1981).

1985-99: Ibid., Amtrak Annual Report, *Statistical Appendix* (Washington, DC: Annual issues).

Transportation Safety

Section A
Multimodal

Table 2-1 Transportation Fatalities by Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Air												
U.S. air carrier[a]	499	261	146	124	1	526	39	168	380	8	1	12
Commuter carrier[b]	N	N	N	28	37	37	7	9	14	46	0	12
On-demand air taxi[c]	N	N	N	69	105	76	[R]51	52	63	39	45	38
General aviation[d]	787	1,029	1,310	1,252	1,239	956	[R]767	734	632	[R]643	[R]624	631
Highway												
Passenger car occupants	N	N	N	25,929	27,449	23,212	24,092	22,423	22,505	22,199	[R]21,194	20,818
Motorcyclists	790	1,650	2,280	3,189	5,144	4,564	3,244	2,227	2,161	2,116	[R]2,294	2,472
Truck occupants[e]	N	N	N	5,817	8,748	7,666	9,306	10,216	10,553	10,972	[R]11,447	12,001
Bus occupants	N	N	N	53	46	57	32	33	21	18	[R]38	58
Pedestrians	7,210	7,990	8,950	7,516	8,070	6,808	6,482	5,584	5,449	5,321	[R]5,228	4,906
Pedalcyclists	490	690	760	1,003	965	890	859	833	765	814	[R]760	750
Other[f]	27,909	36,759	40,637	1,018	669	628	584	501	609	573	[R]540	606
Total highway	**36,399**	**47,089**	**52,627**	**44,525**	**51,091**	**43,825**	**44,599**	**41,817**	[j]**42,065**	**42,013**	[R]**41,501**	**41,611**
Railroad[g]												
Highway-rail grade crossing	1,421	1,610	1,440	917	833	582	698	579	488	461	431	402
Railroad	924	923	785	575	584	454	599	567	551	602	577	530
Transit[h]	**N**	**N**	**N**	**N**	**N**	**N**	**339**	**274**	**264**	**275**	**286**	**299**
Waterborne[i]												
Vessel-related	N	N	178	243	206	131	85	46	50	46	[R]59	44
Not related to vessel casualties	N	N	420	330	281	130	101	137	111	108	76	67
Recreational boating	739	1,360	1,418	1,466	1,360	1,116	865	829	709	821	[R]815	734
Pipeline												
Hazardous liquid pipeline	N	N	4	7	4	5	3	3	5	0	[R]2	4
Gas pipeline	N	N	26	8	15	28	6	18	48	10	17	17
TOTAL fatalities[R]	**U**	**U**	**U**	**U**	**U**	**U**	**47,348**	**44,563**	**44,808**	**44,472**	**43,876**	**43,866**

KEY: N = data do not exist; R = revised; U = data are not available

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Table 2-1 Cont'd Transportation Fatalities by Mode

[a] Carriers operating under 14 CFR 121, all scheduled and nonscheduled service. Since Mar. 20, 1997, 14 CFR 121 include aircraft with 10 or more seats that formerly operated under 14 CFR 135. This change makes it difficult to compare pre-1997 data for 14 CFR 121 and 14 CFR 135 with more recent data.

[b] All scheduled service operating under 14 CFR 135 (commuter air carriers). Before Mar. 20, 1997, 14 CFR 135 applied to aircraft with 30 or fewer seats. Since Mar. 20, 1997, 14 CFR 135 includes only aircraft with fewer than 10 seats. This change makes it difficult to compare pre-1997 data for 14 CFR 121 and 14 CFR 135 with more recent data.

[c] Nonscheduled service operating under 14 CFR 135 (on-demand air taxis).

[d] All operations other than those operating under 14 CFR 121 and 14 CFR 135.

[e] Includes light and large trucks.

[f] Includes occupants of other vehicle types and other nonmotorists. For 1960-70, the U.S. Department of Transportation, National Highway Traffic Safety Administration did not break out fatality data to the same level of detail as in later years, so fatalities for those years also include occupants of passenger cars, trucks, and buses.

[g] Includes Amtrak. Highway-rail grade crossing fatalities data for 1970 and before are not comparable with data after 1970 due to change in reporting system. Fatalities include those resulting from train accidents, train incidents, and nontrain incidents. Highway-rail grade crossing fatalities are counted under highway, except train occupants.

[h] Fatalities include those resulting from all reportable incidents, not just from accidents.

[i] Vessel-related casualties include those involving damage to vessels such as caused by collisions or groundings. Fatalities not related to vessel casualties include deaths from falling overboard or from accidents involving onboard equipment.

[j] Includes 2 fatalities that have not been assigned to a specific vehicle type.

NOTES: Numbers may not add to totals because some fatalities are counted in more than one mode. To avoid double counting, the following adjustments have been made: most (not all) highway-rail grade-crossing fatalities have not been added because most (not all) such fatalities involve motor vehicles and, thus, are already included in highway fatalities; for transit, all commuter rail fatalities and motor-bus, trolley-bus, demand-responsive and van-pool fatalities arising from accidents have been subtracted because they are counted as railroad, highway, or highway-rail grade-crossing fatalities. The reader cannot reproduce the total fatalities in this table by simply leaving out the number of highway-rail grade-crossing fatalities in the sum and subtracting the above transit submodes, because in so doing, grade-crossing fatalities not involving motor vehicles would be left out (see table 2-36 on rail). An example of such a fatality is a bicyclist hit by a train at a grade crossing.

Caution must be exercised in comparing fatalities across modes because significantly different definitions are used. In particular, rail and transit fatalities include incident-related (as distinct from accident-related) fatalities, such as fatalities from falls in transit stations or railroad employee fatalities from a fire in a workshed. Equivalent fatalities for the air and highway modes (fatalities at airports not caused by moving aircraft or fatalities from accidents in automobile repair shops) are not counted toward the totals for these modes. Thus, fatalities not necessarily directly related to in-service transportation are counted for the transit and rail modes, potentially overstating the risk for these modes.

SOURCES:

Air:

U.S. air carrier: 1960: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1967* (Washington, DC: December 1968).

1965-70: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1975*, NTSB/ARC-77/1 (Washington, DC: January 1977).

1975: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1983*, NTSB/ARC-87/01 (Washington, DC: February 1987), table 18.

1980: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1981*, NTSB/ARC-85/01 (Washington, DC: February 1985), tables 2 and 16.

1985-99: Ibid., Internet site www.ntsb.gov/aviation, table 5, as of April 2000.

Commuter: 1975-80: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1980*, NTSB/ARC-83/01 (Washington, DC: January 1983), tables 26 and 40.

1985-99: Ibid., Internet site www.ntsb.gov/aviation, table 9, as of April 2000.

On-demand air taxi: 1975-80: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1981*, NTSB/ARC-85/01 (Washington, DC: February 1985), table 61.

1985-99: Ibid., Internet site www.ntsb.gov/aviation, table 9, as of April 2000 (1999 data as preliminary).

General aviation: 1960-70: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. General Aviation, Calendar Year 1970*, NTSB/ARG-74/1 (Washington, DC: April 1974), table 117.

1975-80: Ibid., *Annual Review of Aircraft Accident Data: General Aviation, Calendar Year 1985*, NTSB/ARG-87/03 (Washington, DC: October 1987), table 21.

1985-99: Ibid., Internet site www.ntsb.gov/aviation, table 10, as of April 2000.

Highway:

1960-65: Estimated by U.S. Department of Transportation, National Highway Traffic Safety Administration from data supplied by U.S. Department of Health and Human Services, National Center for Health Statistics, and individual state accident reports (adjusted to 30-day deaths). Fatalities data prior to 1975 have been adjusted to reflect the Fatality Analysis Reporting System's definition of a fatal crash as one that involves a motor vehicle on a trafficway that results in the death of a vehicle occupant or a nonmotorist within 30 days of the crash.

1970-97: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1997*, DOT HS 808 806 (Washington, DC: November 1998), table 4.

1998-99: Ibid., *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), table 4, and personal communication, July 24, 2000; and National Center for Statistics and Analysis, Fatality Analysis Reporting System (FARS) Database, personal communication, Sept. 11, 2000.

Continued next page

Table 2-1 Cont'd Transportation Fatalities by Mode

Rail:

Highway-rail grade crossing: 1960-70: National Safety Council, *Accident Facts, 1974* (Washington, DC: 1974).

1975-80: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, personal communication.

1985-90: Ibid., *Rail-Highway Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), table S.

1995-97: Ibid., *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1.

1998: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1998/r03.htm, as of July 23, 1999.

1999: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1998/r01.htm, as of June 30, 2000.

Railroad: 1960-65: National Safety Council, *Accident Facts, 1974* (Washington, DC: 1974).

1970-90: U.S. Department of Transportation, Federal Railroad Administration, *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), table 7.

1995-97: Ibid., *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1.

1998: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1998/r03.htm, as of July 23, 1999.

1999: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1998/r01.htm, as of June 30, 2000.

Transit:

1990-98: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics 1998* (Washington, DC: 1999), p. 42.

1999: Ibid., personal communication, Dec. 6, 2000.

Water:

Vessel- and nonvessel-related: 1970-98: U.S. Department of Transportation, U.S. Coast Guard, Office of Investigations and Analysis, Compliance Analysis Division, (G-MOA-2), personal communication, Apr. 13, 1999.

Recreational boating: 1960-97: Ibid., Office of Boating Safety, *Boating Statistics* (Washington, DC: Annual issues).

1998: Ibid., Personal communication, Oct. 4, 1999.

Hazardous liquid and gas pipeline:

1970-99: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, personal communication and Internet site http://ops.dot.gov as of June 28, 2000.

Table 2-2 Injured Persons by Transportation Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Air[a]												
U.S. air carrier[b]	N	N	107	81	19	30	29	25	77	39	28	57
Commuter carrier[c]	N	N	N	N	14	16	11	25	2	1	2	2
On-demand air taxi[d]	N	N	N	N	43	41	36	14	20	23	[R]10	14
General aviation[e]	N	N	715	769	[R]681	483	402	395	359	365	[R]330	325
Highway												
Passenger car occupants	N	N	N	N	N	N	2,376,000	2,469,000	2,458,000	2,341,000	2,201,000	2,138,000
Motorcyclists	N	N	N	N	N	N	84,000	57,000	55,000	53,000	49,000	50,000
Truck occupants[f]	N	N	N	N	N	N	547,000	752,000	794,000	786,000	792,000	880,000
Bus occupants	N	N	N	N	N	N	33,000	19,000	20,000	17,000	16,000	22,000
Pedestrians	N	N	N	N	N	N	105,000	86,000	82,000	77,000	69,000	85,000
Pedalcyclists	N	N	N	N	N	N	75,000	67,000	58,000	58,000	53,000	51,000
Other[g]	N	N	N	N	N	N	11,000	14,000	15,000	17,000	12,000	10,000
Total highway[R]	**N**	**N**	**N**	**N**	**N**	**N**	**3,231,000**	**3,465,000**	**[R]3,483,000**	**3,348,000**	**3,192,000**	**3,236,000**
Railroad[h]												
Highway-rail grade crossing	3,367	3,725	3,272	3,860	3,550	2,687	2,407	1,894	1,610	1,540	1,303	[P]1,396
Railroad	16,113	21,930	17,934	50,138	58,696	31,617	22,736	12,546	10,948	10,227	10,156	10,509
Transit[i]	**N**	**N**	**N**	**N**	**N**	**N**	**54,556**	**57,196**	**55,288**	**56,132**	**55,990**	**55,325**
Waterborne[j]												
Vessel-related	N	N	105	97	180	172	175	145	129	109	83	113
Not related to vessel casualties	N	N	U	U		U	U	1,916	1,298	947	357	399
Recreational boating	929	927	780	2,136	2,650	2,757	3,822	4,141	4,442	4,555	[R]4,612	4,315
Pipeline												
Hazardous liquid pipeline	N	N	21	17	15	18	7	11	13	5	[R]6	20
Gas pipeline	N	N	233	214	177	108	69	53	114	72	[R]75	87
TOTAL injured persons[R]	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**3,518,000**	**3,532,000**	**3,397,000**	**3,241,000**	**3,284,000**

KEY: N = data do not exist; P = preliminary; R = revised; U = data are not available

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[a] Injuries classified as serious. See definitions of injuries in the glossary.

[b] All scheduled and nonscheduled service operating under 14 CFR 121. Since Mar. 20, 1997, 14 CFR 121 includes only aircraft with 10 or more seats formerly operated under 14 CFR 135. This change makes it difficult to compare pre-1997 data for 14 CFR 121 and 14 CFR 135 with more recent data.

[c] All scheduled service operating under 14 CFR 135 (commuter air carriers). Before Mar. 20, 1997, 14 CFR 135 applied to aircraft with 30 or fewer seats. Since Mar. 20, 1997, 14 CFR 135 includes only aircraft with fewer than 10 seats. This change makes it difficult to compare pre-1997 data for 14 CFR 121 and 14 CFR 135 with more recent data.

[d] Nonscheduled service operating under 14 CFR 135 (on-demand air taxis).

[e] All operations other than those operating under 14 CFR 121 and 14 CFR 135.

[f] Includes light and large trucks.

[g] Includes occupants of other unknown vehicle types and other nonmotorists.

[h] Includes Amtrak. Figures include those injuries resulting from train accidents, train incidents, and nontrain incidents. Injury figures also include occupational illness. Railroad injuries data for 1970 and before are not comparable with data after 1970 due to change in reporting system. Highway-rail grade crossing injuries are counted under highway, except train occupants.

i Includes motor bus, commuter rail, heavy rail, light rail, demand responsive, van pool, and automated guideway. Transit injuries include those resulting from all reportable incidents, not just from accidents.

[j] Vessel-related injuries include those involving damage to vessels such as caused by collisions or groundings. Injuries not related to vessel casualties include those from falls overboard or from accidents involving onboard equipment.

NOTES: The motor vehicle injury data in this table come from the U.S. Department of Transportation, National Highway Traffic Safety Administration's General Estimates System (GES). The data from GES, which began operation in 1988, are obtained from a nationally representative probability sample selected from all police-reported crashes. The GES sample includes only crashes where a police accident report was completed and the crash resulted in property damage, injury, or death. The resulting figures do not take into account crashes that were not reported to the police or did not result in property damage. The 1993 NTS Historical Compendium and earlier editions used injury figures estimated by the National Safety Council, which used a different set of methods to arrive at its figures. Thus, the injury figures in this edition of NTS may not be comparable with those found in earlier editions.

Numbers may not add to totals because some injuries are counted in more than one mode. To avoid double counting, the following adjustments have been made in the total injured row:

- most (not all) highway-rail grade crossing injuries have not been added because most (not all) such injuries involve motor vehicles and, thus, are already included in highway injuries;
- for transit, all commuter rail injuries and motor-bus, trolley-bus, demand-responsive, and van-pool injuries arising from accidents have been subtracted because they are counted as railroad, highway, or highway-rail grade crossing injuries.

The reader cannot reproduce the total injuries count in this table by simply leaving out the number of highway-rail grade crossing injuries in the sum and subtracting the above transit submodes, because in so doing, grade-crossing injuries not involving motor vehicles would be left out (see table 2-36 on rail). An example of such an injury is a bicyclist injured by a train at a grade crossing.

SOURCES:

Air:

U.S. air carrier: 1970-90: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995-99: Ibid., Analysis and Data Division, personal communications, Aug. 8, 1996; Mar. 10, 1999; and Mar. 23, 2000.

Commuter carrier, and on-demand air taxi: 1980-90: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995-99: Ibid., Analysis and Data Division, personal communications, 1996, 1997, 1998, and Mar. 23, 2000.

General aviation: 1970-90: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: General Aviation* (Washington, DC: Annual issues).

1995-99: Ibid., Analysis and Data Division, personal communications, 1996, 1997, 1998, and Mar. 23, 2000.

Highway:

1990-97: U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, *Traffic Safety Facts 1997*, DOT HS 808 806 (Washington, DC: November 1998), table 4.

1998: Ibid., *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), table 4.

1999: Ibid., General Estimates System Database and personal communication, Sept. 8, 2000.

Rail:

Highway-rail grade crossings: 1960-70: National Safety Council, *Accident Facts, 1974* (Washington, DC: 1974).

1975: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, personal communication.

1980-90: Ibid., *Rail-Highway Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), table S.

1995-97: U.S. Department of Transportation, Federal Railroad Administration, *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1.

1998-99: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1999/r11.htm, as of June 28, 2000.

Railroad:

1960-70: National Safety Council, *Accident Facts, 1974* (Washington, DC: 1974).

1970-90: U.S. Department of Transportation, Federal Railroad Administration, *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), table 7.

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Table 2-2 Cont'd Injured Persons by Transportation Mode

1995-97: U.S. Department of Transportation, Federal Railroad Administration, *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1.

1998-99: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1999/r01.htm, as of June 28, 2000.

Transit:

1990-98: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics* (Washington, DC: Annual issues).

1999: Ibid., personal communication, Dec. 6. 2000.

Water:

Waterborne transportation: 1970-98: U.S. Department of Transportation, U.S. Coast Guard, Office of Investigations and Analysis, Compliance Analysis Division, (G-MOA-2), personal communication, Apr. 13, 1999.

Recreational boating: 1960-98: Ibid., Office of Boating Safety, *Boating Statistics* (Washington, DC: Annual issues).

1998: Ibid., Personal communication, Oct. 4, 1999.

Hazardous liquid and gas pipeline:

1970-99: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, personal communication; and Internet site http://ops.dot.gov as of June 28, 2000.

Table 2-3 Transportation Accidents[a] by Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Air												
U.S. air carrier[b]	90	83	55	37	19	21	24	36	38	49	R50	52
Commuter carrier[c]	N	N	N	48	38	18	15	12	11	17	8	13
On-demand air taxi[d]	N	N	N	152	171	157	107	75	90	82	R77	76
General aviation[e]	4,793	5,196	4,712	3,995	3,590	2,739	2,215	2,053	1,907	1,858	R1,908	1,909
Highway												
Passenger car	N	N	N	N	N	N	5,561,000	5,594,000	5,599,000	5,423,000	5,146,000	4,916,000
Motorcycle	N	N	N	N	N	N	103,000	66,000	66,000	61,000	54,000	57,000
Truck[f]	N	N	N	N	N	N	2,460,000	3,039,000	3,175,000	3,225,000	3,168,000	3,425,000
Bus	N	N	N	N	N	N	60,000	58,000	57,000	53,000	53,000	63,000
Total highway crashes[a]	**N**	**N**	**N**	**N**	**N**	**N**	**6,471,000**	**6,699,000**	**6,770,000**	**6,624,000**	**6,335,000**	**6,279,000**
Rail												
Highway-rail grade crossing[g,h]	3,195	3,820	3,559	12,076	10,612	6,919	5,713	4,633	4,257	3,865	R3,508	3,489
Railroad[g,i]	N	N	8,095	8,041	8,205	3,275	2,879	2,459	2,443	2,397	2,575	2,768
Transit[j]	**N**	**N**	**N**	**N**	**N**	**N**	**58,002**	**25,683**	**25,166**	**24,924**	**23,937**	**23,416**
Waterborne												
Vessel-related	N	N	2,582	3,310	4,624	3,439	3,613	4,196	3,799	3,704	3,872	3,654
Recreational boating	2,738	3,752	3,803	6,308	5,513	6,237	6,411	8,019	8,026	R8,047	R8,061	7,935
Pipeline												
Hazardous liquid pipeline	N	N	351	254	246	183	180	188	R193	R171	154	165
Gas pipeline	N	N	1,077	1,338	1,524	334	198	161	187	175	R234	174
TOTAL accidents	**U**	**U**	**U**	**U**	**U**	**U**	**6,517,000**	**6,752,000**	**R6,820,000**	**6,675,000**	**6,387,000**	**6,330,000**

KEY: N = data do not exist; R = revised; U = data are not available

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Table 2-3 Cont'd Transportation Accidents[a] by Mode

[a] The U.S. Department of Transportation, National Highway Traffic Safety Administration uses the term "crash" instead of accident in its highway safety data. Highway crashes often involve more than one motor vehicle, hence "total highway crashes" is smaller than the sum of the components.

[b] Carriers operating under 14 CFR 121, all scheduled and nonscheduled service. Since Mar. 20, 1997, 14 CFR 121 includes only aircraft with 10 or more seats formerly operated under 14 CFR 135. This change makes it difficult to compare pre-1997 data for 14 CFR 121 and 14 CFR 135 with more recent data.

[c] All scheduled service operating under 14 CFR 135. Since Mar. 20, 1997, 14 CFR 121 includes only aircraft with 10 or more seats formerly operated under 14 CFR 135. This change makes it difficult to compare pre-1997 data for 14 CFR 121 and 14 CFR 135 with more recent years' data.

[d] Nonscheduled service operating under 14 CFR 135.

[e] All operations other than those operating under 14 CFR 121 and 14 CFR 135.

[f] Includes light and large trucks.

[g] Includes Amtrak.

[h] Includes both accidents and incidents. Data not comparable after 1970 due to change in reporting system. Most highway-rail grade crossing accidents are counted under highway.

[i] Train accidents only.

[j] Accident figures include collisions with vehicles, objects, and people, derailments/vehicles going off the road. Accident figures do not include fires and personal casualties.

NOTES: The motor vehicle crash data in this table come from the U.S. Department of Transportation, National Highway Traffic Safety Administrations' General Estimates System (GES), which began operation in 1988. GES data are obtained from a nationally representative probability sample selected from all police-reported crashes. The GES sample includes only crashes where a police accident report was completed and the crash resulted in property damage, injury, or death. The resulting figures do not take into account crashes that were not reported to the police or did not result in property damage. The 1993 NTS Historical Compendium and earlier editions used crash figures estimated by the National Safety Council, which used a different set of methods to arrive at its figures. Thus, the crash figures in this edition of NTS may not be comparable with those found in earlier editions.

Numbers may not add to totals because some accidents/crashes are counted in more than one mode. To avoid double counting, the following adjustments have been made:

- most (not all) highway-rail grade-crossing injuries have not been added because most (not all) such accidents involve motor vehicles and, thus, are already included in highway crashes;
- for transit, all commuter rail accidents and motor bus, trolley bus, demand responsive, and van pool accidents have been subtracted because they are counted as railroad, high way, or highway-rail grade-crossing accidents.

Note that the reader cannot reproduce the total accidents count in this table by simply leaving out highway-rail grade-crossing accidents in the sum and subtracting the above transit submodes, because in so doing, grade-crossing accidents not involving motor vehicles would be left out (see table 2-36 on rail). An example of such an accident is a bicyclist hit by a train at a grade crossing.

SOURCES:

Air:

Air carrier: 1960: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1967* (Washington, DC: December 1968).

1965-70: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1975*, NTSB/ARC-77/1 (Washington, DC: January 1977).

1975: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1983*, NTSB/ARC-87/01 (Washington, DC: February 1987), table 18.

1980: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1981*, NTSB/ARC-85/01 (Washington, DC: February 1985), tables 2 and 16.

1985-97: Ibid., Press release, SB-99-06, Internet site www.ntsb.gov/aviation, table 5, as of Mar. 2, 1999.

1998-99: Ibid., personal communication, Mar. 28, 2000.

Commuter air carrier: 1975-80: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1980*, NTSB/ARC-83/01 (Washington, DC: January 1983), tables 26 and 40.

1985-97: Ibid., Internet site www.ntsb.gov/aviation, table 8, as of Mar. 2, 1999.

1998-99: Ibid., personal communication, Mar. 28, 2000.

On-demand air taxi: 1975-80: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1981*, NTSB/ARC-85/01 (Washington, DC: Feb. 1985), table 61.

1985-97: Ibid., Internet site www.ntsb.gov/aviation, table 9, as of Mar. 2, 1999.

1998-99: Ibid., personal communication, Mar. 28, 2000.

General aviation: 1960-70: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: General Aviation, Calendar Year 1970*, NTSB/ARG-74/1 (Washington, DC: April 1974), table 117.

1975-80: Ibid., *Annual Review of Aircraft Accident Data: General Aviation, Calendar Year 1985*, NTSB/ARG-87/03 (Washington, DC: October 1987), table 21.

1985-97: Ibid., Press release, SB-99-06, Internet site www.ntsb.gov/aviation, table 10, Mar. 2, 1999.

1998-99: Ibid., personal communication, Mar. 28, 2000.

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Table 2-3 Cont'd Transportation Accidents[a] by Mode

Highway:

1990-99: U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, *Traffic Safety Facts 1998,* DOT HS 808 983 (Washington, DC: October 1999), table 1, and personal communication, Sept. 11, 2000.

Rail:

Highway-rail grade crossings: 1960-70: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Rail-Highway Grade-Crossing Accidents* (Washington, DC: Annual issues).

1975-80: Ibid., Office of Policy and Program Development, personal communication.

1985-90: Ibid., *Rail-Highway Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), table S.

1995-97: Ibid., *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1.

1999: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1998/r01.htm, as of July 28, 2000.

Railroad: 1970-90: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Accident/Incident Bulletin* (Washington, DC: Annual issues), table 4.

1995-98: Ibid., *Railroad Safety Statistics Annual Report 1998* (Washington, DC: July 1999), table 1-1.

1999: Ibid., Office of Safety, Internet site http://safetydata.fra.dot.gov/officeofsafety/Prelim/1999/r01.htm, as of June 28, 2000.

Transit:

1990-98: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics 1998* (Washington, DC: 2000), p. 53-54.

1999: Ibid., personal communication, Dec. 6, 2000.

Water:

Vessel-related: 1970-98: U.S. Department of Transportation, U.S. Coast Guard, Office of Investigations and Analysis, Compliance Analysis Division, personal communication, Apr. 13, 1999.

Recreational boating: 1960-98: Ibid., Office of Boating Safety, *Boating Statistics* (Washington, DC: Annual issues).

Hazardous liquid and gas pipeline:

1970-99: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, Internet site, http://ops.dot.gov as of June 28, 2000.

Table 2-4 Distribution of Transportation Fatalities by Mode

	1999		1998	
	Number	Percent of total	Number	Percent of total
Passenger car occupants	20,818	47.5	21,194	48.3
Light-truck occupants	11,243	25.6	10,705	24.4
Pedestrians struck by motor vehicles	4,906	11.2	5,228	11.9
Motorcyclists	2,472	5.6	2,294	5.2
Large-truck occupants	758	1.7	742	1.7
Pedalcyclists struck by motor vehicles	750	1.7	761	1.7
Recreational boating	734	1.7	815	1.9
General aviation	628	1.4	623	1.4
Railroad[a] (excluding grade crossings)	530	1.2	577	1.3
Other and unknown motor vehicle occupants	457	1.0	409	0.9
Other nonoccupants struck by motor vehicles[b]	149	0.3	131	0.3
Heavy rail transit (subway)	84	0.2	54	0.1
Waterborne transportation (nonvessel-related)[R]	67	0.2	76	0.2
Bus occupants (school, intercity, and transit)	58	0.1	38	0.1
Grade crossings, not involving motor vehicles[c]	57	0.1	62	0.1
Air taxi	38	0.09	45	0.1
Waterborne transportation (vessel-related)	44	0.1	59	0.3
Light rail transit	17	0.04	23	0.05
Gas distribution pipelines	15	0.03	16	0.04
Air carriers	12	0.03	1	<0.01
Commuter air	12	0.0	0	0.0
Transit buses, fatalities not related to accidents[d]	11	0.03	19	0.04
Hazardous liquid pipelines	4	<0.01	2	<0.01
Gas transmission pipelines	2	<0.01	1	<0.01
Demand response transit, fatalities not related to accidents[d]	0	0.0	2	<0.01
Total of all modes[e]	**43,866**	**100.0**	**43,876**	**100.0**
Other counts, redundant with above[f]				
Grade crossings, with motor vehicles	345		369	
Commuter rail	95		94	
Transit buses, accident-related fatalities	91		90	
Passengers on railroad trains	14		4	
Demand responsive transit, accident-related fatalities	1		2	

KEY: R = revised

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Table 2-4 Cont'd Distribution of Transportation Fatalities by Mode

[a] Includes fatalities outside trains, except at grade crossings.

[b] Includes all nonoccupant fatalities, except pedalcyclists and pedestrians.

[c] Grade-crossing fatalities involving motor vehicles are included in counts for motor vehicles.

[d] Fatalities not related to transit bus and demand responsive transit accidents are not included under highway submodes.

[e] Unless otherwise specified, includes fatalities outside the vehicle.

[f] Fatalities at grade crossings with motor vehicles are included under relevant motor vehicle modes. Commuter rail fatalities are counted under railroad. For transit bus and demand responsive transit accidents, occupant fatalities are counted under "bus" and nonoccupant fatalities are counted under "pedestrians," "pedal cyclists," or other motor vehicle categories.

SOURCES:

Air data: National Transportation Safety Board, Internet site www.ntsb.gov/aviation, as of April 2000.

Highway data: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998* (DOT HS 808 983) (Washington, DC : October 1999), table 4, and personal communication, Oct. 4, 1999.

Railroad data: U.S. Federal Railroad Administration, *Railroad Safety Statistics, Annual Report 1998* (Washington, DC: July 1999), table 1-1.

Transit data: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics* (Washington, DC: Annual issues).

Waterborne transportation: U.S. Department of Transportation, U.S. Coast Guard, Office of Investigations and Analysis, Compliance Analysis Division, (G-MOA-2), personal communication, Apr. 13, 1999.

Recreational boating: Ibid., Office of Boating Safety. *Boating Statistics* (Washington, DC: Annual issues).

Pipeline data: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, and Internet site http://ops.dot.gov as of June 28, 2000.

Table 2-5 Highway-Rail Grade-Crossing Safety and Property Damage Data

	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities	[a]1,440	917	833	582	698	579	488	461	431	402
Injured persons	3,272	3,860	3,550	2,687	2,407	1,894	1,610	1,540	1,303	1,396
Accidents	[a]3,559	12,076	10,612	6,919	5,713	4,633	4,257	3,865	[R]3,508	3,489
Property damage ($ millions)										
Railroad vehicles and property	N	N	6.5	8.7	13.1	10.1	8.8	15.0	14.4	23.0

KEY: N = data do not exist; R = revised

[a] 1970 data are not comparable to later years due to change in reporting system.

SOURCES:

Fatalities, injuries, accidents: 1970-90: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Rail-Highway Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), tables S and 11.

1995: Ibid., *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), tables S, 1, and 11.

1997: Ibid., *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998).

1998: Ibid., Internet site http://safetydata.fra.dot.gov/OfficeofSafety, as of May 4, 1999, and May 17, 2000.

Property damage: 1970-96: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Accident/Incident Bulletin* (Washington, DC: Annual issues), table 5.

1996-98: Ibid., Internet site http://safetydata.fra.dot.gov, as of Aug. 17, 1999.

1999: Ibid., Internet site http://safetydata.fra.dot.gov/objects/bul/99.pdf as of Nov. 28, 2000.

Table 2-6 Hazardous Materials Safety and Property Damage Data

	1975	1980	1985	1990	1995	1996	1997	1998	1999
Total fatalities	**27**	**19**	**8**	**8**	**7**	**120**	**R12**	**13**	**5**
Accident-related	21	14	7	7	6	7	R10	8	3
Air fatalities	**0**	**0**	**0**	**0**	**0**	**110**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0	0	0
Highway fatalities	**27**	**17**	**8**	**8**	**7**	**8**	**R12**	**13**	**5**
Accident-related	21	12	7	7	6	5	R10	8	3
Rail fatalities	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**0**
Accident-related	0	2	0	0	0	2	0	0	0
Water[a] fatalities	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0	0	0
Other[b] fatalities	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0	0	0
Total injured persons	**648**	**626**	**253**	**423**	**R400**	**R1,175**	**R225**	**197**	**267**
Accident-related	168	47	16	18	18	R864	16	15	13
Air injured persons	**5**	**8**	**4**	**39**	**R33**	**R33**	**24**	**20**	**13**
Accident-related	0	0	0	0	0	0	0	0	0
Highway injured persons	**527**	**493**	**195**	**311**	**296**	**R216**	**R156**	**153**	**217**
Accident-related	156	43	9	9	14	R22	11	11	13
Rail injured persons	**99**	**121**	**53**	**73**	**71**	**926**	**45**	**22**	**37**
Accident-related	12	4	7	9	4	842	5	4	0
Water[a] injured persons	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**0**
Accident-related	0	0	0	0	0	0	0	0	0
Other[b] injured persons	**15**	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0	0	0
Total incidents	**10,951**	**15,719**	**6,019**	**R8,879**	**14,743**	**R13,950**	**R13,995**	**15,349**	**16,881**
Accident-related	440	486	364	297	**R294**	R332	R310	316	272
Air incidents	**147**	**223**	**114**	**297**	**R814**	**R916**	**R1,027**	**1,380**	**1,553**
Accident-related	0	0	0	0	0	0	1	1	0
Highway incidents	**10,063**	**14,161**	**4,752**	**R7,296**	**R12,764**	**R11,917**	**R11,861**	**12,968**	**14,281**
Accident-related	330	347	302	249	**R244**	R289	R257	264	219

KEY: R = revised

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Table 2-6 Cont'd Hazardous Materials Safety and Property Damage Data

	1975	1980	1985	1990	1995	1996	1997	1998	1999
Rail incidents	**694**	**1,271**	**842**	**1,279**	**1,153**	**R1,111**	**R1,102**	**990**	**1,039**
Accident-related	109	134	61	48	50	R43	52	51	53
Water[a] incidents	**28**	**34**	**7**	**7**	**12**	**6**	**R5**	**11**	**8**
Accident-related	0	2	0	0	0	0	0	0	0
Other[b] incidents	**19**	**30**	**304**	**0**	**0**	**0**	**0**	**0**	**0**
Accident-related	1	3	1	0	0	0	0	0	0
Total property damage (current $ thousands)[c]	**8,090**	**10,829**	**22,993**	**32,353**	**R30,903**	**R46,849**	**R33,394**	**45,796**	**31,407**
Accident-related	6,051	6,236	20,268	24,792	23,516	R37,737	R25,069	36,770	19,406
Air property damage	**8.9**	**12.3**	**12.3**	**142**	**R101**	**87**	**R336**	**267**	**283**
Accident-related	0	0	0	0	0	0	0	0	0
Highway property damage	**5,584**	**7,324**	**12,690**	**20,190**	**R22,144**	**R29,268**	**R24,664**	**28,155**	**23,213**
Accident-related	3,694	3,782	10,175	14,132	16,256	R22,277	R17,730	21,332	13,361
Rail property damage	**2,488**	**2,952**	**10,274**	**11,952**	**8,485**	**R17,374**	**R8,355**	**16,360**	**7,850**
Accident-related	2,357	2,357	10,094	10,660	7,260	15,460	7,339	15,438	6,045
Water[a] property damage	**6.1**	**505**	**3.2**	**70**	**174**	**120**	**R38**	**1015**	**61**
Accident-related	0	81	0	0	0	0	0	0	0
Other[b] property damage	**3.5**	**35**	**14.4**	**0**	**0**	**0**	**0**	**0**	**0**
Accident-related	0.3	15.6	<0.1	0	0	0	0	0	0

KEY: R = revised

[a] Water category only includes nonbulk marine. Bulk marine hazardous materials incidents are reported to the U.S. Coast Guard and are not included.

[b] Other category includes freight forwarders and modes not otherwise specified.

[c] Property damage under $30,000 is reported to the nearest $100. Property damage $30,000 or greater is reported to the nearest $1,000, therefore the total may not equal the sum.

NOTES: Hazardous materials information system database operations were initiated in 1971. The Office of Hazardous Materials Safety determines whether fatalities and injuries should be classified as hazardous material-related after telephone contact with the carriers submitting incident reports.

SOURCES: 1975-85: U.S. Department of Transportation, Research and Special Programs Administration, Office of Hazardous Materials Safety, Hazardous Materials Information System Database, 1999. 1990-99: Ibid., Internet site http://hazmat.dot.gov/10yearfrm.htm, as of May 2, 2000.

Table 2-7 Transportation-Related Occupational Fatalities[a]

	1992	1993	1994	1995	1996	1997	1998
Fatalities							
Highway[b]	1,158	1,243	1,343	1,346	1,346	R1,393	1,431
Nonhighway[c]	436	392	409	387	374	377	384
Aircraft	353	282	426	283	324	261	223
Worker struck by vehicle[d]	346	R365	391	388	353	367	413
Water vehicle[e]	109	120	94	87	119	109	112
Railway[f]	65	86	81	82	74	93	60
Transportation-related[g]	**2,484**	**2,501**	**2,762**	**2,587**	**2,601**	**R2,605**	**2,630**
Total occupational fatalities	6,217	6,331	6,632	6,275	6,202	R6,238	6,026
% of total occupational fatalities							
Highway	19	20	20	21	22	22	24
Nonhighway	7	6	6	6	6	6	6
Aircraft	6	4	6	5	5	4	4
Worker struck by vehicle	6	6	6	6	6	6	7
Water vehicle	2	2	1	1	2	2	2
Railway	1	1	1	1	1	1	1
Transportation-related	**40**	**40**	**42**	**41**	**42**	**42**	**44**

KEY: R = revised

[a] Based on the 1992 Bureau of Labor Statistics, Occupational Injury and Illness Classification Structures.

[b] Includes collisions between vehicles/mobile equipment moving in the same or opposite directions, such as in an intersection; between moving and standing vehicles/mobile equipment at the side of a roadway; or a vehicle striking a stationary object. Also includes noncollisions, e.g., jack-knifed or overturned vehicle/mobile equipment–no collision; ran off highway–no collision; struck by shifting load; sudden start or stop, not elsewhere classified.

[c] Refers to farms and industrial premises. Includes collisions between vehicles/mobile equipment; vehicles/mobile equipment striking a stationary object. Also includes noncollisions such as a fall from a moving vehicle/mobile equipment, fall from and struck by vehicle/mobile equipment, overturned vehicle/mobile equipment, and loss of control of vehicle/mobile equipment.

[d] Includes worker struck by vehicle/mobile equipment in roadway, on side of road, in a parking lot, or nonroad area.

[e] Includes collisions, explosions, fires, fall from or on ship/boat, and sinking/capsized water vehicles involved in transportation. Does not include fishing boats.

[f] Includes collisions between railway vehicles, railway vehicle and other vehicle, railway vehicle and other object, and derailment.

[g] Numbers may not add to totals because transportation categories may include subcategories not shown separately.

NOTES: Percents may not add to totals due to rounding. The above categories do not define the types of jobs people had, nor the industries in which they worked. The categories define the ways in which they died. For example, a sales representative traveling for business reasons who is killed in a rail accident would be listed under rail.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *News: National Census of Fatal Occupational Injuries*. Internet site www.bls.gov/oshhome.htm, as of May 8, 2000. This document is based on the U.S. Department of Labor, Bureau of Labor Statistics, Census of Fatal Occupational Injuries (Washington, DC: Annual issues), table 1.

Table 2-8 Reporting Thresholds for Property Damage by U.S. Department of Transportation Modal Administrations

Modal administration	Reporting threshold
Federal Aviation Administration	More than $25,000 damage to property other than the aircraft.
Federal Highway Administration (FHWA)	None; each state defines its own threshold and FHWA collects state reports.
Federal Railroad Administration	More than $6,600 in damages to railroad on-track equipment, signals, track, track structures, and roadbed for accidents other than at grade crossings. No threshold for grade-crossing accidents.
National Highway Traffic Safety Administration	None; property-damage-only crashes are recorded through the General Estimates System, a nationally representative sample of police-reported crashes of all severities.
Federal Transit Administration	More than $1,000.
Research and Special Programs Administration	More than $50,000 for gas pipelines. More than $50,000 for hazardous liquid pipelines.
U. S. Coast Guard	More than $25,000 for commercial vessels. More than $500 for recreational boats.

SOURCES:

Federal Aviation Administration: U.S. General Accounting Office, *Transportation Safety: Opportunities for Enhancing Safety Across Modes*, T-RCED-94-120 (Washington, DC: February 1994).

Federal Highway Administration: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: 1999); U.S. Department of Transportation, Federal Highway Administration, personal communication, 1997.

Federal Railroad Administration: U.S. Department of Transportation, Federal Railroad Administration, *Railroad Safety Statistics Annual Report 1998* (Washington, DC: July 1999).

Federal Transit Administration: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics*, DOT-FTA-MA-26-5011-00-1 (Washington, DC: 1999).

Research and Special Programs Administration: *Gas pipeline:* 49 CFR 191.3 (as of Oct. 1, 1999).

Oil pipeline: 49 CFR 195.50 (as of Oct. 1, 1999).

U.S. Coast Guard: Commercial shipping: 46 CFR 4.05-1 (as of Oct. 1, 1999).

Recreational boating: 33 CFR 173.55 (as of Oct. 1, 1999).

Section B
Air

Table 2-9 U.S. Air Carrier[a] Safety Data

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999[P]
Total fatalities	**499**	**261**	**146**	**124**	**1**	**526**	**39**	**168**	**380**	**8**	**1**	**12**
Total seriously injured persons	**N**	**N**	**107**	**81**	**19**	**30**	**29**	**25**	**77**	**39**	**28**	**57**
Total accidents	**90**	**83**	**55**	**37**	**19**	**21**	**24**	**36**	**38**	**49**	[R]**50**	**52**
Fatal	17	9	8	3	1	7	6	3	5	4	1	2
Aircraft-miles (millions)	**1,130**	**1,536**	**2,685**	**2,478**	**2,924**	**3,631**	**4,948**	**5,654**	**5,873**	[R]**6,692**	[R]**6,744**	**6,793**
Rates per 100 million aircraft-miles												
Fatalities	[R]44.16	[R]16.99	[R]5.44	[R]5.00	0.034	[R]14.49	0.79	[R]2.97	[R]6.47	[R]0.12	[R]0.015	0.18
Seriously injured persons	N	N	[R]3.99	[R]3.27	0.65	0.83	0.59	0.44	[R]1.31	0.58	[R]0.42	0.84
Total accidents	[R]7.96	[R]5.40	[R]2.05	[R]1.49	0.65	0.58	0.49	0.64	0.65	0.73	[R]0.74	0.77
Fatal	[R]1.50	0.59	0.30	[R]0.121	0.034	0.19	0.12	0.053	0.085	0.060	0.015	0.029
Aircraft departures (thousands)	**N**	**N**	**N**	**N**	**5,479**	**6,307**	**8,092**	**8,457**	**8,229**	[R]**10,314**	[R]**10,986**	**11,636**
Rates per 100,000 aircraft departures												
Fatalities	N	N	N	N	0.018	[R]8.34	0.48	[R]1.99	[R]4.62	0.078	[R]0.0091	0.10
Seriously injured persons	N	N	N	N	0.35	0.48	0.36	0.30	0.94	0.38	[R]0.25	0.49
Total accidents	N	N	N	N	0.35	0.33	0.30	0.43	0.46	0.48	[R]0.46	0.45
Fatal	N	N	N	N	0.018	0.11	0.074	0.035	0.061	0.039	[R]0.0091	0.017
Flight hours (thousands)	**N**	**4,691**	**6,470**	**5,607**	**7,067**	**8,710**	**12,150**	**13,505**	**13,746**	[R]**15,838**	[R]**16,846**	**17,428**
Rates per 100,000 flight hours												
Fatalities	N	[R]5.56	[R]2.26	[R]2.21	0.01	[R]6.04	0.32	[R]1.24	[R]2.76	[R]0.051	[R]0.0059	0.069
Seriously injured persons	N	N	[R]1.65	[R]1.44	0.27	0.34	0.24	0.19	0.56	0.25	0.17	0.33
Total accidents	N	[R]1.77	0.85	0.66	0.27	0.24	0.20	0.27	0.28	0.31	[R]0.0059	0.30
Fatal	N	0.19	0.12	0.054	0.014	[R]0.080	0.049	0.022	0.036	0.025	[R]0.0059	0.011

KEY: N = data do not exist; P = preliminary; R = revised

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Table 2-9 Cont'd U.S. Air Carrier[a] Safety Data

[a] Air carriers operating under 14 CFR 121, scheduled and nonscheduled service. Includes all scheduled and nonscheduled service accidents involving all-cargo carriers and commercial operators of large aircraft when those accidents occurred during 14 CFR 121 operations. Since Mar. 20, 1997, 14 CFR 121 includes aircraft with 10 or more seats formerly operated under 14 CFR 135. This change makes it difficult to compare pre-1997 data for 14 CFR 121 and 14 CFR 135 with more recent data.

NOTES: Miles, departures, and flight hours are compiled by the U.S. Department of Transportation, Federal Aviation Administration. Rates are computed by dividing the number of fatalities, serious injuries, total accidents, and fatal accidents by the number of miles, departures, or flight hours. These figures are based on information provided by airlines to the U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information.

SOURCES:

Fatalities, accidents, miles, departures, and flight hours: 1960: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1967* (Washington, DC: December 1968).

1965-70: Ibid., *Calendar Year 1975*, NTSB/ARC-77/1 (Washington, DC: January 1977).

1975 (all categories except miles): Ibid., *Calendar Year 1983,* NTSB/ARC-87/01 (Washington, DC: February 1987), table 18.

1975 (miles): Ibid., *Calendar Year 1975*, NTSB/ARC-77/1 (Washington, DC: January 1977).

1980: Ibid., *Calendar Year 1981*, NTSB/ARC-85/01 (Washington, DC: February 1985), tables 2 and 16.

1985-99: National Transportation Safety Board, Internet site www.ntsb.gov/aviation/Table5.htm, as of May 8, 2000.

Serious injuries: 1970-90: Ibid. *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995-99: Ibid., Analysis and Data Division, personal communications, Aug. 8, 1996; 1997; Mar. 10, 1999; Mar. 28, 2000.

Table 2-10 U.S. Commuter Air Carrier[a] Safety Data

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999[P]
Total fatalities	**37**	**37**	**7**	[d]**77**	**21**	**24**	**25**	**9**	**14**	**46**	**0**	**12**
Total seriously injured persons	**14**	**16**	**11**	**31**	**7**	**2**	**32**	**25**	**2**	**1**	**2**	**2**
Total accidents	**38**	**18**	**15**	**23**	[e]**23**	**16**	**10**	**12**	**11**	[R]**16**	**8**	**13**
Fatal	8	7	4	8	7	4	3	2	1	5	0	5
Aircraft-miles (millions)	**192**	**301**	**450**	**434**	**508**	**555**	**594**	**550**	**591**	[R]**252**	[R]**51**	**42**
Rates per 100 million aircraft-miles												
Fatalities[b]	19.27	12.29	1.56	17.74	4.13	4.32	4.21	1.64	2.37	[R]18.28	0.00	28.57
Seriously injured persons[b]	7.29	5.32	2.44	7.14	1.38	0.36	5.40	4.55	0.34	[R]0.40	[R]3.94	4.76
Total accidents[b,c]	19.79	5.98	3.33	5.30	[R]4.53	2.88	1.68	2.18	1.86	6.37	[R]15.76	30.95
Fatal[b,c]	4.17	2.33	0.89	1.84	1.38	0.72	0.51	0.36	0.17	[R]1.99	0.00	11.90
Aircraft departures (thousands)	**1,777**	**2,561**	**3,160**	**2,820**	**3,115**	**3,601**	**3,581**	**3,220**	**3,515**	[R]**1,394**	[R]**707**	**530**
Rates per 100 thousand aircraft departures												
Fatalities[b]	2.08	1.44	0.22	2.73	0.67	0.67	0.70	0.28	0.40	3.30	0.00	2.26
Seriously injured persons	0.79	0.62	0.35	1.10	0.22	0.06	0.89	0.78	[R]0.057	[R]0.072	[R]0.28	0.38
Total accidents[c]	2.14	0.70	0.48	0.82	[R]0.74	0.44	0.28	0.37	0.31	[R]1.15	[R]1.13	2.45
Fatal[c]	0.45	0.27	0.13	0.28	0.23	0.11	[R]0.084	[R]0.062	[R]0.028	0.36	0.00	0.94
Flight hours (thousands)	**1,176**	**1,737**	**2,342**	**2,292**	**2,335**	**2,638**	**2,784**	**2,628**	**2,757**	**983**	[R]**354**	**269**
Rates per 100 thousand flight hours												
Fatalities	3.15	2.13	0.30	3.36	0.90	0.91	0.90	0.34	0.51	4.68	0.00	4.46
Seriously injured persons	1.19	0.92	0.47	1.35	0.30	[R]0.076	1.15	0.95	[R]0.073	0.10	[R]0.57	0.74
Total accidents[c]	3.23	1.04	0.64	1.00	[R]0.98	0.61	0.36	0.46	0.40	[R]1.63	[R]2.26	4.83
Fatal[c]	0.68	0.40	0.17	0.35	0.30	0.15	0.11	[R]0.076	[R]0.036	0.51	0.00	1.86

KEY: P = preliminary; R = revised

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Table 2-10 Cont'd U.S. Commuter Air Carrier[a] Safety Data

[a] Air carriers operating under 14 CFR 135, scheduled service. Includes accidents involving all-cargo air carriers when those accidents occurred during scheduled 14 CFR 135 operations. Before March 20, 1997, 14 CFR 135 applied to aircraft with 30 or fewer seats. Since Mar. 20, 1997, 14 CFR 135 includes only aircraft with fewer than 10 seats. This change makes it difficult to compare pre-1997 data with more recent data.

[b] Data updated by rounding to two significant digits instead of one.

[c] Rates are based on all accidents, including some that involve operators not reporting mileage or other traffic data to the U.S. Department of Transportation

[d] Total fatalities for 1991 do not include the 22 persons killed aboard an airliner when it and a commuter aircraft collided.

[e] An attempted suicide case in 1992 is included in accidents but excluded in accident rates in this table.

NOTES: Miles, departures, and hours are compiled by the U.S. Department of Transportation, Federal Aviation Administration. Rates are computed by dividing the number of fatalities, serious injuries, total accidents, and fatal accidents by the number of miles, departures, or flight hours. These figures are based on information provided by airlines to the U.S. Department of Transportation, Bureau of Transportation Statistics, Ofiice of Airline Information.

SOURCES:

Fatalities, accidents, aircraft-miles, aircraft departures and flight hours: 1980: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1980*, NTSB/ARC-83/01 (Washington, DC: January 1983), tables 26 and 40.

1985-99: Ibid., Internet site www.ntsb.gov/aviation/Table 8.htm, as of May 9, 2000.

Serious injuries: 1980-94: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995-99: Ibid., Analysis and Data Division, personal communications, 1996; 1997; 1998; and Mar. 28, 2000.

Table 2-11 U.S. Air Carrier[a] Fatal Accidents by First Phase of Operation[b]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Phase of operation										
Approach/descent/landing	1	2	1	0	2	2	0	0	0	1
Taxi/takeoff/climb	3	1	2	0	1	0	3	2	0	0
Cruise (inflight)	1	0	0	0	0	0	1	1	0	0
Standing (static)	1	1	1	1	0	0	0	1	1	1
Maneuvering[c]	0	0	0	0	1	0	0	0	0	0
Other/not reported	0	0	0	0	0	1	1	0	0	0
Total fatal accidents	**6**	**4**	**4**	**1**	**4**	**3**	**5**	**4**	**1**	**2**

[a] 14 CFR 121, scheduled operations. Before Mar. 20, 1997, 14 CFR 121 applied only to aircrft with more than 30 seats or a maximum payload capacity of more than 7,500 pounds. Since Mar. 20, 1997, 14 CFR 121 includes aircraft with 10 or more seats that formerly operated under 14 CFR 135. This change makes it difficult to compare pre-1997 data with more recent data.

[b] First phase of operation is the phase of flight in which the first occurrence leading to the accident happened.

[c] Includes instructional flights performing turns and agricultural flights for spraying and buzzing (repeated passes over a particular location).

SOURCES: 1990-95: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues), table 18.

1996-97: Ibid., personal communication, Mar. 10, 1999 and Mar. 28, 2000.

Table 2-12 U.S. Commuter Air Carrier[a] Fatal Accidents by First Phase of Operation

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Phase of operation										
Approach/descent/landing	0	3	5	1	2	0	1	2	0	0
Taxi/takeoff/climb	0	0	1	1	0	1	0	1	0	2
Cruise (in flight)	3	2	1	1	1	0	0	0	0	3
Standing (static)	0	1	0	1	0	0	0	0	0	0
Maneuvering[b]	1	1	0	0	0	1	0	2	0	0
Other/not reported	0	1	0	0	0	0	0	0	0	0
Total fatal accidents	**4**	**8**	**7**	**4**	**3**	**2**	**1**	**5**	**0**	**5**

[a] 14 CFR 135, scheduled operations. Before Mar. 20, 1997, 14 CFR applied to aircraft with 30 or fewer seats. Since Mar. 20, 1997, 14 CFR 135 includes only aircraft with fewer than 10 seats. This change makes it difficult to compare pre-1997 data with more recent data.

[b] Includes instructional flights performing turns and agricultural flights for spraying and buzzing (repeated passes over a particular location).

SOURCES: 1990-95: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues), table 36.

1996-99: Ibid., personal communication, Mar. 10, 1999 and Mar. 28, 2000.

Table 2-13 U.S. On-Demand Air Taxi[a] Safety Data

	1975	1980	1985	1990	1995	1996	1997	1998	1999[P]
Total fatalities	**69**	**105**	**76**	**51**	**52**	**63**	**39**	**[R]48**	**38**
Total seriously injured persons	**N**	**43**	**41**	**36**	**14**	**20**	**23**	**[R]10**	**14**
Total accidents	**152**	**171**	**157**	**107**	**75**	**90**	**82**	**[R]77**	**76**
Fatal	**24**	**46**	**35**	**29**	**24**	**29**	**15**	**[R]18**	**12**
Flight hours (thousands)	**2,526**	**3,618**	**2,570**	**2,249**	**1,707**	**2,029**	**2,250**	**2,538**	**2,809**
Rates per 100,000 flight hours[b]									
Fatalities[R]	2.73	2.90	2.96	2.27	3.05	3.10	1.73	[R]1.89	1.35
Seriously injured persons[R]	N	1.19	1.60	1.60	0.82	0.99	1.02	0.39	0.50
Total accidents[R]	6.02	4.73	6.11	4.76	4.39	4.44	3.64	[R]3.03	2.71
Fatal[R]	0.95	1.27	1.36	1.29	1.41	1.43	0.67	[R]0.71	0.43

KEY: N = data do not exist; P = preliminary; R = revised

[a] Air carriers operating under 14 CFR 135, nonscheduled service. Accidents on foreign soil and in foreign waters are excluded.

[b] Rates are computed by dividing the number of fatalities, serious injuries, total accidents, and fatal accidents by the number of flight hours.

NOTE: Hours are estimated by the U.S. Department of Transportation, Federal Aviation Administration.

SOURCES:

Fatalities, accidents and flight hours: 1975-80: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations, Calendar Year 1981*, NTSB/ARC-85/01 (Washington, DC: February 1985), table 61.

1985-99: Ibid., Internet site www.ntsb.gov/aviation/Table9.htm, as of May 10, 2000.

Serious injuries: 1980-90: Ibid., *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995-99: Ibid., Analysis and Data Division, personal communications, 1996; 1997; 1998; and Mar. 28, 2000.

Table 2-14 U.S. General Aviation[a] Safety Data

	1960[d]	1965[d]	1970[d]	1975	1980	1985	1990	1995	1996	1997	1998	1999[P]
Total fatalities	**787**	**1,029**	**1,310**	**1,252**	**1,239**	**956**	**767**	**734**	**632**	**[R]643**	**[R]623**	**628**
Total seriously injured persons	**N**	**N**	**715**	**769**	**681**	**483**	**402**	**395**	**359**	**365**	**[R]330**	**325**
Total accidents[b]	**4,793**	**5,196**	**4,712**	**3,995**	**3,590**	**2,739**	**2,215**	**2,053**	**[R]1,908**	**[R]1,853**	**[R]1,909**	**1,908**
Fatal	**429**	**538**	**641**	**633**	**618**	**498**	**443**	**412**	**360**	**[R]353**	**[R]365**	**342**
Flight hours (thousands)	**13,121**	**16,733**	**26,030**	**28,799**	**36,402**	**28,322**	**28,510**	**24,906**	**24,881**	**[R]25,464**	**26,796**	**27,080**
Rates per 100,000 flight hours[c]												
Fatalities	6.00	6.15	5.03	4.35	3.40	3.38	2.69	[R]2.95	2.54	[R]2.53	[R]1.95	2.32
Seriously injured persons	N	N	2.75	2.67	1.87	1.71	1.41	[R]1.59	1.44	1.43	[R]1.23	1.2
Total accidents	36.53	[R]31.05	[R]18.10	[R]13.87	[R]9.86	[R]9.66	[R]7.77	[R]8.23	[R]7.67	[R]7.28	[R]7.12	7.05
Fatal	3.27	3.22	2.46	2.20	[R]1.70	[R]1.75	1.55	1.64	1.45	[R]1.39	[R]1.36	1.26

KEY: N = data do not exist; P = preliminary; R = revised

[a] U.S. registered civil aircraft not operated under 14 CFR 121 or 14 CFR 135. Accidents on foreign soil and in foreign waters are excluded. Suicide/sabotage cases included in accidents and fatalities but excluded from accident rates in this table are: 1985 (3 accidents, 2 fatal accidents); 1990 (1,0); 1995 (4,3).

[b] Since April 1995, the National Transportation Safety Board has been required by law to investigate all public-use accidents, increasing the number of NTSB reported general aviation accidents by approximately 1.75%.

[c] Rates are computed by dividing the number of fatalities, serious injuries, total accidents, and fatal accidents by the number of flight hours.

[d] Data for 1960, 1965, and 1970 include air taxi.

NOTE: Flight hours are estimated by the U.S. Department of Transportation, Federal Aviation Administration.

SOURCES:

Fatalities, accidents, and flight-hours: 1960-70: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. General Aviation, Calendar Year 1970*, NTSB/ARG-74/1 (Washington, DC: April 1974), table 117.

1975-80: Ibid., *Annual Review of Aircraft Accident Data: General Aviation, Calendar Year 1985*, NTSB/ARG-87/03 (Washington, DC: October 1987), table 21.

1985-99: Ibid., Internet site www.ntsb.gov/aviation/Table10.htm, as of May 10, 2000.

Serious injuries: 1970-95: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: General Aviation* (Washington, DC: Annual issues).

1995-99: Ibid., Analysis and Data Division, personal communications, 1996; 1997; 1998; and Mar. 28, 2000.

Table 2-15 Number of Pilot-Reported Near Midair Collisions (NMAC) by Degree of Hazard

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998[R]	1999
Degree of hazard												
Critical[a]	118	180	74	52	46	35	47	32	26	31	22	24
Potential[b]	319	423	266	197	195	158	139	139	101	105	97	100
No hazard[c]	122	133	114	99	70	61	71	63	55	70	52	55
Unclassified[d]	9	22	0	0	0	0	0	0	0	0	0	0
Open[e]	0	0	0	0	0	0	18	4	12	30	37	73
Total	**568**	**758**	**454**	**348**	**311**	**254**	**275**	**238**	**194**	**236**	**208**	**252**
NMAC involving aircraft operating under 14 CFR 121[f]	U	U	121	101	72	60	63	43	49	81	64	63

KEY: R = reversed; U = data are not available

[a] A situation where collision avoidance was due to chance, rather than an act on the part of the pilot. Less than 100 feet of aircraft separation would be considered critical.

[b] An incident that would probably have resulted in a collision if no action had been taken by either pilot. Less than 500 feet would usually be required in this case.

[c] When direction and altitude would have made a midair collision improbable, regardless of evasive action taken.

[d] No determination could be made, either due to insufficient evidence or unusual circumstances.

[e] Incidents that are still under investigation.

[f] Before Mar. 20, 1997, 14 CFR 121 applied only to aircraft with more than 30 seats or a maximum payload capacity of more than 7,500 pounds. Since Mar. 20, 1997, 14 CFR 121 includes aircraft with 10 or more seats that formerly operated under 14 CFR 135. This change makes it difficult to compare pre-1997 data with more recent data.

NOTE: Includes air carriers, general aviation, military, and other aircraft involved in public-use operations.

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, *Aviation Safety Statistical Handbook Annual Report* (Washington, DC: Annual issues).

NMAC involving 121 aircraft: Ibid., Air Traffic Resource Management, personal communications, Mar. 18, 1999 and May 22, 2000.

Table 2-16 Airline[a] Passenger Screening Results by Type of Weapons Detected, Persons Arrested, and Bomb Threats Received

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Persons screened (millions)	**585**	**993**	**1,145**	**1,015**	**1,111**	**1,150**	**1,261**	**1,263**	**1,497**	**1,660**	**1,903**	**1,754**
Type of weapon detected												
Firearms												
Handguns	1,878	2,823	2,490	1,597	2,503	2,707	2,860	2,230	1,999	1,905	1,401	1,421
Long guns	36	90	59	47	105	91	134	160	156	162	114	131
Total	**1,914**	**2,913**	**2,843**	**1,644**	**2,608**	**2,798**	**2,994**	**2,390**	**2,155**	**2,067**	**1,515**	**1,552**
Other/other dangerous articles[b]	108	74	304	275	N	N	N	N	N	N	N	N
Explosive/incendiary devices	8	12	15	94	167	251	N	N	N	N	N	N
Persons arrested												
Carrying firearms/explosives	1,031	1,310	1,336	893	1,282	1,354	1,433	1,194	999	924	660	633
Giving false information	32	42	18	28	13	31	35	68	131	72	86	58
Bomb threats received												
Against airports	1,179	477	448	498	188	304	250	346	N	U	U	U
Against aircraft	268	153	338	388	215	248	218	327	N	U	U	U

KEY: N = data do not exist; U = data are not available

[a] Includes operators with a U.S. Department of Transportation, Federal Aviation Administration operating certificate engaged in scheduled passenger or public charter passenger operations and airports at which these operations are conducted.

[b] In 1980 and 1985, the "Other" category was included with firearms; in 1990, "Other" became "Other Dangerous Articles."

SOURCES:

Persons screened and persons arrested: 1980-85: U.S. Department of Transportation, Federal Aviation Administration, *Semiannual Report to Congress on the Effectiveness of the Civil Aviation Security Program, July 1-December 31, 1985* (Washington, DC: May 1986).

1990-99: Ibid., Office of Civil Aviation Security Policy and Planning, *Annual Report to Congress on Civil Aviation Security* (Washington, DC: Annual issues), and personal communications, May 27, 1999 and Mar. 29, 2000.

Bomb threats received: Ibid., *Criminal Acts Against Civil Aviation* (Washington, DC: Annual issues).

Section C
Highway

Table 2-17 Motor Vehicle Safety Data

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities	**36,399**	**47,089**	**52,627**	**44,525**	**51,091**	**43,825**	**44,599**	**41,817**	**42,065**	**42,013**	**41,501**	**41,611**
Injured persons	**N**	**N**	**N**	**N**	**N**	**N**	**3,231,000**	**3,465,000**	**R3,483,000**	**3,348,000**	**3,192,000**	**3,236,000**
Crashes	**N**	**N**	**N**	**N**	**N**	**N**	**6,471,000**	**6,699,000**	**R6,770,000**	**6,624,000**	**R6,335,000**	**6,279,000**
Vehicle-miles (billions)	**719**	**888**	**1,110**	**1,328**	**1,527**	**1,775**	**2,144**	**2,423**	**2,486**	**R2,562**	**R2,632**	**2,691**
Rates per 100 million vehicle-miles												
Fatalities	5.1	5.3	4.7	3.4	3.3	2.5	2.1	1.7	1.7	1.6	R1.6	1.5
Injured persons	N	N	N	N	N	N	151	143	140	R131	R122	120
Crashes	N	N	N	N	N	N	302	277	272	R259	R241	233

KEY: N = data do not exist; R = revised

SOURCES:

Fatalities: 1960-70: Estimated by U.S. Department of Transportation, National Highway Traffic Safety Administration from data supplied by U.S. Department of Health and Human Services, National Center for Health Statistics, and individual state accident reports (adjusted to 30-day deaths). Fatalities data prior to 1975 have been adjusted to reflect the Fatality Analysis Reporting System's definition of a fatal crash as one that involves a motor vehicle on a trafficway, which results in the death of a vehicle occupant or a nonmotorist within 30 days of the crash.

1975-1998: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), table 2.

1999: Ibid., National Center for Statistics and Analysis, Fatality Analysis Reporting System (FARS) Database and General Estimates System Database, personal communication, Sept. 8, 2000.

Injured persons: Ibid.

Crashes: Ibid., table 1.

Vehicle-miles: 1960-65: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1970-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

1999: Ibid., *Early Assessment of 1999 Crashes, Injuries, and Fatalities* (Washington, DC: 2000).

Fatality and injury rates: 1960-98: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998 DOT HS 808 983* (Washington, DC: October 1999), table 2.

1999: Calculated by U.S. Department of Transportation, Bureau of Transportation Statistics.

Crash rates: Calculated by U.S. Department of Transportation, Bureau of Transportation Statistics.

Table 2-18 Motor Vehicle Fatalities, Vehicle-Miles, and Associated Rates by Highway Functional System

	1980	1985	1990	1995	1996	1997	1998
Fatalities							
Rural	**29,545**	**24,492**	**25,786**	**23,978**	**24,510**	**24,811**	**24,751**
Interstate	2,263	2,141	2,707	2,675	2,905	3,040	3,105
Other arterial	12,268	9,940	9,893	9,947	9,458	9,678	9,594
Collector	10,004	8,209	8,852	7,401	7,481	7,643	7,593
Local	5,010	4,202	4,334	3,955	4,666	4,450	4,459
Urban	**21,546**	**19,333**	**18,813**	**17,839**	**17,555**	**16,758**	**16,143**
Interstate	2,184	2,025	2,252	2,154	2,323	2,292	2,283
Other arterial	12,752	12,521	11,742	10,916	10,756	10,239	9,902
Collector	2,226	1,696	1,427	1,441	1,290	1,163	1,037
Local	4,384	3,091	3,392	3,328	3,186	3,064	2,921
VMT (millions)							
Rural	**672,030**	**730,728**	**868,878**	**933,289**	**960,194**	**1,001,350**	**1,033,457**
Interstate	135,084	154,357	200,173	223,382	232,565	240,255	251,520
Other arterial	262,774	282,803	330,866	368,595	378,847	392,058	403,484
Collector	189,468	206,669	240,460	236,148	241,030	254,364	257,858
Local	84,704	86,899	97,379	105,164	107,752	114,673	120,595
Urban	**855,265**	**1,044,098**	**1,275,484**	**1,489,534**	**1,523,886**	**1,560,345**	**1,598,065**
Interstate	161,242	216,188	278,901	341,528	351,579	361,401	374,622
Other arterial	484,189	578,270	699,233	815,170	834,623	846,659	862,994
Collector	83,043	89,578	106,297	126,929	129,310	130,143	131,919
Local	126,791	160,062	191,053	205,907	208,374	222,142	228,530

Continued next page

Table 2-18 Cont'd Motor Vehicle Fatalities, Vehicle-Miles, and Associated Rates by Highway Functional System

	1980	1985	1990	1995	1996	1997	1998
Fatality rates per 100 million vehicle miles							
Rural	**4.40**	**3.35**	**2.97**	**2.57**	**2.55**	**2.48**	**2.39**
Interstate	1.68	1.39	1.35	1.20	1.25	1.27	1.23
Other arterial	4.67	3.51	2.99	2.70	2.50	2.47	2.38
Collector	5.28	3.97	3.68	3.13	3.10	3.00	2.94
Local	5.91	4.84	4.45	3.76	4.33	3.88	3.70
Urban	**2.52**	**1.85**	**1.47**	**1.20**	**1.15**	**1.07**	**1.01**
Interstate	1.35	0.94	0.81	0.63	0.66	0.63	0.61
Other arterial	2.63	2.17	1.68	1.34	1.29	1.21	1.15
Collector	2.68	1.89	1.34	1.14	1.00	0.89	0.79
Local	3.46	1.93	1.78	1.62	1.53	1.38	1.28

NOTES: Includes the 50 states and the District of Columbia. Fatality figures reflect original figures received by FHWA from NHTSA, and, when totaled, differ slightly from the revised NHTSA figures that appear in other tables in this volume. VMT data are based on revised estimates from state highway agencies for the various functional systems and, when totaled, differ from the figures in the vehicle-miles table in chapter 1, which have not been revised by FHWA as of Oct. 25, 2000.

SOURCES:

Fatalities: 1980-95: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, Internet site www.fhwa.dot.gov/ohim/ohimstat.htm, as of Oct. 25, 2000.

1996-97: Ibid., *Highway Statistics*, Internet site www.fhwa.dot.gov/ohim/ohimstat.htm, as of Oct. 25, 2000, table FI-1.

1998: Ibid., table FI-20.

Vehicle miles: 1980-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-202.

1995-98: Ibid., *Highway Statistics*, Internet site www.fhwa.dot.gov/ohim/ohimstat.htm, as of Oct. 25, 2000, tables VM-2 and VM-2a.

Fatality rates: Calculated by the U.S. Department of Transportation, Bureau of Transportation Statistics.

Table 2-19 Occupant Fatalities by Vehicle Type and Nonoccupant Fatalities

	1975	1980	1985	1990	1995	1996	1997	1998[R]	1999
Occupant fatalities by vehicle type									
Passenger car									
Subcompact[a]	3,834	7,299	7,993	8,309	6,791	6,618	6,220	5,514	4,930
Compact	614	927	2,635	5,310	6,899	7,288	7,195	6,804	6,967
Intermediate	1,869	3,878	4,391	4,849	4,666	4,670	4,794	4,617	4,743
Full[b]	10,800	11,580	6,586	4,635	3,413	3,417	3,481	3,106	2,908
Unknown	8,812	3,765	1,607	989	654	512	509	1,153	1,270
Total	**25,929**	**27,449**	**23,212**	**24,092**	**22,423**	**22,505**	**22,199**	**21,194**	**20,818**
Truck[c]									
Light	4,856	7,486	6,689	8,601	9,568	9,932	10,249	10,705	11,243
Large	961	1,262	977	705	648	621	723	742	758
Total	**5,817**	**8,748**	**7,666**	**9,306**	**10,216**	**10,553**	**10,972**	**11,447**	**12,001**
Other vehicles									
Motorcycle	3,189	5,144	4,564	3,244	2,227	2,161	2,116	2,294	2,472
Bus	53	46	57	32	33	21	18	38	58
Other/unknown vehicle type	937	540	544	460	392	455	420	409	457
Total	**4,179**	**5,730**	**5,165**	**3,736**	**2,652**	**2,637**	**2,554**	**2,741**	**2,987**
TOTAL vehicle occupant fatalities	**35,925**	**41,927**	**36,043**	**37,134**	**35,291**	**35,695**	**34,725**	**35,382**	**35,806**
Nonoccupant fatalities									
Pedestrian	7,516	8,070	6,808	6,482	5,584	5,449	5,321	5,228	4,906
Pedalcyclist	1,003	965	890	859	833	765	814	760	750
Other	81	129	84	124	109	154	153	131	149
Total nonoccupant fatalities	**8,600**	**9,164**	**7,782**	**7,465**	**6,526**	**6,368**	**6,288**	**6,119**	**5,805**
TOTAL traffic fatalities	**44,525**	**51,091**	**43,825**	**44,599**	**41,817**	**[d]42,065**	**42,013**	**41,501**	**41,611**

KEY: R = revised

[a] Includes minicompact cars (wheelbase under 95 inches) and subcompact cars (wheelbase between 95 and 99 inches).

[b] Includes cars with a wheelbase of 110 inches or greater.

[c] See table 2-23 for definitions of light and large trucks.

[d] Includes 2 fatalities that could not be assigned to a category above.

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), table 4, and personal communication, Sept.11, 2000.

Breakout of passenger car types: Ibid., National Center for Statistics and Analysis, Fatality Analysis Reporting System Database, 1998.

Table 2-20 Occupant and Non-Motorist Fatalities in Crashes by Number of Vehicles and Alcohol Involvement

	1985		1990		1991		1992		1993		1994	
	Fatal	AI	Fatal	AI	Fatal	AI	Fatal	AI	Fatal	AI	Fatal	AI
Total Fatalities	**43,825**	**22,715**	**44,599**	**22,085**	**41,508**	**19,887**	**39,250**	**17,859**	**40,150**	**17,473**	**40,716**	**16,580**
Occupants	**36,043**	**18,791**	**37,134**	**18,442**	**34,740**	**16,588**	**32,880**	**14,814**	**33,574**	**14,404**	**34,318**	**13,746**
Single-vehicle crashes	17,130	10,706	18,159	11,000	17,280	10,086	15,958	8,844	15,932	8,564	15,997	8,084
Two-vehicle crashes	16,467	7,065	16,262	6,429	15,025	5,674	14,449	5,116	15,161	4,998	15,664	4,889
More than two-vehicle crashes	2,446	1,021	2,713	1,013	2,435	828	2,473	854	2,481	842	2,657	773
Non-motorists	**7,782**	**3,924**	**7,465**	**3,643**	**6,768**	**3,299**	**6,370**	**3,045**	**6,576**	**3,069**	**6,398**	**2,834**
Pedestrians	6,808	3,584	6,482	3,258	5,801	2,933	5,549	2,756	5,649	2,741	5,489	2,541
Single-vehicle crashes	6,342	3,297	5,990	2,971	5,302	2,643	5,099	2,494	5,180	2,477	5,027	2,286
Multiple-vehicle crashes	466	287	492	287	499	290	450	261	469	263	462	254
Pedalcyclists	890	303	859	332	843	319	723	250	816	295	802	266
Single-vehicle crashes	864	291	832	319	815	310	690	234	792	280	781	258
Multiple-vehicle crashes	26	12	27	13	28	9	33	15	24	16	21	8
Others/unknown	84	37	124	53	124	47	98	39	111	33	107	27

	1995		1996		1997		1998		1999	
	Fatal	AI	Fatal	AI	Fatal	AI	Fatal	AI	Fatal	AI
Total Fatalities	**41,817**	**17,247**	**42,065**	**17,217**	**42,013**	**16,190**	**41,501**	**16,020**	**41,611**	**15,786**
Occupants	**35,291**	**14,280**	**35,695**	**14,264**	**35,725**	**13,483**	**35,382**	**13,281**	**35,806**	**13,145**
Single-vehicle crashes	16,732	8,643	16,723	8,572	16,529	8,032	16,666	8,153	17,052	8,163
Two-vehicle crashes	15,744	4,794	15,935	4,813	16,218	4,637	15,742	4,363	15,690	4,204
More than two-vehicle crashes	2,815	843	3,037	878	2,978	814	2,974	766	3,064	778
Non-motorists	**6,526**	**2,967**	**6,370**	**2,953**	**6,288**	**2,707**	**6,119**	**2,739**	**5,805**	**2,642**
Pedestrians	5,584	2,627	5,449	2,615	5,321	2,384	5,228	2,429	4,906	2,325
Single-vehicle crashes	5,111	2,395	5,024	2,389	4,876	2,151	4,801	2,203	4,488	2,090
Multiple-vehicle crashes	474	232	425	227	445	233	427	226	418	235
Pedalcyclists	833	303	765	278	814	268	760	263	750	286
Single-vehicle crashes	807	292	739	268	788	259	736	254	714	267
Multiple-vehicle crashes	26	11	26	11	26	8	24	9	36	19
Others/unknown	**109**	**37**	**156**	**60**	**153**	**55**	**131**	**47**	**149**	**31**

KEY: AI = Alcohol involvement; Fatal = Fatalities

NOTE: Alcohol involvement pertains to either or both drivers in two-vehicle crashes and in the case of pedestrians or pedalcyclists killed in single-vehicle crashes, either the motor vehicle driver and/or the pedestrian or pedalcyclist. Alcohol results are determined from positive blood alcohol concentration (BAC) tests and police-reported alcohol involvement.

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, Fatality Analysis Reporting System (FARS) Database query, Internet site http://www-fars.nhtsa.dot.gov/www/query.html, as of July 27, 2000.

Table 2-21 Passenger Car Occupant Safety Data

	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities	**25,929**	**27,449**	**23,212**	**24,092**	**22,423**	**22,505**	**22,199**	**R21,194**	**20,818**
Injured persons	**N**	**N**	**N**	**2,376,000**	**2,469,000**	**2,458,000**	**2,341,000**	**2,201,000**	**2,138,000**
Crashes	**N**	**N**	**N**	**5,560,000**	**5,523,000**	**5,599,000**	**5,537,000**	**5,146,000**	**4,916,000**
Vehicle-miles (billions)	**1,030**	**1,107**	**1,249**	**1,427**	**1,478**	**1,499**	**1,528**	**1,552**	**1,567**
Rates per 100 million vehicle-miles									
Fatalities	2.5	2.5	1.9	1.7	1.5	1.5	1.4	1.4	1.3
Injured persons	N	N	N	167	167	164	153	141	136
Crashes	N	N	N	390	374	R373	R362	331	313

KEY: N = data do not exist; R = revised

NOTES: The injury and crash data in this table are from the U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration's (NHTSA) General Estimates System (GES). The data from GES, which began operation in 1988, are obtained from a nationally representative probability sample selected from all police-reported crashes. The GES sample includes only crashes where a police accident report was completed and the crash resulted in property damage, injury, or death. The resulting figures do not take into account crashes that were not reported to the police or that did not result in property damage. The 1993 *National Transportation Statistics* (NTS) *Historical Compendium* and earlier editions illustrated crashes and injury figures estimated by the National Safety Council, which used a different set of methods to arrive at its figures. Thus, the injury and crash figures in this edition of NTS may not be comparable with those found in earlier editions. USDOT, Bureau of Transportation Statistics rounded vehicle-miles to the nearest billion. Vehicle-miles in this table and in table 2-23 are taken from NHTSA revised data and are not based exclusively on USDOT, Federal Highway Administration (FHWA) data. The change was made to reflect the different vehicle classification schemes used by FHWA. and NHTSA. Thus, vehicle-miles for passenger cars, and light and large trucks in this table and table 2-23 should not be compared with vehicle-miles in chapter 1, which are taken directly from FHWA.

SOURCES:

Fatalities, injuries, vehicle miles, fatality and injury rates: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), table 7 and personal communication, Sept. 11, 2000.

Crashes: U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, Fatality Analysis Reporting System Database and General Estimates System Database, 1998.

Crash rates: Calculated by U.S. Department of Transportation, Bureau of Transportation Statistics by dividing the number of crashes by the vehicle-miles traveled.

Table 2-22 Motorcycle Rider Safety Data

	1990	1991	1992	1993	1994	1995	1996	1997	1998[R]	1999
Fatalities	**3,244**	**2,806**	**2,395**	**2,449**	**2,320**	**2,227**	**2,161**	**2,116**	**2,294**	**2,472**
Injured persons	**84,000**	**80,000**	**65,000**	**59,000**	**57,000**	**57,000**	**55,000**	**53,000**	**49,000**	**50,000**
Crashes	**103,000**	**106,000**	**72,000**	**72,000**	**67,000**	**63,000**	**66,000**	**61,000**	**54,000**	**57,000**
Vehicle-miles (billions)	**9.6**	**9.2**	**9.6**	**9.9**	**10.2**	**9.8**	**9.9**	**10.1**	**10.3**	**10.6**
Rates per 100 million vehicle-miles[a]										
Fatalities	34	31	25	25	23	23	22	21	22	23
Injured persons	882	876	681	600	561	587	562	534	476	472
Crashes[R]	1,078	1,155	753	727	654	643	675	604	524	538

KEY: R = revised; U = data are not available

[a] U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration (NHTSA) rounds its injury and crash data to the nearest thousand before publishing them, but it calculates injury rates using the unrounded data. NHTSA also calculates fatality and injury rates using vehicle-miles expressed to a higher level of precision than shown here. USDOT, Bureau of Transportation Statistics rounded vehicle-miles to the nearest 100 million in this table.

NOTE: The injury and crash data in this table are from NHTSA's General Estimates System (GES). The data from the GES, which began operation in 1988, are obtained from a nationally representative probability sample selected from all police-reported crashes. The GES sample includes only crashes where a police accident report was completed and the crash resulted in property damage, injury, or death. The resulting figures do not take into account crashes that were not reported to the police or that did not result in property damage. The 1993 *National Transportation Statistics* (NTS) *Historical Compendium* and earlier editions illustrated crashes and injury figures estimated by the National Safety Council, which used a different set of methods to arrive at its figures. Thus, the injury and crash figures in this edition of NTS may not be comparable with those found in the *Compendium* and earlier editions.

SOURCES:

Fatalities, injuries, and vehicle-miles: U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October, 1999), table 10, and personal communication, Sept. 11, 2000.

Crashes: Fatality Analysis Reporting System and General Estimates System, personal communications, Feb. 2, 1999, and Sept. 11, 2000.

Table 2-23 Truck Occupant Safety Data

	1975	1980	1985	1990	1995	1996	1997	1998[R]	1999
Fatalities									
Light	4,856	7,486	6,689	8,601	9,568	9,932	10,249	10,705	11,243
Large	961	1,262	977	705	648	621	723	742	758
Total	**5,817**	**8,748**	**7,666**	**9,306**	**10,216**	**10,553**	**10,972**	**11,447**	**12,001**
Injured persons									
Light	N	N	N	505,000	722,000	761,000	755,000	763,000	847,000
Large	N	N	N	42,000	30,000	33,000	31,000	29,000	33,000
Total	**N**	**N**	**N**	**547,000**	**752,000**	**794,000**	**786,000**	**792,000**	**880,000**
Crashes									
Light	N	N	N	2,152,000	2,709,000	2,881,000	2,901,000	2,866,000	3,080,000
Large	N	N	N	372,000	362,000	378,000	421,000	392,000	452,000
Total	**N**	**N**	**N**	**2,524,000**	**3,071,000**	**3,175,000**	**3,225,000**	**3,258,000**	**3,532,000**
Vehicle-miles (billions)									
Light	204	295	389	556	750	787	824	860	U
Large	81	108	124	146	178	183	191	196	U
Rates per 100 million vehicle-miles									
Fatalities									
Light	2.4	2.5	1.7	1.5	1.3	1.3	1.2	1.2	1.2
Large	1.2	1.2	0.8	0.5	0.4	0.3	0.4	0.4	0.4
Injured persons									
Light	N	N	N	91	96	98	93	89	94
Large	N	N	N	29	17	18	16	15	17
Crashes									
Light	N	N	N	387	361	366	352	333	U
Large	N	N	N	255	203	207	220	200	U

KEY: N = data do not exist; R = revised; U = data are not available

Continued next page

Table 2-23 Cont'd Truck Occupant Safety Data

NOTES: Large trucks–trucks over 10,000 pounds gross vehicle weight rating, including single-unit trucks and truck tractors. Light trucks--trucks of 10,000 pounds gross vehicle weight rating or less, including pickups, vans, truck-based stationwagons, and utility vehicles. The injury and crash data in this table are from the U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration's (NHTSA) General Estimates System (GES). The data from GES, which began operation in 1988, are obtained from a nationally representative probability sample selected from all police-reported crashes. The GES sample includes only crashes where a police accident report was completed and the crash resulted in property damage, injury, or death. The resulting figures do not take into account crashes that were not reported to the police or that did not result in property damage. The 1993 *National Transportation Statistics* (NTS) *Historical Compendium* and earlier editions illustrated crashes and injury figures estimated by the National Safety Council, which used a different set of methods to arrive at its figures. Thus, the injury and crash figures in this edition of NTS may not be comparable with those found in the *Compendium* and earlier editions.

USDOT, Bureau of Transportation Statistics rounded vehicle-miles to the nearest billion.

Vehicle-miles in this table and in table 3-19 are taken from NHTSA revised data and are not based exclusively on USDOT, Federal Highway Administration (FHWA) data, as they have been in earlier reports. The change was made to reflect the different vehicle classification schemes used by FHWA and NHTSA. Thus, vehicle-miles for passenger cars and light and large trucks in table 3-19 and this table should not be compared with vehicle-miles in Chapter 1, which are taken directly from FHWA.

SOURCES:

Fatalities, injuries, vehicle-miles, fatality and injury rates: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), tables 8 and 9, and personal communication, Sept. 11, 2000.

Crashes: Ibid., National Center for Statistics and Analysis, Fatality Analysis Reporting System Database and General Estimates System Database, 1998, and personal communication, Sept. 11, 2000.

Crash rates: Calculated by the U.S. Department of Transportation, Bureau of Transportation Statistics.

Table 2-24 Bus Occupant Safety Data[a]

	1975	1980	1985	1990	1995	1996	1997	1998[R]	1999
Fatalities	**53**	**46**	**57**	**32**	**33**	**21**	**18**	**38**	**58**
Injured persons	**N**	**N**	**N**	**33,000**	**19,000**	**20,000**	**17,000**	**16,000**	**22,000**
Crashes	**N**	**N**	**N**	**60,000**	**58,000**	**57,000**	**[R]54,000**	**53,000**	**63,000**
Vehicle-miles (billions)	**6.1**	**6.1**	**4.5**	**5.7**	**6.4**	**6.5**	**6.8**	**7.0**	**7.4**
Rates per 100 million vehicle-miles[b]									
Fatalities	0.9	0.8	1.3	0.6	0.5	0.3	0.3	0.5	0.8
Injured persons	N	N	N	576	298	305	[R]250	229	297
Crashes	N	N	N	1,048	909	869	[R]794	757	851

KEY: N = data do not exist; R = revised

[a] Bus includes school, transit, and intercity buses.

[b] The U.S. Department of Transportation(USDOT), National Highway Traffic Safety Administration(NHTSA) rounds its injury and crash data to the nearest thousand, but injury and crash rates are calculated using the unrounded data. NHTSA also calculates fatality, injury, and crash rates using vehicle-miles expressed to a higher level of precision than shown here. Thus, injury and crash rates shown in this table may differ slightly from the rates that would be calculated from the data in this table. USDOT, Bureau of Transportation Statistics has rounded vehicle-miles to the nearest 100 million in this table.

NOTES: The injury and crash data in this table are from the U.S. Department of Transportation (USDOT), National Highway Traffic Safety Administration's (NHTSA) General Estimates System (GES). The data from GES, which began operation in 1988, are obtained from a nationally representative probability sample selected from all police-reported crashes. The GES sample includes only crashes where a police accident report was completed and the crash resulted in property damage, injury, or death. The resulting figures do not take into account crashes that were not reported to the police or that did not result in property damage. The 1993 *National Transportation Statistics* (NTS) *Historical Compendium* and earlier editions illustrated crashes and injury figures estimated by the National Safety Council, which used a different set of methods to arrive at its figures. Thus, the injury and crash figures in this edition of NTS may not be comparable with those found in the *Compendium* and earlier editions.

SOURCES:

Fatalities and injuries: 1975-99: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998* DOT HS 808 983 (Washington, DC: October 1999), tables 4 and 51, and personal communication, Sept.11, 2000.

Crashes: 1990-98: Ibid., General Estimates System Database, personal communications.

Vehicle-miles: 1975-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 2-25 Fatalities by Highest Blood Alcohol Concentration (BAC) in Highway Crashes

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998[R]	1999
Total fatalities	**43,825**	**44,599**	**41,508**	**39,250**	**40,150**	**40,716**	**41,817**	**42,065**	**42,013**	**41,501**	**41,611**
Fatalities in alcohol-related crashes	**22,716**	**22,084**	**19,887**	**17,858**	**17,473**	**16,580**	**17,247**	**17,218**	**16,189**	**16,020**	**15,786**
Percent	51.8	49.5	47.9	45.5	43.5	40.7	41.2	40.9	38.5	38.6	37.9
BAC = 0.00											
Number	21,109	22,515	21,621	21,392	22,677	24,136	24,570	24,847	25,824	25,481	25,825
Percent	48.2	50.5	52.1	54.5	56.5	59.3	58.8	59.1	61.5	61.4	62.1
BAC = 0.01-0.09											
Number	4,604	4,434	3,957	3,625	3,496	3,480	3,746	3,774	3,480	3,526	3,466
Percent	10.5	9.9	9.5	9.2	8.7	8.5	9.0	9.0	8.3	8.5	8.3
BAC = 0.10+											
Number	18,111	17,650	15,930	14,234	13,977	13,100	13,501	13,444	12,710	12,494	12,321
Percent	41.3	39.6	38.4	36.3	34.8	32.2	32.3	32.0	30.3	30.1	29.6

KEY: BAC = blood alcohol concentration; R = revised

NOTES: BAC values have been assigned by U.S. Department of Transportation, National Highway Traffic Safety Administration when alcohol test results are unknown. Alcohol-related crashes pertain to the BAC of the driver and nonoccupants struck by motor vehicles.

For some years, numbers may not add to totals due to rounding.

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), table 13, and personal communication, Sept.11, 2000.

Table 2-26 Number of States with Different Types of Anti-DUI/DWI Legislation in Effect as of January 1 of the Listed Year

	1986	1990	1992	1994	1996	1997	1998	1999	2000
BAC = 0.08 per se laws[a]	2	4	5	10	13	13	15	16	[c]18
BAC level 0.02 or less for persons younger than 21 years	0	0	3	12	[c]28	[c]38	[c]51	[c]51	[c]51
Administrative license revocation (ALR) for DUI/DWI offenders[b]	[c]21	[c]27	[c]30	[c]33	[c]38	[c]40	[c]41	[c]41	[c]41

KEY: BAC = blood alcohol concentration; DUI = driving under the influence; DWI = driving while intoxicated

[a] Per se law makes it illegal in and of itself to drive with an alcohol concentration measured at or above a certain level.

[b] Those states that have thresholds for administrative license revocation (ALR) above those for DUI/DWI are not included in this total. New York, which limits the duration of ALR, is also not included. States that impose additional thresholds for ALR beyond those imposed for DUI/DWI are not included in these figures.

[c] Includes the District of Columbia.

NOTE: National Uniform Minimum Drinking Age Act, which standardized the minimum drinking age at 21, was enacted in 1984.

SOURCES:

0.02 BAC and Administrative license revocation: 1986-98: U.S. Department of Transportation, National Highway Traffic Safety Administration, Traffic Safety Programs, Research and Evaluation Division, personal communications, Apr. 9, 1999 and Oct. 4, 1999.

1999-2000: Ibid., Impaired Driving Division, personal communications, May 22, 2000.

0.08 BAC: Ibid., Presidential Initiative for Making 0.08 BAC the National Legal Limit, A Progress Report, Internet site http://www.nhtsa.dot.gov/people/injury/alcohol/limit.08/08progressreport/index.html, as of May 19, 2000.

Table 2-27 Motor Vehicle Fatal Crashes by Day of Week, Time of Day, and Weather and Light Conditions (percent)

	1990	1991	1992	1993	1994	1995[R]	1996	1997	1998	1999
Fatal crashes	**39,836**	**36,937**	**34,942**	**35,780**	**36,254**	**37,241**	**[R]37,494**	**[R]37,324**	**37,107**	**37,043**
Day of week										
Sunday	16.1	16.2	15.9	15.8	15.9	15.7	15.2	15.8	15.5	15.8
Monday	11.7	11.5	11.6	12.1	12.4	12.4	12.7	12.1	12.4	12.6
Tuesday	11.5	11.5	11.5	11.8	11.7	11.8	12.4	[R]11.9	12.4	11.9
Wednesday	11.5	11.9	12.3	12.0	12.3	11.9	12.2	13.0	12.4	12.5
Thursday	12.5	12.5	13.2	13.0	12.7	13.0	13.3	13.0	[R]13.5	12.9
Friday	16.6	16.5	16.1	16.3	16.3	16.6	16.1	16.1	15.8	15.9
Saturday	19.9	19.9	19.3	19.0	[R]18.6	18.5	18.1	18.0	18.0	18.5
Unknown	0.02	0.03	0.01	0.02	[R]0.04	0.03	0.04	0.05	0.04	0.02
Time of day										
Midnight to 3 a.m.	15.7	15.3	14.3	[R]13.8	13.1	12.8	[R]12.6	12.2	12.3	12.2
3 a.m. to 6 a.m.	7.7	7.9	7.4	[R]7.3	7.3	7.5	7.4	7.2	7.3	7.8
6 a.m. to 9 a.m.	8.6	8.6	8.5	8.9	9.3	9.2	9.5	9.9	9.7	10.1
9 a.m. to noon	8.4	8.6	8.8	9.7	9.6	9.4	9.7	9.9	10.2	10.0
Noon to 3 p.m.	11.5	0.0	12.4	12.5	13.1	12.9	12.7	13.3	13.4	13.2
3 p.m. to 6 p.m.	15.6	15.7	16.0	16.0	16.6	16.8	16.9	16.6	16.8	16.8
6 p.m. to 9 p.m.	15.5	15.6	16.5	16.2	15.7	15.9	15.7	15.9	15.6	15.4
9 p.m. to midnight	15.9	15.8	15.3	14.7	14.3	14.6	14.6	14.1	13.8	13.8
Unknown	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9
Atmospheric condition										
Normal	86.7	86.7	85.6	[R]87.0	[R]87.3	86.4	86.3	[R]86.4	[R]87.2	89.0
Rain	9.3	9.0	10.0	8.7	8.3	8.5	8.4	[R]8.8	8.8	7.3
Snow/sleet	1.6	1.9	2.0	2.2	1.8	2.4	2.7	2.5	[R]1.7	1.6
Other/unknown	2.3	2.4	2.3	[R]2.1	[R]2.5	2.6	2.6	[R]2.3	[R]2.3	2.1
Light condition										
Daylight	45.0	45.4	46.0	47.7	[R]49.5	[R]48.7	49.3	[R]50.3	[R]50.5	50.7
Dark, but lighted	17.7	17.4	17.4	[R]16.4	15.6	15.8	15.9	[R]15.6	[R]14.9	14.9
Dark	32.7	33.0	32.4	[R]31.5	[R]30.3	[R]30.3	30.3	[R]29.5	30.0	29.7
Dawn or dusk	4.2	3.9	3.9	4.2	[R]4.2	[R]4.2	[R]4.2	4.2	4.3	4.3
Unknown	0.3	0.3	0.3	[R]0.2	[R]0.2	[R]0.4	0.3	1.0	[R]0.3	0.3

KEY: R = revised

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts* (Washington, DC: Annual issues), tables 24 and 25 and personal communication, Sept. 11, 2000.

Table 2-28 Motor Vehicle Fatal Crashes by Posted Speed Limit

	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Under 55 mph												
0-25 mph[a]	2,617	2,865	2,504	2,234	2,097	1,911	1,895	1,890	1,893	1,896	1,955	1,873
26-35 mph	6,099	8,527	7,889	7,756	6,908	6,696	6,759	6,565	6,681	6,445	6,383	6,025
36-45 mph	4,276	6,256	6,813	7,092	6,608	6,345	6,454	6,632	6,938	7,096	7,132	7,349
46-54 mph	2,241	2,431	2,072	2,054	1,894	1,875	1,877	1,861	1,927	1,908	1,788	1,771
Total	**15,233**	**20,079**	**19,278**	**19,136**	**17,507**	**16,827**	**16,985**	**16,948**	**17,439**	**17,345**	**17,258**	**17,018**
55 mph and above												
55 mph	16,094	20,352	18,862	17,556	16,543	15,444	15,980	16,512	16,753	14,097	12,897	12,522
60 mph	N	N	N	18	9	4	9	13	16	523	935	1,073
65 mph	N	N	N	2,175	2,078	2,002	2,155	2,173	2,323	3,214	3,311	3,421
70 mph	N	N	N	0	0	0	0	0	38	1,282	1,633	1,835
Over 70 mph	N	N	N	0	0	0	0	0	10	344	475	482
Total	**16,094**	**20,352**	**18,862**	**19,749**	**18,630**	**17,450**	**18,144**	**18,698**	**19,140**	**19,460**	**19,251**	**19,333**
Unknown, total	**7,834**	**4,853**	**1,055**	**951**	**800**	**665**	**651**	**608**	**662**	**689**	**815**	**756**
TOTAL fatal crashes	**39,161**	**45,284**	**39,195**	**39,836**	**36,937**	**34,942**	**35,780**	**36,254**	**37,241**	**37,494**	**37,324**	**37,107**

KEY: N = data do not exist

[a] The "No Statutory Limit" speed limit designation is included in this category.

NOTES: In 1974, Congress enacted a national maximum speed limit of 55 miles per hour (mph). Amendments in 1987 and 1991 allowed states to increase speed limits to 65 mph on rural Interstates and similar highways. The National Maximum Speed Limit was repealed in late 1995; speed limits are again set by the states, some of which have raised their maximum speed limits to 70 mph or above.

SOURCES: 1975-93: U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, Fatality Analysis Reporting System, personal communications, Oct. 22, 1996, February 1999, and Oct. 4, 1999.

1994-98: Ibid., Internet data query from Internet site http://www-fars.nhtsa.dot.gov/www/query.html, as of June 13, 2000.

Table 2-29 Safety Belt and Motorcycle Helmet Use

	1994	1996	1998
OVERALL BELT USE	**58.0%**	**61.3%**	**68.9%**
Drivers	59.1%	62.2%	70.1%
Passengers	55.2%	58.8%	65.3%
Passenger cars	**62.8%**	**64.4%**	**71.3%**
Drivers	64.2%	65.1%	72.4%
Passengers	59.1%	62.3%	68.1%
Light trucks[a]	**50.2%**	**56.4%**	**65.7%**
Drivers	50.7%	57.5%	67.1%
Passengers	49.1%	53.0%	61.4%
Helmet Use[b]	**62.5%**	**64.1%**	**67.2%**
Operators	67.1%	65.5%	64.4%
Riders	54.4%	58.0%	84.4%

[a] Includes pickup trucks, vans, minivans, and sport utility vehicles.

[b] In 1994, operators and riders were counted as helmeted if wearing any type of helmet. In 1996 and 1998, only those operators and riders wearing safety helmets that met U.S. Department of Transportation (DOT) standards were counted. Those safety helmets that do not meet DOT standards were treated as if the operator/rider were not wearing a helmet.

NOTE: Occupants of commercial and emergency vehicles are excluded.

SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Research Note*, Observed Safety Belt Use in 1999, (Washington, DC: September 1999), Internet site-http://www.nhtsa.dot.gov/people/ncsa/98obbelt.html as of Apr. 6, 2000, table 3. Data are from the National Occupant Protection Use Survey (NOPUS), Moving Traffic Study, 1994, 1996, and 1998.

Table 2-30 Estimated Number of Lives Saved by Use of Restraints

	1975	1980	1985	1990	1995	1996	1997	1998	Total 1975-1998
Safety belts[a]	978	575	2,435	6,592	9,790	10,414	10,750	11,018	112,016
Air bags	0	0	0	37	470	686	842	1,043	3,706
Motorcycle Helmets	823	871	788	602	506	490	486	500	16,605
Age 21 minimum legal drinking age	412	595	701	1,033	851	846	846	861	18,220
Child restraints	36	49	153	222	279	365	312	299	4,193
Safety seats	33	39	135	193	232	313	266	244	3,559
Adult safety belts[b]	3	10	18	29	47	52	46	55	634

[a] Represents all adults and children age 5 and older. Data are for passenger vehicles, which include cars, light trucks, vans, pickups, and utility vehicles. Excludes medium and heavy trucks.

[b] Represents children age 4 and younger restrained only by adult safety belts.

SOURCE: Computed by U.S. Department of Transportation, National Highway Traffic Safety Administration, personal communication, Apr. 5, 2000.

Section D
Transit

Table 2-31 Transit Safety and Property Damage Data

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fatalities[a]	**339**	**300**	**273**	**281**	**320**	**274**	**264**	**275**	**286**	**299**
Injuries[a]	**54,556**	**52,125**	**55,089**	**52,668**	**58,193**	**57,196**	**55,288**	**56,132**	**55,990**	**55,325**
Accidents[b]	**58,002**	**46,467**	**36,380**	**30,559**	**29,972**	**25,683**	**25,166**	**24,924**	**23,937**	**23,416**
Incidents[a,b] (includes accidents)	**90,163**	**83,139**	**73,831**	**64,986**	**70,693**	**62,471**	**59,392**	**R61,561**	**60,094**	**58,703**
Vehicle-miles (millions)	**2,490**	**2,478**	**2,510**	**2,535**	**2,581**	**2,620**	**2,605**	**2,702**	**2,833**	**2,927**
Rates per 100 million vehicle-miles[c]										
Fatalities (all reportable incidents)	13.6	12.1	10.9	11.1	12.4	10.5	10.1	10.2	10.1	10.2
Injuries (all reportable incidents)	2,191	R2,103	2,195	R2,077	R2,254	R2,183	2,122	R2,078	1,976	1,890
Accidents	2,329	1,875	R1,450	1,205	1,161	980	966	922	845	800
Property damage[d] (current $ millions)	**38.0**	**37.5**	**37.5**	**44.9**	**38.4**	**46.3**	**57.6**	**55.5**	**61.5**	**55.3**

KEY: R = revised

[a] Totals do not include data for cable car, inclined plane, jitney, and ferry boat. These data appear in the footnotes for table 2-29.

[b] Accidents include collisions with other vehicles, objects, and people (except suicides), and derailments/buses going off the road. Incidents include accidents plus personal casualties (inside vehicles, inside stations, and boarding and alighting vehicle) and fires.

[c] Fatality and injury rates are based on total incidents, including accidents, and were calculated by dividing the number of fatalities, injuries, and incidents in this table by the number of vehicle miles.

[d] Total does not include property damage for cable car, inclined plane, jitney, and ferry boat, which were: 1990-$300,000; 1991-$400,000; 1992-$300,000; 1993-$200,000; 1994-$300,000; 1995-$3,300,000; 1996-$200,000; 1997-$67,000; 1998-$24,000.

NOTES: Data are provided only for transit systems that furnished safety data for inclusion in the U.S. Department of Transportation, Federal Transit Administration Safety Management Information Statistics (SAMIS) annual reports. Transit vehicle-miles in this table differ from those reported in Chapter 1. The American Public Transit Association, which is the source for the vehicle-miles table in Chapter 1, includes all transit systems, while SAMIS covers only directly operated urban transit systems.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics (SAMIS) 1998 Annual Report* (Cambridge, MA: December 1999), and personal communication, Dec. 6, 2000.

Table 2-32 Transit Safety Data by Mode[a] for All Reported Accidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fatalities										
Motor bus[c]	92	80	91	79	90	69	82	100	90	91
Light rail	5	11	6	14	10	10	5	3	14	13
Heavy rail	51	59	33	37	41	43	32	28	18	21
Commuter rail	63	63	43	59	82	56	30	52	67	62
Demand responsive	0	2	0	2	2	1	3	2	2	1
Van pool	0	0	0	0	0	0	0	0	0	0
Automated guideway	1	0	0	0	0	0	0	0	1	0
Total	**212**	**215**	**173**	**191**	**225**	**179**	**152**	**185**	**192**	**188**
Injured persons										
Motor bus[c]	18,876	19,016	20,556	20,862	19,663	20,879	21,222	20,145	20,138	20,290
Light rail	465	474	468	361	327	355	680	320	332	427
Heavy rail	296	308	273	365	309	348	431	336	261	286
Commuter rail	84	560	110	210	216	159	213	99	66	54
Demand responsive	286	200	233	224	399	395	379	499	492	632
Van pool	16	36	13	58	24	23	25	52	53	37
Automated guideway	0	0	0	1	1	0	0	1	1	0
Total	**20,023**	**20,594**	**21,653**	**22,081**	**20,939**	**22,159**	**22,950**	**21,452**	**21,343**	**21,726**
Accidents										
Motor bus[c]	55,289	44,467	34,282	28,596	27,754	23,819	23,425	22,995	22,277	21,407
Light rail	699	671	600	449	512	309	341	363	328	300
Heavy rail	144	188	613	662	744	637	346	325	293	396
Commuter rail	175	248	181	208	266	216	201	192	193	215
Demand responsive	1,613	814	668	524	659	647	774	886	664	862
Van pool	81	79	35	119	36	54	78	160	179	130
Automated guideway	1	1	1	1	1	1	1	3	3	0
Total	**58,002**	**46,468**	**36,380**	**30,559**	**29,972**	**25,683**	**25,166**	**24,924**	**23,937**	**23,310**

KEY: R = revised

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Table 2-32 Cont'd Transit Safety Data by Mode[a] for All Reported Accidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Vehicle miles (millions)										
Motor bus[c]	1,668	1,661	1,688	1,690	1,702	1,702	1,687	1,719	1,779	1,835
Light rail	24	27	28	27	34	34	37	41	43	48
Heavy rail	529	522	520	518	522	537	543	558	566	578
Commuter rail	187	188	188	206	210	217	203	216	242	249
Demand responsive	74	71	72	77	94	109	108	134	157	167
Van pool	8	8	13	16	18	19	25	33	44	49
Automated guideway	0.6	0.5	1.0	1.0	1.2	1.1	1.4	1.4	1.4	1.4
Total	**2,490**	**2,478**	**2,510**	**2,535**	**2,581**	**2,620**	**2,605**	**2,702**	**2,833**	**2,927**
Rates per 100 million vehicle-miles[d]										
Fatalities										
Motor bus[c]	5.5	4.8	5.4	4.7	5.3	4.1	4.9	5.8	5.1	5.0
Light rail	20.8	40.3	21.2	51.1	29.6	29.0	R13.3	R7.4	32.3	27.1
Heavy rail	9.6	11.3	6.3	7.1	7.9	8.0	5.9	5.0	3.2	3.6
Commuter rail	33.6	R33.4	22.9	28.6	39.0	25.8	14.8	24.1	27.6	24.9
Demand responsive	0	2.8	0	2.6	2.1	0.9	2.8	1.5	1.3	0.6
Van pool	0	0	0	0	0	0	0	0	0	0
Automated guideway	R162.0	0	0	0	0	0	0	0	69.0	0
Total	**8.5**	**8.7**	**6.9**	**7.5**	**8.7**	**6.8**	**5.8**	**6.8**	**6.8**	**6.4**
Injured persons										
Motor bus[c]	1,132	1,145	1,218	1,234	1,155	1,227	1,258	1,172	1,132	1,106
Light rail	1,933	1,735	1,654	1,318	968	1,030	R1,815	R785	767	889
Heavy rail	56	59	52	71	59	65	79	60	46	50
Commuter rail	45	297	59	102	103	73	105	46	27	22
Demand responsive	386	282	324	292	425	361	R349	372	313	379
Van pool	208	430	103	363	132	123	R101	158	121	75
Automated guideway	0	0	0	104	85	0	0	R70	69	0
Total	**804**	**831**	**863**	**871**	**811**	**846**	**R881**	**794**	**753**	**742**

KEY: R = revised

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Table 2-32 Cont'd Transit Safety Data by Mode[a] for All Reported Accidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Accidents										
Motor bus[c]	3,315	2,678	2,031	1,692	1,631	1,400	1,389	1,338	1,252	1,166
Light rail	2,906	2,456	2,121	1,639	1,516	897	R910	R891	758	624
Heavy rail	27	36	118	128	142	119	64	58	52	69
Commuter rail	93	132	96	101	127	100	99	89	80	86
Demand response	2,177	1,147	928	682	702	591	R714	661	423	516
Van pool	1,052	944	278	744	198	289	R314	485	408	263
Automated guideway	162	204	102	104	85	87	R69	R209	207	0
Total	**2,329**	**1,875**	**R1,450**	**1,205**	**1,161**	**980**	**R966**	**922**	**845**	**796**

KEY: R = revised

[a] Accident statistics for cable car, inclined plane, jitney, and ferry boat are not available. The number of incidents, fatalities, and injuries for these modes appear in the footnotes for table 2-33.

[b] Accidents include collisions with vehicles, objects, people (except suicides), and derailments/vehicles going off road.

[c] Motor bus also includes trolley bus.

[d] Rates are based on total incidents including accidents and were calculated by dividing the number of fatalities, injuries, and incidents in this table by the number of vehicle miles.

NOTES: Data are provided only for transit systems that have provided safety data for inclusion in the U.S. Department of Transportation, Federal Transit Administration, Safety Management Information Statistics (SAMIS) annual reports. SAMIS data cover only direct-operated urban transit systems. Vehicle-miles for all transit systems including nonurban and purchased can be found in the vehicle-miles table in Chapter 1.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics* (SAMIS) 1998 Annual Report (Cambridge, MA: Dec. 1999), and personal communication, Dec. 6, 2000.

Table 2-33 Transit Safety Data by Mode[a] for All Reported Incidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fatalities										
Motor bus[c]	110	88	99	83	108	82	101	109	109	102
Light rail	7	13	9	15	13	15	6	3	23	17
Heavy rail	117	103	91	83	85	79	74	77	54	84
Commuter rail	104	93	74	98	112	92	72	79	94	95
Demand responsive	0	3	0	2	2	6	11	7	4	1
Van pool	0	0	0	0	0	0	0	0	0	0
Automated guideway	1	0	0	0	0	0	0	0	2	0
Total	**339**	**300**	**273**	**281**	**320**	**274**	**264**	**275**	**286**	**299**
Injured persons										
Motor bus[c]	40,006	38,619	40,090	38,873	42,195	41,297	39,709	39,181	41,035	41,221
Light rail	1,244	1,251	1,268	982	1,181	1,319	1,604	1,087	1,076	1,271
Heavy rail	10,036	9,285	10,446	10,532	11,673	11,238	11,093	12,285	11,059	9,665
Commuter rail	2,438	2,308	2,546	1,560	2,374	2,374	1,953	2,388	1,677	1,761
Demand responsive	807	622	713	652	731	935	882	1,121	1,064	1,345
Van pool	21	40	19	59	29	25	27	54	67	41
Automated guideway	4	0	7	10	10	8	20	16	12	21
Total	**54,556**	**52,125**	**55,089**	**52,668**	**58,193**	**57,196**	**55,288**	**56,132**	**55,990**	**55,325**
All incidents										
Motor bus[c]	70,437	63,453	52,482	45,580	49,185	42,780	40,456	40,524	41,616	41,094
Light rail	1,465	1,543	1,492	1,136	1,413	1,276	1,350	1,173	1,121	1,182
Heavy rail	12,178	14,102	15,512	15,082	15,869	14,327	13,748	15,151	13,516	12,196
Commuter rail	3,031	2,716	3,160	2,111	3,115	2,847	2,449	3,078	2,410	2,499
Demand responsive	2,965	1,241	1,137	946	1,062	1,173	1,284	1,454	1,221	1,577
Van pool	84	83	40	121	39	58	80	162	194	135
Automated guideway	3	1	8	10	10	10	25	19	16	20
Total	**90,163**	**83,139**	**73,831**	**64,986**	**70,693**	**62,471**	**59,392**	**61,561**	**60,094**	**58,703**

KEY: R = revised

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Table 2-33 Cont'd Transit Safety Data by Mode[a] for All Reported Incidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Passengers served (millions)										
Motor bus[c]	4,912	4,780	4,728	4,585	4,567	4,539	4,464	4,554	4,712	4,926
Light rail	174	184	187	187	274	249	259	259	273	289
Heavy rail	2,252	2,123	2,119	1,960	2,149	2,034	2,157	R2,429	2,393	2,521
Commuter rail	286	274	262	303	318	322	302	311	360	347
Demand responsive	14	13	13	15	17	18	17	48	22	23
Van pool	2	2	3	4	5	5	6	8	9	10
Automated guideway	6	4	R5	5	6	6	6	6	6	5
Total	**7,646**	**7,380**	**7,318**	**7,059**	**7,335**	**7,172**	**7,211**	**R7,615**	**7,774**	**8,121**
Rates per 100 million passengers[d]										
Fatalities										
Motor bus[c]	2.2	1.8	2.1	1.8	2.4	1.8	2.3	2.4	2.3	2.1
Light rail	4.0	7.1	4.8	8.0	4.7	6.0	2.3	1.2	8.4	5.9
Heavy rail	5.2	4.9	4.3	4.2	4.0	3.9	3.4	3.2	2.3	3.3
Commuter rail	36.4	33.9	R28.3	R32.4	35.2	28.6	23.8	25.4	26.1	25.4
Demand responsive	0	R22.6	0	R13.5	R12.0	R33.9	R65.5	14.6	18.1	4.3
Van pool	0	0	0	0	0	0	0	0	0	0
Automated guideway	R17.0	0	0	0	0	0	0	0	32.5	0
All modes	**4.4**	**4.1**	**3.7**	**4.0**	**4.4**	**3.8**	**3.7**	**3.6**	**3.7**	**3.7**
Injured persons										
Motor bus[c]	R815	808	848	848	924	910	890	860	871	837
Light rail	715	R682	R677	R524	R432	R529	R620	R419	394	440
Heavy rail	446	437	493	537	543	553	514	506	462	383
Commuter rail	R853	R843	972	R516	747	R738	R646	R769	466	471
Demand responsive	R5,835	R4,678	R5,393	R4,401	R4,390	R5,286	R5,251	R2,336	4,821	5,846
Van pool	R1,037	R1,721	R584	R1,398	R638	R537	R461	R701	773	411
Automated guideway	R68	0	R127	R194	R160	R123	R317	R272	195	389
All modes	**714**	**706**	**753**	**746**	**793**	**798**	**767**	**R737**	**720**	**681**

KEY: R = revised

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Table 2-33 Cont'd Transit Safety Data by Mode[a] for All Reported Incidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
All incidents										
Motor bus[c]	R1,434	1,327	1,110	994	1,077	R943	906	890	883	834
Light rail	842	R841	R796	R606	516	512	R522	R452	411	410
Heavy rail	541	664	732	769	738	R705	637	R624	565	484
Commuter rail	1,060	991	R1,207	R698	980	R885	R810	R991	670	668
Demand responsive	R21,440	R9,333	R8,600	R6,385	R6,378	R6,632	R7,644	R3,030	5,532	6,854
Van pool	R4,147	R3,570	R1,229	R2,867	R858	R1,245	R1,366	R2,104	2,238	1,353
Automated guideway	R51	R28	R145	R194	R160	R154	R396	R323	260	371
All modes	**1,179**	**R1,126**	**1,009**	**921**	**964**	**871**	**824**	**808**	**773**	**723**

KEY: R = revised

[a] The figures for cable car, inclined plane, jitney, and ferry boat are lumped together and appear in this footnote as follows:

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fatalities:	2	1	0	1	0	0	1	0	0
Injuries:	378	327	399	383	616	598	354	357	379
Incidents:	186	411	400	411	650	536	301	353	253

[b] Incidents include accidents (collisions with vehicles, objects, people (except suicides), derailments/vehicles going off road), plus personal casualties, fires, and property damage associated with transit agency revenue vehicles and all transit facilities.

[c] Motor bus also includes trolley bus.

[d] Rates are based on total incidents including accidents and were calculated by dividing the number of fatalities, injuries, and incidents in this table by the number of passengers served.

NOTES: Data are provided only for transit systems which have provided safety data for inclusion in the U.S. Deaprtment of Transportation, Federal Transit Administration, Safety Management Information Statistics (SAMIS) annual reports. SAMIS data covers only direct-operated urban transit systems.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics (SAMIS) 1998 Annual Report* (Cambridge, MA: December 1999), and personal communication, Dec. 6, 2000.

Table 2-34 Reports of Violent Crime, Property Crime, and Arrests by Transit Mode

	1995	1996	1997	1998
Reported offenses, violent crime				
Homicide[a]	**19**	**20**	**19**	**51**
Motor bus	8	9	6	40
Commuter rail	1	1	4	1
Demand responsive	0	0	0	0
Heavy rail	8	9	8	6
Light rail	2	1	1	4
Other[b]	0	0	0	0
Forcible rape[c]	**29**	**38**	**31**	**47**
Motor bus	11	13	10	16
Commuter rail	5	4	7	1
Demand responsive	0	0	2	4
Heavy rail	13	19	8	24
Light rail	0	2	4	2
Other[b]	0	0	0	0
Robbery[d]	**2,811**	**4,563**	**4,760**	**3,684**
Motor bus	909	871	870	605
Commuter rail	181	242	187	133
Demand responsive	1	3	0	1
Heavy rail	1,490	3,164	3,394	2,686
Light rail	181	238	222	220
Other[b]	49	45	87	39
Aggravated assault[e]	**2,701**	**3,084**	**3,105**	**2,314**
Motor bus	1,941	1,677	1,294	1,186
Commuter rail	133	69	92	80
Demand responsive	6	13	13	13
Heavy rail	437	1,074	1,051	837
Light rail	157	199	143	170
Other[b]	27	52	512	28

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Table 2-34 Cont'd Reports of Violent Crime, Property Crime, and Arrests by Transit Mode

	1995	1996	1997	1998
Reported offenses, property crime				
Theft[f]	**10,596**	**13,238**	**14,486**	**11,830**
Motor bus	2,738	3,408	2,920	2,327
Commuter rail	2,238	2,262	2,345	2,021
Demand responsive	2	8	40	15
Heavy rail	4,625	6,794	8,321	6,807
Light rail	451	609	479	496
Other[b]	542	157	381	164
Vehicle theft[g]	**2,182**	**2,261**	**2,276**	**2,225**
Motor bus	263	306	198	208
Commuter rail	253	125	262	470
Demand responsive	0	1	3	9
Heavy rail	1,536	1,694	1,630	1,234
Light rail	128	135	179	273
Other[b]	2	0	4	31
Burglary[h]	**1,759**	**1,650**	**1,757**	**491**
Motor bus	156	104	94	75
Commuter rail	178	177	260	217
Demand responsive	2	0	4	3
Heavy rail	1,367	1,278	1,343	110
Light rail	43	78	48	70
Other[b]	13	13	8	16
Arson[i]	**63**	**96**	**75**	**60**
Motor bus	29	67	33	21
Commuter rail	14	1	21	10
Demand responsive	0	0	0	0
Heavy rail	14	22	16	27
Light rail	6	6	5	2
Other[b]	0	0	0	0

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Table 2-34 Cont'd Reports of Violent Crime, Property Crime, and Arrests by Transit Mode

	1995	1996	1997	1998
Reported offenses, arrests				
Other assaults[j]	**2,991**	**3,088**	**2,697**	**2,787**
Motor bus	1,896	1,571	1,439	1,400
Commuter rail	144	106	140	122
Demand responsive	4	0	16	3
Heavy rail	645	932	881	898
Light rail	181	330	195	282
Other[b]	121	149	26	82
Vandalism[k]	**17,228**	**8,627**	**9,539**	**6,571**
Motor bus	13,343	6,167	5,262	3,656
Commuter rail	1,071	309	659	778
Demand responsive	12	17	8	10
Heavy rail	1,157	1,339	1,128	1,067
Light rail	1,505	609	2,084	947
Other[b]	140	186	398	113
Sex offenses[l]	**664**	**803**	**1,047**	**962**
Motor bus	242	260	363	258
Commuter rail	100	41	82	91
Demand responsive	5	0	6	2
Heavy rail	249	430	517	541
Light rail	59	71	79	68
Other[b]	9	1	0	2
Drug abuse violations[m]	**2,578**	**3,944**	**4,355**	**3,792**
Motor bus	1,037	2,122	1,970	1,414
Commuter rail	303	393	477	495
Demand responsive	1	0	15	21
Heavy rail	1,078	1,130	1,530	1,550
Light rail	151	298	336	271
Other[b]	8	1	27	41
Driving under the influence[n]	**466**	**129**	**205**	**176**
Motor bus	91	82	101	101
Commuter rail	26	21	22	21
Demand responsive	0	0	1	4
Heavy rail	52	8	22	21
Light rail	292	16	31	21
Other[b]	5	2	28	8

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Table 2-34 Cont'd Reports of Violent Crime, Property Crime, and Arrests by Transit Mode

	1995	1996	1997	1998
Reported offenses, arrests				
Drunkeness[o]	**10,479**	**6,921**	**8,632**	**12,643**
Motor bus	6,457	3,936	5,346	3,046
Commuter rail	71	23	226	156
Demand responsive	2	2	46	34
Heavy rail	1,511	1,617	1,601	7,340
Light rail	2,255	1,305	1,258	1,844
Other[b]	183	38	155	223
Disorderly conduct[p]	**22,206**	**26,178**	**25,325**	**15,897**
Motor bus	4,681	5,025	6,978	4,521
Commuter rail	810	1,085	1,399	1,525
Demand responsive	5	8	47	5
Heavy rail	15,258	19,183	15,309	8,227
Light rail	1,164	800	1,177	1,408
Other[b]	288	77	415	211
Trespassing[q]	**3,362**	**3,497**	**7,444**	**6,049**
Motor bus	928	604	1,225	1,283
Commuter rail	845	674	4,150	2,850
Demand responsive	0	0	2	2
Heavy rail	1,155	1,208	1,398	1,254
Light rail	400	653	463	443
Other[b]	34	358	206	217
Fare evasion[r]	**33,903**	**47,873**	**53,406**	**58,856**
Motor bus	3,172	2,372	1,819	1,694
Commuter rail	140	334	310	204
Demand responsive	1	1	2	5
Heavy rail	8,247	39,957	46,106	40,350
Light rail	22,212	1,185	912	12,798
Other[b]	131	4,024	4,257	3,805
Curfew and loitering laws[s]	**1,878**	**872**	**1,960**	**1,161**
Motor bus	1,201	241	1,112	291
Commuter rail	19	27	223	72
Demand responsive	0	1	5	0
Heavy rail	462	493	530	680
Light rail	161	95	80	106
Other[b]	35	15	10	12

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Table 2-34 Cont'd Reports of Violent Crime, Property Crime, and Arrests by Transit Mode

[a] The killing of one or more human beings by another. This includes murder, non-negligent manslaughter and manslaughter by negligence.

[b] Other transit mode includes automated guideway, cable car, ferryboat, trolleybus, vanpool, and monorail.

[c] The carnal knowledge of a female forcibly and against her will. This includes assault to rape or attempt to rape.

[d] The taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear. The use or threat of force includes firearms, knives or cutting instruments, other dangerous weapons (clubs, acid, explosives), and strong-arm techniques (hands, fists, feet).

[e] An unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury. This type of assault usually is accompanied by the use of a weapon or by means likely to produce death or great bodily harm.

[f] The unlawful taking, carrying, leading, or riding away of property from the possession or constructive possession of another. This includes pocket-picking, purse-snatching, shoplifting, thefts from motor vehicles, thefts of motor vehicle parts and accessories, theft of bicycles, theft from buildings, theft from coin-operated devices or machines, and all other theft not specifically classified.

[g] The theft or attempted theft of a motor vehicle. A motor vehicle is a self-propelled vehicle that runs on the surface of land and not on rails. Examples of motor vehicles are automobiles, trucks, buses, motor cycles, and motor scooters.

[h] The unlawful entry of a structure to commit a felony or a theft. This includes offenses known locally as burglary (any degree), unlawful entry with intent to commit a larceny or felony, breaking and entering with intent to commit a larceny, housebreaking, safe-cracking, and all attempts at these offenses.

[i] To unlawfully and intentionally damage, or attempt to damage, any real or personal property by fire or incendiary device.

[j] An unlawful attack or attempt by one person upon another where no weapon was used or which did not result in serious or aggravated injury to the victim. This includes simple assault, minor assault, assault and battery, injury by culpable negligence, intimidation, coercion, hazing, and all attempts to commit these offenses.

[k] The willful or malicious destruction, injury, disfigurement, or defacement of any public or private property, real or personal, without consent of the owner or person having custody or control by cutting, tearing, breaking, marking, painting, drawing, covering with filth, or any other such means as may be specified by local law.

[l] Any sexual acts except forcible rape, prostitution, and commercialized vice. This includes offenses against chastity, common decency, morals, and the like, such as: adultery and fornication, buggery, incest, indecent exposure, indecent liberties, seduction, sodomy or crime against nature, statutory rape (no force), and all attempts to commit any of the above.

[m] Arrests requested based on the narcotics used. This includes all arrests for violations of state and local laws, specifically those relating to the unlawful possession, sale, use, growing, manufacturing, and making of narcotic drugs.

[n] The driving or operating of any vehicle or common carrier while drunk or under the influence of liquor or narcotics.

[o] Arrests for all offenses of drunkenness, which is the consumption of alcoholic beverages to the extent that one's mental faculties and physical coordination are substantially impaired. This includes drunkenness, drunk and disorderly, common or habitual drunkard, and intoxication.

[p] All charges of committing a breach of the peace. This includes, affray; unlawful assembly; disturbing the peace; disturbing meetings; disorderly conduct in state institutions, at court, at fairs, on trains or public conveyances, etc.; blasphemy, profanity, and obscene language; desecrating the flag; refusing to assist an officer; and all attempts to commit any of the above.

[q] To unlawfully enter land, a dwelling, or other real property.

[r] The unlawful use of transit facilities by riding without paying the applicable fare.

[s] All arrests for violations of local curfew or loitering ordinances where such laws exist.

NOTES: Data are from transit agencies in urbanized areas over 200,000 population and include patrons, employees, and others. The figures for violent and property crime follow the FBI *Uniform Crime Reporting Handbook*, (Washington, DC: 1984) and are based on records of calls for service, complaints, and/or investigations. These figures are for reported offenses and do not reflect the findings of a court, coroner, jury, or decision of a prosecutor. Security data was first reported to the Federal Transit Administration in 1995 and were not compiled for earlier years.

SOURCE: 1995: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database*, *Data Tables*, Internet site http://www.fta.dot.gov/fta/library/reference/sec15/1995/htm/, as of May 2, 2000, tables 23-25.

1996-97: Ibid., Internet site http://www.ntdprogram.com/NTD/NTDData.nsf/Data+Tables?OpenView, as of May 2, 2000, tables 23-25.

1998: Ibid., tables 24-26.

Section E
Railroad

Table 2-35 Railroad and Grade-Crossing Fatalities by Victim Class

	1980	1985	1990	1995	1996	1997	1998	1999
Passengers on trains	**4**	**3**	**3**	**0**	**12**	**6**	**4**	**14**
Railroad only	4	3	3	0	12	6	2	3
Grade crossing only	0	0	0	0	0	0	2	11
Employees on duty	**97**	**46**	**40**	**34**	**33**	**37**	**27**	**31**
Railroad only	97	44	35	32	32	37	23	29
Grade crossing only	0	2	5	2	1	0	4	2
Employees not on duty	**4**	**2**	**0**	**2**	**0**	**0**	**2**	**0**
Railroad only	3	2	0	2	0	0	2	0
Grade crossing only	1	0	0	0	0	0	0	0
Contractor employees	[a]	[a]	[a]	**7**	**9**	**11**	**5**	**12**
Railroad only	[a]	[a]	[a]	7	9	11	5	11
Grade crossing only	[a]	[a]	[a]	0	0	0	0	1
Nontrespassers[b]	**746**	**511**	**554**	**443**	**365**	**363**	**326**	**302**
Railroad only	81	14	18	32	27	15	9	8
Grade crossing only	665	497	536	411	338	348	317	294
Trespassers	**566**	**474**	**700**	**660**	**620**	**646**	**644**	**572**
Railroad only	460	391	543	494	471	533	536	479
Grade crossing only	106	83	157	166	149	113	108	93
Volunteer employees	**N**	**N**	**N**	**N**	**N**	**0**	**0**	**0**
Railroad only	N	N	N	N	N	0	0	0
Grade crossing only	N	N	N	N	N	0	0	0
Railroad only	645	454	599	567	551	602	577	530
Grade crossing only	772	582	698	579	488	461	431	402
Motor vehicles	N	521	614	508	415	419	369	345
Nonmotor vehicles	N	61	84	71	73	42	62	57
Total	**1,417**	**1,036**	**1,297**	**1,146**	**1,039**	**1,063**	**1,008**	**932**

KEY: N = data do not exist

[a] Prior to 1995, contractor employees were included with nontrespassers. They include 7 in 1980, 4 in 1985, and 3 in 1990.

[b] Beginning in 1997, nontrespassers off railroad property are also included.

NOTES: "Railroad only" includes fatalities from train accidents, train incidents, and nontrain incidents (excludes highway-rail grade crossings). This table includes information for both freight and passenger railroad operations.

SOURCES: 1980-90: U.S. Department of Transportation, Federal Railroad Administration, *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), and the Accident/Incident Bulletin (Washington DC: Annual issues).

1995-99: Ibid., Internet site http://safetydata.fra.dot.gov/objects/bull99.pdf as of Nov. 28, 2000.

Table 2-36 Railroad and Grade-Crossing Injured Persons by Victim Class

	1980	1985	1990	1995	1996	1997	1998	1999
Passengers on trains	**593**	**657**	**473**	**573**	**513**	**601**	**535**	**481**
Railroad only	569	646	462	543	489	558	516	438
Grade crossing only	24	11	11	30	24	43	19	43
Employees on duty	**56,331**	**29,822**	**20,970**	**10,777**	**9,199**	**8,295**	**8,398**	**8,622**
Railroad only	56,201	29,667	20,801	10,654	9,120	8,184	8,276	8,482
Grade crossing only	130	155	169	123	79	111	122	140
Employees not on duty	**671**	**419**	**326**	**252**	**228**	**263**	**219**	**216**
Railroad only	671	418	324	248	226	260	216	215
Grade crossing only	0	1	2	4	2	3	3	1
Contractor employees	[b]	[b]	[b]	**269**	**208**	**334**	**380**	**384**
Railroad only	[b]	[b]	[b]	268	208	333	379	384
Grade crossing only	[b]	[b]	[b]	1	0	1	1	0
Nontrespassers[a]	**3,923**	**2,672**	**2,581**	**1,869**	**1,660**	**1,540**	**1,236**	**1,342**
Railroad only	775	394	589	372	431	370	243	335
Grade crossing only	3,148	2,278	1,992	1,497	1,229	1,170	993	1,007
Trespassers	**728**	**734**	**793**	**700**	**750**	**728**	**677**	**650**
Railroad only	480	492	560	461	474	516	513	445
Grade crossing only	248	242	233	239	276	212	164	205
Volunteer employees	**N**	**N**	**N**	**N**	**N**	**6**	**14**	**5**
Railroad only	N	N	N	N	N	6	13	5
Grade crossing only	N	N	N	N	N	0	1	0
Railroad only	58,696	31,617	22,736	12,546	10,948	10,227	10,156	10,509
Grade crossing only	3,550	2,687	2,407	1,894	1,610	1,540	1,303	1,396
Motor vehicles	N	2,561	2,332	1,825	1,545	1,494	1,257	1,338
Nonmotor vehicles	N	126	75	69	65	46	46	58
Total	**62,246**	**34,304**	**25,143**	**14,440**	**12,558**	**11,767**	**11,459**	**11,905**

KEY: N = data do not exist

[a] Beginning in 1997, nontrespassers off railroad property are also included.

[b] Prior to 1995, contractor employees were included with nontrespassers: they include 74 in 1980, 110 in 1985, and 242 in 1990.

NOTES: "Railroad only" includes fatalities from train accidents, train incidents, and nontrain incidents (excludes highway-rail grade crossings). This table includes information for both freight and passenger railroad operations.

SOURCES: 1980-90: U.S. Department of Transportation, Federal Railroad Administration, *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), and *Accident/Incident Bulletin* (Washington, DC: Annual Issues).

1995-99: Ibid., Internet site http://safetydata.fra.dot.gov/objects/bull99.pdf, as of Nov. 28, 2000.

Table 2-37 Train Fatalities, Injuries, and Accidents by Type of Accident[a]

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fatalities												
Derailments	8	2	2	10	2	53	2	2	6	2	1	U
Collisions	20	6	8	5	1	14	8	7	16	9	1	U
Other	1	0	0	4	3	0	2	5	3	6	2	U
Total	**29**	**8**	**10**	**19**	**6**	**67**	**12**	**14**	**25**	**17**	**4**	**9**
Injuries												
Derailments	286	197	272	174	71	179	120	90	98	111	61	U
Collisions	341	223	139	103	59	87	118	151	146	51	32	U
Other	38	56	40	49	41	42	24	53	37	21	36	U
Total	**665**	**476**	**451**	**326**	**171**	**308**	**262**	**294**	**281**	**183**	**129**	**130**
Accidents												
Derailments	6,442	2,495	2,146	1,936	1,734	1,930	1,825	1,742	1,816	1,741	1,757	1,961
Collisions	1,201	366	315	261	207	205	240	235	205	202	168	205
Other	562	414	418	461	418	476	439	482	422	454	650	602
Total	**8,205**	**3,275**	**2,879**	**2,658**	**2,359**	**2,611**	**2,504**	**2,459**	**2,443**	**2,397**	**2,575**	**2,768**

KEY: U = data are unavailable

[a] Excludes highway-rail grade crossing accidents.

NOTE: Train accidents only. This table includes information for both freight and passenger railroad operations.

SOURCES: 1980-96: U.S. Department of Transportation, Federal Railroad Administration, *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), tables 1-1, 1-3.

1997-98: Ibid., *Railroad Safety Statistics Annual Report 1998* (Washington, DC: September 1998), table 1-1, 1-3, 5-6.

1999: Ibid., Internet site http://safetydata.fra.dot.gov/OfficeofSafety/Prelim/1999/r01.htm, as of July 10, 2000.

Table 2-38 Railroad Passenger Safety Data

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Passenger fatalities	**3**	**8**	**3**	**58**	**5**	**0**	**12**	**6**	**4**	**14**
Injured persons	**473**	**382**	**411**	**559**	**497**	**573**	**513**	**601**	**535**	**481**
Train-miles, passenger trains (millions)	**72**	**74**	**74**	**75**	**75**	**76**	**R77**	**78**	**78**	**U**
Fatalities per 100 million passenger train-miles	4	11	4	77	7	0	R16	8	5	U
Injuries per 100 million passenger train-miles	660	520	560	750	660	750	R663	770	683	U

KEY: R = revised; U = data are not available

NOTE: A train-mile is the movement of a train (which can consist of many cars) the distance of 1 mile. A train-mile differs from a vehicle-mile, which is the movement of 1car (vehicle) the distance of 1 mile. A 10-car (vehicle) train traveling 1 mile would be measured as 1 train-mile and 10 vehicle-miles. Caution should be used when comparing train-miles to vehicle miles.

SOURCES:

Fatalities and Injuries: 1990-96: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Accident/Incident Bulletin* (Washington, DC: Annual issues), tables 5, 14, 15, and 36.

1997-98: Ibid., *Railroad Safety Statistics Annual Report 1998* (Washington, DC: September 1999), table 1-1.

Train-miles, passenger trains: 1990-96: U.S. Department of Transportation, Bureau of Transportation Statistics calculations (sum of all commuter rail train-miles reported to USDOT, Federal Transit Administration, plus Amtrak train-miles).

1997-98: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Railroad Safety Statistics Annual Report 1998* (Washington, DC: September 1999), table 2-4.

Table 2-39 Railroad System Safety and Property Damage Data (Excludes highway-rail grade-crossing accidents)

	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities	**785**	**575**	**584**	**454**	**599**	**567**	**551**	**602**	**577**	**530**
Injuried Persons	**[d]17,934**	**50,138**	**58,696**	**31,617**	**22,736**	**12,546**	**10,948**	**10,227**	**10,156**	**10,304**
Accidents[a]	**8,095**	**8,041**	**8,205**	**3,275**	**2,879**	**2,459**	**2,443**	**2,397**	**2,575**	**2,768**
Train-miles (millions)[b,c]	**839**	**755**	**718**	**571**	**609**	**670**	**671**	**677**	**683**	**712**
Rates per 100 million train-miles										
Fatalities	94	76	81	80	98	85	82	89	84	74
Injuries	N	6,640	8,180	5,540	3,740	1,870	1,630	1,511	1,487	1,446
Accidents	970	1,070	1,140	570	470	370	360	354	377	389
Property damage (current $ millions)	**121.6**	**177.4**	**267.4**	**179.3**	**198.7**	**189.2**	**212.3**	**210.4**	**[R]233.1**	**242.3**

KEY: N = data do not exist; R = revised

[a] Train accidents only; excludes highway-rail grade-crossing accidents.

[b] Train-miles in this table differ from train-miles in the vehicle-miles table in Chapter 1. Train-miles reported in Chapter 1 include only Class I rail (see glossary for definition), while this table includes Class I rail, Group II rail, and other rail. For example, in 1999 Group II rail accounted for 75 million train-miles, and other rail for 25 million train-miles. Moreover, the vehicle-miles table in Chapter 1 includes only train-miles between terminals and/or stations, thus excluding yard and switching miles. In 1999, Class I yard/switching train-miles totaled 70 million train-miles. Note that commuter rail safety data are reported in the rail mode and the transit mode. Commuter rail train-miles are included in Class I rail and Group II rail in this table.

[c] A train-mile is the movement of a train (which can consist of many cars) the distance of 1 mile. A train-mile differs from a vehicle-mile, which is the movement of 1 car (vehicle) the distance of 1 mile. A 10-car (vehicle) train traveling 1 mile would be measured as 1 train-mile and 10 vehicle-miles. Caution should be used when comparing train-miles to vehicle-miles.

[d] 1970 injuries not comparable to later years due to change in reporting system.

NOTE: This table includes information for both freight and passenger railroad operations.

SOURCES:

Fatalities, injuries, accidents, and property damage:

1970-96: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Accident/Incident Bulletin* (Washington, DC: Annual issues), tables 14 and 15.

1997-98: Ibid., *Railroad Safety Statistics Annual Report 1998* (Washington, DC: July 1999).

1999: Ibid., Internet site http://safetydata.fra.dot.gov/objects/bull99.pdf, as of Nov. 28, 2000.

Train-miles:

1970-90: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database* (Washington, DC: Annual issues), form 406.

1990-99: U.S. Department of Transportation, Federal Railroad Administration, Internet site http://safetydata.fra.dot.gov/OfficeofSafety/Prelim/1999/r02.htm, as of July 10, 2000.

Table 2-40 Fatalities and Injuries of On-Duty Railroad Employees

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Employee fatalities										
Accidents/incidents, total	**40**	**35**	**34**	**47**	**31**	**34**	**33**	**37**	**27**	**31**
Grade-crossing accidents and incidents	5	1	2	3	1	2	1	0	4	2
Train accidents and incidents only (grade-crossing excluded)	20	22	23	32	25	27	24	U	U	U
Employees injured										
Accidents/incidents, total	**20,970**	**19,626**	**17,755**	**15,363**	**13,080**	**10,777**	**9,199**	**8,295**	**8,398**	**8,622**
Grade-crossing accidents and incidents	169	147	157	143	126	123	79	111	122	140
Train accidents and incidents only (grade-crossing excluded)	3,282	3,003	2,274	1,832	1,703	1,500	1,303	U	U	U
Employee hours (millions)	**N**	**530.7**	**517.0**	**519.7**	**518.6**	**510.3**	**504.6**	**R503.9**	**514.9**	**510.0**
Fatality rates per million employee hours										
All accidents/incidents	N	0.07	0.07	0.09	0.06	0.07	0.07	0.07	0.05	0.06
Grade-crossing accidents and incidents	N	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.00	0.01	<0.01
Train accidents and incidents only (grade-crossing excluded)	N	0.04	0.04	0.06	0.05	0.05	0.05	U	U	U
Injury rates per million employee hours										
All accidents/incidents	N	37.0	34.3	29.6	25.2	21.1	18.2	16.5	16.3	16.9
Grade-crossing accidents and incidents	N	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3
Train accidents and incidents only (grade-crossing excluded)	N	5.7	4.4	3.5	3.3	2.9	2.6	U	U	U
Train-miles (millions)[a]	**609**	**577**	**594**	**614**	**655**	**670**	**671**	**677**	**683**	**712**
Fatality rates per million train-miles										
All accidents/incidents	0.07	0.06	0.06	0.08	0.05	0.05	0.05	0.05	0.04	0.04
Grade-crossing accidents and incidents	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.00	0.01	<0.01
Train accidents and incidents only (grade-crossing excluded)	0.03	0.04	0.04	0.05	0.04	0.04	0.04	U	U	U
Injury rates per million train-miles										
All accidents/incidents	34.4	34.0	29.9	25.0	20.0	16.1	13.7	12.3	12.3	12.1
Grade-crossing accidents and incidents	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.2
Train accidents and incidents only (grade-crossing excluded)	5.4	5.2	3.8	3.0	2.6	2.2	1.9	U	U	U

KEY: N = data do not exist; U = data are unavailable; R = revised

Continued next page

Table 2-40 Cont'd Fatalities and Injuries of On-Duty Railroad Employees

[a] Train-miles in this table differ from train-miles in the vehicle-miles table in Chapter 1. Train-miles reported in Chapter 1 include only Class I rail (see glossary for definition), while this table includes Class I rail, Group II rail, and other rail. In 1999, Group II rail accounted for 75 million train-miles, and other rail for 25 million train-miles. Moreover, the vehicle-miles table in Chapter 1 includes only train-miles between terminals and/or stations, thus excluding yard and switching miles. In 1999, Class I yard/switching train miles totaled 70 million train-miles. Note that commuter rail safety data are reported in the rail mode and in the transit mode. Commuter rail train-miles are included in Class I rail and Group II rail in this table.

[b] A train-mile is the movement of a train (which can consist of many cars) the distance of 1 mile. A train-mile differs from a vehicle-mile, which is the movement of 1 car (vehicle) the distance of 1 mile. A 10-car (vehicle) train traveling 1 mile would be measured as 1 train-mile and 10 vehicle-miles. Caution should be used when comparing train-miles to vehicle miles.

NOTE: This table includes information for both freight and passenger railroad operations.

SOURCES: 1990-96: U.S. Department of Transportation, Federal Railroad Administration, *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues).

1997: Ibid., *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1, 1-3.

1998-99: Ibid., Internet site http://safetydata.fra.dot.gov/OfficeofSafety/Prelim/1999/r01.htm, r02.htm, and r03.htm, as of June 23, 2000.

1999: U.S. Department of Transportation, Federal Railroad Administration, Office of Safety Analysis, personal communications, July 20, 2000.

Section F
Water

Table 2-41 Waterborne Transportation Safety and Property Damage Data Related to Vessel Casualties

	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities[a]	178	243	206	131	85	46	50	46	59	44
Injured persons	105	97	180	172	175	145	129	109	107	113
Accidents[b]	2,582	3,310	4,624	3,439	3,613	4,196	3,799	3,704	3,872	3,654
Vessels[c]	4,063	5,685	7,694	5,694	5,494	6,849	6,075	5,819	5,793	5,285
Property damage (current $ millions)	U	U	U	U	U	127.2	111.8	128.5	161.5	115.3

KEY: U = data are not available

[a] Fatalities include the number of people who died or were declared missing subsequent to a marine accident.

[b] Accidents in this table are cited as "marine casualty cases" by the U.S. Department of Transportation, U.S. Coast Guard.

[c] More than one vessel may be involved in a marine accident.

NOTES: All deaths and injuries cited result from vessel casualties, such as groundings, collisions, fires, or explosions. The data are for all commercial vessels under U.S. jurisdiction, including U.S. flag vessels anywhere in the world and foreign flag vessels within the jurisdiction of the United States (within 12 miles, or having an interaction with a U.S. entity, such as a platform within 200 miles or a collision with a U.S. ship). Includes commercial fishing vessels.

1992-98 data come from the Marine Safety Management Information System. Data for prior years may not be directly comparable.

SOURCE: U.S. Department of Transportation, U.S. Coast Guard, Office of Investigations and Analysis, Compliance Analysis Division (G-MOA-2), personal communication.

Table 2-42 Waterborne Transportation Safety Data not Related to Vessel Casualties

	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities[a]	420	330	281	130	101	137	111	108	76	67
Injured persons	U	U	U	U	U	1,916	1,298	947	474	399
Vessels[b]	U	321	274	128	98	131	R1,409	1,023	506	426

KEY: R = revised; U = data are not available

[a] Fatalities include people who were declared missing.

[b] Figures represent the number of vessels involved in nonvessel casualties. These vessels were not part of the accident, but the accident may have occurred on the vessel (e.g., crewmembers swept overboard by a wave).

NOTES: Fatalities and injuries cited arise from an event not related to a marine casualty, such as falls or electrocution.

1992-98 data come from the Marine Safety Management Information System. Data for prior years may not be directly comparable.

SOURCE: U.S. Department of Transportation, U.S. Coast Guard, Office of Investigations and Analysis, Compliance Analysis Division (G-MOA-2), personal communications.

Table 2-43 Recreational Boating Safety, Alcohol Involvement, and Property Damage Data

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities	**739**	**1,360**	**1,418**	**1,466**	**1,360**	**1,116**	**865**	**829**	**709**	**821**	**R815**	**734**
Injuries	**929**	**927**	**780**	**2,136**	**2,650**	**2,757**	**3,822**	**4,141**	**4,442**	**4,555**	**R4,612**	**4,315**
Accidents	**2,738**	**3,752**	**3,803**	**6,308**	**5,513**	**6,237**	**6,411**	**8,019**	**8,026**	**R8,047**	**R8,061**	**7,935**
Vessels involved	**3,785**	**4,792**	**4,762**	**8,002**	**6,954**	**8,305**	**8,591**	**11,534**	**11,306**	**11,396**	**11,368**	**U**
Numbered boats[a] (millions)	**2.5**	**6.4**	**7.4**	**7.3**	**8.6**	**9.6**	**11.0**	**11.7**	**11.9**	**12.3**	**12.6**	**U**
Rates per 100,000 numbered boats												
Fatalities	32.8	21.3	19.2	20.1	15.8	11.6	7.8	7.1	6.0	6.7	6.5	U
Injuries	37.1	14.5	10.5	29.3	30.8	28.7	34.7	35.4	37.3	37.0	36.7	U
Accidents	109.5	58.6	51.4	86.4	64.1	65.0	58.3	68.5	67.4	65.4	64.1	U
Accident reports citing alcohol involvement	**N**	**N**	**N**	**N**	**N**	**279**	**568**	**472**	**601**	**R698**	**704**	**U**
Property damage (current $ millions)	**3.2**	**4.7**	**8.2**	**10.4**	**16.4**	**20.0**	**23.8**	**R30.3**	**R23.2**	**29.0**	**31**	**U**

KEY: N = data do not exist; R = revised
U = data are not available

[a] Prior to 1975, the count of numbered boats is an estimate.

NOTE: Only a small fraction of property damages and nonfatal accidents are reported to the U.S. Coast Guard.

SOURCE: U.S. Department of Transportation, U.S. Coast Guard, Office of Boating Safety, *Boating Statistics* (Washington, DC: Annual issues).

Table 2-44 Personal Watercraft Safety Data

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1987-98
Fatalities	5	20	20	28	26	34	35	56	68	57	84	78	511
Injured persons	156	254	402	532	708	730	915	1,338	1,617	1,837	1,812	1,743	12,044
Accidents[a]	376	650	844	1,162	1,513	1,650	2,236	3,002	3,986	4,099	4,070	3,607	27,195
Sales	29,000	48,000	64,000	72,000	68,000	79,000	107,000	142,000	200,000	191,000	176,000	130,000	1,306,000
Number in use	92,756	126,881	178,510	241,376	305,915	372,283	454,545	600,000	760,000	900,000	1,000,000	1,100,000	6,132,266

[a] Total vessels involved.

NOTE: Personal watercraft are less than 13 feet in length and are designed to be operated by a person or persons sitting, standing, or kneeling on craft rather than within the confines of the hull.

SOURCES:

Fatalities, Injuries, and Accidents: U.S. Department of Transportation, United States Coast Guard, Office of Boating Safety, *Boating Statistics - 1998* (Washington, DC: 1999).

Sales: Personal Watercraft Industry Association, Internet site http://www.pwia.org/Abo_PWC.htm, as of June 19, 2000.

Use: 1987-96: National Marine Manufacturers Association, data compiled by the United States Coast Guard, personal communications.

1997-98: Ibid., Internet site http://www.nmma.org/facts/boatingstats/statistic98.html, as of June 19, 2000.

Table 2-45 U.S. Coast Guard Search and Rescue Statistics, Fiscal Year

	1985	1990	[e]1991	1992	1993	1994	1995	1996	1997	1998	1999
Cases	60,775	[R]53,097	[R]52,782	[R]53,294	[R]53,026	[R]53,899	[R]49,704	[R]43,553	[R]41,096	37,218	39,844
Responses[a]	70,237	[R]64,971	[R]66,409	69,856	69,784	[R]70,337	[R]63,679	55,710	[R]52,141	46,602	50,622
Sorties[a]	88,449	84,033	84,872	88,388	88,147	[R]108,758	[R]110,267	98,423	[R]91,722	83,307	89,635
Search and Rescue resource hours[Rb]	U	108,020	109,194	108,634	107,431	102,749	93,984	85,136	80,336	80,070	80,490
Lives saved	6,497	[R]4,407	[Re]5,465	[R]17,543	[R]5,826	[Rf]23,211	[R]4,453	[R]5,047	[R]3,897	3,194	3,743
Lives lost before notification[c]	259	[R]622	[R]748	[R]540	[R]800	[R]593	[R]468	[R]611	[R]454	418	353
Lives lost after notification[d]	1,076	[R]463	[R]368	[R]399	[R]415	[R]338	[R]304	[R]367	[R]290	188	180
Total lives lost	**1,335**	**[R]1,085**	**[R]1,116**	**[R]939**	**[R]1,215**	**[R]931**	**[R]772**	**[R]978**	**[R]744**	**606**	**533**
Persons otherwise assisted	138,791	[R]117,327	[R]113,704	[R]121,826	[R]119,069	[R]116,912	[R]101,357	[R]85,869	[R]75,357	66,138	70,255
Value of property lost ($ million)	424.3	[R]368.5	[R]213.6	[R]314.5	[R]316.2	[R]435.5	[R]222.6	[R]273.8	[R]414.8	84.3	262.3
Value of property assisted ($ millions)	2,376.8	[R]2,044.9	[R]2,282.4	[R]1,951.4	[R]2,491.8	[R]2,891.2	[R]4,467.2	[R]3494.2	[R]1762.1	1,288.2	1,235.0
Property loss prevented ($ million)	905.4	[R]1,673.4	[R]1,799.3	[R]1,550.1	[R]2,144.7	[R]2,628.4	[R]3,882.8	[R]3087.3	[R]1353.5	996.8	1,019.0

KEY: R = revised; U = data are not available

[a] Responses are the number of U.S. Coast Guard units involved. Sorties are the number of trips made by boat, aircraft, or cutter.

[b] Search and Rescue resource hours represent the time that Coast Guard assets (i.e., air craft, boats and cutters) perform Search and Rescue operations.

[c] Those persons whose lives were lost before the U.S. Coast Guard was notified of an incident.

[d] Those persons whose lives were lost in an incident to which the U.S.Coast Guard was responding, but who were alive at the time the U.S. Coast Guard was notified of the incident.

[e] Calculations are lower in fiscal year 1991 due to incomplete data submissions by two districts.

[f] The Search and Rescue management Information System's reporting policy has been revised, and now requires complete reporting on all lives saved. This policy also includes reporting on "lives saved" in connection with Coast Guard Law Enforcement Activity (i.e., Alien Migrant Interdiction Operations (AMIO)). AMIO lives saved in fiscal year 1992 was determined to be approximately 12,000. AMIO lives saved in fiscal year 1994 was determined to be 15,179.

SOURCE: U.S. Department of Transportation, U.S. Coast Guard, Search and Rescue Management Information Systems (SARMIS II) Database, 2000 for all data except Search and Rescue resource hours U.S. Department of Transportation, U.S. Coast Guard, Abstract of Operations database, 2000 for Search and Rescue resource hours.

Section G
Pipeline

Table 2-46 Hazardous Liquid and Natural Gas Pipeline Safety and Property Damage Data

	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Fatalities										
Total hazardous liquid	4	7	4	5	3	3	5	0	R2	4
Total gas	26	8	15	28	6	18	48	10	17	17
Transmission	U	U	1	6	0	2	1	1	1	2
Distribution	U	U	14	22	6	16	47	9	16	15
Injuries										
Total hazardous liquid	21	17	15	18	7	11	13	5	R6	20
Total gas	233	214	177	108	69	53	114	72	R75	87
Transmission	U	U	13	12	17	10	5	5	11	8
Distribution	U	U	164	96	52	43	109	67	R64	79
Incidents										
Total hazardous liquid	351	254	246	183	180	188	R193	R171	154	165
Total gas	1,077	1,338	1,524	334	198	161	187	175	R234	174
Transmission	U	U	389	129	89	64	77	73	98	54
Distribution	U	U	1,135	205	109	97	110	102	R136	120
Property damage (current $ millions)										
Total hazardous liquid	1.2	2.2	5.7	5.1	15.7	32.5	49.7	R38.0	R59.8	42.8
Total gas	3.3	5.0	10.0	22.9	18.9	21.0	29.4	24.6	R48.4	58.1
Transmission	U	U	8.8	13.4	11.3	10.0	13.1	12.1	29.7	17.7
Distribution	U	U	1.2	9.5	7.6	11.0	16.3	12.5	R19.1	25.9

KEY: R = revised; U = data are not available

NOTES: Beginning with 1985 data, pipeline incidents are credited to the year in which they occurred, not the year in which the report was received. Gas numbers represent sum of transmission and gathering and distribution operators. Property damage includes, but is not limited to, damage to the operator's facilities and to the property of others; gas lost; restoration of service and relighting; facility repair and replacement; leak locating; right-of-way cleanup; and environmental cleanup and damage.

SOURCES:
1970-85: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, personal communication, 1999.

1990-99: Ibid., Internet site http://ops.dot.gov as of June 19, 2000.

Transportation and the Economy

Section A
Transportation and the Total Economy

Table 3-1a U.S. Gross Domestic Product (GDP) Attributed to For-Hire Transportation Services (Current $ billions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Total GDP[R]	**5,803.2**	**5,986.2**	**6,318.9**	**6,642.3**	**7,054.3**	**7,400.5**	**7,813.2**	**8,300.8**	**8,759.9**
GDP									
Trucking and warehousing[R]	69.4	70.9	74.5	79.2	86.4	89.0	92.1	99.5	106.5
Air[R]	45.3	47.0	50.3	56.4	62.5	67.7	70.8	79.2	87.8
Railroad	[R]19.8	[R]22.0	[R]21.6	[R]22.0	[R]23.3	[R]23.6	23.4	[R]23.2	24.2
Transportation services[a,R]	18.2	19.5	19.9	20.8	22.6	23.5	25.7	26.9	29.0
Local and interurban passenger transit	[R]9.1	10.2	10.9	[R]11.3	[R]11.6	[R]12.4	[R]13.4	[R]14.8	16.0
Water[R]	10.0	11.1	10.7	10.7	11.5	11.6	12.2	13.3	13.9
Pipelines, except natural gas[R]	5.5	5.5	5.5	5.6	5.5	5.5	5.7	5.9	6.5
Total[R]	**177.4**	**186.1**	**193.4**	**206.0**	**223.2**	**233.4**	**243.4**	**262.8**	**283.9**
% of GDP									
Trucking and warehousing	[R]1.2	[R]1.2	[R]1.2	[R]1.2	[R]1.2	[R]1.2	1.2	1.2	1.2
Air	[R]0.8	[R]0.8	[R]0.8	[R]0.8	[R]0.9	[R]0.9	0.9	[R]1.0	1.0
Railroad	0.3	0.4	[R]0.3	0.3	0.3	0.3	0.3	0.3	0.3
Transportation services[a]	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Local and interurban passenger transit	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Water transportation	0.2	0.2	0.2	0.2	0.2	[R]0.2	0.2	0.2	0.2
Pipelines, except natural gas	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	**3.1**	**3.1**	**3.1**	**3.1**	**3.2**	**[R]3.2**	**3.1**	**3.2**	**3.2**
% of for-hire transportation									
Trucking and warehousing[R]	39.1	38.1	38.5	38.4	38.7	38.1	37.8	37.9	37.5
Air[R]	25.5	25.3	26.0	27.4	28.0	29.0	29.1	30.1	30.9
Railroad	[R]11.2	11.8	[R]11.2	[R]10.7	[R]10.4	10.1	[R]9.6	[R]8.8	8.5
Transportation services[a]	[R]10.3	[R]10.5	[R]10.3	[R]10.1	10.1	[R]10.1	[R]10.6	[R]10.2	10.2
Local and interurban passenger transit	5.1	5.5	[R]5.6	5.5	5.2	[R]5.3	5.5	[R]5.6	5.6
Water transportation[R]	5.6	6.0	5.5	5.2	5.2	5.0	5.0	5.1	4.9
Pipelines, except natural gas	[R]3.1	[R]3.0	[R]2.8	[R]2.7	[R]2.5	[R]2.4	[R]2.3	2.2	2.3
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

KEY: R = revised

[a] Defined as services incidental to transportation, such as forwarding and packing and arranging passenger travel and freight transportation.

SOURCE: 1990-98: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: June 2000), table 1.

Table 3-1b U.S. Gross Domestic Product (GDP) Attributed to For-Hire Transportation Services (Chained 1996 $ billions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Total GDP	**6,707.9**	**6,676.4**	**6,880.0**	**7,062.6**	**7,347.7**	**7,543.8**	**7,813.2**	**8,144.8**	**8,495.7**
GDP									
Trucking and warehousing	68.1	71.6	75.7	79.1	85.3	86.6	92.1	97.5	96.6
Air	46.9	45.0	49.2	51.9	59.6	62.9	70.8	75.5	78.1
Railroad	18.1	20.9	20.8	21.0	22.1	22.7	23.4	23.0	22.7
Transportation services[a,R]	19.5	19.8	19.6	20.4	22.1	23.4	25.7	26.3	28.7
Local and interurban passenger transit	12.8	12.5	12.4	12.7	12.8	13.2	13.4	14.8	15.3
Water	10.2	10.5	10.3	10.5	11.3	11.3	12.2	13.4	13.4
Pipelines, except natural gas	5.7	6.2	5.9	6.0	5.5	5.0	5.7	6.4	6.9
Total	**180.6**	**185.9**	**193.6**	**201.2**	**218.6**	**225.1**	**243.4**	**256.8**	**261.6**
% of GDP									
Trucking and warehousing	1.0	1.1	1.1	1.1	1.2	1.1	1.2	1.2	1.1
Air	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9
Railroad	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Transportation services[a]	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Local and interurban passenger transit	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Water	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2
Pipelines, except natural gas	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	**2.7**	**2.8**	**2.8**	**2.8**	**3.0**	**3.0**	**3.1**	**3.2**	**3.1**
% of for-hire transportation									
Trucking and warehousing	37.7	38.5	39.1	39.3	39.0	38.5	37.8	38.0	36.9
Air	26.0	24.2	25.4	25.8	27.3	27.9	29.1	29.4	29.9
Railroad	10.0	11.2	10.7	10.4	10.1	10.1	9.6	9.0	8.7
Transportation services[a]	10.8	10.7	10.1	10.1	10.1	10.4	10.6	10.2	11.0
Local and interurban passenger transit	7.1	6.7	6.4	6.3	5.9	5.9	5.5	5.8	5.8
Water	5.6	5.6	5.3	5.2	5.2	5.0	5.0	5.2	5.1
Pipelines, except natural gas	3.2	3.3	3.0	3.0	2.5	2.2	2.3	2.5	2.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

KEY: R = revised

[a] Defined as services incidental to transportation, such as forwarding and packing and arranging passenger travel and freight transportation.

NOTE: For-hire transportation numbers may not equal total due to the nature of the chained dollar calculations.

SOURCE: 1990-98: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: June 2000), table 6.

Table 3-2a U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand (Current $ billions)

	1980	1985	1990	1995	1996	1997	1998	1999
Personal consumption of transportation								
Motor vehicles and parts	87.0	175.7	210.3	R249.3	R256.3	R263.1	R289.2	316.1
Gasoline and oil	86.7	97.2	109.2	R113.3	R124.2	R126.2	R112.9	123.8
Transport services	64.7	100.0	143.7	R197.7	R214.2	R234.4	R245.2	255.0
Total	**238.4**	**372.9**	**463.2**	**R560.3**	**R594.7**	**R623.7**	**R647.3**	**694.9**
Gross private domestic investment								
Transportation structures	3.7	4.3	3.0	4.4	5.4	6.1	6.8	U
Transportation equipment	48.4	69.7	75.5	R126.1	R138.9	R150.9	R176.0	197.1
Total	**52.1**	**74.0**	**78.5**	**R130.5**	**R144.3**	**R157.0**	**R182.8**	**197.1**
Exports (+)								
Civilian aircraft, engines, and parts	14.1	13.5	32.2	26.1	30.8	41.4	R53.5	53.4
Automotive vehicles, engines, and parts	17.4	24.9	36.5	61.8	65.0	74.0	R73.2	74.8
Passenger fares	2.6	4.4	15.3	18.9	20.4	R20.8	R20.0	21.1
Other transportation	11.6	14.7	22.7	R26.1	R26.1	R27.0	R25.5	27.5
Total	**45.7**	**57.5**	**106.7**	**R132.9**	**R142.3**	**R163.2**	**R172.2**	**176.8**
Imports (-)								
Civilian aircraft, engines, and parts	3.1	5.3	10.5	10.7	12.7	16.6	R21.8	23.4
Automotive vehicles, engines, and parts	28.3	64.9	88.5	123.8	128.9	R139.8	R149.1	180.1
Passenger fares	3.6	6.4	10.5	14.7	15.8	R18.1	R19.8	21.5
Other transportation	11.8	15.6	25.2	R27.0	R27.4	R29.0	R30.5	34.2
Total	**46.8**	**92.2**	**134.7**	**R176.2**	**R184.8**	**R203.5**	**R221.2**	**259.2**
Net exports of transportation-related goods and services[a]	**-1.1**	**-34.7**	**-28.0**	**-43.3**	**-42.5**	**-40.3**	**R-49.0**	**-82.4**

KEY: R = revised; U = data are not available

Continued next page

Table 3-2a Cont'd U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand (Current $ billions)

	1980	1985	1990	1995	1996	1997	1998	1999
Government transportation-related purchases								
Federal purchases[b, R]	7.0	10.0	12.9	16.3	17.2	17.6	18.2	U
State and local purchases[b, R]	48.8	67.5	90.1	109.8	115.2	124.4	129.1	U
Defense-related purchases[c]	4.2	6.2	8.9	R8.4	R8.8	R8.1	R8.4	9.0
Total[R]	**60.0**	**83.7**	**111.9**	**134.5**	**141.2**	**150.1**	**155.7**	**U**
Gross Domestic Product[R]	2,795.6	4,213.0	5,803.2	7,400.5	7,813.2	8,300.8	8,759.9	9,256.1
Total transportation-related final demand[d, R]	**349.4**	**495.9**	**625.6**	**782.0**	**837.7**	**890.5**	**936.8**	**U**
Total transportation in GDP (%)	**12.5%**	**11.8%**	**R10.8%**	**R10.6%**	**R10.7%**	**R10.7%**	**R10.7%**	**U**

KEY: R = revised; U = data are not available

[a] Sum of exports and imports.

[b] Federal purchases and state and local purchases are the sum of consumption expenditures and gross investment.

[c] Defense-related purchases are the sum of transportation of material and travel.

[d] Sum of total personal consumption of transportation, total gross private domestic investment, net exports of transportation-related goods and services, and total government transportation-related purchases.

SOURCES:

Federal, state, and local government transportation-related purchases: U.S. Department of Commerce, Bureau of Economic Analysis, Internet site http://www.bea.doc.gov/bea/dn/annonly.exe, as of July 10, 2000. 1995-98 data also available in *Survey of Current Business* (Washington, DC: June 2000), table 3.15.

GDP: U.S. Department of Commerce, Bureau of Economic Analysis, Internet site http://www.bea.doc.gov/bea/dn/seltab29.exe, as of May 17, 2000, table 1.1.

All other data: 1980-90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1995-99: Ibid., *Survey of Current Business* (Washington, DC: April 2000), tables 1.1, 2.2, 3.10, 4.3, and 5.4.

Table 3-2b U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand
(Chained 1996 $ billions)

	R1980	R1985	R1990	R1995	R1996	R1997	R1998	1999
Personal consumption of transportation								
Motor vehicles and parts	142.7	236.9	246.1	253.4	256.3	263.8	291.9	318.2
Gasoline and oil	94.9	104.8	113.2	120.2	124.2	126.2	127.7	128.3
Transport services	124.7	152.6	173.5	201.0	214.2	226.3	234.2	241.0
Total	**362.3**	**494.3**	**532.8**	**574.6**	**594.7**	**616.3**	**653.8**	**687.5**
Gross private domestic investment								
Transportation structures	U	U	U	U	U	U	U	U
Transportation equipment	77.6	93.9	87.4	128.2	138.9	149.6	175.3	195.7
Total	**77.6**	**93.9**	**87.4**	**128.2**	**138.9**	**149.6**	**175.3**	**195.7**
Exports (+)								
Civilian aircraft, engines, and parts	26.9	19.5	40.9	27.2	30.8	40.0	51.1	49.9
Automotive vehicles, engines, and parts	28.3	30.5	39.8	62.5	65.0	73.4	72.5	73.7
Passenger fares	4.5	7.1	19.1	18.9	20.4	21.5	20.9	20.5
Other transportation	16.5	18.9	23.9	26.8	26.1	26.9	26.4	28.0
Total	**76.2**	**76.0**	**123.7**	**135.4**	**142.3**	**161.8**	**170.9**	**172.1**
Imports (-)								
Civilian aircraft, engines, and parts	6.0	7.7	13.5	11.2	12.7	16.0	20.7	21.7
Automotive vehicles, engines, and parts	52.5	95.8	101.6	124.6	128.9	139.5	148.6	178.3
Passenger fares	5.5	9.3	12.7	14.9	15.8	17.1	18.5	19.5
Other transportation	17.2	19.3	27.2	27.8	27.4	29.6	31.7	31.9
Total	**81.2**	**132.1**	**155.0**	**178.5**	**184.8**	**202.2**	**219.5**	**251.4**
Net exports of transportation-related goods and services[a]	**-5.0**	**-56.1**	**-31.3**	**-43.1**	**-42.5**	**-40.4**	**-48.6**	**-79.3**

KEY: R = revised; U = data are not available

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Table 3-2b Cont'd U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand (Chained 1996 $ billions)

	R1980	R1985	R1990	R1995	R1996	R1997	R1998	1999
Government transportation-related purchases								
Federal purchases[b]	12.5	14.0	15.7	16.6	17.2	17.3	17.6	U
State and local purchases[b]	89.8	93.7	104.6	112.3	115.2	121.7	124.1	U
Defense-related purchases[c]	5.8	8.1	10.4	8.7	8.8	8.2	8.3	8.7
Total	**108.1**	**115.8**	**130.7**	**137.7**	**141.2**	**147.3**	**150.0**	**U**
Gross Domestic Product	**4,900.9**	**5,717.1**	**6,707.9**	**7,543.8**	**7,813.2**	**8,144.8**	**8,495.7**	**8,848.2**
Total transportation-related final demand[d]	**543.0**	**592.1**	**719.6**	**797.4**	**832.3**	**872.8**	**930.5**	**U**
Total transportation in GDP (%)	**11.1%**	**10.4%**	**10.7%**	**10.6%**	**10.7%**	**10.7%**	**11.0%**	**U**

KEY: R = revised; U = data are not available

[a] Sum of exports and imports.

[b] Federal and State purchases are the sum of consumption expenditures and gross investment.

[c] Defense-related purchases are the sum of transportation of material and travel.

[d] Sum of total personal consumption of transportation, total gross private domestic investment, net exports of transportation-related goods and services and total government transportation-related purchases.

NOTE: Chained 1996 $ value = (Quantity index for year n * 1996 current $ value)/100.

SOURCES:

Federal, state, and local government transportation-related purchases: U.S. Department of Commerce, Bureau of Economic Analysis, Internet site http://www.bea.doc.gov/bea/dn/annonly.exe, as of July 10, 2000. 1995-98 data also available in *Survey of Current Business* (Washington, DC: June 2000), table 3.15 and *Survey of Current Business* (Washington, DC: June 2000), table 7.11 (price indices for federal non-defense and state and local).

GDP: U.S. Department of Commerce, Bureau of Economic Analysis, Internet site http://www.bea.doc.gov/bea/dn/seltab29.exe, as of May 17, 2000, table 1.2.

All other data: 1980-90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1995-99: Ibid., *Survey of Current Business* (Washington, DC: April 2000), tables 1.1, 2.2, 3.10, 4.3, and 5.4.

Price indices (for computing 1980-1990 values): U.S. Department of Commerce, Bureau of Economic Analysis, Internet site http://www.bea.doc.gov/bea/dn/seltab29.exe, as of May 17, 2000, tables 7.1, 7.4, 7.6, 7.10, and 7.12.

Table 3-3a U.S. Gross Domestic Demand (GDD) Attributed to Transportation-Related Final Demand (Current $ billions)

	1980	1985	1990	1995	1996	1997	1998	1999
Personal consumption of transportation								
Motor vehicles and parts	87.0	175.7	210.3	R249.3	R256.3	R263.1	289.2	316.1
Gasoline and oil	86.7	97.2	109.2	R113.3	R124.2	R126.2	112.9	123.8
Transportation services	64.7	100.0	143.7	R197.7	R214.2	R234.4	245.2	255.0
Total	**238.4**	**372.9**	**463.2**	**R560.3**	**R594.7**	**R623.7**	**647.3**	**694.9**
Gross private domestic investment								
Transportation structures	3.7	4.3	3.0	4.4	5.4	R5.9	6.6	U
Transportation equipment	48.4	69.7	75.5	R126.1	R138.9	R150.9	176.0	U
Total	**52.1**	**74.0**	**78.5**	**R130.5**	**R144.3**	**R156.8**	**182.6**	**U**
Government transportation-related purchases								
Federal purchases[a,R]	7.0	10.0	12.9	16.3	17.2	17.6	18.2	U
State and local purchases[a,R]	48.8	67.5	90.1	109.8	115.2	124.4	129.1	U
Defense-related purchases[b]	4.2	6.2	8.9	R8.4	R8.8	R8.1	8.4	9.0
Total[R]	**60.0**	**83.7**	**111.9**	**136.6**	**141.2**	**150.1**	**155.7**	**U**
Gross Domestic Demand[R]	**2,810.5**	**4,327.2**	**5,874.6**	**7,484.7**	**7,902.1**	**8,389.1**	**8,909.5**	**9,510.0**
Total domestic transportation-related final demand[c,R]	**350.5**	**530.6**	**653.6**	**R827.4**	**R880.2**	**R930.6**	**985.6**	**U**
Total transportation in GDD (%)[R]	**12.5%**	**12.3%**	**11.1%**	**11.1%**	**11.1%**	**11.1%**	**11.1%**	**U**

KEY: R = revised; U = data are not available

[a] Federal purchases and state and local purchases are the sum of consumption expenditures and gross investment.

[b] Defense-related purchases are the sum of the transportation of material and travel.

[c] Sum of total personal consumption of transportation, total gross private domestic investment, and total government-related purchases.

SOURCES:

Gross domestic demand: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: April 2000), table 1 (p. 127).

Federal, state, and local government purchases: Ibid., *Survey of Current Business* (Washington, DC: June 2000), table 3.15.

All other data: 1980-90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1995-99: Ibid., *Survey of Current Business* (Washington, DC: April 2000), tables 2.2, 3.10, 5.6, 5.8, and 1 (p. 127).

Table 3-3b U.S. Gross Domestic Demand (GDD) Attributed to Transportation-Related Final Demand (Chained 1996 $ billions)

	R1980	R1985	R1990	R1995	R1996	R1997	1998	1999
Personal consumption of transportation								
Motor vehicles and parts	142.7	236.9	246.1	253.4	256.3	263.8	291.9	318.2
Gasoline and oil	94.9	104.8	113.2	120.2	124.2	126.2	127.7	128.3
Transportation services	124.7	152.6	173.5	201.0	214.2	226.3	234.2	241.0
Total	**362.3**	**494.3**	**532.8**	**574.6**	**594.7**	**616.3**	**653.8**	**687.5**
Gross private domestic investment								
Transportation structures	6.4	5.7	3.7	4.6	5.4	5.7	6.3	U
Transportation equipment	77.6	93.9	87.4	128.2	138.9	149.6	175.3	U
Total	**84.0**	**99.6**	**91.1**	**132.8**	**144.3**	**155.3**	**181.6**	**U**
Government transportation-related purchases								
Federal purchases[a]	12.5	14.0	15.7	16.6	17.2	17.3	17.6	U
State and local purchases[a]	89.8	93.7	104.6	112.3	115.2	121.7	124.1	U
Defense-related purchases[b]	5.8	8.1	10.4	8.7	8.8	8.2	8.3	8.7
Total	**108.1**	**115.8**	**130.7**	**137.7**	**141.2**	**147.3**	**150.0**	**U**
Gross Domestic Demand	**4,890.9**	**5,866.2**	**6,764.4**	**7,622.2**	**7,902.1**	**8,256.9**	**8,713.3**	**9,171.3**
Total domestic transportation-related final demand[c]	**554.4**	**709.7**	**754.6**	**845.1**	**880.2**	**918.9**	**985.4**	**U**
Total transportation in GDD (%)	**11.3%**	**12.1%**	**11.2%**	**11.1%**	**11.1%**	**11.1%**	**11.3%**	**U**

KEY: R = revised; U = data are unavailable

[a] Federal purchases and state and local purchases are the sum of consumption expenditures and gross investments.

[b] Defense-related purchases are the sum of the transportation of material and travel.

[c] Sum of total personal consumption of transportation, total gross private domestic investment, and total government-related purchases.

NOTE: Chained 1996 $ value= (Quantity index for year n * 1996 current $ value)/100.

SOURCES:

Federal, state, and local government transportation-related purchases: U.S. Department of Commerce, Bureau of Economic Analysis, Internet site http://www.bea.doc.gov/bea/dn/annonly.exe, as of July 10, 2000. 1995-98 data also available in *Survey of Current Business* (Washington, DC: June 2000), table 3.15 and *Survey of Current Business* (Washington, DC: June 2000), table 7.11 (price indices for federal non-defense and state and local).

All other data: 1980-90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1995-99: Ibid., *Survey of Current Business* (Washington, DC: April 2000), tables 2.3, 5.7, 5.9, 3.11, and 2A (p. 131).

Price indices (for computing 1980-1990 values): U.S. Department of Commerce, Bureau of Economic Analysis, Internet site http://www.bea.doc.gov/bea/dn/seltab29.exe, as of May 17, 2000, tables 7.4, 7.7, 7.8, and 7.12.

Table 3-4a Contributions to Gross Domestic Product (GDP): Selected Industries (Current $ billions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
GDP by industry									
Services[R]	1,072	1,124	1,219	1,288	1,365	1,462	1,564	1,693	1,841
Health care[R]	314	345	378	395	414	433	459	476	496
Education	40	44	[R]47	49	[R]53	[R]56	58	[R]61	66
Finance, insurance, and real estate[R]	1,010	1,072	1,141	1,205	1,255	1,347	1,437	1,562	1,674
Manufacturing[R]	1,041	1,044	1,082	1,131	1,223	1,289	1,316	1,377	1,433
Durable goods[R]	587	576	594	633	694	730	748	799	843
Nondurable goods[R]	454	468	488	499	529	559	568	579	590
Government[R]	807	857	894	925	958	990	1,020	1,059	1,100
Federal[R]	300	322	334	336	340	342	347	355	361
State and local[R]	506	535	561	589	618	647	674	704	739
Retail trade[R]	508	524	552	578	621	647	687	734	782
Wholesale trade[R]	376	396	415	433	479	501	530	572	614
Construction[R]	249	233	234	249	275	290	316	343	373
For-hire transportation	[R]177	186	193	[R]206	[R]223	[R]233	[R]243	[R]263	284
Electric, gas, and sanitary services[R]	165	177	181	189	197	207	208	207	217
Communications[R]	148	156	164	179	191	202	215	243	259
Agriculture, forestry, and fishing	[R]108	103	112	[R]108	119	110	130	[R]130	125
Mining	112	[R]97	[R]88	[R]88	[R]90	[R]96	[R]113	121	106
Total GDP[R]	**5,803**	**5,986**	**6,319**	**6,642**	**7,054**	**7,401**	**7,813**	**8,301**	**8,760**
Statistical discrepancy[R]	31	20	44	64	59	27	33	-3	-48

KEY: R=Revised

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Table 3-4a Cont'd Contributions to Gross Domestic Product (GDP): Selected Industries (Current $ billions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
% of GDP									
Services	18	19	19	19	19	20	20	20	21
Health care	5	6	6	6	6	6	6	6	6
Education	1	1	1	1	1	1	1	1	1
Finance, insurance, and real estate	R17	18	18	R18	18	R18	R18	19	19
Manufacturing	18	17	17	17	R17	R17	17	17	16
Durable goods	10	R10	9	R10	10	10	10	10	10
Nondurable goods	R8	8	8	8	8	8	7	7	7
Government	14	14	14	14	R14	13	13	13	13
Federal	5	5	5	5	5	5	4	4	4
State and local	9	9	9	9	9	9	9	R8	8
Retail trade	9	9	9	9	9	9	9	9	9
Wholesale trade	6	7	7	R7	7	7	7	7	7
Construction	4	4	4	4	4	4	4	4	4
For-hire transportation	3	3	3	3	3	3	3	3	3
Electric, gas, and sanitary services	3	3	3	3	3	3	3	2	2
Communications	3	3	3	3	3	3	3	3	3
Agriculture, forestry, and fishing	2	2	2	2	2	R1	2	2	1
Mining	2	2	1	1	1	1	1	1	1

KEY: R=Revised

SOURCE: 1990-98: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: June 2000), table 1.

Table 3-4b Contributions to Gross Domestic Product (GDP): Selected Industries (Chained 1996 $ billions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
GDP by industry									
Services[R]	1,362	1,352	1,391	1,418	1,458	1,510	1,564	1,634	1,708
Health services[R]	423	433	443	437	438	444	459	463	467
Educational services[R]	50	53	53	55	57	59	58	59	61
Finance, insurance, and real estate[R]	1,251	1,271	1,297	1,329	1,348	1,393	1,437	1,511	1,607
Manufacturing[R]	1,102	1,066	1,085	1,123	1,206	1,285	1,316	1,386	1,449
Durable goods[R]	585	559	569	600	657	715	748	820	907
Nondurable goods[R]	520	511	520	525	551	570	568	566	546
Government[R]	1,008	1,012	1,015	1,013	1,016	1,017	1,020	1,036	1,047
Federal[R]	385	385	382	373	367	354	347	349	350
State and local[R]	624	628	634	640	649	663	674	687	697
Retail trade[R]	560	555	570	582	617	641	687	739	796
Wholesale trade[R]	395	417	445	452	482	483	530	589	664
Construction[R]	291	269	272	279	297	300	316	329	343
For-hire transportation	[R]181	186	[R]194	201	[R]219	[R]225	[R]243	[R]257	262
Electric, gas, and sanitary services[R]	190	196	193	193	197	207	208	203	208
Communications[R]	155	162	169	182	191	202	215	240	257
Agriculture, forestry, and fishing[R]	119	121	131	123	136	123	130	143	143
Mining[R]	106	101	96	101	108	113	113	119	126
Total GDP[R]	**6,708**	**6,676**	**6,880**	**7,063**	**7,348**	**7,544**	**7,813**	**8,145**	**8,496**
Statistical discrepancy[a, R]	35	22	47	68	61	27	33	-3	-46

KEY: R = revised

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Table 3-4b Cont'd Contributions to Gross Domestic Product (GDP): Selected Industries (Chained 1996 $ billions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
% of GDP									
Services[R]	20	20	20	20	20	20	20	20	20
Health services	6	6	6	6	6	6	[R]6	[R]6	5
Educational services	1	1	1	1	1	1	1	1	1
Finance, insurance, and real estate	[R]19	[R]19	[R]19	[R]19	18	18	18	[R]19	19
Manufacturing[R]	16	16	16	16	16	17	17	17	17
Durable goods[R]	9	8	8	8	9	9	10	10	11
Nondurable goods	8	8	8	[R]7	8	8	[R]7	7	6
Government	[R]15	[R]15	[R]15	14	[R]14	13	13	[R]13	12
Federal	[R]6	[R]6	[R]6	5	5	[R]5	4	4	4
State and local	9	9	9	9	9	9	[R]9	8	8
Retail trade	[R]8	[R]8	[R]8	[R]8	[R]8	9	[R]9	[R]9	9
Wholesale trade	6	6	[R]6	[R]6	7	[R]6	7	7	8
Construction	4	4	4	4	4	4	4	4	4
For-hire transportation	3	3	3	3	3	3	3	3	3
Electric, gas, and sanitary services	3	3	3	3	3	3	3	[R]2	2
Communications	2	[R]2	[R]2	3	3	3	3	3	3
Agriculture, forestry, and fishing	2	2	2	2	2	2	2	2	2
Mining	2	2	1	[R]1	[R]1	[R]1	1	[R]1	1

[a] Equals the current dollar statistical discrepancy deflated by the implicit price deflator for gross domestic business product.

KEY: R = revised

SOURCE: 1990-98: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: June 2000), table 1.

Table 3-5 Gross Domestic Product (GDP) by Major Social Function (Current $ billions)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Housing[R]	**1,392**	**1,486**	**1,584**	**1,703**	**1,766**	**1,874**	**1,970**	**2,107**	**2,239**
% of total	23	24	24	24	24	24	24	[R]24	24
Healthcare[R]	**818**	**893**	**957**	**1,011**	**1,086**	**1,142**	**1,200**	**1,272**	**1,356**
% of total	14	14	14	14	[R]15	[R]15	14	15	15
Food[R]	**791**	**819**	**839**	**889**	**926**	**985**	**1,014**	**1,058**	**1,104**
% of total	13	13	13	[R]13	[R]13	[R]13	12	12	12
Transportation[a, R]	**617**	**656**	**699**	**748**	**782**	**838**	**890**	**937**	**980**
% of total	[R]10	[R]10	11	11	11	11	11	11	11
Education	**409**	**428**	**[R]447**	**469**	**[R]511**	**[R]541**	**[R]574**	**[R]608**	**644**
% of total	7	7	7	7	7	7	7	7	7
Other[R]	**1,958**	**2,036**	**2,116**	**2,233**	**2,330**	**2,434**	**2,653**	**2,779**	**2,934**
% of total	[R]33	32	[R]32	[R]32	31	31	32	[R]32	32
Total GDP[R]	**5,986**	**6,319**	**6,642**	**7,054**	**7,401**	**7,813**	**8,301**	**8,760**	**9,256**

KEY: R = revised

[a] Transportation-related final demand.

NOTE: Numbers and percents may not add to totals due to rounding.

SOURCES: 1991-94: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data and personal communications.

1995-98: Ibid., *Survey of Current Business* (Washington, DC: December 1999), tables 2.4, 3.10, 3.15, 4.3, 5.6, 5.8, 5.10, and (Washington, DC: June 2000), table 3.15.

1999: Ibid., (Washington, DC: June 2000), table 1.1; and U.S. Department of Transportation, Bureau of Transportation Statistics, extrapolations based on average annual economic growth rates during the 1990s.

Table 3-6 National Transportation and Economic Trends

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Passenger-miles (billions)[R]	**1,327**	**1,630**	**2,170**	**2,561**	**2,895**	**3,326**	**3,946**	**4,333**	**4,483**	**4,623**	**4,749**	**U**
Index (1980 = 100)	46	56	75	88	100	115	136	150	155	160	164	U
Ton-miles (billions)	**1,562**	**1,854**	**2,207**	**2,285**	**[R]2989**	**2,949**	**3,196**	**3,648**	**3,725**	**[R]3682**	**3,710**	**U**
Index (1980 = 100)	52	62	74	76	100	99	107	122	125	[R]123	124	U
Population[a] (millions)	**181**	**194**	**205**	**216**	**228**	**238**	**250**	**263**	**265**	**268**	**271**	**U**
Index (1980 = 100)	79	85	90	95	100	104	110	115	116	118	119	U
Industrial Production Index[b] (1992 = 100)[R]	**37**	**50**	**59**	**63**	**80**	**88**	**99**	**114**	**[R]119**	**127**	**[R]132**	**[P]137**
Gross Domestic Product												
Current $ (billions)	527	719	1,036	1,063	2,784	4,181	5,744	7,270	7,662	8,111	[R]8,760	9,255
Index (1980 = 100)	19	26	37	[R]38	100	150	206	261	275	291	[R]315	332
Chained (1992) $ (billions)	2,263	2,881	3,398	3,398	4,615	5,324	6,136	6,762	6,995	7,270	8,516	8,867

KEY: P = preliminary; R = revised; U = data are not available

[a] Estimates as of July 1. Includes Armed Forces abroad.

[b] Industrial Production Index covers manufacturing, mining, and utilities.

SOURCES:

Passenger-miles: 1960-98: Summation of all modes from the passenger-miles table in chapter 1.

Ton-miles: 1960-98: Summation of all modes from the ton-miles table in chapter 1.

Population: 1960-98: U.S. Department of Commerce, Census Bureau, *Statistical Abstract of the United States, 1999* (Washington, DC: 1999), table 2.

Industrial Production Index: 1960-99: Council of Economic Advisors, *Economic Report of the President* (Washington, DC: February 2000), table B-49.

Gross Domestic Product: 1960-97: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: August 1998), table 1, pp. 147-148, and table 2A, pp. 151-152.

1998-99: Ibid., *Survey of Current Business* (Washington, DC: February 2000), tables 1.1 and 1.2.

Section B
Transportation and Consumer Expenditures

Table 3-7 Passenger and Freight Transportation Expenditures (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	P1998
Passenger transportation											
Highway											
Auto purchases and ownership[a,f]	R53,659	71,628	R94,963	R152,256	R269,220	R426,766	R507,922	R634,049	647,716	R700,572	722,624
Local											
Bus and transit[b]	1,337	1,454	1,841	4,697	9,297	13,548	16,651	21,572	21,239	21,282	21,430
Taxi	R870	1,113	R1,740	R2,900	R2,755	R3,770	R4,030	R4,960	R5,425	R5,735	5,735
School bus	486	707	1,219	R2,377	3,833	R5,722	R8,031	R9,889	R10,396	R10,353	10,326
Intercity, bus	559	629	799	1,016	1,709	1,989	1,750	1,481	1,472	R1,625	1,738
Total highway	**R56,911**	**75,531**	**R100,562**	**R163,246**	**R286,814**	**R451,795**	**R538,384**	**R671,951**	**R686,248**	**R739,567**	**761,853**
Air total[c]	3,555	5,682	10,565	18,851	38,135	50,319	R73,280	R81,360	87,027	R93,463	97,662
Rail total[d]	759	598	464	1,212	2,976	3,875	4,521	6,693	5,896	5,764	5,709
Water total (includes international)	281	345	287	294	304	R600	R1,386	R1,709	1,741	R1,180	1,153
Total passenger transportation expenditures	**R61,506**	**82,156**	**R111,878**	**R183,603**	**R328,229**	**R506,589**	**R617,571**	**R761,713**	**R780,912**	**R839,974**	**866,377**

KEY: R = revised; P = preliminary

Continued next page

Table 3-7 Cont'd Passenger and Freight Transportation Expenditures (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	P1998
Freight transportation expenditures											
Highway											
Local, truck	14,289	23,779	28,819	37,287	60,545	82,200	108,350	128,352	132,973	R138,727	144,276
Intercity											
Bus	42	70	122	156	235	245	126	130	132	134	141
Truck	17,958	23,628	33,553	47,400	94,551	123,200	162,300	219,627	235,440	257,807	282,814
Total highway	**32,289**	**47,477**	**62,494**	**84,843**	**155,331**	**205,645**	**270,776**	**348,109**	**368,545**	**R396,668**	**427,231**
Air total (domestic and international)	354	708	1,171	1,838	4,013	6,817	13,706	R18,735	20,397	R22,711	24,523
Rail total	9,028	9,923	11,869	16,509	27,858	29,150	30,067	R34,343	35,059	35,349	35,294
Water total	3,487	3,903	5,257	8,221	15,498	R18,448	20,121	R21,781	24,564	R20,992	22,565
Oil pipeline total	895	1,051	1,396	2,220	7,548	8,910	8,387	R8,278	8,635	R8,607	8,656
Other total[e]	1,714	1,869	1,791	2,208	3,488	4,642	7,774	R9,342	9,907	10,590	11,100
Total freight transportation expenditures	**47,767**	**64,931**	**83,978**	**115,839**	**213,736**	**R273,612**	**350,831**	**R440,588**	**467,107**	**R494,917**	**529,369**
TOTAL passenger and freight transportation expenditures	**R109,273**	**147,087**	**R195,856**	**R299,442**	**R541,965**	**R780,201**	**R968,402**	**R1,202,301**	**R1,248,019**	**R1,334,891**	**1,395,746**

KEY: R = revised; P = preliminary

[a] Includes business expenditures for passenger cars.

[b] Includes federal/state operating subsidies, and federal capital grants. Beginning in 1994, includes taxes levied directly by transit agencies and local subsidies such as bridge and tunnel tolls, and nontransit parking lot funds.

[c] Air includes aircraft and operating costs, plus domestic and international air passenger federal excise taxes.

[d] Data from 1980 include federal/state/local operating subsidies and capital grants. Figures also include federal operating subsidies and capital grants for Amtrak and the Northeast Corridor.

[e] Domestic freight forwarder's revenues after payment to live-haul carriers plus other shipper costs such as loading and unloading freight cars.

[f] Auto purchases and ownership data were completely revised in Transportation in America 1997, but data for 1965 and 1996 were not published in the current revised edition and are, therefore, not comparable to other years.

SOURCES:

Passenger and freight: 1960, 1970-75: Eno Transportation Foundation, Inc., *Transportation in America,* 1998 (Washington, DC: 1998), pp. 40, 42.

1965: Ibid., *Transportation in America*, *1993* (Lansdowne, VA: 1994), p. 42 (Passenger only); and Transportation in America 1997 (Washington, D.C.: 1997), p. 40 (freight only).

1980-90, 1995-97: Ibid., *Transportation in America*, 1998, *Supplement* (Washington, D.C.: 1999), pp. vii-x.

1998: Ibid., *Transportation in America*, 1998, (Washington, DC: 1999), pp. 40, 42.

Table 3-8 Sales Price of Transportation Fuel to End-Users (Current ¢/gallon)

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aviation fuel (excluding taxes)												
Aviation gasoline[a]	108.4	120.1	112.0	104.7	102.7	99.0	95.7	100.5	111.6	R112.8	97.5	105.9
Jet fuel kerosene[a]	86.8	79.6	76.6	65.2	61.0	58.0	53.4	54.0	65.1	R61.3	45.2	53.8
Highway fuel												
Gasoline (including taxes)												
Leaded[b]	119.1	111.5	114.9	U	U	U	U	U	U	U	U U	
Unleaded premium[b]	N	134.0	134.9	132.1	131.6	130.2	130.5	R134.0	R141.0	R142.0	125.0	136.0
Unleaded regular[b]	124.5	120.2	116.4	114.0	112.7	110.8	111.2	R115.0	R123.0	R123.0	106.0	117.0
All types	122.1	119.6	121.7	119.6	119.0	117.3	117.4	R121.0	R129.0	R129.0	112.0	122.0
Diesel no. 2[a] (excluding taxes)	81.8	78.9	72.5	64.8	61.9	60.2	55.4	56.0	68.1	64.2	49.4	57.9
Railroad fuel												
Diesel	82.6	77.8	69.2	67.2	63.3	63.1	59.9	60.0	67.7	67.8	57.0	55.5

KEY: N = data do not exist; P = preliminary; R revised; U = data are not available

[a] Sales to end users (those sales made directly to the ultimate consumer, including bulk customers in agriculture, industry, and utility).

[b] Average retail price.

SOURCES:

All data except railroad fuel: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1999*, DOE/EIA-0384(97) (Washington, DC: July 2000), tables 5.20 and 5.22.

Railroad fuel: Association of American Railroads, *Railroad Facts* (Washington, DC: 2000), p. 60.

Table 3-9 Price Trends of Gasoline v. Other Consumer Goods and Services

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Retail price of regular grade gasoline (¢/gallon)											
Service station price (excluding taxes)[a]	21.0	20.7	24.6	44.8	105.3	89.5	88.0	74.3	82.4	80.6	70.4
State and federal taxes[b]	10.1	10.5	11.1	12.4	13.8	22.0	26.9	40.4	40.7	42.8	41.5
Service station price (including taxes)											
Leaded	31.1	31.2	35.7	56.7	119.1	111.5	114.9	NA	NA	NA	NA
Unleaded	NA	NA	NA	NA	124.5	120.2	116.4	114.7	123.1	123.4	106.0
Consumer price indices (1982-84 = 100)											
All items	30	32	39	54	82	108	131	152	157	161	163
Food	30	32	39	60	87	106	132	148	153	157	161
Shelter	25	27	36	49	81	110	140	166	171	176	182
Apparel and upkeep	46	48	59	73	91	105	124	132	132	133	133
Motor fuel	24	25	28	45	97	99	101	100	106	106	92
Medical care	22	25	34	48	75	114	163	221	228	235	242

KEY: NA = not applicable

[a] Calculated by subtracting state and federal taxes from service station price (including taxes).

[b] State and federal taxes are weighted averages computed by the American Petroleum Institute, based on gasoline sold in the 50 states.

SOURCES:

Retail price of regular grade gasoline except service station prices (including taxes): American Petroleum Institute, *Basic Petroleum Data Book* (Washington, DC: Annual issues), section VI, table 5, and similar tables in earlier editions.

Service station price (including taxes): U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1998*, DOA/EIA-0384(97) (Washington, DC: July 1999), table 5.22. Also available at Internet site http://www.eia.doe.gov/pub/energy.overview/aer98/txt/aer0522.txt

Consumer price indices: Council of Economic Advisors, *Economic Report of the President* (Washington, DC: February 1999), tables B-60 and B-61. Also available at Internet site http://w3.access.gpo.gov/eop/

Table 3-10 Producer Price Indices for Transportation Services

	Base date	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Railroads, line-haul operating (SIC 4011)	12/84	107.5	109.3	109.9	110.9	111.8	111.7	111.5	112.1	113.4	113.0
Motor freight transportation and warehousing (SIC 42)	06/93	U	U	U	R99.9	101.9	104.5	106.3	108.9	111.6	114.8
Water transportation (SIC 44)	12/92	U	U	100.0	99.7	100.0	103.0	103.7	104.2	R105.6	113.0
Air Transportation (SIC 45)	12/92	U	U	100.0	105.6	108.5	113.7	121.1	125.3	R124.5	130.8
Pipelines, except natural gas (SIC 46)	12/86	95.8	96.1	96.4	96.6	102.6	110.8	104.6	98.8	99.2	98.3
Travel agencies (SIC 4724)	12/89	107.3	113.6	113.4	115.3	115.3	111.3	109.9	114.5	R112.1	112.0
Freight transportation arrangement (SIC 4731)	12/94	U	U	U	U	100.0	99.8	101.5	101.4	R99.7	99.2

KEY: R = revised; U = data are not available

NOTES: Data are reported monthly from January to December. The monthly indices, however, are available for fewer than 12 months for some years. In both cases, a simple average of the available monthly indices is reported for each year. Data are not seasonally adjusted.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Internet site www.bls.gov/datahome.htm, as of May 12, 2000.

Table 3-11 Producer Price Indices for Transportation Equipment

	Base date	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Transportation equipment (SIC 37)	12/84	115.6	119.8	123.0	126.3	130.1	132.2	134.2	134.1	133.6	134.5
Motor vehicles and motor vehicle equipment (SIC 371)	12/84	113.0	117.4	120.5	123.8	127.5	129.1	130.4	129.0	127.7	128.3
Motor vehicles and passenger car bodies (SIC 3711)	06/82	119.9	125.3	129.1	133.2	138.0	139.1	140.4	138.7	136.8	137.6
Truck and bus bodies (SIC 3713)	12/82	125.4	128.1	131.1	132.8	136.8	145.5	149.9	153.5	155.3	157.0
Motor vehicle parts and accessories (SIC 3714)	12/82	108.9	110.3	111.0	111.7	112.0	113.5	114.0	113.1	112.6	112.0
Truck trailers (SIC 3715)	12/79	125.6	128.1	131.2	134.2	138.6	148.6	147.8	147.7	152.2	153.6
Motor homes built on purchased chassis (SIC 3716)	06/84	125.8	128.7	131.8	133.9	134.5	137.8	141.6	143.1	R145.0	147.6
Aircraft (SIC 3721)	12/85	116.0	120.4	124.3	128.6	132.9	137.3	140.5	142.3	R142.7	144.1
Aircraft engines and engine parts (SIC 3724)	12/85	112.6	117.9	123.6	125.7	129.0	130.9	133.4	134.8	R135.8	136.8
Aircraft parts and auxiliary equipment, NEC (SIC 3728)	06/85	116.3	120.3	124.9	128.0	130.7	131.7	136.3	139.0	R140.8	142.2
Shipbuilding and repairing (SIC 3731)	12/85	114.0	116.2	118.3	123.3	126.8	127.6	130.1	133.3	134.8	135.4
Boatbuilding and repairing (SIC 3732)	12/81	136.0	140.1	144.9	147.7	150.2	154.6	159.6	165.0	168.6	172.7
Railroad equipment (SIC 3743)	06/84	114.2	117.3	118.7	119.8	122.6	127.6	129.6	127.4	127.5	128.1
Motorcycles, bicycles, and parts (SIC 3751)	12/84	109.9	111.8	114.4	116.9	119.0	122.2	123.3	123.3	R124.2	125.5
Travel trailers and campers (SIC 3792)	06/84	118.1	120.1	122.2	123.2	124.7	127.2	129.0	129.6	130.3	132.0
Transportation equipment, NEC (SIC 3799)	06/85	112.5	114.9	116.1	117.2	119.1	123.3	126.6	128.7	R131.3	132.2

KEY: NEC = not elsewhere classified; R = revised

NOTES: Bureau of Labor Statistics data are reported monthly from January to December. The monthly indices, however, are available for fewer than 12 months for some years. In both cases, a simple average of the available monthly indices is reported for each year. Data are not seasonally adjusted.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Producer Price Index Revision – Current Series, Internet site www.bls.gov/datahome.htm, as of May 12, 2000.

Table 3-12 Personal Expenditures by Category (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997[R]	1998	1999
Transportation	42,900	59,100	81,100	130,200	238,400	372,800	463,300	574,100	594,600	623,700	647,400	705,500
Transportation as a % of total	12.9	13.3	12.5	12.7	13.5	13.8	12.1	11.6	11.4	11.3	11.1	11.3
Food and tobacco	89,200	108,800	154,600	238,200	376,200	497,300	672,500	780,400	834,100	866,300	907,400	963,800
Clothing, accessories, and jewelry	32,700	41,400	57,600	85,600	132,300	188,300	262,700	321,800	333,300	348,200	367,900	397,200
Personal care	5,600	8,100	11,800	16,700	26,600	39,100	57,300	71,800	71,600	76,100	80,500	86,000
Housing	48,200	65,400	94,000	147,000	255,200	407,100	586,300	750,400	772,500	809,800	855,900	906,200
Household operation	46,700	62,100	84,800	135,400	232,600	342,000	436,200	559,400	589,200	617,500	646,500	682,500
Medical care	22,100	34,100	60,000	107,900	206,400	366,700	615,600	875,000	932,300	977,600	1,032,300	1,102,600
Personal business	14,600	20,900	32,000	53,000	101,200	182,600	290,100	388,800	435,100	488,300	528,600	586,200
Recreation	18,500	26,800	43,100	70,500	116,300	185,900	281,600	404,200	429,600	457,800	494,700	534,900
Education and research	4,300	6,900	12,500	20,500	33,300	52,900	80,700	112,000	122,300	130,700	139,200	148,900
Religious and welfare activities	5,300	7,700	12,100	19,700	38,300	62,600	100,400	138,600	146,800	150,300	163,500	170,200
Foreign travel and other, net	2,100	2,900	4,500	4,400	3,500	7,500	-7,400	-22,700	-24,100	-21,800	-15,300	-15,400
Total expenditures	**332,200**	**444,200**	**648,100**	**1,029,100**	**1,760,300**	**2,704,800**	**3,839,300**	**4,953,900**	**5,237,300**	**5,524,500**	**5,848,600**	**6,268,700**
Disposable Personal Income (DPI)[R]	366,200	498,900	736,500	1,181,400	2,019,800	3,086,500	4,293,600	5,422,600	5,677,700	5,982,800	6,286,200	6,637,700
Transportation as a % of DPI[R]	11.7	11.9	11.1	11.2	11.8	12.1	10.8	10.6	10.5	10.4	10.3	10.6

KEY: R = revised

SOURCES:

DPI: 1960-1999: U.S. Department of Commerce, Bureau of Economic Analysis, Table 209, Internet site http://www.bea.doc.gov, as of Dec. 14, 2000.

All but DPI: 1960-90: Ibid., personal communication.

1995-97: Ibid., *Survey of Current Business* (Washington, DC: August 1998), table 2.4.

1998: Ibid., *Survey of Current Business:* Internet site www.bea.doc.gov/bea/pubs.htm, table B.4.

1999: Ibid., *Survey of Current Business* (Washington, DC: October 2000), Vol. 80., No. 10, table B.4.

Table 3-13 Personal Consumption Expenditures on Transportation by Subcategory (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995	R1996	R1997	1998
User-operated transportation											
New cars and net purchases of used cars	16,600	25,200	26,800	36,800	57,200	110,700	124,000	139,600	133,300	136,200	146,100
New and used trucks and RVs	610	1,280	2,700	7,700	11,800	40,800	56,900	79,700	84,300	87,200	101,400
Tires, tubes, accessories, and parts	2,500	3,500	6,100	10,300	17,900	24,300	29,400	36,200	38,700	39,700	41,700
Repair and rental	5,500	7,700	12,300	19,800	34,000	60,500	87,300	128,700	134,200	145,900	153,800
Gasoline and oil	12,000	14,800	21,900	39,700	86,700	97,200	109,200	115,600	124,200	126,200	112,900
Tolls	310	460	650	820	1,100	1,520	2,000	2,800	3,700	4,000	4,400
Insurance premiums, less claims paid	2,000	2,400	3,800	3,800	9,400	10,000	18,000	29,400	31,800	36,300	37,800
Total	**39,500**	**55,100**	**74,200**	**118,920**	**218,300**	**344,900**	**426,900**	**531,900**	**550,200**	**575,600**	**598,000**
Purchased intercity transportation											
Railroad	310	280	210	270	300	480	800	800	600	700	700
Intercity bus	290	380	530	740	1,400	1,350	R1,000	1,100	1,800	1,800	2,000
Airline	680	1,280	3,100	5,900	12,800	17,600	23,900	27,900	26,200	29,000	29,500
Other	35	54	182	390	910	1,720	2,800	3,300	4,700	4,700	5,100
Total	**1,310**	**2,000**	**4,000**	**7,300**	**15,410**	**21,100**	**27,800**	**33,000**	**33,300**	**36,300**	**37,200**
Purchased local transportation											
Mass transit system	1,420	1,450	1,810	2,100	2,900	4,200	5,200	6,000	7,700	8,100	8,400
Taxi	610	610	1,180	1,970	1,870	2,600	2,600	3,200	3,500	3,700	3,700
Total	**2,000**	**2,100**	**2,990**	**4,100**	**4,770**	**6,800**	**7,800**	**9,100**	**11,200**	**11,800**	**12,100**
Total transportation	**42,900**	**59,100**	**81,100**	**130,200**	**238,400**	**372,800**	**463,200**	**574,100**	**594,600**	**623,700**	**647,400**

KEY: R = revised; RVs = recreational vehicles

NOTE: Numbers may not add to totals due to rounding.

SOURCES: 1960-91: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Wealth Division, personal communication, 1998.

1992-93: Ibid., *Survey of Current Business* (Washington, DC: August 1997), table 2.4.

1994-98: Ibid., *Survey of Current Business*, Internet site http://www.bea.doc.gov/bea/pubs.htm, table B.4.

Table 3-14 Average Cost of Owning and Operating an Automobile[a] (Assuming 15,000 Vehicle-Miles per Year)

	1975	1980	1985	1990	1995	1996	1997	1998	1999
Average total cost per mile (current ¢)	14.4	21.2	23.2	33.0	41.2	42.6	44.8	46.1	49.1
Gas and oil	4.8	5.9	5.6	5.4	5.8	5.6	6.6	6.2	6.9
Gas and oil as a % of total cost	33.4	27.9	24.0	16.4	14.1	13.1	14.7	13.4	14.1
Maintenance	1.0	1.1	1.2	2.1	2.6	2.8	2.8	3.1	3.6
Tires	0.7	0.6	0.7	0.9	1.2	1.2	1.4	1.4	1.7
Average total cost per 15,000 miles, (current $)	2,154	3,176	3,484	4,954	6,185	6,389	6,723	6,908	7,363
Variable cost	968	1,143	1,113	1,260	1,440	1,440	1,620	1,605	1,829
Fixed cost[b]	1,186	2,033	2,371	3,694	4,745	4,949	5,103	5,303	5,534

[a] All figures reflect the average cost of operating a vehicle 15,000 miles per year in stop and go conditions.

[b] Fixed costs (ownership costs) include insurance, license, registration, taxes, depreciation, and finance charges.

NOTES: Changes in the way costs were calculated make it difficult to compare pre 1985 data with more recent years. Prior to 1985, the cost figures are for a mid-sized, current model, American car equipped with a variety of standard and optional accessories. After 1985, the cost figures represent a composite of three current model American cars. The 1999 fuel costs are based on an average price of $1.285 per gallon of regular unleaded gasoline, weighted 20% full-serve and 80% self-serve. Insurance figures are based on personal use of vehicles driven less than 10 miles to or from work, with no drivers under 25 years old. Normal depreciation costs are based on the vehicle's trade-in value at the end of 4 years or 60,000 miles. American Automobile Association analysis covers vehicles equipped with standard and optional accessories including automatic transmission, air conditioning, power steering, power disc brakes, AM/FM stereo, driver- and passenger-side air bags, anti-lock brakes, cruise control, tilt steering wheel, tinted glass, emissions equipment, and rear-window defogger.

SOURCE: American Automobile Association, *Your Driving Costs* (Heathrow, FL: Annual issues).

Table 3-15a Average Passenger Fares (Current $)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air carrier, domestic, scheduled service	33.01	34.13	40.65	53.64	84.60	92.53	107.86	106.66	110.37	114.10	114.08
Class I bus, intercity[a]	2.46	2.73	3.81	5.46	10.57	11.98	20.22	20.10	22.85	20.57	U
Transit, all modes[b] (unlinked)	0.14	0.16	0.22	0.27	0.30	0.53	0.67	R0.88	0.93	0.89	0.87
Commuter rail	0.64	0.71	0.84	1.04	1.41	2.85	2.90	3.13	3.25	3.30	3.28
Intercity/Amtrak[c]	4.22	3.92	3.19	12.96	17.72	26.15	38.51	39.03	42.54	44.31	43.98

KEY: R = revised; U = data are not available

[a] Regular route intercity service.

[b] Prior to 1984, excludes commuter railroad, automated guideway, urban ferryboat, demand responsive, and most rural and smaller systems.

[c] Amtrak began operations in 1971.

SOURCES:

Air carrier, domestic, scheduled service: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics, 1969* (Washington, DC: February 1970), part III, table 2 (enplanements); part IV, table 2 (passenger revenue).

1965-70: Ibid., *Handbook of Airline Statistics, 1973* (Washington, DC: March 1974), part III, table 2 (enplanements); part IV, table 2 (passenger revenue).

1975-80: Ibid., *Air Carrier Financial Statistics* (Washington, DC: Annual December issues), p. 1, line 3; and Air Carrier Traffic Statistics (Washington, DC: Annual December issues), p. 2, line 16 (passenger revenue/revenue passenger enplanements).

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Financial Statistics* (Washington, DC: Annual December issues), p. 1, line 3 (passenger revenues); *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), p. 2, line 16 (passenger revenue/revenue passenger enplanements).

Class I bus, intercity: 1960-90: Interstate Commerce Commission, *Transport Statistics in the United States, Motor Carriers* (Washington, DC: Annual issues), part 2.

1995-97: U.S. Department of Transportation, Bureau of Transportation Statistics, *Selected Earnings Data, Class I Motor Carriers of Passengers* (Washington, DC: Annual issues).

Transit and commuter rail: 1960-98: American Public Transit Association, *Transit Fact Book* (Washington, DC: Annual issues) (passenger fares/passenger trips).

Intercity/Amtrak: 1960-70: Association of American Railroads, *Railroad Facts* (Washington, DC: Annual issues).

1975-80: Amtrak, State and Local Affairs Department and Public Affairs Department, personal communication.

1985-98: Amtrak, *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues) (transportation revenues/Amtrak system passenger trips).

Table 3-15b Average Passenger Fares (Chained 1996 $)

	R1960	R1965	R1970	R1975	R1980	R1985	R1990	R1995	R1996	R1997	1998
Air carrier, domestic, scheduled service	192.03	181.93	177.59	174.16	184.39	143.77	133.24	109.68	110.37	110.59	108.33
Class I bus, intercity[a]	14.31	14.55	16.64	17.73	23.04	18.61	24.98	20.67	22.85	19.94	U
Transit, all modes[b] (unlinked)	0.81	0.85	0.96	0.88	0.65	0.82	0.83	0.90	0.93	0.86	0.83
Commuter rail	3.72	3.78	3.67	3.38	3.07	4.43	3.58	3.22	3.25	3.20	3.11
Intercity/Amtrak[c]	24.55	20.90	13.94	42.08	38.62	40.64	47.58	40.14	42.54	42.95	41.76

KEY: R = revised; U = data are not available

[a] Regular route intercity service.

[b] Prior to 1984, excludes commuter railroad, automated guideway, urban ferryboat, demand response, and most rural and smaller systems.

[c] Amtrak began operations in 1971.

NOTE: BTS converted current dollars to chained dollars using a combination of deflators constructed from the Bureau of Labor Statistics' Consumer Price Index and the Bureau of Economic Analysis' chain-type price index.

SOURCES: See table 3-15a for data sources.

Section C
Transportation Revenues, Employment, and Productivity

Table 3-16 Average Passenger Revenue per Passenger-Mile (Current ¢)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air carrier, domestic, scheduled service	**6.1**	**6.1**	**6.0**	**7.7**	**11.5**	**12.2**	**13.4**	**13.5**	**13.8**	**13.9**	**14.0**
Index (1980 = 100)	53	53	52	67	100	106	117	117	120	121	122
Class I bus,[a] intercity	**2.7**	**2.9**	**3.6**	**4.9**	**7.3**	**9.9**	**11.6**	**12.2**	**12.3**	**12.5**	**P12.5**
Index (1990 = 100)	23	25	31	42	63	85	100	106	106	108	108
Commuter rail	**2.9**	**3.3**	**3.8**	**4.6**	**6.7**	**12.1**	**13.5**	**13.1**	**13.7**	**R14.7**	**P14.6**
Index (1990 = 100)	R22	R25	28	34	50	90	100	97	R102	R109	109
Intercity/Amtrak[b]	**3.0**	**3.1**	**4.0**	**5.7**	**8.2**	**11.3**	**14.1**	**14.6**	**16.6**	**17.3**	**17.5**
Index (1990 = 100)	21	22	28	40	58	80	100	103	118	123	124
Consumer Price Index (1982-84=100)	**30**	**32**	**39**	**54**	**82**	**108**	**131**	**152**	**157**	**161**	**c163**

KEY: P = Preliminary; R = revised

[a] Regular route intercity service.

[b] Amtrak began operations in 1971.

[c] In 1998, the Consumer Price Index (CPI) was revised to reflect several improvements. For example, the CPI sample area was updated to include 1990 Census data on the regional distribution of the population (1980 population data were previously used). The CPI was also updated to reflect 1993-95 spending patterns (1982-84 data were previously used).

SOURCES:

Air carrier, domestic, scheduled service: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics*, 1969 (Washington, DC: February 1970), part III, table 2 (passenger-miles); part IV, table 2 (passenger revenues).

1965-70: Ibid., *Handbook of Airline Statistics*, 1973 (Washington, DC: March 1974), part III, table 2 (passenger-miles); part IV, table 2 (passenger revenues).

1975-80: Ibid., *Air Carrier Financial Statistics* (Washington, DC: Annual December issues), p. 2, line 3.

Ibid., *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), p. 4, line 9.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Financial Statistics* (Washington, DC: Annual December issues), p. 1, line 3.

Ibid., *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), p. 2, line 9 (total passenger operating revenues/total revenue passenger-miles).

Intercity class I bus and commuter rail: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 2000), p. 50.

Intercity/Amtrak: 1960-70: Association of American Railroads, *Railroad Facts* (Washington, DC: Annual issues).

1975-80: Eno Transportation Foundation, Inc., *Transportation in America, 1994* (Lansdowne, VA: 1994), p. 50.

1985-98: Amtrak. *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues) (transportation revenues/passenger-miles).

Consumer Price Index: 1960-98: Council of Economic Advisors, *Economic Report of the President, 2000* (Washington, DC: 2000), table B-58.

Table 3-17 Average Freight Revenue per Ton-Mile (Current ¢)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air carrier, domestic, scheduled service	**22.8**	**20.5**	**21.9**	**28.2**	**46.3**	**48.8**	**64.6**	**76.5**	**81.5**	**R79.8**	**84.1**
Index (1980 = 100)	49	44	47	61	100	105	140	165	176	172	182
Truck[a]	**6.3**	**6.5**	**8.5**	**11.6**	**18.0**	**22.9**	**24.4**	**25.1**	**R26.0**	**26.1**	**26.2**
Index (1990 = 100)	26	26	35	48	74	94	100	103	107	107	107
Class I rail	**1.40**	**1.27**	**1.43**	**2.04**	**2.87**	**3.04**	**2.66**	**2.40**	**2.35**	**2.40**	**2.34**
Index (1990 = 100)	53	48	54	77	108	114	100	90	88	90	88
Barge	**N**	**0.35**	**0.30**	**0.52**	**0.77**	**0.80**	**0.76**	**0.73**	**0.73**	**0.73**	**0.74**
Index (1990 = 100)	N	46	39	68	101	105	100	96	96	96	98
Oil pipeline	**0.32**	**0.28**	**0.27**	**0.37**	**[b]1.33**	**1.57**	**1.44**	**1.51**	**1.37**	**1.37**	**1.40**
Index (1990 = 100)	22	19	19	26	92	109	100	105	95	95	97
Producer Price Index (1982 = 100)[c]	**33**	**34**	**39**	**58**	**88**	**105**	**119**	**128**	**131**	**132**	**131**

KEY: N = data do not exist; R = revised

[a] General freight common carriers, most of which are LTL (less-than-truckload) carriers.

[b] Reflects entrance of Alaska pipeline moving crude petroleum to U.S. refineries between 1975 and 1980.

[c] Total finished goods.

SOURCES:

Air carrier, domestic, scheduled service: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics*, 1969 (Washington, DC: 1970), part III, tables 2 and 13

1965-70: Ibid., *Handbook of Airline Statistics, 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), pp. 4 and 14 (December 1976) and pp. 2 and 3 (December 1981).

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Financial Statistics* (Washington, DC: Annual December issues), p. 1, line 4.

Ibid., *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), p. 2, line 18 (freight operating revenues/freight revenue ton-miles).

Truck, barge, and oil pipeline: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America, 1999* (Washington, DC: 1999), p. 49.

Class I rail: 1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 30.

Producer Price Index: 1960-98: Council of Economic Advisors, *Economic Report of the President, 2000* (Washington, DC: February 2000), table B-63.

Table 3-18 Total Operating Revenues (Current $ millions)

	R1960	R1965	R1970	R1975	R1980	R1985	R1990	R1995	R1996	R1997	1998
Air carrier, domestic, all services	2,178	3,691	7,180	12,020	26,440	37,629	57,961	70,885	76,891	82,250	87,000
Trucking and courier services, except air	N	N	N	N	N	N	127,314	161,806	174,743	183,153	R197490
Class I bus, intercity	463	607	722	955	1,397	1,233	943	917	912	1,000	U
Transit[a]	1,407	1,444	1,707	3,451	6,510	12,195	16,053	18,241	19,151	19,515	P18,897
Class I rail	9,514	10,208	11,992	16,402	28,258	27,586	28,370	32,279	32,693	33,118	R33151
Intercity/Amtrak[b]	N	N	N	253	454	832	1,308	1,497	1,555	1,674	R2285
Water transportation (domestic)[c]	1,722	1,822	2,070	3,293	7,219	7,703	7,940	7,712	7,684	6,901	P6,886
Oil pipeline[d]	895	1,051	1,396	2,220	7,548	8,910	8,387	8,278	8,635	8,607	8,656
Gas pipeline (investor-owned)[e]	8,700	11,500	16,400	30,551	85,918	103,945	66,027	58,435	72,025	53,328	64,905
Transmission companies	3,190	4,088	5,928	11,898	41,604	45,738	21,756	12,092	12,050	10,339	9,450
Distribution companies	N	N	N	5,938	14,013	21,510	18,750	19,421	30,407	30,864	27,542
Integrated companies	N	N	N	6,962	17,300	17,396	10,117	10,899	11,941	12,125	10,954
Combination companies	N	N	N	5,753	13,001	19,301	15,404	16,023	17,627	U	16,959

KEY: N = data do not exist; P = preliminary; R = revised; U = data are not available

[a] Excludes commuter rail, automated guideway, urban boat, demand responsive, and most rural and smaller systems prior to 1984. Includes operating assistance.

[b] Amtrak began operations in 1971.

[c] Includes foreign traffic moving on domestic inland waterways.

[d] Oil pipeline revenues are much smaller than gas pipeline revenues because oil pipeline companies are common carriers that include transportation costs only.

[e] Data are not directly comparable from year to year due to acquisition and mergers. Prior to 1975, pipeline companies are not categorized by distribution, integrated, or combination. Total numbers for these companies are 1960 = 5,505; 1965 = 7,437; 1970 = 10,542. In 1997, the American Gas Association revised the database that identifies companies by type (distribution, integrated, or transmission). This reclassification of companies has resulted in numerous additions to the distribution company sample, in particular from the integrated company sample.

NOTE: In January 2000, the American Public Transit Association changed its name to the American Public Transportation Association (APTA). The APTA *Transit Fact Book* is now referred to as the *Public Transportation Fact Book*.

SOURCES:

Air carrier, domestic, all services: 1960-70: Civil Aeronautics Board, *Handbook of Airline Statistics, 1973* (Washington, DC: March 1974).

1975-80: Ibid., *Air Carrier Financial Statistics* (Washington, DC: Annual issues), p. 1.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Financial Statistics* (Washington, DC: Annual December issues), p. 1.

Trucking and courier services, except air: 1990-98: U.S. Department of Commerce, Bureau of the Census, *Transportation Annual Survey, 1998* (Washington, DC: January 2000), table 1.

Intercity Class I bus: 1960-90: Interstate Commerce Commission, *Annual Report of the Interstate Commerce Commission* (Washington, DC: Annual issues).

1995-97: U.S. Department of Transportation, Bureau of Transportation Statistics, *Selected Earnings Data, Class 1 Motor Carriers of Passengers* (Washington, DC: Annual issues).

Transit: 1960-98: American Public Transportation Association, *Public Transportation Fact Book* (Washington, DC: March 2000), table 21, and similar tables in earlier editions of the APTA Transit Fact Book.

Class I rail: 1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 12.

Intercity/Amtrak: 1975-80: Amtrak, State and Local Affairs Department and Public Affairs Department, personal communication.

1985-98: Ibid., *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues).

Water transportation: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America* (Washington, DC: Annual issues and supplements), p. 40.

Oil pipeline: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America* (Washington, DC: Annual issues and supplements), p. 40.

Gas pipeline: 1960-98: American Gas Association, *Gas Facts* (Arlington, VA: Annual issues), tables 12-1, 12-2, 12-3, and 12-4; and similar tables in income accounts section in earlier editions.

Table 3-19 Employment in For-Hire Transportation and Selected Transportation-Related Industries[a] (Thousands)

SIC		1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
	Total U.S. labor force[b]	**54,189**	**60,763**	**70,880**	**76,945**	**90,406**	**97,387**	**109,403**	**117,191**	**119,608**	**122,690**	**R125,826**	**128,615**
	For-hire transportation industry												
45	Air	191	229	352	363	453	522	968	1,068	1,107	R1,134	R1,183	1,237
42	Trucking and warehousing	856	964	1,083	1,108	1,280	1,361	1,395	1,587	1,637	R1,677	R1,745	1,813
41	Local and interurban passenger transit												
413	Intercity and rural bus	41	42	43	40	38	35	26	24	24	R22	R26	28
411	Local and suburban	U	U	U	69	79	92	141	203	218	R229	R235	242
415	School bus[c]	N	N	N	65	80	91	111	131	132	R137	R141	146
412	Taxi	121	110	106	85	53	38	32	31	31	31	31	31
	Other local and interurban[d]	R123	R118	R131	11	R16	R22	28	R31	R33	R34	R35	34
40	Railroad	885	735	634	548	532	359	279	238	231	227	R231	230
44	Water	N	228	212	194	211	185	177	175	174	R179	R180	181
46	Liquid pipeline	23	20	18	18	21	19	19	15	15	14	14	13
492	Natural gas pipeline[e]												
	Distribution	N	N	N	51	52	62	65	62	80	75	R70	U
	Transmission	31	30	32	37	45	46	37	28	32	28	R28	U
	Integrated	N	N	N	55	53	43	40	36	13	12	R14	U
	Combination	N	N	N	52	52	53	50	42	39	31	R30	U
	Noninvestor-owned	N	N	N	11	13	12	12	11	R16	9	R9	U
47	Transportation services[f]	N	85	115	134	198	275	R336	401	418	R441	R455	469
	Total for-hire transportation	**R2,271**	**R2,559**	**R2,726**	**2,841**	**3,175**	**3,214**	**R3,715**	**R4,083**	**R4,198**	**R4,278**	**R4,427**	**4,425**

KEY: N = data do not exist; R = revised; U = data are not available

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Table 3-19 Cont'd Employment in For-Hire Transportation and Selected Transportation-Related Industries[a] (Thousands)

SIC		1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
37	**Equipment manufacturing**												
372	Aircraft and parts	605	601	644	499	633	616	712	451	458	R501	R524	490
371	Motor vehicles and equipment	724	843	799	792	789	883	812	971	967	R986	R990	1,000
374	Railroad equipment	43	56	51	57	71	33	33	38	36	R34	R37	35
373	Ship and boat building and repairing	141	160	172	194	221	187	188	160	159	R158	R166	164
301	Tires and inner tubes	105	102	116	124	115	94	84	80	80	78	79	77
	Other[g]	155	193	167	157	R167	241	244	R172	165	167	R168	166
	Total SIC 37 and SIC 301	**1,773**	**1,955**	**1,949**	**1,824**	**R1,995**	**2,054**	**2,073**	**R1,872**	**R1864**	**R1,923**	**R1,963**	**1,932**
	Related industries												
553	Automotive and home supply stores	U	U	U	212	261	304	337	369	380	R392	R398	405
75	Automotive repair, services, and parking	U	U	U	439	571	730	914	1,020	1,080	R1,120	R1,144	1,185
554	Gasoline service stations	461	522	613	622	561	588	647	649	669	R676	R689	702
161	Highway and street construction	U	U	U	U	U	264	239	228	236	R243	R253	264
501	Motor vehicles, parts, and supplies	U	U	U	382	434	454	456	492	503	R513	R518	532
551	New and used car dealers	U	U	U	731	745	856	924	996	1,031	R1,046	R1,048	1,081
	Other automotive retail[h]	N	N	N	112	122	R140	R155	176	187	197	206	218
	Total related industries	**461**	**522**	**613**	**2,498**	**2,694**	**R3,336**	**R3,672**	**3,930**	**4,086**	**R4,186**	**R4,257**	**4,386**
	Government employment[i]												
	U.S. DOT[j]	N	N	104	112	112	100	104	101	99	98	99	100
	State and local highway[k]	532	577	607	604	559	549	569	R543	IN	R531	R530	U
	Total government employment	**532**	**577**	**711**	**716**	**671**	**649**	**673**	**R644**	**99**	**R629**	**R629**	**100**
	Total transportation-related labor force	**R5,037**	**R5,613**	**6,000**	**7,879**	**8,536**	**R9,252**	**10,133**	**R10,527**	**R10,247**	**R11,016**	**R11,276**	**10,843**

KEY: N = data do not exist; R = revised; U = data are not available

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Table 3-19 Cont'd Employment in For-Hire Transportation and Selected Transportation-Related Industries[a] (Thousands)

[a] Annual averages.

[b] Excludes farm employment.

[c] Does not include drivers employed by school districts.

[d] Difference between the total of SIC 41 and the sum of 411, 412, 413, and 415.

[e] In 1997, the American Gas Association revised the database that identifies companies by type (e.g., distribution, integrated, or transmission). This reclassification has resulted in additions to the distribution and reductions to the integrated company categories beginning with the revised data in 1996. Additionally, data by company type are not directly comparable from year to year due to acquisitions and mergers.

[f] Transportation services are defined as those incidental to transportation, such as forwarding and packing; motor vehicle inspection; and freight broker, tour operator, and travel agency services, etc.

[g] The difference between the total of SIC 37 and the sum of 371, 372, 373, and 374.

[h] The difference between the total of SIC 55 and the sum of 551, 553, and 554.

[i] Not all government agencies are included (e.g., the National Transportation Safety Board).

[j] U.S. Department of Transportation was created in 1966. Data are for fiscal year and include permanent civilians as well as temporary employees, and military.

[k] Full-time equivalent employment. Data prior to 1986 are not directly comparable to data from later years due to a change in the way full-time equivalent was calculated. Full-time equivalent was not calculated for 1985.

[l] Due to a change in the reference period, from October to March, the October 1996 Annual Survey of Government Employment and Payroll was not conducted.

NOTES: The employment totals in tables 3-19 and 3-20 differ. Table 3-19 shows employment in transportation and selected transportation-related industries. Table 3-20 shows employment by transportation occupation. Some employees of transportation industries have nontransportation jobs (e.g., a bookkeeper in a trucking firm), and some people with transportation occupations do not work in the transportation industry (e.g., a truck driver for a construction firm). Beginning in January 1999, data are not strictly comparable with data for 1998 and earlier years because of revisions in the population controls used in the household survey.

SOURCES:

All data, except as noted: 1960-85: U.S. Department of Labor, Bureau of Labor Statistics, *Employment, Hours and Earnings, United States, 1909-1994* (Washington, DC: September 1994).

1990-99: Ibid., Internet site www.bls.gov/datahome.htm, database query for individual series, as of Apr. 20, 2000.

Natural gas pipeline: 1975-99: American Gas Association, *Gas Facts* (Arlington, VA: Annual issues), table 14-2 and similar tables in earlier editions.

Government employment:

USDOT: 1970-75: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1976* (Washington, DC: 1976), table 409, and U.S. Department of Transportation, U.S. Coast Guard, G-WPM, Office of Military Personnel, personal communication.

1980-85: U.S. Department of Transportation, Office of the Secretary of Transportation, *DOT Employment Facts, A Report to Management* (Washington, DC: Annual issues).

1990-99: Ibid., *DOT Workforce Demographics* (Washington, DC : Annual issues).

State and local highway: 1960-90: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1993* (Washington, DC: 1993), table 500 and similar tables in earlier editions.

1995-98: Ibid., Internet site http://www.census.gov/pub/govs/www/apesstl.html, as of Apr. 24, 2000.

Table 3-20 Employment in Transportation Occupations (Thousands)

	1985	1990	1995	1996	1997	1998	1999
Total workers, 16 years and over	107,150	118,793	124,900	126,708	129,558	131,463	133,488
Total workers in transportation occupations	3,681	4,039	4,308	4,451	4,534	4,499	4,629
Transportation occupation as % of total workers, 16 years and over	3.4	3.4	3.4	3.5	3.5	3.4	3.5
Motor vehicle operators							
Supervisors, motor vehicle operators	51	76	87	85	95	88	86
Truck drivers	2,412	2,627	2,860	3,018	3,075	3,012	3,116
Drivers-sales workers	214	201	158	156	150	159	160
Bus drivers	394	443	526	512	472	471	490
Taxicab drivers and chauffeurs	180	213	211	203	248	273	271
Parking lot attendants	45	53	50	46	46	62	68
Motor transportation occupations, NEC	2	5	8	4	4	3	11
Total	**3,298**	**3,618**	**3,900**	**4,024**	**4,090**	**4,069**	**4,202**
Rail transportation							
Railroad conductors and yardmasters	36	36	33	45	48	50	45
Locomotive operating occupations	59	46	51	49	53	41	45
Railroad brake, signal, and switch operators	46	28	17	15	14	7	9
Rail vehicle operators, NEC	7	8	3	7	6	6	7
Total	**148**	**118**	**104**	**116**	**121**	**104**	**106**
Water transportation							
Ship captains and mates, except fishing boats	32	27	33	32	24	22	31
Sailors and deckhands	18	18	26	25	21	30	16
Marine engineers	1	2	3	8	2	3	5
Bridge, lock, and lighthouse tenders	8	6	4	5	5	8	5
Total	**59**	**53**	**66**	**70**	**52**	**63**	**57**
Air transportation							
Airplane pilots and navigators	77	114	114	114	120	113	143
Air traffic controllers	34	36	30	32	36	26	24
Total	**111**	**150**	**144**	**146**	**156**	**139**	**167**
Public transportation attendants	**65**	**100**	**94**	**95**	**115**	**124**	**111**

KEY: NEC = not elsewhere classified

NOTES: Beginning in January 1998, data are not comparable with data for 1997 and earlier years due to the new composite estimation procedures and revised population controls used in the household survey. See source for additional information. The employment totals in tables 3-19 and 3-20 differ. Table 3-19 shows employment in transportation and related industries; Table 3-20 shows employment by transportation occupation. Some employees of transportation industries have nontransportation jobs (e.g., a bookkeeper in a trucking firm), and some people in transportation occupations do not work in the transportation industry (e.g., a truck driver for a construction firm).

SOURCES:

All data except total workers, 16 years and over: U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings* (Washington, DC: Annual January issues), table 11 of the Household Data Annual Averages Tables, Internet site http://stats.bls.gov/pdf/cpsaatab.htm, as of May 31, 2000.

Ibid., Personal communications, Apr. 15, 1998, Feb. 26, 1999, and unpublished revisions, Mar. 11, 1999; Mar. 12, 1999; May 31, 2000.

Total workers, 16 years and over: Ibid., *Employment and Earnings* (Washington, DC: January 1999), revised totals, table 1, Internet site http://stats.bls.gov/pdf/cpsaatab.htm, as of May 31, 2000.

Table 3-21 Average Wage[a] and Salary Accruals per Full-Time Equivalent Employee by Transportation Industry (Current $)[R]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Wages, U.S. labor force	4,822	5,807	7,743	10,808	15,790	21,293	26,257	30,996	32,040	33,428	35,112	36,153
Transportation industry	**5,835**	**6,989**	**9,396**	**13,550**	**20,818**	**25,324**	**28,900**	**32,349**	**33,197**	**34,439**	**35,621**	**37,189**
Air	6,929	8,495	12,027	17,035	25,649	32,131	32,747	36,365	37,238	38,705	40,095	42,379
Trucking and warehousing	5,396	6,623	8,672	12,765	19,204	22,383	26,180	29,591	30,351	31,753	32,934	34,042
Local and interurban passenger transit	4,877	5,553	6,996	9,462	13,530	15,706	17,517	20,112	20,811	21,189	21,981	22,676
Railroad	6,241	7,460	10,110	14,987	25,049	36,611	43,614	51,236	54,706	56,505	56,322	60,667
Water	6,212	7,402	10,302	14,136	22,746	28,531	33,855	37,856	38,934	40,421	42,341	43,286
Pipelines, except natural gas	6,957	8,053	10,765	16,765	26,227	37,316	46,167	57,867	58,286	59,929	60,500	64,846
Transportation services[b]	5,380	6,239	8,232	11,430	16,005	20,530	26,058	30,869	31,523	32,805	34,688	36,170

KEY: R = revised

[a] Wages do not include supplements to wages and salaries such as pension, profit-sharing, and other retirement plans, and health, life, and unemployment insurance compensation.

[b] Establishments furnishing services incidental to transportation, such as forwarding and packing services and the arrangement of passenger and freight transportation.

NOTES: Use care in comparing the data in this table with those in table 3-22. This table includes weighted part-time employees' salaries. Table 3-22 covers only full-time employees. 1960-85 data are based on the 1972 SIC codes; 1990-98 data are based on the 1987 SIC codes.

SOURCE: 1960-1998: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, tables 6.6b and 6.6c, Internet site http://www.bea.doc.gov/bea/dn1.htm (file: http://www.bea.doc.gov/bea/dn/seltab29.exe), as of May 17, 2000. 1995-1998 data are also available from *Survey of Current Business* (Washington, DC: April 2000), table 6.6c.

1999: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, (Washington, DC: October 2000), Vol. 80, No. 10, table B.9.

Table 3-22 Median Weekly Earnings of Full-Time Wage and Salary Workers in Transportation by Detailed Occupation (Current $)

	1985	1990	1995	1996	1997	1998	1999
16 years and over, all[a]	**343**	**412**	**479**	**490**	**503**	**523**	**549**
Airplane pilots and navigators	738	910	956	1,138	1,079	1,383	1,048
Public transportation attendants	N	635	450	417	521	524	604
Motor vehicle operators	343	400	475	473	496	503	514
Supervisors, motor vehicle operators	N	520	549	583	589	595	585
Truck drivers	N	N	481	481	506	516	527
Drivers-sales workers	399	439	517	506	524	526	534
Bus drivers	344	355	419	396	405	428	428
Taxicab drivers and chauffeurs	262	307	352	374	405	379	427
Nonmotor vehicle operators	559	687	711	691	761	834	761
Rail transportation operators	599	717	741	740	814	849	816
Water transportation	463	547	624	586	641	812	604

KEY: N = data do not exist

[a] Earnings for all workers, not just transportation related.

NOTES: Use care in comparing the figures in this table with those in table 3-21. This table does not include part-time employees; table 3-21 includes weighted part-time employees' salaries.

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings* (Washington, DC: Annual January issues), table 39 of the Household Data Annual Averages Tables. Based on the U.S. Census Bureau's Current Population Survey. Water transportation: U.S. Department of Labor, Bureau of Labor Statistics, unpublished data, Mar. 1, 1999 and Mar. 11, 1999, and Apr. 25, 2000.

Table 3-23 Total Wage[a] and Salary Accruals by Transportation Industry (Current $ millions)[R]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Total wage and salary accruals	**272,800**	**363,700**	**551,500**	**814,700**	**1,377,600**	**1,995,700**	**2,757,500**	**3,441,060**	**3,630,142**	**3,884,713**	**4,189,515**
Transportation											
Air	1,268	1,852	4,029	5,894	11,029	15,744	29,440	36,183	38,839	41,143	44,826
Trucking and warehousing	4,592	6,265	9,123	13,786	23,755	29,725	34,715	44,830	47,074	50,678	54,671
Local and interurban passenger transit	1,307	1,427	1,868	2,375	3,423	4,272	5,658	7,723	8,366	8,857	9,496
Railroad	5,498	5,446	6,268	8,108	12,850	11,862	10,729	11,272	11,543	11,753	11,546
Water	1,379	1,584	2,112	2,601	4,572	5,050	5,620	6,322	6,463	6,912	7,325
Pipeline, except natural gas	160	153	183	285	577	709	831	868	816	839	847
Transportation services[b]	425	549	922	1,463	3,041	5,420	8,521	11,977	12,483	13,647	14,985
Total	**14,629**	**17,276**	**24,505**	**34,512**	**59,247**	**72,782**	**95,514**	**119,175**	**125,584**	**133,829**	**143,696**

KEY: R = revised

[a] Wages do not include compensation (supplements to wages and salaries such as pension, profit-sharing, and other retirement plans, and health, life, and unemployment insurance).

[b] Defined as services incidental to transportation, such as forwarding and packing services and arranging passenger travel and freight transportation.

SOURCE: 1960-1998: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, tables 6.3b and 6.3c, Internet site http://www.bea.doc.gov/bea/dn1.htm (file: http://www.bea.doc.gov/bea/dn/seltab29.exe), as of May 17, 2000. 1995-1998 data are also available from *Survey of Current Business* (Washington, DC: April 2000), table 6.3c.

Table 3-24 Labor Productivity Indices for Selected Transportation Industries

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Output per hour[a] worked											
Air[b]	N	N	N	N	N	N	93	109	111	112	109
Bus, Class I[c]	106	128	118	107	111	96	95	105	R101	118	99
Railroad	22	32	36	43	55	82	119	156	R167	170	U
Trucking, except local[b]	N	N	N	N	N	N	111	125	131	132	130
Petroleum pipelines[c]	31	49	76	91	89	100	103	116	131	134	136
Output per employee[d]											
Air	22	35	45	56	71	92	93	109	111	112	109
Bus, Class I[c]	108	129	119	103	99	93	94	100	R98	114	98
Railroad	25	36	42	46	55	79	120	162	172	177	U
Trucking, except local	48	56	60	64	78	94	111	125	131	132	130
Petroleum pipelines[c]	30	48	75	89	89	98	102	121	139	141	145

KEY: N = data do not exist; R = revised; U =data are not available

[a] Based on the number of paid hours.

[b] The average weekly hours were assumed to be constant for these industries; therefore, the output per hour worked and the output per employee measures are identical in the years for which data are given for both measures.

[c] Data did not meet the publication standards for the Bureau of Labor Statistics and are considered less reliable than the published series.

[d] Full-time and part-time employees are counted equally. Hence, these data do not reflect output per full-time equivalent employee.

NOTE: Index, 1987 = 100.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Industry Productivity, Internet site www.bls.gov/iprhome.htm, as of May 16, 2000, and unpublished data.

Section D
Government Finance

Table 3-25a Federal, State, and Local Government Transportation-Related Revenues and Expenditures, Fiscal Year (Current $ millions)

	1985	1990	1991	1992	1993	1994	1995
Total government revenues	**52,038**	**69,901**	**77,411**	**80,199**	**85,034**	**87,569**	**93,716**
Federal	18,388	21,532	25,995	25,797	27,310	27,143	30,223
State and Local	33,649	48,369	51,417	54,403	57,723	60,426	63,493
Total government expenditures	**74,515**	**99,869**	**107,446**	**112,863**	**115,647**	**124,079**	**129,289**
State and local expenditures less federal grants[a]	46,810	69,703	75,280	78,544	79,342	85,407	89,359
Federal grants	18,227	19,786	20,579	21,364	22,598	23,721	25,034
Federal expenditures, less grants	9,478	10,380	11,586	12,955	13,307	14,951	14,896

[a] Based on data from the U.S. Department of Commerce, Census Bureau, which uses different definitions and accounting methods than those used by some modal administrations of the U.S. Department of Transportation. For example, highway expenditures in this table do not include traffic control activities by police or public safety activities; while the highway expenditure statistics published by the U.S. Department of Transportation, Federal Highway Administration do include these items.

NOTE: Numbers may not add to totals due to rounding.

SOURCES: 1985-95: U.S. Department of Transportation, Bureau of Transportation Statistics, *Government Transportation Financial Statistics: Fiscal Years 1985-95*, Internet site http://www.bts.gov, as of July 25, 2000, Appendix A, tables A-2, A-4 and A-13. Constant dollar deflator: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC : August 1998), table 3, "Chain Type Price Indexes."

Table 3-25b Federal, State, and Local Government Transportation-Related Revenues and Expenditures, Fiscal Year (Constant 1996 $ millions)

	1985	1990	1991	1992	1993	1994	1995
Total government revenues	**70,990**	**81,839**	**87,824**	**88,978**	**91,969**	**92,299**	**96,032**
Federal	24,300	25,701	29,818	28,718	29,627	28,720	31,090
State and Local	46,689	56,139	58,007	60,260	62,343	63,580	64,941
Total government expenditures	**101,564**	**116,906**	**121,823**	**125,205**	**124,643**	**130,783**	**132,473**
State and local expenditures less federal grants[a]	64,951	80,899	84,928	87,000	85,692	89,864	91,397
Federal grants	24,087	23,617	23,605	23,783	24,515	25,099	25,752
Federal expenditures, less grants	12,525	12,390	13,290	14,422	14,436	15,819	15,324

[a] Based on data from the U.S. Department of Commerce, Census Bureau, which uses different definitions and accounting methods than those used by some modal administrations of the U.S. Department of Transportation. For example, highway expenditures in this table do not include traffic control activities by police or public safety activities; while the highway expenditure statistics published by the U.S. Department of Transportation, Federal Highway Administration do include these items.

NOTE: Numbers may not add to totals due to rounding.

SOURCES: 1985-95: U.S. Department of Transportation, Bureau of Transportation Statistics, *Government Transportation Financial Statistics: Fiscal Years 1985-95*, Internet site http://www.bts.gov, as of July 25, 2000, Appendix A, tables A-2, A-4 and A-13. Constant dollar deflator: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: April 2000), table 3, "Chain Type Price Indexes."

Table 3-26a Federal Transportation-Related Revenues, Fiscal Year (Current $ millions)

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Airport/airway trust fund[a]	2,274	3,598	4,945	6,206	5,918	6,096	6,027	6,291	3,128	4,488	8,654
Highway trust fund											
Highway account[b]	7,647	12,908	13,453	15,303	16,572	16,864	17,005	R20,967	R22,692	21,491	24,364
Mass transit account	X	1,420	1,977	3,149	1,816	2,735	2,691	2,813	3,282	3,819	4,269
Water receipts[c]	381	463	1,147	1,325	1,474	1,591	1,394	R1,711	R1,608	1,593	1,487
Pipeline safety fund	X	X	10	11	14	15	19	35	31	30	29
Emergency preparedness fund	X	X	X	X	3	10	7	7	7	7	8
Total	**10,302**	**18,388**	**21,532**	**25,995**	**25,797**	**27,310**	**27,143**	**R31,824**	**R30,748**	**31,428**	**40,298**

KEY: R = revised; X = no activity or a value of zero

[a] The tax requirement that allows for the 10% passenger ticket tax and certain other taxes paid by airport and airway users to be transferred to the Airport and Airway Trust Fund expired on Dec. 31, 1995; it was reenacted in August 1996; but expired again in December 1996.

[b] Beginning in 1983, a portion of the fuel tax credited to the Highway Trust Fund is earmarked for transit.

[c] Water receipts include the Harbor Maintenance Trust Fund, St. Lawrence Seaway tolls, the Inland Waterway Trust Fund, Panama Canal receipts, and the Oil Spill Liability Trust Fund. 1998 Panama Canal receipts are estimates.

NOTE: Numbers my not add to totals due to rounding.

SOURCES: 1980: U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Receipts and Outlays in the Federal Budget, Fiscal Years 1977-94* (Washington, DC: April 1997), table C-1.

1985-95: Ibid., *Government Transportation Financial Statistics: Fiscal Years 1985-95*, Internet site www.bts.gov, table A-2.

1996-98: U.S. Executive Office of the President, Office of Management and Budget, *Budget of the United States Government, Appendix* (Washington, DC: Annual issues).

Table 3-26b[R] Federal Transportation-Related Revenues, Fiscal Year (Constant 1996 $ millions)

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Airport/airway trust fund[a]	3,958	4,755	5,902	7,119	6,588	6,613	6,377	6,472	3,128	4,429	8,449
Highway trust fund											
Highway account[b]	13,311	17,058	16,057	17,554	18,449	18,294	17,993	21,569	22,692	21,209	23,788
Mass transit account	X	1,877	2,360	3,612	2,022	2,967	2,847	2,894	3,282	3,769	4,168
Water receipts[c]	663	612	1,369	1,520	1,641	1,726	1,475	1,760	1,608	1,572	1,452
Pipeline safety fund	X	X	12	13	16	16	20	36	31	30	28
Emergency preparedness fund	X	X	X	X	3	11	7	7	7	7	8
Total	**17,932**	**24,300**	**25,699**	**29,818**	**28,719**	**29,626**	**28,720**	**32,737**	**30,748**	**31,015**	**37,893**

KEY: R = revised; X = no activity or a value of zero

[a] The tax requirement that allows for the 10% passenger ticket tax and certain other taxes paid by airport and airway users to be transferred to the Airport and Airway Trust Fund expired on Dec. 31, 1995; it was reenacted in August 1996; but expired again in December 1996.

[b] Beginning in 1983, a portion of the fuel tax credited to the Highway Trust Fund is earmarked for transit.

[c] Water receipts include the Harbor Maintenance Trust Funds, St. Lawrence Seaway tolls, the Inland Waterway Trust Fund, Panama Canal receipts, and the Oil Spill Liability Trust Fund. 1998 Panama Canal receipts are estimates.

NOTE: Numbers may not add to totals due to rounding.

Totals may not add due to rounding.

SOURCES: 1980: U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Receipts and Outlays in the Federal Budget, Fiscal Years 1977-94* (Washington, DC: April 1997), table C-1.

1985-95: Ibid., *Government Transportation Financial Statistics: Fiscal Years 1985-95*, Internet site www.bts.gov, Appendix A, table A-2.

1996-98: U.S. Executive Office of the President, Office of Management and Budget, *Budget of the United States Government, Appendix* (Washington, DC: Annual issue). Constant dollar deflator: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (Washington, DC: June 2000), table 7-11, "Chain Type Price Indexes-Federal."

Table 3-27a Federal Transportation-Related Expenditures by Mode, Fiscal Year (Current $ millions)

	1980	1985	1990	1991	1992	1993	1994	1995	1996
Air	3,762	4,947	7,305	8,282	9,313	10,049	10,146	10,389	10,135
Highway	11,706	15,031	15,452	15,860	16,773	18,081	20,053	20,082	20,634
Transit	3,307	3,427	3,832	3,917	3,675	3,517	3,770	4,474	4,375
Rail	2,170	1,057	534	779	900	811	832	1,034	995
Water	2,837	3,054	2,844	3,048	3,357	3,502	3,473	3,565	3,374
Pipeline[a]	3	5	9	9	12	13	12	17	31
General support[b]	177	182	190	270	289	333	387	369	332
Total	**23,961**	**27,705**	**30,166**	**32,166**	**34,319**	**36,305**	**38,672**	**39,930**	**39,874**

[a] Includes gas and liquid pipeline.

[b] General support represents administrative and operating expenditures of the U.S. Department of Transportation, the Interstate Commerce Commission, and the National Transportation Safety Board.

NOTE: Numbers may not add to totals due to rounding.

SOURCES: 1980: U.S. Department of Transportation, Bureau of Transportation Statistics. *Transportation Receipts and Outlays in the Federal Budget, Fiscal Years 1977-94* (Washington, DC: April 1997), table C-3. 1985-96: Ibid., *Government Transportation Financial Statistics: Fiscal Years 1985-95*, Internet site www.bts.gov, Appendix A, tables A-4, and Appendix B, tables B-5 through B-12. Constant dollar deflator: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (Washington, DC: June 2000), table 7-11, "Chain Type Price Indexes-Federal."

Table 3-27b[R] Federal Transportation-Related Expenditures by Mode, Fiscal Year (Constant 1996 $ millions)

	1980	1985	1990	1991	1992	1993	1994	1995	1996
Air	6,548	6,538	8,719	9,500	10,368	10,901	10,736	10,687	10,135
Highway	20,376	19,864	18,443	18,193	18,673	19,614	21,218	20,658	20,634
Transit	5,756	4,529	4,574	4,493	4,091	3,815	3,989	4,602	4,375
Rail	3,777	1,397	637	894	1,002	880	880	1,064	995
Water	4,938	4,036	3,394	3,496	3,737	3,799	3,675	3,667	3,374
Pipeline[a]	5	7	11	10	13	14	13	17	31
General support[b]	308	241	227	310	322	361	409	380	332
Total	**41,708**	**36,613**	**36,004**	**36,897**	**38,207**	**39,384**	**40,919**	**41,076**	**39,874**

KEY: R = revised

[a] Includes gas and liquid pipeline.

[b] General support represents administrative and operating expenditures of the U.S. Department of Transportation, the Interstate Commerce Commission, and the National Transportation Safety Board.

NOTE: Numbers may not add to totals due to rounding.

SOURCES: 1980: U.S. Department of Transportation, Bureau of Transportation Statistics. *Transportation Receipts and Outlays in the Federal Budget, Fiscal Years 1977-94* (Washington, DC: April 1997), table C-3. 1985-96: Ibid., *Government Transportation Financial Statistics: Fiscal Years 1985-95*, Internet site www.bts.gov, Appendix A, tables A-4, and Appendix B, tables B-5 through B-12. Constant dollar deflator: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (Washington, DC: June 2000), table 7-11, "Chain Type Price Indexes-Federal."

Table 3-28 Cash Balances of the Transportation-Related Federal Trust Funds, Fiscal Year ($ millions)

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Airport/Airway Trust Fund											
$ current	5,442	7,426	14,355	15,263	15,204	12,850	12,386	11,365	7,692	6,358	9,411
$ constant 1996[R]	9,473	9,814	17,133	17,508	16,926	13,940	13,106	11,691	7,692	6,274	9,188
Highway Trust Fund											
Highway account											
$ current	10,999	10,361	9,629	10,246	11,300	11,523	7,927	9,421	11,658	12,575	8,519
$ constant 1996[R]	19,145	13,692	11,493	11,753	12,580	12,500	8,388	9,691	11,658	12,410	8,318
Transit account											
$ current	N	2,524	7,155	9,250	9,798	10,617	9,945	9,579	9,525	9,857	10,051
$ constant 1996[R]	N	3,336	8,540	10,610	10,908	11,517	10,523	9,854	9,525	9,727	9,813
Harbor Maintenance Trust Fund											
$ current	N	N	30	74	121	305	451	621	865	1,106	1,246
$ constant 1996[R]	N	N	36	85	135	331	477	639	865	1,091	1,217
Inland Waterway Trust Fund											
$ current	N	172	281	217	186	180	214	238	275	300	327
$ constant 1996[R]	N	227	335	249	207	195	226	245	275	296	319
Oil Spill Liability Trust Fund											
$ current	N	N	345	647	866	1,024	993	1,121	1,124	1,110	1,083
$ constant 1996[R]	N	N	412	742	964	1,111	1,051	1,153	1,124	1,095	1,057
Total all funds											
$ current	**16,441**	**20,483**	**31,795**	**35,697**	**37,475**	**36,499**	**31,916**	**32,345**	**31,139**	**31,306**	**30,637**
$ constant 1996[R]	**28,618**	**27,069**	**37,949**	**40,947**	**41,720**	**39,594**	**33,771**	**33,273**	**31,139**	**30,894**	**29,913**

KEY: N = data do not exist; R = revised

SOURCES: 1980-94: U.S. Department of Transportation, Bureau of Transportation Statistics, *Transportation Receipts and Outlays in the Federal Budget,* Fiscal Years 1977-94 (Washington, DC: April 1997), table 1-3.

1995-97: U.S. Executive Office of the President, Office of Management and Budget, *Budget of the United States Government, Appendix* (Washington, DC: Annual issues). Constant dollar deflator: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: June 2000), table 7-11, "Chain Type Price Indexes-Federal."

Transportation, Energy, and the Environment

Section A
U.S. and Transportation Sector Energy Consumption

Table 4-1 Overview of U.S. Petroleum Production, Imports, Exports, and Consumption (Million barrels per day)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997	1998	1999
Domestic production												
Crude oil[a]	7.04	7.80	9.64	8.38	8.60	8.97	7.36	6.56	6.47	6.45	[R]6.25	[E]5.93
Natural gas plant liquids	0.93	1.21	1.66	1.63	1.57	1.61	1.56	1.76	1.83	1.82	[R]1.76	1.83
Total[b]	**7.96**	**9.01**	**11.30**	**[R]10.05**	**[R]10.21**	**[R]10.64**	**[R]8.99**	**[R]8.63**	**[R]8.61**	**[R]8.61**	**[R]8.39**	**[R]8.14**
Gross imports												
Crude oil[c]	1.02	1.24	1.32	4.11	5.26	3.20	5.89	7.23	7.51	8.23	[R]8.71	8.59
Petroleum products[d]	0.80	1.23	2.10	1.95	1.65	1.87	2.12	1.61	1.97	1.94	[R]2.00	1.96
Total	**1.81**	**2.47**	**3.42**	**6.06**	**6.91**	**5.07**	**8.02**	**8.84**	**9.48**	**10.16**	**[R]10.71**	**10.55**
Exports	**0.20**	**0.19**	**0.26**	**0.21**	**0.54**	**0.78**	**0.86**	**0.95**	**0.98**	**1.00**	**[R]0.95**	**0.94**
U.S. net imports[e]	1.61	2.28	3.16	5.85	6.37	4.29	7.16	7.89	8.50	9.16	[R]9.76	9.61
U.S. petroleum consumption	9.80	11.51	14.70	16.32	17.06	15.73	16.99	[R]17.73	18.31	18.62	[R]18.92	19.39
By the transportation sector	5.14	6.04	7.78	8.95	9.55	9.85	10.97	[R]11.73	11.96	12.10	12.47	12.75
Transportation petroleum use as % of domestic petroleum production	64.6	67.0	68.8	[R]89.1	[R]93.5	[R]92.6	[R]122.0	[R]135.9	[R]139.1	[R]140.5	148.6	156.6
Transportation petroleum use as % of domestic petroleum consumption	52.4	52.5	52.9	54.8	56.0	62.6	64.6	65.9	[R]65.3	[R]65.0	[R]65.9	65.8
World petroleum consumption	21.34	31.14	46.81	56.20	63.07	60.10	65.99	[R]69.93	71.52	73.01	[R]73.64	U
U.S. petroleum consumption as % of world petroleum consumption	45.9	37.0	31.4	29.0	27.0	26.2	25.7	25.5	25.6	25.5	[R]25.7	U

KEY: E = estimate; R = revised; U = data are not available

[a] Includes lease condensate.

[b] Includes crude oil, natural gas plant liquids, and other liquids.

[c] Includes imports for the Strategic Petroleum Reserve, which began in 1977.

[d] Beginning in 1985, motor gasoline blending components and aviation gasoline blending components are included.

[e] Net imports = imports minus exports.

NOTE: Numbers may not add to totals due to rounding.

SOURCES:

Domestic production, imports, exports, and U.S. petroleum consumption: 1960-70: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 5.1.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035 (03/99) (Washington, DC: March 2000), tables 3.1A (domestic production); 3.1B (imports and exports); and 10.2 (U.S. petroleum consumption).

1999: Ibid., *International Energy Database*, December 1999, Table 12.xls, available at Internet site www.eia.doe.gov/emeu/international/petroleu.htm#ConsumptionA, as of Dec. 8, 2000.

World petroleum consumption: 1960-96: Ibid., *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 11.9.

1999: Ibid., *International Energy Database*, December 1999, Table 1.2, available at Internet site www.eia.doe.gov/emeu/international/petroleu.htm#ConsumptionA, as of Dec. 8, 2000.

Table 4-2 U.S. Consumption of Energy from Primary Sources by Sector (Quadrillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Energy consumption												
Transportation	10.56	12.40	16.06	18.21	19.66	20.02	22.49	R23.92	R24.47	R24.77	R25.3	25.89
% of total	24.1	23.5	24.2	R25.8	25.9	R27.1	27.7	R27.3	R27.1	R27.2	R27.7	28
Industrial	16.26	19.24	21.92	20.39	21.07	17.67	19.62	R21.27	R21.97	R22.07	R21.68	21.96
% of total	37.1	36.5	33.0	28.9	27.7	23.9	24.1	R24.3	R24.3	R24.3	R23.8	23.7
Residential and commercial	8.75	10.00	12.14	11.60	10.72	9.78	9.55	R10.31	R10.96	R10.70	R9.85	10.17
% of total	20.0	19.0	18.3	16.4	14.1	13.2	11.8	R11.8	R12.1	R11.8	R10.8	11
Energy Input at electric utilities	8.19	11.01	16.27	20.35	24.51	26.52	29.62	R32.06	R33.01	R33.43	R34.4	34.49
% of total	18.7	20.9	24.5	28.8	32.3	35.8	36.4	R36.6	R36.5	R36.7	R37.7	37.3
Total	**43.80**	**52.68**	**66.43**	**70.55**	**75.96**	**73.98**	**R81.29**	**R87.56**	**R90.42**	**R90.98**	**R91.23**	**92.52**
Percentage of primary demand met by petroleum												
Transportation	96.0	95.7	95.3	96.7	96.7	97.4	R97.0	97.0	97.0	96.9	R97.4	97.5
Industrial	35.4	35.3	35.5	R39.9	45.2	44.2	42.4	R40.5	R41.4	42.2	R42.2	43.1
Residential and commercial	39.8	38.6	35.4	32.8	28.3	R25.8	R22.8	R20.1	R20.1	20.0	R20.0	20.4
Electric utilities	6.7	6.7	13.0	15.6	10.7	4.1	4.2	2.1	2.2	2.5	3.4	2.7

KEY: Btu = British thermal unit; R = revised

NOTES: The data for residential, commercial, and industrial sectors include only fossil fuels consumed directly. Most renewable fuels are not included. The data for the transportation sector includes only fossil and renewable fuels consumed directly. The data for electric utilities includes all fuels (fossil, nuclear, geothermal, hydro, and other renewables) used by electric utilities. Due to a lack of consistent monthly historical data, some renewable energy resources are not included in this table. The totals in table 4-4 are the best numbers for total U.S. energy consumption from all sources.

Numbers may not add to totals due to rounding.

SOURCES: 1960-70: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1990*, DOE/EIA-0394(90) (Washington, DC: May 1991), table 4.

1975-99: Ibid., *Monthly Energy Review*, Internet site www.eia.doe.gov/gov/pub/energy.overview/monthly.energy/ as of Apr. 27, 2000, tables 2.2, 2.3, 2.4, 2.5, and 2.6.

Table 4-3 Domestic Demand for Refined Petroleum Products by Sector (Quadrillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Transportation	10.13	11.87	15.31	17.61	19.01	19.50	21.81	R23.20	R23.74	R24.00	R24.64	25.23
Industrial	5.75	6.79	7.79	8.15	9.53	7.81	8.32	8.62	9.10	9.31	R9.15	9.46
Residential and commercial	3.49	3.87	4.31	3.81	3.04	2.52	2.17	2.08	2.20	2.14	R1.97	2.07
Electric utilities	0.55	0.73	2.12	3.17	2.63	1.09	1.25	0.66	0.73	0.82	R1.17	0.94
Total petroleum demand	**19.92**	**23.26**	**29.53**	**R32.73**	**R34.20**	**30.92**	**33.55**	**R34.55**	**R35.76**	**R36.27**	**R36.93**	**37.71**
Transportation as % of total	50.9	51.0	51.8	53.8	55.6	63.1	65.0	67.1	66.4	66.2	R66.7	66.9

KEY: Btu = British thermal unit; R = revised

NOTE: Transportation's share of U.S. petroleum demand in this table differs slightly from table 4-1 because this table takes into account differences within sectors in the use of various grades of petroleum-based fuel that have different Btu content per unit volume.

SOURCES: 1960-70: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), tables 2.1, 5.12b, and A3.

1975-99: Ibid., *Monthly Energy Review*, Internet site www.eia.doe.gov/gov/pub/energy.overview/monthly.energy/ as of May 8, 2000, tables, 1.4, 2.3, 2.4, 2.5, and 2.6.

Section B
Transportation Energy Consumption by Mode

Table 4-4 U.S. Energy Consumption by the Transportation Sector (Quadrillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Energy consumption (all sectors)	**43.80**	**52.68**	**66.43**	**70.55**	**75.96**	**73.98**	R81.29	R87.56	R90.42	R90.98	R91.23	92.78
Total transportation consumption[a]	10.60	12.43	16.09	18.24	19.70	20.07	R22.54	R23.97	R24.52	R24.82	R25.36	26.09
% of total energy consumption	24.2	23.6	24.2	25.9	25.9	27.1	27.7	R27.4	R27.1	R27.3	R27.8	28.1
Total primary consumption[b]	10.56	12.40	16.06	18.21	19.66	20.02	22.49	R23.92	R24.47	R24.77	R25.30	26.04
Coal	0.074	0.017	0.007	0.001	e	e	e	e	e	e	e	e
Million short tons	3.0	0.7	0.3	<0.05	e	e	e	e	e	e	e	e
Natural gas[c]	0.36	0.52	0.74	0.60	0.65	0.52	0.68	0.72	0.73	0.78	R0.66	0.66
Trillion cubic feet	0.35	0.50	0.72	0.58	R0.63	0.50	0.66	0.70	0.71	R0.76	R0.64	E0.64
Petroleum products[d]	10.13	11.87	15.31	17.61	19.01	19.50	21.81	R23.20	R23.74	R24.00	R24.64	25.38
Million barrels	1,881	2,205	2,840	3,267	3,495	3,595	4,004	4,281	R4,377	R4,431	E4,552	E4,654
Electricity	0.011	0.010	0.009	0.010	0.011	R0.014	R0.016	R0.017	R0.017	R0.017	R0.017	0.017
Electrical system energy losses	0.027	0.023	0.021	R0.024	R0.027	R0.033	R0.036	R0.036	R0.036	R0.035	R0.036	0.035

KEY: Btu = British thermal unit; E = estimated; R = revised

[a] Sum of primary consumption, electricity, and electrical system energy losses categories.

[b] Sum of coal, natural gas, and petroleum categories.

[c] Consumed in the operation of pipelines, primarily in compressors, and small amounts consumed as vehicle fuel.

[d] Includes small amounts (about 0.1 quadrillion Btu per year since 1990) of renewable energy in the form of ethanol blended into motor gasoline.

[e] From 1980, small amounts of coal consumed for transportation are included in industrial sector consumption.

NOTES: Energy consumption (all sectors) differs from totals in table 4-2 for 1990 and subsequent years. Table 4-2 includes primary energy consumption only.

SOURCES:

Energy consumption (all sectors) and total transportation consumption: 1960-70: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington DC: July 1998), table 2.1.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035(00/06) (Washington, DC : June 2000), table 2.2 and table 2.5.

Total primary consumption: 1960-70: Ibid., *Annual Energy Review* 1990, DOE/EIA-0384(90) (Washington, DC: May 1991), table 4.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035(00/06) (Washington, DC: June 2000), table 2.5.

Coal: Btu: 1960-70: Ibid., *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 7.3, and A5 for conversion.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035(00/06) (Washington, DC: June 2000), table 2.5.

Short tons: 1960-99: Ibid., *Annual Energy Review 1998*, DOE/EIA-0384(98) (Washington, DC: July 1999), table 7.3.

Natural gas: Btu: 1960-70: Ibid., *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 6.6, and A4 for conversion.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035(00/06) (Washington, DC: June 2000), table 2.5.

Cubic feet: 1960-70: Ibid., *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 6.6.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035(00/06) (Washington, DC: June 2000), table 4.4.

Petroleum products: Btu: 1960-70: Ibid., *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 2.1.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035(00/06) (Washington, DC: June 2000), table 2.5.

Barrels: 1960-97: Ibid., *Annual Energy Review* 1997, DOE/EIA-0384(97) (Washington, DC: July 1998), table 5.12b (barrels/day x 365 or 366 for leap years).

Electricity and electrical system energy losses: 1960-70: Ibid., *State Energy Data Report 1993* (Washington, DC: July 1995), table 15.

1975-99: Ibid., *Monthly Energy Review*, DOE/EIA-0035(00/06) (Washington, DC: June 2000), table 2.5.

Table 4-5 Fuel Consumption by Mode of Transportation

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Certificated carriers[a]											
Jet fuel (million gallons)	1,954	3,889	7,857	7,558	9,096	10,121	R12,429	12,812	13,188	13,660	13,877
General aviation[b]											
Aviation gasoline (million gallons)	242	292	551	412	520	421	353	276	287	R292	311
Jet fuel (million gallons)	N	56	208	453	766	691	663	544	568	R642	815
Highway											
Gasoline, diesel and other fuels (million gallons)											
Passenger car and motorcycle	41,171	49,723	67,879	74,253	70,186	71,700	69,759	68,268	69,419	R70,094	72,414
Other 2-axle 4-tire vehicle	N	[e]	12,313	19,081	23,796	27,363	35,611	45,605	47,354	R49,388	50,579
Single-unit 2-axle 6-tire or more truck	N	13,848	3,968	5,420	6,923	7,399	8,357	9,216	9,409	R9,576	9,741
Combination truck	N	6,658	7,348	9,177	13,037	14,005	16,133	19,777	20,193	R20,302	21,100
Bus	827	875	820	1,053	1,018	834	895	968	990	R1,027	1,049
Transit[c]											
Electricity (million kWh)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	R4,988	P5,250
Motor fuel (million gallons)											
Diesel	208	248	271	365	431	609	651	678	693	R717	P700
Gasoline and other nondiesel fuels[d]	192	124	68	8	11	46	34	61	61	R59	P50
Compressed natural gas	N	N	N	N	N	N	N	11	15	R24	P31
Rail, Class I (in freight service)											
Distillate/diesel fuel (million gallons)	3,463	3,592	3,545	3,657	3,904	3,110	3,115	3,480	3,579	3,575	3,583

KEY: kWh = kilowatt-hour; N = data do not exist; P = preliminary; R = revised

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Table 4-5 Cont'd Fuel Consumption by Mode of Transportation

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Amtrak											
Electricity (million kWh)	N	N	N	180	254	295	330	304	293	282	275
Distillate/diesel fuel (million gallons)	N	N	N	63	64	65	82	66	71	75	75
Water											
Residual fuel oil (million gallons)	3,952	3,093	3,774	4,060	8,952	4,590	6,326	5,886	5,701	5,010	5,620
Distillate/diesel fuel oil (million gallons)	787	652	819	1,098	1,478	1,699	2,065	2,339	2,491	2,574	2,595
Gasoline (million gallons)	N	N	598	730	1,052	1,053	1,300	1,060	994	987	956
Pipeline											
Natural gas (million cubic feet)	347,075	500,524	722,166	582,963	634,622	503,766	659,816	700,335	711,446	R751,470	635,477

KEY: kWh = kilowatt-hour; N = data do not exist; P = preliminary; R = revised

[a] Domestic operations only.

[b] Includes fuel used in air taxi operations, but not commuter operations. Data for 1996 are estimated using new information on nonrespondents and are therefore not comparable to earlier years. See the accuracy statement in the appendix for more detailed information.

[c] Prior to 1984, excludes commuter rail, automated guideway, ferryboat, demand responsive vehicles, and most rural and smaller systems.

[d] Gasoline and all other nondiesel fuels such as liquefied natural gas, methanol and propane, except compressed natural gas.

[e] Included in single-unit 2-axle 6-tire or more truck category.

SOURCES:

Air:

Certificated air carriers: 1960-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

General aviation: 1960-70: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation - 1972 edition* (Washington, DC: 1973), table 9.12.

1975-97: Ibid., *General Aviation and Air Taxi Activity Survey* (Washington, DC: Annual issues), table 5.1, and similar tables in earlier editions.

1998: Ibid., *FAA Aerospace Forecasts Fiscal Years 2000-2011* (Washington, DC: March 2000), table 29.

Highway:

1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

Electricity/motor fuel/compressed natural gas: 1960-98: American Public Transit Association, *Transportation Fact Book* (Washington, DC: February 1999), tables 65, 66, 67, and similar tables in earlier editions.

Rail:

1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: May 1999), p. 40.

Amtrak:

1975-98: Amtrak, State and Local Affairs Department, personal communication.

Water:

Residual and distillate/diesel fuel oil: 1960-80: American Petroleum Institute, *Basic Petroleum Data Book* (Washington, DC: Annual issues), tables 10, 10a, 12, and 12a.

1985-98: U.S. Department of Energy, Energy Information Administration, *Fuel Oil and Kerosene Sales* (Washington, DC: Annual issues), tables 2 and 4, and similar tables in earlier editions.

Gasoline: 1970-98: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Annual issues), table MF-24 and similar tables in earlier editions.

Pipeline:

1960-96: U.S. Department of Energy, *Natural Gas Annual 1997* (Washington, DC: October 1998), table 101.

1997-98: U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual 1998* (Washington, DC: Annual Issues), table 1.

Table 4-6 Energy Consumption by Mode of Transportation (Trillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Certificated carriers[a]											
Jet fuel	264	525	1,061	1,020	R1,150	1,366	R1,678	1,730	1,780	1,844	1,873
General aviation[b]											
Aviation gasoline	29	35	66	50	63	51	42	R35	R35	35	37
Jet fuel	N	8	28	61	103	93	90	R76	R82	R87	110
Highway											
Gasoline, diesel and other fuels											
Passenger car and motorcycle	5,146	6,215	8,485	9,282	8,773	8,963	8,720	8,534	8,677	R8,762	9,052
Other 2-axle 4-tire vehicle	N	[e]	1,539	2,385	2,975	3,420	4,451	5,701	5,919	R6,173	6,322
Single-unit 2-axle 6-tire or more truck	N	1,921	550	752	960	1,026	1,159	1,278	1,305	R1,328	1,351
Combination truck	N	923	1,019	1,273	1,808	1,942	2,238	2,743	2,801	R2,816	2,927
Bus	115	121	114	146	141	116	124	134	137	R142	145
Transit[c]											
Electricity	10	9	9	9	8	14	17	17	17	17	P18
Motor fuel											
Diesel	29	34	38	51	60	84	90	94	96	R99	P97
Gasoline and other nondiesel fuels[d]	24	16	9	1	1	6	4	8	8	7	P6
Compressed natural gas	N	N	N	N	N	N	N	R1	2	3	P4
Rail, Class I (in freight service)											
Distillate/diesel fuel	480	498	492	507	541	431	432	483	496	496	497
Amtrak											
Electricity	N	N	N	1	1	1	1	1	1	1	1
Distillate/diesel fuel	N	N	N	9	9	9	11	9	10	10	10
Water											
Residual fuel oil	592	463	565	608	1,340	687	947	881	853	750	841
Distillate/diesel fuel oil	109	90	114	152	205	236	286	324	346	357	360
Gasoline	N	N	75	91	132	132	163	133	124	123	120
Pipeline											
Natural gas	358	516	745	601	654	519	680	722	734	775	655

KEY: Btu = British thermal units; kWh = kilowatt-hour;
N = data do not exist; P = preliminary;
R = revised

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Table 4-6 Cont'd Energy Consumption by Mode of Transportation (Trillion Btu)

[a] Domestic operations only.

[b] Includes fuel used in air taxi operations, but not commuter operations.

[c] Prior to 1984, excludes commuter rail, automated guideway, ferryboat, demand responsive vehicles, and most rural and smaller systems.

[d] Gasoline and all other nondiesel fuels such as liquefied natural gas, methanol, and propane, except compressed natural gas.

[e] Included in other single-unit 2-axle 6-tire or more truck category.

NOTES: The following conversion rates were used:

Jet fuel = 135,000 Btu/gal.

Compressed natural gas = 138,700 Btu/gal.

Aviation gasoline = 120,200 Btu/gal.

Distillate fuel = 138,700 Btu/gal.

Automotive gasoline = 125,000 Btu/gal.

Residual fuel = 149,700 Btu/gal.

Diesel motor fuel = 138,700 Btu/gal.

Natural gas = 1,031 Btu/ft3

Electricity 1kWh = 3,412 Btu, negating electrical system loses. To include electrical system loses, multiply this conversion factor by approximately 3.

SOURCES:

Air:

Certificated air carriers: 1960-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

General aviation: 1960-80: U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy, Plans, and Management Analysis, *FAA Statistical Handbook of Aviation* (Washington, DC: Annual issues).

1985-97: Ibid., *General Aviation and Avionics Survey* (Washington, DC: Annual issues), table 5.1 and similar tables in earlier editions.

1998: Ibid., *FAA Aerospace Forecasts Fiscal Years 2000-2011* (Washington, DC: March 2000), table 29.

Highway:

1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

Electricity/motor fuel/compressed natural gas: 1960-98: American Public Transit Association, *Transportation Fact Book* (Washington, DC: February 1999), tables 65, 66, 67, and similar tables in earlier editions.

Rail:

1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: May 1999), p. 40.

Amtrak:

1975-98: Amtrak, State and Local Affairs Department, personal communication.

Water:

Residual and distillate/diesel fuel oil: 1960-80: American Petroleum Institute, *Basic Petroleum Data Book* (Washington, DC: Annual issues), tables 10, 10a, 12, and 12a.

1985-98: U.S. Department of Energy, Energy Information Administration, *Fuel Oil and Kerosene Sales* (Washington, DC: Annual issues), tables 2 and 4, and similar tables in earlier editions.

Gasoline: 1970-98: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Annual issues), table MF-24 and similar tables in earlier editions.

Pipeline:

1960-96: U.S. Department of Energy, *Natural Gas Annual 1997* (Washington, DC: October 1998), table 101.

1997-98: Ibid., table 1.

Table 4-7 Domestic Demand for Gasoline (Million gallons) by Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Highway	**55,429**	**66,979**	**85,598**	**99,354**	**101,183**	**103,545**	**109,529**	**117,061**	**119,515**	**120,938**	**124,694**
Nonhighway											
Agriculture	2,292	1,963	1,932	1,565	1,059	1,081	681	927	918	984	907
Aviation[a]	1,324	501	393	410	413	382	361	367	344	335	351
Marine	61	96	598	730	1,052	1,053	1,300	1,060	994	987	956
Other[b]	1,656	1,647	1,080	938	1,131	1,490	1,733	838	825	990	1,070
Total nonhighway	**5,332**	**4,208**	**4,003**	**3,642**	**3,655**	**4,005**	**4,076**	**3,192**	**3,081**	**3,297**	**3,284**
TOTAL demand	**60,761**	**71,187**	**89,601**	**102,996**	**104,838**	**107,550**	**113,606**	**120,253**	**122,595**	**124,235**	**127,978**

[a] Does not include aviation jet fuel.

[b] Includes state, county, and municipal use, industrial and commercial use, construction use, and miscellaneous.

NOTES: All nonhighway uses of gasoline were estimated by the U.S. Department of Transportation, Federal Highway Administration. These estimates may not be comparable to data for prior years due to revised estimation procedures.

Numbers may not add to totals due to rounding.

SOURCES:

Highway: 1960-95: U.S. Department of Transportation, Federal Highway Administration, *Highway Statististics, Summary to 1995* (Washington, DC: 1996), table MF-221.

1996-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table MF-21.

Nonhighway: 1960-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table MF-24, and unpublished revisions.

Table 4-8 Certificated Air Carrier Fuel Consumption and Travel[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Number of aircraft	**2,135**	**2,125**	**2,679**	**2,495**	**3,808**	**4,678**	**6,083**	**7,411**	**7,478**	**7,616**	**R8,111**	**8,228**
Average miles flown per aircraft (thousands)	**487**	**667**	**949**	**932**	**768**	**740**	**776**	**759**	**783**	**791**	**R767**	**774**
Aircraft-miles (millions)												
Domestic operations	858	1,134	2,068	1,948	2,523	3,046	3,963	4,629	4,811	4,911	5,031	5,176
International operations	182	284	475	377	401	415	760	998	1,043	1,114	1,191	1,197
Fuel consumption (million gallons)												
Domestic operations	1,954	3,889	7,857	7,558	9,096	R10,115	R12,429	12,812	R13,187	13,660	13,877	14,491
International operations	566	1,280	2,243	1,949	1,938	R2,488	R3,963	R4,511	R4,658	4,964	5,186	5,277
Aircraft-miles flown per gallon												
Domestic operations	0.44	0.29	0.26	0.26	0.28	0.30	0.32	0.36	0.36	0.36	0.36	0.36
International operations	0.32	0.22	0.21	0.19	0.21	0.17	0.19	0.22	0.22	0.22	0.23	0.23

KEY: R = revised

[a] Aircraft operating under 14 CFR 121 and 14 CFR 135.

SOURCES:

Number of aircraft: 1960-65: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 1970 edition* (Washington, DC: 1970), table 5.3.

1970-75: Ibid., *FAA Statistical Handbook of Aviation, Calendar Year 1979* (Washington, DC: 1979), table 5.1.

1980-85: Ibid., *FAA Statistical Handbook of Aviation, Calendar Year 1986* (Washington, DC: 1986), table 5.1.

1990-97: Ibid., *FAA Statistical Handbook of Aviation, Calendar Year 1997* (Washington, DC: unpublished), personal communication, Mar. 19, 1999.

1998-99: Aerospace Industries Association, *Aerospace Facts and Figures* (Washington DC: Annual Issues), "Active U.S. Air Carrier Fleet".

Aircraft-miles flown: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, tables 2 and 13.

1965-70: Ibid., *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: December 1976), pp. 4 and 14; and (December 1981), pp. 2 and 3.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual issues, December), pp. 2 and 3, line 27 plus line 50.

1999: Ibid., Internet site http://www.bts.gov/programs/oai, as of July 14, 2000.

Fuel consumption: 1960-99: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/programs/oai/fuel/fuelyearly.html, as of July 5, 2000.

1999: Ibid., Personal communication, July 27, 2000.

Table 4-9 Motor Vehicle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicles registered (thousands)[a]	73,858	90,358	111,242	137,913	161,490	177,133	193,057	205,427	210,441	211,580	215,496
Vehicle-miles traveled (millions)	719,000	888,000	1,110,000	1,328,000	1,527,000	1,775,000	2,144,000	2,423,000	2,486,000	R2,561,695	2,625,367
Fuel consumed (million gallons)	57,880	71,104	92,329	108,984	114,960	121,301	130,755	143,834	147,365	R150,386	154,884
Average miles traveled per vehicle (thousands)	9.7	9.8	10.0	9.6	9.5	10.0	11.1	11.8	11.8	12.1	12.2
Average miles traveled per gallon	12.4	12.5	12.0	12.2	13.3	14.6	16.4	16.8	16.9	17.0	17.0
Average fuel consumed per vehicle (gallons)	784	787	830	790	712	685	677	700	700	711	719

KEY: R = revised

[a] Includes personal passenger vehicles, buses, and trucks.

NOTE: See tables 4-11, 4-12, 4-13, 4-14, and 4-15 for individual highway vehicles.

SOURCES: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-10 Estimated Consumption of Alternative and Replacement Fuels for Highway Vehicles
(Thousand gasoline-equivalent gallons)

	1992	1993	1994	1995	1996	1997	1998[R]	1999	2000[E]
Alternative fuels									
Liquefied petroleum gases	208,142	264,655	248,467	232,701	239,158	238,356	241,583	[R]243,648	249,550
Compressed natural gas	16,823	21,603	24,160	35,162	46,923	[R]65,192	73,251	[R]86,073	104,501
Liquefied natural gas	585	1,901	2,345	2,759	3,247	3,714	5,343	[R]6,062	7,460
Methanol, 85%[a]	1,069	1,593	2,340	2,023	1,775	1,554	1,212	[R]1,108	1,062
Methanol, neat	2,547	3,166	3,190	2,150	347	347	449	[R]449	449
Ethanol, 85%[a]	21	48	80	190	694	1,280	1,727	[R]2,489	3,283
Ethanol, 95%[a]	85	80	140	995	2,699	1,136	59	59	59
Electricity	359	288	430	663	773	1,010	1,202	[R]1,458	1,712
Total	**229,631**	**293,334**	**281,152**	**276,643**	**295,616**	**[R]312, 589**	**324,826**	**[R]341,346**	**368,076**
Oxygenates									
Methyl-tertiary-butyl-ether[b]	1,175,000	2,069,200	2,018,800	2,691,200	2,749,700	3,104,200	2,915,600	[R]3,079,800	3,111,500
Ethanol in gasohol	701,000	760,000	845,900	910,700	660,200	830,700	916,000	[R]890,200	908,700
Traditional fuels									
Gasoline[c]	110,135,000	111,323,000	113,144,000	115,943,000	117,783,000	119,336,000	122,849,000	[R]124,591,000	127,568,000
Diesel	23,866,000	24,296,630	27,293,370	28,555,040	30,101,430	31,949,270	33,665,360	[R]34,239,260	35,212,860
Total	**134,001,000**	**135,620,000**	**140,437,000**	**144,498,000**	**147,884,000**	**151,285,270**	**156,514,360**	**[R]158,830,260**	**162,780,860**
TOTAL fuel consumption[d]	**134,231,000**	**135,913,000**	**140,719,000**	**144,775,000**	**148,180,000**	**[R]151,597,859**	**156,839,186**	**[R]159,171,606**	**163,148,936**

KEY: E = estimate; R = revised

[a] The remaining portion of 85% methanol, 85% ethanol, and 95% ethanol fuels is gasoline. Consumption data include the gasoline portion of the fuel.

[b] Includes a very small amount of other ethers, primarily tertiary-amyl-methyl-ether and ethyl-tertiary-butyl-ether.

[c] Gasoline consumption includes ethanol in gasohol and methyl-tertiary-butyl-ether.

[d] Total fuel consumption is the sum of alternative fuels, gasoline, and diesel. Oxygenate consumption is included in gasoline consumption.

NOTE: Numbers may not add to totals due to rounding.

SOURCE: U.S. Department of Energy, Energy Information Administration, available at Internet site www.eia.doe.gov/cneaf/solar.renewables/alt_trans_fuel98/atf_99.html as of June 26, 2000.

Table 4-11 Passenger Car and Motorcycle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicles registered (thousands)											
Passenger cars	61,671	75,258	89,244	106,706	121,601	127,885	133,700	128,387	129,728	129,749	131,839
Motorcycles	574	1,382	2,824	4,964	5,694	5,444	4,259	3,897	3,872	3,826	3,879
Vehicle-miles traveled (millions)											
Passenger cars	587,000	723,000	917,000	1,034,000	1,112,000	1,247,000	1,408,000	1,438,000	1,470,000	R1,502,556	1,545,830
Motorcycles	[a]	[a]	3,000	5,600	10,200	9,100	9,600	9,800	9,900	R10,081	10,260
Fuel consumed (million gallons)											
Passenger cars	41,171	49,723	67,819	74,140	69,982	71,518	69,568	68,072	69,221	R69,892	72,209
Motorcycles	[a]	[a]	60	113	204	182	191	196	198	202	205
Average miles traveled per vehicle (thousands)											
Passenger cars	9.5	9.6	10.3	9.7	9.1	9.8	10.5	11.2	11.3	11.6	11.7
Motorcycles	[a]	[a]	1.1	1.1	1.8	1.7	2.2	2.5	2.6	2.6	2.6
Average miles traveled per gallon											
Passenger cars	14.3	14.5	13.5	13.9	15.9	17.4	20.2	21.1	21.2	21.5	21.4
Motorcycles	[a]	[a]	50	50	50	50	50	50	50	50	50
Average fuel consumed per vehicle (gallons)											
Passenger cars	668	661	760	695	576	559	520	530	534	R539	548
Motorcycles	[a]	[a]	21	23	36	33	45	50	51	53	53

KEY: R = revised

Continued next page

[a] Included in passenger car.

NOTE: See table 4-12 for other 2-axle 4-tire vehicles.

SOURCES:

Passenger car:

Number registered: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MV-201.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

All other passenger car data: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A. For 1970-94, the unrevised motorcycle vehicle-miles and fuel consumed are subtracted from the combined passenger car and motorcycle vehicle-miles and fuel consumed from VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle:

Number registered: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MV-201.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

All other motorcycle data: 1970-85: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1985*, table VM-201A.

1990-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Average miles traveled per vehicle, average miles traveled per gallon, average fuel consumed per vehicle: Derived by calculation.

Table 4-12 Other 2-Axle 4-Tire Vehicle Fuel Consumption and Travel

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number registered (thousands)	14,211	20,418	27,876	37,214	48,275	65,738	69,134	70,224	71,818
Vehicle-miles traveled (millions)	123,000	201,000	291,000	391,000	575,000	790,000	817,000	850,000	866,228
Fuel consumed (million gallons)	12,313	19,081	23,796	27,363	35,611	45,605	47,354	49,370	50,579
Average miles traveled per vehicle (thousands)	8.7	9.8	10.4	10.5	11.9	12.0	11.8	12.1	12.1
Average miles traveled per gallon	10.0	10.5	12.2	14.3	16.1	17.3	17.2	17.2	17.1
Average fuel consumed per vehicle (gallons)	866	934	854	735	738	694	685	703	704

NOTES: Nearly all vehicles in this category are light trucks, which include vans, pickup trucks, and sport utility vehicles. In 1995, the U.S. Department of Transportation, Federal Highway Administration revised its vehicle categories beginning with 1993 data. They are passenger car, other 2-axle 4-tire vehicle, single-unit 2-axle 6-tire or more truck, and combination truck. Prior to 1993, some minivans and sport utility vehicles were included under the passenger car category.

SOURCES: 1970-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1999*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., H*ighway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-13 Single-Unit 2-Axle 6-Tire or More Truck Fuel Consumption and Travel

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number registered (thousands)	3,681	4,232	4,374	4,593	4,487	5,024	R5,265	5,293	5,414
Vehicle-miles (millions)	27,100	34,600	39,800	45,400	51,900	R62,705	R63,967	R66,893	67,894
Fuel consumed (million gallons)	3,968	5,420	6,923	7,399	8,357	9,216	R9,365	R9,576	9,741
Average miles traveled per vehicle (thousands)	7.4	8.2	9.1	9.9	11.6	12.5	12.2	12.6	12.5
Average miles traveled per gallon	6.8	6.4	5.8	6.1	6.2	6.8	6.8	7.0	7.0
Average fuel consumed per vehicle (gallons)	1,078	1,281	1,583	1,611	1,862	1,835	R1,779	R1,809	1,799

KEY: R = revised

NOTES: In 1995, the U.S. Department of Transportation, Federal Highway Administration revised its vehicle categories beginning with 1993 data to include passenger cars, other 2-axle 4-tire vehicles, single-unit 2-axle 6-tire or more trucks, and combination trucks. Single-unit 2-axle 6-tire or more trucks are on a single frame with at least 2 axles and 6 tires. Pre-1995 data have been reassigned to the most appropriate category.

SOURCES: 1970-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-14 Combination Truck Fuel Consumption and Travel

	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number registered (thousands)	787	905	1,131	1,417	1,403	1,709	1,696	1,747	1,790	1,831
Vehicle-miles traveled (millions)	31,700	35,100	46,700	68,700	78,100	94,300	115,500	118,900	R124,584	128,159
Fuel consumed (million gallons)	6,658	7,348	9,177	13,037	14,005	16,133	19,777	20,193	20,294	21,100
Average miles traveled per vehicle (thousands)	40.3	38.8	41.3	48.5	55.6	55.2	68.1	68.1	69.6	70.0
Average miles traveled per gallon	4.8	4.8	5.1	5.3	5.6	5.8	5.8	5.9	6.1	6.1
Average fuel consumed per vehicle (gallons)	8,465	8,119	8,116	9,201	9,980	9,441	11,663	11,561	11,338	11,526

KEY: R = revised

SOURCES: 1965-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-15 Bus Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number registered (thousands)	272	314	378	462	529	593	627	686	695	698	716
Vehicle-miles traveled (millions)	4,300	4,700	4,500	6,100	6,100	4,500	5,700	6,400	6,600	R6,842	6,996
Fuel consumed (million gallons)	827	875	820	1,053	1,018	834	895	968	990	R1,027	1,049
Average miles traveled per vehicle (thousands)	16.0	14.9	12.0	13.1	11.5	7.5	9.1	9.4	9.4	9.8	9.8
Average miles traveled per gallon	5.3	5.3	5.5	5.8	6.0	5.4	6.4	6.6	6.6	6.7	6.7
Average fuel consumed per vehicle[R] (gallons)	3,039	2,784	2,172	2,279	1,926	1,405	1,428	1,412	1,425	1,471	1,466

KEY: R = revised

NOTE: Includes both publicly and privately owned school, transit, and other commercial buses.

SOURCES: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-16 Transit Industry Electric Power and Primary Energy Consumption[a] and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997[R]	1998[P]
Number of vehicles	65,292	61,717	61,298	62,183	75,388	94,368	92,961	115,874	122,362	126,360	128,970
Vehicle-miles traveled	2,143	2,008	1,883	2,176	2,287	2,791	3,242	3,550	3,650	3,746	3,932
Electric power consumed (million kWh hours)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	4,988	5,250
Primary energy consumed (thousand gallons)											
Diesel	208,100	248,400	270,600	365,060	431,400	608,738	651,030	678,286	692,714	716,952	700,081
Gasoline and other nondiesel fuels[b]	191,900	124,200	68,200	7,576	11,400	45,704	33,906	60,730	61,213	59,463	50,405
Compressed natural gas[R]	N	N	N	N	N	N	N	10,740	15,092	23,906	30,915

[a] Prior to 1985, excludes commuter rail, automated guideway, urban ferryboat, demand responsive vehicles, and most rural and smaller systems.

[b] For 1995, includes propane, liquid petroleum gas, liquefied natural gas, kerosene, and all other nondiesel fuels except compressed natural gas. 1960 to 1990 data include propane.

NOTES: The heat equivalent factors used in Btu conversions are: diesel = 138,700 Btu/gallon; electric = 3,412 Btu/kWh, negating electrical system loses (to include electrical system loses, multiply this conversion factor by approximately three) gasoline = 125,000 Btu/gallon.

KEY: Btu = British thermal unti; kWh = kilowatt hour; N = data do not exist; P = preliminary; R = revised

In January 2000, the American Public Transit Association changed its name to the American Public Transportation Association (APTA). The *Transit Fact Book* is now referred to as the *Public Transportation Fact Book*.

SOURCE: American Public Transportation Association, *Public Transportation Fact Book* (Washington, DC: March 2000), tables 42, 46, 65, 66, 67, and similar tables in earlier editions of the APTA *Transit Fact Book*.

Table 4-17 Class I Rail Freight Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number in use											
Locomotives[a]	29,031	27,780	27,077	27,846	28,094	22,548	18,835	18,812	19,269	19,684	20,261
Cars[b]	1,965,486	1,800,962	1,784,181	1,723,605	1,710,827	1,421,686	1,212,261	1,218,927	1,240,573	1,270,419	1,315,667
Miles traveled (millions)											
Freight train-miles[c]	404	421	427	403	428	347	380	458	469	475	475
Locomotive unit-miles	N	N	N	1,479	1,531	1,228	1,280	1,445	1,465	1,423	1,440
Car-miles	28,170	29,336	29,890	27,656	29,277	24,920	26,159	30,383	31,715	31,660	32,657
Average miles traveled per vehicle (thousands)											
Locomotives	N	N	N	53.1	54.5	54.5	68.0	76.8	76.0	72.3	71.1
Cars	14.3	16.3	16.8	16.0	17.1	17.5	21.6	24.9	25.6	24.9	24.8
Average miles traveled per gallon											
Trains	0.12	0.12	0.12	0.11	0.11	0.11	0.12	0.13	0.13	0.13	0.13
Cars	8.13	8.17	8.43	7.56	7.50	8.01	8.40	8.73	8.86	8.86	9.11
Fuel consumed (million gallons)	3,463	3,592	3,545	3,657	3,904	3,110	3,115	3,480	3,579	3,575	3,583
Average fuel consumed per locomotive[a] (thousand gallons)	119.3	129.3	130.9	131.3	139.0	137.9	165.4	185.0	185.7	181.6	176.8

KEY: N = data do not exist

[a] For 1960-80, the total includes a small number of steam and electric units, which are not included in the per locomotive fuel consumption figure.

[b] Includes cars owned by Class I railroads, other railroads, and car companies and shippers.

[c] Based on the distance run between terminals and/or stations; does not include yard or passenger train-miles.

SOURCES:

All data except for locomotive unit-miles: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1999), pp. 33, 34, 40, 48, 50.

Locomotive unit-miles: 1975-90: Ibid., *Railroad Ten-Year Trends* (Washington, DC: Annual issues).

1995-98: Ibid., *Analysis of Class I Railroads* (Washington, DC: Annual issues), p. 29.

Table 4-18 Amtrak Fuel Consumption and Travel

	1972	1975	1980	1985	1990	1995	1996	1997	1998	1999
Number in use										
Locomotives	185	355	419	291	318	313	299	332	345	329
Cars	1,569	1,913	2,128	1,854	1,863	1,722	1,730	1,728	1,962	1,992
Miles traveled (millions)										
Train-miles	26	30	30	30	33	32	30	32	33	34
Car-miles	213	253	235	251	301	292	276	288	312	342
Locomotive fuel consumed										
Electric (million of kWh hours)	N	180	254	295	330	304	293	282	275	283
Diesel (million gallons)	N	63	64	65	82	66	71	75	75	74
Average miles traveled per car	136,000	132,000	110,000	135,000	162,000	170,000	160,000	167,000	159,000	172,000

KEY: Btu = British thermal unit; kWh = kilowatt hour; N = data do not exist

NOTE: The heat equivalent factors used in Btu conversions are: diesel = 138,700 Btu/gallon; electric = 3,412 Btu/kWh, negating electrical system loses (to include electrical system loses, multiply this conversion factor by approximately three).

SOURCES:

Number of locomotives and cars: 1972-80: Amtrak, State and Local Affairs Department, personal communication.

1985-99: Ibid., *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues).

Miles traveled:

Train-miles: 1972-99: Ibid., *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Car-miles: 1972: Ibid., *Train Information System Reports* (Washington, DC).

1975: Association of American Railroads, *Yearbook of Railroad Facts 1975* (Washington, DC: 1976), p. 40.

1980-85: Amtrak, State and Local Affairs Department and Public Affairs Department, personal communication.

1990-99: Ibid., Amtrak Corporate Reporting, Route Profitability System, personal communication, May 4, 2000.

Locomotive fuel consumed:

1975-99: Ibid., State and Local Affairs Department, personal communications.

Table 4-19 U.S. Government Energy Consumption by Agency and Source (Trillion Btu)

	Petroleum								
	Motor gasoline	Distillate and residual fuel oil	Jet fuel and aviation gas	Other[a]	Total	Electricity	Natural gas	Coal and other[b]	Total
1989									
Agriculture	4.5	0.7	0.1	0.2	5.4	1.8	1.4	0.1	8.7
Defense	17.9	220.7	752.0	3.7	994.3	119.7	108.1	52.3	1,274.4
Energy	1.3	3.1	0.5	0.2	5.0	19.2	9.2	10.8	44.3
GSA	0.1	0.5	0.0	0.0	0.7	7.4	2.7	1.9	12.7
Health and Human Services	0.2	1.9	0.0	0.1	2.3	2.5	1.8	0.1	6.7
Interior	1.9	1.2	0.2	1.1	4.5	1.5	1.0	0.1	7.1
Justice	1.9	0.3	0.2	0.0	2.5	1.7	2.5	1.1	7.7
NASA	0.2	1.0	1.4	0.0	2.6	6.4	2.8	0.3	12.1
Postal Service	8.8	4.6	0.0	0.2	13.6	11.4	4.7	0.6	30.3
Transportation	0.8	5.6	6.9	0.1	13.4	4.0	1.1	0.0	18.5
Veterans Affairs	0.5	2.4	0.0	0.0	3.0	7.8	14.3	1.2	26.2
Other[c]	3.0	3.1	1.2	0.0	7.3	5.0	2.7	0.6	15.6
Total	**41.1**	**245.1**	**762.5**	**5.7**	**1,054.4**	**188.5**	**152.4**	**69.2**	**1,464.5**
1999[P]									
Agriculture	3.3	0.1	0.0	0.1	3.5	1.9	2.0	0.5	7.8
Defense	13.5	143.4	436.8	1.7	595.4	98.7	86.0	30.5	810.7
Energy	1.0	1.1	0.0	0.1	2.3	15.7	6.7	4.7	29.4
GSA	0.1	0.1	0.0	0.0	0.2	9.5	3.2	1.5	14.3
Health and Human Services	0.4	0.3	0.0	0.1	0.9	2.8	3.3	0.1	7.0
Interior	2.8	0.8	0.1	0.7	4.5	1.5	1.4	0.1	7.5
Justice	4.8	0.4	1.5	0.0	6.7	3.8	4.5	0.4	15.4
NASA	0.2	0.4	1.1	0.0	1.8	6.4	3.0	0.2	11.4
Postal Service	10.4	5.0	0.0	0.0	15.4	16.3	7.5	0.6	39.8
Transportation	0.8	6.5	4.4	0.0	11.7	7.8	1.0	0.0	20.5
Veterans Affairs	1.2	1.1	0.0	0.0	2.3	9.4	14.3	1.5	27.5
Other[d]	2.4	3.1	0.9	0.0	6.4	13.3	4.8	0.6	25.1
Total	**41.1**	**162.3**	**444.7**	**2.9**	**651.0**	**187.2**	**137.6**	**40.5**	**1,016.3**

KEY: Btu = British thermal unit; GSA = General Services Adminstration; NASA = National Aeronautics and Space Administration; P = preliminary

Continued next page

Table 4-19 Cont'd U.S. Government Energy Consumption by Agency and Source (Trillion Btu)

[a] Includes liquefied petroleum gases.

[b] Includes purchased steam, coal, and other.

[c] Includes U.S. Department of Commerce, Panama Canal Commission, Tennessee Valley Authority, U.S. Department of Labor, U.S. Department of Housing and Urban Development, Federal Communications Commission, Office of Personnel Management, U.S. Department of State, Small Business Administration, National Science Foundation, U.S. Department of Treasury, and Environmental Protection Agency.

[d] Includes National Archives and Records Administration, U.S. Department of Commerce, U.S. Department of Labor, U.S. Department of State, Environmental Protection Agency, Federal Communications Commission, Federal Trade Commission, Panama Canal Commission, Equal Employment Opportunity Commission, Nuclear Regulatory Commission, Office of Personnel Management, U.S. Department of Housing and Urban Development, U.S. Department of Treasury, Tennessee Valley Authority, Railroad Retirement Board, U.S. Information Agency, and Federal Emergency Management Agency.

NOTES: Numbers may not add to totals due to rounding. These data include energy consumed at foreign installations and in foreign operations, including aviation and ocean bunkering, primarily by the U.S. Department of Defense. U.S. government energy use for electricity generation and uranium enrichment is excluded. Other energy used by U.S. agencies that produce electricity or enriched uranium is included. The U.S. government's fiscal year runs from October 1 through September 30.

This table uses a conversion factor for electricity of 3,412 Btu per kilowatt-hour, and a conversion factor for purchased steam of 1,000 Btu per pound.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1999*, DOE/EIA-0384(99) (Washington, DC: July 2000), table 1.13. Internet site http://www.eia.doe.gov/emeu/aer/ as of June 27, 2000.

Section C
Transportation Energy Intensity and Fuel Efficiency

Table 4-20 Energy Intensity of Passenger Modes (Btu per passenger-mile)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air[R]											
Certificated air carrier											
Domestic operations	8,633	10,118	10,185	7,746	5,727	5,047	4,932	4,382	4,183	4,146	4,123
International operations	9,199	10,292	10,986	8,465	8,866	5,103	4,546	4,173	4,108	4,168	4,278
Highway[b]											
Passenger car	4,495	4,455	4,841	4,743	4,348	4,267	3,812	3,721	3,702	3,657	3,672
Other 2-axle 4-tire vehicle	N	N	6,810	6,571	5,709	4,971	4,451	[R]4,539	[R]4,560	[R]4,563	4,591
Motorcycle	[a]	[a]	2,500	2,354	2,125	1,896	1,990	[R]2,227	[R]2,250	[R]2,295	2,330
Transit motor bus	**N**	**N**	**N**	**N**	**2,742**	**[R]3,396**	**[R]3,723**	**[R]4,155**	**[R]4,196**	**[R]4,228**	**[P]3,729**
Amtrak	**N**	**N**	**N**	**2,383**	**[R]2,164**	**[R]2,094**	**[R]2,064**	**1,838**	**[R]2,148**	**2,200**	**2,138**

KEY: Btu = British thermal unit; N = data do not exist; P = preliminary; R = revised

[a] Included in passenger car.

[b] For 1995 and subsequent years, highway passenger-miles were taken directly from Highway Statistics rather than derived from vehicle-miles and average occupancy, as is the case for 1960-1994.

NOTES: To calculate total Btu, multiply fuel consumed (see tables 4-22, 4-23, 4-24, 4-25) by 135,000 Btu/gallon for air carrier, 125,000 Btu/gallon for passenger car, other 2-axle 4-tire vehicle, and motorcycle, and 138,700 Btu/gallon for transit motor bus and Amtrak.

SOURCES:

Air:

Certificated air carriers:

Passenger-miles: 1960-99: Air Transport Association, Internet site http://www.air-transport.org/public/industry, as of July 5, 2000.

Fuel consumed: 1960-99: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

Highway:

Passenger car: 1960-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970-94: Ibid., *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1970-85: Ibid., *Highway Statistics Summary to 1985*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1990-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit motor bus:

1980-98: American Public Transportation Association, *Public Transportation Fact Book* (Washington, DC: March 2000), tables 30, 42; and 65.

Amtrak:

1975-98: Amtrak, State and Local Affairs Department, personal communications.

Table 4-21 Energy Intensity of Certificated Air Carriers, All Services[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Aircraft-miles (millions)												
Domestic operations	858	1,134	2,068	1,948	2,523	3,046	3,963	4,629	4,811	4,911	5,031	5,176
International operations	182	284	475	377	401	415	760	998	1,043	1,114	1,191	1,197
Available seat-miles (millions)[R]												
Domestic operations	52,220	94,787	213,160	241,282	346,028	445,826	563,065	603,917	626,389	640,319	649,442	686,940
International operations	13,347	29,533	51,960	61,724	86,507	101,963	170,310	203,160	208,682	216,913	224,728	230,909
Passenger-miles (millions)[R]												
Domestic operations	30,557	51,887	104,147	131,728	200,289	270,584	340,231	394,708	425,596	442,640	455,799	479,689
International operations	8,306	16,789	27,563	31,082	54,363	65,819	117,695	145,948	153,067	160,779	163,656	171,908
Fuel consumed (million gallons)												
Domestic operations	1,954	3,889	7,857	7,558	9,096	[R]10,115	[R]12,429	12,812	[R]13,187	13,660	13,877	14,402
International operations	566	1,280	2,243	1,949	1,938	[R]2,488	[R]3,963	[R]4,511	[R]4,658	4,964	5,186	5,250
Seats per aircraft[R]												
Domestic operations	60.9	83.6	103.1	123.9	137.1	146.4	142.1	130.5	130.2	131.1	129.1	132.7
International operations	73.3	104.0	109.4	163.7	215.7	245.7	224.1	203.6	200.1	194.7	188.7	192.9
Seat-miles per gallon[R]												
Domestic operations	27	24	27	32	38	44	45	47	48	47	47	48
International operations	24	23	23	32	45	41	43	45	45	44	43	44
Energy intensity (Btu/passenger-mile)[b, R]												
Domestic operations	8,633	10,118	10,185	7,746	6,131	5,047	4,932	4,382	4,183	4,146	4,123	4,053
International operations	9,199	10,292	10,986	8,465	4,813	5,103	4,546	4,173	4,108	4,168	4,278	4,123
Load factor (%)												
Domestic operations	[R]58.5	[R]54.7	[R]48.9	[R]54.6	[R]58.0	[R]60.7	[R]60.4	[R]65.4	[R]67.9	69.1	70.2	69.8
International operations	[R]62.2	[R]56.8	[R]53.0	[R]54.4	[R]62.8	[R]64.6	[R]69.1	[R]71.8	[R]73.3	74.1	[R]72.8	74.4

KEY: Btu = British thermal unit; R = revised

Continued next page

Table 4-21 Cont'd Energy Intensity of Certificated Air Carriers, All Services[a]

[a] U.S. owned carriers only. Operation of foreign-owned carriers in or out of the United States not included.

[b] Calculation based on unrounded figures not shown here.

NOTES: Aircraft-miles includes all four air-carrier groups (majors, nationals, large regionals, and medium regionals), scheduled and charter, passenger, and all-cargo. Fuel consumed includes majors, nationals, and large regionals, scheduled and charter, passenger, and all-cargo. Passenger-miles includes all four air-carrier groups, scheduled and charter, passenger service only. International operations include operations outside the United States, including those between the United States and foreign countries and the United States and its territories or possessions. Domestic and international load factor values for 1999 are derived by calculation. Heat equivalent factor used for Btu conversion is 135,000 Btu/gallon.

SOURCES:

Aircraft-miles, available seat-miles, passenger-miles, and load factor: 1960-80: Air Transport Association, Internet site http://www.air-transport.org/public/industry, as of July 5, 2000.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington DC: Annual December issues).

Fuel consumed: 1960-99: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

Seats per aircraft, seat-miles per gallon, and energy intensiveness: Derived by calculation.

Table 4-22 Energy Intensity of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicle-miles (millions)											
Passenger car	587,000	723,000	917,000	1,034,000	1,112,000	1,247,000	1,408,000	1,438,000	1,470,000	R1,503,000	1,546,000
Other 2-axle 4-tire vehicle	N	N	123,000	201,000	291,000	391,000	575,000	790,000	817,000	R851,000	866,000
Motorcycle	[b]	[b]	3,000	5,600	10,200	9,100	9,600	9,800	9,900	10,100	10,300
Passenger-miles (millions)[a]											
Passenger car	1,145,000	1,395,000	1,751,000	1,954,000	2,012,000	2,094,000	2,282,000	R2,287,000	2,337,000	R2,389,000	2,458,000
Other 2-axle 4-tire vehicle	N	N	226,000	363,000	521,000	688,000	1,000,000	R1,256,000	R1,298,000	R1,353,000	1,377,000
Motorcycle	[b]	[b]	3,000	6,000	12,000	12,000	12,000	R11,000	R11,000	R11,000	11,000
Fuel consumed (million gallons)											
Passenger car	41,171	49,723	67,819	74,140	69,982	71,518	69,568	68,072	69,221	R69,892	72,209
Other 2-axle 4-tire vehicle	N	N	12,313	19,081	23,796	27,363	35,611	45,605	47,354	R49,388	50,579
Motorcycle	[b]	[b]	60	113	204	182	191	196	198	202	205
Energy intensity (BTU/passenger-mile)											
Passenger car	4,495	4,455	4,841	4,743	4,348	4,269	3,811	3,721	3,702	3,657	3,672
Other 2-axle 4-tire vehicle	N	N	6,810	6,571	5,709	4,971	4,451	4,539	4,560	4,563	4,591
Motorcycle	[a]	[a]	2,500	2,354	2,125	1,896	1,990	2,227	2,250	2,295	2,330

KEY: Btu = British thermal unit; N = data do not exist; R = revised

[a] Passenger-miles are derived by multiplying vehicle-miles by an average occupancy rate for that vehicle type based on data provided by the Federal Highway Administration, Nationwide Personal Transportation Survey, 1977, 1983, 1995. Average vehicle occupancy rates are as follows: passenger car (1960-97): 1.95, 1.93, 1.91, 1.89, 1.81, 1.68, 1.62, 1.62, 1.61, 1.61, 1.60, 1.59, 1.59, 1.59; other 2-axle 4-tire vehicle (1960-97): 1.87, 1.85, 1.83, 1.81, 1.79, 1.76, 1.74, 1.72, 1.70, 1.68, 1.66, 1.64, 1.64, 1.64; motorcycle (1960-97): 1.1, 1.1, 1.1, 1.1, 1.2, 1.3, 1.3, 1.27, 1.25, 1.23, 1.21, 1.18, 1.18, 1.18.

[b] Included in passenger car.

NOTES: In 1995, the U.S. Department of Transportation, Federal Highway Administration revised its vehicle type categories for 1993 and later data. These new categories include passenger car, other 2-axle 4-tire vehicle, single-unit 2-axle 6-tire or more truck, and combination truck. Other 2-axle 4-tire vehicle includes vans, pickup trucks, and sport utility vehicles. In previous years, some minivans and sport utility vehicles were included in the passenger car category. Single-unit 2-axle 6-tire or more trucks are on a single frame with at least 2 axles and 6 tires. Pre-1993 data have been reassigned to the closest available category.

The heat equivalent factor used for Btu conversion is 125,000 Btus/gallon.

SOURCES:

Vehicle-miles:

Passenger car: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1960-90: Ibid., *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1970-85: Ibid., *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A. For 1970-90, the unrevised motorcycle vehicle-miles are subtracted from the combined passenger car and motorcycle vehicle-miles from VM-201A.

1990-98 Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Passenger-miles: Passenger-miles multiplied by vehicle occupancy rates.

Fuel consumed: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A. For 1970-90, the unrevised motorcycle fuel consumed is subtracted from the combined passenger car and motorcycle fuel consumed from VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-23 Average Fuel Efficiency of U.S. Passenger Cars and Light Trucks

	1980	1985	1990	1995	1996	1997	1998	1999
Average U.S. passenger car fuel efficiency (mpg) (calendar year)								
Passenger car	15.9	17.4	20.2	21.1	21.2	21.5	R21.6	21.4
Other 2-axle 4-tire vehicle	12.2	14.3	16.1	17.3	17.2	17.2	R17.2	17.1
New vehicle fuel efficiency (mpg)[a] (model year)								
Light-duty vehicle (passenger cars plus light trucks)								
Domestic	21.4	24.0	23.9	23.8	24.1	R23.3	R23.3	23.7
Imported	28.6	30.3	28.5	27.9	27.7	27.5	27.6	26.9
Passenger car								
Domestic	22.6	26.3	26.9	27.7	28.3	R27.8	R28.1	28.2
Imported	29.6	31.5	29.9	30.3	29.7	R30.1	R30.0	28.4
Light truck (<8,500 lbs GVWR)								
Domestic	16.8	19.6	20.3	20.3	20.5	R20.2	20.5	20.4
Imported	24.3	26.5	23.0	21.5	22.2	22.1	22.9	22.5
CAFE standards (mpg)[a] (model year)								
Passenger car	20.0	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Light truck	16.0/14.0[b]	19.5	20.0	20.6	20.7	20.7	20.7	20.7

KEY: CAFE = Corporate Average Fuel Economy; GVWR = gross vehicle weight rating; mpg = miles per gallon; R = revised;

[a] Assumes 55% city and 45% highway-miles. The source calculated average miles per gallon for light-duty vehicles by taking the reciprocal of the sales-weighted average of gallons per mile. This is called the harmonic average.

[b] 2 Wheel Drive/4 Wheel Drive. No combined figure available for this year.

NOTE: The fuel efficiency figures for light duty vehicles represent the sales-weighted harmonic average of the combined passenger car and light truck fuel economies.

SOURCES:

Average U.S. passenger car fuel efficiency: 1980-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

New vehicle fuel efficiency (based on model year production): 1980-90: U.S. Environmental Protection Agency, final fuel economy calculations for the U.S. Department of Transportation, National Highway Traffic Safety Administration, as cited in Internet site www.nhtsa.dot.gov/cars/problems/fuelecon/index.html.

1995-99: Manufacturer's preliminary estimates for the U.S. Department of Transportation, as cited in National Highway Traffic Safety Administration, *Automotive Fuel Economy Program, Twenty-Fourth Annual Report to Congress, Calendar Year 1999*, Internet site www.nhtsa.dot.gov/cars/problems/fuelecon/index.html.

CAFE standards: 1980-99: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Automotive Fuel Economy Program, Twenty-Fourth Annual Report to Congress, Calendar Year 1999*, Internet site www.nhtsa.dot.gov/cars/problems/fuelecon/index.html.

Table 4-24 Energy Intensity of Transit Motor Buses

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicle-miles (millions)	1,576	1,528	1,409	1,526	1,677	1,863	2,130	2,184	2,165	2,307	2,291
Passenger-miles (millions)	N	N	N	N	21,800	21,200	21,000	18,800	19,100	20,400	20,603
Fuel consumed (million gallons diesel)	208	248	271	365	431	518	563	564	R577	R597	P554
Energy intensity (Btu/passenger-mile)	N	N	N	N	2,742	3,389	3,718	4,161	4,029	R4,059	3,730

KEY: Btu = British thermal unit; N = data do not exist; P = preliminary; R = revised

NOTES: Heat equivalent factor used for Btu conversion is 138,700 Btu/gallon. In January 2000, the American Public Transit Association changed its name to the American Public Transportation Association (APTA). The *Transit Fact Book* is now referred to as the *Public Transportation Fact Book*.

SOURCE: American Public Transportation Association, *Public Transportation Fact Book* (Washington, DC: March 2000), tables 65 and 79, and similar tables in earlier editions of the *Transit Fact Book*.

Table 4-25 Energy Intensity of Class I Railroad[a] Freight Service

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Revenue freight ton-miles (millions)	572,309	697,878	764,809	754,252	918,958	876,984	1,033,969	1,305,688	1,355,975	1,348,926	1,376,802	1,433,461
Car-miles (millions)	28,170	29,336	29,890	27,656	29,277	24,920	26,159	30,383	31,715	31,660	32,657	33,851
Tons per car load	44	49	55	61	67	68	67	65	67	63	64	63
Fuel consumed (million gallons)	3,463	3,592	3,545	3,657	3,904	3,110	3,115	3,480	3,579	3,575	3,583	3,715
Energy intensity (Btu/revenue freight ton-mile)	839	714	643	672	589	492	418	370	366	368	361	359
Energy intensity (Btu/car-mile)	17,051	16,983	16,450	18,341	18,495	17,310	16,516	15,886	15,652	15,662	15,218	15,222

KEY: Btu = British thermal unit

[a] Class I railroads are those that have operating revenues of $255 million or more.

NOTE: The heat equivalent factor used for Btu conversion is 138,700 Btu/gallon.

SOURCE: Association of American Railroads, *Railroad Facts* (Washington, DC: November 2000).

Table 4-26 Energy Intensity of Amtrak Services

	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Revenue passenger-miles (millions)	3,931	4,503	4,785	6,057	6,273	6,091	6,199	5,921	5,545	5,050	5,166	5,304	5,330
Locomotive fuel consumed													
Total fuel consumed (billion Btu)[a]	9,367	9,673	9,995	12,512	12,406	12,328	12,511	11,457	10,191	10,875	11,365	11,341	11,229
Electric (millions of kWh)[a]	180	254	295	330	303	300	301	309	304	293	282	275	283
Diesel (million gallons)	63	64	65	82	82	82	83	75	66	71	75	75	74
Energy intensity (Btu/revenue passenger-mile)[a]	2,383	2,148	2,089	2,066	1,978	2,024	2,018	1,935	1,838	2,153	2,200	2,138	2,107

KEY: Btu = British thermal unit; kWh = kilowatt hour

[a] Does not include electric power generation and distribution losses, which, if included, would triple the electric conversion factor given below, and would increase the numbers in this row by about 20%.

NOTE: The heat equivalent factors used in Btu conversion are: diesel = 138,700 Btus/gallon; electric = 3,412 Btu/kWh.

SOURCES:

Revenue passenger-miles: Amtrak, *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Locomotive fuel consumed: 1975-99: Ibid., State and Local Affairs Department, personal communications.

Table 4-27 Annual Wasted Fuel Due to Congestion

Urban area	Gallons Wasted (millions)							% change: Short-term 1992-1997		% change: Long-term 1982-1997	
	R1982	R1986	R1990	R1992	R1995	R1996	1997	%	Rank	%	Rank
Albany-Schenectady-Troy, NY	0	2	4	4	4	5	5	25	50	NM	59
Albuquerque, NM	2	4	9	11	19	22	25	127	6	1150	3
Atlanta, GA	31	69	71	84	162	185	214	155	3	590	22
Austin, TX	5	11	14	20	27	30	40	100	11	700	14
Bakersfield, CA	0	0	2	2	2	3	3	50	32	NM	59
Baltimore, MD	26	44	84	82	114	117	123	50	32	373	36
Beaumont, TX	0	0	0	1	2	2	2	100	11	NM	59
Boston, MA	63	109	163	175	220	229	236	35	43	275	42
Boulder, CO	0	0	0	0	0	0	0	NM	65	NM	59
Brownsville, TX	0	0	0	0	0	0	0	NM	65	NM	59
Buffalo-Niagara Falls, NY	3	3	7	7	8	8	9	29	47	200	48
Charlotte, NC	4	6	12	14	18	20	27	93	16	575	23
Chicago, IL-Northwestern, IN	108	205	271	297	342	371	398	34	44	269	44
Cincinnati, OH-KY	8	11	26	32	41	43	49	53	31	513	27
Cleveland, OH	4	7	19	23	37	44	48	109	9	1100	4
Colorado Springs, CO	0	2	2	4	7	7	7	75	22	NM	59
Columbus, OH	4	6	18	20	33	32	37	85	18	825	12
Corpus Christi, TX	2	2	2	2	2	3	3	50	32	50	58
Dallas, TX	33	81	87	97	133	136	162	67	26	391	34
Denver, CO	17	27	43	52	80	88	96	85	18	465	29
Detroit, MI	98	131	211	241	245	266	288	20	53	194	49
El Paso, TX-NM	2	2	4	7	8	7	9	29	47	350	38
Eugene-Springfield, OR	0	0	0	0	1	2	2	NM	65	NM	59
Fort Lauderdale-Hollywood-Pompano Beach, FL	7	14	18	35	44	49	55	57	30	686	17

KEY: NM = not meaningful; R = revised

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Table 4-27 Cont'd Annual Wasted Fuel Due to Congestion

Urban area	Gallons Wasted (millions)							% change Short-term 1992-1997		% change Long-term 1982-1997	
	R1982	R1986	R1990	R1992	R1995	R1996	1997	%	Rank	%	Rank
Fort Worth, TX	11	24	34	34	47	52	59	74	23	436	31
Fresno, CA	2	4	9	7	8	8	10	43	38	400	33
Hartford-Middletown, CT	3	10	17	18	15	16	19	6	60	533	25
Honolulu, HI	10	15	21	23	25	24	25	9	58	150	52
Houston, TX	103	133	120	122	140	167	206	69	25	100	55
Indianapolis, IN	3	7	14	19	53	55	61	221	1	1933	1
Jacksonville, FL	8	11	18	20	29	33	33	65	27	313	40
Kansas City, MO-KS	4	8	15	17	32	38	45	165	2	1025	7
Laredo, TX	0	0	0	0	0	0	0	NM	65	NM	59
Las Vegas, NV	3	7	22	22	41	45	44	100	11	1367	2
Los Angeles, CA	490	764	1,044	1,042	1,066	1,092	1,108	6	60	126	54
Louisville, KY-IN	4	7	12	22	32	39	42	91	17	950	9
Memphis, TN-AR-MS	4	4	11	15	27	30	32	113	7	700	14
Miami-Hialeah, FL	44	61	102	119	125	118	136	14	56	209	47
Milwaukee, WI	7	12	22	31	41	39	38	23	51	443	30
Minneapolis-St. Paul, MN	8	20	37	47	76	80	96	104	10	1100	4
Nashville, TN	5	9	15	15	27	30	35	133	5	600	21
New Orleans, LA	16	25	30	31	36	33	32	3	62	100	55
New York, NY-Northeastern, NJ	314	405	616	567	680	724	802	41	40	155	51
Norfolk, VA	9	18	25	25	31	38	41	64	28	356	37
Oklahoma City, OK	2	3	7	9	15	20	22	144	4	1000	8
Omaha, NE-IA	3	5	10	14	18	21	19	36	42	533	25
Orlando, FL	7	13	15	29	35	42	50	72	24	614	20
Philadelphia, PA-NJ	70	92	113	120	139	159	166	38	41	137	53
Phoenix, AZ	25	48	62	65	73	90	93	43	38	272	43

KEY: NM = not meaningful; R = revised

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Table 4-27 Cont'd Annual Wasted Fuel Due to Congestion

Urban area	Gallons Wasted (millions)							% change Short-term 1992-1997		% change Long-term 1982-1997	
	R1982	R1986	R1990	R1992	R1995	R1996	1997	%	Rank	%	Rank
Pittsburgh, PA	12	19	28	27	33	32	33	22	52	175	50
Portland-Vancouver, OR-WA	11	25	38	52	75	85	84	62	29	664	19
Providence-Pawtucket, RI-MA	4	9	20	16	21	24	23	44	37	475	28
Rochester, NY	1	2	4	6	8	9	9	50	32	800	13
Sacramento, CA	8	16	42	43	50	57	54	26	49	575	23
Salem, OR	0	0	2	2	2	2	3	50	32	NM	59
Salt Lake City, UT	2	2	7	13	22	23	23	77	21	1050	6
San Antonio, TX	8	21	17	19	30	34	38	100	11	375	35
San Bernardino-Riverside, CA	9	25	50	62	70	74	72	16	55	700	14
San Diego, CA	15	47	100	108	111	114	117	8	59	680	18
San Francisco-Oakland, CA	149	241	288	276	286	291	280	1	63	88	57
San Jose, CA	20	42	80	85	87	89	86	1	63	330	39
Seattle-Everett, WA	40	74	122	150	143	148	165	10	57	313	40
Spokane, WA	0	2	2	2	3	3	4	100	11	NM	59
St. Louis, MO-IL	23	36	55	66	116	117	122	85	18	430	32
Tacoma, WA	2	7	17	18	18	18	21	17	54	950	9
Tampa, FL	12	16	23	29	38	37	38	31	46	217	46
Tucson, AZ	2	2	8	9	13	15	19	111	8	850	11
Washington, DC-MD-VA	101	164	225	248	300	326	327	32	45	224	45

KEY: NM = not meaningful; R = revised

NOTES: "Wasted" fuel is the difference between the fuel consumed under estimated existing conditions and the fuel consumed if all traffic was moving at free-flow conditions. Calculations are made for peak period speeds and for free-flow speeds on both the freeway and principal arterial systems. For a more detailed description of the formulas used, see the source document. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the study.

SOURCES: 1982-1996: Texas Transportation Institute, unpublished data.

1997: Ibid., *The 1999 Annual Urban Mobility Report* (College Station, TX: 1999), table 6.

Table 4-28 Wasted Fuel per Eligible Driver

Urban area	Gallons Wasted							% change Short-term 1992-1997		% change Long-term 1982-1997	
	R1982	R1986	R1990	R1992	R1995	R1996	1997	%	Rank	%	Rank
Albany-Schenectady-Troy, NY	0	5	10	10	10	13	13	30	40	NM	59
Albuquerque, NM	6	11	23	28	45	51	57	104	6	850	3
Atlanta, GA	25	53	43	47	84	96	106	126	3	324	30
Austin, TX	17	30	33	45	57	63	82	82	14	382	27
Bakersfield, CA	0	0	10	9	8	12	12	33	38	NM	59
Baltimore, MD	20	31	54	51	68	69	72	41	32	260	35
Beaumont, TX	0	0	0	11	20	18	18	64	18	NM	59
Boston, MA	27	48	67	73	91	95	98	34	37	263	34
Boulder, CO	0	0	0	0	0	0	0	NM	62	NM	59
Brownsville, TX	0	0	0	0	0	0	0	NM	62	NM	59
Buffalo-Niagara Falls, NY	4	4	9	8	10	10	11	38	35	175	44
Charlotte, NC	15	19	34	36	42	45	61	69	17	307	31
Chicago, IL-Northwestern, IN	20	38	47	51	58	62	65	27	46	225	39
Cincinnati, OH-KY	9	13	30	34	42	44	50	47	26	456	18
Cleveland, OH	3	5	14	16	26	30	33	106	5	1000	2
Colorado Springs, CO	0	9	9	16	24	23	23	44	28	NM	59
Columbus, OH	6	9	27	27	42	41	47	74	15	683	9
Corpus Christi, TX	11	10	10	10	9	13	13	30	40	18	58
Dallas, TX	24	55	56	62	78	78	92	48	25	283	33
Denver, CO	16	23	34	43	61	65	70	63	20	338	29
Detroit, MI	35	46	72	79	80	86	92	16	51	163	47
El Paso, TX-NM	6	6	10	18	19	16	20	11	53	233	38
Eugene-Springfield, OR	0	0	0	0	6	13	12	NM	62	NM	59
Fort Lauderdale-Hollywood-Pompano Beach, FL	8	14	17	35	40	42	47	34	36	488	14
Fort Worth, TX	13	28	37	38	49	54	60	58	22	362	28

KEY: NM = not meaningful; R = revised

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Table 4-28 Cont'd Wasted Fuel per Eligible Driver

Urban area	Gallons Wasted							% change: Short-term 1992-1997		% change: Long-term 1982-1997	
	R1982	R1986	R1990	R1992	R1995	R1996	1997	%	Rank	%	Rank
Fresno, CA	8	14	29	20	22	22	26	30	40	225	39
Hartford-Middletown, CT	7	23	37	37	31	32	38	3	60	443	21
Honolulu, HI	22	31	38	43	46	44	45	5	57	105	51
Houston, TX	57	63	55	56	63	73	90	61	21	58	57
Indianapolis, IN	5	10	19	26	68	70	79	204	1	1480	1
Jacksonville, FL	17	22	33	35	48	54	53	51	24	212	42
Kansas City, MO-KS	5	9	17	18	31	37	44	144	2	780	8
Laredo, TX	0	0	0	0	0	0	0	NM	62	NM	59
Las Vegas, NV	9	18	42	35	53	55	50	43	29	456	18
Los Angeles, CA	64	92	118	118	120	122	122	3	59	91	53
Louisville, KY-IN	7	11	19	37	49	59	63	70	16	800	5
Memphis, TN-AR-MS	7	7	17	23	39	42	44	91	9	529	13
Miami-Hialeah, FL	31	43	69	79	80	73	83	5	56	168	46
Milwaukee, WI	8	13	24	33	43	41	39	18	50	388	26
Minneapolis-St. Paul, MN	6	14	23	28	43	45	53	89	12	783	7
Nashville, TN	13	22	33	33	55	61	71	115	4	446	20
New Orleans, LA	20	31	37	37	42	38	37	0	62	85	54
New York, NY-Northeastern, NJ	24	33	46	41	49	52	58	41	31	142	49
Norfolk, VA	15	27	34	34	40	49	52	53	23	247	37
Oklahoma City, OK	4	5	13	15	21	27	29	93	8	625	11
Omaha, NE-IA	8	13	26	35	43	50	45	29	44	463	17
Orlando, FL	15	24	22	42	44	52	60	43	29	300	32
Philadelphia, PA-NJ	22	29	32	31	34	39	40	29	43	82	55
Phoenix, AZ	23	37	43	42	42	50	51	21	49	122	50
Pittsburgh, PA	8	13	18	18	22	21	22	22	48	175	44

KEY: NM = not meaningful; R = revised

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Table 4-28 Cont'd Wasted Fuel per Eligible Driver

Urban area	Gallons Wasted							% change: Short-term 1992-1997		% change: Long-term 1982-1997	
	R1982	R1986	R1990	R1992	R1995	R1996	1997	%	Rank	%	Rank
Portland-Vancouver, OR-WA	14	30	44	60	79	85	80	33	38	471	15
Providence-Pawtucket, RI-MA	6	14	30	23	30	34	32	39	34	433	23
Rochester, NY	2	5	9	13	17	19	19	46	27	850	3
Sacramento, CA	12	22	50	48	55	62	59	23	47	392	25
Salem, OR	0	0	17	15	15	14	21	40	33	NM	59
Salt Lake City, UT	4	3	11	22	35	37	36	64	18	800	5
San Antonio, TX	12	28	20	22	33	37	42	91	10	250	36
San Bernardino-Riverside, CA	13	34	59	67	73	77	74	10	54	469	16
San Diego, CA	11	30	55	57	57	59	59	4	58	436	22
San Francisco-Oakland, CA	56	86	96	91	93	94	91	0	62	63	56
San Jose, CA	23	42	75	73	73	72	69	-5	68	200	43
Seattle-Everett, WA	33	56	83	104	94	96	106	2	61	221	41
Spokane, WA	0	9	9	8	12	12	16	100	7	NM	59
St. Louis, MO-IL	16	24	36	43	75	75	79	84	13	394	24
Tacoma, WA	6	19	45	44	41	40	47	7	55	683	9
Tampa, FL	29	33	41	51	58	57	58	14	52	100	52
Tucson, AZ	6	6	20	20	27	30	38	90	11	533	12
Washington, DC-MD-VA	46	69	88	91	106	115	116	27	45	152	48

KEY: NM = not meaningful; R = revised

NOTES: "Wasted" fuel is the difference between the fuel consumed under estimated existing conditions and the fuel consumed if all traffic was moving at free-flow conditions. Calculations are made for peak period speeds and for free-flow speeds on both the freeway and principal arterial system. For a more detailed description of the formulas used, see the source document. An eligible driver is someone 16 years and older who is eligible for a driver's license. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the study.

SOURCES: 1982-1996: Texas Transportation Institute, unpublished data.

1997: Ibid., *The 1999 Annual Urban Mobility Report* (College Station, TX: 1999), table 6.

Section D
Air Pollution

Table 4-29 Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light-Duty Vehicles[a,b] (Grams per mile)

Engine type and pollutant	Prior to control[d]	1968-1969	1970-1971	1972	1973-1974	1975-1976	1977-1979	1980	1981	1982-1986	1987-1993	Tier 1[i] 1994-2003[b]		Interim Tier 2[i] 2004-2006		Tier 2[i] 2007+	
Gasoline																	
HC (total)	11	[g]	2.2	3.4		1.5		0.41				0.41	([h])	[h]			
NMHC	[e]	[h]										0.25	(0.31)	[h]			
NMOG	[e]	[h]												0.125	(0.156)	0.100	(0.125)
CO	80	[g]	23	39		15		7.0	3.4			3.4	(4.2)				
Cold-temp. CO[c]	[e]	[h]										10	([h])				
NO_x	4	[h]			3.0	3.1	2.0		1.0			0.4	(0.6)			0.14	(0.20)
Particulates	[e]	[h]										0.08	(0.10)	0.08	(0.08)	0.02	(0.02)
Formaldehyde	[e]	[h]												0.015	(0.018)		
Diesel																	
HC (total)	11	[h]				1.5		0.41				0.41	([h])	[h]			
NMHC	[e]	[h]										0.25	(0.31)	[h]			
NMOG	[e]	[h]												[h]	(0.156)	0.100	(0.125)
CO	80	[h]				15		7.0	3.4			3.4	(4.2)	[h]	(4.2)	3.4	(4.2)
NO_x	4	[h]				3.1	2.0		1.0			1.0	(1.25)	[h]	(0.6)	0.14	(0.20)
Particulates	[e]	[h]								0.60	0.20	0.08	(0.10)	[h]	(0.10)	0.02	(0.02)
Formaldehyde	[e]	[h]												[h]	(0.018)	0.015	(0.018)
Test procedure		7-mode		CVS-72		CVS-75											
Useful life (intermediate) [b,f]		[h]										5 years/50,000 miles					
(full)		5 years/50,000 miles										10 years/100,000 miles				10 years/120,000 miles	

KEY: CO = carbon monoxide; HC = hydrocarbons; NMHC = nonmethane hydrocarbons; NMOG = nonmethane organic gases; NO_x = nitrogen oxides

[a] The test procedure for measuring exhaust emissions has changed several times over the course of vehicle emissions regulations. The 7-mode procedure was used through model year 1971 and was replaced by the CVS-72 procedure beginning in model year 1972. The CVS-75 procedure became the test procedure as of model year 1975. While it may appear that the total HC and CO standards were relaxed in 1972-74, these standards were actually more stringent due to the more stringent nature of the CVS-72 test procedure. Additional standards for CO and composite standards for NMHC and NOx tested under the new Supplemental Federal Test Procedure will be phased-in beginning with model year 2000; these standards are not shown in this table.

[b] All emissions standards must be met for a useful life of 5 years/50,000 miles. Beginning with model year 1994, a second set of emissions standards must also be met for a full useful life of 10 years/100,000 miles; these standards are shown in parentheses. Tier 1 exhaust standards were phased-in during 1994-96 at a rate of 40%, 80%, and 100%, respectively.

[c] The cold CO emissions standard is measured at 20 °F (rather than 75 °F) and is applicable for a 5-year/50,000-mile useful life.

[d] The "Prior to control" column reports emissions estimates of a typical newly manufactured car in the years before exhaust emissions certification standards were implemented.

[e] No estimate available.

[f] Manufacturers can opt to certify vehicles for a full useful life of 15 years/150,000 miles and have either 1) intermediate useful life standards waived or 2) receive additional NO_x credits.

[g] In 1968-69, exhaust emissions standards were issued in parts per million rather than grams per mile and are, therefore, incompatible with this table.

[h] No standard has been set.

[i] The term "tier" refers to a level of standards and is associated with specific years. Interim Tier 2 refers to an intermediate level of standards that move manufacturers toward compliance with Tier 2 standards. Interim Tier 2 and Tier 2 standards are established as "bins." Each bin is a set of standards for NO_x, CO, NMOG, formaldehyde, and particulate matter; HC and NMHC standards are dropped for Tier 2 and Interim Tier 2. Manufacturers may certify any given vehicle family to any of the bins available for that vehicle class as long as the resulting sales-weight corporate average NO_x standard is met for the full useful life of the vehicle. The Tier 2 corporate average NO_x standard is 0.07 grams/mile. Interim corporate-based average NO_x standards are based on vehicle type. The interim sales-weighted average for light-duty vehicles (LDVs) is 9.3 grams/mile. For LDVs, Tier 2 standards will be phased in at a rate of 25% in 2004, 50% in 2005, 75% in 2006, and 100% in 2007. During this period, all LDVs not meeting the Tier 2 standards must meet Interim Tier 2 standards.

SOURCES: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication.

Table 4-30a Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT1) [a,b,c] (Grams per mile)

Engine type and pollutant	Prior to control[g]	1968-1969	1970-1971	1972	1973-1974	1975	1976-1978	1979-1981	1982-1983	1984	1985-1986	1987	1988-1993	Tier 1[k] 1994	Tier 1[k] 1995-2003	Interim Tier 2[k] 2004-2006	Tier 2[k] 2007+
Gasoline																	
HC (total)	11	[i]	2.2	3.4		2.0		1.7		0.80				[j]		[j]	
NMHC	[h]	[j]												0.25 (0.31)		[j]	
NMOG	[h]	[j]														0.125 (0.156)	0.100 (0.125)
CO	80	[i]	23	39		20		18		10				3.4 (4.2)			
Cold-temp. CO[d]	[e]	[j]												10 [(j)]			
NO_x	4	[j]			3.0	3.1		2.3					1.2	0.4 (0.6)			0.14 (0.20)
Particulates	[h]	[j]													0.08 (0.10)	0.08 (0.08)	0.02 (0.02)
Formaldehyde	[h]	[j]														0.015 (0.018)	
Diesel																	
HC (total)	11	[j]					2.0	1.7		0.80				[j] (0.80)		[j]	
NMHC	[h]	[j]												0.25 (0.31)		[j]	
NMOG	[h]	[j]														[j] (0.156)	0.100 (0.125)
CO	80	[j]					20	18		10				3.4 (4.2)		[j] (4.2)	3.4 (4.2)
NO_x	4	[j]					3.1	2.3					1.2	1.0 (1.25)		[j] (0.6)	0.14 (0.20)
Particulates	[h]	[j]							0.60			0.26			0.08 (0.10)	[j] (0.10)	0.02 (0.02)
Formaldehyde	[h]	[j]														[j] (0.018)	0.015 (0.018)
LDT1 weight critera[e]		GVWR up through 6,000 pounds						GVWR up through 8,500 pounds						GVWR up through 6,000 lbs; LVW up through 3,750 pounds			
Test procedure [b]		7-mode		CVS-72		CVS-75											
Useful life (intermediate) [c,f]		[j]												5 years/50,000 miles		5 years/50,000miles	
(full)		5 years/50,000 miles									11 years/120,000 miles			10 years/100,000 miles			10 years/120,000 miles

KEY: CO=carbon monoxide; GVWR=gross vehicle weight rating; HC=hydrocarbons; LVW=loaded vehicle weight; NMHC=nonmethane hydrocarbons; NMOG= nonmethane organic gases; NO_x=nitrogen oxides

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Table 4-30a Cont'd Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT1) [a,b,c] (Grams per mile)

[a] Light-duty truck categories LDT1-LDT4 were not created until 1994. From 1968 to 1978, all trucks with a GVWR up to 6,000 pounds were classified as light-duty trucks and were required to meet the same standards. As of 1979, the maximum weight was raised to 8,500 pounds GVWR. During 1988-93, light duty trucks were divided into two subcategories that coincide with the current LDT1-LDT4 categories. The standards for LDT2, LDT3, and LDT4 are shown in tables 4-30b through 4-30d.

[b] The test procedure for measuring exhaust emissions has changed several times over the course of vehicle emissions regulation. The 7-mode procedure was used through model year 1971 and was replaced by the CVS-72 procedure beginning in model year 1972. The CVS-75 procedure became the test procedure as of model year 1975. While it may appear that total HC and CO standards were relaxed in 1972-74, these standards were actually more stringent due to the more stringent nature of the CVS-72 test procedure. Additional standards for CO and composite standards for NMHC and NOx tested over the new Supplemental Federal Test Procedure will be phased-in beginning with model year 2000. These standards are not shown in this table.

[c] Emissions standards had to be met for a useful life of 5 years/50,000 miles through model year 1983, and a full useful life of 11 years/120,000 miles was defined for 1985-93 (several useful life options were available for 1984). Beginning in model year 1994, emissions standards were established for an intermediate useful life of 5 years/50,000 miles as well as a full useful life (full useful life standards are shown in parentheses). HC standards, however, were established only for full useful life. Tier 1 exhaust standards, except particulates standards, were phased-in during 1994-96 at a rate of 40%, 80%, and 100%, respectively. PM standards were phased-in at a rate of 40%, 80%, and 100% during 1995-97.

[d] The cold CO emissions standard is measured at 20 ºF (rather than 75 ºF) and is applicable for a 5-year/50,000-mile useful life.

[e] GVWR is the maximum design loaded weight. LVW is the curb weight (nominal vehicle weight) plus 300 pounds.

[f] Manufacturers can opt to certify vehicles for a full useful life of 15 years/150,000 miles and either have (1) intermediate useful life standards waived or (2) receive additional NO_x credits.

[g] The "Prior to controls" column reports emissions estimates of a typical newly manufactured car in the years before exhaust emissions certification standards, were implemented.

[h] No estimate available.

[i] In 1968-69, exhaust emissions standards were issued in parts per million rather than grams per mile and are, therefore, incompatible with this table.

[j] No standard has been set.

[k] The term "tier" refers to a level of standards for specific years. Interim Tier 2 refers to an intermediate level of standards that move manufacturers toward compliance with Tier 2 standards. Interim Tier 2 and Tier 2 standards are established as "bins." Each bin is a set of standards for NO_x, CO, NMOG, formaldehyde, and particulates (HC and NMHC standards are dropped for Tier 2 and Interim Tier 2). Manufacturers may certify any given vehicle family to any of the bins available for that vehicle class as long as the resulting sales-weighted corporate average NO_x standard is met for the full useful life. The Tier 2 corporate average NO_x standard is 0.07 grams/mile. Interim corporate-based average NO_x standards are based on vehicle type. The interim corporate sales-weighted average for LDT1 vehicles is 0.3 grams/mile. Tier 2 standards will be phased in at a rate of 25% in 2004, 50% in 2005, 75% in 2006, and 100% in 2007. During this period, all LDT1 vehicles not meeting the Tier 2 standards must meet Interim Tier 2 standards.

SOURCES: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999, and the Federal Register, Vol. 65, No. 28, pp. 6851-6870.

Table 4-30b Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT2) [a,b,c] (Grams per mile)

Engine type and pollutant	Prior to control[g]	1968-1969	1970-1971	1972	1973-1974	1975	1976-1978	1979-1981	1982-1983	1984	1985-1986	1987	1988-1990	1991-1993	Tier 1[k] 1994	Tier 1[k] 1995-2003	Interim Tier 2[k] 2004-2006	Tier 2[k] 2007+
Gasoline																		
HC (total)	11	[e]	2.2	3.4		2.0		1.7		0.80					[j]	(0.80)	[j]	
NMHC	[h]	[j]													j	(0.40)	[j]	
NMOG	[h]	[j]															0.125 (0.156)	0.100 (0.125)
CO	80	[l]	23	39		20		18		10					4.4	(5.5)	3.4 (4.2)	
Cold-temp. CO[d]	[h]	[j]													12.5	[(j)]		
NO_x	4	[j]			3.0	3.1		2.3					1.7		0.7	(0.97)	0.4 (0.6)	0.14 (0.20)
Particulates	[h]	[j]														0.08 (0.10)	0.08 (0.08)	0.02 (0.02)
Formaldehyde	[h]	[j]															0.015 (0.018)	
Diesel																		
HC (total)	11	[j]					2.0	1.7		0.80					[j]	(0.80)	[j]	
NMHC	[h]	[j]													0.32	(0.40)	[j]	
NMOG	[h]	[j]															[j] (0.156)	0.100 (0.125)
CO	80	[j]					20	18		10					4.4	(5.5)	[j] (4.2)	3.4 (4.2)
NO_x	4	[j]					3.1	2.3					1.7		[j]	(0.97)	[j] (0.6)	0.14 (0.20)
Particulates	[h]	[j]							0.60			0.50	0.45	0.13		0.08 (0.10)	[j] (0.10)	0.02 (0.02)
Formaldehyde	[h]	[j]															[j] (0.018)	0.015 (0.018)
LDT2 weight criteria[e]		GVWR up through 6,000 pounds						GVWR up through 8,500 pounds					GVWR up through 6,000 pounds; LVW over 3,750 pounds					
Test procedure[b]		7-mode		CVS-72		CVS-75												
Useful life (intermediate)[c, f]		[j]													5 years/50,000 miles		5 years/50,000miles	
(full)		5 years/50,000 miles									11 years/120,000 miles				10 years/100,000 miles			10 years/120,000 miles

KEY: CO=carbon monoxide; GVWR=gross vehicle weight rating; HC=hydrocarbons; LVW=loaded vehicle weight; NMHC=non-methane hydrocarbons; NMHC=nonmethane hydrocarbons; NMOG=nonmethane organic gases; NO_x=nitrogen oxides

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Table 4-30b Cont'd — Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT2) [a,b,c] (Grams per mile)

[a] Light-duty truck categories LDT1-LDT4 were not created until 1994. From 1968 to 1978 all trucks with a GVWR up to 6,000 pounds were classified as light-duty trucks and were required to meet the same standards. As of 1979, the maximum weight was raised to 8,500 pounds GVWR. During 1988-93, light-duty trucks were divided into two subcategories that coincide with the current LDT1-LDT4 categories. The standards for LDT1, LDT3, and LDT4 are shown in tables 4-30a, 4-40c, and 4-30d.

[b] The test procedure for measuring exhaust emissions has changed several times over the course of vehicle emissions regulation. The 7-mode procedure was used through model year 1971 and was replaced by the CVS-72 procedure beginning in model year 1972. The CVS-75 procedure became the test procedure as of model year 1975. While it may appear that the total HC and CO standards were relaxed in 1972-74, these standards were actually more stringent due to the more stringent nature of the CVS-72 test procedure. Additional standards for CO and composite standards for NMHC and NOx tested over the new Supplemental Federal Test Procedure will be phased-in beginning with model year 2000. These standards are not shown in this table.

[c] Emissions standards had to be met for a useful life of 5 years/50,000 miles through model year 1983, and a full useful life of 11 years/120,000 miles was defined for 1985-93 (several useful life options were available for 1984). Beginning in model year 1994, emissions standards were established for an intermediate useful life of 5 years/50,000 miles as well as a full useful life (full useful life standards are shown in parentheses). HC standards, however, were established only for full useful life. Tier 1 exhaust standards, except particulates standards, were phased-in during 1994-96 at a rate of 40%, 80%, and 100%, respectively. Particulates standards were phased-in at a rate of 40%, 80%, and 100% during 1995-97.

[d] The cold CO emissions standard is measured at 20 ºF (rather than 75 ºF) and is applicable for a 5-year/50,000-mile useful life.

[e] GVWR is the maximum design loaded weight. LVW is the curb weight (nominal vehicle weight) plus 300 pounds.

[f] Manufacturers can opt to certify vehicles for a full useful life of 15 years/150,000 miles and either have (1) intermediate useful life standards waived or (2) receive additional NO_x credits.

[g] The "Prior to controls" reports emissions estimates of a typical newly manufactured car in the years before exhaust emissions certification standards were implemented.

[h] No estimate available.

[i] In 1968-69, exhaust emissions standards were issued in parts per million rather than grams per mile and are, therefore, incompatible with this table.

[j] No standard has been set.

[k] The term "tier" refers to a level of standards for specific years. Interim 2 refers to an intermediate level of standards that move manufacturers toward compliance with Tier 2 standards. Interim Tier 2 and Tier 2 standards are established as "bins." Each bin is a set of standards for NO_x, CO, NMOG, formaldehyde, and particulates (HC and NMHC standards are dropped for Tier 2 and Interim Tier 2). Manufacturers may certify any given vehicle family to any of the bins available for that vehicle class as long as the resulting sales-weighted corporate average NO_x standard is met for the full useful life. The Tier 2 corporate average NO_x standard is 0.07 grams/mile. Interim corporate-based average NO_x standards are based on vehicle type. The interim corporate sales-weighted average for LDT2 vehicles is 0.3 grams/mile. Tier 2 standards will be phased in at a rate of 25% in 2004, 50% in 2005, 75% in 2006, and 100% in 2007. During this period all LDT2 vehicles not meeting the Tier 2 standards must meet Interim Tier 2 standards.

SOURCES: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999, and the Federal Register, Vol. 65, No. 28, pp. 6851-6870.

Table 4-30c Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT3)[a,b,c] (Grams per mile)

Engine type and pollutant	Prior to control[g]	1968-1969	1970-1971	1972	1973-1974	1975	1976-1978	1979-1981	1982-1983	1984	1985-1986	1987	1988-1989	1990	1991-1995	Tier 1[k] 1996-2007	Interim Tier 2[k] 2008	Tier 2[k] 2009+
Gasoline																		
HC (total)	11	[i]	2.2	3.4		2.0		1.7		0.80						[j] (0.80)	[j]	
NMHC	[h]	[j]														0.32 (0.46)	[j]	
NMOG	[h]	[j]															0.160 (0.230)	0.125 (0.156)
CO	80	[i]	23	39		20		18		10						4.4 (6.4)		3.4 4.2
Cold-temp. CO[d]	[h]	[j]														12.5 [(j)]		
NO_x	4	[j]			3.0	3.1		2.3					2.3	1.7		0.7 (0.98)	0.4 (0.6)	0.14 (0.20)
Particulates	[h]	[j]														[j] (0.10)	0.08 (0.08)	0.02 (0.02)
Formaldehyde	[h]	[j]															0.018 (0.027)	0.015 (0.018)
Diesel																		
HC (total)	11	[j]					2.0	1.7		0.80						[j] (0.80)	[j]	
NMHC	[h]	[j]														0.32 (0.46)	[j]	
NMOG	[h]	[j]															[j] (0.230)	0.125 (0.156)
CO	80	[j]					20	18		10						4.4 (6.4)	[j]	3.4 4.2
NO_x	4	[j]					3.1	2.3					2.3	1.7		[j] (0.98)	[j] (0.6)	0.14 (0.20)
Particulates	[h]	[j]							0.60		0.50		0.45		0.13	[j] (0.10)	[j] (0.08)	0.02 (0.02)
Formaldehyde	[h]	[j]															[j] (0.027)	0.015 (0.018)
LDT3 weight criteria[e]		GVWR up through 6,000 pounds						GVWR up through 8,500 pounds					Any ALVW			ALVW up through 5,750 pounds		
													GVWR 6,001-8,500 pounds					
Test procedure[b]		7-mode		CVS-72		CVS-75												
Useful life (intermediate)[c,f]		[j]														5 years/50,000 miles		
(full)		5 years/50,000 miles									11 years/120,000 miles							

KEY: ALVW=adjusted loaded vehicle weight; CO = carbon monoxide; GVWR=gross vehicle weight rating; HC = hydrocarbons; NMHC=nonmethane hydrocarbon; NMOG=nonmethane organic gases; NO_x=nitrogen oxides

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Table 4-30c Cont'd

Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT3)[a,b,c] (Grams per mile)

[a] Light-duty truck categories LDT1-LDT4 were not created until 1994. From 1968 to 1978 all trucks with a GVWR up to 6,000 pounds were classified as light-duty trucks and were required to meet the same standards. As of 1979, the maximum weight was raised to 8,500 pounds GVWR. During 1988-93, light-duty trucks were divided into two subcategories that coincide with the current LDT1-LDT4 categories. The standards for LDT1, LDT2, and LDT4 are given in tables 4-30a, 4-40b, and 4-30d.

[b] The test procedure for measuring exhaust emissions has changed several times over the course of vehicle emissions regulation. The 7-mode procedure was used through model year 1971 and was replaced by the CVS-72 procedure beginning in model year 1972. The CVS-75 procedure became the test procedure as of model year 1975. While it may appear that the total HC and CO standards were relaxed in 1972-74, these standards were actually more stringent due to the more stringent nature of the CVS-72 test procedure. Additional standards for CO and composite standards for NMHC and NO_X tested over the new Supplemental Federal Test Procedure will be phased-in beginning with model year 2002. These standards are not shown in this table.

[c] Emissions standards had to be met for a full useful life of 5 years/50,000 miles through model year 1983, and a full useful life of 11 years/120,000 miles was defined for 1985-93 (several useful life options were available for 1984). Beginning in model year 1996, emissions standards were established for an intermediate useful life of 5 years/50,000 miles as well as a full useful life of 11 years/120,000 miles (intermediate and full useful life standards are shown in parentheses). This applied to all pollutants except HC and particulates for all LDT3 vehicles and NO_X for diesel-powered LDT3 vehicles, which were only required to meet full useful life standards. Tier 1 exhaust standards were phased-in during 1996-97 at a rate of 50% and 100%, respectively.

[d] The cold CO emissions standard is measured at 20 ºF (rather than 75 ºF) and is applicable for a 5-year/50,000-mile useful life.

[e] GVWR is the maximum design loaded weight. ALVW is the numerical average of the GVWR and the curb weight.

[f] Manufacturers can opt to certify vehicles for a full useful life of 15 years/150,000 miles and either have (1) intermediate useful life standards waived or (2) receive additional NO_X credits.

[g] The "Prior to controls" column reports emissions estimates of a typical newly manufactured car in the years before exhaust emissions certification standards were implemented.

[h] No estimate available.

[i] In 1968-69, exhaust emissions standards were issued in parts per million rather than grams per mile and are, therefore, incompatible with this table.

[j] No standard has been set.

[k] The term "tier" refers to a level of standards for specific years. Interim 2 refers to an intermediate level of standards that moves manufacturers toward compliance with Tier 2 standards. Interim Tier 2 and Tier 2 standards are established as "bins." Each bin is a set of standards for NO_X, CO, NMOG, formaldehyde, and particulates (HC and NMHC standards are dropped for Tier 2 and Interim Tier 2). Manufacturers may certify any given vehicle family to any of the bins available for that vehicle class as long as the resulting sales-weighted corporate average NO_X standard is met for full useful life. The Tier 2 corporate average NO_X standard is 0.07 grams/mile. Interim corporate-based average NO_X standards are based on vehicle type. The interim corporate sales-weighted average for LDT3 vehicles is 0.6 grams/mile. Tier 2 LDT3 standards will be phased in during 2008 and 2009. In 2008, 50% of LDT3 vehicles must meet Tier 2 standards; the others must meet Interim Tier 2 standards. Beginning in 2009, all LDT3 vehicles must meet Tier 2 standards.

SOURCES: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999, and the Federal Register, Vol. 65, No. 28, pp. 6851-6870.

Table 4-30d Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT4) [a,b,c] (Grams per mile)

Engine type and pollutant	Prior to control[g]	1968-1969	1970-1971	1972	1973-1974	1975	1976-1978	1979-1981	1982-1983	1984	1985-1986	1987	1988-1989	1990	1991-1995	Tier 1[k] 1996-2007	Interim Tier 2[k] 2008	Tier 2[k] 2009+
Gasoline																		
HC (total)	11	[l]	2.2	3.4		2.0		1.7		0.80						[j] (0.80)	[j]	
NMHC	[h]	[j]														0.39 (0.56)	[j]	
NMOG	[h]	[j]															0.160 (0.230)	0.125 (0.156)
CO	80	[i]	23	39		20		18		10						5.0 (7.3)	4.4 (6.4)	3.4 (4.2)
Cold-temp. CO[d]	[h]	[j]														12.5 [(j)]		
NO_x	4	[j]			3.0	3.1		2.3					2.3	1.7		1.1 (1.53)	0.4 (0.6)	0.14 (0.20)
Particulates	[h]	[j]														[j] (0.12)	0.08 (0.08)	0.02 (0.02)
Formaldehyde	[h]	[j]															0.018 (0.027)	0.015 (0.018)
Diesel																		
HC (total)	11	[j]					2.0	1.7		0.80						[j] (0.80)	[j]	
NMHC	[h]	[j]														0.39 (0.56)	[j]	
NMOG	[h]	[j]															[j] (0.230)	0.125 (0.156)
CO	80	[j]					20	18		10						5.0 (7.3)	[j] (6.4)	3.4 (4.2)
NO_x	4	[j]					3.1	2.3					2.3	1.7		[j] (1.53)	[j] (0.6)	0.14 (0.20)
Particulates	[h]	[j]							0.60		0.50		0.45		0.13	[j] (0.12)	[j] (0.08)	0.02 (0.02)
Formaldehyde	[h]	[j]															[j] (0.027)	0.015 (0.018)
LDT4 weight criteria[e]		GVWR up through 6,000 pounds						GVWR up through 8,500 pounds					Any ALVW			ALVW over 5,750 pounds		
													GVWR 6,001-8,500 pounds					
Test procedure[b]		7-mode		CVS-72		CVS-75												
Useful life (intermediate)[c, f]		[j]														5 years/50,000 miles		
(full)		5 years/50,000 miles									11 years/120,000 miles							

KEY: ALVW=adjusted loaded vehicle weight; CO = carbon monoxide; GVWR=gross vehicle weight rating; HC = hydrocarbons; NMHC=nonmethane hydrocarbon; NMOG=nonmethane organic gases; NO_x=nitrogen oxides

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Table 4-30d Cont'd — Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Duty Trucks (Category LDT4) [a,b,c] (Grams per mile)

[a] Light-duty truck categories LDT1-LDT4 were not created until 1994. From 1968 to 1978 all trucks with a GVWR up to 6,000 pounds were classified as light-duty trucks and were required to meet the same standards. As of 1979, the maximum weight was raised to 8,500 pounds GVWR. During 1988-93, light-duty trucks were divided into two sub categories that coincide with the current LDT1-LDT4 categories. The standards for LDT1, LDT2, and LDT3 are given in tables 4-30a, 4-40b, and 4-30c.

[b] The test procedure for measuring exhaust emissions has changed several times over the course of vehicle emissions regulation. The 7-mode procedure was used through model year 1971 and was replaced by the CVS-72 procedure beginning in model year 1972. The CVS-75 procedure became the test procedure as of model year 1975. While it may appear that the total HC and CO standards were relaxed in 1972-74, these standards were actually more stringent due to the more stringent nature of the CVS-72 test procedure. Additional standards for CO and composite standards for NMHC and NO_X tested over the new Supplemental Federal Test Procedure will be phased-in beginning with model year 2002. These standards are not shown in this table.

[c] Emissions standards had to be met for a full useful life of 5 years/50,000 miles through model year 1983, and a full useful life of 11 years/120,000 miles was defined for 1985-93 (several useful life options were available for 1984). Beginning in model year 1996, emissions standards were established for an intermediate useful life of 5 years/50,000 miles as well as a full useful life of 11 years/120,000 miles (intermediate and full useful life standards are shown in parentheses). This applied to all pollutants except HC and particulates for all LDT4 vehicles and NO_X for diesel-powered LDT4 vehicles, which were only required to meet full useful life standards. Tier 1 exhaust standards were phased-in during 1996-97 at a rate of 50% and 100%, respectively.

[d] The cold CO emissions standard is measured at 20 ºF (rather than 75 ºF) and is applicable for a 5-year/50,000-mile useful life.

[e] GVWR is the maximum design loaded weight. ALVW is the numerical average of the GVWR and the curb weight.

[f] Manufacturers can opt to certify vehicles for a full useful life of 15 years/150,000 miles and either have (1) intermediate useful life standards waived or (2) receive additional NO_X credits.

[g] The "Prior to controls" column reports emissions estimates of a typical newly manufactured car in the years before exhaust emissions certification standards were implemented.

[h] No estimate available.

[i] In 1968-69, exhaust emissions standards were issued in parts per million rather than grams per mile and are, therefore, incompatible with this table.

[j] No standard has been set.

[k] The term "tier" refers to a level of standards for specific years. Interim 2 refers to an intermediate level of standards that moves manufacturers toward compliance with Tier 2 standards. Interim Tier 2 and Tier 2 standards are established as "bins." Each bin is a set of standards for NO_X, CO, NMOG, formaldehyde, and particulate matter (HC and non-methane HC standards are dropped for Tier 2 and interim Tier 2). Manufacturers may certify any given vehicle family to any of the bins available for that vehicle class as long as the resulting sales-weighted corporate average NO_X standard is met for full useful life. The Tier 2 corporate average NO_X standard is 0.07 grams/mile. Interim corporate-based average NO_X standards are based on vehicle type. The interim corporate sales-weighted average for LDT4 vehicles is 0.6 grams/mile. Tier 2 standards will be phased in during 2008 and 2009. In 2008, 50% of LDT4 vehicles must meet Tier 2 standards; the others must meet Interim Tier 2 standards. Beginning in 2009, all LDT4 vehicles must meet Tier 2 standards.

SOURCES: 40 CFR 86, Subpart A (July 1, 1998). US Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999, and the U.S. Federal Register, Vol. 65, No. 28, pp. 6851-6870.

Table 4-31 Federal Exhaust Emission Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Medium-Duty Passenger Vehicles (MDPV)[a,b]

(Grams per mile)

Engine type and pollutant	2004	2008	2009+
Gasoline			
NMOG	0.195 (0.280)		0.125 (0.156)
CO	5.0 (7.3)		3.4 (4.2)
Cold-temp. CO[c]	12.5		
NO_x	0.6 (0.9)		0.14 (0.20)
Particulates	0.12 (0.12)		0.02 (0.02)
Formaldehyde	0.022 (0.032)		0.015 (0.018)
Diesel			
HC	1.3 g/bhp-hr		
NMHCHC + NO_x	2.4 g/bhp-hr		
NMOG		[g] (0.280)	0.125 (0.156)
CO	15.5 g/bhp-hr	[g] (7.3)	3.4 (4.2)
NO_x	4.0 g/bhp-hr	[g] (0.9)	0.14 (0.20)
Particulates	0.10 g/bhp-hr	[g] (0.12)	0.02 (0.02)
Formaldehyde		[g] (0.032)	0.015 (0.018)
Smoke opacity (acceleration/lugging/peak)[d]	20/15/50		
Weight Criteria	Greater than 8,500 pounds GVWR; less than 10,000 pounds GVWR		
Test procedure-gasoline	CVS-75		
diesel	EPA Transient	CVS-75	
Useful life-gasoline (intermediate)[b,e]	5 years/50,000 miles		
(full)	11 years/120,000 miles		
Useful life-diesel (intermediate) [b,e]	[g]		5 years/50,000 miles
(full)	8 years/110,000 miles	11 years/120,000 miles	

KEY: CO = carbon monoxide; g/bhp-hr = grams per brake horsepower/hour; GVWR = gross vehicle weight rating; HC = hydrocarbons; NMHC=nonmethane hydrocarbon; NMOG = nonmethane organic gases; NO_X = nitrogen oxides

[a] The MDPV category was created for the Interim Tier 2 and Tier 2 vehicle emissions standards. This category was specifically designed to help bring passenger vehicles (such as large sport utility vehicles and passenger vans) over 8,500 pounds GVWR into the Tier 2 program. MDPVs are defined as any complete heavy-duty vehicle less than 10,000 pounds GVWR designed primarily for transportation of persons, including conversion vans (i.e., vans which are intended to be converted to vans used primarily for transporting people). This does not include vehicles that have 1) a capacity of more than 12 persons total, or 2) are designed to accommodate more than 9 persons seated rearward of the driver's seat, or 3) have a cargo box (i.e., a pickup-bed or box) of six feet or more in interior length. Prior to Tier 2 standards, these vehicles would have been regulated as light heavy-duty trucks.

[b] Diesel MDPVs can continue to use light heavy-duty truck standards for new vehicle certification until 2008. Note that these standards are measured in grams per brake horsepower-hour (g/bhp-hr). Beginning in 2008, MDPVs must use the same on-chassis testing procedure as heavy light-duty trucks (categories LDT3 and LDT4) and must meet standards for MDPVs. Beginning in 2009, MDPVs must meet the same standards as light heavy-duty trucks, except MDPVs are not required to meet Supplemental Federal Test Procedure standards.

[c] The cold CO emissions standard is measured at 20 ºF (rather than 75 ºF) and is applicable for a full useful life of 5-years/50,000-miles.

[d] Smoke opacity is expressed as a percentage for acceleration, lugging, and peak operation modes. Lugging occurs when a vehicle is carrying a load.

[e] Manufacturers can opt to certify vehicles for a full useful life of 15 years/150,000 miles and have either 1) intermediate useful life standards waived or 2) receive additional NO_X credits.

[f] The term "tier" refers to a level of standards for specific years. Interim 2 refers to an intermediate level of standards that moves manufacturers toward compliance with Tier 2 standards. Tier 2 and interim Tier 2 standards are established as "bins." Each bin is a set of standards for NO_X, CO, NMOG, formaldehyde, and particulates (HC and NMHC standards are dropped for Tier 2 and Interim Tier 2). Manufacturers may certify any given vehicle family to any of the bins available for that vehicle class as long as the resulting sales-weighted corporate average NO_X standard is met for full useful life. The Tier 2 corporate average NO_X standard is 0.07 grams/mile. Interim corporate-based average NO_X standards are based on vehicle type. The interim corporate sales-weighted average for MDPVs is 0.6 grams/mile. Tier 2 MDPV standards will be phased in during 2008 and 2009. In 2008, 50% of MDPVs must meet Tier 2 standards; the other 50% of MDPVs must meet interim Tier 2 standards. Beginning in 2009, all MDPVs must meet Tier 2 standards.

[g] Diesel MDPVs are not required to meet intermediate life standards during this time period.

SOURCE: Federal Register, Vol. 65, No. 28, pp. 6698-6870.

Table 4-32a Federal Exhaust Emissions Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light Heavy-Duty Trucks (Grams per brake horsepower-hour)

Engine type and pollutant	1970-73	1974-78	1979-83	1984	1985-86	1987	1988-89	1990	1991-93	1994-97	1998-2003	2004+
Gasoline												
HC + NO_x	e	16	10	[e]								
HC	[f]	e	1.5	1.9	1.1							
NO_x	e			10.6				6.0	5.0		4.0	
CO	[f]	40	25	37.1	14.4							
Diesel												
HC + NO_x	e	16	10	e								
HC	[f]	e	1.5	1.3								
NO_x	e			10.7				6.0	5.0		4.0	
Nonmethane HC + NO_x	e											2.4[g]
CO	[f]	40	25	15.5								
Particulates	e						0.60		0.25	0.10		
Smoke opacity (acceleration/lugging/peak) [a]	40/20/[e]	20/15/50										
Weight criteria for light heavy-duty trucks [b]	GVWR over 6,000 lbs		GVWR over 8,500 lbs			GVWR 8,501 through 14,000						
Test procedure (gasoline)[c]	9-mode steady-state				MVMA transient							
(diesel)[c]	13-mode steady-state			EPA transient								
Useful life (gasoline) [d]	5 years/50,000 miles				8 years/110,000 miles							

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_X = nitrogen oxides

[a] Smoke opacity is expressed in percentage for acceleration, lugging, and peak modes (acceleration/lugging/peak). Lugging is when a vehicle is carrying a load.

[b] Gross vehicle weight rating (GVWR) is the maximum design loaded weight.

[c] Several testing procedures have been used during the course of exhaust emissions control. A steady-state 9-mode test procedure (13-mode for diesel) was used for 1970-83 standards. For 1984, either the steady-state tests or the U.S. Environmental Protection Agency (EPA) transient test procedure could be used. For diesels, the EPA transient test was required from 1985 to the present. For gasoline-powered vehicles, either the EPA or the Motor Vehicle Manufacturers Association (MVMA) transient test procedure could be used during 1985-86, and the MVMA procedure was required thereafter.

[d] Emissions standards apply to the useful life of the vehicle. Useful life was 5 years/50,000 miles through 1983, and 8 years/110,000 miles for model year 1985 and after. 1984 was a transitional year in which vehicles could meet the older standard (and test procedure) or the newer one. Useful life requirement for gasoline-powered trucks meeting NO_X standards for 1998 and after is 10 years/110,000 miles. The useful life requirements for heavy-duty diesel truck standards are more complex and vary by vehicle weight, pollutant, test procedure, and year. Consult the U.S. Code of Federal Regulations for further information.

[e] No standard set.

[f] Although emissions standards for HC and CO were in effect for these years, they were not measured in grams per brake horsepower-hour and are, therefore, incompatible with this table.

[g] Vehicles can meet a composite nonmethane HC and NO_X standard of 2.5, given they meet a nonmethane HC standard of no more than 0.5.

NOTE: Tables 4-31a and 4-31b are identical for diesel.

SOURCES: 40 CFR 86, Subpart A (July 1, 1998); U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999.

Table 4-32b Federal Exhaust Emissions Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Heavy Heavy-Duty Trucks (Grams per brake horsepower-hour)

Engine type and pollutant	1970-73	1974-78	1979-83	1984	1985-86	1987	1988-89	1990	1991-93	1994-97	1998-2003	2004+
Gasoline												
HC + NO_x	[e]	16	10	[e]								
HC	[f]	[e]	1.5	1.9								
NO_x	[e]			10.6				6.0	5.0		4.0	
CO	[f]	40	25	37.1								
Diesel												
HC + NO_x	[e]	16	10	[e]								
HC	[f]	[e]	1.5	1.3								
NO_x	[e]			10.7				6.0	5.0		4.0	
Nonmethane HC + NO_x	[e]											2.4[g]
CO	[f]	40	25	15.5								
Particulates	[e]						0.60		0.25	0.10		
Smoke opacity (acceleration/lugging/peak) [a]	40/20[e]	20/15/50										
Weight criteria for heavy heavy-duty trucks [b]	GVWR over 6,000 lbs		GVWR over 8,500 lbs			GVWR over 14,000 lbs						
Test procedure (gasoline) [c]	13-mode steady-state				MVMA							
(diesel) [c]	13-mode steady-state			EPA transient								
Useful life (gasoline) [d]	5 years/50,000 miles				8 years/110,000 miles							

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_x = nitrogen oxides

[a] Smoke opacity is expressed in percentage for acceleration, lugging, and peak modes (acceleration/lugging/peak). Lugging is when a vehicle is carrying a load.

[b] Gross vehicle weight rating (GVWR) is the maximum design loaded weight.

[c] Several testing procedures have been used during the course of exhaust emissions control. A steady-state 9-mode test procedure (13-mode for diesel) was used for 1970-83 standards. For 1984, either the steady-state tests or the U.S. Environmental Protection Agency (EPA) transient test procedure could be used. For diesels, the EPA transient test was required from 1985 to the present. For gasoline-powered vehicles, either the EPA or the Motor Vehicle Manufacturers Association (MVMA) transient test procedure could be used during 1985-86, and the MVMA procedure was required thereafter.

[d] Emissions standards apply to the useful life of the vehicle. Useful life was 5 years/50,000 miles through 1983, and 8 years/110,000 miles for model year 1985 and after. 1984 was a transitional year in which vehicles could meet the older standard (and test procedure) or the newer one. Useful life requirement for gasoline-powered trucks meeting NOx standards for 1998 and after is 10 years/110,000 miles. The useful life requirements for heavy-duty diesel truck standards are more complex and vary by vehicle weight, pollutant, test procedure, and year. Consult the U.S. Code of Federal Regulations for further information.

[e] No standard set.

[f] Although emissions standards for HC and CO were in effect for these years, they were not measured in grams per brake horsepower-hour and are, therefore, incompatible with this table.

[g] Vehicles can meet a composite nonmethane HC and NO_X standard of 2.5, given they meet a nonmethane HC standard of no more than 0.5.

NOTES: Tables 4-31a and 4-31b are identical for diesel.

SOURCES: 40 CFR 86, Subpart A (July 1, 1998).

U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999.

Table 4-33 Federal Exhaust Emissions Standards for Newly Manufactured Motorcycles[a] (g/km)[b]

Pollutant	Engine displacement	Emissions prior to controls[c]	1978-79	1980-89	1990-96	1997+
Gasoline-powered						
HC	50-169 cc	1.0-13.8	5			
	170-749 cc		5 + 0.0155(D-170)[d]	5.0		
	750 cc and greater		14	5.0		
CO	50 cc and greater	11.0-31.0	17	12		
Methanol-powered						
Total HC equivalent	50 cc and greater				5.0	
CO	50 cc and greater				12	
Natural gas- and LPG-powered						
HC	50 cc and greater					5.0
CO	50 cc and greater					12
Useful life (Class I)	50-169 cc		5 years or 12,000 km (7,456 mi), whichever comes first			
(Class II)	170-279 cc		5 years or 18,000 km (11,185 mi), whichever comes first			
(Class III)	280 cc and greater		5 years or 30,000 km (18,641 mi), whichever comes first			

[a] A motorcycle is any motor vehicle with a headlight, taillight, and stoplight, and having two or three wheels and a curb mass less than or equal to 793 kg (1,749 lb). (The limit was 680 kg, or 1,499 lb prior to the 1998 model year.) A motorcycle is excluded from the standards if it has a displacement of less than 50 cc (3.1 cubic inches) or if with a 80 kg (176 lb) driver it cannot start from a dead stop using only the engine or exceed a speed of 40 km/h (25 mph) on a level, paved surface.

[b] Readers who wish to compare motorcycle regulations with passenger car and truck regulations should note that 5.0 g/km = 8.0 g/mi and 12 g/km = 19 g/mi. The formula for 1978-79 HC emissions by motorcycles 170-749 cc becomes, in g/mi., approximately 8.0 + 0.025(D-170).

[c] Estimates of emissions rates prior to controls are ranges of emissions for all engine displacements. Not available for motorcycles powered by fuels other than gasoline.

KEY: cc = cubic centimeters; D = engine displacement; g = gram; h = hour; HC = hydrocarbon; kg = kilogram; km = kilometer; lb = pound; LPG = liquefied petroleum gas; mi = miles; mph = miles per hour

[d] D = engine displacement in cubic centimeters (cc). For example, the standard for a 300 cc engine would be 5.0 + 0.0155(300-170) = 7.0 g/km.

SOURCES: 40 CFR 86 Subpart E (July 1, 1998); U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, Apr. 4, 1998.

Table 4-34 Federal Exhaust Emissions Standards for Newly Manufactured and In-Use Aircraft Engines[a, b]

Engine type [c]	Pollutant	Year of engine manufacture						
		1974-75	1976-77	1978-82	1983	1984-96	1997-99	2000+
Turboprop								
	Smoke					[h]$187(rO)^{-0.168}$		
Class T3 turbojet								
	CO (g/kN) [d]						118	
	HC (g/kN) [d]					19.6		
	NO_x (g/kN) [d]						[j]$40 + 2(rPR)$	[k]$32 + 1.6(rPR)$
	Smoke			25		[i]$83.6(rO)^{-0.274}$		
Class T8 turbojet								
	CO (g/kN) [d]						118	
	HC (g/kN) [d]					19.6		
	NO_x (g/kN) [d]						[j]$40 + 2(rPR)$	[k]$32 + 1.6(rPR)$
	Smoke	[e]30				[i]$83.6(rO)^{-0.274}$		
Turbofan and turbojet engines other than Classes T3, T8, and TSS								
	CO (g/kN) [d]						118	
	HC (g/kN) [d]					19.6		
	NO_x (g/kN) [d]						[j]$40 + 2(rPR)$	[k]$32 + 1.6(rPR)$
	Smoke		[f]$83.6(rO)^{-0.274}$		[g]$83.6(rO)^{-0.274}$	[i]$83.6(rO)^{-0.274}$		
TSS engines (supersonic aircraft engines)								
	HC (g/kN)					[rPR]$140(0.92)$		
	Smoke					[i]$83.6(rO)^{-0.274}$		

KEY: CO = carbon monoxide; g = gram; g/kN = grams of pollutant per kilonewtons of thrust; HC = hydrocarbon, kN = kilonewtons; kW = kilowatt; NO_X = nitrogen oxides; rO = rated output, which is the maximum power or thrust available for takeoff; rPR = rated pressure ratio

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Table 4-34 Cont'd Federal Exhaust Emissions Standards for Newly Manufactured and In-Use Aircraft Engines[a, b]

[a] Federal standards apply to all planes operating in the United States, regardless of where they were manufactured. This table primarily displays exhaust emissions standards for newly manufactured aircraft engines. Only two standards (smoke standards) have been set for in-use aircraft engines (see footnotes j and k). Therefore, unless otherwise noted, emissions in this table apply to new aircraft engines only.

[b] HC, CO, and NO_X are measured using the International Civil Aviation Organization (ICAO) Gaseous Emissions Test Procedure. Smoke is measured using the ICAO Smoke Emission Test Procedure. There is no useful life or warranty period for purposes of compliance with emissions standards.

[c] Examples of commercial aircraft that use each engine type include the following:

- Class T3 turbojet--Boeing 707-320s (Class T3 engines are currently out of production, though some are still in use).
- Class T8 turbojet--Boeing 727s and 737-200s, and McDonnell-Douglas MD-80s and DC-9s.
- Turbofans and turbojets other than T3, T8, and TSS--Boeing 747-400s, 757s, 767-200s and 777s, and McDonnell-Douglas MD-11s; Canadair Regional Jets.
- Turboprops--Used mostly in regional airliners such as ATR 72, Dornier 328, and Saab SF 340.
- TSS--British Aircraft Corp./Aerospatiale Concorde (the only supersonic aircraft currently used in commercial civil aviation).

[d] rO >= 1,000 kW

[e] Applies to engines with rO>26.7 kN.

[f] Effective as of July 7, 1997. This standard applies only to those engines of a type or model for which the date of manufacture of the first individual production model was on or before Dec. 31, 1995 and for which the date of manufacture of the individual engine was on or before Dec. 31, 1999.

[g] Effective as of July 7, 1997. This standard also applies to engines of a type or model for which the date of manufacture of the first individual production model was after Dec. 31, 1995 and for which the date of manufacture of the individual engine was on or before Dec. 31, 1999.

[h] Engines with rO>=26.7 kN. Smoke number may not exceed 50.

[i] Engines manufactured after Feb. 1, 1974 and before 1984. This is also the in-use standard for all such aircraft engines manufactured after Feb. 1, 1974.

[j] Engines with rated output rO>=129 kN. This is also the in-use standard for all such aircraft engines.

[k] Engines with rO<26.7 kN. Smoke number may not exceed 50.

SOURCES: 40 CFR 87, Subparts A-D (July 1, 1998); Jane's Information Group Inc. 1992. *Jane's All the World's Aircraft, 1992-93* (Alexandria, VA).

Table 4-35 Federal Exhaust Emissions Standards for Locomotives[a] (g/bhph except where noted)

Pollutant	Duty-cycle [f]	Tier 0 1973-2001 [h]	Tier 1 2002-2004	Tier 2 2005+
Total HC [b]	Line-haul	1.00	0.55	0.30
	Switch	2.10	1.20	0.60
Nonmethane HC [c]	Line-haul	1.00	0.55	0.30
	Switch	2.10	1.20	0.60
Total HC equivalent [d]	Line-haul	1.00	0.55	0.30
	Switch	2.10	1.20	0.60
CO	Line-haul	5.0	2.2	1.5
	Switch	8.0	2.5	2.4
	Line-haul (optional standard) [g]	10.0	10.0	10.0
	Switch (optional standard) [g]	12.0	12.0	12.0
NO_x	Line-haul	9.5	7.4	5.5
	Switch	14.0	11.0	8.1
Particulates	Line-haul	0.60	0.45	0.20
	Switch	0.72	0.54	0.24
	Line-haul (optional standard) [g]	0.30	0.22	0.10
	Switch (optional standard) [g]	0.36	0.27	0.12
Smoke opacity (% opacity-normalized) [e]	Steady-state	30%	25%	20%
	30-second peak	40%	40%	40%
	3-second peak	50%	50%	50%
Useful life		7.5 MWh per hp or 10 years [i, j]		

KEY: bhp = boiler horsepower; bhph = boiler horsepower hour;
CO = carbon monoxide; g = gram; h = hour;
MW = megawatt; MWh = megawatt hour;
NO_x = nitrogen oxides; PM = particulate matter

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Table 4-35 Cont'd Federal Exhaust Emissions Standards for Locomotives[a] (g/bhph except where noted)

[a] Locomotive standards apply to both new and remanufactured locomotives, except as noted.

[b] Total HC standards apply to locomotives powered by any fuel except alcohol or natural gas or fuels primarily composed of alcohol or natural gas.

[c] Nonmethane HC standards apply to locomotives powered by natural gas or fuels that are primarily composed of natural gas.

[d] Total HC equivalent standards apply to locomotives powered by alcohol or fuels that are primarily composed of alcohol.

[e] Smoke opacity values are normalized to be equivalent to a 1 meter path length.

[f] The line-haul duty-cycle is weighted toward operation in the higher power notches and is typical of line-haul applications. The switch duty-cycle is typical of switch operations, with more emphasis on idle and low power notch emissions. Locomotives generally are required to meet the standards for both duty-cycles. However, Tier 0 dedicated switch locomotives rated at 2,300 hp or less are only required to meet the switch duty-cycle standard.

[g] Manufacturers and remanufacturers can elect to comply with the alternate CO and PM standards. However, a manufacturer or remanufacturer using the alternate standards must meet both the CO and the PM standards. This allows locomotives to have higher CO emissions in exchange for meeting more stringent PM standards.

[h] Tier 0 standards apply to all new production locomotives in the 2001 model year, as well as for any 1994 through 2001 model year freight locomotives remanufactured on or after Jan. 1, 2001. They also apply to all other 1973 through 2001 model year loco motives remanufactured on or after Jan. 1, 2002. Other phase-in options are also available for manufacturers (see 40 CFR 92 for more detail on phase-in options).

[i] For Tier 0 locomotives not equipped with MW/h meters, the minimum useful life is 750,000 miles or 10 years, whichever comes first.

[j] This is a minimum standard. The certifying manufacturer or remanufacturer must specify a longer useful life if the locomotive or locomotive engine is designed to last longer than the applicable minimum useful life.

SOURCE: 40 CFR 92, July 1, 1998.

Table 4-36 Federal Exhaust Emissions Standards for Newly Manufactured Marine Spark-Ignition Outboard, Personal Watercraft[a], and Jet-Boat Engines[b] (g/kWh)

	HC + NOx (g/kWh)			
Year	Rated power < 4.3 kW	Rated power >= 4.3 kW [c,d,e]	Warranty period	Useful life [e]
1998	278.00	(0.917 x (151 + 557/$P^{0.9}$)) + 2.44	1 yr for all emissions-related components	Outboard engines: 350 hr/10 yr Personal watercraft: 350 hr/5 yr
1999	253.00	(0.833 x (151 + 557/$P^{0.9}$)) + 2.89		
2000	228.00	(0.750 x (151 + 557/$P^{0.9}$)) + 3.33		
2001	204.00	(0.667 x (151 + 557/$P^{0.9}$)) + 3.78	1 yr for all emission-related components; 3 yr/200 hr for specified major emissions control components	
2002	179.00	(0.583 x (151 + 557/$P^{0.9}$)) + 4.22		
2003	155.00	(0.500 x (151 + 557/$P^{0.9}$)) + 4.67		
2004	130.00	(0.417 x (151 + 557/$P^{0.9}$)) + 5.11	2 yr/200 hr for all emissions-related components; 3 yr/200 hr for specified major emissions control components	
2005	105.00	(0.333 x (151 + 557/$P^{0.9}$)) + 5.56		
2006+	81.00	(0.250 x (151 + 557/$P^{0.9}$)) + 6.00		

KEY: g = gram; hr = hour; HC = hydrocarbon; hp = horsepower; kW = kilowatt; kWh = kilowatt hour; NOx = nitrogen oxide; yr = year

[a] The standards for personal watercraft did not go into effect until 1999, although the standard went into effect for outboard engines in 1998.

[b] The standards apply to marine spark-ignition outboard, personal watercraft, and jet-boat engines only. There are currently no federal standards for marine spark-ignition sterndrive/inboard engines (previously proposed standards have not been finalized). Marine compression-ignition engines under 50 hp are covered under the proposed non road compression-ignition engine standards. Federal standards are in development for marine compression-ignition engines over 50 hp.

[c] P = the average power of the engine family in kilowatts (sales-weighted).

[d] As an example, the standards for an outboard engine of 125 hp (just over 93 kW) would be 149.53 g/kWh in 1998, 123.63 g/kWh in 2000, 97.74 g/kWh in 2002, 72.00 g/kWh in 2004, and 46.10 g/kWh in 2006.

[e] All emissions standards must be met for the useful life of the engine.

SOURCES: 40 CFR 91 July 1, 1998 edition, pp. 242-243.

Society of Automotive Engineers, Small Craft--Marine Propulsion Engine and Systems--Power Measurements, Document J1228, November 1991.

Table 4-37 Tier 2 Federal Exhaust Emissions Standards for Newly Manufactured Commercial Marine Compression-Ignition Engines[a] [b]

Engine Category[c]	Displacement (liters/cylinder)	Rated Power (kW)	Year	NOx + THC (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Useful Life[d]	Warranty Period *5*
1	< 0.9	37 kW and above	2005	7.5	0.40	5.0	10 yrs or 10,000 hrs operation	5 yrs or 5,000 hrs operation
	0.9 to < 1.2		2004	7.2	0.30			
	1.2 to < 2.5		2004	7.2	0.20			
	2.5 to < 5.0		2007	7.2	0.20			
2	5.0 to < 15.0	37 kW and above	2007	7.8	0.27	5.0	10 yrs or 20,000 hrs operation	5 yrs or 10,000 hrs operation
	15.0 to < 20.0	37 kW to < 3,300 kW		8.7	0.50			
	15.0 to < 20.0	3,300 kW and above		9.8	0.50			
	20.0 to < 25.0	37 kW and above		9.8	0.50			
	25.0 to < 30.0	37 kW and above		11.0	0.50			
3	30 and above	37 kW and above	No Tier 2 emissions standards have been set for Category 3 commercial marine vessels.					

KEY: CO=carbon monoxide; disp=displacement; g/kW-hr=gram per kilowatt-hour; hrs=hours;kW=kilowatt; NOx=nitrogen oxides; PM=particulate matter; THC=total hydrocarbons; yrs=years

[a] Tier 2 emissions standards established by Congress apply to commercial compression-ignition (diesel) engines with a power rating of at least 37 kW. Both propulsion and auxiliary engines are covered under these standards, but land-based engines used in portable auxiliary equipment are exempted. Smaller compression-ignition engines are covered under a separate rule. The U.S. Environmental Protection Agency (EPA) also intends to regulate recreational diesel engine emissions under a separate rule and is establishing provisions to allow exemptions for category 1 and 2 engines used as auxiliary engines in U.S.-flagged vessels engaged in foreign trade or overseas operations at least 75 percent of the time (i.e., operation will occur more than 320 nautical kilometers outside the United States, not including trips between U.S. ports in Alaska, Hawaii, the continental United States, or its territories).

[b] MARPOL Annex VI nitrogen oxide (NO_X) standards (international standards adopted by the International Maritime Convention on the Prevention of Pollution from Ships) are referred to as Tier 1 emissions standards. These standards apply to any diesel engine over 130 kW installed on a vessel constructed on or after Jan. 1, 2000 and to any engine that undergoes major conversion after that date. MARPOL standards are currently voluntary for ships engaged in domestic travel but will be required for ships engaged in foreign trade with countries that ratify MARPOL standards. Although they have not yet been ratified by the United States, EPA encourages engine manufacturers to make compliant engines and encourages owners to purchase them. If ratified by the United States, MARPOL Annex VI NO_X standards will be retroactively effective Jan. 1, 2000.

[c] Emissions standards are based on displacement/cylinder and rated power. The three standards categories are as follows:

Category 1 (< 5 liters displacement/cylinder and rated power >=37 kW): These engines are typically used as propulsion engines on relatively small commercial vessels (fishing vessels, tugboats, crewboats, etc.). They are also used as auxiliary engines on vessels of all sizes and applications.

Category 2 (>= 5 liters displacement/cylinder to < 30 liters displacement/cylinder and rated power >=37 kW): The largest engines that are widely used as propulsion engines in harbor and coastal vessels in U.S. waters. These engines also provide auxiliary power on very large vessels. Many of these engines are of similar size and configuration as locomotive engines or use comparable emissions control technologies.

Category 3 (>= 30 liters displacement/cylinder and rated power = 37kW): These are very large high-power engines that are used almost exclusively for propulsion on vessels engaged in international trade.

[d] Manufacturers must demonstrate that the engine or engine family will meet all standards for its useful life. Certification for useful life is accomplished by testing a sample of engines. The warranty period applies to each engine manufactured. The manufacturer of each engine must provide a warranty to the ultimate purchaser or owner (and each subsequent purchaser or owner) that the engine is designed, built, and equipped so as to conform at the time of sale with Tier 2 standards and is free from defects in materials and workmanship that would cause the engine to fail to conform to these standards for the warranty period. Furthermore, this warranty cannot be shorter than any mechanical warranty on the engine and must be at least one half of the useful life period.

SOURCE: Federal Register, Vol. 64, No. 249, Dec. 29, 1999, pp 73,299-73,373.

Table 4-38 Estimated National Average Vehicle Emissions Rates by Vehicle Type and Fuel (Grams per mile)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000[E]
GASOLINE (assuming zero RFG)											
Light-duty vehicles											
Exhaust and nonexhaust hydrocarbons (HC)	3.09	2.91	2.77	2.65	2.57	2.49	[R]2.42	2.36	2.29	2.23	2.16
(Exhaust HC)	(2.05)	(1.92)	(1.81)	(1.72)	(1.66)	(1.60)	(1.55)	(1.51)	(1.47)	(1.44)	(1.42)
(Nonexhaust HC)	(1.04)	(0.99)	(0.96)	(0.93)	(0.91)	(0.89)	(0.87)	(0.85)	(0.82)	(0.79)	(0.74)
Exhaust carbon monoxide (CO)	24.68	23.42	22.40	21.65	21.10	20.52	20.14	19.86	19.52	19.36	19.28
Exhaust nitrogen oxide (NO_x)	1.81	1.76	1.72	1.69	1.67	1.61	1.56	1.51	1.45	1.41	1.38
Light-duty trucks											
Exhaust and nonexhaust HC	4.68	4.34	4.01	3.77	3.57	3.38	3.24	3.14	3.01	2.93	2.85
(Exhaust HC)	(3.24)	(3.03)	(2.80)	(2.61)	(2.46)	(2.31)	(2.21)	(2.13)	(2.05)	(1.99)	(1.95)
(Nonexhaust HC)	(1.44)	(1.31)	(1.21)	(1.16)	(1.11)	(1.07)	(1.03)	(1.01)	(0.96)	(0.94)	(0.90)
Exhaust CO	36.32	34.01	31.78	30.03	28.62	27.41	26.83	26.38	25.69	25.29	24.99
Exhaust NO_x	2.36	2.25	2.16	2.10	2.04	1.97	1.95	1.92	1.87	1.84	1.80
Heavy-duty vehicles											
Exhaust and nonexhaust HC	11.89	10.90	10.06	9.24	8.49	7.89	7.30	6.70	6.11	5.70	5.32
(Exhaust HC)	(7.45)	(6.79)	(6.22)	(5.53)	(4.92)	(4.51)	(4.13)	(3.73)	(3.33)	(3.07)	(2.82)
(Nonexhaust HC)	(4.44)	(4.11)	(3.84)	(3.71)	(3.57)	(3.38)	(3.17)	(2.97)	(2.78)	(2.63)	(2.50)
Exhaust CO	131.19	120.49	111.05	101.92	93.61	85.10	76.97	69.13	61.07	54.65	48.67
Exhaust NO_x	6.49	6.28	6.05	5.85	5.69	5.48	5.36	5.25	5.05	4.89	4.72
Motorcycles											
Exhaust and nonexhaust HC	4.68	4.56	4.48	4.41	4.38	4.33	4.29	4.29	4.27	4.26	4.26
(Exhaust HC)	(2.31)	(2.19)	(2.11)	(2.05)	(2.02)	(1.96)	(1.93)	(1.92)	(1.90)	(1.89)	(1.89)
(Nonexhaust HC)	(2.37)	(2.37)	(2.37)	(2.36)	(2.36)	(2.37)	(2.36)	(2.37)	(2.37)	(2.37)	(2.37)
Exhaust CO	20.89	20.61	20.60	20.59	20.59	20.47	20.47	20.47	20.35	20.35	20.35
Exhaust NO_x	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.83	0.83	0.83

KEY: E = estimate; GVWR = gross vehicle weight rating; R = revised; RFG = reformulated gasoline

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Table 4-38 Cont'd Estimated National Average Vehicle Emissions Rates by Vehicle Type and Fuel (Grams per mile)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000[E]
DIESEL											
Light-duty vehicles											
Exhaust HC	0.73	0.74	0.75	0.75	0.76	0.77	0.76	0.74	0.71	0.67	0.63
Exhaust CO	1.68	1.71	1.72	1.73	1.74	1.74		1.71	1.67	1.62	1.57
Exhaust NO_x	1.65	1.67	1.68	1.68	1.66	1.64	1.60	1.55	1.48	1.40	1.33
Light-duty trucks											
Exhaust HC	1.08	1.14	1.15	1.14	1.13	1.11	1.09	1.05	0.98	0.91	0.84
Exhaust CO	2.03	2.10	2.09	2.07	2.04	2.02	1.99	1.95	1.88	1.80	1.73
Exhaust NO_x	1.97	2.00	1.99	1.97	1.94	1.90	1.85	1.78	1.67	1.56	1.46
Heavy-duty vehicles											
Exhaust HC	3.30	3.08	2.89	2.75	2.65	2.54	2.44	2.36	2.30	2.25	2.22
Exhaust CO	13.71	13.38	13.07	12.76	12.50	12.28	12.08	11.93	11.77	11.63	11.53
Exhaust NO_x	21.05	19.59	18.14	16.89	15.81	14.79	13.96	13.33	12.66	11.93	11.24
AVERAGE OF ALL VEHICLES, GASOLINE AND DIESEL											
Exhaust and nonexhaust HC	3.75	3.52	3.31	3.15	3.02	2.90	2.80	2.71	2.62	2.54	2.47
(Exhaust HC)	(2.56)	(2.40)	(2.25)	(2.13)	(2.03)	(1.93)	(1.86)	(1.80)	[R](1.74)	(1.70)	(1.67)
(Nonexhaust HC)	[R](1.18)	(1.12)	(1.06)	(1.02)	[R](1.00)	(0.97)	(0.94)	(0.91)	(0.88)	(0.84)	(0.80)
Exhaust CO	29.97	28.29	26.81	25.62	24.68	23.75	23.11	22.58	21.94	21.53	21.20
Exhaust NO_x	3.09	2.99	2.89	2.80	2.73	2.63	2.56	2.50	2.41	2.34	2.27

KEY: E = estimate; GVWR = gross vehicle weight rating; R = revised; RFG = reformulated gasoline

NOTES: As of July 1 of each year. Vehicles types are defined as follows: light-duty vehicles (passenger cars up to 6,000 lb GVWR); light-duty trucks (pickups and minivans up to 8,500 lb GVWR); heavy-duty vehicles (8,501 lbs or more GVWR) ; motorcycle (highway only). This table revises the data shown in *National Transportation Statistics 1999* because it is based on MOBILE5b, the U.S. Environmental Protection Agency's (EPA) latest highway vehicle emissions factor model. Interested readers can learn more about the Mobile5b model at the following EPA Internet site http://www.epa.gov/otaq. Emissions factors are national averages based on the following assumptions: ambient temperature 75 ºF, daily temperature range 60-84 ºF, average traffic speed 19.6 mph (representative of overall traffic in urban areas), standard operating mode (cold-start, hot-start, stabilized), vehicle-miles traveled fractions, no inspection/maintenance or antitampering programs, and gasoline volatility 9.0 per square inch RVP (Reid vapor pressure).

See Table 4-37 for emissions from vehicles operating on reformulated gasoline.

Data for nonexhaust HC is negligible for diesel light-duty vehicles, light-duty trucks, and heavy-duty vehicles.

SOURCE: U.S. Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory, unpublished data, Aug. 10, 2000.

Table 4-39 Estimated National Average Vehicle Emissions Rates by Vehicle Type Using Reformulated Gasoline (Grams per mile)

	1995	1996	1997	1998	1999	2000[E]
Light-duty vehicles						
Exhaust HC	1.43	1.38	1.34	1.30	1.28	1.16
Nonexhaust HC	0.69	0.68	0.66	0.64	0.60	0.37
Total HC	**2.12**	**2.06**	**2.00**	**1.94**	**1.88**	**1.53**
Exhaust CO	16.46	16.14	15.90	15.62	15.48	15.41
Exhaust NO_x	1.59	1.54	1.49	1.43	1.39	1.29
Light-duty trucks						
Exhaust HC	2.11	2.02	1.93	1.84	1.78	1.63
Nonexhaust HC	0.85	0.80	0.78	0.75	0.73	0.47
Total HC	**2.96**	**2.82**	**2.71**	**2.59**	**2.51**	**2.10**
Exhaust CO	22.15	21.62	21.20	20.59	20.22	19.95
Exhaust NO_x	1.96	1.93	1.91	1.85	1.82	1.71
Heavy-duty vehicles						
Exhaust HC	4.40	4.02	3.62	3.22	2.96	2.65
Nonexhaust HC	2.53	2.38	2.24	2.10	1.99	1.30
Total HC	**6.93**	**6.40**	**5.86**	**5.32**	**4.95**	**3.95**
Exhaust CO	72.26	65.30	58.59	51.68	46.18	41.04
Exhaust NO_x	5.47	5.35	5.24	5.04	4.88	4.67
Motorcycles						
Exhaust HC	1.92	1.89	1.88	1.86	1.86	1.82
Nonexhaust HC	1.91	1.91	1.91	1.91	1.90	1.43
Total HC	**3.83**	**3.80**	**3.79**	**3.77**	**3.76**	**3.25**
Exhaust CO	17.46	17.46	17.46	17.36	17.36	17.36
Exhaust NO_x	0.84	0.84	0.84	0.83	0.83	0.83
Average of all RFG and diesel vehicles						
Exhaust HC	1.77	1.70	1.64	1.58	1.54	1.41
Nonexhaust HC	[R]0.75	0.73	0.71	[R]0.68	0.64	0.41
Total HC	**2.52**	**2.43**	**2.35**	**2.25**	**2.18**	**1.82**
Exhaust CO	19.38	18.83	18.37	17.81	17.45	17.17
Exhaust NO_x	2.61	2.54	2.48	2.39	2.32	2.19

KEY: CO = carbon monoxide; E = estimate; HC = hydrocarbon; NO_X = nitrogen oxide; R = revised; RFG = reformulated gasoline

NOTES: As of July 1 of each year. Vehicle types are defined as follows: light-duty vehicles (passenger cars up to 6,000 lb gross vehicle weight rating GVWR) ; light-duty trucks (pickups and minivans up to 8,500 lb GVWR); heavy-duty vehicles (8,501 lb or more GVWR); motorcycle (on-highway only). The data in this table are based on MOBILE5b, and reflect the introduction of RFG starting in 1995. Emissions factors are national averages based on the following assumptions: ambient temperature 75 ºF, daily temperature range 60 - 84 ºF, average traffic speed 19.6 mph (representative of overall traffic in urban areas), standard operating mode (cold-start, hot-start, stabilized), vehicle-miles traveled fractions, no inspection/maintenance or antitampering programs, and gasoline volatility 9.0 per square inch RVP (Reid vapor pressure).

Emissions estimates in this table assume 100% RFG.

SOURCE: U.S. Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory, unpublished data, Aug. 10, 2000.

Table 4-40 Estimated National Emissions of Carbon Monoxide (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Transportation									
On-road vehicles	88.03	83.13	78.05	77.39	57.85	54.11	53.26	R51.67	50.39
Off-road									
Aircraft	0.51	0.60	0.74	0.83	0.90	0.94	0.95	R0.95	0.96
Railroads	0.07	0.08	0.10	0.11	0.12	0.11	0.11	0.12	0.12
Marine vessels[R]	0.02	0.03	0.06	0.07	0.13	0.13	0.13	0.14	0.14
Other off-road[a, R]	2.04	2.17	2.30	2.43	2.50	2.56	2.56	2.57	2.58
Total transportation[R]	**90.67**	**86.01**	**81.25**	**80.83**	**61.50**	**57.85**	**57.01**	**55.45**	**54.19**
Nontransportation									
Fuel combustion	4.63	4.48	7.30	8.49	5.51	5.93	R6.15	R5.42	5.37
Industrial processes[b]	9.84	7.54	6.95	5.28	4.77	4.61	R3.57	R3.70	3.71
Waste disposal and recycling	7.06	3.23	2.30	1.94	1.08	1.19	R1.13	R1.14	1.15
Miscellaneous[c, R]	17.25	15.50	19.63	20.49	25.66	23.78	27.62	28.71	25.05
Total nontransportation[R]	**38.78**	**30.75**	**36.18**	**36.20**	**37.02**	**35.51**	**38.47**	**38.97**	**35.28**
TOTAL all sources[R]	**129.44**	**116.76**	**117.43**	**117.01**	**98.52**	**93.35**	**95.48**	**94.41**	**89.45**

KEY: R = revised

[a] Other off-road comprises nonroad gasoline- and diesel-powered recreational, airport service and railway maintenance vehicles, and recreational marine vessels.

[b] Industrial processes comprise chemical and allied product manufacturing, metals processing, petroleum and related industries, and other industrial processes; and solvent utilization, storage, and transport.

[c] Miscellaneous comprises nonroad gasoline- and diesel-powered construction, industrial, lawn and garden, farm, light-commercial, logging vehicles and other non-road sources; health services, cooling towers, fugitive dust; and other combustion sources that could not be accurately allocated to specific source categories.

NOTES: The methodologies used to estimate emissions constantly evolve and undergo major changes. These improved methods are often used to revise estimates for previous years. Therefore, some estimates in this table may not match estimates produced in previous reports, and some trends may not be consistent across years in which major methodology changes have occurred.

Numbers may not add to totals due to rounding.

SOURCES: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900-1998* (EPA-454/R-00-002) (Research Triangle Park, NC: March 2000), table A-1; also available at Internet site www.epa.gov/ttn/chief/trends98/emtrnd.html, as of Aug. 8, 2000.

Table 4-41 Estimated National Emissions of Nitrogen Oxides (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Transportation									
On-road vehicles	7.39	8.65	8.62	8.09	R7.09	R7.83	R7.85	R7.88	7.77
Off-road									
Aircraft	0.07	0.09	0.11	0.12	0.16	0.17	0.17	R0.17	0.17
Railroads	0.50	0.59	0.73	0.81	0.93	0.99	0.92	0.95	0.95
Marine vessels[R]	0.17	0.21	0.47	0.56	0.94	0.94	0.99	1.00	1.01
Other off-road[a, R]	0.04	0.04	0.04	0.06	0.08	0.08	0.09	0.09	0.09
Total transportation[R]	**8.17**	**9.58**	**9.97**	**9.64**	**9.20**	**10.01**	**10.02**	**10.09**	**9.99**
Nontransportation									
Fuel combustion	10.06	10.49	11.32	10.05	10.89	10.83	R10.35	R10.40	10.19
Industrial processes[b]	0.78	0.54	0.56	0.80	0.80	0.77	R0.76	R0.79	0.80
Waste disposal and recycling	0.44	0.16	0.11	0.09	0.09	0.10	0.10	0.10	0.10
Miscellaneous[c]	R1.49	R1.88	R2.43	R2.62	R3.07	R3.22	R3.46	R3.46	3.40
Total nontransportation	**R12.77**	**R13.07**	**R14.42**	**R13.56**	**R14.85**	**R14.92**	**R14.67**	**R14.75**	**14.49**
TOTAL all sources[R]	**20.93**	**22.63**	**24.38**	**23.20**	**24.05**	**24.92**	**24.68**	**24.82**	**24.45**

KEY: R = revised

[a] Other off-road comprises nonroad gasoline- and diesel-powered recreational, airport service and railway maintenance vehicles, and recreational marine vessels.

[b] Industrial processes comprises chemical and allied product manufacturing, metals processing, petroleum and related industries, and other industrial processes; and solvent utilization, storage, and transport.

[c] Miscellaneous comprises nonroad gasoline- and diesel-powered construction, industrial, lawn and garden, farm, light-commercial, logging vehicles, and other non-road sources; health services, cooling towers, fugitive dust; and other combustion sources that could not be accurately allocated to specific source categories.

NOTES: The methodologies used to estimate emissions constantly evolve and undergo major changes. These improved methods are often used to revise estimates for previous years. Therefore, some estimates in this table may not match estimates produced in previous reports, and some trends may not be consistent across years in which major methodology changes have occurred.

Numbers may not add to totals due to rounding.

SOURCES: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900-1998* (EPA-454/R-00-002) (Research Triangle Park, NC: March 2000), table A-2; also available at Internet site www.epa.gov/ttn/chief/trends98/emtrnd.html, as of Aug. 8, 2000.

Table 4-42 Estimated National Emissions of Volatile Organic Compounds (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Transportation									
On-Road vehicles	12.97	10.55	8.98	9.38	6.31	5.70	5.49	R5.33	5.33
Off-Road									
Aircraft	0.10	0.12	0.15	0.17	0.18	0.18	0.18	R0.18	0.18
Railroads	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05	0.05
Marine vessels	0.01	0.01	R0.02	R0.02	R0.03	R0.03	R0.03	R0.03	0.04
Other off-road[a]	R0.87	R0.93	R0.98	R1.03	R0.92	R0.93	R0.92	R0.92	0.92
Total transportation	**R13.97**	**R11.64**	**R10.16**	**R10.64**	**R7.49**	**R6.89**	**R6.67**	**R6.51**	**6.52**
Nontransportation									
Fuel combustion	0.72	0.66	1.05	1.57	1.01	1.07	R1.04	R0.90	0.89
Industrial processes[b]	12.33	11.10	12.10	9.50	9.01	9.71	R8.17	R8.39	8.02
Waste disposal and recycling	1.98	0.98	0.76	0.98	0.99	1.07	R0.42	R0.43	0.43
Miscellaneous[c, R]	R1.98	R1.71	R2.22	R1.75	R2.42	R2.07	R2.43	R2.64	2.05
Total nontransportation	**R17.02**	**R14.45**	**R16.13**	**R13.80**	**R13.44**	**R13.93**	**R12.07**	**R12.37**	**11.40**
TOTAL all sources[R]	**R30.98**	**R26.08**	**R26.34**	**R24.43**	**20.94**	**R20.82**	**R18.74**	**R18.88**	**17.92**

KEY: R = revised

[a] Other off-road comprises nonroad gasoline- and diesel-powered recreational, airport service and railway maintenance vehicles, and recreational marine vessels.

[b] Industrial processes comprises chemical and allied product manufacturing, metals processing, petroleum and related industries, and other industrial processes; and solvent utilization, storage, and transport.

[c] Miscellaneous comprises nonroad gasoline- and diesel-powered construction, industrial, lawn and garden, farm, light-commercial, logging vehicles, and other non-road sources; geogenic sources, catastrophic and accidental releases, health services, cooling towers, nontransportation-related fugitive dust, agriculture and forestry, structural fires, agriculture fires, slash/prescribed burning, forest wildfires, and other combustion sources that could not be accurately allocated to specific source categories.

NOTES: The methodologies used to estimate emissions constantly evolve and undergo major changes. These improved methods are often used to revise estimates for previous years. Therefore, some estimates in this table may not match estimates produced in previous reports, and some trends may not be consistent across years in which major methodology changes have occurred.

Numbers may not add to totals due to rounding.

SOURCES: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900-1998* (EPA-454/R-00-002) (Research Triangle Park, NC: March 2000), table A-3; also available at Internet website www.epa.gov/ttn/chief/trends98/emtrnd.html, as of Aug. 8, 2000.

Table 4-43 Estimated National Emissions of Particulate Matter (PM-10)[a] (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Transportation									
On-road vehicles	0.44	0.47	0.40	0.36	0.34	0.29	0.28	0.27	0.26
Off-road									
Aircraft	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04
Railroads	0.03	0.03	0.04	0.04	0.05	0.03	0.03	0.03	0.03
Marine vessels	0.01	0.01	0.02	R0.03	R0.04	R0.04	R0.04	R0.04	0.04
Other off-road[b]	R<0.01	0.03	R0.03	R0.03	0.04	R0.04	R0.04	R0.04	0.04
Total transportation-fuel-related	**R0.49**	**0.57**	**0.52**	**0.50**	**0.51**	**0.44**	**0.43**	**0.42**	**0.41**
Transportation-related fugitive dust									
Unpaved highways	N	N	N	11.64	11.23	10.36	12.06	R12.53	12.67
Paved highways	N	N	N	5.08	2.25	2.41	2.39	R2.54	2.62
Total transportation	**R0.49**	**R0.57**	**R0.52**	**17.22**	**R13.99**	**13.21**	**14.88**	**R15.49**	**15.70**
Nontransportation									
Fuel combustion	2.87	2.25	2.45	1.54	1.20	1.18	R1.17	R1.09	1.09
Industrial processes[c]	7.67	3.70	2.75	1.06	1.04	0.95	R0.68	R0.70	0.71
Waste disposal and recycling	1.00	0.37	0.27	0.28	0.27	0.29	R0.30	R0.31	0.31
Miscellaneous[d,R]	1.00	0.78	1.13	25.34	13.47	11.45	16.00	16.64	16.94
Total nontransportation[R]	**12.54**	**7.10**	**6.60**	**28.22**	**15.98**	**13.87**	**18.15**	**18.74**	**19.05**
TOTAL all sources[R]	**13.04**	**7.67**	**7.12**	**45.45**	**29.96**	**27.07**	**33.04**	**34.23**	**34.74**

KEY: N = data do not exist; R = revised

[a] Fine particulate matter less than 10 microns.

[b] Other off-road comprises nonroad gasoline- and diesel-powered recreational, airport service and railway maintenance vehicles, and recreational marine vessels.

[c] Industrial processes comprise chemical and allied product manufacturing, metals processing, petroleum and related industries, and other industrial processes; solvent utilization; and storage and transport.

[d] Miscellaneous comprises nonroad gasoline- and diesel-powered construction, industrial, lawn and garden, farm, light-commercial, logging vehicles and other non-road sources; geogenic sources; agriculture and forestry, cooling towers, nontransportation-related fugitive dust, wildfires, managed burning, and other combustion sources that could not be accurately allocated to specific source categories.

NOTES: The methodologies used to estimate emissions constantly evolve and undergo major changes. These improved methods are often used to revise estimates for previous years. Therefore, some estimates in this table may not match estimates produced in previous reports, and some trends may not be consistent across years in which major methodology changes have occurred.

Numbers may not add to totals due to rounding.

SOURCES: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900-1998* (EPA-454/R-00-002) (Research Triangle Park, NC: March 2000), table A-5; also available at Internet site www.epa.gov/ttn/chief/trends98/emtrnd.html, as of Aug. 8, 2000.

Table 4-44 Estimated National Emissions of Particulate Matter (PM-2.5)[a] (Million short tons)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Transportation									
On-road vehicles	0.28	0.29	0.28	0.26	0.26	0.23	0.22	0.21	0.20
Aircraft	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Railroads	0.05	0.05	0.05	0.05	0.05	0.03	0.02	0.03	0.03
Marine vessels	R0.03	R0.03	R0.03	R0.03	R0.03	R0.03	R0.04	R0.04	0.04
Other off-road[b]	R0.03	R0.03	R0.03	0.04	0.04	0.04	0.04	0.04	0.04
Transportation-related fugitive dust									
Unpaved roads	1.69	1.68	1.64	1.72	1.71	1.56	1.82	R1.89	1.91
Paved roads	0.56	0.60	0.61	0.62	0.63	0.59	0.60	R0.64	0.66
Total transportation	**2.67**	**2.71**	**2.67**	**R2.75**	**R2.75**	**R2.51**	**R2.77**	**R2.88**	**2.91**
Nontransportation									
Fuel combustion	0.91	0.89	0.93	0.85	0.84	0.90	R0.86	R0.79	0.79
Industrial processes[c]	0.56	0.57	0.58	0.50	0.50	0.50	R0.38	R0.39	0.39
Waste disposal and recycling	0.23	0.24	0.24	0.29	0.27	0.25	R0.23	R0.24	0.24
Miscellaneous[d]	3.59	3.32	R3.22	R2.95	R3.62	R3.04	R3.96	R4.21	4.06
Total nontransportation	**5.29**	**5.02**	**R4.97**	**R4.59**	**R5.23**	**R4.69**	**R5.43**	**R5.63**	**5.49**
TOTAL	**7.96**	**7.74**	**R7.65**	**R7.33**	**R7.98**	**R7.18**	**R8.19**	**R8.48**	**8.38**

KEY: R = revised

[a] Particulate matter less than 2.5 microns in size.

[b] Other off-road comprises nonroad gasoline- and diesel-powered recreational, airport service and railway maintenance vehicles and recreational marine vessels.

[c] Industrial processes comprise chemical and allied product manufacturing, metals processing, petroleum and related industries, and other industrial processes; solvent utilization; and storage and transportation.

[d] Miscellaneous comprises nonroad gasoline- and diesel-powered construction, industrial, lawn and garden, farm, light-commercial, logging vehicles and other non-road sources; geogenic sources, agriculture and forestry, cooling towers, nontransportation-related fugitive dust, wildfires, managed burning, and other fugitive dust and combustion (that could not accurately be allocated to specific source categories).

NOTES: The emissions estimates shown here are those that are directly emitted, which represent only a portion of the total PM-2.5 emissions found in the air. Secondary formation of fine particulates resulting from emissions of nitrogen oxide, sulfur dioxide, volatile organic compounds, and other substances is also a significant source of PM-2.5.

Numbers may not add to totals due to rounding.

The methodologies used to estimate emissions constantly evolve and undergo major changes. Improved methods are often used to revise estimates for previous years. Therefore, some estimates in this table may not match estimates produced in previous reports, and some trends may not be consistent across years in which major methodology changes have occurred.

SOURCES: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900-1998* (EPA-454/R-00-002) (Research Triangle Park, NC: March 2000), table A-6; also available at Internet site www.epa.gov/ttn/chief/trends98/emtrnd.html, as of Aug. 8, 2000.

Table 4-45 Estimated National Emissions of Sulfur Dioxide (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Transportation									
On-road vehicles	0.41	0.50	0.52	0.52	0.54	0.30	0.32	0.32	0.33
Off-road									
Aircraft	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Railroads	0.04	0.04	0.05	0.06	0.12	0.11	0.11	0.12	0.11
Marine vessels	0.04	0.05	0.12	0.14	0.25	0.24	0.24	0.25	0.26
Total transportation	**0.49**	**R0.59**	**0.70**	**0.73**	**R0.92**	**R0.66**	**0.68**	**R0.70**	**0.71**
Nontransportation									
Fuel combustion	23.46	22.66	21.39	20.02	20.29	16.23	R16.32	R16.73	16.72
Industrial processes[a]	7.09	4.68	3.77	2.43	1.86	1.59	R1.41	R1.46	1.46
Waste disposal and recycling	0.01	0.05	0.03	0.03	0.04	0.05	R0.04	R0.04	0.04
Miscellaneous[b]	0.11	0.02	0.01	R0.44	R0.55	0.65	R0.67	R0.69	0.71
Total nontransportation	**30.67**	**27.41**	**25.20**	**R22.92**	**R22.74**	**18.52**	**R18.44**	**R18.92**	**18.93**
TOTAL all sources	**31.16**	**28.01**	**25.91**	**R23.66**	**R23.66**	**R19.18**	**R19.12**	**R19.62**	**19.65**

KEY: R = revised

[a] Industrial processes comprise chemical and allied product manufacturing, metals processing, petroleum and related industries, and other industrial processes; solvent utilization; and storage and transport.

[b] Miscellaneous comprises nontransportation-related fugitive dust, nonroad gasoline, non road diesel, other nonroad sources and other miscellaneous combustion that could not be accurately allocated to specific source categories.

NOTES: The methodologies used to estimate emissions constantly evolve and undergo major changes. These improved methods are often used to revise estimates for previous years. Therefore, some estimates in this table may not match estimates produced in previous reports, and some trends may not be consistent across years in which major methodology changes have occurred.

Numbers may not add to totals due to rounding.

SOURCES: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900-1998* (EPA-454/R-00-002) (Research Triangle Park, NC: March 2000), table A-4; also available at Internet site www.epa.gov/ttn/chief/trends98/emtrnd.html, as of Aug. 8, 2000.

Table 4-46 Estimated National Emissions of Lead (Thousand short tons)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Transportation									
Highway vehicles	171.96	130.21	60.50	18.05	0.42	0.02	0.02	0.02	0.02
Aircraft	1.40	1.12	0.89	0.69	0.62	0.54	0.51	0.50	0.50
Total transportation[R]	**173.36**	**131.33**	**61.39**	**18.74**	**1.04**	**0.56**	**0.53**	**0.52**	**0.52**
Fuel combustion	10.62	10.35	4.30	0.52	0.50	0.49	0.49	0.50	0.50
Industrial processes[a]	26.36	11.38	3.94	2.53	[R]2.48	2.27	2.27	[R]2.32	2.33
Waste disposal and recycling	2.20	1.60	1.21	0.87	0.80	0.60	[R]0.61	[R]0.62	0.62
Miscellaneous[b]	8.34	5.01	3.32	0.23	0.16	<0.01	<0.01	<0.01	<0.01
Total nontransportation	**47.52**	**[R]28.34**	**12.77**	**4.15**	**3.94**	**[R]3.36**	**[R]3.37**	**[R]3.44**	**3.45**
TOTAL	**220.87**	**159.66**	**74.15**	**22.89**	**4.98**	**[R]3.93**	**[R]3.90**	**[R]3.95**	**3.97**

KEY: R = revised

[a] Industrial processes comprise chemical and allied product manufacturing, metals processing, and other industrial processes.

[b] Miscellaneous comprises other nonroad gasoline, engines and vehicles that could not be accurately allocated to specific source categories.

NOTES: Total lead emissions decreased sharply from 1970 to 1995 as a result of regulatory actions. The lead content of leaded gasoline was reduced dramatically in 1985. In addition, unleaded gasoline was introduced in 1975 for use in automobiles equipped with catalytic control devices. By 1995, unleaded gasoline sales accounted for 99% of the gasoline market. The methodologies used to estimate emissions constantly evolve and undergo major changes. Improved methods are often used to revise estimates for previous years. Therefore, some estimates in this table may not match estimates produced in previous reports, and some trends may not be consistent across years in which major methodology changes have occurred.

Numbers may not add to totals due to rounding.

SOURCES: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends Update: 1970-1997* (EPA 454/E-98-007) (Research Triangle Park, NC: December 1998), table A-7; also available at Internet website http://www.epa.gov/ttn/chief/trends98/emtrnd.html, as of Sep. 22, 2000.

Table 4-47 Air Pollution Trends in Selected Metropolitan Statistical Areas[R]

(Number of days with AQI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	AQI days > 100 (1998)	Number of trend sites	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Akron, OH	6	14	5	15	9	30	8	10	8	12	11	6	14
Albany-Schenectady-Troy, NY	13	2	7	4	4	9	5	5	6	3	4	3	2
Albuquerque, NM	25	0	21	8	8	5	0	0	1	0	0	0	0
Allentown-Bethlehem-Easton, PA	9	18	9	11	10	14	3	6	10	17	6	13	18
Atlanta, GA	18	60	7	14	42	23	18	30	12	33	21	26	43
Austin-San Marcos, TX	5	6	5	4	4	3	1	2	4	12	0	0	5
Bakersfield, CA	16	78	7	113	97	109	100	97	98	104	109	55	75
Baltimore, MD	22	51	15	28	29	50	23	48	41	36	28	30	51
Baton Rouge, LA	10	21	6	12	28	11	5	5	7	15	7	8	14
Bergen-Passaic, NJ	8	0	8	12	8	11	2	3	5	11	3	5	0
Birmingham, AL	16	23	16	5	28	5	12	10	6	32	15	8	23
Boston, MA-NH	25	9	25	12	7	13	9	6	10	8	2	8	7
Buffalo-Niagara Falls, NY	21	13	21	4	8	9	3	1	4	6	3	1	13
Charleston-North Charleston, SC	9	3	9	5	1	2	0	2	2	1	3	3	3
Charlotte-Gastonia-Rock Hill, NC-SC	26	51	10	13	31	12	11	23	9	13	18	26	48
Chicago, IL	61	10	46	16	4	22	4	3	8	21	6	9	7
Cincinnati, OH-KY-IN	23	20	20	19	19	22	3	13	19	23	11	11	14
Cleveland-Lorain-Elyria, OH	40	22	24	18	10	23	11	13	23	24	17	12	20
Columbus, OH	12	23	10	7	4	17	5	7	10	15	16	8	19
Dallas, TX	11	36	8	18	24	2	11	12	15	36	12	15	18
Dayton-Springfield, OH	13	21	10	10	13	12	2	11	14	11	18	9	19
Denver, CO	29	9	20	14	9	6	8	3	1	2	0	0	5
Detroit, MI	32	17	30	18	11	28	8	5	13	14	13	12	17
El Paso, TX	22	8	17	25	19	7	10	7	11	5	7	3	5
Fort Lauderdale, FL	18	1	8	6	1	0	2	4	1	1	1	0	1

KEY: R = revised

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Table 4-47 Cont'd

Air Pollution Trends in Selected Metropolitan Statistical Areas[R]

(Number of days with AQI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	AQI days > 100 (1998)	Number of trend sites	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fort Worth-Arlington, TX	8	17	8	17	16	20	7	9	31	28	14	14	17
Fresno, CA	15	69	11	91	62	83	69	59	55	61	70	75	67
Gary, IN	22	10	18	15	2	8	5	0	6	17	11	12	9
Grand Rapids-Muskegon-Holland, MI	10	19	8	16	10	26	6	3	12	17	7	8	13
Greensboro-Winston-Salem-High Pt, NC	16	30	7	6	12	5	2	20	7	6	6	13	25
Greenville-Spartanburg-Anderson, SC	7	29	5	3	2	3	5	9	5	8	7	10	29
Harrisburg-Lebanon-Carlisle, PA	7	22	7	10	10	21	1	15	12	13	3	9	22
Hartford, CT	15	10	15	19	13	23	15	14	18	14	5	16	10
Honolulu, HI	14	0	6	0	0	0	0	0	0	0	0	0	0
Houston, TX	26	40	26	43	54	37	32	28	45	66	28	47	38
Indianapolis, IN	37	22	29	15	9	12	7	9	22	19	13	12	19
Jacksonville, FL	15	10	15	4	3	0	2	3	2	1	1	4	10
Jersey City, NJ	7	7	7	15	15	25	9	19	12	16	5	9	7
Kansas City, MO-KS	22	15	21	4	2	11	1	4	10	22	10	18	15
Knoxville, TN	18	55	14	2	23	10	7	20	13	20	19	36	52
Las Vegas, NV-AZ	28	11	6	36	21	8	4	6	8	1	5	0	0
Little Rock-North Little Rock, AR	7	3	7	1	1	3	0	2	2	7	1	1	2
Los Angeles-Long Beach, CA	38	56	38	215	173	169	175	134	139	113	94	60	56
Louisville, KY-IN	26	29	18	15	10	15	2	20	27	21	10	13	24
Memphis, TN-AR-MS	14	27	13	8	24	9	14	15	10	21	19	17	27
Miami, FL	12	8	10	5	1	1	3	6	1	2	1	3	8
Middlesex-Somerset-Hunterdon, NJ	4	22	4	19	24	24	8	13	9	16	8	18	21
Milwaukee-Waukesha, WI	22	12	18	17	8	24	3	4	9	14	5	4	10
Minneapolis-St. Paul, MN-WI	37	1	24	8	4	2	3	0	4	7	1	0	0
Monmouth-Ocean, NJ	4	31	3	15	21	20	6	11	3	6	12	12	19

KEY: R = revised

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Table 4-47 Cont'd

Air Pollution Trends in Selected Metropolitan Statistical Areas[R]

(Number of days with AQI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	AQI days > 100 (1998)	Number of trend sites	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Nashville, TN	21	32	17	12	31	13	6	18	21	28	23	20	30
Nassau-Suffolk, NY	8	11	4	14	20	25	5	15	10	9	6	8	10
New Haven-Meriden, CT	10	10	10	11	17	29	10	17	14	14	8	19	10
New Orleans, LA	11	7	11	4	6	2	5	6	8	20	8	7	7
New York, NY	39	21	29	29	36	49	10	19	21	19	15	23	17
Newark, NJ	12	23	12	21	23	35	10	13	13	20	12	13	23
Norfolk-VA Beach-Newport News, VA-NC	12	15	12	4	8	7	8	19	6	6	4	17	15
Oakland, CA	29	12	20	6	4	4	3	4	3	12	11	0	11
Oklahoma City, OK	14	7	10	4	4	4	2	2	5	13	2	4	7
Omaha, NE-IA	12	5	9	1	1	0	0	1	1	1	1	0	5
Orange County, CA	11	6	11	56	45	35	35	25	15	9	9	3	6
Orlando, FL	13	14	9	9	4	1	4	4	3	1	1	4	11
Philadelphia, PA-NJ	44	38	36	44	39	49	24	51	26	30	22	32	37
Phoenix-Mesa, AZ	49	37	23	30	12	11	13	16	10	22	17	12	17
Pittsburgh, PA	53	39	41	21	19	21	9	13	19	25	11	20	39
Ponce, PR	1	0	1	0	0	0	0	0	0	0	0	0	0
Portland-Vancouver, OR-WA	17	3	12	2	11	8	6	0	2	2	6	0	3
Providence-Fall River-Warwick, RI-MA	13	5	11	9	13	20	5	7	7	11	4	10	4
Raleigh-Durham-Chapel Hill, NC	18	40	4	14	15	5	0	11	2	1	1	13	21
Richmond-Petersburg, VA	11	28	10	11	6	18	8	30	13	19	5	21	28
Riverside-San Bernardino, CA	51	96	35	187	158	154	174	168	149	124	119	106	94
Rochester, NY	8	4	8	5	5	16	2	0	1	6	0	6	4
Sacramento, CA	33	33	13	63	36	54	44	14	30	32	30	5	17
St. Louis, MO-IL	63	24	54	25	23	32	15	9	32	34	20	15	23
Salt Lake City-Ogden, UT	23	19	12	21	5	20	9	5	13	4	8	1	12

KEY: R = revised

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Table 4-47 Cont'd

Air Pollution Trends in Selected Metropolitan Statistical Areas[R]

(Number of days with AQI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	AQI days > 100 (1998)	Number of trend sites	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
San Antonio, TX	7	6	7	3	4	3	1	3	4	18	3	3	6
San Diego, CA	28	35	23	127	96	67	66	58	46	48	31	14	33
San Francisco, CA	11	0	9	0	0	0	0	0	0	2	0	0	0
San Jose, CA	11	8	8	18	7	11	3	4	2	10	7	0	5
San Juan-Bayamon, PR	27	1	10	0	0	0	0	0	0	0	1	2	1
Scranton-Wilkes Barre-Hazleton, PA	11	7	11	6	9	17	3	10	7	12	4	11	7
Seattle-Bellevue-Everett, WA	26	3	16	6	9	4	3	0	3	0	6	1	3
Springfield, MA	13	7	13	10	13	15	12	13	12	9	5	10	7
Syracuse, NY	8	3	6	2	1	11	2	4	0	1	0	0	2
Tacoma, WA	9	4	7	3	5	1	2	0	2	0	1	0	4
Tampa-St. Petersburg-Clearwater, FL	32	11	22	4	6	1	1	1	3	2	3	4	11
Toledo, OH	6	6	6	8	3	6	2	7	9	9	11	4	5
Tucson, AZ	25	0	20	2	1	0	1	1	1	3	0	1	0
Tulsa, OK	11	9	11	5	16	12	1	4	12	21	14	7	9
Ventura, CA	15	30	12	87	70	87	54	37	63	65	62	44	29
Washington, DC-MD-VA-WV	46	47	32	24	25	48	14	48	20	29	18	29	45
West Palm Beach-Boca Raton, FL	9	2	6	1	0	0	0	3	0	0	0	0	2
Wilmington-Newark, DE-MD	10	28	5	12	9	12	7	10	5	12	3	6	8
Youngstown-Warren, OH	15	22	9	8	3	14	5	2	0	11	5	3	15

KEY: R = revised

NOTES: The Air Quality Index (AQI) integrates information on 5 major pollutants (particulate matter less than 10 microns in diameter, sulfur dioxide, carbon monoxide, ozone, and nitrogen dioxide) across an entire monitoring network into a single number that represents the worst daily air quality experienced in an urban area. An AQI greater than 100 indicates that at least 1 criteria pollutant exceeded air quality standards on a given day; therefore, air quality would be in the unhealthful range on that day. In 1997, 4,738 monitoring sites reported air quality data. Air quality monitoring sites are selected as "trend sites" if they have complete data for at least 8 of the 10 years between 1989 and 1998.

SOURCE: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *National Air Quality and Emissions Trends Report, 1998* (Research Triangle Park, NC: 2000), table A-15.

Table 4-48 Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants
(Condensed nonattainment area list as of July 31, 2000)

Ref. no.	States	Consolidated nonattainment area name [a]	Number of areas in nonattainment [c]						Area population, in 1000s [n]					
			O_3 [e]	CO	SO_2	PM-10	Pb	NO_2 [d]	O_3 [d]	CO	SO_2	PM-10	Pb	Total exposed
1	AK	Anchorage	•	1	•	1	•	•		222		170		222
2	AK	Fairbanks	•	1	•	•	•	•		30				30
3	AK	Juneau	•	•	•	1	•	•				12		12
4	AL	Birmingham	1	•	•	•	•	•	751					751
5	AZ	Ajo	•	•	1	1	•	•			6	6		6
6	AZ	Bullhead City	•	•	•	1	•	•				5		5
7	AZ	Douglas	•	•	1	1	•	•			13	13		13
8	AZ	Miami-Hayden	•	•	2	1	•	•			3	3		3
9	AZ	Morenci	•	•	1	•	•	•			8			8
10	AZ	Nogales	•	•	•	1	•	•				19		19
11	AZ	Paul Spur	•	•	•	1	•	•				1		1
12	AZ	Payson	•	•	•	1	•	•				8		8
13	AZ	Phoenix	1	1	•	1	•	•	2,092	2,006		2,122		2,122
14	AZ	Rillito	•	•	•	1	•	•				0		0
15	AZ	San Manuel	•	•	1	•	•	•			5			5
16	AZ	Yuma	•	•	•	1	•	•				54		54
17	CA	Imperial Valley	•	•	•	1	•	•				92		92
18	CA	Los Angeles-South Coast Air Basin	1	1	•	1	•	•	13,000	13,000		13,000		13,000
19	CA	Mono Basin (in Mono Co.)	•	•	•	1	•	•				0		0
20	CA	Owens Valley	•	•	•	1	•	•				18		18
21	CA	Sacramento Metro	1	•	•	1	•	•	1,639			1,041		1,639
22	CA	San Diego	1	•	•	•	•	•	2,498					2,498
23	CA	San Francisco-Oakland-San Jose	1	•	•	•	•	•	5,815					5,815
24	CA	San Joaquin Valley	1	•	•	1	•	•	2,742			2,742		2,742
25	CA	Santa Barbara-Santa Maria-Lompoc	1	•	•	•	•	•	370					370
26	CA	Searles Valley	•	•	•	1	•	•				30		30
27	CA	Southeast Desert Modified AQMA	1	•	•	2	•	•	384			349		384
28	CA	Ventura Co.	1	•	•	•	•	•	669					669
29	CO	Aspen	•	•	•	1	•	•				5		5
30	CO	Denver-Boulder	•	1	•	1	•	•		1,800		1,836		1,836

KEY: CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; PM-10 = particulate matter smaller than 10 microns; SO_2 = sulfur dioxide; • = all areas in attainment for a particular pollutant

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Table 4-48 Cont'd

Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants
(Condensed nonattainment area list as of July 31, 2000)

Ref. no.	States	Consolidated nonattainment area name [a]	Number of areas in nonattainment [c]						Area population, in 1000s [n]					
			O_3 [e]	CO	SO_2	PM-10	Pb	NO_2 [d]	O_3 [d]	CO	SO_2	PM-10	Pb	Total exposed
31	CO	Fort Collins	•	1	•	•	•	•		106				106
32	CO	Lamar	•	•	•	1	•	•				8		8
33	CO	Pagosa Springs	•	•	•	1	•	•				1		1
34	CO	Steamboat Springs	•	•	•	1	•	•				6		6
35	CO	Telluride	•		•	1	•	•				1		1
36	CT	Greater Connecticut	1	•	•	1	•	•	2,470			126		2,470
37	DC-MD-VA	Washington	1	•	•	•	•	•	3,923					3,923
38	GA	Atlanta	1	•	•	•	•	•	2,653					2,653
39	GU [b]	Piti Power Plant	•	•	1	•	•	•			0			0
40	GU [b]	Tanguisson Power Plant	•	•	1	•	•	•			0			0
41	ID	Bonner Co.(Sandpoint)	•	•	•	1	•	•				26		26
42	ID	Fort Hall Indian Reservation	•	•	•	1	•	•				1		1
43	ID	Portneuf Valley	•	•	•	1	•	•				74		74
44	ID	Shoshone Co.	•	•	•	2	•	•				13		13
45	IL-IN	Chicago-Gary-Lake County	1	•	1	3	•	•	7,887		475	625		7,887
46	KY	Boyd Co. (Ashland)	•	•	[g]1	•	•	•			51			51
47	KY-IN	Louisville	1	•	•	•	•	•	834					834
48	LA	Baton Rouge	1	•	•	•	•	•	559					559
49	MA	Springfield (W. Mass)	1	•	•	•	•	•	812					812
50	MD	Baltimore	1	•	•	•	•	•	2,348					2,348
51	MD	Kent and Queen Anne Cos.	1	•	•	•	•	•	52					52
52	MN	Minneapolis-St. Paul	•	•	•	1	•	•				272		272
53	MN	Olmsted Co. (Rochester)	•	•	1	•	•	•			71			71
54	MO	Dent	•	•	•	•	1	•					3	3
55	MO	Liberty-Arcadia	•	•	•	•	1	•					2	2
56	MO-IL	St. Louis	1	•	•	•	[i]1	•	2,390				2	2,390
57	MT	Butte	•	•	•	1	•	•				33		33
58	MT	Columbia Falls	•	•	•	1	•	•				3		3
59	MT	Kalispell	•	•	•	1	•	•				12		12
60	MT	Lame Deer	•	•	•	1	•	•				1		1

KEY: CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; PM-10 = particulate matter smaller than 10 microns; SO_2 = sulfur dioxide; • = all areas in attainment for a particular pollutant

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Table 4-48 Cont'd

Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants
(Condensed nonattainment area list as of July 31, 2000)

Ref. no.	States	Consolidated nonattainment area name [a]	Number of areas in nonattainment [c]						Area population, in 1000s [n]					
			O_3 [e]	CO	SO_2	PM-10	Pb	NO_2 [d]	O_3 [d]	CO	SO_2	PM-10	Pb	Total exposed
61	MT	Lewis & Clark (E. Helena)	•	•	1	•	[j]1	•			2		2	2
62	MT	Libby	•	•	•	1	•	•				3		3
63	MT	Missoula	•	1	•	1	•	•		43		43		43
64	MT	Polson	•	•	•	1	•	•				3		3
65	MT	Ronan	•	•	•	1	•	•				2		2
66	MT	Thompson Falls	•	•	•	1	•	•				1		1
67	MT	Whitefish	•	•	•	1	•	•				3		3
68	MT	Yellowstone Co. (Laurel)	•	•	1	•	•	•			5			5
69	NE	Douglas Co. (Omaha)	•	•	•	•	1	•					1	1
70	NM	Anthony	•	•	•	1	•	•				2		2
71	NM	Grant Co.	•	•	1	•	•	•			28			28
72	NM	Sunland Park	[f]1	•	•	•	•	•	8					8
73	NV	Central Steptoe Valley	•	•	1	•	•	•			2			2
74	NV	Las Vegas	•	1	•	1	•	•		258		741		741
75	NV	Reno	•	1	•	1	•	•		134		254		254
76	NY-NJ-CT	New York-N. New Jersey-Long Island	1	1	•	1	•	•	17,943	12,338		1,488		17,943
77	OH	Cleveland-Akron-Lorain	•	•	1	1	•	•			1,412	1,412		1,412
78	OH	Jefferson Co. (Steubenville)	•	•	•	1	•	•				4		4
79	OH	Lucas Co. (Toledo)	•	•	1	•	•	•			462			462
80	OR	Grants Pass	•	1	•	1	•	•		17		17		17
81	OR	Klamath Falls	•	1	•	1	•	•		18		18		18
82	OR	LaGrande	•	•	•	1	•	•				12		12
83	OR	Lakeview	•	•	•	1	•	•				3		3
84	OR	Medford	•	1	•	1	•	•		62		63		63
85	OR	Oakridge	•	•	•	1	•	•				3		3
86	OR	Springfield-Eugene	•	•	•	1	•	•				157		157
87	PA	Lancaster	1	•	•	•	•	•	423					423
88	PA	Pittsburgh-Beaver Valley	1	•	2	1	•	•	2,468		446	75		2,468
89	PA	Warren Co	•	•	2	•	•	•			22			22
90	PA-DE-NJ-MD	Philadelphia-Wilmington-Trenton	1	•	•	•	•	•	6,010					6,010

KEY: CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; PM-10 = particulate matter smaller than 10 microns; SO_2 = sulfur dioxide; • = all areas in attainment for a particular pollutant

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Table 4-48 Cont'd

Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants
(Condensed nonattainment area list as of July 31, 2000)

Ref. no.	States	Consolidated nonattainment area name [a]	Number of areas in nonattainment [c]						Area population, in 1000s [n]					
			O_3 [e]	CO	SO_2	PM-10	Pb	NO_2 [d]	O_3 [d]	CO	SO_2	PM-10	Pb	Total exposed
91	PA-NJ	Allentown-Bethlehem		•	1						91			91
92	PR	Guaynabo Co.	•	•	•	1	•	•				85		85
93	TN	Shelby Co. (Memphis)	•	•	•	•	[k]1	•					826	826
94	TX	Beaumont-Port Arthur	1	•	•	•	•	•	361					361
95	TX	Dallas-Fort Worth	1	•	•	•	•	•	3,561					3,561
96	TX	El Paso	1	1	•	1	•	•	592	54		515		592
97	TX	Houston-Galveston-Brazoria	1	•	•	•	•	•	3,731					3,731
98	UT	Ogden	•	1	•	1	•	•		63		63		63
99	UT	Salt Lake City	•	•	1	1	•	•			725	725		725
100	UT	Tooele Co.	•	•	1	•	•	•			26			26
101	UT	Utah Co. (Provo)	•	1	•	1	•	•		85		263		263
102	WA	Olympia-Tumwater-Lacey	•	•	•	1	•	•				63		63
103	WA	Seattle-Tacoma	•	•	•	3	•	•				730		730
104	WA	Spokane	•	1	•	1	•	•		279		177		279
105	WA	Wallula	•	•	•	1	•	•				47		47
106	WA	Yakima	•	•	•	1	•	•				54		54
107	WI	Manitowoc Co.	1	•	•	•	•	•	80					80
108	WI	Marathon Co. (Wausau)	•	•	1	•	•	•			115			115
109	WI	Milwaukee-Racine	1	•	•	•	•	•	1,735					1,735
110	WI	Oneida Co. (Rhinelander)	•	•	1	•	•	•			31			31
111	WV	Follansbee	•	•	•	1	•	•				3		3
112	WV	New Manchester Gr. (in Hancock Co)	•	•	1	•	•	•			10			10
113	WV	Wier.-Butler-Clay (in Hancock Co)	•	•	1	1	•	•			25	22		25
114	WY	Sheridan	•	•	•	1	•	•				13		13
National totals (114 areas) [c]			31	17	28	76	6	0	90,800	30,515	4,664	29,792	836	100,593

KEY: CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; PM-10 = particulate matter smaller than 10 microns; SO_2 = sulfur dioxide; • = all areas in attainment for a particular pollutant

Continued next page

Table 4-48 Cont'd
Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants
(Condensed nonattainment area list as of July 31, 2000)

[a] This is a simplified listing of classified nonattainment areas. Unclassified and Section 185a (transitional) nonattainment areas are not included. Names of nonattainment areas are listed alphabetically within each state. Note that several smaller nonattainment areas may be inside one larger nonattainment area. In these cases, the smaller nonattainment areas are listed on the same line as the larger one, and the number of nonattainment areas are indicated under each pollutant.

[b] Guam (U.S. territory)

[c] National total includes Guam (U.S. territory).

[d] The number of nonattainment areas for each of the criteria pollutants is listed. A dot (.) indicates that all areas are in attainment for that pollutant.

Note that there are no areas in nonattainment for NO_2.

[e] 1-hour ozone standard.

[f] Ozone nonattainment area is a portion of Dona Ana County, New Mexico.

[g] SO_2 nonattainment area is a portion of Boyd County, Kentucky.

[h] Lead nonattainment area is a portion of Franklin township, Marion County, Indiana.

[i] Lead nonattainment area is Herculaneum, Missouri in Jefferson County.

[j] Lead nonattainment area is a portion of Lewis and Clark County, Montana.

[k] Lead nonattainment area is a portion of Shelby County, Tennessee.

[l] Lead nonattainment area is a portion of Williamson County, Tennessee.

[m] Lead nonattainment area is Frisco, Texas, in Collin County.

[n] Population figures were obtained from the 1990 census data. For nonattainment areas defined as only partial counties, population figures for just the nonattainment area were used when these were available. Otherwise, whole county population figures were used. When a larger nonattainment area encompasses a smaller one, double counting the population in the "Total exposed" column is avoided by only counting the population of the larger nonattainment area.

The "Total exposed" values represent estimated population living in areas that are in nonattainment for at least one pollutant.

NOTE: Reference numbers 1-130 do not indicate ranking.

SOURCE: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, USA Air Quality Nonattainment Areas, Internet website http://www.epa.gov/airs/nonattn.html as of Oct. 17, 2000.

Table 4-49 U.S. Carbon Dioxide Emissions from Energy Use by Sector, 1990-1998 (Million Metric tons of Carbon)

Sector	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Industrial	**454.8**	**444.1**	**461.6**	**461.0**	**471.0**	**469.2**	**483.8**	**489.7**	**480.2**	**481.2**
Residential	**254.2**	**259.0**	**258.6**	**274.3**	**272.2**	**273.4**	**289.6**	**288.6**	**288.8**	**290.1**
Commercial	**207.7**	**208.0**	**207.8**	**213.6**	**217.1**	**220.6**	**229.2**	**241.5**	**244.5**	**243.5**
Transportation	**431.8**	**424.3**	**431.1**	**436.4**	**449.1**	**457.6**	**468.7**	**473.6**	**481.9**	**496.1**
Motor Gasoline	260.6	259.2	263.1	268.9	273.3	279.0	284.0	286.5	292.9	299.1
Liquid Petroleum Gas	0.4	0.3	0.3	0.3	0.6	0.3	0.3	0.2	0.2	0.3
Jet Fuel	60.1	58.1	57.6	58.1	60.4	60.0	62.7	63.3	64.2	66.3
Distillate Fuel	75.7	72.6	75.3	77.3	82.5	85.1	89.7	93.5	96.4	100.1
Residual Fuel	21.9	22.0	23	19.4	19.1	19.7	18.4	15.5	15.2	17.5
Lubricants	1.8	1.6	1.6	1.6	1.7	1.7	1.6	1.7	1.8	1.8
Aviation Gas	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Petroleum	*421.2*	*414.6*	*421.6*	*426.4*	*438.2*	*446.5*	*457.4*	*461.5*	*471.5*	*485.8*
Natural Gas	*9.8*	*9.0*	*8.8*	*9.3*	*10.2*	*10.4*	*10.6*	*11.2*	*9.5*	*9.5*
Electricity	*0.7*	*0.7*	*0.7*	*0.7*	*0.9*	*0.8*	*0.8*	*0.8*	*0.9*	*0.8*
Total CO_2 Emissions from End-Use Sector Energy Consumption	**1,348.6**	**1,335.3**	**1,359.1**	**1,385.3**	**1,409.6**	**1,421.0**	**1,471.5**	**1,493.4**	**1,495.4**	**1,510.8**
Total U.S. CO_2 Emissions	**1,350.0**	**1,338.4**	**1,365.1**	**1,396.8**	**1,422.5**	**1,434.7**	**1,484.1**	**1,505.2**	**1,507.4**	**1,526.8**

NOTES: Electric utility emissions are distributed across end-use sectors.

Numbers may not add to totals due to rounding.

Tons of carbon can be converted to tons of carbon dioxide gas by multiplying by 3.667. One ton of carbon equals 3.667 tons of carbon dioxide gas.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Emissions of Greenhouse Gases in the United States 1999*, DOE/EIA-0573(98) (Washington, DC: October 1999), available at Internet site www.eia.doe.gov/oiaf/1605/ggrpt/html, as of Nov. 7, 2000.

Section E
Water Pollution, Noise and Solid Waste

Table 4-50 Petroleum Oil Spills Impacting Navigable U.S. Waters[a]

	1985		1990		1995		1996		1997		1998		1999	
Source	**Incidents**	**Gallons Spilled**	**Incidents**	**Gallons Spilled**	**Incidents**	**Gallons Spilled**	**Incidents**	**Gallons Spilled**	**Incidents**	**Gallons Spilled**	**Incidents**	**Gallons Spilled**	**Incidents**	**Gallons Spilled**
Vessel Sources														
Tankship	164	732,397	249	4,977,251	148	125,491	122	219,311	124	22,429	104	56,673	92	8,414
Tank barge	385	3,683,548	457	992,025	353	1,101,938	313	1,163,258	252	165,649	220	248,089	227	158,977
Other vessels[a]	1,113	446,966	1,779	417,882	4,977	396,724	5,151	298,451	4,971	192,801	4,848	316,473	5,361	409,084
Total vessel sources	**1,662**	**4,862,911**	**2,485**	**6,387,158**	**5,478**	**1,624,153**	**5,586**	**1,681,020**	**5,347**	**380,879**	**5,172**	**621,235**	**5,680**	**576,475**
Nonvessel sources														
Offshore pipelines	23	17,977	73	46,228	7	1,143	4	386	13	810	10	843	5	35,707
Onshore pipelines	362	759,040	76	270,700	23	10,751	13	978,006	19	223,312	35	47,020	20	433
Other[b]	2,417	2,473,212	2,435	1,091,544	1,086	946,328	1,061	429,911	1,324	227,143	1,508	198,853	1,590	515,241
Total nonvessel sources	**2,802**	**3,250,229**	**2,584**	**1,408,472**	**1,116**	**958,222**	**1,078**	**1,408,303**	**1,356**	**451,265**	**1,553**	**246,716**	**1,615**	**551,381**
Mystery[c]	**1,705**	**323,108**	**3,108**	**119,377**	**2,444**	**55,854**	**2,671**	**28,508**	**1,921**	**60,430**	**1,590**	**17,352**	**1,244**	**44,593**
Total All Spills	**6,169**	**8,436,248**	**8,177**	**7,915,007**	**9,038**	**2,638,229**	**9,335**	**3,117,831**	**8,624**	**892,574**	**8,315**	**885,303**	**8,539**	**1,172,449**

[a] Other vessels include commercial vessels, fishing boats, freight barges, freight ships, industrial vessels, oil recovery vessels, passenger vessels, unclassified public vessels, recreational boats, research vessels, school ships, tow and tug boats, mobile offshore drilling units, offshore supply vessels, publicly owned tank and freight ships, as well as vessels not fitting any particular class (unclassified).

[b] Other nonvessel sources include designated waterfront facilities, nonmarine land facilities, fixed offshore and inshore platforms, mobile facility, municipal facility, aircraft, land vehicles, railroad equipment, bridges, factories, fleeting areas, industrial facilities, intakes, locks, marinas, MARPOL reception facilities, nonvessel common carrier facilities, out falls, sewers, drains, permanently moored facilities, shipyards, ship repair facilities.

[c] Mystery spills are spills from unknown or unidentified sources. U.S. Coast Guard investigators are unable to identify the vessel or facility that spilled the oil into U.S. navigable waters.

SOURCE: U.S. Coast Guard, Oil Spill Compendium 2000, available at Internet site www.uscg.mil/hq/g-m/nmc/response/stats/aa/htm.

Table 4-51 Leaking Underground Storage Tank Releases and Cleanups

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total confirmed releases	**87,528**	**127,195**	**184,457**	**237,022**	**270,567**	**303,635**	**317,488**	**341,773**	**371,387**	**397,821**
Cleanups initiated	51,770	79,506	129,074	171,082	209,797	238,671	252,615	292,446	314,965	346,300
Cleanups not initiated	35,758	47,689	55,383	65,940	60,770	64,964	64,873	49,327	56,422	51,521
Cleanups completed	16,905	26,666	55,444	87,065	107,448	131,272	152,683	178,297	203,247	228,925
Releases not cleaned up	70,623	100,529	129,013	149,957	163,119	172,363	164,805	163,476	168,140	168,896

NOTE: All numbers are cumulative.

SOURCES: 1990-97: U.S. Environmental Protection Agency, Office of Underground Storage Tanks, personal communications, Nov. 17 and Nov. 18, 1998. 1998-99: Ibid., Internet site http://www.epa.gov/swerust1/cat/camarchv.htm, as of June 27, 2000.

Table 4-52 Highway Noise Barrier Construction (Miles)

	Unknown	R1970-79	R1980-89	R1990	R1995	1996	1997	1998	Total 1970-98
Type I barriers[a]	6[d]	102	419	44	87	34	47	114	1,146
Type II barriers[b]	0	70	128	19	32	15	31	22	391
All other types[c]	N	2	28	0	6	0	1	1	79
Total length	**6**	**175**	**575**	**63**	**125**	**49**	**78**	**137**	**1,623**
Cost (1998 $ millions)	N	134	656	89	152	60	111	169	1,931

KEY: N = data do not exist; R = revised

[a] A Type I barrier is built on a highway project to construct a new highway or to physically alter an existing highway.

[b] A Type II barrier is built to abate noise along an existing highway (often referred to as retrofit abatement) and is not mandatory.

[c] All other types of barriers are nonfederally funded.

[d] Have not been assigned a year of construction or a cost.

NOTES: Miles have been converted from kilometers. Totals may not match the sum of yearly estimates due to rounding and converting from metric. Twenty-four miles of barriers, while assigned a year of construction, cannot be assigned a cost. Data are produced on a 3-year cycle.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, *Highway Traffic Noise Barrier Construction Trends* (Washington, DC: 2000), tables 1 and 3.

Table 4-53 Number of People Residing in High Noise Areas around U.S. Airports[a,b,c] (within 65 dB DNL noise level contours)

Year	Exposure: People (millions)	Exposure: Percent of U.S.Resident Population	U.S. Resident Population (millions)
1975	7.0	3.2	215.5
1980	5.2	2.3	227.2
1985	3.4	1.4	237.9
1990	2.7	1.1	249.4
1995	1.7	0.6	262.8
1996	1.6	0.6	265.2
1998	1.1	0.4	270.3

Key: db=decibels; DNL=day night sound level

[a] Noise-level contours are graphical representations of noise levels on a map, similar to elevation contours on a topographic map. Noise-level contours are lines that join points of equal sound levels. Areas between given noise-level contour lines would have a noise level between the two contour values. The U.S. Department of Transportation, Federal Aviation Administration (FAA) has identified FNL 65 dB as the highest threshold of airport noise exposure that is normally compatible with indoor and outdoor activity associated with a variety of land uses, including residential, recreational, schools, and hospitals.

[b] Estimates are for areas surrounding airport property of 250 of the largest civil airport with jet operations in the United States. They exclude exposure to aircraft noise within an airport boundary.

[c] 1975 exposure estimates were made by the U.S. Environmental Protection Agency. 1980-99 estimates were made by FAA. See the source and accuracy statement for more details on how exposure estimates are made.

SOURCES:

Exposure: U.S. Department of Transportation, Federal Aviation Administration, Office of Environment and Energy (AEE-12), personal communications.

Population: U.S. Department of Commerce, Census Bureau, *Statistical Abstract of the United States 1999* (Washington, DC: 2000), table 2.

Table 4-54 Motor Vehicles Scrapped[a] (Thousands)

	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Passenger cars	7,461	5,669	8,405	7,729	8,897	7,414	7,527	8,244	6,819	7,216
Trucks	837	908	1,732	2,100	2,177	2,918	3,284	4,265	4,846	4,447
Total motor vehicles	**8,298**	**6,577**	**10,137**	**9,829**	**11,074**	**10,332**	**10,811**	**12,509**	**11,665**	**11,664**

[a] Data are for the period July 1 to June 30 of the given year.

NOTE: Figures represent vehicles that are not re-registered.

SOURCE: The Polk Co., personal communication, May 4, 2000.

Modal Profiles

Air Carrier Profile

Financial	1960	1970	1980	1990	1995	1996	1997	R1998	P1999
Operating revenues (thousand dollars)									
Domestic total[a,b]	2,178,339	R7,180,161	26,440,297	57,960,508	70,885,050	76,890,526	82,249,568	86,493,789	90,517,576
Majors, all services	e1,942,635	e6,272,775	f23,012,073	h53,333,552	h64,317,169	h70,036,709	h74,942,391	h77,650,810	h80,797,402
Nationals, all services	146,481	736,831	3,182,418	i4,167,552	i5,935,773	i5,990,391	i6,163,458	i8,113,690	i8,933,847
Large regionals, all services	N	N	245,806	j459,404	j632,108	j863,426	j1,143,719	j729,289	j786,328
International total	705,938	2,109,497	6,442,144	17,990,355	23,433,483	25,046,820	27,318,034	26,971,289	27,809,573
Majors, all services	705,938	2,109,497	g5,976,221	h16,761,376	h19,892,111	h21,524,274	h23,608,853	h23,356,233	h24,446,105
Nationals, all services	N	N	465,923	i901,352	i3,282,606	i3,326,467	i3,376,014	i3,161,212	i2,954,249
Large regionals, all services	N	N	N	j327,627	j258,766	j196,079	j333,166	j453,844	j409,219
Total certificated[a]	R2,884,877	R9,289,658	32,882,441	75,950,863	94,318,533	101,937,346	109,567,602	113,465,078	118,327,149
Operating expenses (thousand dollars)									
Domestic total[a]	2,052,094	7,001,668	26,465,999	58,953,086	66,119,699	71,573,073	75,731,215	78,388,515	84,344,125
Majors, all services	1,907,785	6,256,039	f23,150,527	h54,209,401	h59,721,080	h64,793,763	h68,307,270	h70,114,852	h75,244,844
Nationals, all services	144,309	745,629	3,058,289	i4,297,823	i5,750,372	i5,847,797	i6,163,923	i7,500,451	i8,342,749
Large regionals, all services	N	N	257,183	j445,862	j648,247	j931,513	j1,260,021	j773,212	j756,532
International total	665,660	2,065,605	6,642,095	18,914,480	22,335,257	24,155,203	25,249,593	25,748,752	26,132,232
Majors, all services	665,660	2,065,605	g6,171,366	h17,746,006	h19,061,258	h20,807,517	h21,688,642	h22,321,441	h23,048,059
Nationals, all services	N	N	470,729	i853,361	i3,025,707	i3,166,097	i3,253,249	i3,014,282	i2,698,045
Large regionals, all services	N	N	N	j315,113	j248,292	j181,589	j307,702	j413,029	j386,129
Total certificated[a]	2,717,754	9,067,273	33,108,094	77,867,566	88,454,956	95,728,276	100,980,807	104,137,267	110,476,358
Inventory[c]									
Number of carriers									
Total domestic and international	k55	k39	kR66	kR59	kR89	kR90	kR82	kR81	k84
Majors	N	N	R14	12	11	12	13	13	13
Nationals	N	N	R18	R15	R27	R31	31	R28	33
Regionals	N	N	R34	R32	R51	R47	R38	R40	38

KEY: N = data do not exist; R = revised;
U = data are not available

Continued next page

Air Carrier Profile
Cont'd

Inventory cont'd	1960	1970	1980	1990	1995	1996	1997	R1998	P1999
Number of aircraft available for service									
Total domestic and international	[l] 2,135	[l] 2,690	[l] 2,818	[l] 4,727	[l] 5,567	[l] 5,961	[l] 5,770	[l] 6,144	[l] 6,254
Majors	N	N	2,071	3,854	4,039	4,422	4,352	4,605	4,711
Nationals	N	N	432	650	1,143	1,167	967	1,113	1,319
Regionals	N	N	315	223	385	372	451	426	224
Number of employees									
Total domestic and international	[k] 169,872	[k] 304,690	[k] 354,264	[k] 588,926	[k R] 610,363	[k] 634,866	[kR] 656,243	[kR] 696,202	[k] 728,495
Majors	118,189	214,021	318,973	549,100	533,313	564,631	597,953	623,389	650,267
Nationals	12,470	24,913	29,922	32,077	59,444	56,586	[R] 47,662	[R] 59,414	68,138
Regionals	N	N	5,369	7,749	[R] 17,606	13,649	[R] 10,628	[R] 13,399	10,090
Performance									
Aircraft revenue-miles (thousands)									
Domestic[b]									
Certificated, all services[a]	[m] 858,451	[m] 2,067,598	[n] 2,523,375	[o] 3,963,263	[o] 4,629,394	[o] 4,811,453	[o] 4,910,948	[o] 5,034,691	[o] 5,308,533
Major, all services[a]	716,961	1,778,065	2,113,669	[p] 3,547,339	[p] 3,953,287	[p] 4,083,664	[p] 4,191,113	[p] 4,260,052	[p] 4,445,131
Nationals, all services[a]	94,794	247,055	330,528	[q] 351,946	[q] 569,641	[q] 614,519	[q] 594,241	[q] 702,913	[q] 781,351
Large regionals, all services[a]	N	N	56,995	[n] 60,542	[n] 85,363	[n] 96,573	[n] 112,682	[n] 51,199	[n] 57,360
International									
Certificated, all services[a]	181,605	474,666	[r] 400,971	[s] 760,338	[s] 997,658	[s] 1,043,313	[s] 1,113,816	[s] 1,192,489	[s] 1,223,177
Major, all services[a]	N	N	330,391	[q] 666,231	[q] 822,283	[q] 859,483	[q] 917,109	[q] 1,003,726	[q] 1,043,737
Nationals, all services[a]	N	N	66,499	[t] 48,812	[t] 141,870	[t] 150,147	[t] 145,821	[t] 145,494	[t] 137,996
Large regionals, all services[a]	N	N	2,948	[u] 60,542	[u] 27,761	[u] 22,519	[u] 47,138	[u] 40,398	[u] 35,766
Medium regionals, all services, domestic and international[a]	N	N	23,204	[v] 9,017	[v] 28,847	[v] 27,861	[v] 16,660	[v] 21,024	[v] 30,369
Total certificated[a]	1,040,056	2,542,264	2,924,346	4,723,601	5,627,052	5,854,766	6,024,764	6,227,180	6,531,710
Aircraft revenue-hours									
Domestic[b]									
Certificated, all services[a]	3,672,900	5,133,161	[n] 6,247,795	[o] 9,717,375	[o] 11,378,134	[o] 11,871,886	[o] 12,060,253	[o] 12,445,483	[o] 13,040,149
Major, all services[a]	2,802,317	4,066,480	4,941,327	[p] 8,524,236	[p] 9,257,260	[p] 9,584,525	[p] 9,828,418	[p] 9,957,390	[p] 10,349,988
Nationals, all services[a]	606,146	908,935	919,187	[q] 1,016,491	[q] 1,839,835	[q] 1,981,219	[q] 1,882,975	[q] 2,299,916	[q] 2,472,930
Large regionals, all services[a]	N	N	267,522	[n] 167,826	[n] 223,007	[n] 260,985	[n] 315,506	[n] 143,197	[n] 153,616

KEY: N = data do not exist; R = revised;
U = data are not available

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Air Carrier Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	R1998	P1999
International									
Certificated, all services[a]	608,736	977,325	r819,518	s1,556,760	s2,021,060	s2,113,467	s2,235,441	s2,394,095	s2,452,176
Major, all services[a]	N	N	668,199	q1,351,349	q1,634,465	q1,712,416	q1,819,583	q1,992,776	q2,071,513
Nationals, all services[a]	N	N	140,329	t101,533	t314,066	t329,311	t309,948	t311,540	t289,523
Large regionals, all services[a]	N	N	7,583	u88,641	u59,572	u48,619	u97,304	u83,437	u75,851
Medium regionals, all services, Domestic and international[a]	N	N	123,411	v24,059	v70,989	v68,278	v41,960	v51,322	v78,904
Total certificated[a]	4,281,636	6,110,486	7,190,724	11,298,194	13,399,194	13,985,353	14,295,694	14,839,578	15,492,325
Revenue passenger-miles (thousands)									
Domestic[b]									
Certificated, all services	31,098,944	108,441,978	n204,367,599	o345,872,950	o403,887,802	o434,651,687	o450,612,482	o463,262,198	o487,905,650
Majors, all services	29,430,428	99,903,229	182,984,795	p327,112,620	p368,701,100	p395,099,254	p410,906,050	p421,217,665	p440,441,958
Nationals, all services	1,170,779	7,642,071	20,466,712	q16,756,818	q29,255,179	q33,000,546	q33,241,082	q37,699,063	q43,040,816
Large regionals, all services	N	N	711,868	n1,752,615	n4,381,267	n5,443,071	n5,778,338	n3,124,802	n3,205,805
International									
Certificated, all services	m8,950,672	m39,695,392	r63,354,387	s126,362,697	s154,869,249	s161,512,010	s169,356,100	s172,255,197	s180,263,824
Majors, all services	N	N	54,318,160	q118,268,507	q137,986,520	q145,330,811	q153,564,956	q157,398,986	q166,321,018
Nationals, all services	N	N	8,659,592	t6,794,533	t16,128,695	t14,681,127	t13,616,245	t13,471,798	t11,498,538
Large regionals, all services	N	N	330,288	u1,219,706	u676,925	u505,337	u2,148,486	u1,097,330	u2,034,607
Medium regionals, all services, domestic and international[a]	N	N	250,571	v330,848	v1,627,365	v2,103,551	v713,425	v1,507,751	v1,626,732
Total certificated[a]	40,049,616	148,137,370	267,972,557	472,566,495	558,757,051	596,163,697	619,968,582	635,517,395	668,169,474
Average passenger revenue/passenger-mile									
(Domestic, scheduled service)	6.09	6.00	11.49	13.43	13.48	13.76	13.97	14.08	13.96
Average passenger fare									
(Domestic, scheduled service)	30.01	40.65	84.60	107.86	106.66	110.37	114.10	114.34	114.99

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U = data are not available

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Air Carrier Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	R1998	P1999
Revenue passenger enplanements (thousands)									
Domestic[b]									
Certificated, all services[a]	[m]56,352	[m]153,662	[n]275,182	[o]428,767	[o]506,789	[o]538,394	[o]548,735	[o]566,951	[o]588,601
Major, all services[a]	48,678	122,866	223,237	[p]393,927	[p]441,650	[p]466,743	[p]478,253	[p]486,903	[p]502,305
Nationals, all services[a]	5,949	26,726	47,145	[q]32,015	[q]55,656	[q]62,183	[q]61,316	[q]74,281	[q]80,504
Large regionals, all services[a]	N	N	3,748	[n]2,566	[n]7,136	[n]7,887	[n]8,203	[n]4,352	[n]4,254
International									
Certificated, all services[a]	5,904	16,620	[r]26,514	[s]46,126	[s]52,864	[s]54,515	[s]56,767	[s]57,759	[s]57,699
Major, all services[a]	N	N	23,949	[q]42,207	[q]44,155	[q]46,302	[q]48,614	[q]49,610	[q]49,768
Nationals, all services[a]	N	N	2,343	[t]2,632	[t]8,114	[t]7,401	[t]6,896	[t]7,038	[t]6,279
Large regionals, all services[a]	N	N	149	[u]1,246	[u]556	[u]405	[u]1,231	[u]940	[u]1,322
Medium regionals, all services, domestic and international[a]	N	N	1,125	[v]300	[v]2,386	[v]1,988	[v]989	[v]1,586	[v]1,868
Total certificated[a]	62,256	169,922	302,821	475,193	559,653	592,909	605,502	624,710	646,300
Revenue passenger Load factor (%) (scheduled service)									
Domestic[b]									
Certificated	58.5	48.9	[n]58.0	[o]60.4	[o]65.4	[o]67.9	[o]69.1	[o]70.0	[o]69.8
Majors	59.5	49.3	58.1	[p]60.6	[p]65.7	[p]68.5	[p]69.7	[p]70.4	[p]70.2
Nationals	41.9	43.6	58.4	[q]56.6	[q]61.9	[q]61.5	[q]63.2	[q]65.1	[q]66.1
Large regionals	N	N	47.7	[n]48.7	[n]56.0	[n]60.4	[n]60.7	[n]58.8	[n]58.7
International									
Certificated	62.2	53.0	[r]62.8	[s]69.1	[s]71.8	[s]73.3	[s]74.1	[s]72.8	[s]74.4
Majors	N	N	62.8	[q]69.1	[q]72.1	[q]73.7	[q]74.4	[q]72.9	[q]74.5
Nationals	N	N	65.5	[t]73.4	[t]67.7	[t]67.8	[t]69.6	[t]70.9	[t]73.8
Large regionals	N	N	73.9	[u]66.5	[u]44.5	[u]0.0	[u]64.9	[u]46.0	[u]U
Medium regionals, all services, domestic and international[a]	N	N	[v]46.7	[v]0.0	[v]59.3	[v]66.7	[v]49.7	[v]58.2	[v]48.4

KEY: N = data do not exist; R = revised; U = data are not available

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Air Carrier Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	R1998	P1999
U.S. international passenger travel									
Total passenger-arrivals (thousands)									
Flag of carrier									
United States	[w]1,332	[w]5,531	[x]10,031	[x]19,145	[y]24,582	[x]25,148	[x]26,744	[x]27,390	[x]27,462
Foreign	1,234	4,343	10,231	17,269	22,328	24,704	27,571	28,791	30,324
Total passenger-departures (thousands)									
Flag of carrier									
United States	1,200	4,949	9,369	17,628	22,231	22,901	24,302	24,513	25,457
Foreign	1,136	4,147	9,886	16,418	20,795	22,884	25,382	26,350	28,399
Total revenue ton-miles (thousands)[d]									
Domestic[b]									
Certificated, all services	[m]3,732,949	[m]13,876,802	[n]24,964,907	[o]43,651,162	[o]52,910,081	[o]56,326,750	[o]58,658,887	[o]60,199,459	[o]62,743,196
Majors, all services	3,332,483	12,589,057	21,427,534	[p]39,107,033	[p]47,015,642	[p]50,096,661	[p]52,254,323	[p]53,424,349	[p]55,599,771
Nationals, all services	121,157	850,477	3,336,057	[q]3,561,283	[q]4,996,345	[q]231,398	[q]5,317,576	[q]6,012,665	[q]6,327,438
Large regionals, all services	N	N	180,042	[n]945,929	[n]718,659	[n]863,449	[n]971,942	[n]508,172	[n]584,773
International									
Certificated, all services	1,291,336	6,308,701	[r]9,689,067	[s]19,975,915	[s]26,295,684	[s]28,177,721	[s]30,944,299	[s]31,481,513	[s]32,780,309
Majors, all services	N	N	7,377,733	[q]17,803,825	[q]21,517,789	[q]22,880,295	[q]24,971,379	[q]25,794,344	[q]27,764,472
Nationals, all services	N	N	2,261,534	[t]1,229,849	[t]4,116,380	[t]4,603,920	4,657,365 [t]	4,376,654 [t]	[t]4,123,176
Large regionals, all services	N	N	44,438	[u]835,701	[u]513,476	[u]396,142	[u]1,240,303	[u]1,269,602	[u]830,782
Medium regionals, all services domestic and international[a]	N	N	28,178	[v]143,457	[v]327,474	[v]432,606	[v]190,298	[v]265,186	[v]293,093
Total certificated[a]	5,024,285	20,185,503	34,682,153	63,770,534	79,205,765	84,504,471	89,603,186	91,650,972	95,523,505
Revenue ton-miles of freight (thousands)									
Domestic[b]									
Certificated, all services	552,756	2,708,900	[n]4,528,316	[o]9,063,864	[o]12,520,057	[o]12,860,845	[o]13,601,412	[o]13,839,605	[o]13,957,599
Majors, all services	321,176	U	3,129,087	[p]6,395,767	[p]10,145,537	[p]10,586,741	[p]11,163,518	[p]11,302,583	[p]11,555,578
Nationals, all services	3,850	U	1,289,510	[q]1,885,600	[q]2,070,570	[q]1,931,201	[q]1,993,498	[q]2,239,140	[q]2,023,150
Large regionals, all services	N	N	108,864	[n]770,670	[n]280,512	[n]318,542	[n]398,153	[n]195,791	[n]269,628

KEY: N = data do not exist; R = revised;
U = data are not available

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Air Carrier Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	R1998	P1999
International									
Certificated, all services	m268,156	m1,566,105	r3,353,371	s7,339,660	s10,854,620	s12,031,634	s14,008,685	s14,262,373	s14,752,926
Majors, all services	N	N	1,945,660	q5,976,973	q7,719,138	q8,347,214	q9,614,881	q10,054,448	q11,132,370
Nationals, all services	N	N	1,395,575	t550,409	t2,549,371	t3,140,921	t3,295,738	t3,035,853	t2,972,323
Large regionals, all services	N	N	11,409	u713,733	u445,783	u345,609	u1,025,455	u1,159,869	u627,320
Medium regionals, all services, domestic and international [a]	N	N	3,124	v110,372	v163,766	v222,251	v118,854	v114,294	v130,156
Total certificated[a]	820,907	3,755,436	7,884,811	16,513,896	23,374,677	24,892,479	27,610,097	28,101,978	28,710,525
Safety									
Air carrier fatalities									
Operating under 14 CFR 121 (airlines)									
Scheduled services	N	N	z0	z39	z166	z342	z3	z1	z12
Nonscheduled services	N	N	1	0	2	38	5	0	0
Operating under 14 CFR 135									
Scheduled services (commuters)	N	N	37	7	9	14	46	0	12
Nonscheduled services (on–demand air taxis)	N	N	105	51	52	63	39	R48	38
Total[a]	AA499	AA146	143	97	229	457	93	49	62
Air carrier accidents									
Operating under 14 CFR 121 (airlines)									
Scheduled services	N	N	15	22	34	32	44	R43	48
Nonscheduled services	N	N	4	2	2	6	5	7	4
Operating under 14 CFR 135									
Scheduled services (commuters)	N	N	38	15	12	11	R17	8	13
Nonscheduled services (on–demand air taxis)	N	N	171	107	75	90	82	R77	76
Total[a]	AA90	AA55	R228	146	123	139	148	R135	141

KEY: N = data do not exist; R = revised;
U = data are not available

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Air Carrier Profile
Cont'd

Safety cont'd	1960	1970	1980	1990	1995	1996	1997	R1998	P1999
Fatal air carrier accidents									
Operating under 14 CFR 121 (airlines)									
Scheduled services	N	N	0	6	2	3	3	1	2
Nonscheduled services	N	N	1	0	1	2	1	0	0
Operating under 14 CFR 135									
Scheduled services (commuters)	N	N	8	4	2	1	5	0	5
Nonscheduled services (on–demand air taxis)	N	N	46	29	24	29	15	R18	12
Total[a]	AA17	AA8	55	39	29	35	24	R19	19

KEY: N = data do not exist; R = revised; U = data are not available

[a] Totals include data not in table; thus totals may not be sum of table data.

[b] Domestic encompasses operations within and between the 50 states of the United States, the District of Columbia, Puerto Rico and the Virgin Islands. It also encompasses Canadian and Mexican transborder operations (U.S. airlines only).

All other operations are considered international.

[c] Includes scheduled and nonscheduled (charter) operators. By Sec. 2 of the Airline Deregulation Act of 1978 "charter air carrier" and "charter air transportation" replaced supplemental air carriers and supplemental air transportation which were formerly Sec. 101(36) and (37) of the Act. The 24 pre–deregulation supplemental carriers now have scheduled service authority.

[d] Total Revenue Ton–Miles includes Passenger, Freight, Express and Mail.

SOURCES: Unless otherwise noted, refer to chapter tables for sources

[e] Civil Aeronautics Board, *Handbook of Airline Statistics, 1969 and 1973* (Washington, DC), pp. 69, 71.

[f] Ibid., *Air Carrier Financial Statistics*, December 1981 (Washington, DC), pp. 3/28, 44.

[g] Ibid., pp. 42, 44.

[h] U.S. Department of Transportation, Bureau of Transportation Statistics, (pre-1995, U.S. Department of Transportation, Research and Special Programs Administration), *Air Carrier Financial Statistics*, *December* Various years (Washington, DC) p. 3.

[i] Ibid., pp. 30, 31, 32, 35.

[j] Ibid., pp. 65, 71, 72, 76.

[k] U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, http://www.bts.gov/oai/employees/employcov.html.

[l] Ibid., personal communication.

[m] Civil Aeronautics Board, *Handbook of Airline Statistics, 1973*, (Washington, DC), Part III, Tables 2, 4, 7, 13.

[n] Ibid., *Air Carrier Traffic Statistics*, December 1981 (Washington, DC), pp. 2, 5, 46, 84.

[o] U.S. Department of Transportation, Bureau of Transportation Statistics, (pre-1995, U.S. Department of Transportation, Research and Special Programs Administration), *Air Carrier Traffic Statistics, December 1991/1990, 1992/1991, 1993/1992, 1994/1993, 1995/1994, 1996/1995, 1997/1996, 1998/1997, 1998/1999* (Washington, DC), p. 2.

[p] Ibid., p. 5.

[q] Ibid., pp. 52, 53, 59.

[r] Civil Aeronautics Board, *Air Carrier Traffic Statistics*, December 1981 (Washington, DC), pp. 3, 6, 85, 115.

[s] U.S. Department of Transportation, Bureau of Transportation Statistics, (pre-1995, U.S. Department of Transportation, Research and Special Programs Administration), *Air Carrier Traffic Statistics, December 1991/1990, 1992/1991, 1993/1992, 1994/1993, 1995/1994, 1996/1995, 1997/1996, 1998/1997, 1998/1999* (Washington, DC), p. 3.

[t] Ibid., pp. 52, 53, 56, 60.

[u] Ibid., pp. 118, 119, 133, 134.

[v] Ibid., pp. 178, 182, 187.

[w] U.S. Department of Justice, Immigration and Naturalization Service, *Report of Passenger Travel Between the U.S. and Foreign Countries,* 1960, 1970 (Washington, DC).

[x] U.S. Department of Transportation, Research and Special Programs Administration, *U.S. International Air Travel Statistics* (Washington, DC: Annual issues), tables IIa and IId.

[y] U.S. Department of Commerce, International Trade Administration, *U.S. International Air Passenger Statistics Report*, Calendar Year 1995, (Washington, DC), tables IIa, IId.

[z] National Transportation Safety Board, *NTSB Press Release, SB-00-05,* 2000, tables 6 through 9, available at http://www.ntsb.gov/aviation/Stats.htm.

[AA] Ibid., personal communication.

General Aviation Profile

Financial	1960	1970	1980	1990	1995	1996	1997	1998
Expenditures ($ millions)								
Aircraft	[h]202	[h]339	[h]2,853	[hR]3,398	[h]4,260	[h]5,297	[hR]7,174	[h]9,571
Operating costs	693	1,696	5,200	[R]6,744	[R]6,324	6,443	[R]6,818	7,105
Total	895	2,035	8,053	[R]10,142	[R]10,584	11,740	[R]13,992	16,676
Inventory								
Number of active aircraft by primary use								
Corporate	N	[i]6,835	[i]14,860	[i]10,100	[i]9,800	[i]9,300	[i]10,411	[i]11,250
Business	N	26,900	49,391	33,100	26,200	28,200	27,716	32,611
Instructional	N	10,727	14,862	18,600	14,800	14,300	14,663	11,375
Personal	N	65,398	96,222	112,600	109,300	109,600	115,630	124,347
Aerial application	N	5,455	7,294	6,200	5,100	5,400	4,858	4,550
Aerial observation	N	N	N	4,900	4,700	3,200	3,311	3,242
External load	N	N	N	N	200	400	186	313
Other work[a]	N	2,054	2,813	1,400	1,100	1,100	579	1,116
Air taxi/air tours[b]	N	N	N	5,800	4,100	3,900	4,948	5,190
Sight seeing[c]	N	N	N	N	900	900	677	679
Other	N	8,249	17,045	4,100	6,300	6,700	5,250	6,010
Public use	N	N	N	N	N	4,200	4,130	4,029
Total	[i]76,549	131,743	211,045	196,800	188,100	191,100	192,400	204,710

KEY: N = data do not exist; R = revised

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General Aviation Profile
Cont'd

Performance	1960	1970	1980	1990	1995	1996	1997	1998
Number of flight hours by use (thousands)								
Corporate	N	N	[j]5,332	[j]2,913	[j]2,869	[j]2,718	[j]2,878	[j]3,213
Business	[j]5,699	[j]7,204	8,434	4,417	3,191	3,152	3,006	3,523
Instructional	1,828	6,791	5,748	7,244	4,106	4,425	4,956	3,961
Personal	3,172	6,896	8,894	9,276	9,320	8,893	9,644	9,781
Aerial application	N	N	2,044	1,872	1,557	1,787	1,562	1,306
Aerial observation	N	N	N	1,745	1,385	1,036	1,261	812
External load	N	N	N	N	118	203	112	153
Other work[a]	N	N	1,053	572	268	262	139	286
Air taxi/air tours[b]	N	N	N	2,249	1,527	1,773	2,120	2,583
Sight seeing[c]	N	N	N	N	206	186	127	169
Other	2,422	5,139	4,925	475	1,121	644	819	940
Public use[d]	N	N	N	N	N	1,021	1,096	1,373
Total	13,121	26,030	36,430	30,763	25,667	26,100	27,713	28,100
Vehicle-miles[e] (millions)	**[k]1,769**	**[k]3,207**	**[k]5,204**	**[kR]4,548**	**[k]3,795**	**[k]3,524**	**[k]3,877**	**[k]U**
Passenger-miles[e] (millions)	**[h]2,300**	**[h]9,100**	**[h]14,700**	**[h]13,000**	**[hR]10,800**	**[hR]12,000**	**[h]12,500**	**[h]13,300**
Fuel consumed[e] (million gallons)	**[l]242**	**[l]759**	**[l]1,286**	**[l]1,016**	**[qR]847**	**[qR]896**	**[qR]934**	**[q]1,126**
Aviation gasoline	242	551	520	353	[R]287	[R]289	[R]292	311
Jet fuel	N	208	766	663	[R]560	[R]608	[R]642	815

KEY: N = data do not exist; R = revised

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General Aviation Profile
Cont'd

Safety	1960	1970	1980	1990	1995	1996	1997	1998
Fatalities[f]								
Corporate	N	[m]28	[n]66	[n]21	[n]15	[n]20	[n]3	[p]0
Business	N	148	126	80	73	44	53	42
Instructional	N	93	73	62	44	40	38	36
Personal	N	726	808	492	488	413	436	424
Aerial application	N	41	32	17	15	10	18	6
Other	N	174	134	95	99	105	122	112
Total	[m]787	1,310	1,239	767	734	632	660	620
Accidents								
Fatal	[o]429	[o]641	[o]618	[o]443	[o]412	[o]360	[oR]353	[o]365
Total	4,793	4,712	3,590	2,215	2,053	[R]1,908	[R]1,853	1,909
Accident rate[g] **(per 100,000 flight hours)**								
Fatal	3.3	2.5	1.7	1.6	1.6	1.5	1.4	1.4
Total	36.5	18.1	9.9	7.8	8.2	7.7	7.3	7.1

KEY: N = data do not exist; R = revised

[a] In 1960, 1970, 1980, classified as "Industrial."

[b] Includes air tours done under 14 CFR 135: air taxi operators and commercial operators.

[c] Includes sight seeing done under 14 CFR 91: general operating and flight rules.

[d] Federal, state or local Government-owned or leased aircraft used for the purpose of fulfilling a government position.

[e] Includes air taxi operations. Nautical miles in source multiplied by 1.151 to convert from nautical miles.

[f] Sum of fatalities does not necessarily equal total. Differences are due to methodology used to count collisions involving aircraft in different categories.

[g] Suicide/sabotage cases are included in accidents and fatalities data but are excluded from accident rates.

NOTES: Numbers may not add to totals due to rounding. Total fatalities in this profile may not match those in table 3-14, due to when the total fatalities data were received and the data breakdown by type of flying. NTSB constantly updates and reclassifies accident and fatality data.

1995 data for active aircraft by use, and flight hours, have been revised to reflect changes in adjustment for nonresponse bias with 1996 telephone survey factors. 1996 vehicle-miles and fuel consumption data are estimated using new information on nonrespondents and are not comparable to earlier years.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[h] Eno Transportation Foundation, Inc., *Transportation in America*, Annual Issues (Washington, DC), pp. 42, 47.

[I] United States. Federal Aviation Administration, *General Aviation and Air Taxi Activity and Avionics Survey* (Washington, DC: 1990-1997 issues), table 1.1.

[j] Ibid., table 1.4.

[k] Ibid., table 3.3.

[l] Ibid., table 5.1.

[m] National Transportation Safety Board, RE-50, personal communication.

[n] Ibid., *Annual Review of Aircraft Accident Data, U.S. General Aviation, Calendar Year 1998* (Washington, DC: July 2000), charts 27, 39, 40, 41, 42 and 43.

[o] Ibid., *NTSB Press Release*, SB99-06 (Washington, DC: 2000, and earlier issues).

[p] Ibid., personal communication, Aug. 29, 2000.

[q] 1998: U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecasts, Fiscal Years 2000-2011* (Washington, DC: March 2000), table 29.

Highway Profile

Financial	1960	1970	1980	1990	1995	1996	1997	R1998
Government receipts ($ millions)								
Total federal	2,771	6,160	9,949	14,576	19,851	R23,196	R21,648	24,509
Highway trust fund[a]	i2,531	i5,464	7,615i	i13,380	j18,835	jR22,036	j20,500	j23,396
Other	240	696	2,334	1,196	1,016	R1,160	R1,148	1,113
State and local total								
State and D.C.	6,055	11,737	19,666	40,026	50,064	R52,808	R58,087	58,806
Local	2,367	3,866	10,219	20,842	26,432	R26,767	R27,686	28,266
Total	11,193	21,763	39,834	75,444	96,347	R102,771	R107,421	111,581
Government expenditures ($ millions)								
Total federal	197	425	874	664	1,402	R1,598	R1,315	1,355
Highway trust fund[a]	27	83	315	358	1,092	R1,384	R1,103	1,156
Other[b]	170	342	559	306	310	R214	212	199
State and local total								
State and D.C.	7,125	14,100	25,936	45,609	56,981	59,709	61,534	65,507
Local	3,435	6,304	14,953	29,135	35,095	R36775	R39,104	41,093
Total	10,757	20,829	41,763	75,408	93,478	R98,082	R101,953	107,955
State highway user tax revenues[c] ($ millions)								
Motor fuel tax	k3,374	k6,433	9,485k	k19,658	k26,881	l27,555	l28,477	l29,803
Other motor fuel receipts[d]	22	44	92	220	108	63	55	58
Motor vehicle registration fees	m1,514	m2,873	5,173m	m10,257	m11,942	n13,234	n13,631	n14,552
Other motor vehicle fees[e]	235	577	1,490	3,353	4,416	4,689	4,704	5,068
Motor carrier taxes[f]	110	176	323	695	770	726	729	861
Miscellaneous fees	68	181	615	1,761	3,307	3,489	3,785	4,165
Total	5,323	10,284	17,177	35,944	47,424	49,756	51,381	54,507

KEY: N = data do not exist; R = revised;
U = data are not available

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Highway Profile
Cont'd

Inventory	1960	1970	1980	1990	1995	1996	1997	[R] 1998
Rural/urban mileage by ownership								
Rural mileage								
Under state control	[o]658,896	[o]707,002	[p]750,479	[p]702,486	[p]690,924	[qR]691,156	[q]692,767	[q]660,834
Under federal control[g]	111,912	187,696	246,130	178,188	170,568	[R]168,938	167,369	118,369
Under local control	2,345,317	2,274,714	2,234,327	2,241,608	2,231,029	[R]2,232,793	2,248,357	2,285,447
County roads	1,742,404	1,732,981	1,542,984	1,616,634	1,626,927	[R]1,627,639	1,642,468	1,647,025
Town and township roads	538,651	510,174	458,231	437,460	424,529	426,170	426,433	426,340
Other local roads	64,262	31,559	233,112	187,514	179,573	[R]178,984	179,456	212,082
Total rural mileage	3,116,125	3,169,412	3,230,936	3,122,282	3,092,520	[R]3,092,887	3,108,493	3,064,650
Urban mileage								
Under state control	50,158	74,103	97,287	95,778	111,766	[R]111,924	112,226	110,017
Under federal control[g]	N	N	1,495	1,024	1,509	[R]1,470	1,464	1,485
Under local control	N	N	530,119	647,842	706,431	[R]713,371	722,418	730,152
County roads	N	N	71,357	95,929	117,518	[R]117,181	117,487	117,016
Town and township roads	N	N	37,583	42,752	60,561	60,926	74,402	75,195
Other local roads	379,410	486,567	421,179	509,161	528,352	[R]535,264	530,529	537,941
Total urban mileage	429,568	560,670	628,901	744,644	819,706	[R]826,765	836,108	841,654
Total rural and urban mileage	3,545,693	3,730,082	3,859,837	3,866,926	3,912,226	[R]3,919,652	3,944,601	3,906,304
Rural/urban mileage by functional system								
Rural mileage								
Interstate	N	N	[r]31,905	[rR]33,547	[r]32,580	[s]32,820	[s]32,817	[s]32,803
Other principal arterial	N	N	82,569	83,802	97,948	98,131	98,257	98,852
Minor arterial	N	N	149,057	144,774	137,151	137,359	[R]137,497	137,308
Major collector	N	N	439,000	436,352	431,712	432,117	432,714	432,408
Minor collector	N	N	299,613	293,922	274,081	273,198	272,362	272,140
Local	N	N	2,228,792	2,129,885	2,119,048	[R]2,119,262	[R]2,135,485	2,091,127
Total rural mileage	[t]3,116,125	[t]3,169,412	3,230,936	3,122,282	3,092,520	[R]3,092,887	[R]3,109,132	3,064,649

KEY: N = data do not exist; R = revised;
U = data are not available

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Highway Profile
Cont'd

Inventory cont'd	1960	1970	1980	1990	1995	1996	1997	R1998
Urban mileage								
Interstate	N	N	9,215	11,527	13,164	R13,217	R13,247	13,312
Other freeways and expressways	N	N	6,774	7,668	8,970	R9,027	R9,063	9,127
Other principal arterial	N	N	44,155	51,968	52,796	R52,983	R53,223	53,132
Minor arterial	N	N	66,377	74,659	88,510	R89,020	R89,195	89,496
Collector	N	N	68,387	78,254	87,331	R87,790	R88,049	88,071
Local	N	N	433,993	520,568	568,935	R574,728	R583,973	588,504
Total urban mileage	429,568	560,670	628,901	744,644	819,706	R826,765	R836,740	841,642
Total rural and urban mileage	3,545,693	3,730,082	3,859,837	3,866,926	3,912,226	R3,919,652	R3,945,872	3,906,290
U.S. roads and streets by surface								
Paved mileage								
Rural	919,082	1,188,080	t1,490,050	t1,550,283	t1,591,334	uR1,582,166	u1,605,804	u1,612,251
Urban	311,387	470,341	582,642	704,539	786,934	R798,484	804,131	808,093
Total	1,230,469	1,658,421	2,072,692	2,254,822	2,378,268	R2,380,650	2,409,935	2,420,344
Percent paved	34.7%	44.5%	53.7%	58.3%	60.8%	R60.5%	R60.9%	61.3%
Unpaved mileage								
Rural	t2,197,043	t1,981,332	t1,740,886	t1,571,999	t1,501,186	uR1,518,310	u1,510,330	u1,490,488
Urban	118,181	90,329	46,259	40,105	32,772	R35,227	38,019	38,061
Total	2,315,224	2,071,661	1,787,145	1,612,104	1,533,958	R1,553,537	1,548,349	1,528,549
Percent unpaved	65.3%	55.5%	46.3%	41.7%	39.2%	R39.5%	R39.1%	38.7%
Number of employees								
State and local govt. streets and highways	v532,000	v607,000	v559,000	v569,000	v560,000	U	v548,000	U
Highway and street construction	U	U	U	w238,700	w227,900	w236,100	wR242,800	w256,500

KEY: N = data do not exist; R = revised;
U = data are not available

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Highway Profile
Cont'd

Performance	1960	1970	1980	1990	1995	1996	1997	R1998
Vehicle-miles of travel by functional system (millions)[h]								
Rural								
Interstate	[x]10,514	[x]79,516	[x]135,084	[x]200,173	[y]223,382	[y]232,565	[yR]240,255	[y]251,520
Other principal arterial	N	N	132,958	175,133	215,567	221,403	[R]228,716	237,704
Minor arterial	N	N	129,816	155,733	153,028	157,444	[R]163,342	165,780
Major collector	N	N	150,186	190,512	186,212	190,923	[R]201,790	203,580
Minor collector	N	N	39,282	49,948	49,936	50,107	[R]52,574	54,278
Local	N	N	84,704	97,379	105,164	[R]107,752	[R]114,673	120,595
Total Rural	400,463	539,472	672,030	868,878	933,289	[R]960,194	[R]1,001,350	1,033,457
Urban								
Interstate	13,365	81,532	161,242	278,901	341,515	351,579	[R]361,401	374,622
Other freeways and expressways	N	N	79,690	127,465	151,509	157,502	[R]159,622	166,626
Other principal arterial	N	N	229,469	335,543	370,365	377,776	[R]385,125	388,073
Minor arterial	N	N	175,030	236,225	293,228	299,345	[R]301,912	309,295
Collector	N	N	83,043	106,297	126,883	129,310	[R]130,143	131,919
Local	N	N	126,791	191,053	205,907	208,374	[R]222,142	228,530
Total urban	318,299	570,252	855,265	1,275,484	1,489,407	1,523,886	[R]1,560,345	1,598,065
Total rural and urban	718,762	1,109,724	1,527,295	2,144,362	2,422,696	[R]2,484,080	[R]2,561,695	2,631,522
Highway demand for petroleum (thousand barrels)								
Motor fuel	[z]1,378,095	[z]2,198,310	[z]2,737,143	[z]3,113,214	[AA]3,424,616	[AAR]3,492,285	[AAR]3,580,620	[AA]3,687,704
Asphalt and road oil	[BB]110,000	[BB]163,000	[BB]145,000	[CC]176,340	[CC]177,543	[CCR]177,206	[CC]184,383	[CC]190,258
Total	1,488,095	2,361,310	2,882,143	3,289,554	3,602,159	[R]3,669,491	[R]3,765,003	3,877,962
Safety								
Fatalities	**[DD]36,399**	**[DD]52,627**	**[DD]51,091**	**[DD]44,599**	**[DD]41,817**	**[DD]42,065**	**[DDR]42,013**	**[DD]41,501**
Injured persons	**N**	**N**	**N**	**3,231,000**	**3,465,000**	**[R]3,483,000**	**3,348,000**	**3,192,000**
Crashes	**N**	**N**	**N**	**6,471,000**	**6,699,000**	**6,770,000**	**6,624,000**	**6,335,000**

KEY: N = data do not exist; R = revised;
U = data are not available

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[a] The Federal Highway Trust Fund was created with the enactment of the Highway Revenue Act of 1956. The total receipts shown for 1995 are overstated by approximately $1.59 billion due to a fiscal year(FY) 1994 error by the Treasury Department in reconciling estimated deposits to the actual tax revenue. The correction was made after the close of FY1994 and is shown in FY1995 receipts.

[b] Figures obtained by addition/subtraction and may not appear directly in data source.

[c] Revenues not necessarily allocated to highway expenditures.

[d] Includes distributors and dealers licenses, inspection fees, fines and penalties, and miscellaneous receipts.

[e] Includes drivers licenses, title fees, special title taxes, fines and penalties, estimated service charges, and local collections.

[f] Includes carrier gross receipt taxes; mileage, ton–mile and passenger–mile taxes; special license fees and franchise taxes; and certificate or permit fees.

[g] Mileage in Federal parks, forests, and reservations that are not a part of the state and local highway system.

[h] Highway category classifications changed several times before 1980. Actual 1960 data categories were: main Rural Roads, local Rural Roads and Urban Streets; 1970 data categories were: Rural Interstate, Rural Other Arterial, Other Rural, Urban Interstate and Other Urban.

NOTES: Motor vehicle injury and crash data in this profile come from the National Highway Traffic Safety Administration's General Estimates System (GES). The data from GES, which began operation in 1988, are obtained from a nationally representative probability sample selected from all police-reported crashes, and the GES sample includes only crashes where a police accident report was completed and the crash resulted in property damage, injury, or death. The resulting figures do not take into account crashes which were not reported to the police or which did not result in at least property damage.

Earlier editions of NTS, particularly the 1993 Historical Compendium, used crash and injury figures estimated by the National Safety Council, which employed a different set of methods to arrive at its figures. Thus, the injury and crash figures in this edition of NTS may not be comparable with those found in earlier editions.

In 1998, FHWA instituted a new method of creating mileage based tables derived from the Highway Peformance Monitoring System (HPMS). See Chapter 1 accuracy profiles for more information about the HPMS.

SOURCES: Unless otherwise noted, please refer to chapter tables for sources.

[i] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table HF-210.

[j] Ibid., *Highway Statistics* (Washington, DC: 1996, 1997, 1998), tables HF-10A and HF-10.

[k] Ibid., *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MF-201A.

[l] Ibid., *Highway Statistics* (Washington, DC: 1996, 1997, 1998), table MF-1.

[m] Ibid., *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MV-202.

[n] Ibid., *Highway Statistics* (Washington, DC:1996, 1997, 1998) table MV-2.

[o] Ibid., *Highway Statistics, Summary to 1985*, FHWA-PL-97-009 (Washington, DC: July 1997), table M-203.

[p] Ibid., Table HM-210.

[q] Ibid., *Highway Statistics* (Washington, DC: 1996, 1997, 1998), table HM-10.

[r] Ibid., Table HM-220.

[s] Ibid., *Highway Statistics* (Washington, DC: 1996, 1997, 1998), table HM-20.

[t] Ibid., *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table HM-212.

[u] Ibid., Table HM-12.

[v] U.S. Department of Commerce, *Statistical Abstract of the United States, various years,* State and Local Government Section.

[w] Ibid., Internet site http://stats.bls.gov/sahome.html, as of Aug. 16, 2000.

[x] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: April 1987), table VM-201.

[y] Ibid., *Highway Statistics* (Washington, DC: Various years), table VM-2, VM-2A.

[z] Ibid., *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A (total fuel consumed in thousands of gallons divided by 42).

[AA] Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1(total fuel consumed in thousands of gallons divided by 42).

[BB] U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, *1960-1980* (Washington, DC), p. 13.

[CC] Ibid., *Petroleum Supply Annual* (Washington, DC: Annual issues), table 2.

[DD] U.S. Department of Transportation, National Highway Traffic Safety Administration, National Center for Statistics and Analysis, NRD-30, personal communication.

Automobile Profile

Financial	1960	1970	1980	1990	1995	R1996	R1997	R1998
Personal auto expenditures ($ millions)								
New and used cars[a]	[g]16,571	[g]26,754	[g]57,243	[g,R]119,000	[g,R]132,200	[g,R]133,300	[g,R]135,600	[g]143,100
Tires, tubes, accessories, and parts	2,487	6,087	17,926	[R]29,900	[R]36,900	[R]38,700	[R]39,600	41,700
Gasoline and oil	12,004	21,921	86,689	[R]107,300	[R]113,300	[R]124,200	[R]128,100	115,200
Tolls	310	652	1,104	[R]2,300	[R]3,400	[R]3,700	[R]4,000	4,200
Insurance premiums less claims paid	2,029	3,752	9,443	[R]18,100	[R]29,700	[R]31,800	[R]36,300	38,000
Repair, greasing, washing, parking, storage, rental, and leasing	5,519	12,329	34,022	[R]84,900	[R]122,200	[R]134,200	[R]146,300	153,100
Auto registration fees	[h]867	[h]1,668	[h]2,893	[h]6,054	[h]7,043	[i]7,698	[i]8,163	[l]8,630
Driver's license fees	119	222	370	638	823	893	865	917
Total[a]	39,906	[R]73,385	209,690	[R]368,192	[R]445,567	[R]474,491	[R]498,928	504,847
Taxi expenditures ($ millions)	[g]609	[g]1,180	[g]1,866	[g,R]2,600	[g]3,200	[g]3,500	[g,R]3,700	[g]4,100
Inventory								
Number of vehicle registrations								
Passenger car and motorcycle	[j]62,245,422	[j]92,067,655	[j]127,294,783	[j]137,959,958	[k]132,283,966	[k,R]133,599,940	[k]133,575,077	135,717,988
Other 2-axle 4-tire vehicle	[e]	14,210,591	27,875,934	48,274,555	65,738,322	[R]69,133,913	70,224,082	71,330,205
Motorcycle	574,032	2,824,098	5,693,940	4,259,462	3,897,191	[R]3,871,599	3,826,373	3,879,450
Motor vehicle licensed drivers	[l]87,252,563	[l]111,542,787	[l]145,295,036	[l]167,015,250	[l]176,628,482	[l]179,539,340	[l]182,709,204	184,980,177
Number of employees								
Taxicabs[m]	120,700	106,400	52,500	32,400	30,700	30,500	30,600	31,200
Automotive dealers and service stations	1,267,200	1,617,400	1,688,500	2,063,100	2,189,600	2,266,700	[R]2,310,800	2,332,300
Motor vehicles, parts, and supplies	N	N	434,300	456,000	492,100	502,800	[R]513,000	516,600
Auto repair, services, and parking	N	N	570,900	913,700	1,020,100	1,080,000	[R]1,119,600	1,145,200
Performance								
Vehicle-miles (millions)								
Passenger car and motorcycle								
Rural highway								
Rural interstate	N	[n]62,342	[n]89,488	[n]117,519	[k]115,991	[k,R]120,323	[k,R]121,095	128,447
Rural other arterial	[n]233,452	182,213	180,857	211,066	212,063	[R]217,559	[R]221,732	230,435
Other rural roads	80,171	179,533	180,314	219,325	199,878	[R]203,147	[R]212,400	220,376
All rural	313,623	361,746	361,171	430,391	527,932	[R]541,029	[R]555,227	579,258
Urban highway[b]								
Urban interstate	N	69,369	124,480	184,783	205,489	[R]211,817	[R]215,525	222,066
Other urban	N	426,222	546,671	685,129	714,670	726,928	[R]741,885	758,536
All urban	273,389	495,591	671,151	869,912	920,159	[R]938,745	[R]957,410	980,602
Total rural and urban highway	587,012	857,337	1,032,322	1,300,303	1,448,091	[R]1,479,744	[R]1,512,637	1,559,860

KEY: N = data do not exist; R = revised

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Automobile Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	R1996	R1997	R1998
Vehicle-miles (millions) cont'd								
Other 2-axle 4-tire vehicle								
Rural highway								
Rural interstate	e	6,766	19,952	46,298	63,329	65,779	R69,030	72,345
Rural other arterial	e	29,808	56,137	87,474	118,305	R122,212	R129,890	132,043
Other rural roads	e	37,017	73,471	94,059	113,838	R119504	R128,396	130,420
All rural	e	73,591	149,560	227,831	295,472	R307495	R327,316	334,806
Urban highway[c]								
Urban interstate	e	6,252	23,067	71,500	109,807	112,908	R116,680	121,700
Other urban	e	43,443	118,308	275,239	384,750	R396,137	R406,743	411,769
All urban	e	49,695	141,375	346,739	494,557	R509,045	R523,423	533,469
Total rural and urban highway	e	123,286	290,935	574,570	790,029	R816540	R850,739	868,275
Vehicle-miles (millions)								
Passenger car and motorcycle	j587,012	j919,679	j1,121,810	j1,417,823	1,448,091	R1,479,774	R1,512,637	1,559,860
Other 2-axle 4-tire vehicle	e	123,286	290,935	574,571	790,029	R816,540	R850,739	868,275
Motorcycle	f	2,979	10,214	9,574	9,797	R9,920	R10,081	10,283
Total	587,012	1,042,965	R1,412,745	1,992,394	R3,280,932	R2,296,314	R2,363,376	2,428,135
Passenger-miles[c] (millions)								
Passenger car and motorcycle	a1,145,000	a1,754,175	a2,024,246	2,293,815	R2,282,870	R2,348,774	R2,400,960	2,475,961
Other 2-axle 4-tire vehicle	e	225,613	520,774	999,754	1,295,648	R1,339,126	R1,395,212	1,423,971
Motorcycle	f	3,277	12,257	12,424	11,560	11,706	11,896	12,134
Total	1,145,000	1,979,787	2,545,020	3,293,569	R3,578,518	R3,687,900	R3,796,172	3,899,932
Average miles traveled per vehicle								
Passenger car and motorcycle	R9,431	9,989	8,813	10,277	10,947	R13,892	R14,216	14,404
Other 2-axle 4-tire vehicle	e	8,676	10,437	11,902	12,018	R11,811	R12,115	12,173
Motorcycle	f	1,055	1,794	2,244	2,514	R2,562	R2,635	2,651
Fuel consumed (million gallons)								
Passenger car and motorcycle	41,171	67,879	70,186	69,759	68,268	R69,095	R70,094	71,904
Other 2-axle 4-tire vehicle	e	12,313	23,796	35,611	45,605	R47,133	R49,387	50,462
Motorcycle	f	60	204	191	196	198	202	205
Average fuel consumption per vehicle (gallons)								
Passenger car and motorcycle	668	737	551	506	516	R585	591	597
Other 2-axle 4-tire vehicle	e	866	854	738	694	R685	703	707
Motorcycle	f	21	36	45	50	R51	53	53

KEY: N = data do not exist; R = revised

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Automobile Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	R1996	R1997	R1998
Vehicle-miles (millions) cont'd								
Average miles traveled per gallon of fuel consumed								
Passenger car	14.3	13.5	16.0	20.3	21.2	R21.4	21.6	21.5
Other 2-axle 4-tire vehicle	e	10.0	12.2	16.1	17.3	R17.2	17.2	17.1
Motorcycle	f	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Safety								
Number of occupants and nonoccupant fatalities								
Passenger car	N	N	o27,449	o24,092	o22,423	o22,505	o22,199	21,194
Motorcycle	790	2,280	5,144	3,244	2,227	2,161	2,116	2,294
Bicycle[d]	490	760	965	859	833	765	814	760
Pedestrian[d]	7,210	8,950	8,070	6,482	5,584	5,449	5,321	5,228
Occupant fatality rates								
Per 100 million vehicle-miles								
Passenger car	4.7	3.8	2.5	1.7	1.5	1.5	R1.5	1.4
Motorcycle	N	76.5	50.4	33.9	22.7	21.8	R21.0	22.3
Per 10,000 registered vehicles								
Passenger car	5.1	3.9	2.6	R1.8	R1.7	R1.7	R1.8	1.7
Motorcycle	R13.8	8.1	9.0	7.6	5.7	5.6	5.5	5.9
Vehicle involvement rate (fatal crashes)								
Per 100 million vehicle-miles								
Passenger car	N	5.6	3.5	2.4	2.1	2.0	2.0	1.9
Motorcycle	N	22.9	50.9	34.3	23.1	21.9	21.4	22.7
Per 10,000 registered vehicles								
Passenger car	N	5.6	3.7	2.8	2.5	2.5	2.4	2.3
Motorcycle	N	8.2	9.1	7.7	5.8	5.6	5.6	6.0

KEY: N = data do not exist; R = revised

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NOTES:

[a] Figures obtained by addition/subtraction and may not appear directly in data source.

[b] Urban consists of travel on all roads and streets in urban places of 5,000 or greater population.

[c] In July 1997, the USDOT, Federal Highway Administration published revised passenger-miles data for the highway modes for many years. The major change reflected the reas signment of some vehicles from the passenger car category to the other 2-axle 4-tire vehicle category.

[d] Involvement only with motor vehicle.

[e] Included in single-unit 2-axle 6-tire or more truck category.

[f] Included in passenger car and motorcycle.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[g] U.S. Department of Commerce, Bureau of Economic Analysis, "Annual Only" NIPA Table 2.4 available at http://www.bea.doc.gov/bea/dn1.htm as of Aug 17, 2000

[h] U.S. Department of Transportation, Federal Highway Administration (FHWA), Highway Statistics, Summary to 1995, FHWA-97-009 (Washington, DC: July 1997), table MV-202.

[i] Ibid., *Highway Statistics* (Washington, DC: Annual issues), table MV-2.

[j] Ibid., *Highway Statistics*, Summary to 1995, FHWA-97-009 Washigton, DC: July 1997), table VM–201A.

[k] Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

[l] Ibid., *Highway Statistics* (Washington, DC: Annual issues), table DL-22.

[m] Ibid., internet site http://stats.bls.gov/sahome.html, as of Aug. 17, 2000, codes "414120 Taxicabs", "605500 Automotive Dealers and Service Stations", "525010 Motor Vehicle Parts, and Supplies" and "807500 Auto Repair, Services and Parking."

[n] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201.

[o] U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA), *Traffic Safety Facts 1998* (Washington, DC: October 1998), tables 3, 4, 7, and 10.

Truck Profile

Financial	1960	1970	1980	1990	1995	R1996	1997	R1998
Operating revenues, total ($ millions)	N	N	N	127,314	161,806	172,743	183,153	197,490
Local trucking	N	N	N	31,397	43,830	46,589	49,972	55,553
Trucking, except local	N	N	N	74,465	91,675	97,586	103,847	109,351
Local trucking with storage	N	N	N	4,115	5,154	5,502	5,860	6,144
Courier services, except by air	N	N	N	17,337	21,147	23,066	23,474	26,442
Operating expenses, total ($ millions)	N	N	N	118,968	151,628	162,825	170,998	179,908
Local trucking	N	N	N	28,049	38,695	41,325	43,871	47,478
Trucking, except local	N	N	N	70,965	88,061	94,390	98,570	101,584
Local trucking with storage	N	N	N	3,885	4,817	5,121	5,439	5,638
Courier services, except by air	N	N	N	16,069	20,055	21,989	23,118	25,207
Truck highway-user taxes ($ millions)								
State	1,709	3,429	6,731	12,691	13,844	U	15,750	15,611
Federal	1,121	2,203	3,157	6,665	11,273	U	12,260	13,086
Total[b]	2,830	5,632	9,888	19,356	R25,117	U	28,010	28,697
Inventory								
Number of truck registrations								
Single-unit truck	N	3,681,405	4,373,784	4,486,981	5,023,670	R5,266,029	5,293,358	5,734,925
Combination truck	N	905,082	1,416,869	1,708,895	1,695,751	R1,746,586	1,789,968	1,997,345
Total	11,914,249	4,586,487	5,790,653	6,195,876	6,719,421	7,012,615	7,083,326	7,732,270
Number of employees								
Trucking and courier services, except air	N	998,500	1,182,000	1,273,900	1,440,000	R1,482,000	R1,514,200	1,568,800
Truck drivers and deliverymen	1,477,000	1,565,000	1,931,000	2,148,000	2,861,000	2,542,000	R2,602,000	2,601,000
Number of trucking and courier establishments	N	64,756	69,796	90,709	112,887	116,861	121,111	U

KEY: N = data do not exist; R = revised; U = data are not available

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Truck Profile
Cont'd

Performance	1960	1970	1980	1990	1995	R1996	1997	R1998
Vehicle-miles (millions)								
Rural highway								
Rural interstate	N	10,069 [n]	25,111 [n]	35,789 [n]	43,351 [i]	45,721 [i]	R49,336 [i]	49,896
Rural other arterial	N	17,625	24,789	31,331	37,056	37,875	R39,193	39,724
Other rural roads	N	11,550	18,876	22,572	25,624	R25,884	R26,169	25,522
All rural roads	84,508 [n]	39,244	68,776	89,692	106,031	R109,480	R114,698	115,142
Urban highway[c]								
Urban interstate	N	5,634	13,135	22,163	25,639	26,256	R28,549	30,193
Other urban streets	N	17,337	26,580	34,387	46,486	47,235	R48,230	51,045
All urban streets	42,896	22,971	39,715	56,550	72,125	73,491	R76,779	81,238
Total rural and urban highway	127,405	62,215	108,491	146,242	178,156	R182,971	R191,477	196,380
Passenger-miles[e] (millions)								
Single-unit truck[d]	98,551	27,081	39,813	51,901	62,705	R64,072	R66,893	68,021
Combination truck	28,854	35,134	68,678	94,341	115,451	R118,899	R124,584	128,359
All trucks	127,405	62,215	108,491	146,242	178,156	R182,971	R191,477	195,380
Ton-miles, intercity (millions)	285,000 [o]	412,000 [o]	555,000 [o]	735,000 [o]	921,000 [o]	972,000 [o]	R996,000 [o]	1,027,000
Fuel consumed (million gallons)								
Single-unit truck	N	3,968 [h]	6,923 [h]	8,357 [h]	9,216 [i]	R9,409 [i]	R9,576 [i]	6,817 [i]
Combination truck	N	7,348	13,037	16,133	19,777	R20,192	R20,302	25,158
All trucks	15,882 [h]	11,316	19,960	24,490	28,993	R29,601	R29,878	31,975
Average fuel consumption per vehicle (gallons)								
Single-unit truck	N	1,078	1,583	1,862	1,835	R1,787	R1,809	1,189
Combination truck	N	8,119	9,201	9,441	11,663	R11,561	R11,342	12,596
All trucks	1,333	2,467	3,447	3,953	4,315	R4,221	R4,218	4,135
Average miles traveled per gallon of fuel consumed								
Single-unit truck	N	6.8	5.8	6.2	6.8	6.8	7.0	10.0
Combination truck	N	4.8	5.3	5.8	5.8	5.9	6.1	5.1
All trucks	8.0	5.5	5.4	6.0	R6.1	6.2	6.4	6.1

KEY: N = data do not exist; R = revised; U = data are not available

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Truck Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	R1996	1997	R1998
Average miles traveled per vehicle								
Single-unit truck	N	7,356	9,103	11,567	12,482	R12,167	R12,637	11,861
Combination truck	N	38,819	48,472	55,206	68,083	R68,075	R69,601	64,265
All trucks	10,693	13,565	18,736	23,603	26,514	R26,092	R27,032	25,397
Average length of haul (domestic freight) (miles)	272 p	263 p	363 p	391 p	416 p	R426 p	435	444
Safety								
Occupant fatalities								
Light truck	N	N	7,486 q	8,601 q	9,568 q	9,932 q	R10,249 q	10,705
Large truck	N	N	1,262	705	648	621	R723	742
All trucks	N	N	8,748	9,306	10,216	10,553	R10,972	11,447
Occupant fatality rate								
Per 100 million vehicle-miles								
Light truck	N	N	2.5	1.5	1.3	1.3	1.2	1.2
Large truck	N	N	1.2	0.5	0.4	0.3	0.4	0.4
All trucks	N	N	2.2	1.3	1.1	1.1	1.1	1.1
Per 10,000 registered vehicles								
Light truck	N	N	2.5	1.7	1.5	1.5	1.5	1.5
Large truck	N	N	2.2	1.1	1.0	0.9	1.0	1.0
All trucks	N	N	2.4	1.7	1.5	1.5	1.5	1.5
Vehicle involvement rate (fatal crashes)								
Per 100 million vehicle-miles								
Light truck	N	N	4.3	2.8	2.3	2.3	R2.3	2.2
Large truck	N	N	5.0	3.3	2.5	2.6	R2.6	2.5
All trucks	N	N	4.5	2.9	2.4	2.4	2.3	2.3
Per 10,000 registered vehicles								
Light truck	N	N	4.2	3.1	2.8	2.8	2.8	2.8
Large truck	N	N	9.3	7.7	6.7	6.8	6.9	6.4
All trucks	N	N	5.0	3.6	3.2	3.2	3.3	3.1

KEY: N = data do not exist; R = revised;
U = data are not available

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[a] **Local trucking (SIC 4212)** - Establishments primarily engaged in furnishing trucking or transfer services without storage for freight generally weighing more than 100 pounds.
Trucking, except Local (SIC 4213) - Establishments primarily engaged in furnishing "over-the-road" trucking services or trucking services and storage services, including household goods either as common carriers or under special or individual contracts or agreements, for freight generally weighing more than 100 pounds.
Local trucking, without Storage (SIC 4214) - Establishments primarily engaged in furnishing both trucking and storage services, including household goods.
Courier Services, except by Air (SIC 4215) - Establishments primarily engaged in the delivery of individually addressed letters, parcels, and packages (generally under 100 pounds).

[b] Numbers may not equal totals due to rounding.

[c] Urban consists of travel on all roads and streets in urban places of 5,000 or greater population.

[d] Includes other 2-axle 4-tire vehicle in 1960.

[e] Highway passenger-miles are calculated by multiplying vehicle miles of travel as cited by the Federal Highway Administration (FHWA) by the average number of occupants for each vehicle type as estimated by the FHWA using the Nationwide Personal Transportation Survey.

NOTE: In 1995, FHWA revised its vehicle type categories. These new categories include passenger car, other 2-axle 4-tire vehicle, single-unit 2-axle 6-tire or more truck, and combination truck. Other 2-axle 4-tire vehicles include vans, pickup trucks, and sport/utility vehicles. In previous years, some minivans and sport/utility vehicles were included in the passenger car category. Single-unit 2-axle 6-tire or more trucks are on a single frame with at least 2 axles and 6 tires.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[f] U.S. Census Bureau, *Transportation Annual Survey* (Washington, DC : December 1998), table 1.

[g] American Trucking Association, *American Trucking Trends* (Washington, DC: Annual issues).

[h] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

[i] Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

[j] U.S. Department of Labor, Bureau of Labor Statistics, *Employment, Hours and Earnings, United States, 1909-1994* (Washington, DC: September 1994), SIC 421.

[k] Ibid., Internet site www.bls.gov, as of Apr. 19, 1999.

[l] Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 61.

[m] U.S. Bureau of the Census, *County Business Patterns* (Washington, DC: Annual issues), table 1b (SIC 421).

[n] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201.

[o] Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 44.

[p] Ibid., p. 71.

[q] U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1999*, DOT HS 808 983 (Washington, DC: October 1999), tables 3, 8, and 9.

Bus Profile

Financial	1960	1970	1980	1990	1995	1996	1997	R1998
Expenditures ($ thousands)								
School bus	486,000 [b]	1,219,000 [b]	R3,833,000 [b]	R8,031,000 [b]	R9,889,000 [b]	R10,396,000 [b]	R10,353,000 [b]	10,326,000 [b]
Operating revenues ($ thousands)								
Intercity bus, class I	463,100 [c]	721,700 [c]	1,397,378 [c]	943,268 [c]	917,298 [d]	911,504 [d]	999,918 [d]	U [d]
Operating expenses ($ thousands)								
Intercity bus, class I	405,400	639,000	1,318,372	1,026,213	899,176	878,185	947,556	U
Inventory								
Number of operating companies								
Intercity bus, class I	143	71	61	31	28 [d]	27 [d]	U	U [d]
Number of vehicles								
All buses	272,129 [e]	377,562 [e]	528,789 [e]	626,987 [e]	685,503 [e]	694,781 [e]	697,548 [e]	715,540 [e]
Number of employees								
Intercity and rural bus	40,500 [f]	43,400 [f]	37,900 [f]	26,100 [f]	23,800 [g]	23,800 [g]	R22,200 [g]	24,400 [g]
School bus	N	N	79,900	111,200	131,100	132,200	R136,500	141,000
Performance								
Vehicle-miles (millions)								
All buses								
Rural highway								
Interstate rural	N	339 [h]	533 [h]	567 [h]	711 [h]	742 [i]	794 [i]	834 [i]
Other arterial rural	N	944	991	995	1,134	1,201	R1,243	1,282
Other rural	N	1,266	1,511	1,882	1,972	2,015	R2,072	2,135
All rural	2,332 [h]	2,549	3,035	3,444	3,817	3,958	R4,109	4,251
Urban highway [a]								
Interstate urban	N	277	560	455	580	598	647	663
Other urban	N	1,718	2,464	1,828	1,986	2,007	2,086	2,093
All urban	2,014	1,995	3,024	2,283	2,566	2,605	2,733	2,756
Total rural and urban highway	4,346	4,544	6,059	5,726	6,383	6,563	6,842	7,007

KEY: N = data do not exist; R = revised; U = data are not available

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Bus Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	R1998
Passenger-miles (millions)								
All buses	N	N	N	121,398	136,104	138,613	R145,060	148,558
Number of revenue passengers (thousands)								
Intercity bus, total	366,000 [b]	401,000 [b]	370,000 [b]	334,000 [b]	366,500 [b]	347,900 [b]	350,600 [b]	357,600 [b]
Average miles traveled per vehicle								
All buses	15,970 [l]	12,035 [l]	11,458 [l]	9,133 [l]	9,365 [i]	9,446 [i]	R9,809 [i]	9,793 [i]
Fuel consumed (million gallons)								
All buses	827	820	1,018	895	968	990	R1,027	1,040
Average fuel consumption per vehicle (gallons)								
All buses	3,039	2,172	1,925	1,427	1,412	R1425	R1,472	1,454
Average miles traveled per gallon of fuel consumed								
All buses	5.3	5.5	6.0	6.4	6.6	R6.6	R6.7	6.7
Average revenue per passenger-mile (cents) (intercity)	2.71 [b]	3.60 [b]	7.26 [b]	11.55 [b]	12.19 [b]	12.30 [b]	R12.45 [b]	12.48 [b]
Safety								
Number of fatalities								
School bus-related	N	N	150 [k]	115 [k]	123[k]	136 [k]	131 [k]	128 [k]
School bus								
Occupants	N	N	9	11	13	10	8	6
Other vehicle								
Occupants	N	N	88	64	72	101	99	91
Nonoccupants	N	N	53	40	38	25	24	31
Occupant fatalities								
All buses	N	N	46	32	R33	R21	18	38
School buses	N	N	14	13	R12	R10	8	6
Cross country buses	N	N	23	2	6	3	R5	13
Transit buses	N	N	6	3	R1	5	3	2
Other and unknown	N	N	3	14	14	3	R2	17

KEY: N = data do not exist; R = revised;
U = data are not available

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Bus Profile
Cont'd

Safety cont'd	1960	1970	1980	1990	1995	1996	1997	R1998
Fatalities in vehicular accidents								
All buses	N	N	390	340	340	297	343	334
Occupant fatality rate								
Per 100 million vehicle-miles								
All buses	N	N	0.8	0.6	0.5	0.3	R0.3	0.5
Per 10,000 registered vehicles								
All buses	N	N	0.9	0.5	0.5	R0.3	R0.3	0.5
Vehicle involvement rate								
Per 100 million vehicle-miles								
All buses	N	N	6.4	5.9	5.3	4.5	4.4	4.2
Per 10,000 registered vehicles								
All buses	N	N	7.4	5.4	5.0	4.3	4.3	4.1

KEY: N = data do not exist; R = revised; U = data are not available

NOTE: See transit profile for transit bus data.

[a] Urban consists of travel on all roads and streets in urban places of 5,000 or greater population.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[b] Eno Transportation Foundation, Inc., *Transportation In America, 1999* (Washington, DC: 2000), p. 42, 48, 50.

[c] Interstate Commerce Commission, *Annual Report of the ICC* (Washington, DC: Annual issues), Appendix F, tables 1, 6.

[d] U.S. Department of Transportation, Bureau of Transportation Statistics, *Selected Earnings Data, Class I Motor Carriers of Passengers* (Washington, DC: Annual issues).

[e] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Annual issues), table MV-10.

[f] U.S. Department of Labor, Bureau of Labor Statistics, *Employment, Hours and Earnings, United States, 1909-1994* (Washington, DC: September 1994), SIC codes 413, 415.

[g] Ibid., Internet site www.bls.gov, as of August 18, 2000.

[h] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: July 1997), table VM-201.

[i] Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

[j] Ibid., *Highway Statistics*, *Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

[k] Ibid., National Highway Traffic Safety Administration, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), Tables 74, 93.

Transit Profile

Financial	1960	1970	1980	1990	1995	1996	1997	1998[P]
Passenger operating revenues ($ millions)								
Passenger fares	1,335 l	1,639 l	2,556 l	[R]5,891 l	6,801 l	7,416 l	[R]7,546 l	7,717 l
Motor bus	N	N	N	2,967	3,287	3,515	[R]3,558	3,703
Heavy rail	N	N	N	1,741	2,018	2,322	2,351	2,297
Light rail	N	N	N	83	127	144	139	150
Trolley bus	N	N	N	46	54	55	57	55
Demand responsive	N	N	N	41	146	157	[R]170	153
Ferry boat[a]	N	N	N	56	60	54	[R]51	69
Commuter rail	N	N	N	952	1,078	1,146	1,178	1,255
Other[b]	N	N	N	26	46	24	[R]42	35
Other operating revenue	72 x	68 x	248 x	895 x	2,812 x	[R]2,928 x	[R]3,308 x	2,875 x
Total operating revenues	1,407	1,707	2,805	6,786	9,613	[R]10,345	[R]10,854	10,592
Operating assistance[c]								
State and local	N	N	2,611	8,297	7,811	8,210	[R]8,014	7,579
Federal	N	N	1,093	970	817	[R]596	[R]647	727
Total operating assistance	N	N	3,705	9,267	8,628	8,807	[R]8,661	8,305
Total revenues	1,407	1,707	6,510	16,053	18,241	19,151	[R]19,515	18,897
Operating expenses ($ millions)								
Motor bus	N	N	N	8,903 j	10,321 j	10,575 j	[R]10,944 j	11,048 j
Heavy rail	N	N	N	3,825	3,523	3,402	3,474	3,530
Light rail	N	N	N	237	376	442	[R]473	503
Trolley bus	N	N	N	109	139	135	140	147
Demand responsive	N	N	N	518	1,000	1,187	[R]1,285	1,273
Ferry boat[a]	N	N	N	171	210	183	[R]221	267
Commuter rail	N	N	N	1,939	2,211	2,294	[R]2,278	2,365
Other[b]	N	N	N	41	67	124	[R]122	117
Total operating expenses[d]	N	N	6,247	15,742	17,849	18,341	[R]18,936	19,249

KEY: ~ = included in heavy rail figure; + = included in motor bus figure;
N = data do not exist; NA = not applicable;
P = preliminary; R = revised

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Transit Profile
Cont'd

Financial cont'd	1960	1970	1980	1990	1995	1996	1997	1998[P]
Depreciation and amortization	N	N	278 [k]	1,593 [k]	2,601 [k]	2,885 [k]	[R]3,106 [k]	3,349 [k]
Other reconciling items	N	N	186	644	1,091	1,034	[R]1,117	1,116
Total expenses	1,377	1,996	6,711	17,979	21,540	22,260	[R]23,159	23,715
Average passenger revenue per passenger-mile ($)								
Motor bus	N	N	N	0.14 [il]	0.17 [il]	0.18 [il]	0.18 [il]	0.18 [il]
Heavy rail	N	N	N	0.15	0.19	0.20	0.20	0.19
Light rail	N	N	N	0.15	0.15	0.15	0.13	0.13
Trolley bus	N	N	N	0.24	0.29	0.30	0.30	0.30
Demand responsive	N	N	N	0.10	0.29	0.24	[R]0.23	0.15
Ferry boat[a]	N	N	N	0.20	0.23	0.21	[R]0.17	0.20
Commuter rail	N	N	N	0.14	0.13	0.14	0.15	0.14
Other[b]	N	N	N	0.21	0.17	0.07	[R]0.11	0.09
All modes	N	N	N	0.14	[R]0.17	0.18	0.18	0.17
Average passenger fare ($)								
Motor bus	N	N	N	0.52 [m]	0.66 [m]	0.70 [m]	0.70 [m]	0.69 [m]
Heavy rail	N	N	N	0.74	0.99	1.08	0.97	0.96
Light rail	N	N	N	0.47	0.50	0.55	0.53	0.55
Trolley bus	N	N	N	0.36	0.45	0.47	0.47	0.47
Demand responsive	N	N	N	0.60	2.26	2.21	1.83	1.60
Ferry boat[a]	N	N	N	1.11	1.31	1.12	[R]0.99	1.32
Commuter rail	N	N	N	2.90	3.13	3.24	3.30	3.28
Other[b]	N	N	N	0.90	1.57	1.33	0.66	0.62
All modes	0	0	0	0.67	0.87	0.93	0.89	0.87

KEY: ~ = included in heavy rail figure; + = included in motor bus figure;
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Transit Profile
Cont'd

Inventory	1960	1970	1980	1990	1995	1996	1997	1998[P]
Number of systems								
Motor bus	1,236 [n]	1,075 [n]	1,022 [n]	2,685 [n]	2,250 [n]	2,250 [n]	2,250 [n]	2,262 [n]
Heavy rail	31	15	11	12	14	14	14	14
Light rail	~	~	9	17	22	22	22	23
Trolley bus	19	6	5	5	5	5	5	5
Demand responsive	N	N	N	3,193	5,214	5,214	5,214	5,254
Ferry boat[a]	N	N	16	27	25	25	25	28
Commuter rail	N	N	18	14	16	16	18	18
Other[b]	N	N	5	35	69	69	70	72
Total[e]	1,286	1,096	1,055	5,078	5,973	5,973	5,975	6,000
Number of vehicles								
Motor bus	49,600 [o]	49,700 [o]	59,411 [o]	58,714 [o]	67,107 [o]	71,678 [o]	[R]72,770 [o]	74,641 [o]
Heavy rail	9,010	9,286	9,641	10,419	10,157	10,201	10,242	10,301
Light rail	2,856	1,262	1,013	913	999	1,140	1,229	1,205
Trolley bus	3,826	1,050	823	832	885	871	859	880
Demand responsive	N	N	N	16,471	29,352	30,804	[R]32,509	32,899
Ferry boat[a]	N	N	N	108	110	109	[R]134	124
Commuter rail	N	N	4,500	4,415	4,565	4,665	4,943	4,907
Other[b]	N	N	N	1,089	2,699	2,894	[R]3,674	4,013
Total	65,292	61,298	75,388	92,961	115,874	122,362	[R]126,360	128,970
Number of employees[f]								
Motor bus	121,300 [p]	101,598 [p]	N	162,189 [p]	181,973 [p]	190,152 [p]	[R]196,861	193,542
Heavy rail	35,100	36,442	N	46,102	[R]45,644	45,793	45,935	45,155
Light rail	+	+	N	4,066	4,935	5,728	[R]5,940	6,048
Trolley bus	+	+	N	1,925	1,871	2,084	2,037	2,047
Demand responsive	N	N	N	22,740	39,882	44,667	[R]44,029	47,509
Ferry boat[a]	N	N	N	2,813	2,697	2,830	[R]3,166	3,433
Commuter rail	N	N	N	21,443	22,320	22,604	[R]21,651	22,399
Other[b]	N	N	N	898	1,169	1,086	[R]1,140	1,246
Total	156,400	138,040	189,300	262,176	300,491	314,944	[R]320,759	321,379

KEY: ~ = included in heavy rail figure; + = included in motor bus figure;
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Transit Profile
Cont'd

Performance	1960	1970	1980	1990	1995	1996	1997	1998[P]
Vehicle-miles (millions)								
Motor bus	1,576 [q]	1,409 [q]	1,677 [q]	2,130 [q]	2,184 [q]	2,221 [q]	[R]2,245 [q]	2,291 [q]
Heavy rail	391	407	385	537	537	543	558	566
Light rail	75	34	18	24	35	38	41	43
Trolley bus	101	33	13	14	14	14	14	14
Demand responsive	N	N	N	306	507	548	[R]585	698
Ferry boat[a]	N	N	2	2	3	3	[R]3	2
Commuter rail	N	N	179	213	238	242	251	265
Other[b]	N	N	13	16	33	43	[R]50	53
Total	2,143	1,883	2,287	3,242	3,550	3,650	[R]3,746	3,932
Unlinked passenger trips (millions)								
Motor bus	N	5,034 [r]	5,837 [r]	5,677 [r]	4,848 [r]	4,887 [r]	[R]5,013 [r]	5,387 [r]
Heavy rail	N	1,881	2,108	2,346	2,033	2,157	2,430	2,393
Light rail	N	124	133	175	251	261	[R]262	275
Trolley bus	N	182	142	126	119	117	121	117
Demand responsive	N	N	–	68	88	93	[R]99	95
Ferry boat[a]	N	N	63	50	47	48	[R]51	52
Commuter rail	N	N	280	328	344	352	357	382
Other[b]	N	N	4	29	33	33	[R]41	45
Total	N	7,332	8,567	8,799	7,763	7,948	[R]8,374	8,746
Passenger-miles (millions)								
Motor bus	N	N	21,790 [y]	20,981 [y]	18,818 [y]	19,096 [y]	[R]19,604 [y]	20,602 [y]
Heavy rail	N	N	10,558	11,475	10,559	11,530	12,056	12,284
Light rail	N	N	381	571	860	957	[R]1,035	1,118
Trolley bus	N	N	219	193	187	184	189	182
Demand responsive	N	N	N	431	607	656	[R]754	1,012
Ferry boat[a]	N	N	c	286	260	256	[R]294	345
Commuter rail	N	N	6,516	7,082	8,244	8,351	8,038	8,716
Other[b]	N	N	390	124	273	348	[R]369	397
Total	N	N	39,854	41,143	39,808	41,378	[R]42,339	44,656

KEY: ~ = included in heavy rail figure; + = included in motor bus figure;
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Transit Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	1998[P]
Average trip length (miles)								
Motor bus	N	N	N	N	4 [s]	4 [s]	4 [s]	4 [s]
Heavy rail	N	N	N	N	5	5	5	5
Light rail	N	N	N	N	3	4	4	4
Trolley bus	N	N	N	N	2	2	2	2
Demand responsive	N	N	N	N	8	9	10	11
Ferry boat[a]	N	N	N	N	6	5	[R]6	6
Commuter rail	N	N	N	N	24	24	23	23
Vanpool	N	N	N	N	35	34	33	36
Other[b]	N	N	N	N	1	1	1	1
All modes	N	N	N	N	5	5	5	5
Average speed (miles per hour)								
Motor bus	N	N	N	N	13 [t]	13 [t]	13 [t]	13 [t]
Heavy rail	N	N	N	N	21	21	21	21
Light rail	N	N	N	N	14	14	16	16
Trolley bus	N	N	N	N	8	8	8	8
Demand responsive	N	N	N	N	15	15	15	17
Ferry boat[a]	N	N	N	N	6	7	[R]7	8
Commuter rail	N	N	N	N	34	33	34	32
Vanpool	N	N	N	N	35	37	36	37
Other[b]	N	N	N	N	6	7	7	7
All modes	N	N	N	N	15	15	15	15
Energy consumption, diesel (million gallons)								
Motor bus	N	N	N	563 [u]	564 [u]	578 [u]	[R]598	554
Heavy rail	NA	NA	NA	NA	NA	NA	NA	NA
Light rail	NA	NA	NA	NA	NA	NA	NA	NA
Trolley bus	NA	NA	NA	NA	NA	NA	NA	NA
Demand responsive	N	N	N	15	29	31	[R]32	44
Ferry boat[a]	N	N	N	20	22	22	24	24
Commuter rail	N	N	N	53	63	62	[R]63	78
Other[b]	N	N	N	[R]<1	< 1	< 1	< 1	<1
Total	208 [u]	271 [u]	431 [u]	651	678	693	[R]717	700

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Transit Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	1998[P]
Gasoline and other nondiesel fuels[g]	192 [v]	68 [v]	11 [v]	33 [v]	61 [v]	61 [v]	[R]59 [v]	50 [v]
Compressed natural gas	U	U	U	U	11	15	[R]24	31
Total	192	69	11	34	71	76	[R]83	81
Energy consumption (million kWh)								
Motor bus	NA	NA	NA	NA	NA	NA	NA	NA
Heavy rail	N	N	N	3,284 [w]	3,401 [w]	3,332 [w]	3,253 [w]	3,280 [w]
Light rail	N	N	N	239	288	321	[R]361	383
Trolley bus	N	N	N	69	100	69	78	74
Demand responsive	NA	NA	NA	NA	NA	NA	NA	NA
Ferry boat[a]	NA	NA	NA	NA	NA	NA	NA	NA
Commuter rail	N	N	N	1,226	1,253	1,255	[R]1,270	1,480
Other[b]	N	N	N	19	26	30	[R]26	33
Total	2,908 [w]	2,561 [w]	2,446 [w]	4,837	5,068	5,007	[R]4,988	5,250
Safety[h]								
Fatalities, all modes	N	N	N	339	274	264	275	286
Injured persons, all modes	N	N	N	54,556	57,196	55,288	56,132	55,990
Incidents, all modes	N	N	N	90,163	62,471	59,392	[R]61,561	60,094

KEY: ~ = included in heavy rail figure; + = included in motor bus figure;
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[a] Excludes international, rural, rural interstate, island and urban park ferries.

Includes cable car, inclined plane, aerial tramway, monorail, vanpool, and automated guideway.

[c] Beginning in 1992, local operating assistance and other revenue declined by about $500 million due to change in accounting procedures at the New York City Transit Authority. Beginning in 1992, total operating expense declined by about $400 million due to a change in accounting procedures at the New York City Transit Authority.

[d] Included in other.

[e] The total figure represents the number of transit agencies. It is not the sum of all modes since many agencies operate more than one mode.

[f] Based on employee equivalents of 2,080 hours equals one employee; beginning in 1993, based on number of actual employees.

[g] Liquefied natural gas, liquefied petroleum gas, methanol, propane, and other nondeisel fuels, except compressed natural gas.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[h] U.S. Department of Transportation, Federal Transit Administration.*Safety Management Information Statistics (SAMIS)*, (Washington, DC: Annual reports).

[i] American Public Transportation Association, *Transportation Fact Book* (Washington, DC: 2000), tables 21, 22, D2 and similar tables for prior years.

[j] Ibid., 2000 edition table 25, and similar tables in earlier years

Ibid., 2000 edition table 24, and similar tables in earlier years.

[l] Ibid., 2000 edition table 18, and similar tables in earlier years.

[m] Ibid., 2000 edition table 20, and similar tables in earlier years.

[n] Ibid., 2000 edition table 1, and similar tables in earlier years.

[o] Ibid., 2000 edition table 46, and similar tables in earlier years.

[p] Ibid., 2000 edition table 62, and similar tables in earlier years.

[q] Ibid., 2000 edition table 42, and similar tables in earlier years.

[r] Ibid., 2000 edition table 26, and similar tables in earlier years.

[s] Ibid., 2000 edition table 39, and similar tables in earlier years.

[t] Ibid., 2000 edition table 44, and similar tables in earlier years.

[u] Ibid., 2000 edition table 65, and similar tables in earlier years.

[v] Ibid., 2000 edition table 66, and similar tables in earlier years.

[w] Ibid., 2000 edition table 67, and similar tables in earlier years.

[x] Ibid., 2000 edition table 17, and similar tables in earlier years.

y Ibid., 2000 edition table 30, and similar tables in earlier years.

Rail Profile

Financial	1960	1970 [a]	1980	1990	1995	1996	1997	1998
Class I[b]								
Operating revenues ($ millions)								
Passenger	640 [f]	421 [f]	446 [f]	94 [f]	89 [f]	59 [f]	60 [f]	61 [f]
Freight	8,025	10,922	26,350	27,471	31,356	31,889	32,322	32,247
Other	849	649	1,462	805	835	745	736	843
Total	9,514	11,992	28,258	28,370	[R]32,279	32,693	33,118	33,151
Operating expenses ($ millions)[c]	8,775	11,478	26,355	24,652	27,897	26, 331	27,291	27,916
Amtrak								
Total revenue ($ millions)	N	162	429	1,308 [h]	1,497 [h]	1,555 [h]	1,674 [h]	2,285 [h]
Total expenses ($ millions)	N	301	1,103	2,012	2,305	2,318	2,436	2,638
Inventory								
Class I[b]								
Number of vehicles								
Class I freight cars	1,658,292	1,423,921 [f]	1,168,114 [f]	658,902 [f]	583,486 [f]	570,865 [f]	568,493 [f]	575,604 [f]
Other nonclass I freight cars	307,194	360,260	542,713	553,359	635,441	669,708	701,926	740,063
Freight cars, total	1,965,486	1,784,181	1,710,827	1,212,261	1,218,927	1,240,573	1,270,419	1,315,667
Locomotives	29,031	27,077	28,094	18,835	18,812	19,269	19,684	20,261
Number of companies	106	71	38	14	11	10	9	9
Number of employees	780,494	566,282	458,994	216,424	188,215	181,809	177,981	178,222
Miles of road owned	207,334	196,479	164,822	119,758	108,264	105,779	102,128	100,570
Amtrak								
Number of vehicles								
Passenger								
Train-cars	N	1,569 [g]	2,128 [g]	1,863 [h]	1,722 [h]	1,730 [h]	1,728 [h]	1,962 [h]
Locomotives	N	185	419	318	313	299	332	345
Number of employees	N	1,500 [j]	21,416 [j]	24,000 [j]	23,646	23,278 [g]	23,555 [g]	24,528 [f]
System route mileage	N	N	24,000 [k]	24,000 [k]	24,000	25,000 [h]	25,000 [h]	22,000 [h]

KEY: N = data do not exist; R = revised; U = data are not available

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Rail Profile
Cont'd

Performance	1960	1970 [a]	1980	1990	1995	1996	1997	1998
Class I [b]								
Car mileage, freight (thousands)	28,170,000 [f]	29,890,000 [f]	29,277,000 [f]	26,159,000 [f]	30,383,000 [f]	31,715,000 [f]	31,660,000 [f]	32,657,000 [f]
Train mileage, freight (thousands)	404,464	427,065	428,498	379,582	458,271	468,792	474,954	474,947
Locomotive mileage (thousands)								
Freight	421,900 [l]	1,278,200 [l]	1,319,010 [l]	1,144,559 [l]	1,293,851 [l]	1,311,351 [l]	1,281,768 [l]	1,285,706 [l]
Train and yard switching	N	N	212,040	135,806	150,840	153,798	141,461	153,997
Total	N	N	1,531,050	1,280,365	1,444,691	1,465,149	1,423,229	1,439,703
Revenue ton-miles of freight (millions)	572,309 [f]	764,809 [f]	918,958 [f]	1,033,969 [f]	1,305,688 [f]	1,355,975 [f]	1,348,926 [f]	1,376,802 [f]
Average length of haul, freight (miles)	461	515	616	726	843	842	851	835
Fuel consumed in freight service (million gallons)	3,463	3,545	3,904	3,115	3,480	3,579	3,575	3,583
Average miles traveled per vehicle								
Locomotive	N	N	54,497	67,978	76,796	76,037	72,304	71,058
Car	14,332	16,753	17,113	21,579	24,926	25,565	24,921	24,822
Average miles traveled per gallon								
Train	0.12	0.12	0.11	0.12	0.13	0.13	0.13	0.13
Car	8.13	8.43	7.50	8.40	8.73	8.86	8.86	9.11
Amtrak								
Passenger train car-miles (millions)	N	213 [m]	235 [m]	301 [m]	292 [p]	276 [p]	288 [p]	312 [p]
Passenger train-miles (millions)	N	26	30	33	32	30	32	33
Passenger locomotive-miles (millions)	N	N	41	49	48	U	U	U
Revenue passengers carried (millions)	N	17	21	22	21	20	20	21
Revenue passenger-miles (millions)	N	3,039	4,503	6,057 [h]	5,545 [h]	5,050 [h]	5,166 [h]	5,304 [h]
Average passenger fare (dollars)	N	8.3 [n]	17.7	38.5	39.0	42.5	44.3	44.0
Average passenger revenue/ passenger-mile (cents)	N	4.5	8.2	14.1	14.6	16.6	17.3	17.5
Average passenger trip length (miles)	N	182.6	217.0	273.0	267.6	256.9	255.8	251.5
Locomotive fuel consumed								
Diesel (million gallons)	N	N	64	82	66 [q]	71 [q]	75 [q]	75 [q]
Electric kWh (millions)	N	N	254	330	304	293	282	275

KEY: N = data do not exist; R = revised; U = data are not available

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Rail Profile
Cont'd

Safety[d,o]	1960	1970 [a]	1980	1990	1995	1996	1997	1998
Number of fatalities, railroads and grade crossings								
Passenger on trains	34	10	4	3	0	12	6	4
Employees on duty	215	179	97	40	34	33	37	27
Employees not on duty	N	N	4	0	2	0	0	2
Trespassers	637	607	566	700	660	620	646	644
Non-trespassers	1,459	1,535	R746	R554	443	365	363	326
Contractor employees	N	N	7	3	7	9	11	5
Railroad and grade crossing, total	2,345	2,225	1,417	1,297	1,146	1,039	1,063	1,008
Grade crossing only	1,421	1,440	R772	698	579	488	461	431
Railroad only[e]	924	785	R645	599	567	551	602	577

KEY: N = data do not exist; R = revised; U = data are not available

[a] Amtrak data in this column are for 1972, Amtrak's first full year of operation.

[b] Excluding Amtrak and all non-Class I railroads, except for Section IV.

[c] Operating expenses include equipment, joint facility rents, leased roads and equipment, and all taxes except Federal income.

[d] Safety figures from U.S. Department of Transportation, Federal Railroad Administration are for all railroads.

[e] Figures may not appear directly in data source.

NOTE: Amtrak figures are based on Amtrak fiscal year (October 1-September 30).

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[f] Association of American Railroads (AAR), *Railroad Facts*, Annual issues, 1990-1998, pp. 3, 10, 12, 13, 14, 33, 34, 36, 40, 44, 48, 50, 56, 78.

[g] Amtrak, *National Railroad Passenger Corporation Annual Report,*1972, 1980, 1990, 1993-95.

[h] Ibid., *Statistical Appendix to Amtrak Annual Report*, annual issues.

[i] Ibid., Human Resources Information Center, personal communication.

[j] Ibid., Public Affairs, personal communication.

[k] Ibid., Route Miles by Railroad, Corp. Planning & Development.

[l] Association of American Railroads (AAR), *Analysis of Class 1 Railroads*, annual issues.

[m] Amtrak, *Train Information System Reports*.

[n] Ibid., *Train Earnings Reports*.

[o] 1960-80: U.S. Department of Transportation, Federal Railroad Administration, Systems Support Division, RRS-22, personal communication.

1990-96: Ibid., *Accident/Incident Bulletin*, annual issues, tables 7 and 9.

1997-98: Ibid., *Railroad Safety Statistics, Annual Report 1998*, table 1-3.

[p] Amtrak Corporate Reporting, Route Profitability System, Washington D.C., personal communication, June 1999.

[q] Amtrak General Accounting, Pennsylvania, personal communication, June 1999.

Water Transport Profile

Financial	1960	1970	1980	1990	1995	1996	1997	1998
Operating revenues ($ millions)								
Domestic freight	1,722 [i]	2,070 [i]	7,219 [i]	7,940 [i]	7,712 [i]	7,684 [i]	[R]6,901 [i]	6,886 [i]
Coastal waterways	747	834	3,155	3,066	2,774	2,782	[R]2,169 [i]	2,115 [i]
Inland waterways	461	621	2,395	2,956	2,964	3,044	[R]2,860	2,801
Great lakes	227	239	513	615	585	579	[R]615	612
Locks, channels	287	376	1,156	1,303	1,389	1,279	1,257	1,358
International freight[h]	1,765	3,187	8,279	12,181	[R]14,069	17,281	[R]14,091	15,679
Passenger, total	281	287	304	[R]1,386	[R]1,709	[R]1,800 0	[R]1,180 0	1,147
Domestic passenger, intercity	14	12	21	[R]99 [u]	[R]129 [u]	[R]141 [u]	[R]141 [u]	147 [u]
International passenger[a]	267	275	283	1,287 [i]	1,580 [i]	1,659 [i]	[R]1,039 [i]	1,000 [i]
Revenues of U.S. commercial fishing Fleet (domestic landings) ($ millions)	**354 [j]**	**613 [j]**	**2,237 [j]**	**3,522 [j]**	**3,770 [j]**	**3,487 [j]**	**[R]3,448 [j]**	**3,128 [j]**
Inventory								
Number of domestic inland Vessel operators[b]	228 [k]	380 [k]	403 [k]	565 [k]	557 [k]	554 [k]	U	U
Number of employees								
Ships, boat building, and repairing	141,200 [l]	171,800 [l]	220,500 [l]	187,700 [m]	159,600 [n]	158,800 [n]	[R]158,300 [n]	165,900 [n]
Water transportation[c]	N	212,300	211,200	176,600	174,500	174,100	[R]178,700	180,000
Number of employees[d]								
Passenger/combo	8,560 [o]	2,178 [o]	618 [o]	642 [o]	642 [o]	321 [o]	321 [o]	321 [c]
Cargo	28,668	22,257	9,878	7,019	5,400	4,964	4,831	4,924
Tankers	12,053	10,567	8,722	4,471	4,261	3,965	3,785	3,711
Total	49,281	35,000	19,218	12,132	10,303	9,250	8,937	8,956
Mileage of commercially Navigable channels	**25,000 [i]**	**26,000 [i]**	**26,000 [i]**	**26,000 [i]**	**26,000 [i]**	**26,000 [i]**	**[R]26,000 [i]**	**26,000 [i]**
Number of vessels								
Total nonself-propelled	16,777 [p]	19,377 [p]	31,662 [p]	31,209 [p]	31,360 [p]	32,811 [p]	33,011 [p]	33,509 [p]
Dry cargo barges and scows	14,025	15,890	27,426	27,091	27,342	28,743	29,006	29,526
Tankers	2,429	3,281	4,166	3,913	3,985	4,036	3,971	3,952
Railroad car floats	323	206	70	13	33	32	34	31

KEY: N = data do not exist; R = revised; U = data are not available

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Water Transport Profile
Cont'd

Inventory cont'd	1960	1970	1980	1990	1995	1996	1997	1998
Total self-propelled	6,543	6,455	7,126	8,236	8,281	8,293	8,408	8,523
Dry cargo/passenger	1,796	1,761	2,036	2,678	2,804	2,782	2,905	2,938
Ferries, railroad car	31	17	67	135	172	173	183	213
Tankers	489	421	330	213	178	161	147	135
Towboats/tugs	4,203	4,248	4,693	5,210	5,127	5,177	5,173	5,237
U.S. merchant marine ships (over 1,000 gross tons)								
Total U. S. flag	2,926 [q]	1,579 [q]	864 [q]	636 [q]	509 [q]	495 [q]	477	470
Passenger/cargo	309	171	65	10	13	15	14	12
Freighters	2,138	1,076	471	367	295	292	288	289
Bulk carriers	57	38	20	26	20	15	14	15
Tankers	422	294	308	233	181	173	161	154
Privately owned	1,008	U	578	408	319	302	285	281
Government owned	1,918	U	286	228	190	193	192	189
Number of recreational boats (thousands)[e]	**2,500** [r]	**7,400** [r]	**[R]8,905** [r]	**[R]10,996** [r]	**[R]11,735** [r]	**[R]11,878** [r]	**12,313** [r]	**12,567** [r]
Performance								
Ton-miles (thousands)[f]								
Domestic water freight								
Coastwise	N	359,784,000 [s]	631,149,247 [s]	479,133,600 [s]	440,345,100 [s]	408,086,100 [s]	349,843,000 [s]	314,863,900 [s]
Internal	N	155,816,000	227,342,991	292,393,300	306,329,100	296,790,600	[R]294,023,000	294,896,400
Lakewise	N	79,416,000	61,747,114	60,929,900	[R]59,703,800	58,335,300	[R]62,165,900	61,654,300
Intraport	N	1,179,000	1,596,412	1,087,000	1,349,600	1,474,500	1,378,100	1,380,700
Total	N	596,195,000	921,835,764	853,543,800	748,023,800	764,686,500	[R]707,409,900	672,795,000
Tons of freight hauled (thousands)								
Domestic								
Coastwise	209,197	238,440	329,609	298,637	266,612	267,389	[R]263,146	249,633
Internal	291,057	472,123	534,979	622,595	620,324	622,081	[R]630,558	625,028
Lakewise	155,109	157,059	115,124	110,159	116,127	114,870	[R]122,734	122,156
Intraport[R]	104,193	81,475	94,184	86,378	83,104	89,011	[R]89,816	90,077
Intraterritory	1,017	1,630	3,588	4,529	6,868	7,327	[R]6,273	7,217
Total	760,573	950,727	1,077,483	1,122,299	1,093,035	1,100,679	[R]1,112,527	1,094,112

KEY: N = data do not exist; R = revised;
U = data are not available

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Water Transport Profile
Cont'd

Performance cont'd	1960	1970	1980	1990	1995	1996	1997	1998
Exports								
Great lakes ports	23,150	35,932	45,077	32,898	32,968	31,855	33,209	36,876
Coastal ports	104,810	205,698	358,806	408,688	441,732	418,940	399,104	367,831
Total	**127,961**	**241,629**	**403,883**	**441,586**	**474,700**	**450,794**	**432,313**	**404,708**
Imports								
Great lakes ports	12,851	26,406	15,515	17,578	18,897	24,503	24,532	25,558
Coastal ports	198,466	312,934	502,006	582,412	653,760	708,090	763,771	815,122
Total	211,316	339,340	517,521	599,970	672,657	732,593	788,303	840,680
Average haul, domestic system (miles)[f]								
Coastwise	1,496	1,509	1,915	1,604	1,652	1,526	1,330	1,261
Internal	282	330	405	[R]470	494	477	466	472
Lakewise	522	506	536	553	514	508	507	505
Cargo capacity (short tons)								
Total nonself-propelled vessels	16,355,657 [p]	24,026,024 [p]	44,875,116 [p]	[R]48,946,785 [p]	51,140,530 [p]	54,086,973 [p]	54,974,961 [p]	55,999,952 [p]
Dry cargo barges	12,147,006	17,695,275	34,486,851	[R]38,189,490	39,971,443	42,748,644	43,710,093	44,718,691
Tankers	4,208,651	6,330,749	10,388,265	[R]10,757,295	11,169,087	11,338,329	11,264,868	11,281,261
Total self-propelled vessels	15,905,881	19,284,050	23,906,346	19,723,788	15,783,399	14,850,253	14,161,739	12,970,167
Dry cargo/passenger	12,188,956	10,815,977	8,011,587	7,042,263	6,484,707	6,208,011	6,685,719	6,371,425
Tankers	3,716,925	8,468,073	15,894,753	12,681,525	9,298,692	8,642,242	7,476,020	6,598,742
Fuel consumption (thousand barrels)								
Diesel fuel and distillate	18,730 [i]	19,503 [i]	35,201 [i]	52,310 [i]	47,098 [i]	51,848 [i]	50,180 [i]	50,609 [i]
Residual fuel oil	94,084	89,850	213,131	148,764	153,125	138,213	114,044	110,480
Gasoline	9,200	14,238	25,048	30,962	25,250	23,659	[R]23,659	22,767
Total	122,014	123,591	273,380	232,036	225,473	213,720	[R]187,883	183,856

KEY: N = data do not exist; R = revised;
U = data are not available

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Water Transport Profile
Cont'd

Safety	1960	1970	1980	1990	1995	1996	1997	1998
Fatalities in waterborne transport (vessel casualties only)								
Freight	N	30 [t]	8 [t]	0 [t]	0 [t]	0 [t]	2 [t]	0 [t]
Tankship	N	4	4	5	0	0	0	0
Passenger vessel	N	1	5	3	4	2	1	3
Tug/towboat	N	22	14	13	1	1	4	1
Offshore supply	N	N	N	2	2	2	0	3
Fishing vessel	N	77	60	47	18	38	22	35
Recreational vessel	N	N	N	3	20	3	7	5
MODU[g]	N	N	N	0	0	0	4	0
Platform	N	N	N	1	0	1	0	1
Freight barge	N	N	N	0	0	0	5	2
Tank barge	N	H	N	0	0	0	0	0
Miscellaneous	N	44	56	11	1	3	1	9
Total	N	178	206	85	46	50	46	59
Injuries in waterborne transport								
Freight	N	14	8	10	1	0	3	4
Tankship	N	19	9	13	5	5	1	0
Passenger vessel	N	10	10	51	50	60	37	29
Tug/towboat	N	10	27	19	18	12	20	15
Offshore supply	N	N	N	9	10	7	3	5
Fishing Vessel	N	13	28	31	32	32	25	33
Recreational vessel	N	N	N	2	19	7	5	6
MODU[g]	N	N	N	13	0	0	2	0
Platform	N	N	N	9	1	0	0	1
Freight barge	N	N	N	3	0	0	6	1
Tank barge	N	H	N	3	3	1	0	0
Miscellaneous	N	39	98	12	6	5	7	13
Total	N	105	180	175	145	129	109	107

KEY: N = data do not exist; R = revised;
U = data are not available

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Water Transport Profile
Cont'd

Safety cont'd	1960	1970	1980	1990	1995	1996	1997	1998
Fatalities in recreational boating (vessel casualties only)								
Air thrust	N	N	N	N	4 r	1 r	6 r	11 r
Propeller	N	N	N	N	475	363	R436	462
Inboard	N	119 r	100 r	50 r	N	N	N	N
Outboard	N	774	609	454	N	N	N	N
Inboard/outboard	N	28	47	53	N	N	N	N
Jet	N	N	10	25	68	61	83	82
Sail	N	44	43	20	4	8	15	5
Manual (oars, paddle)	N	205	272	182	148	109	150	151
Other	N	29	14	5	8	8	10	0
Propulsion unknown	N	219	265	76	122	159	121	104
Total	739 r	1,418	1,360	865	829	709	821	815

KEY: N = data do not exist; R = revised; U = data are not available

[a] Revenues paid by American travelers to U.S. and foreign flag carriers.

[b] Does not include vessel operators whose primary area of operation is fishing, towing, passenger transport, ferrying, or crew boat utility service.

[c] Includes commercial port, marina, and other employees; excludes employees of non-for-hire private businesses.

[d] Estimate based on established active jobs for licensed and unlicensed personnel aboard oceangoing ships of 1,000 gross-tons and over, privately owned and operated, government-owned ships under bare boat charters, ship managers and General Agency Agreement, supplemented by Military Sealift Command employment totals for ships with Civil Service crews.

[e] The U.S. Coast Guard changed its methodology for counting the number of recreational boats.

Figures cited represent number of numbered boats, not estimates as previously noted for 1960 and 1970.

[f] Does not include intraterritorial traffic (traffic between ports in Puerto Rico and the Virgin Islands, which are considered a single unit).

[g] Mobile Offshore Drilling Units.

[h] The international water freight operating revenues data was revised in Transportation in America 1998 for all years expect 1994 & 1996. Therefore, the international water freight data for years 1994 & 1996 may not be comparable to other years.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[i] Eno Transportation Foundation Inc., *Transportation in America,1999* (Washington, DC: 2000), pp. 40, 42, 57, 64.

[j] U.S. Department of Commerce, National Marine Fisheries Services, *Fisheries of the United States* (Washington, DC: Annual issues), p. 5 and similar tables in earlier editions.

[k] U.S. Department of Transportation, Maritime Administration, MAR-450, personal communication.

[l] U.S. Department of Labor, Bureau of Labor Statistics, *Employment, Hours and Earnings, United States, 1909-1994*, (Washington, DC: September 1994), SICs 373 and 44.

[m] Ibid., *Employment, Hours and Earnings, 1988-1996* (Washington, DC: August 1996), SICs 373 and 44.

[n] Ibid., Internet website www.bls.gov, as of April 21, 2000.

[o] U.S. Department of Transportation, Maritime Administration, *U.S. Merchant Marine Data Sheet* (Washington, DC: Annual issues).

[p] U.S. Army, Corps of Engineers, *Summary of U.S. Flag Passenger & Cargo Vessels* (New Orleans, LA: Annual issues).

[q] U.S. Department of Transportation, Maritime Administration, *Merchant Fleets of the World* (Washington, DC: Annual issues).

[r] U.S. Coast Guard, *Boating Statistics* (Washington, DC: Annual issues).

[s] U.S. Army Corps of Engineers, *Waterborne Commerce of the United States* (New Orleans, LA: Annual issues), part 5, section 1, table 1 & table 4.

[t] U.S. Coast Guard, Office of Investigations and Analysis, G-MAO-2, personal communication.

[u] U.S. Department of Commerce, Bureau of Economic Analysis, *Selected NIPA Tables*, table 2.4, Internet website http://www.bea.doc.gov, as of August 21, 2000.

Oil Pipeline Profile

Financial	1960	1970	1980	1990	1995	1996	1997	1998
Operating revenues ($ millions)								
FERC-regulated	770 [c]	1,188 [c]	6,340 [c]	R7,045 [c]	R6,962 [c]	7,262 [c]	R7,264 [c]	7,300 [c]
Nonregulated	125	208	1,208	1,342	R1,316	1,373	R1,343	1,356
Total	895	1,396	7,548	R8,387	R8,278	8,635	R8,607	8,656
Inventory								
Number of FERC-regulated companies	87 [d]	101 [d]	130 [d]	150 [d]	161 [d]	160 [d]	U	U
Number of employees, pipeline companies[a]	23,100 [e]	17,600 [e]	21,300 [e]	18,500 [f]	R15,100 [g]	14,500 [g]	R14,200 [g]	13,800 [g]
Miles of pipeline (statute miles)[b]								
Crude lines	141,085 [h]	146,275 [h]	129,831 [h]	118,805 [h]	R129,423 [h]	R92,610 [h]	91,523 [h]	87,663 [h]
Product lines	49,859	72,396	88,562	89,947	R92,177	R84,925	88,350	90,985
All lines	190,944	218,671	218,393	208,752	221,600	177,535	179,873	178,648
Performance								
Intercity ton-miles (millions)								
Crude oil	N	N	362,600 [i]	334,800 [i]	335,900 [i]	338,300 [i]	R337,400 [l]	334,100 [l]
Petroleum products	N	N	225,600	249,300	265,200	280,900	R279,100	285,700
Total	229,000 [i]	431,000 [i]	588,200	584,100	601,100	619,200	R616,500	619,800
Tons transported (millions)	468.4	790.3	960.8	1,057.4	R1,124.8	1,099.0	R1183.8	1,211.8
Average length of haul (statute miles)								
Crude oil	325 [j]	300 [j]	871 [j]	805 [j]	R747 [j]	R779 [j]	713	689
Petroleum products	269	357	414	389	R393	R393	393	393
Safety								
Fatalities	N	4 [k]	4 [k]	3 [k]	3 [k]	5 [k]	0 [k]	2 [k]
Injuried Persons	N	21	15	7	11	13	5	6
Incidents	N	351	246	180	188	R193	R171	153

KEY: FERC = Federal Energy Regulatory Commission;
N = data do not exist; R = revised;
U = data are not available

[a] Includes companies whose pipelines carry crude petroleum, petroleum products, and nonpetroleum pipeline liquids.

[b] Regulated plus unregulated mileage of crude oil trunk and gathering lines, plus refined oil trunk lines.

NOTE: The Interstate Commerce Committee regulated oil pipelines in the 1960s and 1970s.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[c] Eno Transportation Foundation, Inc., Transportation In America, 1998 (Washington, DC: 1998), p. 40.

[d] Federal Energy Regulatory Commission, personal communication.

[e] U.S. Department of Labor, Bureau of Labor Statistics, Employment, Hours and Earnings, United States, 1909-94 (Washington, DC: September 1994), SIC 46.

[f] Ibid., Employment, Hours and Earnings, United States, 1988-1996 (Washington, DC: July 1996), SIC 46.

[g] Ibid., Internet website www.bls.gov, as of Apr. 19, 1999.

[h] Eno Transportation Foundation, Inc., Transportation In America, 1998 (Washington, DC: 1998), p. 64; and Transportation in America, Supplement, 1999, (Washington, DC: 1999), p. xii.

[i] Ibid., pp. 44, 59, 46.

[j] Ibid., p. 71.

[k] U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, DPS-35, personal communication, and Internet website http://ops.dot.gov, as of Mar. 18, 1999.

Natural Gas Pipeline Profile

Financial ($ millions)	1960	1970	1980	1990	1995	1996[R]	1997	1998
Transmission pipeline companies								
Total operating revenues	3,190 [d]	5,928 [d]	41,604 [e]	21,756 [e]	12,092 [e]	12,050 [e]	10,339 [e]	9,450 [e]
Total operating expenses[a]	2,698	5,088	39,709	19,484	9,534	9,603	7,862	6,795
Taxes (federal, state, local)[b]	319	376	1,991	1,245	1,582	1,643	1,531	1,481
Operation and maintenance	2,095	4,203	36,480	17,058	6,680	6,802	5,381	4,260
Distribution pipeline companies								
Total operating revenues	N	N	14,013 [d]	18,750 [f]	19,421 [f]	30,407 [f]	30,817 [f]	27,542 [f]
Total operating expenses[a]	N	N	13,263	17,125	17,402	27,917	[R]27,445	25,039
Taxes (federal, state, local)[b]	N	N	1,136	1,625	1,888	2,668	[R]2,415	2,422
Operation and maintenance	N	N	11,791	14,544	14,170	23,301	[R]23,155	20,910
Investor-owned, total industry								
Total operating revenues	N	N	85,918 [g]	66,027 [g]	58,434 [g]	63,600 [g]	[R]62,660 [h]	57,117 [h]
Total operating expenses[a]	N	N	81,789	60,137	50,800	56,695	[R]55,422	50,896
Taxes (federal, state, local)[b]	N	N	4,847	4,957	6,186	6,362	[R]6,384	5,429
Operation and maintenance	N	N	74,508	51,628	40,041	45,785	[R]44,851	41,026
Inventory								
Pipeline mileage								
Transmission	183,700 [l]	252,200 [l]	266,500 [j]	280,100 [j]	[R]268,300 [j]	259,300 [j]	[R]251,100 [j]	253,900
Distribution	391,400	594,800	701,800	837,300	[R]936,800	959,500	[R]957,100	980,800
Field and gathering	55,800	66,300	83,500	89,500	[R]60,400	57,500	[R]43,000	45,000
Total	630,950	913,267	1,051,774	1,206,894	1,262,152	1,276,315	[R]1251,200	1,279,700
Number of employees								
Investor-owned companies	206,400 [k]	211,700 [k]	215,400 [l]	204,200 [l]	179,000 [l]	[R]179,000 [l]	[R]154,600 [l]	151,500 [l]
Transmission pipeline companies	31,400	32,400	45,200	37,400	28,000	32,300	27,500	28,400
Distribution pipeline companies	N	N	52,100	64,700	61,600	79,700	[R]75,000	69,700
Integrated pipeline companies	N	N	53,200	39,900	36,400	12,700	12,300	13,600
Combination pipeline companies	N	N	52,200	50,100	42,100	38,700	30,600	30,400
Total	N	N	202,700	192,100	168,100	163,500	145,400	142,100
Number of interstate natural gas pipeline companies[c]	87 [m]	89 [m]	91 [m]	132 [m]	133 [n]	138 [n]	86 [o]	86 [o]

KEY: N = data do not exist; R = revised

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Natural Gas Pipeline Profile
Cont'd

Performance (million cubic ft.)	1960	1970	1980	1990	1995	1996[R]	1997	1998
Marketed production, total	12,771,038 [p]	21,920,642 [p]	20,179,724 [p]	18,593,792 [p]	19,506,474 [p]	[R]19,812,241 [p]	[R]19,866,093 [p]	19,645,554 [p]
Delivered to consumers, total	10,382,681 [q]	19,018,462 [q]	18,216,233 [q]	16,818,882 [q]	19,660,161 [q]	20,005,508 [q]	[R]20,004,012 [q]	19,469,047 [q]
Consumed, total	11,966,537	21,139,386	19,877,293	18,715,090	21,580,665	[R]21,966,616	[R]21,958,660	21,262,023
Gas used as a pipeline fuel, total	347,075	722,166	634,622	659,816	700,335	711,446	[R]751,470	635,477
Safety								
Fatalities	N	26 [r]	15 [r]	6 [r]	18 [r]	48 [r]	[R]10 [r]	17 [r]
Injured persons	N	233	177	69	53	114	[R]72	75
Incidents	N	1,077	1,524	198	161	187	[R]175	234

KEY: N = data do not exist; R = revised

[a] Does not add due to omission of line from source table for depreciation and other non-cash expenses.

[b] Figures obtained by addition/subtraction and may not appear directly in data source.

[c] As of Sept. 30 each year.

NOTE: Numbers may not add to totals due to rounding.

SOURCES: Unless otherwise noted, refer to chapter tables for sources.

[d] American Gas Association, *Gas Facts, 1979* (Arlington, VA), table 134.

[e] Ibid., *Gas Facts* (Arlington, VA: Annual issues), table 12-2, and similar tables in earlier editions.

[f] Ibid., table 12-3, and similar tables in earlier editions.

[g] Ibid., table 12-1.

[h] Ibid., Unpublished data and personal communication, Aug 17, 2000.

[i] Ibid., *Gas Facts, 1979* (Arlington, VA), table 44.

[j] Ibid., *Gas Facts* (Arlington, VA: Annual issues), table 5-1, and similar tables in earlier editions.

[k] Ibid., *Gas Facts, 1979* (Arlington, VA), table 153.

[l] Ibid., *Gas Facts* (Arlington, VA: Annual issues), table 14–2, and similar tables in earlier editions.

[m] U.S. Department of Energy, Energy Information Administration, Statistics of Interstate Natural Gas Pipeline Companies (Washington, DC: Annual issues), preface.

[n] Federal Energy Regulatory Commission, personal communication.

[o] American Gas Association, personal communication, Aug 17, 2000.

[p] U.S. Department of Energy, Energy Information Administration, Natural Gas Annual, 1998 (Washington, DC: October 1999), table 98. Internet site http://www.eia.doe.gov /oil_gas/natural_gas/data_publications/natural_gas_annual/nga.html as of Aug 9, 2000.

[q] Ibid., Table 100.

[r] U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, DPS-35, personal communication, and Internet site http://ops.dot.gov/stats.htm, as of Aug. 9, 2000.

Metric Conversion Tables

Table 1-1M System Kilometers Within the United States (Statute kilometers)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Highway[a]	5,706,240	5,937,942	6,002,985	6,176,897	6,211,806	6,218,364	6,223,214	6,296,117	6,307,743	6,348,214	6,355,127
Class I rail[b,c]	333,672	321,544	316,202	308,222	265,255	234,584	192,732	174,234	170,235	164,359	161,852
Amtrak[c]	N	N	N	N	38,624	38,624	38,624	38,624	40,234	40,234	35,406
Transit[d]											
Commuter rail[c]	N	N	N	N	N	5,752	6,649	6,695	5,926	7,108	8,324
Heavy rail	N	N	N	N	N	2,081	2,174	2,346	2,379	2,457	2,457
Light rail	N	N	N	N	N	618	777	913	1,027	1,061	1,088
Navigable channels[e]	40,234	40,234	41,843	41,843	41,843	41,843	41,843	41,843	41,843	R41,843	41,843
Oil pipeline[f]	307,295	339,358	351,917	363,533	351,469	343,764	335,954	R356,631	R285,715	R289,478	287,506
Gas pipeline[g]	1,015,416	1,235,204	1,469,761	1,575,971	1,692,666	1,800,655	1,942,308	2,031,237	2,054,030	R2,013,610	2,059,500

KEY: N = data do not exist; R = revised

[a] All public road and street mileage. Prior to 1980, some miles of nonpublic roadways are included. No consistent data on private road mileage are available. Includes District of Columbia.

[b] Data represent miles of road owned (aggregate length of road, excluding yard tracks, sidings, and parallel lines).

[c] Portions of Class I freight railroads, Amtrak, and commuter rail networks share common trackage. Amtrak data represent miles of track operated.

[d] Transit system mileage is measured in directional route-miles. A directional route-mile is the mileage in each direction over which public transportation vehicles travel while in revenue service. Directional route-miles are computed with regard to direction of service, but without regard to the number of traffic lanes or rail tracks existing in the right-of-way.

[e] The St. Lawrence Seaway is not included in this number because 3 of the 5 subsections are solely in Canadian waters, and the others are in international boundary waters. Of the 26,000 miles of navigable waterways, 10,867 miles are commercially significant shallowdraft inland waterways subject to fuel taxes.

[f] Includes trunk and gathering lines for crude-oil pipeline.

[g] Excludes service pipelines. Data not adjusted to common diameter equivalent. Mileage as of the end of each year. Includes field and gathering, transmission, and distribution main. See table 1-8 for a more detailed breakout of oil and gas pipeline mileage.

NOTE: Total highway mileage in this table will not match that in tables 1-3 and 1-4 because of a change in the way the U.S. Department of Transportation, Federal Highway Administration (FHWA) creates mileage-based tables derived from the Highway Performance Monitoring System, beginning with the 1997 issue of FHWA's *Highway Statistics*.

SOURCES:

Highway: 1960-95: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: Annual issues), table HM-212.

1996-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table HM-12.

Class I rail: 1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 44.

Amtrak: 1980: Amtrak, Corporate Planning and Development, personal communication (Washington, DC).

1985-98: Amtrak, Corporate Planning and Development, *Statistical Appendix to Amtrak Annual Report* (Washington, DC: Annual issues).

Transit: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database* (Washington, DC: Annual issues), table 18 (1996-1997) and table 19 (for 1998) and similar tables in earlier editions.

Navigable channels: 1960-96: U.S. Army Corps of Engineers, Ohio River Division, Huntington District, *Ohio River Navigation System Report, 1996, Commerce on the Ohio River and its Tributaries* (Fort Belvoir, VA: 1996), p. 2.

1997-1998: Waterborne Commerce Statistics Center Databases, personal communication, June 2000.

Oil pipeline: 1960-98: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1999), p. 64.

Gas pipeline: 1960-98: American Gas Association, *Gas Facts* (Arlington, VA : Annual issues), table 5-2 and similar tables in earlier editions.

Table 1-6M Estimated U.S. Roadway Lane-Kilometers by Functional System[a]

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997[R]	1998[R]	1999
Urban												
Interstates	77,986	92,207	100,124	101,109	108,254	111,341	113,993	114,870	115,535	117,427	118,655	119,153
Other arterials	536,995	598,111	642,733	647,536	673,041	700,686	712,093	717,491	723,368	733,655	734,397	728,433
Collectors	233,561	261,320	270,000	266,005	283,465	289,123	295,078	297,780	300,823	306,022	303,928	301,932
Local	1,396,888	1,530,515	1,675,546	1,693,477	1,765,643	1,801,744	1,817,300	1,831,224	1,849,870	1,897,301	1,911,925	1,926,427
Total	**2,245,429**	**2,482,154**	**2,688,403**	**2,708,127**	**2,830,403**	**2,902,894**	**2,938,464**	**2,961,365**	**2,989,596**	**3,054,405**	**3,068,905**	**3,075,944**
Rural												
Interstates	210,792	212,284	218,663	219,680	214,794	212,655	211,252	212,298	213,983	214,308	215,073	216,635
Other arterials	816,095	820,773	832,581	833,339	847,664	846,364	852,659	854,089	857,549	865,618	867,235	869,381
Collectors[a]	2,303,401	2,360,568	2,361,876	2,361,810	2,319,815	2,308,561	2,304,885	2,281,129	2,279,896	2,287,792	2,283,229	2,280,379
Local	7,173,786	7,027,931	6,855,435	6,893,084	6,861,779	6,817,027	6,797,650	6,820,554	6,821,243	6,891,559	6,748,873	6,768,836
Total	**10,504,074**	**10,421,557**	**10,268,556**	**10,307,914**	**10,244,052**	**10,184,606**	**10,166,447**	**10,168,070**	**10,172,671**	**10,259,277**	**10,114,410**	**10,135,232**
TOTAL lane-kilometers	**12,749,503**	**12,903,711**	**12,956,959**	**13,016,041**	**13,074,455**	**13,087,501**	**13,104,911**	**13,129,436**	**13,162,268**	**13,313,681**	**13,183,315**	**13,211,176**

KEY: R = revised

[a] Includes the 50 States, the District of Columbia, and Puerto Rico

[b] Includes minor and major collectors.

NOTE: In estimating rural and urban lane mileage, the U.S. Department of Transportation, Federal Highway Administration assumed that rural minor collectors and urban/rural local roads are two lanes wide.

SOURCES: 1980-95: U.S. Department of Transportation, Federal Highway Administration, Office of Highway Information Management, table HM-260 (unpublished).

1996: Ibid,. *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

1997-99: Ibid., Internet site www.fhwa.dot.gov/ohim.ohimstat.htm, as of Nov. 15, and Dec. 8, 2000.

Table 1-29M U.S. Vehicle-Kilometers (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Air carrier, large certificated, domestic, all services	1,381	1,825	3,328	3,135	4,060	4,902	6,378	7,450	7,743	R7,904	8,097
General aviation[a]	2,847	4,123	5,161	6,820	8,375	7,520	7,319	6,107	5,671	6,239	U
Highway[R]											
Passenger car[b,c]	944,706	1,163,069	1,475,288	1,663,984	1,788,944	2,006,531	2,266,389	2,298,947	2,347,942	2,401,910	2,487,782
Motorcycle[b]	[h]	[h]	4,794	9,059	16,438	14,623	15,381	15,767	15,953	16,224	16,512
Other 2-axle 4-tire vehicle[c]	[h]	[h]	198,410	322,996	468,215	629,192	924,684	1,271,431	1,313,124	1,369,134	1,394,061
Truck											
Single-unit 2-axle 6-tire or more truck	158,603	207,234	43,583	55,693	64,073	73,130	83,527	100,914	103,006	107,654	109,265
Combination truck	46,436	50,960	56,543	75,195	110,527	125,630	151,827	185,801	191,245	200,499	206,252
Bus	6,994	7,533	7,313	9,745	9,751	7,207	9,215	10,332	10,522	11,011	11,259
Total highway[c]	**1,156,739**	**1,428,796**	**1,785,931**	**2,136,672**	**2,457,948**	**2,856,313**	**3,451,023**	**3,883,192**	**3,981,793**	**4,106,432**	**4,208,615**
Transit											
Motor bus[d]	2,537	2,460	2,268	2,456	2,699	2,998	3,428	3,515	3,574	R3,613	P3,687
Light rail	120	67	54	38	28	27	39	56	61	66	P69
Heavy rail	629	636	655	681	619	725	864	864	874	898	P911
Trolley bus	162	69	53	25	21	25	22	23	23	23	P23
Commuter rail	N	N	N	278	288	295	343	383	389	404	P426
Demand responsive[d]	N	N	N	N	N	398	492	816	882	R941	P1,123
Ferry boat	N	N	N	N	[I]	[I]	4	5	5	3	3
Other	N	N	N	24	25	24	R29	R60	R72	R84	85
Total transit[e]	**3,449**	**3,232**	**3,030**	**3,502**	**3,681**	**4,492**	**R5,218**	**5,713**	**5,874**	**R6,029**	**P6,328**
Rail											
Class I freight, train-kilometers	650	678	687	649	689	558	612	737	754	764	764
Class I freight, car-kilometers	45,335	47,212	48,103	44,508	47,117	40,105	42,099	48,897	51,040	50,952	52,556
Intercity/Amtrakf, train-kilometers	336	277	150	48	48	48	53	51	48	51	53
Intercity/Amtrakf, car-kilometers	3,554	2,857	1,110	407	378	404	484	470	444	463	502
Total train-kilometers[g]	**987**	**954**	**837**	**697**	**737**	**607**	**665**	**789**	**803**	**816**	**818**

KEY: N = data do not exist; P = preliminary; R = revised; U = data are not available

Continued next page

Table 1-29M Cont'd U.S. Vehicle-Kilometers (Millions)

[a] All operations other than those operating under 14 CFR 121 and 14 CFR 135. Data for 1996 are estimated using new information on nonrespondents and are not comparable to earlier years. Mileage in source is multiplied by 1.151 to convert to nautical-miles for 1985-1997, data is then converted to kilometers.

[b] U.S. Department of Transportation, Federal Highway Administration (FHWA), provides data separately for passenger car and motorcycle in its annual Highway Statistics series. However, the 1995 summary report provides updated data for passenger car and motor cycle combined. Passenger car figures in this table were computed by U.S. Department of Transportation, Bureau of Transportation Statistics by subtracting the most current motorcycle figures from the aggregate passenger car and motorcycle figures.

[c] In July 1997, the FHWA published revised vehicle-kilometers data for the highway modes for many years. The major change reflected the reassignment of some vehicles from the passenger car category to the other 2-axle 4-tire vehicle category.

[d] Motor bus and demand responsive figures are also included in the bus figure for highway.

[e] Prior to 1985, excludes demand response and most rural and smaller systems funded via Sections 18 and 16(b)2, Federal Transit Act. The series is not continuous between 1980 and 1985. Transit rail modes are measured in car-kilometers. Car-kilometers measure individual vehicle-kilometers in a train. A 10-car train traveling 1 kilometer would equal 1 train-kilometer and 10 car-kilometers. Motor bus and demand response figures are also included in the bus figure for highway.

[f] Amtrak began operations in 1971.

[g] Although both train-kilometers and car-kilometers are shown for rail, only train-kilometers are included in the total. A train-kilometer is the movement of a train, which can consist of multiple vehicles (cars), the distance of 1 kilometer. This differs from a vehicle-kilometer, which is the movement of 1 vehicle the distance of 1 kilometer. A 10-vehicle train traveling 1 kilometer would be measured as 1 train-kilometer and 10 vehicle-kilometers. Caution should be used when comparing train-kilometers with vehicle kilometers.

[h] 1960–65, motorcycle data are included in passenger car, and other 2-axle 4-tire vehicle data included in single-unit 2-axle 6-tire or more truck.

[i] Ferry boat included with other.

SOURCES:

Air:

Air carrier: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, table 2.

1965-70: Ibid., *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, table 2.

1975-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), p. 4 (December 1976) and p. 2 (December 1981).

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), p. 2, line 27 plus line 50.

General aviation: 1960-65: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation 1972* (Washington, DC: 1973), table 9.10.

1970-75: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation 1976* (Washington, DC: 1976), table 8-5.

1980: U.S. National Transportation Safety Board estimate, personal communication, Dec. 7, 1998.

1985-90: Ibid., *General Aviation Activity and Avionics Survey* (Washington, DC: Annual issues,) table 3.3.

1995-97: Ibid., *General Aviation and Air Taxi Activity and Avionics Survey* (Washington, DC: Annual issues), table 3.3.

Highway:

Passenger car and motorcycle: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1, sum of passenger car and motorcycle.

Motorcycle: 1970-80: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A.

1985-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit 2-axle 6-tires or more truck, combination truck, and bus: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

1960-98: American Public Transit Association, *Public Transportation Fact Book* (Washington, DC: 2000), table 42, 84, and similar tables in earlier editions.

Rail:

Class I rail freight train- and car-miles: 1960-98: Association of American Railroads, *Railroad Facts, 1998* (Washington, DC: 1999), p. 33 (train-miles) and p. 34 (car-miles).

Intercity/Amtrak train-miles: 1960-70: Association of American Railroads, *Yearbook of Railroad Facts* (Washington, DC: 1975), p. 39.

1975-98: Amtrak, *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Intercity/Amtrak car-miles: 1960-75: Association of American Railroads, *Yearbook of Railroad Facts* (Washington, DC: 1975), p. 40.

1980-98: Amtrak, Amtrak Corporate Reporting, Route Profitability System, personal

Table 1-30M Roadway Vehicle-Kilometers Traveled (VKT) and VKT per Lane-Kilometer by Functional Class

	1980	1985	1990	1995	1996	1997	1998
VKT (millions)							
Urban							
Interstate	259,494	R347,922	448,848	R549,616	R565,813	R581,571	602,551
Other arterials[a]	R779,228	R930,637	R1,125,309	R1,311,782	R1,343,198	R1,362,467	1,387,975
Collector	133,645	144,162	R171,069	R204,199	R208,105	209,957	210,601
Local	R204,051	257,595	R307,471	R331,376	R335,346	R357,314	361,046
Total	**R1,376,418**	**R1,680,316**	**R2,052,696**	**R2,396,973**	**R2,452,461**	**R2,511,309**	**2,562,172**
Rural							
Interstate	217,397	248,414	R322,148	R359,499	R374,278	R386,438	404,046
Other arterials[a]	R422,895	R455,128	R532,478	R593,197	R609,696	R630,029	649,505
Collector[b]	R304,920	332,602	R386,984	R380,044	R387,901	R408,464	415,323
Local	136,318	R139,851	R156,717	169,245	R176,256	184,288	194,081
Total	**R1,081,529**	**R1,175,995**	**R1,398,326**	**R1,501,986**	**R1,548,131**	**R1,609,218**	**1,662,954**
VKT per lane-kilometer (thousands)							
Urban							
Interstate	R3,327	R3,773	R4,483	R4,785	R4,902	R5,005	5,140
Other arterials[a]	R1,451	R1,556	R1,751	R1,828	R1,855	R1,868	1,899
Collector	R572	R552	R634	R686	R687	R693	698
Local	R146	R168	R184	R181	292	R190	191
Total	**R613**	**R677**	**R764**	**R809**	R819	**R830**	**842**
Rural							
Interstate	R1,031	R1,170	R1,473	R1,693	R1,748	R1,803	1,885
Other arterials[a]	R518	R555	R640	R695	1,144	R729	750
Collector[b]	R132	R141	R164	R167	274	R179	182
Local	R19	R20	R23	R25	R25	R27	29
Total	**R103**	**R113**	**R136**	**R148**	**245**	**R157**	**165**

KEY: R = revised

[a] For urban: the sum of other freeways and expressways, other principal arterials, and minor arterials. For rural: they represent the sum of other principal arterials and minor arterials.

[b] Collector is the sum of major and minor collectors (rural only).

NOTE: See table 1-5M for estimated highway lane-kilometers by functional class.

SOURCES:

Vehicle-kilometers: 1980-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-202.

1995-97: Ibid., *Highway Statistics* (Washington, DC: Annual issues), tables VM-2 and VM-2A.

Lane-kilometers: 1980-95: Ibid., Office of Highway Information Management, unpublished data, 1997, table HM-260.

1996-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

Table 1-31M U.S. Passenger-Kilometers (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Air carrier, certificated, domestic, all services	R50,049	R85,659	R174,521	218,871	R328,899	R447,135	R556,630	R649,996	R699,506	R725,191	745,549
General aviation[a]	3,701	7,081	14,645	18,347	23,657	19,795	R20,922	R17,381	R19,312	20,117	21,404
Highway[R]											
Passenger car[b,c]	1,842,177	2,244,722	2,817,801	3,144,930	3,237,988	3,370,971	3,671,550	3,655,326	3,733,228	3,819,037	3,929,311
Motorcycle[b,c]	[f]	[f]	5,274	9,965	19,725	19,009	19,995	18,604	18,825	19,145	19,484
Other 2-axle 4-tire vehicle[c]	[g]	[g]	363,090	584,623	838,106	1,107,378	1,608,950	2,085,147	2,153,524	2,245,380	2,286,261
Truck											
Single-unit 2-axle 6-tire or more truck	158,603	207,234	43,583	55,693	64,073	73,130	83,527	100,914	103,006	107,654	109,265
Combination truck	46,436	50,960	56,543	75,195	110,527	125,630	151,827	185,801	191,245	200,499	206,252
Bus[d]	N	N	N	N	N	152,767	195,372	219,039	223,918	233,452	238,706
Total[c]	**2,047,216**	**2,502,916**	**3,286,290**	**3,870,406**	**4,270,419**	**4,848,887**	**5,731,220**	**6,264,830**	**6,423,746**	**6,625,167**	**6,789,280**
Transit											
Motor bus[d]	N	N	N	N	R35,068	R34,055	R33,766	R30,285	R30732	R31,550	P33,156
Light rail	N	N	N	N	613	563	919	1,384	1,540	R1,666	P1,799
Heavy rail	N	N	N	N	R16,991	R16,781	R18,467	R16,993	R18,556	R19,402	P19,769
Trolley bus	N	N	N	N	352	492	311	301	296	304	P293
Commuter rail[R]	6,754	6,643	7,390	7,263	10,487	10,515	11,397	13,267	13,440	12,936	14,027
Demand responsive[d]	N	N	N	N	N	586	694	977	1,056	R1,213	1,629
Ferry boat	N	N	N	N	[h]	[h]	460	418	412	562	P555
Other	N	N	N	N	628	707	200	439	560	R505	P639
Total[R]	**[i]6,754**	**[i]6,643**	**[i]7,390**	**[i]7,263**	**64,139**	**63,700**	**66,213**	**64,065**	**66,592**	**R68,138**	**P71,867**
Rail											
Intercity/Amtrak[e,R]	27,462	21,340	9,944	6,326	7,247	7,765	9,748	8,924	8,127	8,314	8,536

KEY: N = data do not exist; P = preliminary; R = revised

Continued next page

[a] All operations other than those operating under 14 CFR 121 and 14 CFR 135.

[b] U.S. Department of Transportation, Federal Highway Administration (FHWA), provides data separately for passenger car and motorcycle in its annual Highway Statistics series. However, the 1995 summary report provides updated data for passenger car and motorcycle combined. Passenger car figures in this table were computed by U.S. Department of Transportation, Bureau of Transportation Statistics by subtracting the most current motorcycle figures from the aggregate passenger car and motorcycle figures.

[c] In July 1997, FHWA published revised passenger-kilometers data for the highway modes for a number of years. The major change reflected the reassignment of some vehicles from the passenger car category to the other 2-axle 4-tire vehicle category. Passenger-kilometers for passenger car, motorcycle, and other 2-axle 4-tire vehicles were derived by multiplying vehicle-kilometers for these vehicles by average vehicle occupancy rates, provided by the Nationwide Personal Transportation Survey, 1977, 1983, and 1995.

[d] Motor bus and demand responsive figures are also included in the bus figure for highway.

[e] Amtrak began operations in 1971. Does not include contract commuter passengers.

[f] Included in passenger car.

[g] Included in other single-unit 2-axle 6-tire or more truck.

[h] Ferry boat included in other.

[i] Includes commuter rail figures only.

NOTES: Air carrier passenger-kilometers are computed by summing of the products of the aircraft-kilometers flown on each interairport segment multiplied by the number of passengers carried on that segment. Highway passenger-kilometers are calculated by multiplying vehicle-kilometers of travel as cited by FHWA by the average number of occupants for each vehicle type. Average vehicle occupancy rates are based on various sources, such as the Nationwide Personal Transportation Survey, conducted by the Federal Highway Administration, and the Truck Inventory and Use Survey, conducted by the Bureau of the Census. Transit passenger-kilometers are the cumulative sum of the distances ridden by each passenger. Rail passenger-kilometers represent the movement of 1 passenger for 1 kilometer.

SOURCES:

Air:

Air carrier, domestic, all services: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, table 2.

1965-70: Ibid., *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, table 2.

1975-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), p. 4 (December 1976) and p. 2 (December 1981).

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), page 2, line 1.

General aviation: 1960-97: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 47.

Highway:

Passenger car and motorcycle: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1, sum of passenger car and motorcycle.

Motorcycle: 1970-80: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A.

1985-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit 2-axle 6-tires or more truck, combination truck, and bus: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (updated June 1999), Internet site http://www.fhwa.dot.gov/ohim/summary95/index.html, as of July 28, 2000, table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

All other data: 1960-98: American Public Transit Association, *Transit Fact Book* (Washington, DC: 2000), table 30 and similar tables in earlier editions.

Rail:

Intercity/Amtrak: 1960-80: Association of American Railroads, *Railroad Facts* (Washington, DC: Annual issues).

1985: Amtrak, *Amtrak FY95 Annual Report* Statistical Appendix (Washington, DC: 1996), p. 4.

1990-98: Ibid., *Amtrak FY99 Annual Report* Statistical Appendix (Washington, DC: 2000), p. 43.

Table 1-41M U.S. Tonne-Kilometers of Freight (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air carrier, domestic, all services[a]	**807**	**1,975**	**3,955**	**5,066**	**6,611**	**7,528**	**13,233**	**18,279**	**18,777**	**19,857**	**20,083**
Intercity truck	**R416,093**	**R524,131**	**R601,510**	**R662,829**	**R810,286**	**R890,585**	**R1,073,082**	**R1,344,637**	**R1,419,096**	**R1,454,135**	**1,499,394**
Class I rail[b]	**R835,557**	**R1,018,884**	**R1,116,602**	**R1,101,189**	**R1,341,656**	**R1,280,375**	**R1,509,569**	**R1,906,272**	**R1,979,690**	**R1,969,398**	**2,010,096**
Domestic water transportation											
Coastwise	U	R441,709	R525,276	R461,127	d,R921,462	R892,010	R699,523	R642,893	R595,795	R510,762	459,694
Lakewise	U	110,838	115,946	100,033	90,149	70,347	88,956	87,166	R85,168	90,761	90,013
Internal	U	160,161	227,487	263,378	R331,915	R339,748	426,886	R447,233	433,307	R429,266	430,541
Intraport	U	2,392	1,721	1,785	2,331	1,609	1,587	1,971	2,153	2,012	2,016
Total domestic water transportation[c]	**U**	**715,100**	**870,430**	**826,322**	**1,345,856**	**1,303,714**	**1,216,953**	**1,179,263**	**1,116,424**	**1,032,801**	**982,264**
Oil pipeline	**334,334**	**446,752**	**R629,249**	**R740,207**	**R858,757**	**R823,864**	**R852,771**	**R877,591**	**R904,017**	**R900,075**	**904,892**
TOTAL	**R2,280,481**	**R2,706,794**	**R3,222,165**	**R3,336,043**	**R4,363,865**	**R4,305,466**	**R4,666,080**	**R5,325,989**	**R5,438,407**	**R5,375,628**	**5,416,507**

KEY: R = revised; U = data are not available

[a] Includes freight, express, and mail revenue tonne-kilometers as reported on U.S. DOT Form 41.

[b] Revenue tonne-kilometers.

[c] Excludes intraterritorial traffic, for which tonne-kilometers were not compiled.

[d] Reflects startup between 1975 and 1980 of Alaska pipeline and consequent water transportation of crude petroleum from Alaskan ports to mainland United States for refining.

NOTE: Domestic water transportation numbers may not add to totals due to rounding.

SOURCES:

Air carrier, domestic, all services: 1960-65: Civil Aeronautics Board, Handbook of Airline Statistics, 1969 (Washington, DC: 1970).

1970-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: Annual issues), p. 2, line 3.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual issues), p. 2, line 3.

Intercity truck: 1960-98: Eno Transportation Foundation, Inc., Transportation in America, 1998 (Washington, DC: 1999), p. 44.

Class I rail: 1960-98: Association of American Railroads, *Railroad Facts 1998* (Washington, DC: 1999), p. 27.

Domestic water transportion: 1965-98: U.S. Army Corps of Engineers, *Waterborne Commerce of the U.S.* (New Orleans, LA: Annual issues), part 5, section 1, table 1-4, and similar tables in earlier editions.

Oil pipeline: 1960-70: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 44.

1975: Association of Oil Pipe Lines, *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 4.

1980-98: Ibid., *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 1.

Table 1-42M Average Length of Haul, Domestic Freight and Passenger Modes (Kilometers)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Freight											
Air carrier	1,534	1,518	1,632	1,741	1,693	1,862	2,235	R1,720	R1,730	R1,453	1,432
Truck[a]	438	417	423	460	584	589	629	669	R686	R700	715
Class I rail	742	810	829	871	991	1,070	1,168	1,357	1,355	1,370	1,344
Water											
Coastwise	2,408	2,416	2,429	2,192	3,082	3,174	2,581	2,659	2,456	2,140	2,029
Lakewise	840	795	814	853	863	843	890	827	818	816	813
Internal	454	478	531	576	652	700	756	795	768	750	760
Intraport	U	U	U	26	27	24	21	26	27	24	24
Oil Pipeline											
Crude	523	515	483	1,019	1,402	1,250	1,296	R1,202	R1,254	R1,147	1,109
Petroleum products	433	539	575	830	666	629	626	R632	R632	R632	632
Passenger											
Air carrier, domestic, scheduled	938	988	1,091	1,123	1,184	1,220	1,292	1,273	1,291	R1,315	1,308
Bus, intercity	127	151	171	182	201	195	227	225	230	R232	232
Commuter rail	33	34	36	37	37	38	35	39	39	R37	U
Amtrak[b]	RN	RN	RN	R380	R348	R372	439	431	414	412	406

[a] Total Class I and Class II motor carriers of freight (less-than-truckload, specialized carrier for truckload, and others).

[b] Amtrak began operations in 1971. Data are reported for fiscal years.

NOTES: Conversion to Kilometers occurred after the following calculations. Average length of haul for freight is calculated by dividing ton-miles in table 1-11 by estimates of tonnage from the various data sources. The calculation of average length of haul for passenger trips varies by mode: for air carrier it is calculated by dividing revenue passenger-miles by revenue passenger enplanements; for commuter rail, intercity bus, and Amtrak it is calculated by dividing passenger-miles by number of passengers.

SOURCES:

Freight:

Air carrier, truck: Eno Transportation Foundation, Inc., *Transportation In America, 1999* (Washington, DC: 1999), p. 71.

Class I rail: Association of American Railroads, *Railroad Facts* (Washington, DC: 1999), p. 36.

Water: U.S. Army Corps of Engineers, *Waterborne Commerce of the United States, Part 5* (New Orleans, LA: Annual issues), section 1, Table 1-4.

Oil pipeline: 1960-70: Transportation Policy Associates, Washington, DC, personal communication.

1975-98: Eno Transportation Foundation, Inc., *Transportation in America, 1999* (Washington, DC: 1999), p. 71.

KEY: N = data do not exist; R = revised; U = data are not available

Passenger:

Air carrier: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual issues).

Intercity bus and commuter rail: Eno Transportation Foundation, Inc., *Transportation in America, 1999* (Washington, DC: 1999), p. 70.

Amtrak: 1970-85: Amtrak, corporate communication, Jan. 26, 1999.

1990-98: *Amtrak, Amtrak FY99 Annual Report* (Washington, DC), statistical appendix, p. III.

Table 1-46M U.S. Waterborne Freight (Million metric tons)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Foreign	307.8	402.5	527.0	679.2	835.9	702.5	944.9	1,040.9	1,073.6	1,107.3	1,129.8
Imports	191.7	244.8	307.8	432.3	469.5	374.4	544.3	610.2	664.6	715.1	762.7
Exports	116.1	157.8	219.2	246.9	366.4	328.1	400.6	430.6	409.0	392.2	367.1
Domestic	690.0	752.2	862.5	858.5	977.5	920.0	1,018.1	991.6	998.5	R1,009.3	992.6
Inland	264.0	335.3	428.3	457.2	485.3	485.0	564.8	562.7	564.3	572.0	567.0
Coastal	189.8	182.8	216.3	210.4	299.0	281.0	270.9	241.9	242.6	238.7	226.4
Great Lakes	140.7	139.4	142.5	117.3	104.4	83.4	99.9	105.3	104.2	111.3	110.9
Intraport	94.5	93.3	73.9	71.0	85.4	67.4	78.4	75.4	80.7	81.5	81.7
Intraterritory	0.9	1.3	1.5	2.6	3.3	3.1	4.1	6.2	6.6	5.7	6.5
Total	**997.8**	**1,154.8**	**1,389.5**	**1,537.7**	**1,813.4**	**1,622.4**	**1,963.0**	**2,032.5**	**2,072.1**	**2,116.6**	**2,122.4**

KEY: R = revised

NOTE: Beginning in 1996, shipments of fish are excluded from domestic tonnage totals.

SOURCE: U.S. Army Corps of Engineers, *Waterborne Commerce of the U.S.* (New Orleans, LA: March 2000). Part 5, section 1.

Table 1-51M Crude Oil and Petroleum Products Transported in the United States by Mode

	1975	1980	1985	1990	1995	1996	1997	1998
Crude Oil Tonne-kilometers (billions)								
Pipelines[a]	420.5	529.4	488.2	488.8	490.4	493.9	492.6	487.8
Water carriers	59.3	[c]565.6	655.8	425.1	361.6	295.5	215.1	172.1
Motor carriers[b]	2.0	3.6	2.6	2.2	2.5	2.5	2.5	2.3
Railroads	2.2	0.7	1.2	1.0	1.2	1.2	0.7	0.7
Total	**484.0**	**1099.3**	**1147.8**	**917.2**	**855.7**	**793.1**	**710.9**	**663.0**
% of total								
Pipelines[a]	86.9	48.2	42.5	53.3	57.3	62.3	69.3	73.6
Water carriers	12.2	51.4	57.1	46.4	42.3	37.3	30.3	26.0
Motor carriers[b]	0.4	0.3	0.2	0.2	0.3	0.3	0.3	0.4
Railroads	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Refined Petroleum Products Tonne-kilometers (billions)								
Pipelines[a]	319.7	329.4	335.6	364.0	387.2	410.1	407.5	417.1
Water carriers	375.8	336.4	206.1	230.4	223.7	225.0	216.5	214.8
Motor carriers[b]	38.3	35.5	39.3	41.2	35.9	40.9	38.0	39.0
Railroads	18.4	17.5	16.5	19.4	23.2	23.4	23.7	23.7
Total	**752.2**	**718.7**	**597.6**	**654.9**	**670.0**	**699.3**	**685.6**	**694.5**
% of total								
Pipelines[a]	66.1	30.0	29.2	39.7	45.2	51.7	57.3	62.9
Water carriers	77.6	30.6	18.0	25.1	26.1	28.4	30.5	32.4
Motor carriers[b]	7.9	3.2	3.4	4.5	4.2	5.2	5.3	5.9
Railroads	3.8	1.6	1.4	2.1	2.7	2.9	3.3	3.6
Combined Crude and Petroleum Products Tonne-kilometers (billions)								
Pipelines[a]	740.2	858.8	823.9	852.8	877.6	904.0	900.1	904.9
Water carriers	435.1	[c]902	862.0	655.5	585.3	520.5	431.6	386.9
Motor carriers[b]	40.3	39.1	41.9	43.4	38.4	43.4	40.4	41.3
Railroads	20.6	18.2	17.7	20.4	24.2	24.5	24.4	24.4
Total	**846.7**	**1,818.1**	**1,745.4**	**1,572.1**	**1,525.5**	**1,492.4**	**1,396.5**	**1,357.5**
% of total								
Pipelines[a]	87.4	47.2	47.2	54.2	57.5	60.6	64.5	66.7
Water carriers	51.4	72.4	49.4	41.7	38.4	34.9	30.9	28.5
Motor carriers[b]	4.8	2.2	2.4	2.8	2.5	2.9	2.9	3.0
Railroads	2.4	1.0	1.0	1.3	1.6	1.6	1.7	1.8

[a] The amount carried by pipeline is based on tonne-kilometers of crude and petroleum products for federally regulated pipelines (84%), plus an estimated breakdown of crude and petroleum products for the tonne-kilometers for pipelines not federally regulated (16%).

[b] The amount carried by motor carriers is estimated.

[c] Reflects the entrance between 1975 and 1980 of the Alaska pipeline, moving crude petroleum for water transportation to U.S. refineries.

SOURCES: 1975: Association of Oil Pipe Lines, *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 6.

1980-98: Ibid., *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 3.

Table 4-3M Domestic Demand for Refined Petroleum Products by Sector (Petajoules)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Transportation	10,688	12,524	R16,154	18,580	20,057	20,574	R23,012	R24,478	R25,048	R25,322	R25,998	26,620
Industrial	6,067	7,164	8,219	8,599	10,055	8,240	8,778	9,095	9,601	9,823	R9,654	9,981
Residential and commercial	3,682	4,083	4,547	4,020	R3,208	2,659	R2,290	2,195	2,321	2,258	R2,079	2,184
Electric utilities	579	771	2,237	3,346	2,770	1,155	1,323	694	770	865	1,234	992
Total petroleum demand	**R21,017**	**R24,542**	**R31,157**	**R34,533**	**R36,084**	**R32,628**	**R35,403**	**R36,454**	**R37,730**	**R38,268**	**R38,965**	**39,788**
Transportation as % of total	50.9	51.0	51.8	53.8	55.6	63.1	65.0	R67.1	R66.4	R66.2	R66.7	66.9

KEY: R = revised

NOTE: Transportation's share of U.S. petroleum demand in this table differs slightly from table 4-1 because this table takes into account that sectors use various grades of petroleum-based fuel that have different Petajoule content per unit volume.

SOURCES: 1960-70: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), tables 2.1, 5.12b, and A3.

1975-99: Ibid., Monthly Energy Review, Internet site www.eia.doe.gov/gov/pub/energy.overview/monthly.energy/, as of May 8, 2000, tables, 1.4, 2.3, 2.4, 2.5, and 2.6.

Table 4-5M Fuel Consumption by Mode of Transportation

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Certificated carriers[a]											
Jet fuel (million liters)	7,397	14,721	29,742	28,610	34,432	38,312	R47,049	48,499	49,922	51,709	52,530
General aviation[b]											
Aviation gasoline (million liters)	916	1,105	2,086	1,560	1,968	1,594	1,336	1,045	1,086	R1,105	1,177
Jet fuel (million liters)	N	212	787	1,715	2,900	2,616	2,510	2,059	2,150	R2,430	3,085
Highway											
Gasoline, diesel and other fuels (million liters)											
Passenger car and motorcycle	155,849	188,222	256,950	281,078	265,683	271,414	264,067	258,424	262,780	R265,335	274,117
Other 2-axle 4-tire vehicle	N	[e]	46,610	72,229	90,078	103,580	134,802	172,634	179,254	R186,954	191,462
Single-unit 2-axle 6-tire or more truck	N	52,420	15,021	20,517	26,206	28,008	31,635	34,886	35,617	R36,249	36,874
Combination truck	N	25,203	27,815	34,739	49,350	53,015	61,070	74,864	76,439	R76,851	79,872
Bus	3,131	3,312	3,104	3,986	3,854	3,157	3,388	3,664	3,748	R3,888	3,971
Transit[c]											
Electricity (million kWh)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	R4,988	P5,250
Motor fuel (million liters)											
Diesel	787	939	1,026	1,382	1,632	2,305	2,464	2,567	2,623	R2,714	P2,650
Gasoline and other nondiesel fuels[d]	727	469	257	30	42	174	129	231	231	R223	P189
Compressed natural gas	N	N	N	N	N	N	N	42	57	R91	P117
Rail, Class I (in freight service)											
Distillate/diesel fuel (million liters)	13,109	13,597	13,419	13,843	14,778	11,773	11,792	13,173	13,548	13,533	13,563
Amtrak											
Electricity (million kWh)	N	N	N	180	254	295	330	304	293	282	275
Distillate/diesel fuel (million liters)	N	N	N	238	242	246	310	250	269	284	284
Water											
Residual fuel oil (million liters)	14,960	11,708	14,286	15,369	33,887	17,375	23,947	22,281	21,581	18,965	21,274
Distillate/diesel fuel oil (million liters)	2,979	2,468	3,100	4,156	5,595	6,431	7,817	8,854	9,429	9,744	9,823
Gasoline (million liters)	N	N	2,264	2,763	3,982	3,986	4,921	4,013	3,763	3,736	3,619
Pipeline											
Natural gas (million cubic meters)	9,828	14,173	20,449	16,508	17,970	14,265	18,684	19,831	20,146	R21,279	17,995

KEY: kWh = kilowatt-hour; N = data do not exist; P = preliminary; R = revised

Continued next page

Table 4-5M Cont'd Fuel Consumption by Mode of Transportation

[a] Domestic operations only.

[b] Includes fuel used in air taxi operations, but not commuter operations. Data for 1996 are estimated using new information on nonrespondents and are therefore not comparable to earlier years. See the accuracy statement at the end of this chapter for more detailed information.

[c] Prior to 1984, excludes commuter rail, automated guideway, ferryboat, demand responsive vehicles, and most rural and smaller systems.

[d] Gasoline and all other nondiesel fuels such as liquefied natural gas, methanol and propane, except compressed natural gas.

[e] Included in single-unit 2-axle 6-tire or more truck category.

SOURCES:

Air:

Certificated air carriers: 1960-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

General aviation: 1960-70: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation - 1972 edition* (Washington, DC: 1973), table 9.12.

1975-97: Ibid., General Aviation and Air Taxi Activity Survey (Washington, DC: Annual issues), table 5.1, and similar tables in earlier editions.

1998: Ibid., *FAA Aerospace Forecasts Fiscal Years 2000-2011* (Washington, DC: March 2000), table 29.

Highway:

1960-90: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics, Summary to 1995, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

Electricity/motor fuel/compressed natural gas: 1960-98: American Public Transit Association, *Transportation Fact Book* (Washington, DC: February 1999), tables 65, 66, 67, and similar tables in earlier editions.

Rail:

1960-98: Association of American Railroads, Railroad Facts (Washington, DC: May 1999), p. 40.

Amtrak:

1975-98: Amtrak, State and Local Affairs Department, personal communication.

Water:

Residual and distillate/diesel fuel oil: 1960-80: American Petroleum Institute, *Basic Petroleum Data Book* (Washington, DC: Annual issues), tables 10, 10a, 12, and 12a.

1985-98: U.S. Department of Energy, Energy Information Administration, *Fuel Oil and Kerosene Sales* (Washington, DC: Annual issues), tables 2 and 4, and similar tables in earlier editions.

Gasoline: 1970-98: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Annual issues), table MF-24 and similar tables in earlier editions.

Pipeline:

1960-96: U.S. Department of Energy, *Natural Gas Annual 1997* (Washington, DC: October 1998), table 101.

1997-98: Ibid., table 1.

Table 4-6M Energy Consumption by Mode of Transportation (Petajoules)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
Certificated carriers[a]											
Jet fuel	278	554	1,119	1,077	R1,213	1,442	R1,770	1,825	1,878	1,946	1,976
General aviation[b]											
Aviation gasoline	31	37	70	52	66	53	45	R37	R37	37	39
Jet fuel	N	8	30	65	109	98	94	R80	R87	R92	116
Highway											
Gasoline, diesel and other fuels											
Passenger car and motorcycle	5,430	6,558	8,952	9,793	R9,257	9,456	9,200	R9,004	9,155	R9,245	9,551
Other 2-axle 4-tire vehicle	N	[d]	1,624	R2,517	3,138	3,609	R4,697	R6,015	6,245	R6,513	6,671
Single-unit 2-axle 6-tire or more truck	N	2,027	581	793	1,013	1,083	1,223	1,349	1,377	1,401	1,425
Combination truck	N	974	1,075	1,343	1,908	R2,050	2,361	2,894	2,955	R2,971	3,088
Bus	121	128	120	154	149	122	131	142	R145	150	153
Transit[c]											
Electricity	10	9	9	10	9	15	17	18	18	18	P19
Motor fuel											
Diesel	30	36	40	53	63	89	95	100	101	R104	P102
Gasoline and other nondiesel fuels[e]	25	16	9	1	1	6	4	8	8	8	R6
Compressed natural gas	N	N	N	N	N	N	N	R1	2	3	R4
Rail, Class I (in freight service)											
Distillate/diesel fuel	507	526	519	535	571	455	456	509	524	523	524
Amtrak											
Electricity	N	N	N	1	1	1	1	1	1	1	1
Distillate/diesel fuel	N	N	N	9	9	10	12	10	10	11	11
Water											
Residual fuel oil	624	489	596	641	1,414	725	999	930	900	791	888
Distillate/diesel fuel oil	115	95	120	161	216	249	302	342	365	377	380
Gasoline	N	N	79	96	139	139	171	140	131	130	126
Pipeline											
Natural gas	378	544	786	634	690	548	718	762	774	818	691

KEY: kWh = kilowatt-hour; N = data do not exist; P = preliminary; R = revised

Continued next page

Table 4-6M Cont'd Energy Consumption by Mode of Transportation (Petajoules)

[a] Domestic operations only.

[b] Includes fuel used in air taxi operations, but not commuter operations.

[c] Prior to 1984, excludes commuter rail, automated guideway, ferryboat, demand responsive vehicles, and most rural and smaller systems.

[d] Included in other single-unit 2-axle 6-tire or more truck category.

[e] Gasoline and all other nondiesel fuels such as liquefied natural gas, methanol, and propane, except compressed natural gas.

NOTES: The following conversion rates were used:

Jet fuel = 37,626,700 joules/ liters

Compressed natural gas = 38,657,950 joules/ liters

Aviation gasoline = 33,501,698 joules/ liters

Residual fuel = 41,723,829 joules/ liters

Automotive gasoline = 34,839,537 joules/ liters

Residual fuel = 41,723,829 joules/ liters

Diesel motor fuel = 38,657,950 joules/ liters

Natural gas = 38,413,974 joules/ m3

Electricity 1kWh = 3,600,000 joules, negating electrical system loses. To include electrical system loses, multiply this conversion factor by approximately 3.

SOURCES:

Air:

Certificated air carriers: 1960-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

General aviation: 1960-80: U.S. Department of Transportation, Federal Aviation Administration, Office of Aviation Policy, Plans, and Management Analysis, *FAA Statistical Handbook of Aviation* (Washington, DC: Annual issues).

1985-97: Ibid., *General Aviation and Avionics Survey* (Washington, DC: Annual issues), table 5.1 and similar tables in earlier editions.

1998: Ibid. *FAA Aerospace Forecasts Fiscal Years 2000-2011* (Washington, DC: March 2000), table 29.

Highway:

1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995, FHWA-PL-97-009* (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit:

Electricity/motor fuel/compressed natural gas: 1960-98: American Public Transit Association, *Transportation Fact Book* (Washington, DC: February 1999), tables 65, 66, 67, and similar tables in earlier editions.

Rail:

1960-98: Association of American Railroads, *Railroad Facts* (Washington, DC: May 1999), p. 40.

Amtrak:

1975-98: Amtrak, State and Local Affairs Department, personal communication.

Water:

Residual and distillate/diesel fuel oil: 1960-80: American Petroleum Institute, *Basic Petroleum Data Book* (Washington, DC: Annual issues), tables 10, 10a, 12, and 12a.

1985-98: U.S. Department of Energy, Energy Information Administration, *Fuel Oil and Kerosene Sales* (Washington, DC: Annual issues), tables 2 and 4, and similar tables in earlier editions.

Gasoline: 1970-98: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Annual issues), table MF-24 and similar tables in earlier editions.

Pipeline:

1960-96: U.S. Department of Energy, *Natural Gas Annual 1997* (Washington, DC: October 1998), table 101.

1997-98: Ibid., table 1.

Table 4-7M Domestic Demand for Gasoline (Million liters) by Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Highway	**209,820**	**253,541**	**324,025**	**376,094**	**383,019**	**391,960**	**414,614**	**443,125**	**452,412**	**457,800**	**472,018**
Nonhighway											
Agriculture	8,675	7,432	7,313	5,924	4,009	4,091	2,579	3,508	3,475	3,727	3,433
Aviation[a]	5,011	1,898	1,488	1,551	1,563	1,444	1,366	1,389	1,301	1,267	1,329
Marine	230	365	2,264	2,762	3,983	3,986	4,923	4,014	3,761	3,737	3,619
Other[b]	6,270	6,235	4,087	3,551	4,280	5,639	6,562	3,172	3,124	3,749	4,050
Total nonhighway	**20,185**	**15,930**	**15,152**	**13,788**	**13,834**	**15,160**	**15,430**	**12,083**	**11,662**	**12,479**	**12,431**
TOTAL demand	**230,005**	**269,471**	**339,178**	**389,882**	**396,854**	**407,121**	**430,044**	**455,209**	**464,074**	**470,279**	**484,449**

[a] Does not include aviation jet fuel.

[b] Includes state, county, and municipal use, industrial and commercial use, construction use, and miscellaneous.

NOTES: All nonhighway uses of gasoline were estimated by the U.S. Department of Transportation, Federal Highway Administration or data were obtained from other sources. These estimates may not be comparable to data for prior years due to revised estimation procedures.

Numbers may not add to totals due to rounding.

SOURCES:

Highway: 1960-95: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1995* (Washington, DC: 1996), table MF-221.

1996-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table MF-21.

Nonhighway: 1960-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table MF-24, and unpublished revisions.

Table 4-8M Certificated Air Carrier Fuel Consumption and Travel[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Number of aircraft	**2,135**	**2,125**	**2,679**	**2,495**	**3,808**	**4,678**	**6,083**	**7,411**	**7,478**	**7,616**	**R8,111**	**8,228**
Average kilometers flown per aircraft (thousands)	**784**	**1,074**	**1,528**	**R1,500**	**1,236**	**1,191**	**1,250**	**1,222**	**1,260**	**1,273**	**R1,234**	**1,246**
Aircraft-kilometers (millions)												
Domestic operations	1,381	1,825	3,328	3,135	4,060	4,902	6,378	7,450	7,743	R7,904	8,097	8,330
International operations	293	457	764	607	645	668	1,223	1,606	1,679	1,793	1,917	1,926
Fuel consumption (million liters)												
Domestic operations	7,397	14,721	29,742	28,610	34,432	R38,289	R47,049	48,499	R49,918	51,709	52,530	54,854
International operations	2,143	4,845	8,491	7,378	7,336	R9,418	R15,002	R17,076	R17,632	18,791	19,631	19,976
Aircraft-kilometers flown per liter												
Domestic operations	0.19	0.12	0.11	0.11	0.12	0.13	0.14	0.15	0.16	0.15	0.15	0.15
International operations	0.14	0.09	0.09	0.08	0.09	0.07	0.08	0.09	0.10	0.10	0.10	0.10

KEY: R = revised; U = data are unavailable

[a] Aircraft operating under 14 CFR 121 and 14 CFR 135.

SOURCES:

Number of aircraft: 1960-65: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook of Aviation, 1970 edition* (Washington, DC: 1970), table 5.3.

1970-75: Ibid., *FAA Statistical Handbook of Aviation, Calendar Year 1979* (Washington, DC: 1979), table 5.1.

1980-85: Ibid., *FAA Statistical Handbook of Aviation, Calendar Year 1986* (Washington, DC: 1986), table 5.1.

1990-97: Ibid., *FAA Statistical Handbook of Aviation, Calendar Year 1997* (Washington, DC: unpublished), personal communication, Mar. 19, 1999.

1998-99: Aerospace Industries Association, *Aerospace Facts and Figures* (Washington DC: Annual Issues), "Active U.S. Air Carrier Fleet".

Aircraft-kilometers flown: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, tables 2 and 13.

1965-70: Ibid., *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975-80: Ibid., *Air Carrier Traffic Statistics* (Washington, DC: December 1976), pp. 4 and 14; and (December 1981), pp. 2 and 3.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual issues, December), pp. 2 and 3, line 27 plus line 50.

1999: Ibid., Internet site http://www.bts.gov/programs/oai, as of July 14, 2000.

Fuel consumption: 1960-99: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/programs/oai/fuel/fuelyearly.html, as of July 5, 2000.

1999: Ibid., Personal communication, July 27, 2000.

Table 4-9M Motor Vehicle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicles registered (thousands)[a]	73,858	90,358	111,242	137,913	161,490	177,133	193,057	205,427	210,441	211,580	215,496
Vehicle-kilometers traveled (millions)[R]	1,157,120	1,429,100	1,786,375	2,137,213	2,457,473	2,856,591	3,450,440	3,899,448	4,000,837[R]	4,122,656	4,225,127
Fuel consumed (million liters)	219,100	269,158	349,503	412,549	435,171	459,174	494,962	544,471	557,837	[R]569,273	586,300
Average kilometers traveled per vehicle (thousands)	15.7	15.8	16.1	15.5	15.2	16.1	17.9	19.0	19.0	19.5	19.6
Average kilometers traveled per liter	5.3	5.3	5.1	5.2	5.6	6.2	7.0	7.2	7.2	7.2	7.2
Average fuel consumed per vehicle (liters)	[R]2,968	2,979	3,142	[R]2,990	2,695	[R]2,593	[R]2,563	2,650	[R]2,650	[R]2,691	2,722

KEY: R = revised

[a] Includes personal passenger vehicles, buses, and trucks.

NOTE: See tables 4-11, 4-12, 4-13, 4-14, and 4-15 for individual highway vehicles.

SOURCES: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-11M Passenger Car and Motorcycle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicles registered (thousands)											
Passenger cars	61,671	75,258	89,244	106,706	121,601	127,885	133,700	128,387	129,728	129,749	131,839
Motorcycles	574	1,382	2,824	4,964	5,694	5,444	4,259	3,897	3,872	3,826	3,879
Vehicle-kilometers traveled (millions)											
Passenger cars	945,000	1,164,000	1,476,000	1,664,000	1,790,000	2,007,000	2,266,000	2,314,000	2,366,000	R2,418,000	2,488,000
Motorcycles	[a]	[a]	4,800	9,000	16,400	14,600	15,400	15,800	15,900	R16,200	16,500
Fuel consumed (million liters)											
Passenger cars	155,849	188,222	256,723	280,650	264,911	270,725	R263,343	R257,680	262,030	R264,570	273,341
Motorcycles	[a]	[a]	227	428	772	689	723	742	750	765	776
Average kilometers traveled per vehicle (thousands)											
Passenger cars	15.3	15.5	16.5	15.6	14.7	15.7	16.9	18.0	18.2	18.6	18.9
Motorcycles	[a]	[a]	1.7	1.8	2.9	2.7	R2.2	4.1	4.1	R4.2	4.3
Average kilometers traveled per liter											
Passenger cars	6.1	6.2	5.7	5.9	6.8	7.4	8.6	9.0	9.0	9.1	9.1
Motorcycles	[a]	[a]	21	21	21	21	21	21	21	21	21
Average fuel consumed per vehicle (liters)											
Passenger cars	2,527	2,501	2,877	2,630	2,179	2,117	1,970	2,007	2,020	R2,039	2,073
Motorcycles	[a]	[a]	80	86	136	127	170	190	194	200	200

KEY: R = revised

Continued next page

Table 4-11M Cont'd Passenger Car and Motorcycle Fuel Consumption and Travel

[a] Included in passenger car.

NOTE: See table 4-12 for other 2-axle 4-tire vehicles.

SOURCES:

Passenger car:

Number registered: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MV-201.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

All other passenger car data: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A. For 1970-94, the unrevised motorcycle vehicle-miles and fuel consumed are subtracted from the combined passenger car and motorcycle vehicle-miles and fuel consumed from VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle:

Number registered: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table MV-201.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

All other motorcycle data: 1970-85: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1985*, table VM-201A.

1990-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1. Average kilometers traveled per vehicle, average kilometers traveled per liter, average fuel consumed per vehicle: Derived by calculation.

Table 4-13M Single-Unit 2-Axle 6-Tire or More Truck Fuel Consumption and Travel

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number registered (thousands)	3,681	4,232	4,374	4,593	4,487	5,024	R5,265	5,293	5,414
Vehicle-kilometers (millions)R	43,613	55,683	64,052	73,064	83,525	R100,914	R102,945	R107,654	109,265
Fuel consumed (million liters)	15,021	20,517	26,206	28,008	31,635	34,886	R35,450	R36,249	36,874
Average kilometers traveled per vehicle (thousands)	11.8	13.2	R14.6	15.9	18.6	20.1	19.6	20.3	20.2
Average kilometers traveled per liter	2.9	2.7	2.4	2.6	2.6	2.9	2.9	3.0	3.0
Average fuel consumed per vehicle (liters)	4,080	4,848	5,992	6,098	7,050	6,944	R6,734	R6,848	6,810

KEY: R = revised

NOTES: In 1995, the U.S. Department of Transportation, Federal Highway Administration revised its vehicle categories beginning with 1993 data to include passenger cars, other 2-axle 4-tire vehicles, single-unit 2-axle 6-tire or more trucks, and combination trucks. Single-unit 2-axle 6-tire or more trucks are on a single frame with at least 2 axles and 6 tires. Pre-1993 data have been reassigned to the most appropriate category.

SOURCES: 1970-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-14M Combination Truck Fuel Consumption and Travel

	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number registered (thousands)	787	905	1,131	1,417	1,403	1,709	1,696	1,747	1,790	1,831
Vehicle-kilometers traveled (millions)R	51,016	56,488	75,157	110,562	125,690	151,761	185,880	191,351	R200,499	206,252
Fuel consumed (million liters)	25,203	27,815	34,739	49,350	53,015	61,070	74,864	76,439	76,821	79,872
Average kilometers traveled per vehicle (thousands)	R64.9	62.4	66.5	R78.0	89.6	88.8	109.6	R109.5	112.0	112.6
Average kilometers traveled per liter	2.0	2.0	2.2	2.2	2.4	2.5	2.5	2.5	2.6	2.6
Average fuel consumed per vehicle (liters)	32,044	30,732	30,722	34,831	37,780	35,737	44,148	R43,763	R42,919	43,631

KEY: R = revised

SOURCES: 1965-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-15M Bus Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number registered (thousands)	272	314	378	462	529	593	627	686	695	698	716
Vehicle-kilometers traveled (millions)[R]	6,920	7,564	7,242	9,817	9,817	7,242	9,173	10,300	10,622	[R]11,011	11,259
Fuel consumed (million liters)	3,131	3,312	3,104	3,986	3,854	3,157	3,388	3,664	3,748	[R]3,888	3,971
Average kilometers traveled per vehicle (thousands)	25.4	[R]24.1	[R]19.2	21.2	[R]18.6	[R]12.2	[R]14.6	15.0	15.3	[R]15.8	15.7
Average kilometers traveled per liter	2.2	[R]2.3	2.3	2.5	2.5	2.3	2.7	2.8	2.8	2.8	2.8
Average fuel consumed per vehicle[R] (liters)	11,504	10,539	8,221	[R]8,627	[R]7,291	5,319	[R]5,406	5,345	[R]5,394	[R]5,568	5,549

KEY: R = revised

NOTE: Includes both publicly and privately owned school, transit, and other commercial buses.

SOURCES: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A. 1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-16M Transit Industry Electric Power and Primary Energy Consumption[a] and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997[R]	1998[P]
Number of vehicles	65,292	61,717	61,298	62,183	75,388	94,368	92,961	115,874	122,362	126,360	128,970
Vehicle-kilometers traveled	3,449	3,232	3,030	3,502	3,681	4,492	[R]5,218	5,713	5,874	6,029	6,328
Electric power consumed (million kWh hours)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	4,988	5,250
Primary energy consumed (thousand liters)											
Diesel	787,744	940,296	1,024,332	1,381,903	1,633,027	2,304,324	2,464,417	2,567,592	2,622,208	2,713,959	2,650,095
Gasoline and other nondiesel fuels[b]	726,421	470,148	258,165	28,678	43,154	173,008	128,348	229,888	231,716	225,092	190,804
Compressed natural gas	N	N	N	N	N	N	N	40,655	57,129	90,494	117,026

KEY: kWh = kilowatt hour; N = data do not exist; P = preliminary; R = revised

[a] Prior to 1985, excludes commuter rail, automated guideway, urban ferryboat, demand responsive vehicles, and most rural and smaller systems.

[b] For 1995-96, includes propane, liquid petroleum gas, liquefied natural gas, kerosene, and all other nondiesel fuels except compressed natural gas. From 1960 to 1990, includes propane.

NOTE: To convert to joules, use the following energy conversion factors: 1kWh=3,600,000 joules, negating electrical system loses. To include electrical system loses, multiply this conversion factor by approximately three; 1 liter of gasoline = 34,839,537 joules; 1 liter of diesel fuel=38,657,950 joules. APTA changed from American Public Transit Association to American Public Transportation Association in January 2000. The APTA Transit Fact Book changed to the Public Transportation Fact Book in March 2000.

SOURCE: American Public Transportation Association, *Public Transportation Fact Book* (Washington, DC: March 2000), tables 42, 46, 65, 66, 67, and similar tables in earlier editions of the APTA *Transit Fact Book*.

Table 4-17M Class I Rail Freight Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Number in use											
Locomotives[a]	29,031	27,780	27,077	27,846	28,094	22,548	18,835	18,812	19,269	19,684	20,261
Cars[b]	1,965,486	1,800,962	1,784,181	1,723,605	1,710,827	1,421,686	1,212,261	1,218,927	1,240,573	1,270,419	1,315,667
Kilometers traveled (millions)											
Freight train-kiliometers[c]	650	677	687	648	689	559	611	738	754	764	764
Locomotive unit-kilometers	N	N	N	2,380	2,464	1,976	2,060	2,326	2,358	2,290	2,317
Car-kilometers	45,335	47,212	48,103	44,508	47,117	40,105	42,099	48,897	51,040	50,952	52,556
Average kilometers traveled per vehicle (thousands)											
Locomotives	N	N	N	85.5	87.7	87.6	109.4	123.6	122.4	116.3	114.4
Cars	23.1	26.2	27.0	25.8	27.5	28.2	34.7	40.1	41.1	40.1	39.9
Average kilometers traveled per liter											
Trains	0.05	0.05	0.19	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06
Cars	3.46	3.47	13.57	3.22	3.19	3.41	3.57	3.71	3.77	3.77	3.87
Fuel consumed (million liters)	13,109	13,597	13,419	13,843	14,778	11,773	11,792	13,173	13,548	13,533	13,563
Average fuel consumed per locomotive[a] (thousand liters)	451.5	489.5	495.6	497.1	526.0	522.1	626.0	700.3	703.1	687.5	669.4

KEY: N = data do not exist

[a] For 1960-80, locomotives total includes a small number of steam and electric units, which are not included in the per locomotive fuel consumption figure.

[b] Includes cars owned by Class I railroads, other railroads, and car companies and shippers.

[c] Based on the distance run between terminals and/or stations; does not include yard or passenger train-miles.

SOURCES:

All data except for locomotive unit-miles: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1999), pp. 33, 34, 40, 48, 50.

Locomotive unit-miles: 1975-90: Ibid., *Railroad Ten-Year Trends* (Washington, DC: Annual issues).

1995-98: Ibid., *Analysis of Class I Railroads* (Washington, DC: Annual issues), p. 29

Table 4-19M U.S. Government Energy Consumption by Agency and Source (Petajoules)

	Petroleum								
	Motor gasoline	Distillate and residual fuel oil	Jet fuel and aviation gas	Other[a]	Total	Electricity	Natural gas	Coal and other[b]	Total
1989									
Agriculture	4.7	0.7	0.1	0.2	5.7	1.9	1.5	0.1	9.2
Defense	18.9	232.9	793.4	3.9	1,049.1	126.3	114.1	55.2	1,344.6
Energy	1.4	3.3	0.5	0.2	5.3	20.3	9.7	11.4	46.7
GSA	0.1	0.5	0.0	0.0	0.7	7.8	2.8	2.0	13.4
Health and Human Services	0.2	2.0	0.0	0.1	2.4	2.6	1.9	0.1	7.1
Interior	2.0	1.3	0.2	1.2	4.7	1.6	1.1	0.1	7.5
Justice	2.0	0.3	0.2	0.0	2.6	1.8	2.6	1.2	8.1
NASA	0.2	1.1	1.5	0.0	2.7	6.8	3.0	0.3	12.8
Postal Service	9.3	4.9	0.0	0.2	14.3	12.0	5.0	0.6	32.0
Transportation	0.8	5.9	7.3	0.1	14.1	4.2	1.2	0.0	19.5
Veterans Affairs	0.5	2.5	0.0	0.0	3.2	8.2	15.1	1.3	27.6
Other[c]	3.2	3.3	1.3	0.0	7.7	5.3	2.8	0.6	16.5
Total	**43.4**	**258.6**	**804.5**	**6.0**	**1,112.5**	**198.9**	**160.8**	**73.0**	**1,545.2**
1999[P]									
Agriculture	3.5	0.1	0.0	0.1	3.7	2.0	2.1	0.5	8.2
Defense	14.2	151.3	460.9	1.8	628.2	104.1	90.7	32.2	855.4
Energy	1.1	1.2	0.0	0.1	2.4	16.6	7.1	5.0	31.0
GSA	0.1	0.1	0.0	0.0	0.2	10.0	3.4	1.6	15.1
Health and Human Services	0.4	0.3	0.0	0.1	0.9	3.0	3.5	0.1	7.4
Interior	3.0	0.8	0.1	0.7	4.7	1.6	1.5	0.1	7.9
Justice	5.1	0.4	1.6	0.0	7.1	4.0	4.7	0.4	16.2
NASA	0.2	0.4	1.2	0.0	1.9	6.8	3.2	0.2	12.0
Postal Service	11.0	5.3	0.0	0.0	16.2	17.2	7.9	0.6	42.0
Transportation	0.8	6.9	4.6	0.0	12.3	8.2	1.1	0.0	21.6
Veterans Affairs	1.3	1.2	0.0	0.0	2.4	9.9	15.1	1.6	29.0
Other[d]	2.5	3.3	0.9	0.0	6.8	14.0	5.1	0.6	26.5
Total	**43.4**	**171.2**	**469.2**	**3.1**	**686.9**	**197.5**	**145.2**	**42.7**	**1,072.3**

KEY: GSA = General Services Adminstration; NASA = National Aeronautics and Space Administration; P = preliminary

Continued next page

Table 4-19M Cont'd U.S. Government Energy Consumption by Agency and Source (Petajoules)

[a] Includes liquefied petroleum gases.

[b] Includes purchased steam, coal, and other.

[c] Includes U.S. Department of Commerce, Panama Canal Commission, Tennessee Valley Authority, U.S. Department of Labor, U.S. Department of Housing and Urban Development, Federal Communications Commission, Office of Personnel Management, U.S. Department of State, Small Business Administration, National Science Foundation, U.S. Department of Treasury, and Environmental Protection Agency.

[d] Includes National Archives and Records Administration, U.S. Department of Commerce, U.S. Department of Labor, U.S. Department of State, Environmental Protection Agency, Federal Communications Commission, Federal Trade Commission, Panama Canal Commission, Equal Employment Opportunity Commission, Nuclear Regulatory Commission, Office of Personnel Management, U.S. Department of Housing and Urban Development, U.S. Department of Treasury, Tennessee Valley Authority, Railroad Retirement Board, U.S. Information Agency, and Federal Emergency Management Agency.

NOTES: Numbers may not add to totals due to rounding. These data include energy consumed at foreign installations and in foreign operations, including aviation and ocean bunkering, primarily by the U.S. Department of Defense. U.S. government energy use for electricity generation and uranium enrichment is excluded. Other energy used by U.S. agencies that produce electricity or enriched uranium is included. The U.S. government's fiscal year runs from October 1 through September 30. This table uses a conversion factor for electricity of 3,600,000 joules per kilowatt-hour, and a conversion factor for purchased steam of 2,326 Kilojoules per kilogram.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1999*, DOE/EIA-0384(99) (Washington, DC: July 2000), table 1.13. Internet site http://www.eia.doe.gov/emeu/aer/ as of June 27, 2000.

Table 4-20M Energy Intensity of Passenger Modes (Thousand joules per passenger-kilometer)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air[R]											
Certificated air carrier											
Domestic operations	5,664	6,639	6,682	5,082	3,757	3,311	3,236	2,875	2,744	2,720	2,705
International operations	6,036	6,753	7,208	5,554	5,817	3,348	2,983	2,738	2,695	2,735	2,807
Highway[b]											
Passenger car	[R]2,949	[R]2,923	[R]3,176	[R]3,112	[R]2,853	[R]2,800	[R]2,501	[R]2,441	[R]2,429	[R]2,399	2,409
Other 2-axle 4-tire vehicle	N	N	[R]4,468	[R]4,311	[R]3,746	[R]3,261	[R]2,920	[R]2,978	[R]2,992	[R]2,994	3,012
Motorcycle	[a]	[a]	[R]1,640	[R]1,544	[R]1,394	[R]1,244	[R]1,306	[R]1,461	[R]1,476	[R]1,506	1,529
Transit motor bus	**N**	**N**	**N**	**N**	**[R]1,799**	**[R]2,228**	**[R]2,443**	**[R]2,726**	**[R]2,753**	**[R]2,774**	**[P]2,447**
Amtrak	**N**	**N**	**N**	**[R]1,563**	**[R]1,420**	**[R]1,374**	**1,354**	**[R]1,206**	**[R]1,409**	**[R]1,443**	**1,403**

KEY: N = data do not exist; P = preliminary; R = revised

[a] Included in passenger car.

[b] Energy intensity for highway vehicles may not match similar values in table 4-22 due to rounding error.

NOTE: To calculate total joules multiply fuel consumed by 37,626,700 joules/liter for air carrier and 34,839,537 joules/liter for passenger car, other 2-axle 4-tire vehicle, and motorcycle, and 90,999,114 for transit motor bus and Amtrak.

SOURCES:

Air:

Certificated air carriers:

Passenger-miles: 1960-99: Air Transport Association, Internet site http://www.air-transport.org/public/industry, as of July 5, 2000.

Fuel consumed: 1960-99: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

Highway:

Passenger car: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970-90: Ibid., *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1970-85: Ibid., *Highway Statistics Summary to 1985*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1990-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit motor bus:

1980-98: American Public Transit Association, *Public Transportation Fact Book* (Washington, DC: 2000), tables 30, 42, and 65.

Amtrak:

1975-90: Amtrak, State and Local Affairs Department, personal communication.

1995-98: Ibid., Personal communication, June 25, 1999.

Table 4-21M Energy Intensity of Certificated Air Carriers, All Services[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999
Aircraft-kilometers (millions)												
Domestic operations	1,381	1,825	3,328	3,135	4,060	4,902	6,378	7,450	7,743	R7,904	8,097	8,330
International operations	293	457	764	607	645	668	1,223	1,606	1,679	1,793	1,917	1,926
Available seat-kilometers (millions)R												
Domestic operations	84,040	152,545	343,048	388,306	556,879	717,489	906,167	971,912	1,008,077	1,030,495	1,045,178	1,105,525
International operations	21,480	47,529	83,622	99,335	139,220	164,094	274,088	326,955	335,842	349,088	361,665	371,613
Passenger-kilometers (millions)R												
Domestic operations	49,177	83,504	167,609	211,996	322,335	435,464	547,550	635,222	684,932	712,361	733,539	771,986
International operations	13,367	27,019	44,358	50,022	87,489	105,926	189,412	234,881	246,338	258,749	263,379	276,660
Fuel consumed (million liters)												
Domestic operations	7,397	14,721	29,742	28,610	34,432	R38,289	R47,049	48,499	R49,918	51,709	52,530	54,518
International operations	2,143	4,845	8,491	7,378	7,336	R9,418	R15,002	R17,076	R17,632	18,791	19,631	19,873
Seats per aircraftR												
Domestic operations	60.9	83.6	103.1	123.9	137.1	146.4	142.1	130.5	130.2	131.1	129.1	132.7
International operations	73.3	104.0	109.4	163.7	215.7	245.7	224.1	203.6	200.1	194.7	188.7	192.9
Seat-kilometer per literR												
Domestic operations	11	10	12	14	16	19	19	20	20	20	20	20
International operations	10	10	10	13	19	17	18	19	19	19	18	19
Energy intensiveness (1000 Joules/passenger-kilometer)b, R												
Domestic operations	5,664	6,639	6,682	5,082	4,022	3,311	3,236	2,875	2,744	2,720	2,705	2,659
International operations	6,036	6,753	7,208	5,554	3,158	3,348	2,982	2,738	2,695	2,735	2,807	2,705
Load factor (%)												
Domestic operations	R58.5	R54.7	R48.9	R54.6	R58.0	R60.7	R60.4	R65.4	67.9	69.1	70.2	69.8
International operations	R62.2	R56.8	R53.0	54.4	R62.8	R64.6	R69.1	71.8	73.3	74.1	R72.8	74.4

KEY: R = revised

Continued next page

Table 4-21M Cont'd Energy Intensity of Certificated Air Carriers, All Services[a]

[a] U.S. owned carriers only. Operation of foreign-owned carriers in or out of the United States not included.

[b] Calculation based on unrounded figures not shown here.

NOTES: Aircraft-kilometers includes all four air-carrier groups (majors, nationals, large regionals, and medium regionals), scheduled and charter, passenger, and all-cargo. Fuel consumed includes majors, nationals, and large regionals, scheduled and charter, passenger, and all-cargo. Passenger-kilometers includes all four air-carrier groups, scheduled and charter, passenger service only. International operations include operations outside the United States, including those between the United States and foreign countries and the United States and its territories or possessions.

Domestic and international load factor values for 1999 are derived by calculation.

Heat equivalent factor used for joules conversion is 37,626,700 joules/liter.

SOURCES:

Aircraft-kilometers, available seat-kilometers, passenger-kilometers, and load factor: 1960-80: Air Transport Association, Internet site http://www.air-transport.org/public/industry, as of July 5, 2000.

1985-98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington DC: Annual December issues).

Fuel consumed: 1960-99: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, Internet site http://www.bts.gov/oai/fuel/fuelyearly.html, as of July 5, 2000.

Seats per aircraft, seat-kilometers per liter, and energy intensiveness: Derived by calculation.

Table 4-22M Energy Intensity of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicle-kilometers (millions)											
Passenger car	R944,687	R1,163,558	R1,475,771	R1,664,065	R1,789,594	R2,006,856	R2,265,961	R2,314,241	R2,365,740	R2,418,849	2,488,050
Other 2-axle 4-tire vehicle	N	N	R197,950	R323,479	R468,320	R629,255	R925,375	R1,271,384	R1,314,836	R1,369,554	1,393,695
Motorcycle	[b]	[b]	4,828	9,012	16,415	14,645	15,450	15,772	15,933	16,254	16,576
Passenger-kilometers (millions)[a]											
Passenger car	R1,842,702	R2,245,039	R2,817,967	R3,144,664	R3,238,006	R3,369,973	R3,672,530	R3,680,577	R3,761,044	R3,844,730	3,955,775
Other 2-axle 4-tire vehicle	N	N	363,712	R584,193	R838,470	R1,107,231	R1,609,347	R2,021,340	R2,088,932	R2,177,446	2,216,071
Motorcycle	[b]	[b]	4,828	9,656	19,312	19,312	19,312	R17,703	R17,703	R17,703	17,703
Fuel consumed (million liters)											
Passenger car	155,849	188,222	256,723	280,650	264,911	270,725	263,344	257,681	262,030	R264,570	273,341
Other 2-axle 4-tire vehicle	N	N	46,610	72,229	90,078	103,580	134,802	172,634	179,254	R186,954	191,462
Motorcycle	[b]	[b]	227	428	772	689	723	742	750	765	776
Energy intensiveness (1,000 Joules/passenger-kilometer)[R]											
Passenger car	2,947	2,921	3,174	3,109	2,850	2,799	2,498	2,439	2,427	2,397	2,407
Other 2-axle 4-tire vehicle	N	N	4,465	4,308	3,743	3,259	2,918	2,975	2,990	2,991	3,010
Motorcycle	[a]	[a]	1,639	1,543	1,393	1,243	1,304	1,460	1,475	1,505	1,527

KEY: N = data do not exist; R = revised

Continued next page

Table 4-22M Cont'd Energy Intensity of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

[a] Passenger-kilometers are derived by multiplying vehicle-kilometers by an average occupancy rate for that vehicle type based on data provided by the Federal Highway Administration, Nationwide Personal Transportation Survey, 1977, 1983, 1995. Average vehicle occupancy rates are as follows: passenger car (1960-97): 1.95, 1.93, 1.91, 1.89, 1.81, 1.68, 1.62, 1.62, 1.61, 1.61, 1.60, 1.59, 1.59, 1.59; other 2-axle 4-tire vehicle (1960-97): 1.87, 1.85, 1.83, 1.81, 1.79, 1.76, 1.74, 1.72, 1.70, 1.68, 1.66, 1.64, 1.64, 1.64; motorcycle (1960-97): 1.1, 1.1, 1.1, 1.1, 1.2, 1.3, 1.3, 1.27, 1.25, 1.23, 1.21, 1.18, 1.18, 1.18.

[b] Included in passenger car.

NOTES: In 1995, the U.S. Department of Transportation, Federal Highway Administration revised its vehicle type categories for 1993 and later data. These new categories include passenger car, other 2-axle 4-tire vehicle, single-unit 2-axle 6-tire or more truck, and combination truck. Other 2-axle 4-tire vehicle includes vans, pickup trucks, and sport utility vehicles. In previous years, some minivans and sport utility vehicles were included in the passenger car category. Single-unit 2-axle 6-tire or more trucks are on a single frame with at least 2 axles and 6 tires. Pre-1993 data have been reassigned to the closest available category.

The heat equivalent factor used for joules conversion is 34,839,537 joules/liter.

SOURCES:

Vehicle-kilometers:

Passenger car: 1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1960-90: Ibid., *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1970-85: Ibid., *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A. For 1970-90, the unrevised motorcycle vehicle-kilometers are subtracted from the combined passenger car and motorcycle vehicle-kilometers from VM-201A.

1990-98 Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Passenger-kilometers:

Passenger-kilometers multiplied by vehicle occupancy rates.

Fuel consumed:

1960-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A. For 1970-90, the unrevised motorcycle fuel consumed is subtracted from the combined passenger car and motorcycle fuel consumed from VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-23M Average Fuel Efficiency of U.S. Passenger Cars, Light Trucks, and Light-Duty Vehicles

	1980	1985	1990	1995	1996	1997	1998	1999
Average U.S. passenger car fuel efficiency (kpl) (calendar year)[R]								
Passenger car	6.8	7.4	8.6	9.0	9.0	9.1	9.2	9.1
Other 2-axle 4-tire vehicle	5.2	6.1	6.8	7.4	7.3	7.3	7.3	7.3
New vehicle fuel efficiency (kpl)[a] (model year)[R]								
Light-duty vehicle (passenger cars plus light trucks)								
Domestic	9.1	10.2	10.2	10.1	10.2	9.9	9.9	10.1
Imported	12.2	12.9	12.1	11.9	11.8	11.7	11.7	11.4
Passenger car								
Domestic	9.6	11.2	11.4	11.8	12.0	11.8	11.9	12.0
Imported	12.6	13.4	12.7	12.9	12.6	12.8	12.7	12.1
Light truck (<3,865 lbs GVWR)								
Domestic	7.1	8.3	8.6	8.6	8.7	8.6	8.7	8.7
Imported	10.3	11.3	9.8	9.1	9.4	9.4	9.7	9.6
CAFE standards (kpl)[a] (model year)[R]								
Passenger car	8.5	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Light truck	6.8/6.0[b]	8.3	8.5	8.8	8.8	8.8	8.8	8.8

[a] Assumes 55% city and 45% highway-kilometers. The source calculated average kilometers per liter for light-duty vehicles by taking the reciprocal of the sales-weighted average of liters per kilometer. This is called the harmonic average.

[b] 2 Wheel Drive/4 Wheel Drive. No combined figure available for this year.

KEY: CAFE = Corporate Average Fuel Economy; GVWR = gross vehicle weight rating; kpl = kilometers per liter; R = revised; U = data are unavailable

NOTE: The fuel efficiency figures for light duty vehicles represent the sales-weighted harmonic average of the combined passenger car and light truck fuel economies.

SOURCES:

Average U.S. passenger car fuel efficiency: 1980-90: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995-98: Ibid., *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

New vehicle fuel efficiency (based on model year production): 1980-99: U.S. Environmental Protection Agency, final fuel economy calculations for the U.S. Department of Transportation, National Highway Traffic Safety Administration, as cited in Internet site www.nhtsa.dot.gov/cars/problems/fuelecon/index.html.

1995-99: Manufacturer's preliminary estimates for the U.S. Department of Transportation, National Highway Traffic Safety Administration, as cited in Internet site www.nhtsa.dot.gov/cars/problems/fuelecon/index.html.

CAFE standards: 1980-99: U.S. Department of Transportation, National Highway Traffic Safety Administration, as cited in Internet site www.nhtsa.dot.gov/cars/problems/fuelecon/index.html.

Table 4-24M Energy Intensiveness of Transit Motor Buses

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Vehicle-kilometers (millions)	2,536	2,459	2,268	2,456	2,699	2,998	3,428	3,515	3,484	3,713	3,687
Passenger-kilometers (millions)[R]	N	N	N	N	35,084	34,118	33,796	30,256	30,739	32,831	33,157
Fuel consumed (million liters diesel)	787	939	1,026	1,382	1,632	1,961	2,131	2,135	[R]2,184	[R]2,260	2,097
Energy intensiveness (1,000 Joules/passenger-kilometer)[R]	N	N	N	N	1,798	2,222	2,438	2,728	2,747	2,661	2,445

KEY: N = data do not exist; R = revised

NOTES: Heat equivalent factor used for joules conversion is 38,657,950 joules/liter. APTA changed from American Public Transit Association to American Public Transportation Association in January 2000. The APTA Transit Fact Book changed to the Public Transportation Fact Book in March 2000.

SOURCE: American Public Transportation Association, *Public Transportation Fact Book* (Washington, DC: March 2000), tables 65 and 79, and similar tables in earlier editions of the APTA *Transit Fact Book*.

Table 4-25M Energy Intensity of Class I Railroad[a] Freight Service

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Revenue freight tonne-kilometers (millions)	[R]835,557	[R]1,018,884	[R]1,116,602	[R]1,101,189	[R]1,341,656	[R]1,280,375	[R]1,509,569	[R]1,906,272	[R]1,979,690	[R]1,969,398	2,010,096
Car-kilometers (millions)	45,335	47,212	48,103	44,508	47,117	40,105	42,099	48,897	51,040	50,952	52,556
Tonnes per car load	40	44	50	55	61	61	60	59	60	57	58
Fuel consumed (million liters)	13,109	13,597	13,419	13,843	14,778	11,773	11,792	13,173	13,548	13,533	13,563
Energy intensiveness (1000 Joules/revenue freight tonne-kilometer)	[R]607	516	465	486	426	355	302	267	265	266	261
Energy intensiveness (1000 Joules/car-kilometer)	11,178	11,134	[R]10,785	12,024	12,125	11,348	10,828	10,415	10,261	10,268	9,977

[a] Class I railroads are those that have operating revenues of $255 million or more.

SOURCE: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1999), pp. 34, 37, and 40.

Source and Accuracy Profiles

Data Source and Accuracy Statements

Chapter 1 Extent, Condition, and Performance

TABLE 1-1. System Mileage Within the United States

Highway

The Highway Performance Monitoring System (HPMS) is the source of road mileage data and is considered reliable. (See box 1-1 for detailed information about the HPMS.) The Federal Highway Administration (FHWA) of the U.S. Department of Transportation (USDOT) collects and reviews state-reported HPMS data for completeness, consistency, and adherence to specifications. Some inaccuracy may arise from variations across states in their adherence to federal guidelines in the Traffic Monitoring Guide and the *Highway Performance Monitoring System Field Manual for the Continuing Analytical and Statistical Database*.

Beginning with the 1997 issue of *Highway Statistics*, FHWA instituted a new method for creating mileage-based tables derived from the HPMS. Previously, adjustments to tables developed from sample data were made using area-wide mileage information provided by states. These adjustments are now being made using universe totals from the HPMS dataset. In addition, FHWA has discontinued the process of spreading rounding and other differences across table cells. Thus, users may note minor differences in table-to-table totals. FHWA considers mileage totals from table HM-20, "Public Road Length, Miles by Functional System" to be the controlling totals should a single value be required.

Reliability may be diminished for comparisons with pre-1980 data, which were collected via different methods and special national studies. For instance, pre-1980 mileage data included some nonpublic roadways (95,000 miles in 1979) while post-1980 data reports only public road mileage (roads or streets governed and maintained by a public authority and open to public travel).

Class I Rail

These data are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). AAR data are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual Report*. The STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although Class I railroads represent only 2 percent of railroads in the country, they account for over 70 percent of the industry's mileage.

To obtain railway mileage, AAR subtracts trackage rights from miles of rail traveled on line 57 in the Schedule 700 report. Historical reliability may vary due to changes in the railroad industry, including bankruptcies, mergers, and declassification by the STB. Small data errors may also exist because of because of independent rounding of this series by AAR.

Amtrak

These statistics originate from the Statistical Appendix to *Amtrak's Annual Report*. Amtrak estimates track mileage based on point-to-point

Box 1-1. Highway Performance Monitoring System

Sampling Frame Construction

The Highway Performance Monitoring System (HPMS) sample is a stratified simple random sample of highway links (small sections of roadway) selected from state inventory files. The 1997 sample consists of about 120,000 samples. Each state maintains an independent inventory of highway road links for those roads that the state is responsible for (in some cases this can be a low percentage of total road miles within the state). Lower jurisdictions (MPO's, counties, cities, national parks, Indian reservations, etc.) may also maintain inventories of highway links under their jurisdiction. The HPMS sample was originally selected in 1978 based on guidelines provided by the FHWA for sampling highway systems excluding those roads functionally classified as local. The sampling frame for the state systems were the state inventories. The estimates represent the highway systems of each state. The HPMS sample was designed as a fixed sample to minimize data collection costs but adjustments to maintain representativeness are carried out periodically. The HPMS also consists of universe reporting (a complete census) for the Interstate and the National Highway System, and tabular summary reporting of limited information. A small number of data items (about 30) are reported for the complete universe. The universe information contains no sampling error. There are 4 tables reported as part of the summary.

Stratification

The HPMS sample (and universe) is stratified by state, type of area (rural, urban, and individual urbanized areas), highway functional classification, and traffic (annual average daily traffic (AADT) volume groups). Complete information is provided in the HPMS *Field Manual*.

Weighting

The HPMS sample expansion factors are the ratio of universe mileage to sample mileage in each strata.

Data Collection

Data are collected independently by the 50 states, metropolitan planning organizations (MPOs), and lower jurisdictions. Many of the geometric data items rarely change, such as number of lanes. Others change frequently, such as traffic. Typically, the states maintain data inventories that are the repositories of a wide variety of data items. The HPMS data items are extracted from these inventories. For example, each State has a traffic volume counting program. Typically, equipment is installed or placed on the roads to measure traffic. The counts are then converted to annual average daily traffic (AADT) and stored in the state databases. AADT is one of the sample and universe items extracted from the inventories and reported to the HPMS. The FHWA provides guidelines for data collection in the HPMS *Field Manual*, which the states follow to varying extents depending on issues such as staff, resources, state perspective, uses of the data, state/MPO/local needs for data, etc. Traffic data collection, for example, is an expensive and dangerous undertaking, particularly in high volume urban areas.

State departments of transportation report HPMS data annually to the FHWA. There are about 80 data items reported for the sample component. The reporting deadline is June 15. Except for special cases where major problems occur, data items are reported for each sample. There is no provision for nonresponse since a number is available for each section in the state inventories; however, states do leave items blank to indicate that no data collection has taken place for a specific item (e.g., if no system to measure pavement has been implemented in the state, the pavement condition item may be left blank.) The HPMS has gone through a major restructuring effort, and major data item reductions, modifications, and other changes will begin to be implemented with the 1999 data reported by June 15, 2000.

Sampling Error

The sample size is estimated based on traffic volume (AADT) within each stratum. Traffic volume is the most variable data item. Sampling error can be estimated directly based on the sample design for each stratum and aggregated by stratified random sample methods to total values. This exercise was done originally in 1980 for some of the most variable data items including vehicle-miles traveled. It has not been repeated since due to the work involved and the limited impact of sampling error as compared to nonsampling error.

Nonsampling Error

This is a major item of concern for the HPMS. For some of the most variable and important data items, such as AADT, guidelines for measurement and data collection have been produced. States have the option of using the guidelines or using their own procedures. Many data items are difficult and costly to collect and are reported as estimates not based on direct measurement. The data are collected and reported by many entities and individuals within the responsible organizations. Most do a reasonably good job, but staff turnover, cost, equipment issues, etc., can create difficulties identifying data problems. As mentioned before, a response is usually provided for each link as included in state inventories. Measurement errors are unknown, but the difficulty of collecting some of the data items is well known. For highway links not the responsibility of states, metropolitan planning organizations and lower jurisdictions using a wide variety of methods may collect the data. This a major area of concern and efforts are underway within States to standardize data collection. The major effort with the HPMS is to insure the collection and reporting of reliable annual data. The FHWA field offices in each state conduct annual verification of the data reported. Computer software is provided to build the database and conduct logic edits prior to submittal. The reported data are subjected to intense editing and comparison with previous reporting and a written annual report is provided to each state to document problems found and encourage correction. Data resubmittal is requested in cases where major problems are found. The process involves many people and substantial resources, but it provides extensive quality assurance. Complete information on data items, edits, processing, expansion, sample design, definitions, data reporting, etc., is included in the HPMS *Field Manual.*

city timetables that railroad companies provide for engineers. The figures are estimates, but are considered reliable.

Transit

These figures are based on information in the U.S. Department of Transportation, Federal Transit Administration (FTA), National Transit Database. Section 15 of the Federal Transit Act requires federally funded transit agencies to provide detailed financial and operating data, including vehicle inventories and directly operated mileage. Transit operators that do not report to FTA are those that do not receive federal funding, typically private, small, and rural operators. The data are generally considered accurate because FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or may misinterpret certain data definitions.

Navigable Channels

These statistics originate from a mid-1950s U.S. Army Corps of Engineers (USACE) estimate that there were approximately 25,000 miles of commercially important navigable channels in the United States. That number has been adjusted from time to time, for example, by addition of the 234-mile Tennessee-Tombigbee Waterway in the early 1980s. The 25,000 plus mile number has been universally quoted for decades, but has definitional and methodological uncertainties. USACE is currently developing a rigorous, Global Information System (GIS)-based approach to facilitate tabulation of the lengths of shallow and deep-draft commercially navigable waterways in the United States; this calculation will be available in several years.

Oil Pipeline

The data are from *Transportation in America*, published by the Eno Transportation Foundation, Inc. (Eno). The numbers reprinted here for 1960, 1965, 1970, and 1975 are Eno estimates from the U.S. Department of Energy (DOE) *Energy Data Report* issues labeled "Crude-oil and Refined Products Mileage in the United States." Eno estimated the 1980 number based on the assumption that refinement of old, less profitable, and smaller lines exceeded in mileage the construction of new, larger, and more profitable lines. Post-1985 data were calculated using a base figure reported in a 1982 USDOT study entitled *Liquid Pipeline Director* and then combined with data from the Association of Oil Pipe Lines and the Oil Pipeline Research Institute. Lack of additional information raises definitional and methodological uncertainties for the data's reliability. Moreover, the three different information sources introduce data

discontinuities, making time comparisons unreliable.

Gas Pipeline

These statistics originate from annual editions of *Gas Facts*, published by the American Gas Association (AGA). The data reported by the AGA are based on gas utilities participation and reporting to the *Uniform Statistical Report*. Utilities reporting represented 98 percent of gas utility industry sales while the remaining 2 percent was estimated for nonreporting companies based on recent historical experience. Varying percentages of nonreporters from year to year introduce minor reliability problems for time-series comparisons.

TABLE 1-3. Number of U.S. Airports

The Federal Aviation Administration (FAA), Office of Airport Safety and Standards *Administrator's Fact Book* (annual issues) furnished the data shown in this table and includes airports certified for air carrier operations with aircraft that seat 30 or more passengers. These airports include civil and joint civil-military use airports, heliports, STOLports (short takeoff and landing), and seaplane facilities. The FAA obtained this data via physical inspections and mail solicitations of all federally regulated landing facilities. Since this is a census of all U.S. airports, reliability should be high. Data, however, may be subject to reporting errors typical of administrative recordkeeping.

TABLE 1-4. Public Road and Street Mileage in the United States by Type of Surface

TABLE 1-5. U.S. Public Road and Street Mileage by Functional System

TABLE 1-6. Estimated U.S. Roadway Lane-Miles by Functional Class

The Highway Performance Monitoring System (HPMS) is the source of road mileage data and is considered reliable. (See box 1-1 for detailed information about the HPMS.) The U.S. Department of Transportation, Federal Highway Administration collects and reviews state-reported HPMS data for completeness, consistency, and adherence to specifications. Some inaccuracy may arise from variations across states in their adherence to federal guidelines in the Traffic Monitoring Guide and the *Highway Performance Monitoring System Field Manual for the Continuing Analytical and Statistical Database*.

Beginning with the 1997 issue of *Highway Statistics*, FHWA instituted a new method for creating mileage-based tables derived from the HPMS. Previously, adjustments to tables developed from sample data were made using area-wide mileage information provided by states. These adjustments are now being made using universe totals from the HPMS dataset. In addition, FHWA has discontinued the process of spreading rounding and other differences across table cells. Thus, users may note minor differences in table-to-table totals. FHWA considers mileage totals from table HM-20, "Public Road Length, Miles by Functional System" to be the controlling totals should a single value be required.

Lane-miles are calculated by multiplying the centerline length by the number of through lanes. Because the HPMS requires that the number of lanes be reported for all principal arterials, other National Highway System (NHS) roads, and all standard samples, lane length can be computed for the Interstate, other principal arterials, and the NHS on a 100-percent basis. For minor arterials, rural major collectors, and urban collectors, lane length is calculated based on standard sample sections using the reported number of through lanes, length of section, and an expansion factor. FHWA uses the expanded sample to check that the centerline length of a state's functional system matches the universe functional system length. If the centerline length and functional system length do not match, FHWA may ask a state to make adjustments.

Reliability may be diminished for comparisons with pre-1980 data, which were collected via different methods and special national studies. For instance, pre-1980 mileage data included some nonpublic roadways (95,000 miles in 1979) while post-1980 data reports only public road mileage (roads or streets governed and maintained by a public authority and open to public travel).

TABLE 1-7. Number of Stations Served by Amtrak and Rail Transit, Fiscal Year

These numbers originate from Amtrak's Statistical Appendix to *Amtrak's Annual Report* and the U.S. Department of Transportation, Federal Transit Administration's National Transit Database.

Amtrak maintains a computer database with a record of every station, locomotive, and car it operates. Those records include for each vehicle the year built, its service status (operating or not on a daily basis), and location. These data should be considered very reliable.

TABLE 1-8. U.S. Oil and Gas Pipeline Mileage

Oil Pipeline

The data are from *Transportation in America*, published by the Eno Transportation Foundation, Inc. (Eno). The numbers reprinted here for 1960, 1965, 1970, and 1975 are Eno estimates from the U.S. Department of Energy's *Energy Data Report* issues labeled "Crude-oil and Refined Products Mileage in the United States." Eno estimated the 1980 number based on the assumption that refinement of old, less profitable, and smaller lines exceeded in mileage the construction of new, larger, and more-profitable lines. Figures from 1985 and later years are calculated from a base figure that Eno obtained from the 1982 U.S. Department of Transportation study *Liquid Pipeline Director* and then incorporated that figure with data from the Association of Oil Pipe Lines and the Oil Pipeline Research Institute. Lack of additional information raises definitional and methodological uncertainties for the data's reliability. Moreover, the three different information sources introduce data discontinuities making time comparisons less reliable.

Gas Pipeline

These statistics originate from annual editions of *Gas Facts* published by the American Gas Association (AGA). The data reported by AGA are based on gas utilities participation and reporting to the Uniform Statistical Report. Utilities reporting in 1991 represented 98 percent of total gas utility industry sales while the remaining 2 percent was estimated for the nonreporting companies based on recent historical experience. Varying percentages of nonreporters from year to year introduce minor reliability problems for time-series comparisons.

TABLE 1-2. Number of Air Carriers, Railroads, Interstate Motor Carriers, Marine Operators, and Pipeline Operators

Air Carriers

The data are from the *Air Carrier Financial Statistics Quarterly*, published by the Office of Airline Information of the U.S. Department of Transportation, Bureau of Transportation Statistics (BTS). The Alphabetical List of Air Carriers by Carrier Group at the beginning of each fourth quarter edition is used to determine the number of major air carriers and other air carriers in operation at the end of each calendar year. The publication draws its data from the T-100 and T-100(f) databases maintained by BTS. These databases include data obtained from a 100-percent census of BTS Form 41 schedule submissions by large certificated air carriers, which are carriers that hold a certificate issued under section 401 of the Federal Aviation Act of 1958 and that (1) operate aircraft designed to have a maximum passenger seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds or (2) that conduct international operations. Carriers are grouped as major, national, large regional, or medium regional based on their annual operating revenues. The thresholds were last adjusted July 1, 1999 and the threshold for major air carriers is currently $1 billion. The table combines the number of national, large regional, and medium regional air carriers into the other air carrier category.

Railroads

The Association of American Railroads (AAR)'s *Railroad Ten-Year Trends* series is the source for the number of railroads. The number of Class I railroads is based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual*

Report. The STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although Class I railroads represent only 2 percent of railroads in the country, they account for over 70 percent of the industry's mileage.

The Association of American Railroads through an annual determines the number of non-Class I railroads, comprehensive survey sent to every U.S. freight railroad. By following up with nonrespondents, the AAR obtains essentially a 100-percent census of all railroads. Use of the current survey instrument began in 1986.

Interstate Motor Carriers

The Motor Carrier Management Information System (MCMIS), maintained by the U.S. Department of Transportation, Federal Motor Carrier Safety Administration, contains information on the safety of all commercial interstate motor carriers and hazardous material (HM) shippers subject to the Federal Motor Carrier Safety Regulations and the Hazardous Materials Regulations. All carriers operating in interstate or foreign commerce within 90 days of beginning operations must submit a Form MCS 150, Motor Carrier Identification Report. Carriers may use the form to update their information. The Motor Carrier Safety Improvement Act of 1999 requires that reports be periodically updated, but not more than once every two years. MCMIS is updated on a weekly basis, and periodic archives are not made. Historical data are only available from summary information previously prepared, including tables and reports. MCMIS began operations in 1980, but data prior to 1990 are not available. Data since 1990 are available on a fiscal year basis (October through September). As MCMIS data are from a 100-percent census, they are believed to be very accurate.

Marine Vessel Operators

The U.S. Army Corps of Engineers (USACE) provides the data for marine vessel operators through the *Waterborne Transportation Lines of the United States*. Data are collected by the USACE's Navigation Data Center (NDC) by various means, including the U.S. Coast Guard's registry, maritime service directories, and waterway sector publications. However, an annual survey of companies that operate inland waterway vessels is the principle source of data. More than 3,000 surveys are sent to these companies and response rates are typically above 90 percent. However, a USACE official did report that less than 10 percent of the total number of companies operating inland water vessels either did not receive or respond to the annual survey.

Pipeline Operators

The Office of Pipeline Safety (OPS) in the U.S. Department of Transportation's Research and Special Programs Administration collects annual report data from natural gas transmission and distribution operators as required by 49 CFR 191.17 and 191.11, respectively. Annual data must be submitted by March 15 of the following calendar year. No annual report is required for hazardous liquid pipeline operators. However, information is available through the pipeline safety program. Since 1986, the program has been funded by fees assessed to each OPS-regulated pipeline operator based on per-mile of hazardous pipeline operated. Data for each operator and each mile of pipeline are stored in the OPS user-fee database, which is revised annually as updated fees are assessed.

Totals for pipeline operators in this table will differ from those in other tables due to differences in the regulatory authority of USDOT and the Federal Energy Regulatory Commission (FERC). FERC regulates only interstate pipelines, whereas DOT regulates both interstate and intrastate pipelines, except for rural gathering lines and some offshore pipelines, which fall under jurisdiction of the U.S. Coast Guard or the U.S. Department of the Interior's Minerals Management Service. An OPS official stated that FERC regulates about two-thirds the amount of pipeline mileage that USDOT regulates.

TABLE 1-9. Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances

TABLE 1-11. Active Air Carrier and General Aviation Fleet by Type of Aircraft

Air Carrier, Certificated, All Services

Data are from the U.S. Department of Transportation, Federal Aviation Administration (FAA), *FAA Statistical Handbook of Aviation*. U.S. air carrier fleet data are based on reports collected by FAA field offices from carriers. The reports include information on the number of aircraft by type used in air carrier service. The FAA points out that this information is not an inventory of the aircraft owned by air carriers, but represents the aircraft reported to the FAA as being used in air carrier fleet service. The reported aircraft are all aircraft carrying passengers or cargo for compensation or hire under 14 CFR 121 and 14 CFR 135.

General Aviation

The 1960-1980 figures originated from the *FAA Statistical Handbook of Aviation*. Later data are from FAA annual issues of the *General Aviation and Air Taxi Activity (GAATA) Survey* report, table 3.1. The FAA collects both aircraft registration data and voluntary information about aircraft operation, equipment, and location. Before 1978, the FAA mandated owners to annually register their aircraft for the Aircraft Registration Master File. This was a complete enumeration of operating aircraft. Registrants were also asked to voluntarily report information on hours flow, avionics equipment, base location, and use. The FAA changed their data collection methodology in 1978. The annual registration requirement became triennial and the General Aviation Activity and Avionics Survey was initiated to sample aircraft operation and equipment data.

The General Aviation Activity and Avionics Survey was renamed the General Aviation and Air Taxi Activity Survey in 1993 to reflect the fact that the survey includes air taxi aircraft. This survey is conducted annually and encompasses a stratified, systematic design from a random start to generate a sample of all general aviation aircraft in the United States. It is based on the FAA registry as the sampling frame. FAA established three stratification design variables in the survey: 1) the average annual hours flown per aircraft by aircraft type, 2) the aircraft manufacturer/model characteristics, and 3) the state of aircraft registration.

Data Reliability

Because of the change in 1978, the reliability of comparisons over time will be affected. The FAA asserted that the change to a triennial registration deteriorated the Aircraft Registration Master File in two ways. First, the resulting lag in registration updates caused the number of undeliverable questionnaires to steadily increase over the three-year period. Second, inactive aircraft would remain in the registry, inflating the general aviation fleet count. In addition, a new regulation added two categories of aircraft to the general aviation fleet. However, FAA concluded that these changes resulted in no more than a five-percent error in the fleet population estimate.

The reliability of the GAATA survey can be impacted by two factors: sampling and nonsampling error. A measure, called the standard error, is used to indicate the magnitude of sampling error. Standard errors can be converted for comparability by dividing the standard error value by the estimate (derived from sample survey results) and multiplying it by 100. This quantity, referred to as the percent standard error, totaled seven-tenths of a percent in 1997 for the general aviation fleet. A large standard error relative to an estimate indicates lack of precision and, inversely, a small standard error indicates precision.

Nonsampling errors could include problems such as nonresponse, respondent's inability or unwillingness to provide correct information, differences in interpretation of questions, and data-entry mistakes. Readers should note that nonresponse bias might be a component of reliability errors in the data from 1980 to 1990. The FAA conducted telephone surveys of nonrespondents in 1977, 1978, and 1979 and found no significant differences or inconsistencies in respondents' and nonrespondents' replies. The FAA discontinued the telephone survey of nonrespondents in 1980 to save costs. Nonresponse surveys were resumed in 1990, and the FAA found notable differences and

thus adjusted its fleet estimates. The 1991 through 1996 data have been revised to reflect nonresponse bias. In 1997, a sample of 29,954 aircraft was identified and surveyed from an approximate population of 251,571 registered general aviation aircraft. Just over 65 percent of the sample responded to the survey.

Highway, Total (registered vehicles)

The 1960 to 1980 figures are from the U.S. Department of Transportation, Federal Highway Administration (FHWA) document, *Highway Statistics, Summary to 1985*, table MV-201 and related tables. Data quality and consistency will be less reliable for these years because of a diversity of registration practices from state to state. Users should recognize that motor vehicle statistical information is not necessarily comparable across all states or within a state from year to year. For instance, the FHWA reported that separate data on single-unit trucks and combinations was unobtainable from all states in 1990.

After 1980, the FHWA began to use the Highway Performance Monitoring System (HPMS) database, which improved data reliability. FHWA reviews state-reported HPMS data for completeness, consistency, and adherence to these specifications. Some inaccuracy may arise from variations across states in their adherence to federal guidelines in the *Highway Performance Monitoring System Field Manual for the Continuing Analytical and Statistical Database*.

If choosing to compare state data, the FHWA recommends that users carefully select a set of peer states that have characteristics similar to the specific comparison. Improperly selected peer states are likely to yield invalid data comparisons. Characteristics that a user needs to consider in determining compatibility of a peer state include similarities and differences in urban/rural areas, population densities, degrees of urbanization, climate, geography, state laws and practices that influence data definitions, administrative controls of public road systems, state economies, traffic volumes, and degrees of centralization of state functions. The FHWA has developed a set of variables that users may use to determine appropriate peer states.

Other 2-Axle 4-Tire Vehicle (truck)

Sources for these figures included FHWA's *Highway Statistics, Summary to 1995* (table VM-201A) and annual issues of *Highway Statistics* (table VM-1). FHWA compiles these figures from the U.S. Bureau of the Census' Truck Inventory and Use Survey (TIUS). Since 1963, Census has conducted the TIUS every five years with the last survey completed in 1997. The Census Bureau changed the name of the survey to the Vehicle Inventory and Use Survey (VIUS) in 1997. The VIUS collects data and the physical and operational characteristics of the nation's truck population. In 1997, 131,000 trucks were surveyed from an estimated universe of over 75 million trucks. Chronological reliability may be diminished due to sampling design changes in 1977, 1982, and 1992. In 1977, the sampling universe was first stratified by the number of trucks in a state: large (> 1.5 million trucks), medium (700,000 to 1.5 million), and small (< 700,000); and then by two truck sizes.

Stratification in 1982 was then based on body type rather than vehicle weight. In 1992 and 1997, the sampling universe was first subdivided geographically and then into five strata: 1) pickups, 2) vans, 3) single-unit light, 4) single-unit heavy, and 5) truck tractor. Cases were then selected randomly within each stratum.

Census delivered a mail-out/mail-back survey to the owner identified in the vehicle registration records. Data collection is staggered as state records become available. Owners report data only for the vehicles selected. In the 1992 survey, a method was employed to also collect data on new truck purchases in the latter half of the year to estimate the fleet for the calendar year. This adjustment in the sampling frame had not been done in previous surveys and may diminish chronological reliability. The sample for 1997 was some 22,500 vehicles smaller than for 1992. The 1997 VIUS had two sampling stages. For the first stage, the Census Bureau surveyed about 131,000 trucks registered as of July 1, 1997. The second stage sampled a total of 3,000 truck owners with state mailing addresses different from the state of truck registration.

The accuracy and reliability of the VIUS survey depends jointly on sampling variability and nonsampling errors. Standard errors arising from sampling variability can be converted for comparability by dividing the standard error value by the estimate and multiplying it by 100. This quantity, referred to as the percent standard error, totaled two-tenths of a percent in 1992 and 1997 for the VIUS sample. A large standard error relative to an estimate indicates lack of precision and, inversely, a small standard error indicates precision. The 1992 TIUS achieved over 90.2 percent reporting and the 1997 response rate equaled 84.5 percent, thus reliability may have decreased in the most recent survey.

Transit

The American Public Transit Association (APTA) provided these data, which are based on the Federal Transit Administration (FTA), National Transit Database. These data are generally accurate because the FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or may misinterpret data. APTA conservatively adjusts FTA data to include transit operators that do not report to the database (private, very small, and rural operators).

Railroad (all categories)

The data are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). AAR data are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual Report*. Thus, data estimates are considered very reliable. The STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the adjusted threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although Class I railroads represent only 2 percent of railroads in the country, they account for over 70 percent of the industry's mileage.

AAR determines the number of non-Class I railroads through an annual, comprehensive survey sent to every U.S. freight railroad. By following up with nonrespondents, the AAR obtains essentially a 100 percent census of all railroads. Use of the current survey instrument began in 1986.

Amtrak

Amtrak maintains a computer database with a record of every locomotive and car it operates. For each vehicle, those records include the year built, service status (operating or not operating on a daily basis), and location. This data should be considered very reliable.

Water Transportation

The source for Inland Nonself-Propelled Vessels, Self-Propelled Vessels, and flag passenger and cargo vessels is the U.S. Army Corps of Engineers (USACE), *Waterborne Transportation Lines of the United States*, annual issues. Data are collected by the USACE's Navigation Data Center (NDC) by various means, including the U.S. Coast Guard's registry, maritime service directories, and waterway sector publications. However, an annual survey of companies that operate inland waterway vessels is the principle source of data. More than 3,000 surveys are sent to these companies, and response rates are typically above 90 percent. However, a USACE official did report that less than 10 percent of the total number of companies operating inland vessels either did not receive or respond to the annual survey.

Oceangoing Steam Motor Ships

Merchant Fleets of the World, published annually by the U.S. Department of Transportation, Maritime Administration (MARAD), is the source of these data. MARAD, which classifies vessels as merchant based on size and type, compiles these figures from a data service provided by Lloyd's Maritime Information Service (LMIS). The parent company, Lloyd's Register (LR), collects data from 200 offices worldwide, from data transfers and agreements with other classification societies, from

questionnaires to ship owners and ship builders, from feedback from government agencies, and from input from port agents. According to an LR official, consistent data-gathering methods have been maintained for more than 30 years. The same official did caution that there are sometimes inconsistencies in groupings of ship types over time. For example, propelled tank barges are now included in the tanker ship-type grouping.

Recreational Boats

Boating Statistics, published annually by the U.S. Coast Guard (USCG), is the source. The USCG derives these figures from state and other jurisdictional reporting of the actual count of valid boat numbers issued. In accordance with federal requirements, all 55 U.S. states and territories require motor-powered vessels to be numbered. However, over half the states do not require non-powered vessels to be numbered. Accuracy can also be diminished by noncompliance of boat owners with numbering and registration laws. In 1996, the USCG estimated that approximately eight million recreational boats are not numbered and, thus, are excluded from the reported number of recreational vessels. The USCG did not provide estimates for the number of boats without numbering in their 1997 and 1998 reports. Some jurisdictions fail to report by publication deadlines, and the USCG provided estimates based on the previous year's estimate.

TABLE 1-10. Sales or Deliveries of New Aircraft, Vehicles, Vessels, and Other Conveyances

Civilian Aircraft

The Aerospace Industries Association (AIA) provided this data in their annual issues *Aerospace Facts and Figures*, "Civil Aircraft Shipments." AIA collects their data from aircraft company reports, the General Aviation Manufacturers Association (GAMA), and the U.S. Department of Commerce's (DOC) International Trade Administration. DOC data provide total number of shipments and exports, and the difference computed by AIA equals domestic shipments. DOC collects shipments data separately for individual factories or establishments and not at the company level. A potential limitation of this approach is when a factory producing aircraft for shipment also makes aircraft parts. If the establishment has 80 percent of its production in aircraft and 20 percent in parts, all of the output is attributed to aircraft shipments.

Transport

The Aerospace Industries Association (AIA) is the source of these data. AIA obtains quarterly data from Boeing Corp., now the sole U.S. manufacturer of transport aircraft, and publicly available financial disclosure information filed with the U.S. Securities and Exchange Commission (SEC) via Form 10-k. SEC requires a publicly traded company to file an annual report 90 days after the end of the company's fiscal year to provide an overview of that business.

Helicopters

AIA surveyed and received data from all 10 major helicopter manufacturers on their sales and deliveries.

General Aviation

The general aviation figures are taken from the *General Aviation Statistical Databook* published by the GAMA. General aviation refers usually to the small aircraft industry in the United States. GAMA collects quarterly data from the 10 to 14 manufacturers who nearly equal a census of the general aviation sector.

Passenger Car, Truck, Bus, and Recreational Vehicles

Ward's *Motor Vehicle Facts and Figures* is the source of these data. Ward's obtains sales data directly from manufacturers. Readers should note that automobile manufacturers have inflated sales figures in the past, but Ward's does contact companies to verify numbers that appear too high or low.

Motorcycle

The Motorcycle Industry Council, Inc. (MIC) publishes the *Motorcycle Statistical Annual*, which is the source for these data. MIC derived the estimate for new retail motorcycle sales for each state from the *MIC Retail Sales Report*, and adjusted for total retail sales. Motorcycle company reports provided sales data. Prior to 1985, all-terrain vehicles (ATVs) were included in the motorcycle total. In 1995, the Motorcycle Industry Council revised its data for the years 1985 to present to exclude all terrain vehicles from its totals.

Bicycle

The National Bicycle Dealers Association (NBDA) reported these data, which are based on Bicycle Manufacturers Association (BMA) information through 1996. BMA stopped reporting members' shipments in 1996. Moreover, BMA represents the largest bicycle manufacturers (Huffy, Roadmaster, and Murray), and thus the data do not reflect specialty bike makers or other manufacturers. The Bicycle Council estimated 1997 and 1998 figures in the table. According to a Bicycle Council representative, the estimates are a combination of domestic forecasts produced by a panel of industry experts and import data from monthly U.S. census databases.

Transit

The American Public Transit Association provided these figures, which are based on information in the U.S. Department of Transportation, Federal Transit Administration (FTA), National Transit Database. These data are generally considered accurate because the FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or misinterpret data. APTA conservatively adjusts FTA data to include transit operators that do not report to the database (private, very small, and rural operators).

Class I Rail

The data are from Railroad Facts, published annually by the Association of American Railroads (AAR). AAR data are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual Report*. STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Although Class I railroads encompass only 2 percent of the number of railroads in the country, they account for over 70 percent of the industry's mileage operated. Historical reliability may vary due to changes in the railroad industry, including bankruptcies, mergers, and declassification by the STB. Small data errors may also have occurred because of independent rounding in this series by the AAR.

Amtrak

Amtrak maintains a computer database with a record of every locomotive and car it operates. For each vehicle, those records include the year built, its service status (operating or not on a daily basis), and location. These data should be considered very reliable.

Water Transportation

U.S. Department of Transportation, Maritime Administration (MARAD), which classifies vessels as merchant based on size and type, reports these data in annual issues of its *Merchant Fleets of the World*. MARAD compiles these figures from a data service provided by Lloyd's Maritime Information Service. The parent company, Lloyd's Register (LR), collects data from several sources: its 200 offices worldwide, data transfers and agreements with other classification societies, questionnaires to shipowners and shipbuilders, feedback from government agencies, and input from port agents. According to an LR official, consistent data gathering methods have been maintained for more than 30 years but cautioned that inconsistencies may occur in groupings of ship types over time. For example, tank barges are now included in the tanker ship-type grouping rather than the barge grouping.

TABLE 1-12. U.S. Automobile and Truck Fleets by Use

These statistics originate from two sources. The R.L. Polk Co. provides numbers for commercial fleet vehicles from state registrations. Bobit Publishing Co. also obtains fleet vehicle sales data from automobile manufacturers. These two sources cover nearly 100 percent of fleet vehicles in the United States. Thus, the data should be very accurate.

TABLE 1-13. Annual U.S. Motor Vehicle Production and Factory (Wholesale) Sales

TABLE 1-14. Retail New Passenger Car Sales

TABLE 1-15. New and Used Passenger Car Sales and Leases

TABLE 1-19. World Motor Vehicle Production, Selected Countries

Motor Vehicle Production, Factory Sales, and New Passenger Car Retail Sales

Ward's Motor Vehicle Facts & Figures is the source of these data. Ward's obtains sales data directly from manufacturers. Readers should note that automobile manufacturers have inflated sales figures in the past, but Ward's does contact companies to verify numbers that appear too high or low.

Used Passenger Car Sales and Leased Passenger Cars

ADT Automotive Used Car Market Report is the source of these data. The *Wall Street Journal* (WSJ) is the original source of 1999 data. According to an ADT representative, publishing deadlines require ADT to use *WSJ* numbers until they can be replaced with National Automotive Dealers Association data. ADT Automotive's Market Analysis Department also gathers figures from CNW Marketing/Research and the R.L. Polk Co. CNW estimates used car sales volumes by collecting state title transfer data and determining if a transaction was made between private individuals or between a consumer and a franchised or independent dealer. This estimate is evaluated by comparing total transactions with state automobile sales revenues. Polk, an additional source of data, maintains a state vehicle registration database. For 1998, the ADT representative stated that Polk's data were within 5 percentage points of CNW estimates.

TABLE 1-16. Retail Sales of New Cars by Sector

The U.S. Department of Commerce, Bureau of Economic Analysis, uses data from *Ward's Automotive Reports*. The sectoral break down is derived from registration data obtained from R.L. Polk. Ward's obtains sales data directly from manufacturers. Readers should note that automobile manufacturers have inflated sales figures in the past, but Ward's does contact companies to verify numbers that appear too high or low.

TABLES 1-17 and 1-18. Period Sales, Market Shares, and Sales-Weighted Fuel Economies of New Domestic and Imported Automobiles and Light Trucks, Selected Sales Periods

These data originate from Oak Ridge National Laboratory's (ORNL) Light-Duty MPG and Market Shares System database, which relies on information from monthly Ward's Automotive Reports. Comparisons and observations are made on sales and fuel economy trends from one model year to the next. ORNL has adopted several conventions to facilitate these comparisons, such as the use of sales-weighted average to estimate fuel economy and vehicle characteristics. For example, "sales-weighted" miles per gallon refers to a composite or average fuel economy based on the distribution of vehicle sales. ORNL's methodology for sales-weighting can be found in the Appendix of the *Highway Vehicle MPG and Market Shares Report: Model Year 1990* (the latest published report). The method was changed dramatically in 1983, and data reliability prior to that year is questionable. This information is now published annually in ORNL's *Transportation Energy Data Book*.

TABLE 1-20. Number and Size of the U.S. Flag Merchant Fleet and Its Share of the World Fleet

The U.S. Department of Transportation, Maritime Administration, which classifies vessels as merchant based on size and type, compiles these figures from a data service provided by Lloyd's Maritime Information Service. The parent company, Lloyd's Register (LR), collects data from several sources: its 200 offices worldwide, data transfers and agreements with other classification societies, questionnaires to shipowners and shipbuilders, feedback from government agencies, and input from port agents. According to an LR official, consistent data gathering methods have been maintained for more than 30 years, but cautioned that inconsistencies may occur in groupings of ship types over time. For example, tank barges are now included in the tanker ship-type grouping rather than the barge grouping.

TABLE 1-21. U.S. Airport Runway Pavement Conditions

These data originate from the U.S. Department of Transportation, Federal Aviation Administration (FAA), National Plan of Integrated Airport Systems (NPIAS). The NPIAS includes all commercial service airports, all reliever airports, and selected general aviation airports. It does not include more than 1,000 publicly owned public use landing areas, privately owned public use airports, and other civil landing areas not open to the general public. NPIAS airports serve 92 percent of general aviation aircraft (based on an estimated fleet of 200,000 aircraft). In 1998, the NPIAS encompassed 3,344 of the 5,357 airports with public access. Runway pavement condition is classified as follows:

Good: All cracks and joints are sealed.

Fair: Mild surface cracking, unsealed joints, and slab edge spalling.

Poor: Large open cracks, surface and edge spalling, vegetation growing through cracks and joints.

On a rotating basis, the FAA arranges annual inspections for about 2,000 of the approximately 4,700 public-use airports. The inspections are based on funding availability and not on statistical criteria, and nearly all runways are inspected every two years. Inspections are primarily made to collect information for pilots on airport conditions. The FAA relies on state and local agencies to perform inspections, so some inaccuracy may arise from variation in their adherence to federal guidelines regarding pavement condition reporting. In 1998, the U.S. General Accounting Office found that Pavement Condition Index information was available for about 35 percent of NPIAS airports (GAO/RCED-98-226).

TABLE 1-22. Median Age of Automobiles and Trucks in Operation in the United States

The R.L. Polk Co. is a private enterprise that purchases state registration data to maintain a database of operational vehicles. Its data represent a near census of registered vehicles in the United States, and the age estimate should be considered very reliable.

TABLE 1-23. Condition of U.S. Roadways by Functional System

U.S. Department of Transportation, Federal Highway Administration (FHWA) collects pavement condition data from each state through the Highway Performance Monitoring System. The FHWA uses two rating schemes—the Present Serviceability Rating (PSR) and the International Roughness Indicator (IRI). IRI is used to measure the condition of Interstates, other principal arterials, rural minor arterials, and other National Highway System roadways. PSR is used to measure the condition of rural major collectors and urban minor arterials and collectors. Rural minor collectors are not measured. Where IRI data are not reported for sampled sections, the PSR data are collected. Using the PSR, values range from 0.1 to 5.0, where 5.0 denotes new pavement in excellent condition and 0.1 denotes pavement in extremely poor condition. On the IRI scale how-

ever, lower values indicate smoother roads (e.g., <60 for interstate pavement in very good condition to >170 for interstate pavement in poor condition).

The IRI is an objective measure of pavement roughness developed by the World Bank. The PSR is a more subjective measure of a broader range of pavement characteristics and therefore less comparable. Prior to 1993, all pavement conditions were evaluated using PSR values. Beginning with data published in *Highway Statistics 1993*, the FHWA began a transition to the IRI, which should eventually replace the PSR. The change from PSR to IRI makes comparisons between pre-1993 pavement condition data and 1993 and later pavement condition data difficult. Thus, trend comparisons should be made with care.

FHWA indicates that the protocol of measuring pavement roughness is not followed by all states, and some did not report for all required mileage. Totals only reflect those states reporting usable or partially usable data. Column percentages may not sum to 100 and may differ slightly from percentages in source tables, which were adjusted so that they would add to 100. FHWA believes that the IRI data are of "reasonably good quality."

TABLE 1-24. Condition of U.S. Bridges

These figures are from the U. S. Department of Transportation, Federal Highway Administration (FHWA), National Bridge Inventory Database. State highway agencies are required to maintain a bridge inspection program and inspect most bridges on public roadways at a minimum of every two years. With FHWA approval, certain bridges may be inspected less frequently. A complete file of all bridges is collected and maintained, representing a very reliable assessment of bridge conditions. However, some inaccuracy may be attributable to variations in state inspector's adherence to the National Bridge Inspection Standards.

TABLE 1-25. Average Age of Urban Transit Vehicles

These figures are based on information in the U.S. Department of Transportation, Federal Transit Administration (FTA), National Transit Database. Section 15 of the Federal Transit Act requires federally funded transit agencies to provide detailed financial and operating data, including vehicle inventories. Transit operators that do not report to FTA are those that do not receive federal funding, typically private, small, and rural operators. The data are generally considered accurate because FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or may misinterpret certain data definitions.

TABLE 1-26. Class I Railroad Locomotive Fleet by Year Built

The data are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). Figures reported by the AAR are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual Report*. STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although Class I railroads encompass only 2 percent of the number of railroads in the country, they account for over 70 percent of the industry's mileage.

TABLE 1-27. Age and Availability of Amtrak Locomotive and Car Fleets

Amtrak maintains a computer database with a record of every locomotive and car it operates. For each vehicle those records include the year built, its service status (operating or not on a daily basis), and location. These data should be considered very reliable.

TABLE 1-28. U.S. Flag Vessels by Type and Age

The data are from the U.S. Army Corps of Engineers (USACE), *Waterborne Transportation Lines of the United States* (WTLUS), annual issues. The WTLUS database contains information on vessel operators and characteristics and descriptions for all domestic vessel operations. Data are collected by the USACE's Navigation Data Center, primarily through a survey of vessel operating companies. More than 3,000 surveys are sent to these companies and response rates are typically above 90 percent. However, a USACE official did report that less than 10 percent of the total number of companies operating inland vessel fleets either did not receive and/or did not respond to the annual survey.

TABLE 1-29. U.S. Vehicle-Miles

TABLE 1-30. Roadway Vehicle-Miles Traveled (VMT) and VMT per Lane-Mile by Functional Class

TABLE 1-31. U.S. Passenger-Miles

Air Carrier, Certificated, Domestic, All Services

The U.S. Department of Transportation (USDOT), the Bureau of Transportation Statistics, Office of Airline Information, reports aircraft revenue-miles and passenger-miles in its publication *Air Traffic Statistics*. These numbers are based on 100-percent reporting of passengers and trip length by large certificated air carriers. Minor errors arise from nonreporting but amount to less than 1 percent of all air carrier passenger-miles. The figures do not include data for all airlines, such as most scheduled commuter airlines and all nonscheduled commuter airlines. These, if added, may raise total air passenger-miles by about 5 percent.

General Aviation

Passenger-mile numbers for 1975 to present are calculated by adjusting the Interstate Commerce Commission's 1974 figure for air passenger-miles by the percentage change in annual hours flown by general aviation aircraft as published in the USDOT, Federal Aviation Administration (FAA), *FAA Statistical Handbook of Aviation*. Numbers in the handbook are based on the General Aviation and Air Taxi Survey (GAATA). In 1993, the GAATA stopped including commuter aircraft. Commuter-miles collected before 1993 by the GAATA were, according to one FAA official, woefully underreported. Therefore, problems with the estimate of general aviation aircraft include: a break in the series between 1992 and 1993, a possible outdated factor used to calculate passenger-miles, and the classification of commuter operations.

Highway

Highway vehicle-miles of travel (vmt) are estimated using data from the Highway Performance Monitoring System (HPMS), a database maintained by FHWA that contains information on highway characteristics supplied by individual states. Annual vmt by highway functional system is calculated as the product of the annual average daily traffic (AADT) along each highway section, the centerline length of each highway section, and the number of days in the year. Also, expansion factors are used for roadways that are sampled rather than continuously monitored. Vmt by vehicle type is estimated using vehicle share estimates supplied by states.

FHWA has established methods for collecting, coding, and reporting HPMS data in two manuals: *Traffic Monitoring Guide* (TMG) and *Highway Performance Monitoring System Field Manual*. The prescribed sampling process for collecting highway volume data, which is used to estimate AADT, is based on statistical methods. However, in practice, several factors affect the ultimate quality of the data. FHWA discusses many of these issues in their annual *Highway Statistics* report and other publications. However, BTS is not aware of any study or report that has statistically quantified the accuracy of vmt estimates. Some of the primary issues related to data quality are noted here.

1. The sampling procedures suggested in the TMG and HPMS *Field Manual* are designed to produce traffic volume estimates with an aver-

age precision level of 80-percent confidence with a 10-percent allowable error at the state level. FHWA provides additional guidance to states through annual workshops and other avenues to help them follow these procedures as closely as possible. However, the actual data quality and consistency of HPMS information are dependent on the programs, actions, and maintenance of sound databases by numerous data collectors, suppliers, and analysts at the state, metropolitan, and other local area levels. Not all states follow the recommended sampling, counting, and estimating procedures contained in the *Traffic Monitoring Guide*, and the exact degree to which the states follow these guidelines overall is unknown. However, FHWA believes that most states generally follow the guidelines.

2. Estimates for higher level roadway systems are more accurate than those for lower level ones, since traffic volumes on higher level roadways are sampled at a higher rate. The TMG recommends that traffic counts be collected for all Interstate and principal arterial sections on a three-year cycle. Under this scheme, about one-third of the traffic counts for these roadway sections in a given year are actually measured, while volumes on the remainder are factored to represent present growth. Although some States collect data at all traffic count locations every year, most use some variation of the TMG data collection guidelines. Volumes on urban and rural minor arterials, rural major collectors, and urban collectors are collected using a sampling procedure. States are not required to report volumes for rural/urban local systems and rural minor collectors, though most do so. However, the methods used to estimate travel on these roadways vary from state to state since there are no standard guidelines for calculating travel on these roadways.

3. Vmt estimates by vehicle type are less accurate than are estimates for total motor vehicle vmt for several reasons: 1) vehicle classification equipment can frequently misclassify vehicles (see B.A. Harvey et al, *Accuracy of Traffic Monitoring Equipment*, GDOT 9210, (Georgia Tech Research Institute: 1995)); 2) vehicle shares are often determined by methods or by special studies that are not directly compatible with HPMS data definitions and/or purposes, and observed local-level vehicle classification counts are difficult to apply on a statewide basis; and 3) vehicle type definitions can vary among states.

4. Vmt estimates for combination trucks in HPMS differ from survey-based estimates from the Truck Inventory and Use Survey (TIUS), as much as 50 percent for some categories of combination trucks. Much of this discrepancy appears to be due to differences in truck classification definitions and biases introduced by data collection practices. See R.D. Mingo et al. 1995. *Transportation Research Record*, No. 1511 (Washington, DC: National Academy Press), pp. 42-46.

5. FHWA adjusts questionable data using a variety of standard techniques and professional judgement. For example, national average temporal adjustment factors developed from HPMS and other national highway monitoring programs are applied to State data, when necessary, to compensate for temporal deficiencies in sampling practices. Also, in estimating vmt by vehicle type, FHWA employs an iterative process to reconcile vmt, fuel economy (miles per gallon), fuel consumption, and vehicle registration estimates. Fuel consumption, total vmt by highway functional class, and registrations by vehicle group are used as control totals. This process limits the size of errors and ensures data consistency.

6. Passenger-miles of travel (pmt) are calculated by multiplying vmt estimates by vehicle loading (or occupancy) factors from various sources, such as the Nationwide Personal Transportation Survey conducted by FHWA and TIUS. Thus, pmt data are subject to the same accuracy issues as vmt, along with uncertainties associated with estimating vehicle loading factors.

Transit

The American Public Transit Association (APTA) figures are based on information in USDOT, Federal Transit Administration (FTA),

National Transit Database. Transit data are generally considered accurate because FTA reviews and validates information submitted by individual transit agencies. However, reliability may vary because some transit agencies cannot obtain accurate information or may misinterpret data. APTA adjusts the FTA data to include transit operators that do not report to the FTA database (private, very small, and rural operators).

Class I Rail (vehicle-miles)

Data are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). AAR data are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual Report* required of Class I railroads. STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although Class I railroads represent only 2 percent of railroads in the country, they account for over 70 percent of the industry's mileage.

Intercity Train

The AAR passenger-miles number is based on an almost 100-percent count of tickets and, therefore, is considered accurate.

TABLE 1-33. Long-Distance Travel in the United States by Selected Trip Characteristics: 1995

TABLE 1-34. Long-Distance Travel in the United States by Selected Traveler Characteristics: 1995

The data presented in these tables are estimates derived from the 1995 American Travel Survey (ATS) conducted for the U.S. Department of Transportation, Bureau of Transportation Statistics. The survey's estimation procedure inflates unweighted sample results to independent estimates of the total population of the United States. Values for missing data are estimated through imputation procedures.

Since ATS estimates come from a sample, they are subject to two possible types of error: nonsampling and sampling. Sources of nonsampling errors include inability to obtain information about all sample cases, errors made in data collection and processing, errors made in estimating values for missing data, and undercoverage.

The accuracy of an estimate depends on both types of error, but the full extent of the nonsampling error is unknown. Consequently, the user should be particularly careful when interpreting results based on a relatively small number of cases or on small differences between estimates.

Standard errors for ATS estimates that indicate the magnitude of sampling error as well as complete documentation of the source and reliability of the data may be obtained from detailed ATS reports. Because of methodological differences, users should use caution when comparing these data with data from other sources.

TABLE 1-35. U.S. Air Carrier Departures, Enplaned Revenue Passengers, and Enplaned Revenue Tons

The *Airport Activity Statistics of Certificated Air Carriers* (AAS) is the source of these data. Published annually by the U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information (OAI), the AAS presents traffic statistics for all scheduled and nonscheduled service by large certificated U.S. air carriers for each airport served within the 50 states, the District of Columbia, and other U.S. areas designated by the Federal Aviation Administration. The publication draws its data from the T-100 and T-3 databases maintained by OAI. These data are based on a 100-percent reporting of enplanements, departures, and tonnage information by large certificated U.S. air carriers via BTS Form 41.

Prior to 1993, the AAS included all scheduled and some nonscheduled enplanements for certifi-

cated air carriers but did not include enplanements for air carriers offering charter service only. Prior to 1990, the freight category was divided into both freight and express shipments and the mail category was divided into U.S. mail (priority and nonpriority) and foreign mail. Beginning in 1990, only aggregate numbers were reported for freight and mail.

Air traffic hubs are designated as geographical areas based on the percentage of total passengers enplaned in the area. A hub may have more than one airport. This definition of hub should not be confused with the definition used by airlines in describing their "hub-and-spoke" route structures.

TABLE 1-36. Passengers Boarded at the Top 50 U.S. Airports

The *Airport Activity Statistics of Certificated Air Carriers* (AAS), is the source of these data. Data for 1998 are from the U.S. Department of Transportation (USDOT), Federal Aviation Administration's *Statistical Handbook of Aviation*. Published by USDOT, Bureau of Transportation Statistics, Office of Airline Information (OAI), the AAS presents traffic statistics for all scheduled and nonscheduled service by large certificated U.S. air carriers for each airport served within the 50 states, the District of Columbia, and other U.S. areas designated by the Federal Aviation Administration. The publication draws its data from the T-100 and T-3 databases maintained by OAI. These data are based on a 100-percent reporting of enplanements, departures, and tonnage information by large certificated U.S. air carriers via BTS Form 41.

Prior to 1993, the AAS included all scheduled and some nonscheduled enplanements for certificated air carriers but did not include enplanements for air carriers offering charter service only. Prior to 1990, the freight category was divided into both freight and express shipments and the mail category was divided into U.S. mail (priority and nonpriority) and foreign mail. Beginning in 1990, only aggregate numbers were reported for freight and mail.

TABLE 1-37. Air Passenger Travel Arrivals in the United States from Selected Foreign Countries

TABLE 1-38. Air Passenger Travel Departures from the United States to Selected Foreign Countries

The International Trade Administration in the U. S. Department of Commerce publishes these data, which are based on information collected from 100,000 international visitors.

TABLE 1-41. U.S. Ton-Miles of Freight

Air Carrier

Air Carrier Traffic Statistics, published by the U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), Office of Airline Information (OAI), is the source of these data. Large certificated U.S. air carriers report domestic freight activities to OAI via BTS Form 41. The information reported in the table represents transportation of freight (excluding passenger baggage), U.S. and foreign mail, and express mail within the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands. It also covers transborder traffic to Canada and Mexico by U.S. carriers. The data does not include information on small certificated air carriers, which represent less than 5 percent of freight ton-miles.

Intercity Truck

The data are estimates from *Transportation in America*, published by the Eno Transportation Foundation, Inc. (Eno). Eno's estimates of intercity truck ton-miles are based on historic data from the former Interstate Commerce Commission (ICC), estimates from the American Trucking Association, and other sources. Eno supplements its estimates by using additional information on vehicle-miles of truck travel published in *Highway Statistics* by the Federal Highway Administration. Users should note that truck estimates in the tables do not include local truck movements.

Class I Rail

The data are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). AAR data are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB). The data represent all revenue freight activities of the Class I railroads and are not based on information from the Rail Waybill Sample. The STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although the Class I railroads represented only 2 percent of the number of railroads in the country, they account for over 90 percent of the rail industry's freight revenues.

Domestic Water Transport

The data are from *Waterborne Commerce of the United States*, published by the U.S. Army Corps of Engineers (USACE). All vessel operators of record report their domestic waterborne traffic movements to USACE via ENG Forms 3925 and 3925b. Cargo movements are reported according to points of loading and unloading. Certain cargo movements are excluded: 1) cargo carried on general ferries, 2) coal and petroleum products loaded from shore facilities directly into vessels for fuel use, 3) military cargo moved in U.S. Department of Defense vessels, and 4) cargo weighing less than 100 tons moved on government equipment. USACE calculates ton-miles by multiplying the cargo's tonnage by the distance between the points of loading and unloading.

Oil Pipeline

The data for 1960, 1965, and 1970 are from *Transportation in America*, published by the Eno Transportation Foundation, Inc., and the data for 1975 to 1998 are from *Shifts in Petroleum Transportation*, by the Association of Oil Pipe Lines (AOPL). Eno's data are based on information from the former Interstate Commerce Commission's *Transport Economics*. Common carrier oil pipelines reported all freight activities to the ICC.

AOPL obtains barrel-miles from the Federal Energy Regulatory Commission (FERC), which requires petroleum shippers to report annual shipments. AOPL then coverts barrel-miles to ton-miles using conversion figures in the American Petroleum Institute's (API's) *Basic Petroleum Data Book*. Since 16 percent of pipeline shipments are intrastate and not subject to FERC reporting requirements, AOPL makes adjustments to FERC data.

TABLE 1-42. Average Length of Haul: Domestic Freight and Passenger Modes

Freight

Air Carrier and Truck

The Eno Transportation Foundation, Inc. estimated these figures.

Class I Rail

The data are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). AAR data are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the R1 Annual Report required of Class I railroads. The STB defined Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although Class I railroads represent only 2 percent of railroads in the country, they account for over 70 percent of the industry's mileage.

Water

The data are from *Waterborne Commerce of the United States*, published by the U.S. Army Corps of Engineers (USACE). All vessel operators

of record report their domestic waterborne traffic movements to USACE via ENG Forms 3925 and 3925b. Cargo movements are reported according to points of loading and unloading. Certain cargo movements are excluded: 1) cargo carried on general ferries, 2) coal and petroleum products loaded from shore facilities directly into vessels for fuel use, 3) military cargo moved in U.S. Department of Defense vessels, and 4) cargo weighing less than 100 tons moved on government equipment. USACE calculates ton-miles by multiplying the cargo's tonnage by the distance between points of loading and unloading.

Oil Pipeline

The Eno Transportation Foundation, Inc., provided these figures, which are estimates based on U.S. Department of Energy and Association of Oil Pipe Lines reports. Figures are derived by dividing estimated pipeline ton-miles by estimated crude and petroleum products tonnage.

Passenger

Air Carrier

The U.S. Department of Transportation (USDOT), the Bureau of Transportation Statistics, Office of Airline Information, reports average trip length in its publication *Air Traffic Statistics*. These numbers are based on 100-percent reporting of passengers and trip length by large certificated air carriers via BTS Form 41. The figures do not include data for all airlines, such as most scheduled commuter airlines and all nonscheduled commuter airlines.

Bus

The Eno Transportation Foundation, Inc. estimated these figures based on Class I carrier passenger data and vehicle-miles data from *Highway Statistics*, an annually published report of the USDOT, Federal Highway Administration.

Commuter Rail

The American Public Transit Association (APTA) provided these data, which are based on the USDOT, Federal Transit Administration's (FTA's), National Transit Database. Transit data are generally accurate because the FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or may misinterpret data. APTA conservatively adjusts FTA data to include transit operators that do not report to the database (private, very small, and rural operators).

Intercity/Amtrak

The Statistical Appendix to the *Amtrak Annual Report* is the source of these data. Amtrak data are based on 100 percent of issued tickets, and thus should be accurate.

TABLE 1-43. Top U.S. Foreign Trade Freight Gateways by Value of Shipments: 1998

The value of U.S. air, maritime, and land imports and exports are captured from administrative documents required by the U.S. Departments of Commerce and Treasury. In 1990, the United States entered into a Memorandum of Understanding with Canada concerning the exchange of import data. As a consequence, each country is using the other's import data to replace its own export data. U.S. international merchandise trade statistics, therefore, are no longer derived exclusively from the administrative records of the Departments of Commerce and Treasury, but from Revenue Canada. Import value is for U.S. general imports, customs value basis. Export value is FAS (free along ship) and represents the value of exports at the U.S. port of export, including the transaction price and inland freight, insurance, and other charges. Trade levels reflect the mode of transportation as a shipment entered or exited a U.S. Customs port.

Truck, rail pipeline, mail, and miscellaneous modes are included in the total for land modes. Data present trade activity between the United States, Puerto Rico, and the U.S. Virgin Islands and Canada and Mexico. These statistics do not include traffic between Guam, Wake Island, and America Samoa and Canada and Mexico. These statistics also exclude imports that are valued at less than $1,250 and for exports that are valued at less than $2,500.

TABLE 1-46. U.S. Waterborne Freight

The data are from *Waterborne Commerce of the United States*, published by the U.S. Army Corps of Engineers (USACE). All vessel operators of record report their domestic waterborne traffic movements to USACE via ENG Forms 3925 and 3925b. Cargo movements are reported according to points of loading and unloading. Certain cargo movements are excluded: 1) cargo carried on general ferries, 2) coal and petroleum products loaded from shore facilities directly into vessels for fuel use, 3) military cargo moved in U.S. Department of Defense vessels, and 4) cargo weighing less than 100 tons moved on government equipment. USACE calculates ton-miles by multiplying the cargo's tonnage by the distance between points of loading and unloading.

Foreign waterborne statistics are derived from Census Bureau and U.S. Customs data, which excludes traffic between Guam, Wake Island, and American Samoa and any other foreign country, and imports and exports used by U.S. Armed Forces abroad. Individual vessel movements with origins and destinations at U.S. ports, traveling via the Panama Canal are considered domestic traffic.

TABLE 1-47. Tonnage of Top 50 U.S. Water Ports, Ranked by Total Tons

Data on the weight of U.S. maritime imports and exports are captured from administrative documents required by the U.S. Departments of Commerce and Treasury. In 1990, the United States entered into a Memorandum of Understanding with Canada concerning the exchange of import data. As a consequence, each country is using the other's import data to replace its own export data. The United States' merchandise trade statistics, therefore, are no longer derived exclusively from U.S. government administrative records, but from Revenue Canada. Maritime weight data are initially processed and edited by the Foreign Trade Division, U.S. Census Bureau (Census) as part of the overall edits and quality checks performed on all U.S. international merchandise trade data. After Census processing, the U.S. Army Corps of Engineers (USACE) and the Maritime Administration (MARAD) perform additional maritime-specific processing and quality edits on maritime-related data elements, including the weight of maritime imports and exports. The USACE and MARAD began performing this function in October 1998 after the Foreign Waterborne Trade data program was transferred from the Census Bureau. Prior to October 1998, the USACE historically performed additional specialized edits at the port level, including reassignment of some tonnage data to the actual waterborne port rather than the reported U.S. Customs port.

TABLE 1-43. Modal Shares of Freight Shipments within the United States by Domestic Establishments: 1993 and 1997

TABLE 1-49. Value, Tons, and Ton- Miles of Freight Shipments within the United States by Domestic Establishment, 1997

TABLE 1-52. U.S. Hazardous Materials Shipments by Mode of Transportation, 1997

TABLE 1-53. U.S. Hazardous Materials Shipments by Hazard Class, 1997

These data are collected via the 1997 Commodity Flow Survey (CFS) undertaken through a partnership between the U.S. Department of Commerce, Census Bureau (Census), and the U.S. Department of Transportation, Bureau of Transportation Statistics. For the 1997 CFS, Census conducted a sample of 100,000 domestic establishments randomly selected from a universe of about 800,000 multiestablishment companies in the mining, manufacturing, wholesale trade, and selected retail industries. It excluded establishments classified as farms, forestry, fisheries, governments, construction, transportation, foreign, services, and most retail.

Reliability of the Estimates

An estimate based on a sample survey potentially contains two types of errors—sampling and nonsampling. Sampling errors occur because the estimate is based on a sample, not on the entire

universe. Nonsampling errors can be attributed to many sources in the collection and processing of the data and occur in all data, not just those from a sample survey. The accuracy of a survey result is affected jointly by sampling and nonsampling errors.

Sampling Variability

Because the estimates are derived from a sample of the survey population, results are not expected to agree with those that might be obtained from a 100-percent census using the same enumeration procedure. However, because each establishment in the Standard Statistical Establishment List had a known probability of being selected for sampling, estimating the sampling variability of the estimates is possible. The standard error of the estimate is a measure of the variability among the values of the estimate computed from all possible samples of the same size and design. Thus, it is a measure of the precision with which an estimate from a particular sample approximates the results of a complete enumeration. The coefficient of variation is the standard error of the estimate divided by the value being estimated. It is expressed as a percent. Note that 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. Standard errors and coefficients of variation for CFS data presented in this report are given in Appendix B of the 1997 Economic Census report, and are available online www.census.gov/econ/wwwse0700.html.

Nonsampling Errors

In the CFS, as in other surveys, nonsampling errors can be attributed to many sources, including 1) nonresponse; 2) response errors; 3) differences in the interpretation of questions; 4) mistakes in coding or recoding the data; and 5) other errors of collection, response, coverage, and estimation.

A potentially large source of nonsampling error is due to nonresponse, which is defined as the inability to obtain all intended measurements or responses from selected establishments. Nonresponse is corrected by imputation.

TABLE 1-50. Value of U.S. Land Exports to and Imports from Canada and Mexico by Mode

The Transborder Surface Freight Data (TSFD) is derived from official U.S. international merchandise import and export data. (For a description of U.S. merchandise trade statistics, see www.census.gov/foreign-trade/www/index.html.) As of December 1995, about 96 percent of the value of all U.S. imports has been collected electronically by the Automated Broker Interface System. About 55 percent of the value of all U.S. exports is collected electronically through the U.S./Canada Data Exchange and the Automated Export Reporting Program. The balance is collected from administrative records required by the U.S. Departments of Commerce and Treasury.

The TSFD incorporates all data, by surface mode, on shipments entering or exiting the United States from or to Canada or Mexico. Prior to January 1997, this dataset also included transshipments—shipments entering or exiting the United States by way of U.S. Customs ports on the northern or southern borders even when the actual origin or final destination of the goods was other than Canada or Mexico. (In other U.S. Bureau of the Census trade statistics, transshipments through Canada and Mexico are credited to the true country of origin or final destination.) To make this dataset more comparable to other U.S. Census Bureau trade statistics, detailed information on transshipments has been removed. The TSFD presents a summary of transshipments by country, direction of trade, and mode of transportation. Shipments that neither originate nor terminate in the United States (i.e., intransits) are beyond the scope of this dataset because they are not considered U.S. international trade shipments.

In general, the reliability of U.S. foreign trade statistics is very good. Users should be aware that trade data fields (e.g., value and commodity classification) are typically more rigorously reviewed than transportation data fields (e.g., the mode of transportation and port of entry/exit). Users should also be aware that the use of foreign trade data to describe physical transportation flows may not be accurate. For example, this dataset provides surface transportation information for indi-

vidual U.S. Customs districts and ports on the northern and southern borders. However, because of filing procedures for trade documents, these ports may or may not record where goods physically cross the border. This is because the information filer may choose to file trade documents at one port while shipments actually enter or exit at another port. The TSFD, however, is the best publicly available approximation for analyzing transborder transportation flows.

Since the dataset was introduced in April 1993, it has gone through several refinements and improvements. When improbabilities and inconsistencies were found in the dataset, extensive analytical reviews were conducted and improvements made. However, accuracy varies by direction of trade and individual field. For example, import data are generally more accurate than export data. This is primarily because the U.S. Customs Bureau uses import documents for enforcement purposes while it performs no similar function for exports. For additional information on TSFD, the reader is referred to the U.S. Department of Transportation, Bureau of Transportation Statistics Internet site at www.bts.gov/transborder.

TABLE 1-51. Crude Oil and Petroleum Products Transported in the United States by Mode

Pipelines

The Association of Oil Pipelines (AOPL) obtains barrel-miles from the Federal Energy Regulatory Commission (FERC), which requires petroleum shippers to report annual shipments. AOPL then coverts barrel-miles to ton-miles using conversion figures in the American Petroleum Institute's (API's) *Basic Petroleum Data Book*. Since 16 percent of pipeline shipments are intrastate and not subject to FERC reporting requirements, AOPL makes adjustments to FERC data to include intrastate shipments. AOPL also conducts periodic studies to estimate intrastate shipments.

Water Carriers

Data are from *Waterborne Commerce of the United States*, published by the U.S. Army Corps of Engineers (USACE). All vessel operators of record report domestic freight and tonnage information to USACE via ENG Forms 3925 and 3925b. Cargo movements are reported according to points of loading and unloading. Certain cargo movements are excluded: 1) cargo carried on general ferries, 2) coal and petroleum products loaded from shore facilities directly into vessels for fuel use, 3) military cargo moved in U.S. Department of Defense vessels, and 4) cargo weighing less than 100 tons moved on government equipment. USACE calculates ton-miles by multiplying the cargo's tonnage by the distance between the points of loading and unloading.

Motor Carriers

AOPL estimates ton-miles by multiplying tons by the average length of haul. For crude, the tonnage of the prior year is projected by using a growth rate established by data from the U.S. Department of Energy, Energy Information Administration's *Petroleum Supply Annual*, vol. 1, table 37. For products, the same calculation is made but with a growth rate estimated by the American Trucking Association in *Financial and Operating Statistics, Class I and II, Motor Carriers*, Summary table VI-B. Average length of haul is determined from the prior six years of data for ton-miles and tonnage of crude and petroleum products moved by motor carriers.

Railroad

AOPL calculates ton-miles by multiplying tonnage by average length of haul. Tonnage data for crude and products comes from the Association of American Railroad's *Freight Commodity Statistics*, U.S. Class I Railroads. The U.S. Department of Transportation, Federal Railroad Commission provides the average length of haul for crude and products in its *Carload Way Bill Statistics*.

TABLE 1-54. Worldwide Commercial Space Launches

The U.S. Department of Transportation, Federal Aviation Administration, Associate Administrator for Commercial Space Transportation (AST) licenses and regulates U.S. commer-

cial space launches as authorized by the Commercial Space Launch Act of 1984 and Executive Order 12465. Every commercial space launch must be approved and monitored by AST. Thus, data reliability is high.

TABLE 1-55. Passengers Denied Boarding by the Largest U.S. Air Carriers

TABLE 1-56. Mishandled-Baggage Reports Filed by Passengers with the Largest U.S. Air Carriers

TABLE 1-57. Flight Operations Arriving On Time for the Largest U.S. Air Carriers

These numbers are based on data filed with the U.S. Department of Transportation on a monthly basis by the largest U.S. air carriers – those that have at least one percent of total domestic scheduled-service passenger revenues. Data cover nonstop scheduled service flights between points within the United States (including territories). The largest U.S. carriers account for more than 90 percent of domestic operating revenues. They include Alaska Airlines, America West Airlines, American Airlines, Continental Airlines, Delta Air Lines, Northwest Airlines, Trans World Airlines, Southwest Airlines, United Airlines, and US Airways. However, there are other carriers offering domestic scheduled passenger service that are not required to report. In some cases, major airlines sell tickets for flights that are actually operated by a smaller airline that is not subject to the reporting requirement.

TABLE 1-58. U.S. Air Carrier Delays Greater than 15 Minutes by Cause

The source of these data, the U.S. Department of Transportation (USDOT), Federal Aviation Administration (FAA), counts a flight as delayed if it departed or arrived more than 15 minutes after its scheduled gate departure and arrival times. FAA calculates delayed departures based on the difference between the time a pilot requests FAA clearance to taxi and the time an aircraft's wheels lift off the runway, minus the airport's standard unimpeded taxi-out time. Users should note that taxi-out time varies by airport due to differences in configurations. The cause of delay is also recorded, e.g., weather, terminal volume, closed runways, etc.

USDOT guidance defines departure as the time the aircraft parking brake is released and gate arrival as the time the brake is set. According to the USDOT's Office of the Inspector General (OIG), FAA's omission of part of a plane's ground movement compromises the data's validity. A recent OIG report noted that the FAA tracks ground time only after a pilot requests clearance and fails to track a plane's time in the ramp area. OIG found that ramp time comprised 28.7 percent to 40.5 percent of the average taxi-out time at the three major New York area airports (OIG Audit Report CR-2000-112), and would not be counted as an FAA delay.

Reliability

Several data collection changes complicate comparisons over time. For example, FAA modified its method for calculating volume-related delays that resulted in a 17 percent drop in such delays. Decreases in volume-related delays from 1998 to 1999 totaled less than one percent. Moreover, prior to 1999, USDOT did not provide a clear definition of what a departure was. An OIG Audit (CE-1999-054) report noted that air carriers used four different departure events: 1) rolling of aircraft wheels; 2) release of parking brake; 3) closure of passenger and/or cargo doors; and 4) a combination of door closures and release of the parking break. The same report also noted errors in the reporting of departure times by the air carriers.

Data are now manually entered in FAA's Operations Network (OSPNET) database, and reporting errors may arise and decrease reliability. The FAA monitors data quality assurance by spot checking the reported delay data and requesting that discrepancies be reviewed by the responsible facility. According to an OIG Audit (CR-2000-112), however, mistakes are not reliably corrected and many air traffic controllers suggested that delays are underreported sometimes by as much as 30 percent.

TABLE 1-59. Major U.S. Air Carrier Delays, Cancellations, and Diversions

A second data source for air-carrier delay is the USDOT, Bureau of Transportation Statistics, Office of Airline Information (OAI). This information originates from the Airline Service Quality Performance data. These figures are collected from the largest airlines—those that have at least one percent or more of total domestic scheduled service passenger revenues. Delays are categorized by phase of flight (i.e., gate-hold, taxi-out, airborne, or taxi-in delays). These data differ from FAA's OSPNET information due to differences in definition of delay.

While the FAA tracks delays on the taxiway, runway, and in the air, BTS tracks delays at the departure and arrival gates. OAI calculates delays as the difference between scheduled and actual gate departure. If a flight leaves the gate within 15 minutes of its scheduled time, then OAI would record it as departed on-time even if it sat for several hours on the ramp or runway, in which case the delay would be accounted for as a late arrival.

TABLE 1-60. Annual Person-Hours of Delay Per Eligible Drive

TABLE 1-61. Roadway Congestion Index

TABLE 1-62. Congestion Index and Cost Values

The Texas Transportation Institute's (TTI) *Urban Roadway Congestion Annual Report* provided figures for tables 1-54 through 56. TTI relies on data from the U.S. Department of Transportation, Federal Highway Administration, Highway Performance Monitoring System database (HPMS). TTI utilizes these data as inputs to its congestion estimation model. Detailed documentation for the TTI model and estimations can be found at this website http://mobility.tamu.edu/study/index.stm.

Structure, Assumptions, and Parameters

Urban roadway congestion levels are estimated using a formula measuring traffic density. Average travel volume per lane on freeways and principal arterial streets are estimated using area wide estimates of vehicle-miles of travel (vmt) and lane miles of roadway. The resulting ratios are combined using the amount of travel on each portion of the system so that the combined index measures conditions on the freeway and principal arterial street systems. Values greater than one are indicative of undesirable congestion levels. Readers seeking the algorithm for the congestion index should examine this website http://mobility.tamu.edu/study/numbers.stm.

Annual person-hours of delay results from the multiplication of daily vehicle-hours of incident and recurring delay times 250 working days per year times 1.25 persons per vehicle. Two types of costs are incurred due to congestion: time delay and fuel consumption. Delay costs are the product of passenger vehicle hours of delay times $12.00 per hour person time value times 1.25 occupants per vehicle. Fuel costs are calculated for passenger and commercial vehicles from the multiplication of peak period congestion speeds, the average fuel economy, fuel costs, and vehicle-hours of delay.

In previous reports, the TTI methodology assumed that 45 percent of all traffic, regardless of the urban location, occurred in congested conditions. TTI indicated that this assumption overestimated travel in congested periods. Thus, their 1999 estimates now vary by urban area anywhere from 21 percent to 50 percent of travel that occurs in congestion. TTI's model structure applies to two types of roads: freeways and principal arterial streets. The model derives estimates of vehicle traffic per lane and traffic speed for an entire urban area. Based on variation in these amounts, travel is then classified under 5 categories: uncongested, moderately congested, heavily congested, severely congested, and extremely congested (a new category in 1999). The threshold between uncongested and congested was changed in 1999. Previous editions classified congested travel when areawide traffic levels reached 13,000 vehicles per lane per day on highways and 5,000 vehicles per lane per day on principal arterial streets. These thresholds were raised in the latest report to 14,000 and 5,500 vehicles per lane per day respectively. Comparisons across time will be questionable due to these changes. For instance, TTI applied the new methodology to 1996 data that resulted in

lower congestion levels. Readers should refer to the TTI Internet site for more detailed algorithms and estimation procedures at http://mobility.tamu.edu/estimating_mobility.

TTI reviews and adjusts the data used in their models. State and local officials also review the TTI data and estimations. Some of the limitations acknowledged in the TTI report include the macroscopic character of the index. Thus, it does not account for local variations in travel patterns that may affect travel times. The index also does not account for local improvements, such as ramp metering or travel speed advantages obtained with transit or carpool lanes.

TABLE 1-63. Amtrak On-Time Performance Trends and Hours of Delay by Cause

Amtrak determines on-time performance through its computer system maintained at the National Operations Center (NOPS) in Wilmington, Delaware. If a train is delayed, a call is made to the NOPS for recordkeeping. These data can be supplemented with computer entries made for locomotive or car malfunctions that cause delays. These data should be considered reliable.

Chapter 2 Safety

AIR DATA

National Transportation Safety Board investigators perform onsite and offsite investigations of all accidents involving U.S. registered air carriers operating under 14 CFR 121, 14 CFR 135, and general aviation U.S. Department of Transportation (USDOT), Federal Aviation Administration (FAA) regulations. The investigators compile information on fatalities and injuries for all accidents. The counts for fatalities and serious injuries are expected to be extremely accurate. (See glossary for serious injury definition.)

Exposure data (aircraft-miles, aircraft-hours, and aircraft-departures) are obtained from the FAA, which in turn gets some of its exposure data from the USDOT, Bureau of Transportation Statistics, Office of Airline Information (OAI) and other exposure data from its own General Aviation and Air Taxi Activity and Avionics (GAATAA) Survey. The OAI data represent 100 percent reporting by airlines. Tables that include air carriers (14 CFR 121, scheduled and nonscheduled service) and commuter air carriers (14 CFR 135, scheduled service only) use OAI exposure data. Tables that include on-demand air taxi (14 CFR 135, nonscheduled service) and general aviation use GAATAA Survey results. For information about the GAATA Survey, please refer to the chapter 1 data accuracy statement for table 1-9.

The coefficients of variation for aircraft-hours vary by year, but are usually in the 9 to 10 percent range for on-demand air taxi and are approximately 2 percent for general aviation.

TABLE 2-15. Number of Pilot-Reported Near Midair Collisions by Degree of Hazard

Near Midair Collision reports are provided voluntarily by air carriers, general aviation companies, and the military, and this information is added to the Near Midair Collisions System database. Factors that may influence whether or not a near midair collision is reported include the pilot's or other crew member's perception of whether a reportable near midair collision occurred, which in turn can depend on factors such as visibility conditions; the reporter's flying experience; or the size of the aircraft involved. A reportable incident is one in which an aircraft is within 500 feet of another aircraft and a possibility of collision existed.

TABLE 2-16. Airline Passenger Screening Results by Type of Weapons Detected, Persons Arrested, and Bomb Threats Received

Federal Aviation Regulations (FARs) mandate that passenger screening be performed by each air carrier required to implement an approved security program. The USDOT, Federal Aviation Administration, monitors the records of passenger screening in accordance with FAR, and oversees compliance with the carriers' security programs through, for example, scheduled and unscheduled inspections. FAR requires the reporting of information on bomb threats.

HIGHWAY DATA

TABLE 2-1. Transportation Fatalities by Mode

TABLE 2-2. Transportation Injuries by Mode

TABLE 2-3. Transportation Accidents by Mode

TABLE 2-4. Distribution of Transportation Fatalities by Mode

TABLE 2-5. Highway-Rail Grade-Crossing Safety Data and Property Damage

TABLE 2-7. Transportation-Related Occupational Fatalities

TABLE 2-17. Motor Vehicle Safety Data

TABLE 2-18. Motor Vehicle Fatalities, Vehicle-Miles, and Associated Rates by Highway Functional System

TABLE 2-19. Occupant Fatalities by Vehicle Type and Nonoccupant Fatalities

TABLE 2-21. Passenger Car Occupant Safety Data

TABLE 2-22. Motorcycle Ride Safety Data

TABLE 2-23. Truck Occupant Safety Data

TABLE 2-24. Bus Occupant Safety Data

TABLE 2-25. Fatalities by Highest Blood Alcohol Concentration in Highway Crashes

TABLE 2-27. Motor Vehicle Fatal Crashes by Day of Week, Time of Day, and Weather and Light Conditions

TABLE 2-28. Motor Vehicle Fatal Crashes by Posted Speed Limit

TABLE 2-20. Occupant and Nonmotorist Fatalities in Crashes by Number of Vehicles and Alcohol Involvement

Fatalities

Highway fatality data come from the Fatality Analysis Reporting System (FARS), which is compiled by trained FARS analysts at USDOT, National Highway Traffic Safety Administration (NHTSA) regional offices. Data are gathered from a census of police accident reports (PARs), state vehicle registration files, state drivers licensing files, state highway department data, vital statistics, death certificates, coroner/medical examiner reports, hospital medical reports, and emergency medical service reports. A separate form is completed for each fatal crash. Blood alcohol concentration (BAC) is estimated when not known. Statistical procedures used for unknown data in FARS can be found in the NHTSA report *A Method for Estimating Posterior BAC Distributions for Persons Involved in Fatal Traffic Accidents*, DOT HS 807 094 (Washington, DC: July 1986).

Data are collected from relevant state agencies and electronically submitted for inclusion in the FARs database on a continuous basis. Cross-verification of PARs with death certificates ensures that undercounting is rare. Moreover, when data are entered, they are checked automatically for acceptable range values and consistency, enabling quick corrections when necessary. Several programs continually monitor the data for completeness and accuracy. Periodically, sample cases are analyzed for accuracy and consistency.

Note that the FARS data do not include motor vehicle fatalities on nonpublic roads. However, previous NHTSA analysis found that these fatalities account for 2 percent or fewer of the total motor vehicle fatalities per year. (See glossary for highway fatality definition.)

Injuries and Crashes

NHTSA's General Estimates System (GES) data are a nationally representative sample of police-reported crashes that contributed to an injury or fatality or resulted in property damage, and involved at least one motor vehicle traveling on a trafficway. Trained GES data collectors randomly sample PARs and forward copies to a central contractor for coding into a standard GES system format. Documents such as police diagrams or supporting text provided by the officers may be further reviewed to complete a data entry.

NHTSA suggests that about half of motor vehicle crashes in the United States are not reported to police and that the majority of these unreported crashes involve minor property damage and no significant personal injury. A NHTSA study of

injuries from motor vehicle crashes estimated the total count of nonfatal injuries at over 5 million compared with the GES's estimate of 3.2 million in 1998. (See glossary for highway crash and injury definitions.)

(See U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts*, 1998, DOT HS 808 983 (Washington, DC: October 1999), appendices B and C for further information on the GES, including a table of standard errors applicable to GES data.)

TABLE 2-29. Safety Belt and Motorcycle Helmet Use

The National Occupant Protection Use Survey (NOPUS), conducted in 1994, 1996, and 1998 by the U.S. Department of Transportation, National Highway Traffic Safety Administration is the source for these data.

In 1994 and 1996, NOPUS consisted of three separate studies: 1) the Moving Traffic Study, which provides information on overall shoulder belt use, 2) the Controlled Intersection Study, which provides more detailed information about shoulder belt use by type of vehicle, characteristics of the belt users and child restraint use, and 3) the Shopping Center Study, which provides information on rear-seat belt use and shoulder belt misuse. In 1998, the Shopping Center Study was dropped from the survey. The Controlled Intersection Study includes the collection of license plate information to link seat belt use to vehicle type. As the results of the Controlled Intersection Study for 1998 were not available prior to publication, only the Moving Traffic Study data were used in this table.

In 1998, the NOPUS separated pickups from the light truck category, thereby creating three categories of passenger vehicles: passenger cars, pickup trucks, and other passenger vehicles. Other passenger vehicles include vans, minivans, and sport utility vehicles. In this table, 1998 data for pickup trucks and other vehicles are combined into the light truck category to allow comparison to data from the earlier surveys.

In 1994, operators and riders wearing any type of helmet were counted as helmeted. In 1996 and 1998, motorcycle helmets that meet USDOT standards are counted as valid protection, whereas those that do not meet USDOT standards were treated as if the operator/rider were not wearing a helmet.

Data collection from the moving traffic study was conducted at over 3,800 sites across the country. Shoulder belt use was obtained for drivers and right-front passengers only. Three observers (two observers in 1994 and 1996) were stationed for 30 minutes at interstate/highway exit ramps, controlled (intersections with stop signs or traffic signals), and uncontrolled intersections. Every day of the week and all daylight hours (8 a.m. to 6 p.m.) were covered in each survey. Commercial and emergency vehicles were excluded.

NOPUS was designed as a multistage probability sample to ensure that the results would represent occupant protection use in the country. In the first stage, counties were grouped by region (northeast, midwest, south, west), level of urbanization (metropolitan or not), and level of belt use (high, medium, or low). Fifty counties or groups of counties were selected based on the vehicle miles of travel in those locations. In the next stage, roadways were selected from two categories: major roads and local roads. Finally, approximately 4,000 intersections or exit ramps were chosen on these roadways. Of the originally selected sites, some were found to be ineligible during mapping and data collection, and at some sites no vehicles were observed. In 1998, a total of 199,412 passenger cars, 135,505 light trucks (of which 76,004 were other vehicles and 59,501 were pickup trucks), and 1,444 motorcycles were observed.

Each reported estimate has been statistically weighted according to the sample design. Two kinds of error can be attributed to all survey research: sampling and nonsampling. A measure, called the standard error, is used to indicate the magnitude of sampling error. The source information provides two standard errors along with each estimate. Nonsampling errors could include problems such as vehicles not counted, incorrect determination of restraint use, and data entry mistakes, among others.

TABLE 2-30. Estimated Number of Lives Saved by Use of Restraints

The U.S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA) uses data obtained from the Fatality Analysis Reporting System to calculate the number of lives saved by the use of restraints. The methodology used is outlined in a NHTSA report, *Research Note, Estimating Lives Saved by Restraint Use in Potentially Fatal Crashes* (Washington, DC: June 1995). The general approach is to adjust the observed number of fatalities by a determined effectiveness rate for each type of restraint. This equates to subtracting the actual fatalities from the potential fatalities to determine the number of lives saved. This method is more accurate than earlier estimation methods since all calculations are derived from NHTSA's count of fatalities in which restraints were used. Reported restraint use is believed to be accurate for fatalities.

The key to NHTSA's calculations is the effectiveness estimate for preventing fatalities for each type of restraint. With the exception of an adjustment in the effectiveness estimate for front outboard air bag-only restraint use in passenger cars (NHTSA, *Fourth Report to Congress, Effectiveness of Occupant Protection Systems and Their Use*, Washington, DC, May 1999), a list of effectiveness estimates can be found in a NHTSA report, *Estimating Alcohol Involvement in Fatal Crashes in Light of Increases in Restraint Use*, published in March 1998. This report also includes additional references describing the determination of these effectiveness estimates.

TRANSIT DATA

TABLE 2-1. Transportation Fatalities by Mode

TABLE 2-2. Transportation Injuries by Mode

TABLE 2-3. Transportation Accidents by Mode

TABLE 2-4. Distribution of Transportation Fatalities by Mode

TABLE 2-31. Transit Safety and Property Damage Data

TABLE 2-32. Transit Safety Data by Mode for All Reported Accidents

TABLE 2-33. Transit Safety Data by Mode for All Reported Incidents

TABLE 2-34. Reports of Violent Crime, Property Crime, and Arrests by Transit Mode

The data for this report are obtained from the U.S. Department of Transportation, Federal Transit Administration's (FTA's) National Transit Database (NTD) Reporting System. Transit agencies are required to file an NTD report at regular intervals if they are recipients of Urbanized Area Formula Funds. In 1998, 575 agencies reported to the NTD. Of that total, 60 transit agencies received exemptions from detailed reporting because they operated 9 or fewer vehicles, and 6 were deleted because their data were incomplete. Thus, 509 individual reporters were included in the NTD, accounting for 90 to 95 percent of passenger-miles traveled on transit. Of the transit agencies reporting, 56.2 percent contract for some or all of their transportation from private or public companies or organizations.

Transit operators report fatalities, injuries, accidents, incidents, and property damage in excess of $1,000. Electronic reporting has recently been implemented for the NTD. Certification from a company's Chief Executive Officer must accompany all NTD reports along with an independent auditor's statement. Upon receipt, an NTD report is reviewed and outstanding items noted in writing to the agency that submitted the form. (See glossary for transit fatality, injury, and accident definitions.)

Four major categories of transit safety are collected: 1) collisions, 2) derailments/buses going off the road, 3) personal casualties, and 4) fires. These major categories are divided into subcategories. The collisions category comprises collisions with vehicles, objects, and people (except suicides). Of the four major categories, only the first two are included in the definition of transit accidents adopted in this report (see glossary). Understanding this definition of accident is relevant to understanding how double counting is removed in the grand total of U.S. transportation

fatalities and injuries. (See cross modal comments in box 2-1.)

Transit data submitted to the NTD are generally considered accurate because the FTA reviews and validates information submitted by individual transit agencies. However, reliability may vary because some transit agencies cannot obtain accurate information or misinterpret data.

Security

FTA collects security data from transit agencies serving urbanized areas of over 200,000 in population, using Form 405, and manages it in the National Transit Database (NTD). The reporting of security data follows the FBI *Uniform Crime Reporting Handbook* (Washington, DC: 1984) and is divided into two categories: 1) Reported Offenses, including violent and property crime, and 2) Arrests, consisting of less serious crimes. The figures for violent and property crime are based on records of calls for service, complaints, and/or investigations. They do not reflect the findings of a court, coroner, jury, or decision of a prosecutor. Security data were first reported in 1995 and were not compiled for earlier years.

In 1998, the number of agencies reporting to this database was 575. Of that, 60 transit agencies received exemptions from detailed reporting because they operated nine or fewer vehicles, and six were deleted because their data were incomplete. Thus, 509 individual reporters are included in the full database in 1998. Of the transit agencies reporting, 56.2 percent contract for some or all of their transportation from private or public companies or organizations.

RAILROAD DATA

TABLE 2-1. Transportation Fatalities by Mode

TABLE 2-2. Transportation Injuries by Mode

TABLE 2-3. Transportation Accidents by Mode

TABLE 2-4. Distribution of Transportation Fatalities by Mode

TABLE 2-5. Highway-Rail Grade-Crossing Safety Data and Property Damage

Box 2-1.

Cross-Modal Comparisons

Caution must be exercised in comparing fatalities (and injuries) across modes because different definitions for reportable events are used among the modes. In particular, rail and transit facilities and injuries include deaths and injuries that are not, strictly speaking, caused by transportation accidents, but are caused by such events as a fall on a transit station escalator; or for railroad employees, a fire in a workshed. Similar fatalities for the air and highway modes (death at airports not caused by moving aircraft, or fatalities from accidents in automobile repair shops) are not counted towards the totals for these modes.

Total fatalities (injuries) in the tables are less than the sum of the modal totals because some deaths (injuries) are reported and counted in more than one mode. To avoid double counting, adjustments have been made to fatality totals (see table 2-4).

TABLE 2-7. Transportation-Related Occupational Fatalities

TABLE 2-35. Railroad and Grade-Crossing Fatalities by Victim Class

TABLE 2-36. Railroad and Grade-Crossing Injured Persons by Victim Class

TABLE 2-37. Train Fatalities, Injuries, and Accidents by Type of Accident

TABLE 2-38. Railroad Passenger Safety Data

TABLE 2-39. Railroad System Safety and Property Damage Data

TABLE 2-40. Fatalities and Injuries of On-Duty Railroad Employees

Railroads are required to file a report for each train accident resulting in property damage in excess of $6,600, each highway-rail accident, and each incident involving the operation of a railroad resulting in a fatality or a reportable injury. (See glossary for reportable injury, train accident and incident, and nontrain incident definitions.)

Reporting requirements, which are fixed in law, are very broad and encompass events not strictly related to transportation. For example, if a passenger falls on a staircase and breaks a leg in

the station while going to a train, the injury would be reported and appear in the data as a rail injury.

WATERBORNE TRANSPORTATION DATA

TABLE 2-1. Transportation Fatalities by Mode

TABLE 2-2. Transportation Injuries by Mode

TABLE 2-3. Transportation Accidents by Mode

TABLE 2-4. Distribution of Transportation Fatalities by Mode

TABLE 2-7. Transportation-Related Occupational Fatalities

TABLE 2-41. Waterborne Transportation Safety Data and Property Damage Related to Vessel Casualties

TABLE 2-42. Waterborne Transportation Safety Data Not Related to Vessel Casualties

U.S. waterborne fatality and injury data are based on reports required by CFR Part 4.05-10. This code requires that the owner, agent, master, operator, or person in charge file a written report of any marine casualty or accident within five days of the accident. Reports must be delivered to Investigative Officers (IOs) at a U.S. Coast Guard Marine Safety Office or Marine Inspection Office at the U.S. Department of Transportation, who use these reports as guides to investigate the marine casualty or accident. The IO ensures that all the entries on the forms are filled out and errors are corrected. Regulations require IO notification of marine casualties for certain circumstances, including loss of life; injuries that require medical treatment beyond first aid; and, for individuals engaged or employed onboard a vessel in commercial service, injuries that render a person unfit to perform routine duties.

Incidents requiring an investigation include death, injury resulting in substantial impairment, and other incidents determined important to promoting the safety of life or property or to protect the marine environment. These incidents are investigated in accordance with procedures set forth in the regulations. Furthermore, the Federal Water Pollution Control Act mandates that certain incidents be reported to the U.S. Coast Guard. The reports are entered into the Marine Safety Information System, which is later analyzed and transferred to the Marine Safety Management System maintained in Washington, DC.

RECREATIONAL BOATING DATA

TABLE 2-1. Transportation Fatalities by Mode

TABLE 2-2. Transportation Injuries by Mode

TABLE 2-3. Transportation Accidents by Mode

TABLE 2-4. Distribution of Transportation Fatalities by Mode

TABLE 2-43. Recreational Boating Safety, Alcohol Involvement, and Property Damage Data

TABLE 2-44. Personal Watercraft Safety Data

TABLE 2-45. U.S. Coast Guard Search and Rescue Statistics, Fiscal Years

Operators of boats involved in an accident resulting in 1) a fatality, 2) an injury requiring medical treatment beyond first aid, 3) damage to the vessel or other property greater than $500 or complete loss of vessel, or 4) the disappearance of a person from the vessel under circumstances indicating death or injury are required to file a report with the U.S. Coast Guard. If a person dies within 24 hours of the occurrence, requires medical treatment beyond first aid, or disappears from the vessel, reports must be made within 48 hours of the occurrence. In cases involving only damage to the vessel and/or property, reports are to be submitted within 10 days of the occurrence. Although there is no quantitative estimate of the response rate, there may be considerable underreporting, especially of nonfatal accidents, because of the difficulty of enforcing the requirement and because boat operators may not always be aware of the law.

NATURAL GAS AND LIQUID PIPELINE DATA

TABLE 2-1. Transportation Fatalities by Mode

TABLE 2-2. Transportation Injuries by Mode

TABLE 2-3. Transportation Accidents by Mode

TABLE 2-4. Distribution of Transportation Fatalities by Mode

TABLE 2-46. Hazardous Liquid and Natural Gas Pipeline Safety and Property Damage Data

U.S. fatality and injury data for natural gas pipelines are based on reports filed with the U.S. Department of Transportation (USDOT), Office of Pipeline Safety (OPS). Accidents must be reported as soon as possible, but no later than 30 days after discovery. Reports are sent to the Information Systems Manager at the OPS. Possible sources of error include a release going undetected; even if subsequently detected and reported, it may not be possible to accurately reconstruct the accident. Property damage figures are estimates. (See glossary for gas and liquid pipeline fatality data and injury definitions.)

TABLE 2-6. Hazardous Materials Safety Data and Property Damage Data

Incidents resulting in certain unintentional releases of hazardous materials must be reported under 49 CFR 171.16. Each carrier must submit a report to the U.S. Department of Transportation, Research and Special Programs Administration (RSPA) within 30 days of the incident, including information on the mode of transportation involved, results of the incident, and a narrative description of the accident. These reports are made available on the incident database within 60 days of receipt.

Fatalities and injuries are counted only if they are directly due to a hazardous material. For example, a truck operator killed by impact forces during a motor vehicle crash would not be counted as a hazardous-material fatality. RSPA verifies all reported fatalities and injuries by telephone with the carrier submitting the report.

Possible sources of error include a release going undetected; even if subsequently detected and reported, it may not be possible to accurately reconstruct the accident. Although RSPA acknowledges that there is some level of underreporting, it believes that the underreporting is limited to small, nonserious incidents. As incident severity increases, it is more likely that the incident will come to RSPA's attention and will ultimately be reported. Additionally, the reporting requirements were extended to intrastate highway carriers on October 1, 1998, and the response rate from this new group is expected to increase over time. Property damage figures are estimates determined by the carrier prior to the 30-day reporting deadline and are generally not subsequently updated. Property damage figures, therefore, may underestimate actual damages.

Chapter 3 Transportation and the Economy

TABLE 3-1a & 3-1b. U.S. Gross Domestic Product Attributed to For-Hire Transportation Services (Current and chained 1996 dollars)

TABLE 3-2a & 3-2b. U.S. Gross Domestic Product Attributed to Transportation-Related Final Demand (Current and chained 1996 dollars)

TABLE 3-3a & 3.3b. U.S. Gross Domestic Demand Attributed to Transportation-Related Final Demand (Current and chained 1996 dollars)

TABLE 3-4a & 3-4b. Contributions to Gross Domestic Product: Selected Industries (Current and chained 1996 dollars)

TABLE 3-5. Gross Domestic Product by Major Social Function

Tables 3-1 through 3-5 present data on transportation's contributions to the economy through consumption (or the money spent on transportation activity). The *Survey of Current Business* (SCB) published by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). The SCB is a monthly journal that contains estimates of U.S. economic activity, including industry contributions to the Gross Domestic Product (GDP). GDP is defined as the net value of the output of goods and services produced by labor and property located in the United States. BEA constructs two complementary measures of GDP-one based on income and the other on expenditures (product). Together, they represent the National Income and Product Accounts (NIPA), our nation's principle framework for macroeconomic estimates. The product side results from the addition of labor, capital, and taxes for producing output. Consumption derives from household, business, and government expenditures and net foreign purchases.

Table 3-3 presents transportation's economic impact in a different form, Gross Domestic Demand (GDD). Also derived from the national accounts, GDD is the sum of personal consumption, gross private domestic investment, and government purchases. GDD includes imports, but excludes exports, thus counting only what is consumed, purchased, or invested in the United States.

GDP Methodology

The 1960 through 1985 data in table 3-1 are from the November 1993 issue of the SCB. The 1990 through 1991 data and 1992 through 1996 data are from an August 1996 and November 1997 SCB issue respectively. The October 1999 issue introduced a revised methodology for GDP estimates (Yuskavage 1996). This section describes BEA's methodology for estimating transportation's share of GDP.

BEA's current-dollar estimates of GDP by industry rely on several sources, including the Bureau of Labor Statistics (BLS), the Health Care Financing Administration, and the Internal Revenue Service (IRS). Some of the tables in this chapter report chained-dollar figures. BEA derived chained dollars by using the Fisher Ideal Quantity Index to calculate changes between adjacent years (Parker and Triplett 1996; Landerfeld and Parker 1997). Annual changes are then chained to form a time series that incorporates the effects of relative price and output composition changes. Please refer to page 142 of the August 1996 issue of the *Survey of Current Business* for the mathematical formulas (Yuskavage 1996). This method produced separate estimates of gross output and intermediate inputs for a sector's GDP calculation. BEA updated the reference year for the chained-dollar estimates from 1992 to 1996.

Transportation GDP in chained dollars was estimated using the double-deflation method, which relies on a chain-type quantity index formula, and requires gross output and intermediate input information. Principal source data for the transportation categories include: 1) operating revenues of air carriers and Federal Express from the U.S. Department of Transportation and public sources (air); 2) operating revenues for Class I motor carriers from historical records of the Interstate Commerce Commission and Census Bureau annual surveys (trucking and warehousing); 3) BEA personal consumption expenditures

(PCE), BLS, and trade sources (local and interurban passenger transit); 4) operating revenues for Class I railroads and Amtrak (rail); and 5) other trade sources (pipelines). Data sources for water were not provided (Yuskavage, 1996).

Table 3-1 reported current dollar estimates from various SCB issues. BEA derived the 1991 data and subsequent years in four steps:

1. BEA's benchmark input-output (I-O) tables produced input compositions for 1977, 1982, and 1987.

2. BEA estimated 1978 through 1981 and 1983 through 1986 input compositions by interpolating the 1977, 1982, and 1987 figures.

3. BEA estimates the 1977 through 1987 imported and domestically imported shares of each detailed input.

4. BEA estimates the 1988 through 1994 input compositions based on the 1987 figures and the Economic Censuses of 1992.

For intermediate input estimations, BEA deflates each of the current-dollar inputs. (BEA deflates import and domestic production separately.) For deflation, quantities are approximated by real values (expressed at present with 1996 as the base period) that are calculated by dividing the current-dollar value of the component by its price index. BEA develops estimates for import prices with data from a variety of sources, but primarily from the BLS import price series

Reliability and Accuracy

BEA views GDP as a reliable measure of output because of the source data underlying the estimates. The following reliability comments are based on the Valliant (1993) SCB article and Ritter (2000). GDP data originate from three types of sources. The foundational data come first from the economic censuses conducted every five years. These approach complete enumerations of sectoral activity in state and local governments, manufacturing, services, retail trade, wholesale trade, construction, transportation, communications and utilities, mining, finance, insurance, and real estate. Annual estimates form the second tier of GDP data and emanate form sources such as IRS tax returns and smaller surveys of establishments. The Annual Retail Trade Survey, for instance, forms one of the major components of the annual estimates. The U.S. Census Bureau collects sales and end-of-year inventory data from about 22,000 retail firms totaling $2 trillion of the $8.8 trillion GDP amount. While considered reliable by many economists, sampling variability may introduce errors into these annual estimates. Moreover, the Census Bureau imputes (substitutes estimates for missing or clearly incorrect data) about 11 percent of reported national annual retail sales because of accounting inconsistencies or raw survey data errors. The third component of the GDP flows from quarterly estimates.

In the October 1993 SCB, Valliant described the reliability and accuracy of the quarterly estimates of GDP, providing insights into the pre-1985 data in terms of dispersion and bias. BEA followed a schedule that produced three successive "current" estimates; advanced, preliminary, and final. BEA analysts developed a dispersion and bias measure based on the difference between these three estimates.

Dispersion is the average of the absolute values of the revisions, or, the difference between P, representing the percentage change in the current estimates, and L representing the percentage change in the latest available estimates, divided by n, representing the number of quarterly changes. Bias is the average of the revisions. According to the October 1993 SCB, dispersion averaged 1.6 percent from 1958 to 63 and dropped to 1.1 percent for 1968 to 1972. BEA stated that these declines in dispersion correspond with more accurate initial and final estimates subsequent to the late 1950s. For years after 1973 until 1991, the BEA concluded that more accurate source data for preliminary and final estimates did not improve reliability by much. BEA also determined that bias was not large enough from 1978 to 1991 to be significant under normality assumptions at the five- percent confidence level. Overall, for the period beginning in 1978 and covering the 1985 data from table 3-1, the BEA concluded there was no evidence of reliability increases. BEA also questioned its own estimating procedures and, in particular, the use of disparate sources of data, which may explain why reliability levels have not increased.

The NIPA framework also undergoes major updates referred to as comprehensive, or benchmark revisions. Eleven of these have been completed including one in 1996 and most recently on October 28, 1999 that provided the data for tables 3-1 through 3-5. The major change encompassed a definitional change reflecting our evolving economic system. Software became a business investment rather than just a "purchased input," or the equivalent of raw material. Unless the company increased the price of its product to cover software purchases, no impact registered in the GDP. With this benchmark revision, the Census Bureau increased the 1996 estimate by $115 billion, or 1.5 percent--the amount of software investments made in that year. Another change involved the Census Bureau's interpretation of the value of "unpriced" banking services such as ATM (automatic teller machine) contributions to an establishment's productivity. Previously, banking service productivity relied only on an index constructed from labor input. Economists argued that this ignored productivity gains from technological improvements such as ATMs and electronic banking. The BLS developed a productivity based instead of bank transactions, and this was used in the 1999 revision. For more detail, readers should refer to Moulton and Seskin (1999).

Sources of Error for GDP Estimates

The GDP estimates can contain several kinds of error. One source of error arises from estimates based on preliminary or incomplete tabulations of source data or BEA judgment in the absence of data. Errors may also arise because of sampling errors and biases in monthly, quarterly, annual, or periodic tabulations. Another source of potential error may arise when data are seasonally adjusted. Readers should refer to the October 1993 SCB issue for more detail (Young 1993).

NIPA and Transportation-Related Final Demand

For table 3-2, transportation-related final demand (TRFD) is from NIPA reported in the SCB. It represents the sum of all consumer and government expenditures for transportation purposes, plus the value of goods and services purchased by business as investment for transportation purposes. Since TRFD includes only expenditures on the final products of the economy, it is comparable to GDP and provides a measure of transportation's importance from a consumption perspective.

NIPA tables report the composition of production and the distribution of incomes earned in production. The totals of these produce a GDP estimate that should theoretically be equal, but there is always a difference referred to as the "statistical discrepancy." NIPA is based on four subaccounts of national economic activity. These include 1) the personal income and outlay account, 2) the gross savings and investment account, 3) the government receipts and expenditures account, and 4) the foreign transactions account.

Personal Consumption Expenditures (PCE) for transportation include 1) road motor vehicles, such as new and used automobiles, and motorcycles; 2) motor vehicle parts, such as tires, tubes, accessories; 3) motor fuels and lubricants; and 3) transportation services, such as repair, greasing, washing, parking, storage, rental, leasing, tolls, insurance, and purchased local and intercity transportation services. Motor vehicles used primarily for recreation, boats, noncommercial trailers, and aircraft are excluded.

Gross private domestic fixed investment in transportation includes private purchases of transportation structures and equipment. Transportation structures include railroads and petroleum pipelines. Transportation equipment consists of automobiles, trucks, buses, truck trailers, aircraft, ships and boats, and railroad equipment.

Goods and services that are counted as part of transportation-related exports include 1) civilian aircraft, engines, and parts; 2) road motor vehicles, engines, and parts; 3) passenger fares, including receipts of U.S. air and ocean/cruise carriers for transporting non-U.S. residents between the United States and foreign countries or between two foreign points; and 4) other transportation. The total for road motor vehicles, engines and parts excludes boats, aircraft, and noncommercial trailers. Other transportation includes 1) the freight revenues of U.S.-operated ocean, air, and other carriers (e.g., rail, pipeline, and Great Lakes

shipping) for international transport of U.S. exports and for transporting foreign freight between foreign points; 2) port expenditure receipts (representing payments for goods and services purchased in the United States by foreign-operated carriers); and 3) receipts of U.S. owners from foreign operators for the charter of vessels and rental of freight cars and containers.

Goods and services that are counted as part of transportation-related imports include 1) civilian aircraft, engines, and parts; 2) road motor vehicles, engines, and parts; 3) passenger fares, including payments to foreign air and ocean/cruise carriers for the transportation of U.S. residents between the United States and foreign countries or between two foreign points; and 4) other transportation. The total for road motor vehicle, engines and parts excludes boats, aircraft, and non-commercial trailers. Other transportation includes 1) freight revenues of foreign-operated ocean, air, and other carriers (e.g., rail, pipeline, and Great Lakes shipping) for international transport of U.S. imports and for the transportation of foreign freight between foreign points; 2) port expenditure receipts (representing payments for goods and services purchased in foreign countries by U.S.-operated carriers); and 3) payments to foreign owners from U.S. operators for the charter of vessels and rental of freight cars and containers.

Transportation-related government purchases include federal, state, and local purchases of transportation services, and government expenditures on transportation-related structures and equipment. Federal, state, and local purchases represent the sum of consumption expenditures and gross inventory. Defense-related purchases include expenditures on the transportation of materials (care and movement of goods by water, rail, truck, and air); the rental of trucks and other transportation equipment and warehousing fees; and travel of persons (care and movement of Department of Defense military civilian employees), including tickets for all modes of travel, per diem, taxi fares, automobile rental, and mileage allowances for privately owned vehicles.

Further References

This data source and accuracy statement is based on several papers that have appeared in the SCB. Data users who desire more methodological detail can refer to the list of references at the end of this chapter.

TABLE 3-6. National Transportation and Economic Trends

The *Statistical Abstract of the United States* published by the U.S. Department of Commerce, Census Bureau, is the source of the population data. The *Current Population Reports* are the source of the *Abstract's* data that are collected through the *Current Population Survey* (CPS). This is a monthly survey administered by the Census Bureau of a scientifically selected sample representative of the noninstitutional civilian population in 754 areas covering every state and the District of Columbia. Like other surveys, the CPS is subject to sampling error. Readers should note that estimates based on the CPS may not agree with census counts because different procedures are used. Changes in the CPS also mean that annual comparisons must be made with caution. For instance, in 1994, the CPS methodology was dramatically changed, and the estimates began to incorporate 1990 census population controls, adjusted for the estimated undercount.

Industrial production data come from the Industrial Production Index, produced by the Board of Governors of the Federal Reserve System and published in the *Economic Report of the President*. For annual figures, individual industrial production (IP) indexes are constructed from a variety of sources, including the quinquennial Censuses of Manufactures and Mineral Industries; the Annual Survey of Manufactures, prepared by the Census Bureau; the Minerals Yearbook, prepared by the U.S. Department of the Interior; and publications of the U.S. Department of Energy. The Federal Reserve Board (FRB) uses these data in a modeling framework to produce estimates of industrial production. Below are brief discussions on three major sources for the IP indexes; the survey of manufactures, the census of manufactures, and the electric utility survey.

Annual Survey of Manufacturers

The Census Bureau conducts a mail survey of approximately 55,000 manufactures with three

different sample strata. The sampling frame is based on previously surveyed firms and is updated annually based partially on IRS administrative records and other sources. Large manufactures (shipments > $500 million, and > 250 employees), some computer manufacturing firms, and all remaining firms with at least 250 employees are selected. Establishments with employment generally ranging from 20 to 250 employees are sampled with a probability proportional to a composite measure of establishment size. Approximately 5,000 of the smallest firms (5 to 20 employees) are also sampled and receive a shorter survey instrument. Additional information on the survey, readers should refer to www.census.gov/econ/www/ma0300.html.

Census of Manufacturers

The Census of Manufactures collects data through mail surveys from approximately 237,000 multiunit and single-unit firms with a minimum payroll figure. This census is supplemented by IRS administrative data from over 142,000 firms not contacted by mail. For additional information on the census, readers should refer to www.census.gov/econ/www/ma0100.html.

Electric Utility Survey

Since 1971, the FRB has conducted the *Monthly Survey of Industrial Electricity Use* based on responses from utilities and manufacturing and mining firms that are cogenerators. This survey is the basis for estimates of the amount of electricity power used by 120 industrial sectors. More than 40 industrial production series estimates are based on data from this survey and compose 28 percent of the Industrial Production Index in 1994 value-added proportions.

Survey responses are voluntary and are gathered from a panel of 175 utilities and 186 cogenerating companies with a monthly response rate near 95 percent. In 1992, an additional 71 new cogenerators joined the panel. This resulted, according to an FRB statistical analysis, in a decrease of the standard deviation of errors for electricity growth rates from 3.0 to 1.9 percentage points. Overall, the estimates for total power use produce a standard error of about 0.5 percentage points. The panel accounts for approximately 73 percent of industrial electric power use in the United States.

The *Survey of Current Business*, published by the U.S. Department of Commerce, Bureau of Economic Analysis, is the source of GDP estimates. Readers should refer to the source and accuracy statement for tables 3-1 through 3-5 for information on GDP estimates.

TABLE 3-7. Passenger and Freight Transportation Expenditures

Detailed information from the source was not available at the time of publication. Readers should contact the Eno Transportation Foundation, Inc. directly for information about methodologies and reliability.

TABLE 3-8. Sales Price of Transportation Fuel to End-Users

The U.S. Department of Energy, Energy Information Administration's (EIA's) *Annual Energy Review 1999*, tables 5.20 and 5.21, provided price data, except for railroad fuel. Pre-1981 data were reported by the EIA from Bureau of Labor Statistics reports. Beginning in 1983, the EIA administered a series of surveys to collect data on petroleum prices, market distribution, supply, and demand. The EIA-782 series encompasses three surveys: 1) Form EIA-782A, Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report; 2) Form EIA-782B, Resellers'/Retailers' Monthly Petroleum Product Sales Reports; and 3) Form EIA-782C, Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption.

EIA developed a method for comparing data from the new surveys with older information gathered by various methods. As a result, a number of adjustment factors were developed and used to "backcast" price estimates. Readers who require a more detailed description of this methodology should refer to EIA's petroleum data publications web page (www.eia.doe.gov/oil_gas/petroleum/pet_frame.html) and the explanatory notes section.

Changes in sample elements or collection methods may affect data continuity. Two regulatory changes affected data collection in October 1993. The Clean Air Act Amendments of 1990 required that oxygenated gasoline be sold in the winter months in ozone nonattainment areas. Thus, the EIA-782 forms were modified to collect information on fuels divided among conventional, oxygenated, and reformulated categories. Second, requirements for the production and selling of low-sulfur diesel were required and necessitated the separation of diesel fuel into high- and low-sulfur categories. Moreover, surveys prior to October 1993 did not include propane. The EIA followed several different sampling designs during two periods in the 1980s and thus, there may be some price estimate discontinuity for periods between December 1983 and January 1984 as well as between August and September of 1988.

Data Collection

The 782 series occurs on a monthly schedule via mail. The 782A and 782C surveys reflect a census of about 115 and 190 firms, respectively. The 782B samples about 2,000 firms. The EIA first stratifies by sales volume for the form 782B survey to ensure that dealers with 5 percent or more of the market are captured with certainty. The remaining elements of the frame were assigned a probability of selection to form a 2,200 firm survey. These "noncertainty" companies were post-stratified by geographic area and type of sales category

Data Reliability

EIA has studied its sampling effects on reliability and determined that the sample size of 2,000 should yield a less than 1-percent price coefficient of variation in its estimates. Errors can arise because of nonresponse, but an EIA official indicated that the response rates for the 1997-1999 782A, B, and C surveys averaged 95 percent, 86 percent, and 96 percent, respectively. Because survey data invariably contain incomplete data (because of reporting errors or nonresponse), EIA estimates or "imputes" missing data. Readers requiring imputation algorithms should refer to the 782 series explanatory notes referred to above.

TABLE 3-9. Price Trend of Gasoline v. Other Consumer Goods and Services

Data in this table were reproduced from the American Petroleum Institute's (API) *Basic Petroleum Data Book*. API noted that data reported prior to 1981 was obtained from Platt's *Oil Price Handbook* and *Oilmanac*. Platt's is part of Standard and Poor's, and an independent third party organization that tracks the petroleum industry. Platt's reported the retail price of gasoline based on telephone interviews with gas stations in 55 cities. More detailed historical information on their data collection methods could not be ascertained and the data's reliability is uncertain. API reported the Bureau of Labor Statistics (BLS) as its data source for 1981 to 1998 retail gasoline prices. The remainder of this section discusses the BLS Consumer Price Index (CPI) data collection and estimation methods used to derive the average retail price of gasoline.

BLS uses the CPI as a measure of average price changes paid by urban consumers for a fixed basket of goods and services. BLS estimates the CPI with a survey-based approach. Survey results define a categorization of goods and services, a representative sample of items to track, and weights according to the consumption of an average consumer during a base period.

Sample Design

BLS relies on two sampling frames for their CPI estimates. One represents the universe of retail outlets from which households may purchase defined groups of commodities and services including gasoline. A second represents households across urban areas. Moreover, the household frame is based on an "urban-consumer" population and consists of households in Metropolitan Statistical Areas (MSA's) and in urban places with more than 2,500 inhabitants. This "all urban" CPI (CPI-U) provides the estimates for retail gasoline prices shown in table 3-9. Thus, this frame does not represent non-urban consumers.

For the retail outlet sampling frame, BLS relies on the Point-of-Purchase Survey (CPOPS) conducted by the Census Bureau in 94 Primary

Sampling Units (PSUs) identified by BLS. PSUs are based on urban counties, groups of contiguous urban counties, or MSAs. For the household sample, a noncompact clustering procedure was employed which dispersed households evenly within a Census enumeration district (ED). More detailed sampling design information can be found in BLS's *Handbook of Methods* at http://stats.bls.gov/opub/hom/homhome.htm.

Prices for the goods and services used to calculate the CPI are collected in 91 PSUs located in 85 urban areas throughout the country. The sample size for the CPOPS totals about 21,000 retail and service establishments-supermarkets, department stores, gasoline stations, hospitals, etc. Food, fuels, and a few other items are priced monthly in all 85 locations. BLS field representatives collect all price information through visits or telephone calls in the household surveys. Price changes are computed based on a sample of outlets selected from locations identified by consumers. Specific sample items are then selected from each sample outlet to ensure that the market basket is representative of where households shop.

Estimation

BLS routinely updates its price estimates for specific items among the collection of goods and services, for example, a new car model year. BLS employs three techniques to produce new price estimates. First, an item that is directly comparable to the previous discontinued good will be used to provide a price estimate. However, a substitute item may be inappropriate when goods change slightly in their characteristics. BLS relies on Hedonic regression modeling as a second "quality adjustment" for price estimates. This statistical technique can model the importance of various quality characteristics that add value to a particular good (the fiber content and construction of apparel products for instance). A researcher can estimate a Hedonic regression model that identifies the factors most important is determining the price of a good, and BLS field representatives will note these in their data collection. Imputation is a third quality adjustment used for "noncomparable" substitutions where BLS estimates the price change from previous averages. Detailed algorithms can be found in chapter 17 of the BLS *Handbook of Methods* at http://stats.bls.gov/opub/hom/homhome.htm.

Effective January 1999, BLS began using a new formula for calculating the basic components of the Consumer Price Index for all Urban Consumers (CPI-U) and the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). The new formula, the geometric mean estimator, is used in index categories that comprise approximately 61 percent of total consumer spending represented by the CPI-U. Based on BLS research, it is expected that use of the new formula will reduce the annual rate of increase in the CPI by approximately 0.2 percentage point per year. Additional information on this change was published in the April 1998 CPI Detailed Report and is available on the Internet at http://stats.bls.gov/cpihome.htm.

Accuracy

One of the CPI's limitations is that it represents price movements for urban residents and may not correctly represent nonurban consumption patterns. The CPI may also contain sampling error because it is estimated from a sample of consumer purchases. Nonsampling error may occur if respondents provide BLS field representatives with inaccurate or incomplete information. Another potential source of error identified by BLS may occur because of a time lag between the Point-of-Purchase Survey and the initiation of price collection for commodities and services at resampled outlets. Because of the time lag, the products offered by the outlet at the time pricing is initiated may not coincide with the set from which the CPOPS respondents were purchasing.

The CPI is also subject to response error when data are not collected because of non-response. BLS established a nonresponse auditing program in 1986. It reported that response rates in 1990 for transportation commodities and services were above 90 percent.

Bias

Four categories of bias were identified in the BLS report, *Measurement Issues in the Consumer Price Index*, published in 1997. First, because of the fixed-weight nature of the index, the CPI creates substitution bias by placing too much weight

on items measured in previous surveys from which consumers may have shifted away. Second, the study found that the index did not account for consumers switching to discount stores. Third, a quality change bias was also identified when the differences between goods priced in two different periods cannot be accurately measured nor deduced from the accompanying price difference between the goods. Finally, the report noted that the CPI also had a new product bias because the index inadequately reflected consumer value of products introduced into the market. The commission concluded that the CPI overstated the true cost-of-living change by 1.1 percentage points per year.

TABLE 3-10. Producer Price Indices for Transportation Services

TABLE 3-11. Producer Price Indices for Transportation Equipment

Data shown in these tables are drawn from annual issues of *The Supplement to Producer Price Indexes* published by the Bureau of Labor Statistics (BLS) in the U.S. Department of Labor. These indexes represent a measure of outputs in all goods-producing American industries as well as partial coverage of service industries including transportation. BLS defines a price as the net revenue accrued to a specified production establishment from a specified kind of buyer for a specific product shipped under specific transaction terms on a specified day of the month. BLS collects this data series through surveys of a sample of establishments that report their prices from economic transactions.

Data Collection

A BLS field economist visits an establishment or cluster of establishments selected for price sampling. The economist uses a disaggregation procedure to select a sample of transactions from all the establishment's revenue-producing activities. This disaggregation procedure assigns a probability of selection to each shipping or receipt category proportionate to its value within a reporting unit. In most cases, the final price index produced by the BLS requires that 1) there are at least three different respondents to a survey, 2) at least two reporting units provide price information in a given month, and 3) no single respondent accounts for 50 percent or more of the weight for a given item.

BLS regional offices review field data for consistency and completeness. The national office then conducts a final review and a survey is then tailored specifically to establishments or clusters of establishments. BLS refers to these as repricing schedules and sends them to reporting establishments on a regular basis. Most prices refer to a reporting schedule on a particular day of the month, usually, the first Tuesday or the 13th of a month.

Estimation

BLS collects prices for over 100,000 items. It utilizes several different weighting schemes for the numerous indexes produced because some products will have a greater effect on the movement of groupings of individual products. BLS utilizes the net output of shipment values as weights for the 4-digit SIC industries. Net output values include only shipments from establishments in one industry to other industry establishments and, thus, differ from gross shipment values. The latter would include shipments among establishments in the same industry, even if those establishments are separate firms. BLS also makes seasonal adjustments if statistical tests and economic rationale justify them, and imputes data when a participating company does not deliver a price report. BLS bases the missing price estimation on the average of price changes for similar products reported by other establishments.

Accuracy

As in all surveys, the accuracy of producer price indexes depends on the quality of information voluntarily provided by participating establishments. One of the accuracy concerns of BLS revolves around the preferred use of realistic transaction prices (including discounts, premiums, rebates, allowances, etc.) rather than list or book prices. Before BLS fully changed its data collection method in 1986, a survey indicated that about 20 percent of traditional commodity indexes were based on list prices. The newer and more systematic methodology decreased the use of list prices.

BLS documentation (available at http://stats.bls.gov/opub/hom) provided no more details on sampling error, response rates, or the availability of generalized variance parameters or techniques for estimating them.

TABLE 3-12: Personal Expenditures by Category

TABLE 3-13: Personal Consumption Expenditures on Transportation by Subcategory

Data used in these tables are from the Bureau of Labor Statistics, *Annual Report of Consumer Expenditure Survey*. The Consumer Expenditure Survey (CEX) collects information from U.S. households and families on their buying habits (expenditures), income, and consumer characteristics. The strength of the survey is that it allows data users to relate the expenditures and income of consumers to the characteristics of those consumers. BLS uses 11 standard characteristics to classify consumers, including income, before-tax income class, age, size of the consumer unit, composition of the consumer unit, number of earners, housing tenure, race, type of area (urban or rural), region, and occupation.

The CEX is a national probability sample of households. The sampling frame (i.e., the list from which housing units are chosen) for this survey is generated from the 1990 census 100-percent detail file, which is augmented by a sample drawn from new construction permits. Coverage improvement techniques are also utilized to eliminate recognized deficiencies in the census.

Data Collection

The current survey consists of two separate surveys (Interview and Diary), each utilizing a different data collection technique and sample. Data is collected for each survey from approximately 5,000 households. In the Interview survey, each consumer unit (CU) in the sample is interviewed every three months over five calendar quarters. The interviewer uses a structured questionnaire to collect both the demographic and expenditure data in the Interview survey. The interviewer collects the demographic data in the Diary survey whereas the respondent enters the expenditure data on the diary form. Both surveys accept proxy responses from any eligible household member who is at least 16 years old if an adult is not available after a few attempts to contact that person. The respondent family completes the Diary (or recordkeeping) survey at home for two consecutive one-week periods.

A reinterview program for the CEX provides quality control. The program provides a means of evaluating individual interviewer performance to determine how well the procedures are being carried out in the field. A member of the supervisory staff conducts the reinterview. Subsamples of approximately 6 percent of households in the Interview survey and 17 percent in the Diary survey are reinterviewed on an ongoing basis. A new diary form with more categories and expanded use of cues for respondents was introduced in 1991, based on results from earlier field and laboratory studies.

Estimation

Missing or invalid data on demographic or work experience are imputed. No imputation is done for missing data on expenditures or income. Selected portions of the Diary data are also adjusted by automated imputation and allocation routines when respondents report insufficient detail to meet publication requirements. These procedures are performed annually on the data. The imputation routines assign qualifying information to data items when there is clear evidence of invalid nonresponse.

The statistical estimation of the population quantities of interest, such as the average expenditure on a particular item by a CU or the total number of CUs in a particular demographic group, is conducted via a weighting scheme. Each CU included in the survey is assigned a weight that is interpreted as representing the number of similar families in the universe of interest, the U.S. civilian noninstitutional population. Readers should refer to http://stats.bls.gov/opub/hom/homch16_c.htm for the detailed weighting method.

Beginning with 1997 data, BLS introduced a new calibration method to compute weights in the Consumer Expenditure Survey. The weights are

calculated using a model-assisted, design-based regression estimator.

Accuracy

The Consumer Expenditures Survey is a sample survey and hence is subject to two types of errors, nonsampling and sampling. Nonsampling errors can be attributed to many sources, such as differences in the interpretation of questions, inability or unwillingness of the respondent to provide correct information, mistakes in recording or coding the data obtained, and other errors of collection, response, processing, coverage, and estimation for missing data. The full extent of nonsampling error is unknown. Sampling errors occur because the survey data are collected from a sample and not from the entire population. Tables with coefficients of variation and other reliability statistics are available on request from the national office. However, because the statistics are shown at the detailed item level, the tables are extensive.

TABLE 3-14. Cost of Owning and Operating an Automobile

Your Driving Costs produced by the American Automobile Association (AAA) provided the data for this table. Prior to 1985, the cost figures are for a mid-sized, current model, American car equipped with a variety of standard and optional accessories. After 1985, the cost figures are for a composite of three current model American cars:

1. a 1999 Chevrolet Cavalier LS,
2. a 1999 Ford Taurus GL, and
3. a 1999 Mercury Grand Marquis GS.

Thus, the estimates are not reliable estimates for all cars.

Fuel costs were based on an average price of $1.34 per gallon of regular unleaded gasoline, weighted 20 percent full-serve and 80 percent self-serve. Insurance figures were based on personal use of vehicles driven less than 10 miles to or from work, with no young drivers. Normal depreciation costs were based on the vehicle's trade-in value at the end of four years or at 60,000 miles. American Automobile Association (AAA) analysis covers vehicles equipped with standard and optional accessories, including automatic transmission, air conditioning, power steering, power disc brakes, AM/FM stereo, driver-and passenger side air bag, anti-lock brakes, cruise control, tilt steering wheel, tinted glass, emission equipment and rear window defogger.

TABLE 3-15a & 3-15b. Average Passenger Fare (Current and chained 1996 dollars)

TABLE 3-18. Total Operating Revenues

Air

The U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), Office of Airline Information, reports passenger fares and operating revenues in its publication *Air Carrier Financial Statistics*. These numbers are based on 100 percent reporting by large certificated air carriers. Minor errors from nonreporting may occur but amount to less than one percent of all passenger or freight activity. The figures do not include data for all airlines; such as most scheduled commuter airlines and all nonscheduled commuter airlines.

Class I Bus

Class I passenger motor carriers are required to report financial and operating information to BTS using form MP-1. (Prior to 1996, Class I carriers were required to report to the Interstate Commerce Commission.) Class I passenger motor carriers are defined as those having annual gross operating revenues, as adjusted for inflation, of $5,000,000 or more. This table does not include Class I carriers whose data had not been received at the time of publication. Thus, these data do not represent total Class I passenger motor carrier activity.

Transit

The American Public Transit Association (APTA) reports these figures, which are based on the annual National Transit Database report published by the USDOT, Federal Transit Administration (FTA). Section 15 of the Federal Transit Act requires federally funded transit agencies to provide detailed financial and operating data

including capital expenditures, revenues and expenses. These data are generally considered accurate because the FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or misinterpret certain data definitions. APTA conservatively adjusts FTA data to include transit operators that do not report to the database (private and very small operators and rural operators).

Rail

Data are from *Railroad Facts* published annually by the Association of American Railroads (AAR). AAR figures are based on 100-percent reporting by all nine Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the R1 Annual Report. STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million in 1991 and adjusted annually in concert with changes in the "Railroad Freight Rate Index" published by the Bureau of Labor Statistics. In 1998, the threshold for Class I railroads was $259.4 million. Declassification from Class I status occurs when a railroad falls below the applicable threshold for three consecutive years. Although Class I railroads represent only 2 percent of the number of railroads in this country, they account for over 90 percent of the industry's freight revenues.

Intercity/Amtrak

Average passenger fare data are based on 100 percent of issued tickets, and thus should be accurate. Created as a publicly-owned for-profit corporation, Amtrak collects its own financial data and reports this information in its annual report. Auditing should ensure the accuracy of the operating revenue figures.

Trucking and Courier Services (except air)

The Census Bureau's Transportation Annual Survey (formerly known as the Motor Freight Transportation and Warehousing Survey) is the source of this information. The sample survey represents all employer firms with one or more establishments engaged primarily in providing commercial motor freight transportation or public warehousing services. It excludes motor carriers that operate as auxiliary establishments to nontransportation companies, as well as independent owner-operators with no paid employees. Thus, the data do not represent the total trucking industry.

As with all sample surveys, two types of errors are possible: sampling and nonsampling. Nonsampling errors may include response errors and mistakes in coding or keying data. For additional information about the survey and data reliability, the reader is referred to the Census Bureau website at www.census.gov.

Water (Domestic)

Eno Transportation Foundation, Inc. is the source of these data. Eno estimates these figures by multiplying ton-mile figures by estimated revenue per ton-mile. The U.S. Army Corps of Engineers reports the ton-mile figures in its publication *Waterborne Commerce of the United States*, and the revenue per ton-miles figures are estimated by Eno..

Oil Pipeline

Eno Transportation Foundation, Inc., publishes these data, which are based on Federal Energy Regulatory Commission (FERC) data and reported by the Oil Pipeline Research Institute for years 1977 to the present. FERC data originates from required quarterly reports filed by pipeline companies. Prior to 1977, the data are based on the former Interstate Commerce Commission data for regulated pipelines, and estimated to be 16 percent of the total of nonregulated pipelines.

Gas Pipeline

These statistics originate from *Gas Facts*, published annually by the American Gas Association (AGA). AGA data are based on gas utilities participation and reporting to the Uniform Statistical Report and estimates for those companies not reporting based on recent historical experience. Varying percentages of nonreporters from year to year introduce minor reliability problems for time-series comparisons.

TABLE 3-19. Employment in For-Hire Transportation and Selected Transportation-Related Industries

Employment data by industry are from the National Employment, Hours, and Earnings estimates published by the Bureau of Labor Statistics (BLS), U.S. Department of Labor. These estimates originate from the Current Employment Statistics (CES) survey program. The CES is a monthly survey conducted by state employment security agencies in cooperation with the BLS. The survey provides employment, hours, and earnings estimates based on payroll records of nonfarm business establishments, including government.

BLS uses a stratified sample based on a sector's employment size, or the degree of variability among its establishments, or both. This ensures that BLS captures a more representative survey from employers with large payrolls. Thus, large establishments are certain of selection while smaller ones have less of chance.

Data Collection

Data are collected electronically from about two-thirds of the respondents and by mail or fax from the remainder. The primary type of electronic reporting is touch-tone phone self-response; others are computer-assisted phone interviews and phone voice recognition technology. Increasingly, data are collected through electronic data interchange from a small but growing number of companies that have a large number of establishments across the country. Mail respondents submit Form 790 to the BLS each month. It is then edited and returned to the respondent for use again the following month. All firms with 250 employees or more are asked to participate in the survey, as well as a sample of smaller firms.

Estimation

Employment estimates are made at what is termed the basic estimating cell level and aggregated upward to broader levels of industry detail by simple addition. Basic cells are defined by industry (usually at the 3- or 4-digit SIC level) and are stratified within industry by geographic region and/or size class in the majority of cases. Within the wholesale trade, retail trade, and services divisions, most industries are stratified into three to five size classes (beginning in 1984).

Most national employment estimates are multiplied by bias adjustment factors to produce the monthly published estimates. Bias adjustment factors are used primarily to compensate for the inability to capture the entry of new firms on a timely basis. New firms contribute a substantial amount to employment growth each year, but there is a lag between the creation of a firm and its inclusion on the sample frame (i.e., the Unemployment Insurance universe file). It is, therefore, necessary to use modeling techniques to capture this segment of the population. BLS also performs seasonal adjustments for certain SIC industries.

Accuracy

BLS does not publish data reliability information along with estimates. Instead, it provides estimation formula and the necessary parameters so that users can estimate standard errors. For additional information, see the "Explanatory Notes and Estimates of Error" in the BLS monthly publication *Employment and Earnings*.

The CES survey, which began over 50 years ago, predates the introduction of probability sampling as the internationally recognized standard for sample surveys. Instead, a quota sample has been used since its inception. Quota samples are at risk for potentially significant biases, and recently completed BLS research suggests that, despite the large CES sample size, employment estimates based on that sample at times diverge substantially from those that a more representative sample would have been expected to produce. This leads to an over-reliance on bias adjustment in the estimation procedure. Because bias adjustment is primarily based on past experience, it is limited in its ability to accurately reflect changing economic conditions on a timely basis.

Government Employment

The Office of the Secretary provides employment figures for the U.S. Department of Transportation. State and local highway department employment figures are from the' *State and Local Government Employment and Payroll*

Estimates, published by the U.S. Department of Commerce, Bureau of the Census. The data are for the 50 states and the District of Columbia. Employment and payroll data pertain to the month of October. At present, data are collected for one pay period that includes October 12 (regardless of the period's length) through the Public Employment Survey (PES).

Employment refers to all persons gainfully employed by and performing services for a government. Employees include all persons paid for personal services performed from all sources of funds, including persons paid from federally funded programs, paid elected officials, persons in a paid leave status, and persons paid on a per meeting, annual, semiannual, or quarterly basis. Excluded from employment statistics are unpaid officials, pensioners, persons whose work is performed on a fee basis, and contractors and their employees.

The Census Bureau derives full-time equivalent (FTE) employment by summing the number of full-time employees reported and converting the number of hours worked by part-time employees to a full-time equivalent amount. Up until 1985 data, the method used to calculate FTEs was based solely on payroll data. Effective with 1986 data, the annual employment survey started collecting data on the number of hours worked by part-time employees in order to provide a more accurate representation of full-time equivalent employment. No October 1985 FTE employment data are available.

Beginning in 1999, the Public Employment Survey (PES) was conducted using a separate sample of approximately 11,000 government units to improve data accuracy and survey efficiency. Government units meeting any of the following criteria are included in the survey: 1) counties with populations greater than 100,000; 2) cities with populations greater than 75,000; 3) townships in New England and Mid-Atlantic with populations greater than 50,000; 4) special districts with FTEs greater than 1000; 5) independent school districts with enrollment greater than 10,000; and 6) all dependent and independent schools providing college level education. In 1999, government units were sampled to obtain a relative standard error of 3 percent or less for FTE and total payroll for each of the states by type of government groups.

Prior to 1993, the PES used a joint sample of approximately 24,000 units for both employment and finance. From 1993 to 1998, the sample size was reduced to around 14,000 units. The standard error for the PES prior to 1999 was designed to be around 3 percent for major state- or county-level estimates of finance variables (state-level for 1993-1998 and county-level prior to 1993). Employment estimates are made using regression, except when the number of noncertainty cases contributing to the estimate is less than 20, where a simple unbiased estimate is used.

TABLE 3-20. Employment in Transportation Occupations

TABLE 3-22. Median Weekly Earnings of Full-Time Wage and Salary Workers in Transportation by Detailed Occupation

Employment by detailed transportation occupation data are from the Occupational Employment Statistics (OES) survey, collected by the Bureau of Labor Statistics (BLS). The OES is a periodic mail survey of nonfarm establishments that collects occupational employment data on workers by industry. The OES program surveys approximately 725,000 establishments in 400 detailed industries. The average response rate for the last three years, according to a BLS official, averaged about 70 percent.

The sample is selected primarily from the list of business establishments reporting to the state unemployment insurance program. The OES sample initially stratifies the universe of establishments by three-digit industry code and size- class code. Establishments employing 250 employees or more are sampled with certainty. Establishments employing fewer than 250 employees but more than 4 employees are sampled with probability proportional to the size class employment within each three-digit industry. Establishments employing four or fewer employees (i.e., size class 1 establishments) are not sampled. Instead, the employment for these establishments are accounted for by assigning a larger sampling weight to

establishments employing five to nine employees (i.e., size-class 2 establishments). Within each three-digit industry/size- class cell, establishments are systematically selected into the sample through a single random start.

Data Collection

Employers are the source of occupational data. Within establishments, the main source of occupational data reported by respondents is personnel records. Data are collected from respondents primarily by mail. Occasionally, visits are made to large employers and to other respondents who indicate particular difficulty in completing the questionnaires. Ordinarily, two mailings follow the initial mailing. After the third mailing, a subsample of the remaining nonrespondents is drawn and contacted by telephone. The OES survey follows a 3-year cycle. Three surveys are conducted alternately for manufacturing, nonmanufacturing, and the balance of nonmanufacturing industries.

Estimation

During the sample selection process, each sampled establishment is assigned a sampling weight that is equal to the reciprocal of its probability of selection. For example, if an establishment on the sampling frame had a 1 in 10 chance of being selected into the sample, then its sampling weight is 10. For establishments that did not respond to the survey, a nonresponse adjustment factor is calculated and applied against the sampling weights of the responding establishments within each state/3-digit industry/size-class cell. Multiplying these adjustment factors by sampling weights increases the weight of the responding establishments so they can account for the missing employment data of the nonresponding establishments.

Accuracy

The OES survey uses a subsample replication technique to estimate variances in occupational employment at the 3-digit industry/size-class level. For additional information on occupational employment estimates and measurements of sampling error associated with the estimates, the reader is referred to http://stats.bls.gov/oeshome.htm.

TABLE 3-21. Average Wage and Salary Accruals per Full-Time Equivalent Employee by Transportation Industry

TABLE 3-23. Total Wage and Salary Accruals by Transportation Industry

The *Survey of Current Business* (tables 6.3c and 6.6c) published by the U.S. Department of Commerce, Bureau of Economic Analysis, is the source of transportation wage and salary data. These estimates are based on BLS tabulations of employee wages that are covered by State unemployment insurance. As a component of the income side of National Income and Product Account, wages and salaries comprise part of the GDP calculation. These data reflect the monetary remuneration of employees in terms of wage accruals less disbursements. It is defined as the difference between wages and salaries on a "when-earned" basis, or accrued, and wages and salaries on a "when-paid," or disbursed basis. This computation was instituted in 1992 because a significant portion of bonus payments were missed in previous calculations. Readers should also refer to the earlier discussion of GDP methods and reliability for more detail.

TABLE 3-24. Labor Productivity Indices for Selected Transportation Industries

The Bureau of Labor Statistic's (BLS) *Industry Productivity Measures* is the source of transportation labor productivity data. BLS develops industry productivity measures based on various data sources.

For rail, BLS uses freight ton-mile and passenger miles that are collected by the Surface Transportation Board (STB), the Association of American Railroads (AAR), and Amtrak. BLS also aggregates four different air transportation outputs to form a single productivity index: domestic passenger-miles, domestic freight ton-miles, international passenger-miles, and international freight ton-miles. Air transportation data come from *Air Carrier Traffic Statistics* and *Air Carrier Financial Statistics*, published by the U.S. Department of

Transportation, Bureau of Transportation Statistics. For petroleum pipeline, BLS relies on data from the Association of Oil Pipelines and derived an output index based on trunkline barrel-miles. A barrel-mile is one barrel of petroleum moved through one mile of pipeline.

Estimation

BLS generally calculates labor productivity by dividing an index of output (in this case, ton-miles) by an index of hours. Output is derived with a weight adjusted Tornqvist formula that produces an output ratio for one year. BLS then combines these in a series that produces a chained output index. The hour indexes are developed from data in BLS's Current Employment Statistics (CES; see discussion above for table 3-12) and are the results of dividing the annual aggregate hours for each year by a base-period figure. Readers who need more detail, such as mathematical specifications or equations, should refer to Kunze and Jablonski (Kunze and Jablonski 1998) or call the Office of Productivity and Technology at BLS.

Accuracy

BLS provides no measures of reliability. However, BLS makes an assumption that transportation outputs should be measured using the production of passenger-miles or freight-miles. Another school of thought might assume that many transportation firms or facilities are actually providing capacity rather than actual use. Thus, an argument can be made that productivity should be based on capacity rather than use. In fact, this is how BEA measures transportation output. To evaluate the BLS assumption, one study compared the two approaches by examining the different growth rates produced by BLS and BEA and found that in 25 of 35 service industries, the differences are within one percentage point. For transportation, differences in growth rates across BLS and BEA estimates were two percentage points or less (Kunze and Jablonski 1998).

Beginning with 1997 data, the indices for bus and petroleum pipelines did not meet BLS publication standards and are considered less reliable than those for other modes. These industries had between 14,000 and 15,000 employees, far below the 50,000-employee threshold established for transportation industries by BLS. However, they both met a basic test of variability of the annual percent changes in the output per hour measure.

GOVERNMENT REVENUES AND EXPENDITURES

TABLE 3-25a &3-25b. Federal, State, and Local Government Transportation-Related Revenues and Expenditures, Fiscal Year (Current and constant 1996 dollars)

TABLE 3-26a & 3-26b. Federal Transportation-Related Revenues, Fiscal Years (Current dollars and constant 1996 dollars)

TABLE 3-27a & 3-27b. Federal Transportation-Related Expenditures by Mode, Fiscal Year (Current and constant 1996 dollars)

TABLE 3-28. Cash Balances of the Transportation-Related Federal Trust Funds, Fiscal Year

The main sources for federal-level data are the *Budget of the United States* and the *Appendix to the Budget*. These data are the "actual" figures as reported for the various transportation-related programs in the appendices of each year's budget document.[1] The figures are consistent from year to year and follow the definitional structure required by the Office of Management and Budget (OMB).

Primary sources for state and local transportation-related revenues and expenditures data are censuses and surveys collected by the U.S. Census Bureau. All units of government are included in

[1] The federal budget is broken down into 20 functional categories, of which one is transportation (function 400). Function 400 is not tied to any one department or agency, but instead aggregates transportation functions wherever in the federal government they occur. Thus, the transportation function may include many activities, such as highway construction and safety, airways and airports, maritime subsidies, U.S. Coast Guard operations, railroads, and mass transit. It also covers grants-in-aid programs to support state and local activities. A good summary of the federal budget process can be found in Collender, Stanley E., *The Guide to the Federal Budget, Fiscal 1996* (Washington, DC: Urban Institute Press. 1995).

the Census of Governments, which is taken at five-year intervals for years ending in "2" or "7," and these data are "full counts," and not subject to sampling error.

State and local government data for noncensus years are obtained by annual surveys, which are subject to sampling error. For the U.S. totals of local government revenues and expenditures in this report, the sampling variability is in most cases small (less than 2 percent).

The federal figures in this report correspond to the federal fiscal year, which begins on October 1, while state and local data are for fiscal years that generally start in July. While this may create a small error in totals for any given year, the data are suitable for illustrating trends in public transportation finance. Programs that were terminated before 1985 are excluded from the tables. The totals for transportation revenues and expenditures in this report are the sum of the Census Bureau's state and local figures plus the total of the federal figures.

The source of the constant dollar deflators is *The Survey of Current Business*, August 1998, Bureau of Economic Analysis, table 3, "Chain Type Price Indexes." All inflation-adjusted data are for the base year 1992, instead of 1987 as in the previous editions of the NTS. Note that different deflators are used for the federal data and the state and local data. Thus, if expenditures are totaled across different levels of government in constant dollars before and after Federal grant transfers, the totals do not match.

Limitations of the Source Data Sets

Some federal agencies, such as the U.S. Department of Health and Human Services, have substantial transportation activities, but do not distinguish these activities as individual programs and do not report transportation revenues, obligations, and expenditures as separate items. There is reason to believe that the effect of omitting the transportation activities in those agencies and programs with missing data is relatively small (less than 10 percent).

The same is true in the case of Census Bureau data at the state and local levels. It is known, for example, that the states expend funds for intercity rail and bus services and pipeline safety programs, but the Census Bureau does not report these outlays at the state and local government levels separately. BTS has collected data from other sources or estimated data using assumptions about ratios between federal, state, and local funds. Data from other sources include the Federal Highway Administration's (FHWA's) *Highway Statistics* report for federal-level highway data, the National Aeronautics and Space Administration (NASA) aeronautics expenditures data from the *Aeronautics and Space Report of the President*, and pipeline expenditures data from direct agency contacts.

The Census Bureau's database also does not include detailed modal information on interest earnings and bond issue proceeds on the revenue side nor bond retirement and interest payments on the expenditure side. In addition, the Census Bureau's highway expenditures data, in particular, do not include highway law enforcement expenditures, which form a part of the state and local highway expenditures published in *Highway Statistics*. However, to maintain consistency between the different modes regarding the types of revenues and expenditures included, these additional data from the *Highway Statistics* report have *not* been used.

Transportation Revenues

Transportation revenue estimates include transportation-related user charges, taxes, or fees earmarked for transportation-related expenditures, and funds that support federal transportation programs through the U.S. government's General Fund. Estimates include transit fares from systems owned and operated by state and local governments, including those systems operated under contract by a private firm while the government maintains day-to-day financial oversight.

Not all transportation-related revenues are included, however. Other funds exist that could be categorized as transportation-related revenues, such as local government property taxes on vehicles, equipment, and streets, and state income taxes to support rail and intercity bus services. However, it is impossible to identify these revenues because they are not shown as such in the source materials used to compile the database in this report.

In addition, taxes collected from users of the transportation system that go into the General Fund are not included as transportation revenues. This occurred in 1981 and 1982 when the Airport and Airway Trust Fund (AATF) revenues were assigned to the General Fund of the Treasury rather than the AATF.

The reader should note that in the case of rail transportation, revenue estimates do not exist since both freight and passenger rail yield no revenues to federal, state, or local governments.

Federal transportation revenues generally consist of trust-fund collections from user charges, such as fuel taxes, vehicle taxes, registration and licensing fees, and air passenger ticket taxes. Interest earned on fund balances are added to these funds, along with any damage payments made by private parties and deposited in the funds to reimburse the government for related fund expenditures.

The five transportation-related Federal trust funds are established by law:

1. Highway Trust Fund (HTF) (which includes both highway and transit accounts),
2. Airport and Airway Trust Fund (AATF),
3. Harbor Maintenance Trust Fund (HMTF),
4. Inland Waterways Trust Fund (IWATF), and
5. Oil Spill Liability Trust Fund (OSLTF).

These tables also contain data relating to the Pipeline Safety Fund, which has not been designated by law as a trust fund, but has been set up to record revenues and disbursements of fees earmarked to support the pipeline safety program. A status report of each of these funds made annually in the *Appendix to the Budget* shows their revenues, expenditures, and interest earnings.

Air Revenues

Federal air revenues are derived from the AATF, which includes a passenger ticket tax and other taxes paid by airport and airway users on air cargo and general aviation fuel. Most of this trust fund is devoted to airport grants and capital improvements, such as new radar and traffic control towers. Within certain limits set by Congress, some of the remaining money can be used to cover the Federal Aviation Administration's (FAA) operation and maintenance expenses. The portion of the FAA's operation and maintenance expenses not paid from the trust fund revenues are financed by general funds of the Treasury.

State and local revenues from the air mode are derived from airport charges. Beginning in 1992, local governments began collecting passenger facility charges and spending these revenues (both subject to FAA approval) to finance capital programs. The collection of passenger facility charges was authorized by the Aviation Safety and Capacity Expansion Act of 1990.[2]

Highway Revenues

The major source of Federal highway revenues is the Highway Trust Fund (HTF). HTF revenues are derived from various excise taxes on highway users (e.g., motor fuel, motor vehicles, tires, and parts and accessories for trucks and buses). The money paid into the fund is earmarked primarily for the Federal-aid highway program. The excise tax on gasoline is the greatest individual source of HTF revenues. Although the excise tax per gallon changed several times during the 1985 through 1995 period, the amount dedicated to the HTF only increased once during that time. Portions of the gasoline excise tax per gallon were dedicated to budget deficit reduction and to the Leaking Underground Storage Tank Trust Fund.

State and local highway revenues include state and local taxes on motor fuels, motor vehicle licenses, and motor vehicle operator licenses, along with state and local charges for regular toll highways and local parking charges. Regular highway charges (revenues) include reimbursements for street construction and repairs; fees for curb cuts and special traffic signs; and maintenance assessments for street lighting, snow removal, and other highway or street services unrelated to toll facilities. Local governments finance local road and street programs with special assessments and property taxes that may be commingled with other local revenue in a general fund. Consistent with federal revenues, state and

[2] Public Law 101-508, 104 Stat. 1388 (November 5, 1990).

local transportation revenues in this report do not include general funds that may be allocated to transportation.

Transit Revenue

Effective April 1983, one cent per gallon of the federal excise tax on gasoline sales was set aside for the Mass Transit Account of the Highway Trust Fund; on December 1, 1990, this was increased to 1.5 cents per gallon. Although highway users pay the taxes, these funds are treated as federal transit budget revenues in calculating user coverage.

State and local transit revenues include revenues from operations of public mass transportation systems (rapid transit, subway, bus, street, railway, and commuter rail services), such as fares, charter fees, advertising income, and other operations revenues. They exclude subsidies from other governments to support either operations or capital projects.

Waterway and Marine Revenues

Federal water revenues come from four primary sources: the Inland Waterways Trust Fund, the Harbor Maintenance Trust Fund, the Oil Spill Liability Trust Fund, and tolls and other charges collected by the Panama Canal Commission.

Established by the Inland Waterways Revenue Act of 1978, the Inland Waterways Trust Fund has been in effect since fiscal year 1981. The source for the fund is a fuel tax paid by freight carriers on inland waterways. From this tax of 24.2 cents per gallon, 4.3 cents goes for deficit reduction, and a statutory maximum of 20 cents (raised to that level from the previous maximum of 19 cents at the beginning of 1995) flows to the Trust Fund. Funds are earmarked for 50 percent of the construction and rehabilitation costs of specified inland waterway projects.

Rail Revenues

There are no governmental transportation revenues for rail. (Rail generates fuel taxes that are designated for deficit reduction and, thus, are not considered transportation revenues in these tables. Rail also pays substantial taxes because it does not have a publicly maintained infrastructure.)

Pipeline Revenues

The Pipeline Safety Program is funded by user fees assessed on a per-mile basis. The assessments are made on each pipeline operator regulated by the Office of Pipeline Safety (OPS) of the Research and Special Programs Administration in the U.S. Department of Transportation. There are no state and local revenues for pipeline.

General Support Revenues

General Support revenues come from the Emergency Preparedness Fund, which is generated from fees paid by registered shippers of hazardous materials. RSPA administers and distributes the revenues to states, territories, and tribes through the Hazardous Materials Emergency Preparedness (HMEP) grant program, which is authorized by the Federal Hazardous Materials Transportation Law.

Transportation Expenditures

Expenditures, rather than obligations, are used in these tables because they represent the final, actual costs to the government, by year, for capital goods and operating services required by the transportation programs. Obligations suggest government commitment to future transportation expenditures, but do not indicate when the funds will actually be disbursed or even if the amounts obligated will be spent.

It is important to recognize that in some accounts in the *Budget of the United States Government*, expenditures for a particular year understate total government disbursements. This is because certain offsetting collections of fees and assessments from the public are not treated as government revenues, but deducted from disbursements to determine expenditures. These collections are those mandated, by statute, to be applied directly to fund agency expenditures rather than being transferred to the Treasury. For this reason, expenditures do not necessarily indicate how much the Federal government actually spends on transportation each year.

Air Expenditures

Federal expenditures reported here consist of all FAA expenditures, such as those associated

with constructing, operating, and maintaining the national air traffic system; administration of the airport grant program; safety regulation; and research and development. NASA expenses related to air transportation are also included.

State and local expenditures for air include the operation and maintenance of airport facilities, as administered by local airport and port authorities—quasi-government agencies with responsibilities for promoting safe navigation and operations forair modes.

Highway Expenditures

FHWA expenditures include funds for Federal Aid Highways (financed from the HTF) and the Interstate Substitution and Railroad Crossing Demonstration (financed from the general fund). The National Highway Traffic Safety Administration (NHTSA) expenditures include: operations, research, and highway traffic safety grants. Federal highway expenditures also include road construction activities managed by the Department of the Interior's National Park Service, Bureau of Indian Affairs, Bureau of Reclamation, and Bureau of Land Management; the Department of Agriculture's Forest Service; the Department of Housing and Urban Development; and other federal agencies.

State and local governments' highway expenditures reported by the Census Bureau are generally slightly lower than those reported in FHWA's *Highway Statistics* because the FHWA includes some highway expenditure data, such as law enforcement activities and patrols, and policing of streets and highways not included in the Census data. Box 3-1 outlines the major differences in Census Bureau and FHWA calculation of state and local highway transportation financial statistics.

Transit Expenditures

Federal expenditures include grants to states and local agencies for the construction, acquisition, and improvement of mass transportation facilities and equipment and for the payment of operating expenses. Several other items are also included: Federal Railroad Administration (FRA) commuter rail subsidies related to the transition of Conrail to the private sector; research and administrative expenses of the Federal Transit Administration (FTA); and Federal interest payment contribution to the Washington Metropolitan Area Transportation Authority (WMATA).

Waterway and Marine Expenditures

Federal expenditures comprise those parts of U.S. Coast Guard's expenses that are transportation-related, such as aids to navigation, marine safety, and marine environmental protection. All expenses of the U.S. Maritime Administration are included, such as subsidies for construction and operation of vessels by U.S.-flag operators, research and development, and training of ship officers. Also included are those expenses of the U.S. Army Corps of Engineers for construction and operations and maintenance of channels, harbors, locks and dams; protection of navigation; the salaries and expenses of the Federal Maritime Commission; and the expenses of the Panama Canal Commission.

State and local governments incur water transportation expenditures by operating and maintaining water terminal facilities within ports and harbors.

Rail Expenditures

Federal rail transportation expenditures include:

1. expenses for rail safety enforcement;
2. inspection and program administration;
3. railroad research and development;
4. financial assistance to states for planning, acquisition, rail facility construction, and track rehabilitation with respect to low volume freight lines;
5. grants to Amtrak, including funds to upgrade the high-speed line between Boston, MA, and Washington, DC, owned by Amtrak (the Northeast Corridor Improvement Program); annual appropriations to cover operating losses; and funds to invest in new equipment and facilities;
6. the purchase of redeemable preference shares for track rehabilitation and line acquisition; and

Box 3-1.
U.S. Census Bureau and Federal Highway Administration calculations of state and local transportation financial statistics differ in the following ways:

ITEM	CENSUS	FHWA
Motor Fuel Tax Revenues	Includes state and local tax revenues on any fuel used in motor vehicles, and on gasoline used by aircraft.	Includes state and local fuel tax revenues attributed to highway use of fuels, including diesel fuel, gasohol and liquefied petroleum gas used by private and commercial highway use motor vehicles and transit. Does not include revenues on gasoline used by aircraft.
Motor Vehicle License Tax Revenues	Includes vehicle mileage and weight taxes on motor carriers; highway use taxes; or off-highway fees.	Does not include vehicle mileage and weight taxes on motor carriers; highway use taxes or off-highway fees.
Local Parking Charges Revenues	Includes local parking revenues.	Not explicitly collected.
Highway Expenditures	Excludes patrols or policing of streets and highways; traffic control activities of police or public safety agencies; law enforcement and safety activities of vehicle inspection enforcement, and vehicle size and weight enforcement; street cleaning activities; and roads within parks maintained by a park agency.	Includes patrols or policing of streets and highways; traffic control activities of police or public safety agencies; law enforcement and safety activities of vehicle inspection enforcement, and vehicle size and weight enforcement; street cleaning activities; and roads within parks maintained by a park agency.

7. loan guarantee defaults for railroad rehabilitation and improvement and Conrail labor protection.[3]

The local rail freight assistance program, a program of FRA grants to state governments, has had a 70:30 percent federal-state funding share since in 1982.

Pipeline Expenditures

The OPS reimburses state agencies up to 50 percent of their costs to carry out the state's pipeline safety program. Federal expenditures are for the enforcement programs, research and development, and grants for state pipeline safety programs.

General Support Expenditures

General Fund expenditures include all of the expenses of the following agencies: Office of Inspector General, National Transportation Safety Board, all expenses of RSPA (except pipeline expenditures) and the Office of the Secretary of Transportation (except for payments to Air Carriers and the Commission on Aircraft Safety).

[3] Funds in the Conrail Labor Protection Program were provided for benefits to Conrail employees deprived of employment because of work force reductions and other actions. This program no longer exists since Conrail has been returned to the private sector. In 1988, the unobligated balances available from this program were transferred to the USCG and in 1990 they were returned to the U.S. Treasury.

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Chapter 4 Energy and the Environment

PETROLEUM SUPPLY

TABLE 4-1. Overview of U.S. Petroleum Production, Imports, Exports, and Consumption

The petroleum supply system is extremely complicated, with many different processes, products, and entities involved. Briefly, crude oil is produced or imported, transported to refineries where it is refined into various products, and then transported to markets. Imports and exports of crude oil and products must be accounted for, as must be nonpetroleum components of final products, such as natural gas plant liquids and ethanol for gasoline blending.

The U.S. Department of Energy, Energy Information Administration (EIA) collects extensive data at select points in the petroleum supply system. Sixteen surveys are conducted by EIA's Petroleum Supply Reporting System to track the supply and disposition of crude oil, petroleum products, and natural gas plant liquids:

- five weekly surveys cover refineries (form EIA-800), bulk terminal stocks (form EIA-801), product pipelines (form EIA-802), crude stocks (form EIA-803), and imports (form EIA-804).
- eight monthly surveys cover the same five points plus tanker and barge movement (form EIA-817), gas processing facilities (form EIA-816), and oxygenates (form EIA-819M).
- one survey (form EIA-807) collects propane data on a monthly basis in the warmer months (April-September) and on a weekly basis in the colder months.
- one annual survey determines production capacity of oxygenates and fuel ethanol (form EIA-819A), and
- one annual survey determines refinery fuel use, capacity, and crude oil receipts by transportation mode (form EIA-820).

The five weekly surveys target key points in the petroleum supply system. They do not include all companies, but sample 90 percent of volume at each selected point in the supply system. EIA rank-orders the companies involved in the survey and sends surveys as it scrolls down the list, stopping when it reaches the 90 percent level. Although 100 percent coverage is sacrificed, this method keeps the level of incoming data manageable and avoids burdening the smallest companies. All data are reviewed and anomalies checked.

Monthly surveys provide data that are used in the monthly and annual reports. They are similar to the weekly surveys, but are more exhaustive in both the range of data collected and the depth of the collection. Sample sizes and response rates for several of the key points in the supply system are shown in table 4-1. The eight monthly surveys cover the industry more accurately than the weekly surveys and provide some double-check points that the other surveys do not. EIA expends considerable effort to ensure that its data are as accurate as possible. Revisions are made throughout the year. For example, EIA's *Annual Energy Review 1996*, released in July 1997, provided a

Table 4-1.
Average Response Rates for Monthly Surveys, 1998

Survey site	Average universe site	Average number of respondents	Percent
Refinery	252	243	96.3
Bulk terminal	300	287	95.6
Pipeline	81	80	99.3
Crude oil stocks	174	169	99.1

NOTE: The average response rate is calculated by summing individual monthly response rates and dividing by 12.

SOURCE: Tammy G. Heppner and Carol L. French, Energy Information Administration, U.S. Department of Energy, Accuracy of Petroleum Supply Data (Washington, DC: 1998).

preliminary 1996 number for total petroleum production of 8.30 million barrels per day (mmbd). The *Annual Energy Review 1997*, released a year later, revised that to 8.25 mmbd, and the 1999 *Review* reported 8.29 mmbd.

No complicated survey is likely to be 100 percent accurate. EIA lists four sources of potential systematic errors:

1. Some members of the target population are missed. EIA reports that it continually reviews the lists and searches industry periodicals and newspapers to identify new actors. Considering the nature of the petroleum industry, it is very unlikely that companies with significant production are not surveyed.

2. Some members of the target population do not respond. EIA reports a 97 percent response rate for monthly surveys. For some points in the supply system, the average response is over 99 percent. Survey respondents are required by law to respond, but some nonresponse is inevitable, especially among small companies. EIA assumes that the nonrespondent's value for that month is the same as for the previous month except for imports. Since imports vary widely, with respondents frequently having no imports, EIA assumes a nonresponse means zero imports. It can be assumed that EIA is good at "filling in the blanks." Assuming for illustration purposes that 0.5 percent of production does not respond, and that EIA is 90 percent accurate in covering the gap, then there is a possibility of a 0.05 percent error. Applying that to total production of 8.29 mmbd in 1999 suggests that there could be an error of 0.0041 mmbd (4,100 barrels per day), which would not affect the published number.

3. The most serious problem may be response error. A company may have poor data, perhaps as a result of imperfect measurements, or it may transmit the wrong number. EIA has no control over a company's data quality. Companies have incentive to measure their inputs and products accurately. Otherwise, they may be cheating themselves or risking ill will with their customers or suppliers. However, no instrumentation is perfectly accurate. The high throughput of, say, a refinery with capacity of several hundred thousand barrels per day, with a variety of products changing density and some lost or used on site, is very complicated to measure. Instrumentation errors are likely to be systematic at any one site, although they will be more nearly random in the aggregate for all facilities. There is potential for small but significant overall errors.

Mistakes may be made in recording and transferring the data. EIA reviews the data and flags gross errors or missing data for review by the respondent. However, not all errors will be picked up by EIA and/or the respondent. Overall, response errors probably are several times as large as nonresponse errors, but it is beyond the scope of this profile to estimate them.

4. The final potential source of systematic error is in the clarity of the survey form, i.e., whether all respondents interpret it correctly. No doubt errors and ambiguities can creep into a form, but at least for petroleum supply, that does not appear to be a major risk. The supply system is not changing rapidly, and EIA should be able to keep with it and the terminology. However the final digit of EIA's published supply data is questionable.

For additional information on survey methodology and statistical reliability, the reader is referred to the EIA reference cited in the tables or the EIA Internet site at www.eia.doe.gov.

FUEL AND ENERGY CONSUMPTION

TABLE 4-1. Overview of U.S. Petroleum Production, Imports, Exports, and Consumption

TABLE 4-2. U.S. Consumption of Energy from Primary Sources by Sector

TABLE 4-3. Domestic Demand for Refined Petroleum Products by Sector

TABLE 4-4. U.S. Energy Consumption by the Transportation Sector

TABLE 4-7. Domestic Demand for Gasoline

Petroleum consumption is far more complex to measure than supply. Instead of a few hundred companies at most measuring points in the supply system, there are tens of millions of consumers. It would be impossible for any survey of individual consumers to produce the high rate of return of U.S. Department of Energy (DOE), Energy Information Administration's (EIA's) supply surveys. EIA's transportation data collection is further limited by the termination of the Residential Transportation Energy Consumption Survey (RTECS). Therefore, EIA uses surveys of sales of products (e.g., Form EIA-821: Annual Fuel Oil and Kerosene Sales Report) or tax collection data from the U.S. Department of Transportation, Federal Highway Administration (FHWA).

EIA reviewed the accuracy of its energy consumption data in a 1990 monograph *Energy Consumption by End-Use Sector, a Comparison of Measures by Consumption and Supply Surveys*. Unfortunately, this monograph does not discuss the transportation sector because the consumption and supply surveys were not comparable. However, some of the results from other sectors indicate the discrepancies between supply and consumption surveys. Table 4-2 shows the ratio of fuel supplied to the sector to consumption reported by the sector in consumption surveys.

In most cases, supply is reported as substantially larger than consumption. Supplies of fuel oil to the commercial sector are reported at almost twice the level of consumption reported by that sector. Some of the discrepancies may be due to definition differences (e.g., fuel oil for apartment buildings is included in commercial supply surveys but not in consumption surveys.) Overall, however, the differences are too large for great confidence in the accuracy of the data.

If transportation had been reviewed in the same format, it is likely that the discrepancies would have been larger. Most transportation fuel (gasoline for automobiles) is purchased in small quantities at irregular intervals and cannot be checked simply by looking at a utility bill. Hence, highway transportation energy consumption surveys must be extensive to avoid the risk of large uncertainties in the data. But, with the termination of the RTECS, EIA ceased conducting such surveys. Consumption data must be derived indirectly from sales of petroleum products and tax collection data. While petroleum supply may be accurate to one decimal place, it is likely that disaggregating by sector use may be within plus or minus several percentage points, or perhaps about half a quadrillion British thermal unit (Btu) in table 4-1.

Table 4-2.
Reported Ratio of Fuel Supply to Reported Consumption

Sector	Electricity	Gas	Oil
Residential	1.05	.92	.92
Commercial	0.91	1.38	1.96
Industrial	1.18	1.28	1.34

SOURCE: U.S. Department of Energy, Energy Information Administration, Energy Consumption by End-Use Sector, A Comparison of Measures by Consumption and Supply Surveys, DOE/EIA-0533 (Washington, DC: 1990).

Motor Gasoline

Almost all gasoline is consumed in the transportation sector. Small amounts are used in the commercial sector for nonhighway use and the industrial sector, which includes agriculture, construction, and other uses. Subtracting estimates of those uses from the known total sales yields the transportation sector's total, which is further subdivided into highway and marine use. Aviation gasoline is, of course, used entirely in the transportation sector (for a very few high-performance automobiles as well as small aircraft).

Data on actual sales is collected by the states for revenue purposes. These data are forwarded to FHWA. EIA uses the data from FHWA to allocate highway consumption of motor gasoline among the states. For 1998, FHWA reported 124.7 billion gallons of gasoline sold nationally for highway use. EIA's table 5.12b of the *Annual Energy Review 1999* lists 8.13 mmbd of gasoline supplied for the transportation sector, the same as 124.7 billion gallons.

Such close agreement between supply and demand is not totally convincing. Definitions are unique to each state (e.g., whether gasohol is counted as pure gasoline or part gasoline and part renewables), measurement points vary from state to state, and each state handles losses differently. Hence, the total of all states' sales of gasoline is not entirely consistent.

Separation of highway from nonhighway uses of gasoline is, by necessity, based in part on careful estimates. Nevertheless, overall gasoline sales are well documented, and the separation is probably fairly accurate. Refinery output of motor gasoline was 7.94 mmbd in 1999, which is probably accurate to the first decimal place and maybe a little better. The transportation sector's 8.13 mmbd would have about the same accuracy.

Diesel Fuel

Diesel fuel is used in highway vehicles, railroads, boats, and military vehicles. Sales are only about 30 percent of gasoline in the transportation sector, but uncertainties are greater. More diesel than gasoline is used for nonhighway purposes, especially agriculture and construction. In addition, there has been more potential for cheating to avoid the tax; heating oil is virtually the same as diesel fuel and can easily be transferred to a vehicle. However, this is less significant now that tracers have been added to fuel oil. After the addition of tracers, the amount of transportation diesel fuel use jumped.

To estimate diesel fuel sales by mode, EIA starts with the total supply of distillate fuel and subtracts the small amount sold to electric utilities (the most accurately known sector, as measured by EIA Form EIA-759). The remainder is divided among the other end-use sectors according to EIA's sales surveys (Form EIA-821: Annual Fuel Oil and Kerosene Sales Report, and Form EIA-863: Petroleum Product Sales Identification Survey).

This method introduces several potential elements of inaccuracy. First, the surveys of each sector are probably less accurate than the supply surveys noted earlier. Companies and individuals may inadvertently send incorrect data, or not respond at all. Then EIA has to determine what adjustment factor to use for each end-use sector. Since each sector will have a different response rate to the surveys, the adjustments will be different. Large adjustments can introduce large errors. EIA has not published its adjustments for the transportation sector. As shown in table 2, the adjustments in other sectors range from 5 to 96 percent of reported consumption. Even a 20 percent adjustment could introduce an error of one or two percentage points (plus or minus) for any one sector.

Overall, the accuracy of diesel fuel use in the transportation sector should be viewed with some skepticism.

Jet Fuel

Jet fuel is the only other petroleum-based fuel that is used in large quantities (over 1 million barrels/day) in the transportation sector. Virtually all of it is used by airlines. These data are accurate because airlines are required to report usage, and because there are relatively few certificated air carriers, data collection should be manageable.

NONPETROLEUM FUELS CONSUMPTION

TABLE 4-10. Estimated Consumption of Alternative and Replacement Fuels for Highway Vehicles

Collectively, oxygenates, natural gas, electricity, and various alternative fuels amount to only about 3 percent of all energy used in the transportation sector. While this may not be much greater than the error bars associated with petroleum use, it is important to track changes in these fuels accurately.

Oxygenates

Oxygenates, mostly methyl tributyl ether (MTBE), which is derived from natural gas and ethanol, are part of mainstream gasoline supply. They are measured routinely with petroleum supply (forms EIA-819A and 819M). Consumption

is estimated from production, net imports, and stock changes. Refineries and other entities are required to report data on oxygenates, and EIA also monitors production capability to provide a crosscheck. Thus, oxygenates data are likely to be reasonably accurate.

Natural Gas

Natural gas is used in the transportation sector mainly as the fuel for compressor stations on natural gas transmission lines. A small but growing amount is used in compressed or liquefied form in vehicles. EIA collects data on natural gas much as it does for petroleum, but the system is much simpler. Natural gas transmission companies may not know exactly how much gas is used in compressor stations, but they have a good idea based on the size of the equipment and the load on the line. The reported numbers probably are reasonably accurate. Data on natural gas-fueled vehicles are collected by DOE via Form-886, which is sent to fuel suppliers, vehicle manufacturers, and consumers. In addition, private associations and newsletters are important sources of information on alternative vehicles and alternative fuels use. Since most groups work cooperatively with DOE, it is likely that the data reported are accurate. EIA tracks the number of natural gas vehicles and the number of refueling stations to provide a cross check on estimates of natural gas consumption.

Electricity

Electricity powers intercity trains (Amtrak) and intracity rail systems. In addition, the number of electric vehicles is growing. There is considerable uncertainty over the energy consumed by these modes. Amtrak no longer provides national totals of its electricity consumption. Data on intracity transit is based on U.S. Department of Transportation, Federal Transit Administration's (FTA's) National Transit Database that contains information for directly operated services by federally funded transit agencies. Section 15 of the Federal Transit Act requires that these agencies provide detailed financial and operating information, including energy use. Although the data is generally considered accurate because FTA reviews and validates information submitted, reliability may vary because some transit agencies cannot obtain accurate information or may misinterpret certain data.

If electric vehicles become important over the next decade or two, dedicated charging stations may become commonplace, which could provide accurate data. Fleet owners (e.g., electric utilities) can keep accurate records, but individuals who plug their vehicles in at home may not. Electricity use must be estimated from the number of such vehicles and the expected driving cycles. Hence, data on electric power for transportation must be viewed as an estimate.

It should also be noted that electricity is a form of work that usually is generated from heat with the loss of about two-thirds of the energy. Automobile engines are equivalent to electric generators in that they convert chemical energy to heat and then to work, losing most of the energy as waste heat. When electrical energy is compared to petroleum in transportation, the waste heat must be included for consistency. A kilowatt-hour of electricity is equivalent to 3,413 British thermal units (Btu), but about 10,000 Btu of heat are required to produce it. This factor is dropping as generators become more efficient. High efficiency gas turbines may require 8,000 Btu or less, but the average is much higher. It is usually impossible to tell where the power for a specific use is generated, so average figures for a region are used to estimate the waste energy, a factor that further reduces the accuracy of the data.

Alternative Fuels

In addition to oxygenates, natural gas, and electricity, alternative fuels include ethanol and methanol. EIA tracks the numbers of such vehicles through Form-886, state energy offices, federal demonstration programs, manufacturers, and private associations. These numbers probably are fairly accurate although it is difficult to monitor retirements. Fuel consumption is estimated from the types of vehicles in operation, vehicle miles traveled, and expected fuel efficiency. Adjustments are necessary for the relatively few flexible-fuel vehicles. Obviously, the reported data are estimates only.

FUEL AND ENERGY CONSUMPTION BY MODE

Fuel consumption data are collected quite differently than supply data collected by the U.S. Department of Energy, Energy Information Administration (EIA). Highway fuel consumption, for example, is based on U.S. Department of Transportation, Federal Highway Administration (FHWA) data collected from states in the course of revenue collection. EIA starts from the fuel delivered to transportation entities.

Highway

Highway fuel data (tables 4-5, 4-9, and 4-11 through 4-15) are collected mainly by FHWA. All states plus the District of Columbia report total fuel sold along with travel by highway category and vehicle registration. Data typically flows from state revenue offices to the state departments of transportation to FHWA. Even if reporting is reasonably accurate, some data are always anomalous or missing and must be modified to fit expected patterns. In addition, as discussed earlier, there are some significant differences in methodology and definitions among the states. In particular, states differ in where the tax is applied in the fuel supply system, how gasohol is counted, how nonhighway use is treated, and how losses are handled.

Nonhighway use of gasoline and diesel fuel is a particularly large source of potential error. Some states designate nonhighway users as tax-exempt, others make the tax refundable. In either case, many people won't bother to apply if the amount of money is small. Nonhighway use of diesel fuel is especially large because many construction and agricultural vehicles are diesel powered. Thus, the fraction of petroleum attributed to transportation could be overestimated. On the other hand, some nonhighway fuel finds its way into the transportation system because heating oil can be used as diesel fuel, evading the tax. Tracers are now added to heating oil, which appears to have reduced the level of such tax evasion-if found in a truck's fuel tank, the tracer indicates diversion from a nontaxed source.

Breaking fuel use down by class of motor vehicle introduces the potential for error. FHWA must estimate the miles each class is driven and the fuel economy. Estimation of miles is based on the 1995 Nationwide Personal Transportation Survey (NPTS), administered by FHWA, and the Vehicle Inventory and Use Survey (formerly known as the Truck Inventory and Use Survey) conducted by the U.S. Census Bureau. For information about these two surveys, the reader is referred to the technical appendix of *Our Nation's Travel*, available from the FHWA, Office of Highway Information Management; and the 1997 Census of Transportation, available from the Economics and Statistics Administration within the Census Bureau. Fuel economy is based on state-supplied data, TIUS, and the National Highway Traffic Safety Administration data on new car fuel economy, which must be reduced by about 15 percent to reflect actual experience on the road. Overall,

both vehicle-miles of travel and fuel economy are estimates.

Fuel consumption by buses is particularly uncertain. FHWA collects data on intercity buses, and the American Public Transit Association (APTA) covers local travel. Very little data are collected on school buses. APTA figures are based on data from the USDOT, Federal Transit Administration's (FTA's) National Transit Database, which covers about 90 to 95 percent of total passenger-miles. These data are generally accurate because FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or may misinterpret data. APTA conservatively adjusts the FTA data to include transit operators that do not report to FTA, such as private and very small operators and rural operators. Prior to 1984, APTA did not include most rural and demand responsive systems.

Air

The U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information (OAI) is the source of these data. The numbers are based on 100-percent reporting of fuel use by large certificated air carriers (those with revenues of more than $100 million annually) via Form 41. The data are probably reasonably accurate because the airlines report fuel use regularly, and the limited number of airlines aids data management.

Smaller airlines, such as medium size regional and commuter air carriers, are not required to report energy data. OAI estimates that about 8 percent would have to be added to the total of the larger airlines to account for this use, but that has not been done in table 4-5 or 4-8.

General aviation aircraft and air taxis are covered in the General Aviation and Air Taxi and Avionics Survey, conducted by the Federal Aviation Administration (FAA). The survey is conducted annually and encompasses a stratified, systematic design from a random start to generate a sample of all general aviation aircraft in the United States. It is based on the FAA registry as the sampling frame. For instance, in 1997, a sample of 29,954 aircraft was identified and surveyed from an approximate population of 251,571 registered general aviation aircraft.

The reliability of the GAATA survey can be impacted by two factors: sampling and nonsampling error. A measure, called the standard error, is used to indicate the magnitude of sampling error. Standard errors can be converted for comparability by dividing the standard error by the estimate (derived from the sample survey results) and multiplying it by 100. This quantity, referred to as the percent standard error, totaled seven-tenths of a percent in 1997 for the general aviation fleet. A large standard error relative to an estimate indicates lack of precision, and inversely, a small standard error indicates precision.

Nonsampling errors could include nonresponse, a respondent's inability or unwillingness to provide correct information, differences in interpretation of questions, and data entry mistakes. The reliability of general aviation fleet data comparisons over time would decrease because of changes implemented in 1978 and sampling errors discussed above. Readers should note that nonresponse bias may be a component of reliability errors in the data from 1980 to 1990. The FAA conducted telephone surveys of nonrespondents in 1977, 1978, and 1979 and found no significant differences or inconsistencies between respondent and nonrespondent replies. The FAA discontinued the telephone survey of nonrespondents in 1980 to save costs. Nonresponse surveys were resumed in 1990; and the FAA found notable differences and make adjustments to its data to reflect nonresponse bias.

The U.S. Government, in particular the Department of Defense (DOD), uses a large amount of jet fuel as shown in table 4-19 (see discussion on government consumption below). However, DOD reports all fuel purchased, including from foreign sources for operations abroad. While the data may be accurate, it is not comparable to EIA's overall U.S. supply and consumption figures on jet fuel.

International operations are included in table 4-8 but not table 4-5. The fuel use for international operations includes that purchased by U.S. airlines for return trips. OAI does not collect data on foreign airline purchases of fuel in the United States. Thus, a significant use of U.S. jet fuel is missed.

However, these two factors approximately balance each other out. As shown in table 1-34, foreign carrier traffic is just slightly less than U.S. carrier international traffic, so presumably the fuel purchased here by foreign carriers is very close to the fuel purchased abroad by U.S. carriers.

Rail

The data are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). AAR figures are based on 100 percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual Report*. Thus, the data are considered accurate. STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the adjusted threshold for Class I railroads was $259.4 million. Although Class I railroads represent only 2 percent of the number of railroads in the country, they account for over 70 percent of the industry's mileage operated and more than 90 percent of all freight revenue; energy consumption should be of the same order. For passenger travel, information is unavailable. Amtrak no longer provides data on a national basis, and the regional data appears to be inconsistent.

Transit

The APTA figures are based on information in FTA's National Transit Data Base. APTA conservatively adjusts FTA data to include transit operators that do not report to the FTA Database (private and very small operators and rural operators), which accounts for about 90 to 95 percent of the total passenger-miles. The data are generally accurate because the FTA reviews and validates information submitted by individual transit agencies. Reliability may vary because some transit agencies cannot obtain accurate information or misinterpret certain data definitions in federal guidelines.

Water

The EIA collects data on residual and distillate fuel oils and diesel through its *Annual Fuel Oil and Kerosene Sales Report* survey, form EIA-821. The survey targets companies that sell fuel oil and kerosene to end users. This survey commenced in 1984 and data from previous years should be used with caution.

Sampling Frame and Design

The sample's target universe includes all companies that sell fuel oil and kerosene to end users. EIA derives the sampling frame from the EIA-863 database containing identity information for approximately 22,300 fuel oil and kerosene sellers. EIA stratifies the sampling frame into two categories: companies selected with certainty and uncertainty. Those in the certainty category varied but included the end use "vessel bunkering,"or sales for the fueling of commercial and private watercraft.

Sampling Error, Imputation, and Estimates

EIA reported a 91.3 percent response rate for the 1999 survey. The EIA also provides estimates of the sampling error for geographic areas and U.S. averages are 1.3 for residential distillate fuel oil, 0.9 for nonresidential retail distillate fuel oil, and 0.1 for retail residual fuel oil. Some firms inevitably ignore survey requests, causing data gaps. EIA estimates the volumes of these firm's sales by imputation; more detailed information and the algorithm can be obtained at EIA's web site in the technical notes for the Annual Fuel Oil and Kerosene Sales Report. See http://www.eia.doe.gov/oil_gas/petroleum/data_publications/fuel_oil_and_kerosene_sales/foks.html.

TABLE 4-19. U.S. Government Energy Consumption by Agency and Source

Energy consumption data are collected by DOE's Office of Federal Energy Management Programs in cooperation with most departments and agencies. DOD is by far the largest consumer,

accounting for about 80 percent of the total. As discussed above, the data includes fuel purchased abroad for military bases. Since government agencies are required to report these data, they are probably accurate. However, it is possible that some consumption is missed. For example, some agencies may report only fuel supplied directly, missing consumption such as gasoline purchased by employees while on government business for which they are then reimbursed. In addition, smaller agencies were neglected. Overall, however, the data should provide a fairly good approximation of government energy consumption.

ENERGY EFFICIENCY

TABLE 4-20. Energy Intensity of Passenger Modes

TABLE 4-21. Energy Intensity of Certificated Air Carriers, All Services

TABLE 4-22. Energy Intensity of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

TABLE 4-24. Energy Intensity of Transit Motor Buses

TABLE 4-25. Energy Intensity of Class I Railroad Freight Service

TABLE 4-26. Energy Intensity of Amtrak Service

Total energy consumed for each mode can be estimated with reasonable accuracy. Miles traveled are known for some modes, such as air carriers, but less accurately for others, most notably automobiles. When the numbers of passengers or tons are required to calculate energy efficiency, another uncertainty is introduced. Again, air carriers and intercity buses know how many passengers are on board and how far they travel, but only estimates are available for automobiles and intracity buses.

Thus, table 4-21 should be quite accurate for certificated air carriers, though it is missing small airlines and private aircraft. Table 4-22 is based on FHWA fuel tax data, derived from state fuel tax revenues. VMT is as discussed for tables 1-9 and 1-10. Data for motorcycles must be adjusted significantly more than for automobiles because less information is collected from the states or from surveys. Transit bus data (table 4-24) are very uncertain because, unlike intercity buses, the distance each passenger travels is not measured by ticket sales.

The intermodal comparison of passenger travel in table 4-20 must be viewed with considerable caution. Data for the different modes are collected in different ways, and the preparation of the final results is based on different assumptions. As noted above, airlines accurately record passenger miles, but the data on occupancy of private automobiles must be estimated from surveys. Even relatively certain data, such as state sales of gasoline, must be modified to resolve anomalies, and transit data are even harder to make consistent. Furthermore, different groups collect the data for the various modes, and they have different needs, assumptions, and methodologies. Thus, the comparisons are only approximate.

Freight service data (table 4-25) are from *Railroad Facts*, published annually by the Association of American Railroads (AAR). AAR figures are based on 100 percent reporting by Class I railroads to the Surface Transportation Board (STB) via Schedule 700 of the *R1 Annual Report*. STB defines Class I railroads as having operating revenues at or above a threshold indexed to a base of $250 million (1991) and adjusted annually in concert with changes in the Railroad Freight Rate Index published by the Bureau of Labor Statistics. In 1998, the adjusted threshold for Class I railroads was $259.4 million. Although Class I railroads comprise only 2 percent of the number of railroads in the country, they account for over 70 percent of the industry's mileage and 90 percent of all freight revenue; energy data should be of the same order.

TABLE 4-27. Annual Wasted Fuel Due to Congestion

TABLE 4-28. Wasted Fuel per Eligible Driver

The Texas Transportation Institute's (TTI) *Urban Roadway Congestion Annual Report* pro-

vided figures for tables 4-27 and 4-28. TTI relies on data from the U.S. Department of Transportation, Federal Highway Administration, Highway Performance Monitoring System database (HPMS). (See box 1-1 for detailed information about the HPMS.) TTI utilizes these data as inputs for its congestion estimation model. Detailed documentation for the TTI model and estimations can be found at http://mobility.tamu.edu/study/index.stm.

The sum of fuel wasted in typical congestion (recurring delay) and incident related delays equal the annual wasted fuel for an urban area. Recurring delay is the product of recurring delay (annual hours in moderate, heavy, and severe delays) and average peak period system speed divided by average fuel economy. Incident delay hours are multiplied by the average peak period system speed and divided by the average fuel economy to produce the amount of incident fuel wasted.

Structure, Assumptions, and Parameters

Urban roadway congestion levels are estimated using a formula measuring traffic density. Average daily travel volume per lane on freeways and principal arterial streets are estimated using area wide estimates of vehicle-miles of travel and lane miles of roadway. The resulting ratios are combined using the amount of travel on each portion of the system (freeway and principal arterials) so that the combined index measures conditions overall. This variable weighting factor allows comparisons between areas such as Phoenix-where principal arterial streets carry 50 percent of the amount of travel of freeways-and cities such as Phoenix where the ratio is reversed. Values greater than one are indicative of undesirable congestion levels. Readers seeking the algorithm for the congestion index should examine http://mobility.tamu.edu/study/numbers.stm.

In previous reports, TTI assumed that 45 percent of all traffic, regardless of the urban location, occurred in congested conditions. TTI indicated that this presumption overestimated travel in congested periods. Its 1997 estimates now vary by urban area anywhere from 21 to 50 percent of travel that occurs in congestion. TTI's model structure applies to two types of roads: freeways and principal arterial streets. The model derives estimates of vehicle traffic per lane and traffic speed for an entire urban area. Based on variation in these amounts, travel is then classified under 5 categories: uncongested, moderately congested, heavily congested, severely congested, and extremely congested (a new category in 1999). The threshold between uncongested and congested was changed in 1999. Previous editions classified congested travel when area wide traffic levels reached 13,000 vehicles per lane per day on highways and 5,000 vehicles per lane per day on principal arterial streets. These thresholds were raised in the latest report to 14,000 and 5,500 vehicles per lane per day respectively. Comparisons across time will be questionable due to these changes. For example, TTI applied the new methodology to 1996 data that resulted in lower congestion levels. Readers should refer to the TTI website for more detailed information on its estimation procedures http://mobility.tamu.edu/estimating_mobility.

TTI reviews and adjusts the data used in its model, including statewide average fuel cost estimates (published by the American Automobile Association) and the number of eligible drivers for each urban area (taken from the Statistical Abstract of the United States, published by the U.S. Department of Commerce, Bureau of the Census). The model has some limitations because it does not include local variations (such as bottlenecks, local travel patterns, or transportation improvements) that affect travel times. TTI documentation does not provide information on peer-review, sensitivity analysis, or estimation errors for their model. Information about sensitivity analysis or external reviews of the model could not be obtained and users should interpret the data cautiously.

ENVIRONMENT

TABLE 4-38. Estimated National Average Vehicle Emissions Rates by Vehicle Type and Fuel

TABLE 4-39. National Average Vehicle Emissions Rates by Vehicle Type Using Reformulated Gasoline

The U.S. Environmental Protection Agency uses its Mobile Source Emissions Factor Model (MOBILE) to generate average emissions factors for each vehicle and fuel type. The methods used in the model are theoretically sound, the assumptions are reasonable, but the data vary in quality, and no formal analysis of the accuracy of these estimates has been performed. Emissions rate estimates for light-duty vehicles are considered more reliable than those for heavy-duty vehicles because in-use emissions tests are performed on a sample of vehicles each year. Deterioration for heavy-duty vehicles in the national fleet are based only on manufacturer's engine deterioration tests. In addition, because reformulated fuels (table 4-37) are newer than other gasoline fuels (table 4-36), in-use emissions test data for reformulated fuels are not as extensive.

The estimates in the tables represent average emissions rates taking into account the characteristics of the nation's fleet, including vehicle type and age, and fuel used. The model also assumes Federal Test Procedure conditions. The model does not take into account actual travel distributions across different highway types with their associated average speeds and operating mode fractions, nor do they consider ambient local temperatures. However, fleet composition and deterioration because of age are considered. Thus, these rates illustrate only trends due to vehicle emissions control improvements and their increasing use in the national fleet and should not be used for other purposes.

TABLES 4-40, 4-41, 4-42, 4-43, 4-44, 4-45 and 4-46. Estimates of National Emissions of Carbon Monoxide, Nitrogen Oxides, Volatile Organic Compounds, Particular Matter, Sulfur Dioxide, and Lead

Emissions by sector and source are estimated using various models and calculation techniques and are based on a number of assumptions and on data that vary in precision and reliability. The methods used are theoretically sound, the assumptions are reasonable, but the data vary in quality, and no formal analysis of the accuracy of these estimates has been performed.

Carbon Monoxide (CO), Nitrogen Oxides (NOx), and Volatile Organic Compounds (VOCs)

Highway vehicle emissions of CO, NO_x, and VOC are generated by the U.S. Environmental Protection Agency's (EPA's) Mobile Source Emissions Factor Model (MOBILE), which uses per-mile vehicle emissions factors and vehicle travel (vehicle-miles) to calculate county-level emissions. Emissions rates are then adjusted based on fuel characteristics, vehicle fleet composition, emissions control measures, average vehicle speed, and other factors that can affect emissions. (Emissions rates used in MOBILE are based on vehicle certification tests, emissions standards, and in-use vehicle tests and are updated approximately every three years.) The U.S. Department of Transportation, Federal Highway Administration's Highway Performance Monitoring System is the source of vehicle travel estimates used in the model. Although the methodology for this survey data is sound and well documented, analyses have shown that individual states vary in how rigorously they follow the established sampling guidelines.

Nonhighway vehicle emissions are calculated by applying a growth factor (based on modal activity trends) to modal emissions estimates from the most recently conducted state emissions inventories. These emissions inventories are typically estimated every three years in accordance with the Clean Air Act of 1970,[1] but the methodology may vary among states and by year.

Particulate Matter Under 10 Microns (PM-10) and 2.5 Microns (PM-2.5) in Size

Highway vehicle emissions are estimated using the U.S. Environments Protection Agency's PART model, which estimates emissions factors for exhaust emissions and brake and tire wear by vehicle type. Exhaust emissions factors are based on certification tests, while brake wear (per vehicle) and tire wear (per tire) are assumed values which are constant over all years. Per-mile emissions factors are multiplied by vehicle travel (vehicle-miles) and adjusted to account for other factors that effect exhaust emissions (e.g., fuel composition, weather,

[1] Public Law 91-604, 84 Stat. 1705 (December 31, 1970).

etc.). The U.S. Department of Transportation, Federal Highway Administration's Highway Performance Monitoring System is the source of vehicle-miles of travel (vmt) estimates used in the model. While the methodology for this survey data is sound and well documented, analyses have shown that individual states vary in how rigorously they follow the established sampling guidelines.

Fugitive dust estimates for paved and unpaved roads are calculated by multiplying vmt on each type of road by emissions factors for each vehicle type and road type.

Nonhighway vehicle emissions are calculated by applying a growth factor (based on modal activity trends) to modal emissions estimates from the most recently conducted state emissions inventories. These emissions inventories are typically estimated every three years in accordance with the Clean Air Act of 1970, but the methodology may vary among states and by year.

Sulfur Dioxide (SO_2)

Highway vehicle SO_2 emissions are estimated by multiplying vehicle travel (for each vehicle type and highway type) by an emissions factor reflecting each vehicle type and highway type. Highway SO_2 emissions factors are based on vehicle type and model year, sulfur content of fuel by type and year, fuel density by fuel type, and vehicle fuel efficiency by type and model year.

In general, estimates for nonhighway vehicles are calculated based on fuel consumption and sulfur content of fuel, though other factors may be considered.

Lead

In general, lead emissions are estimated by multiplying an activity level by an emissions factor that represents the rate at which lead is emitted for the given source category. This estimate is then adjusted by a factor that represents the assumed effectiveness of control technologies. For lead released during combustion, a top-down approach is used to share national estimates of fuel consumption by fuel type to each consumption category (e.g., motor fuel, electric utility, etc.) and, subsequently, each source (e.g., passenger cars, light-duty trucks, etc.).

TABLE 4-47. Air Pollution Trends in Selected Metropolitan Statistical Areas (MSAs)

TABLE 4-48. Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants

The U.S. Environmental Protection Agency measures concentrations of pollutants in the ambient air at its air quality monitoring sites, which are operated by state and local agencies. These sites conform to uniform criteria for monitor siting, instrumentation, and quality assurance, and each site is weighted equally in calculating the composite average trend statistics. Furthermore, trend sites must have complete data for 8 of the 10 years in the trend time period to be included. However, monitoring devices are placed in areas most likely to observe significant concentrations of air pollutants rather than a random sampling of sites throughout the nation.

TABLE 4-49. U.S. Carbon Dioxide Emissions from Energy Use by Sector

The combustion of fossil fuels, such as coal, petroleum, and natural gas, is the principal anthropogenic (human caused) source of carbon dioxide (CO_2) emissions. Since fossil fuels are typically 75 percent to 90 percent carbon by weight, emissions from the combustion of these fuels can be easily measured in carbon units, as is shown in the table.

CO_2 emissions data are derived from estimates. The U.S. Department of Energy, Energy Information Administration (EIA), estimates CO_2 emissions by multiplying energy consumption for each fuel type by its carbon emissions coefficient, then subtracting carbon that is sequestered by nonfuel use of fossil fuels. Carbon emissions coefficients are values used for scaling emissions to specific activities (e.g., pounds of CO_2 emitted per barrel of oil consumed).

Emissions estimates are based on energy consumption data collected and published by EIA Several small adjustments are made to its energy consumption data to eliminate double counting or miscounting of emissions. For example, EIA subtracts the carbon in ethanol from transportation gasoline consumption because of its biological origin.

Emissions coefficients are based on the density, carbon content, and heat content of petroleum products. For many fuels, except liquefied petroleum gas (LPG), jet fuel, and crude oil, EIA assumed coefficients to be constant over time. For LPG, jet fuel, and crude oil, EIA annualized carbon emissions coefficients to reflect changes in chemical composition or product mix.

Since the combustion of fossil fuels is a major producer of CO_2 emissions, sources of uncertainty are related to: 1) volumes of fuel consumed; 2) characteristics of fuel consumed; 3) emissions coefficients; and 4) coverage. EIA notes that volumetric fuel data are fairly reliable in the 3 percent to 5 percent range of uncertainty. The density and energy content of fuels are usually estimated. According to EIA, the reliability of these estimates vary. For example, estimates of the energy content of natural gas are reliable to 0.5 percent, while estimates for coal and petroleum products are lower because they are more heterogeneous fuels. The reliability of emissions coefficients depends on whether the characteristics of a fuel are difficult to measure accurately. Finally, uncertainties may result because data may be excluded or unknown sources of emissions not included.

EIA's estimation methods, emissions coefficients, and the reliability of emissions estimates are discussed in detail in U.S. Department of Energy, Energy Information Administration, *Emissions of Greenhouse Gases in the United States, 1998* available on www.eia.doe.gov/oiaf/1605/ggrpt/index.html.

TABLE 4-50. Annual Oil Spills in U.S. Navigable Waters by Vessel Type

The U. S. Coast Guard's (USCG) Marine Safety Information System (MSIS) is the source of these data. It includes data on all oil spills impacting U.S. navigable waters and the Coastal Zone. The USCG learns of spills through direct observation, reports from responsible parties and third parties. Responsible parties are required by law to report spills to the National Response Center (NRC). Reports may be made to the USCG or Environmental Protection Agency pre-designated On Scene Coordinator for the geographic area where the discharge occurs if direct reporting to the NRC is not practicable. There is no standard format for these reports, but responsible personnel face significant penalties for failing to do so. Most reports are made by telephone, and USCG personnel complete investigations based on the information provided. The type and extent of an investigation conducted varies depending on the type and quantity of the material spilled. Each investigation will determine as closely as possible source of the pollutant, the quantity of the material spilled, the cause of the accident, as well as whether there is evidence that any failure of material (either physical or design) was involved or contributed to the incident. These are so financial responsibility may be properly assigned for the incidents, as well as proper recommendations for the prevention of the recurrence of similar incidents may be made.

Some spills may not be entered into MSIS because they are either not reported to or discovered by the USCG. The probability of a spill not being reported is inversely proportional to its size. Large spills impact a large area and a large number of people, resulting in numerous reports of such spills. Small spills are less likely to be reported, particularly if they occur at night or in remote areas where persons other than the responsible party are unlikely to detect them. Responsible parties are required by law to report spills and face penalties for failing to do so, providing a strong incentive to report spills that might be detected by others. Experience with harbor patrols shows that the number of spills increases as the frequency of patrols increases. However, the volume of material spilled does not increase significantly, indicating that the spills discovered through increased harbor patrols generally involved very small quantities.

Data Collection

From 1973 to 1985, data were collected on forms completed by the investigator and later entered into the Pollution Incident Reporting System (PIRS) by data entry clerks at USCG headquarters. Since 1985, data have been entered directly into MSIS by the investigator. From 1985 to 1991, data were entered into a specific electronic form that captured information on the spilled substance and pollution response actions. Since 1995, a growing number of reports of pollution incidents of 100 gallons or less of oil have been captured on a Notice of Violation ticket form, which are then entered into MSIS.

The information shown in this table comes from the USCG Spill Compendium, which contains spill data from the applications described above. The Compendium contains summary data from 1969 through 1999 and is intended to provide general information to the public, the maritime industry and other interested persons about spills in and around U.S. waterways. For more information about spill data, please refer to the USCG Internet sit at http://www.uscg.mil/hq/gm/nmc/response/stats/aa.htm.

Nonsampling Errors

According to the USCG, nonsampling errors, such as nonreporting and mistakes made in data collection and entry, should not have a major impact on most interpretations of the data, but the impact will vary depending on the data used. The error rate for volume spilled is estimated to be less than 5 percent because larger spills, which account for most of the volume of oil spilled, are thoroughly reviewed at several levels. The error rate for the number of spills is difficult to estimate primarily due to low reporting rates for small spills. Most of the error in spill counts involves spills of less than 100 gallons.

TABLE 4-51. Leaking Underground Storage Tank Releases and Cleanups

A national inventory of reported spills and corrective actions taken for leaking underground storage tanks is compiled biannually based on state counts of leaking tanks reported by owners as required by the Resource Conservation and Recovery Act of 1976.[2] These data may be affected by general accounting errors, some of which have changed semiannual counts by as many as 2,000 actions.

TABLE 4-52. Highway Noise Barrier Construction

State highway agencies (SHAs) provide data on highway noise barrier construction, extent, and costs to the U.S. Department of Transportation, Federal Highway Administration. Individual SHA definitions of barriers and costs may differ. This could lead to nonuniformity and/or anomalies among state data, which will in turn affect national totals.

TABLE 4-53. Number of People Residing in High-Noise Areas Around U.S. Airports

The number of the people exposed to aircraft noise around airports is estimated by computer modeling rather than by actual measurements. The U.S. Department of Transportation (USDOT), Federal Aviation Administration's (FAA's) Integrated Noise Model (INM) has been the primary tool for assessing aircraft noise around airports for nearly 30 years. This model uses information on aircraft mix, average daily operations, flight tracks, and runway distribution to generate and plot contours of Day Night Sound Level (DNL). With the addition of a digitized population census database, the model can estimate the number of residents exposed to noise levels of 65 decibels (db) DNL.

The U.S. Environmental Agency (EPA) produced the first estimate of airport noise exposure in 1975. It reported that 7 million residents were exposed to significant levels of aircraft noise in 1978. This number became the "anchor point" for all future estimates of the nationwide noise impacts. In 1980, FAA developed another methodology for estimating the change in the number

[2] Public Law 94-580, 90 Stat. 2795 (October 21, 1976).

of people impacted by noise (from the 1975 anchor value) as a function of changes in both the national fleet and in the FAA's Terminal Area Forecast (TAF). In 1990, the FAA created an improved method of estimating the change in number of people impacted (relative to the 1980 estimates).

In 1993, the FAA began using its newly developed Nationwide Airport Noise Impact Model (NANIM) to estimate the impact of airplane noise on residential communities surrounding U.S. airports that support jet operations. FAA uses this model to determine the relative changes in number of people and land area exposed to 65 db DNL as a result of changes in nationwide aircraft fleet mix and operations. NANIM uses data on air traffic patterns found in the Official Airline Guide (OAG), air traffic growth projections found in FAA's TAF, population figures from the U.S. Census Bureau, and information on noise contour areas for the top 250 U.S. civil airports with jet operations.

The methodology used in NANIM has been peer reviewed and approved. However, a formal evaluation of the model's accuracy has not been conducted. Some data used in NANIM are updated manually, thus the possibility of data entry errors does exist. Entries are reviewed and then corrected as appropriate. The aircraft mix and operations files from FAA's TAF and OAG are updated automatically. Changes to either of the sources could introduce errors. For example, it was recently discovered that OAG redefined some aircraft codes and altered some data fields in its database. These changes make it impossible for the NANIM utility program to accurately read the current OAG database. A rewrite of the source code is necessary to eliminate this error. Also, since airport authorities are not required to produce noise exposure maps and reports unless they intend to apply for Federal grants, 14 of the 50 busiest commercial airports, including JFK and LaGuardia, have not produced (for public consumption) noise exposure maps in several years. In the absence of actual data, the NANIM database contains approximations of the noise contours areas based on airports of similar size and similar operation. Without actual airport data, it is impossible to quantify the error introduced by the approximation.

TABLE 4-54. Motor Vehicles Scrapped

The Polk Company's Vehicles in Operation database is the source of these data. This database is a census of vehicles that are currently registered in all states within the United States. It is based on information from state department of motor vehicles. Polk updates the database quarterly (March, June, September, and December).

Scrapped vehicles are those that Polk removes from its database when: 1) States indicate registered vehicles have suffered major damage (such as a flood or accident), or 2) No renewal (reregistration) notice is received by Polk within a state's allotted time (normally one year). In the latter case, if a vehicle is subsequently reregistered, it is returned to the database. The Polk data on motor vehicles is broken down into passenger cars and trucks, and this identification comes with the registration data from the DMV.

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Glossary

14 CFR 121 (Air): Code of Federal Regulations, Title 14, part 121. Prescribes rules governing the operation of domestic, flag, and supplemental air carriers and commercial operators of large aircraft.

14 CFR 135 (Air): Code of Federal Regulations, Title 14, part 135. Prescribes rules governing the operations of commuter air carriers (scheduled) and on-demand air taxi (unscheduled).

ACCIDENT (Aircraft): As defined by the National Transportation Safety Board, an occurrence incidental to flight in which, as a result of the operation of an aircraft, any person (occupant or nonoccupant) receives fatal or serious injury or any aircraft receives substantial damage.

ACCIDENT (Automobile): See Crash (Highway)

ACCIDENT (Gas): 1) An event that involves the release of gas from a pipeline or of liquefied natural gas (LNG) or other gas from an LNG facility resulting in personal injury necessitating inpatient hospitalization or a death; or estimated property damage of $50,000 or more to the operator or others, or both, including the value of the gas that escaped during the accident; 2) An event that results in an emergency shutdown of an LNG facility; or 3) An event that is significant in the judgment of the operator even though it did not meet the criteria of 1) or 2).

ACCIDENT (Hazardous liquid or gas): Release of hazardous liquid or carbon dioxide while being transported, resulting in any of the following: 1) An explosion or fire not intentionally set by the operator; 2) Loss of 50 or more barrels of hazardous liquid or carbon dioxide; 3) Release to the atmosphere of more than 5 barrels a day of highly volatile liquids; 4) Death of any person; 5) Bodily harm resulting in one or more of the following: a) The loss of consciousness, b) The necessity of carrying person from the scene, c) The necessity for medical treatment, d) Disability that prevents the discharge of normal duties; and 6) Estimated damage to the property of the operators and/or others, exceeding $50,000.

ACCIDENT (Highway-Rail Grade-Crossing): An impact between on-track railroad equipment and an automobile, bus, truck, motorcycle, bicycle, farm vehicle, or pedestrian or other highway user at a designated crossing site. Sidewalks, pathways, shoulders, and ditches associated with the crossing are considered to be part of the crossing site.

ACCIDENT (Rail): A collision, derailment, fire, explosion, act of God, or other event involving operation of railroad on-track equipment (standing or moving) that results in railroad damage exceeding an established dollar threshold.

ACCIDENT (Recreational Boating): An occurrence involving a vessel or its equipment that results in 1) A death; 2) An injury that requires medical treatment beyond first aid; 3) Damage to a vessel and other property, totaling to more than $500 or complete loss of a vessel; or 4) The disappearance of the vessel under circumstances that indicate death or injury. Federal regulations (33 CFR 173-4) require the operator of any vessel that is numbered or used for recreational purposes to submit an accident report.

ACCIDENT (Transit): An incident involving a moving vehicle. Includes a vehicle, object, or person (except suicides) or a derailment/left roadway.

ACTIVE AIRCRAFT (General Aviation): All legally registered civil aircraft that flew one or more hours.

AERIAL APPLICATION FLYING (General Aviation): The operation of aircraft for the purposes of dispensing any substances required for agriculture, health, forestry, seeding, firefighting, and insect control purposes.

AERIAL OBSERVATION FLYING (General Aviation): Any use of an aircraft for aerial mapping and photography, surveying, patrolling, fish spotting, search and rescue, hunting, sightseeing, or highway traffic advisory not included under Federal Aviation Regulations (FAR) Part 135.

AIR CARRIER: A person who undertakes directly, by lease, or other arrangement to engage in air

transportation. More specifically, the commercial system of air transportation comprising large certificated air carriers, small certificated air carriers, commuter air carriers, on-demand air taxis, supplemental air carriers, and air travel clubs.

AIR ROUTE TRAFFIC CONTROL CENTER: A facility established to provide air traffic control service to aircraft operating on an IFR (instrument flight rule) flight plan within controlled airspace and principally during the en route phase of flight.

AIR TAXI: An aircraft operator who conducts operations for hire or compensation in accordance with 14 CFR 135 (for safety purposes) or FAR Part 135 (for economic regulations/reporting purposes) in an aircraft with 30 or fewer passenger seats and a payload capacity of 7,500 pounds or less. An air taxi operates on an on-demand basis and does not meet the flight scheduled qualifications of a commuter air carrier (see below).

AIRCRAFT REVENUE HOURS: The airborne hours in revenue service, computed from the moment an aircraft leaves the ground until it lands.

AIRCRAFT REVENUE MILES: The miles (computed in airport-to-airport distances) for each interairport hop actually completed in revenue service, whether or not performed in accordance with the scheduled pattern. For this purpose, operation to a flag stop is a hop completed even if a landing is not actually made. In cases where the interairport distances are inapplicable, aircraft-miles flown are determined by multiplying the normal cruising speed for the aircraft type by the airborne hours.

AIRPORT: A landing area regularly used by aircraft for receiving or discharging passengers or cargo.

AIRPORT/AIRWAY TRUST FUND: See Trust Funds.

ALTERNATIVE FUELS: The Energy Policy Act of 1992 defines alternative fuels as methanol, denatured ethanol, and other alcohol; mixtures containing 85 percent or more (but not less than 70 percent as determined by the Secretary of Energy by rule to provide for requirements relating to cold start, safety, or vehicle functions) by volume of methanol, denatured ethanol, and other alcohols with gasoline or other fuels. Includes compressed natural gas, liquid petroleum gas, hydrogen, coal-derived liquid fuels, fuels other than alcohols derived from biological materials, electricity, or any other fuel the Secretary of Energy determines by rule is substantially not petroleum and would yield substantial energy security and environmental benefits.

AMTRAK: Operated by the National Railroad Passenger Corporation of Washington, D.C., this rail system was created by the Rail Passenger Service Act of 1970 (P.L. 91-518, 84 Stat. 1327) and given the responsibility for the operation of intercity, as distinct from suburban, passenger trains between points designated by the Secretary of Transportation.

ARTERIAL HIGHWAY: A major highway used primarily for through traffic.

ASPHALT: A dark brown to black cement-like material containing bitumens as the predominant constituent. The definition includes crude asphalt and finished products such as cements, fluxes, the asphalt content of emulsions, and petroleum distillates blended with asphalt to make cutback asphalt. Asphalt is obtained by petroleum processing.

AVAILABLE SEAT-MILES (Air Carrier): The aircraft miles flown in each interairport hop multiplied by the number of seats available on that hop for revenue passenger service.

AVERAGE HAUL: The average distance, in miles, one ton is carried. It is computed by dividing ton-miles by tons of freight originated.

AVERAGE PASSENGER TRIP LENGTH (Bus/Rail): Calculated by dividing revenue passenger-miles by the number of revenue passengers.

AVIATION GASOLINE (General Aviation): All special grades of gasoline used in aviation reciprocating engines, as specified by American Society of Testing Materials (ASTM) Specification D910 and Military Specification MIL-G5572.

Includes refinery products within the gasoline range marketed as or blended to constitute aviation gasoline.

BARREL (oil): A unit of volume equal to 42 U.S. gallons.

BLOOD ALCOHOL CONCENTRATION (Highway): A measurement of the percentage of alcohol in the blood by grams per deciliter.

BRITISH THERMAL UNIT: The quantity of heat needed to raise the temperature of 1 pound of water by 1 °F at or near 39.2 °F.

BULK CARRIER (Water): A ship with specialized holds for carrying dry or liquid commodities, such as oil, grain, ore, and coal, in unpackaged bulk form. Bulk carriers may be designed to carry a single bulk product (crude oil tanker), or accommodate several bulk product types (ore/bulk/oil carrier) on the same voyage or on a subsequent voyage after holds are cleaned.

BUS: Large motor vehicle used to carry more than 10 passengers, includes school buses, intercity buses, and transit buses.

BUSINESS TRIP (American Travel Survey): A trip taken for business or business combined with pleasure, or for attending a convention, conference, or seminar.

CAFE STANDARDS: See Corporate Average Fuel Economy Standards.

CAR-MILE (Rail): The movement of a railroad car a distance of 1 mile. An empty or loaded car-mile refers to a mile run by a freight car with or without a load. In the case of intermodal movements, the designation of empty or loaded refers to whether the trailers/containers are moved with or without a waybill.

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY (Air Carrier): A certificate issued by the Department of Transportation to an air carrier under Section 401 of the Federal Aviation Act authorizing the carrier to engage in air transportation.

CERTIFICATED AIR CARRIER: An air carrier holding a Certificate of Public Convenience and Necessity issued by the U.S. Department of Transportation (DOT) to conduct scheduled services interstate. These carriers may also conduct nonscheduled or charter operations. Certificated air carriers operate large aircraft (30 seats or more or a maximum load of 7,500 pounds or more) in accordance with FAR Part 121. See also Large Certificated Air Carrier.

CERTIFICATED AIRPORTS: Airports that service air carrier operations with aircraft seating more than 30 passengers.

CHAINED DOLLARS: A measure used to express real prices, defined as prices that are adjusted to remove the effect of changes in the purchasing power of the dollar. Real prices usually reflect buying power relative to a reference year. The "chained-dollar" measure is based on the average weights of goods and services in successive pairs of years. It is "chained" because the second year in each pair, with its weights, becomes the first year of the next pair. Prior to 1996, real prices were expressed in constant dollars, a weighted measure of goods and services in a single year. See also Constant Dollars and Current Dollars.

CLASS I RAILROAD: A carrier that has an annual operating revenue of $250 million or more after applying the railroad revenue deflator formula, which is based on the Railroad Freight Price Index developed by the U.S. Department of Labor, Bureau of Labor Statistics. The formula is the current year's revenues x 1991 average index/current year's average index.

COASTWISE TRAFFIC (Water): Domestic traffic receiving a carriage over the ocean, or the Gulf of Mexico (e.g., between New Orleans and Baltimore, New York and Puerto Rico, San Francisco and Hawaii, Alaska and Hawaii). Traffic between Great Lakes ports and seacoast ports, when having a carriage over the ocean, is also considered coastwise.

COEFFICIENT OF VARIATION: Ratio of the sampling error (or standard error) of a statistic to the value of that statistic. Also referred to as relative standard error.

COLLECTOR (Highway): In rural areas, routes that serve intracounty rather than statewide travel. In urban areas, streets that provide direct access to neighborhoods and arterials.

COLLISION WITH OBJECT (Transit): An incident in which a transit vehicle strikes an obstacle other than a vehicle or person (e.g., building, utility pole). Reports are made if the accident results in a death, injury, or property damage over $1,000.

COLLISION WITH PEOPLE (Transit): An incident in which a transit vehicle strikes a person. Excludes suicides and suicide attempts. Reports are made if the incident results in death, injury, or property damage over $1,000.

COLLISION WITH VEHICLE (Transit): An incident in which a transit vehicle strikes or is struck by another vehicle. Reports are made if the incident results in a death, injury, or property damage over $1,000.

COMBINATION TRUCK: A power unit (truck tractor) and one or more trailing units (a semitrailer or trailer).

COMMERCIAL BUS: Any bus used to carry passengers at rates specified in tariffs; charges may be computed per passenger (as in regular route service) or per vehicle (as in charter service).

COMMERCIAL SERVICE AIRPORT: Airport receiving scheduled passenger service and having 2,500 or more enplaned passengers per year.

COMMUTER AIR CARRIER: Different definitions are used for safety purposes and for economic regulations and reporting. For safety analysis, commuter carriers are defined as air carriers operating under 14 CFR 135 that carry passengers for hire or compensation on at least five round trips per week on at least one route between two or more points according to published flight schedules, which specify the times, days of the week, and points of service. On March 20, 1997, the size of the aircraft subject to 14 CFR 135 was reduced from 30 to fewer than 10 passenger seats. (Larger aircraft are subject to the more stringent regulations of 14 CFR 121.) Helicopters carrying passengers or cargo for hire, however, are regulated under CFR 135 whatever their size. Although, in practice, most commuter air carriers operate aircraft that are regulated for *safety purposes* under 14 CFR 135 and most aircraft that are regulated under 14 CFR 135 are operated by commuter air carriers, this is not necessarily the case.

For economic regulations and reporting requirements, commuter air carriers are those carriers that operate aircraft of 60 or fewer seats or a maximum payload capacity of 18,000 pounds or less. These carriers hold a certificate issued under section 298C of the Federal Aviation Act of 1958, as amended.

COMMUTER RAIL (Transit): Urban passenger train service for short-distance travel between a central city and adjacent suburb. Does not include rapid rail transit or light rail service.

COMPACT CAR: An automobile industry designation usually consisting of cars with a wheelbase between 100 and 104 inches.

COMPRESSED NATURAL GAS: Natural gas compressed to a volume and density that is practical as a portable fuel supply. It is used as a fuel for natural gas-powered vehicles.

CONSTANT DOLLAR: Dollar value adjusted for changes in the average price level by dividing a current dollar amount by a price index. See also Chained Dollar and Current Dollar.

CORPORATE AVERAGE FUEL ECONOMY STANDARDS (CAFÉ): Originally established by Congress for new automobiles and later for light trucks. Under CAFE, automobile manufacturers are required by law to produce vehicle fleets with a composite sales-weighted fuel economy not lower than the CAFE standards in a given year. For every vehicle that does not meet the standard, a fine is paid for every one-tenth of a mile per gallon that vehicle falls below the standard.

CORPORATE FLYING (General Aviation): Corporate aircraft piloted by a professional crew.

CRASH (Highway): An event that produces injury and/or property damage, involves a motor vehicle in transport, and occurs on a trafficway or while the vehicle is still in motion after running off the trafficway.

CRUDE OIL: A mixture of hydrocarbons that exists in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface-separating facilities.

CURRENT DOLLAR: Dollar value of a good or service in terms of prices current at the time the good or service is sold. See also Chained Dollar and Current Dollar.

DEADWEIGHT TONNAGE (Water): The carrying capacity of a vessel in long tons (2,240 pounds). It is the difference between the number of tons of water a vessel displaces "light" and the number of tons it displaces when submerged to the "load line."

DEMAND-RESPONSIVE VEHICLE (Transit): A nonfixed-route, a nonfixed-schedule vehicle that operates in response to calls from passengers or their agents to the transit operator or dispatcher.

DERAILMENT/LEFT ROADWAY (Transit): A noncollision incident in which a transit vehicle leaves the rails or road on which it travels. This also includes rollovers. Reports are made for all occurrences.

DESTINATION OF TRIP (American Travel Survey): The place the survey respondent names as the destination of the trip. If more than one location is visited on the same trip, the farthest point from the origin is considered the destination.

DIESEL FUEL: A complex mixture of hydrocarbons with a boiling range between approximately 350 and 650 °F. Diesel fuel is composed primarily of paraffins and naphthenic compounds that auto-ignite from the heat of compression in a diesel engine. Diesel is used primarily by heavy-duty road vehicles, construction equipment, locomotives, and by marine and stationary engines.

DISTILLATE FUEL OIL: A general classification for one of the petroleum fractions produced in conventional distillation operations. Included are No. 1, No. 2 and No. 4 fuel oils and No. 1, No. 2, and No. 4 diesel fuels. Distillate fuel oil is used primarily for space heating, on- and off- highway diesel engine fuel (including railroad engine fuel and fuel for agricultural machinery), and electric power generation.

DISTRIBUTION MAINS (Gas): A network of pipelines, services, and equipment that carry or control the supply of gas from the point of local supply to, and including, the sales meters.

DOMESTIC FREIGHT (Water): All waterborne commercial movements between points in the United States, Puerto Rico, and the Virgin Islands, excluding traffic with the Panama Canal Zone. Cargo moved for the military in commercial vessels is reported as ordinary commercial cargo; military cargo moved in military vessels is omitted.

DOMESTIC OPERATIONS (Air Carrier): All air carrier operations having destinations within the 50 United States, the District of Columbia, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands.

DOMESTIC PASSENGER (Water): Any person traveling on a public conveyance by water between points in the United States, Puerto Rico, and the Virgin Islands.

DRY CARGO BARGES (Water): Large flat-bottomed, nonself-propelled vessels used to transport dry-bulk materials such as coal and ore.

EMERGENCY PREPAREDNESS TRUST FUND: See Trust Funds.

ENERGY EFFICIENCY: The ratio of energy inputs to the outputs from a process; for example, miles traveled per gallon of fuel (mpg).

ENPLANED PASSENGERS (Air Carrier): See Revenue Passenger Enplanements.

ETHANOL: A clear, colorless, flammable oxygenated hydrocarbon with a boiling point of 78.5 °C. in the anhydrous state. It is used in the United States as a gasoline octane enhancer and oxygenate (10-percent concentration). Ethanol can be used in high concentrations in vehicles optimized for its use. Otherwise known as ethyl alcohol, alcohol, or grain-spirit.

FATAL CRASH (Highway): A police-reported crash involving a motor vehicle in transport on a trafficway in which at least one person dies within 30 days of the crash as a result of that crash.

FATAL INJURY (Air): Any injury that results in death within thirty days of the accident.

FATALITY: For purposes of statistical reporting on transportation safety, a fatality shall be considered a death due to injuries in a transportation crash, accident, or incident that occurs within 30 days of that occurrence.

FATALITY (Rail): 1) Death of any person from an injury within 30 days of the accident/incident (may include nontrain accidents/incidents); or 2) Death of a railroad employee from an occupational illness within 365 days after the occupational illness was diagnosed by a physician.

FATALITY (Recreational Boating): All deaths (other than deaths by natural causes) and missing persons resulting from an occurrence that involves a vessel or its equipment.

FATALITY (Transit): A transit-caused death confirmed within 30 days of a transit incident. Incidents include collisions, derailments, personal casualties, and fires associated with transit agency revenue vehicles, transit facilities on transit property, service vehicles, maintenance areas, and rights of way.

FATALITY (Water): All deaths and missing persons resulting from a vessel casualty.

FEDERAL ENERGY REGULATORY COMMISSION (FERC): The Federal agency with jurisdiction over, among other things, gas pricing, oil pipeline rates, and gas pipeline certification.

FERRY BOAT (Transit): Vessels that carry passengers and/or vehicles over a body of water. Generally steam or diesel-powered, ferry boats may also be hovercraft, hydrofoil, and other high-speed vessels. The vessel is limited in its use to the carriage of deck passengers or vehicles or both, operates on a short run on a frequent schedule between two points over the most direct water routes other than in ocean or coastwise service, and is offered as a public service of a type normally attributed to a bridge or tunnel.

FIELD AND GATHERING GAS PIPELINES: A network of pipelines (mains) transporting natural gas from individual wells to a compressor station, processing point, or main trunk pipeline.

FLAG STOP (Air): A drop-off or pick-up point along a predetermined route that is visited only by request or if a signal to stop is given.

FOSSIL FUELS: Any naturally occurring organic fuel formed in the Earth's crust, such as petroleum, coal, and natural gas.

FREIGHT REVENUE (Rail): Revenue from the transportation of freight and from the exercise of transit, stopoff, diversion, and reconsignment privileges as provided for in tariffs.

FREIGHTERS (Water): General cargo carriers, full containerships, partial containerships, roll-on/rolloff ships, and barge carriers.

FULL-SIZE CAR: As designated by the automobile industry, cars with a wheelbase between 110 and 114 inches.

GAS TRANSMISSION PIPELINES: Pipelines installed for the purpose of transmitting gas from a source or sources of supply to one or more distribution centers, or to one or more large volume customers; or a pipeline installed to interconnect sources of supply. Typically, transmission lines differ from gas mains in that they operate at higher pressures and the distance between connections is greater.

GASOHOL: A blend of finished motor gasoline (leaded or unleaded) and alcohol (generally ethanol but sometimes methanol) limited to 10 percent by volume of alcohol.

GASOLINE: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives that have been blended to produce a fuel suitable for use in spark ignition engines. Motor gasoline includes both leaded or unleaded grades of finished motor gasoline, blending components, and gasohol. Leaded gasoline is no longer used in highway motor vehicles in the United States.

GENERAL AVIATION: 1) All facets of civil aviation, except facets of those air carriers holding a Certificate of Public Convenience and Necessity. 2) All civil aviation activity except that of air carriers certificated in accordance with Federal Aviation Regulations (FAR) Parts 121, 123, 127, and 135. The types of aircraft used in general aviation range from corporate multiengine jet aircraft piloted by professional crews to amateur-built single-engine piston-driven acrobatic planes to balloons and dirigibles. 3) All civil aviation operations other than scheduled air services and nonscheduled air transport operations for taxis, commuter air carriers, and air travel clubs that do not hold Certificates of Public Convenience and Necessity.

GENERAL ESTIMATES SYSTEM: A Data collection system that uses a nationally representative probability sample selected from all police-reported highway crashes. It began operation in 1988.

GROSS DOMESTIC PRODUCT: The total output of goods and services produced by labor and property located in the United States, valued at market prices. As long as the labor and property are located in the United States, the suppliers (workers and owners) may be either U.S. residents or residents of foreign countries.

GROSS VEHICLE WEIGHT RATING (gvwr) (Truck): The maximum rated capacity of a vehicle, including the weight of the base vehicle, all added equipment, driver and passengers, and all cargo.

HARBOR MAINTENANCE TRUST FUND: See Trust Funds.

HAZARDOUS MATERIAL: Any toxic substance or explosive, corrosive, combustible, poisonous, or radioactive material that poses a risk to the public's health, safety, or property-particularly when transported in commerce.

HEAVY RAIL (Transit): An electric railway with the capacity to transport a heavy volume of passenger traffic and characterized by exclusive rights-of-way, multicar trains, high speed, rapid acceleration, sophisticated signaling, and high-platform loading. Also known as "subway," "elevated (railway)," or "metropolitan railway (metro)."

HIGHWAY-RAIL GRADE CROSSING (Rail): A location where one or more railroad tracks are crossed by a public highway, road, or street or a private roadway at grade, including sidewalks and pathways at or associated with the crossing.

HIGHWAY TRUST FUND: A grant-in-aid type fund administered by the U.S. Department of Transportation, Federal Highway Administration. Most funds for highway improvements are apportioned to States according to formulas that give weight to population, area, and mileage.

HOUSEHOLD TRIP (American Travel Survey): A trip in which one or more members of a household travel together.

HIGHWAY-USER TAX: A charge levied on persons or organizations based on their use of public roads. Funds collected are usually applied toward highway construction, reconstruction, and maintenance.

INCIDENT (Hazmat): Any unintentional release of hazardous material while in transit or storage.

INCIDENT (Train): Any event involving the movement of a train or railcars on track equipment that results in a death, a reportable injury, or illness, but in which railroad property damage does not exceed the reporting threshold.

INCIDENT (Transit): Collisions, derailments, personal casualties, fires, and property damage in excess of $1,000 associated with transit agency revenue vehicles; all other facilities on the transit property; and service vehicles, maintenance areas, and rights-of-way.

INJURY (Air): See SERIOUS INJURY (air and general aviation).

INJURY (Gas): Described in DOT Forms 7100.1 or 7100.2 as an injury requiring "in-patient hospitalization" (admission and confinement in a hospital beyond treatment administered in an emergency room or out-patient clinic in which confinement does not occur).

INJURY (Hazardous Liquid Pipeline): An injury resulting from a hazardous liquid pipeline accident that results in one or more of the following: 1) Loss of consciousness, 2) A need to be carried from the scene, 3) A need for medical treatment, and/or 4) A disability that prevents the discharge of normal duties or the pursuit of normal duties beyond the day of the accident.

INJURY (Highway): Police-reported highway injuries are classified as follows:

Incapacitating Injury: Any injury, other than a fatal injury, that prevents the injured person from walking, driving, or normally continuing the activities the person was capable of performing before the injury occurred. Includes severe lacerations, broken or distorted limbs, skull or chest injuries, abdominal injuries, unconsciousness at or when taken from the accident scene, and inability to leave the accident scene without assistance. Exclusions include momentary unconsciousness.

Nonincapacitating Evident Injury: Any injury, other than a fatal injury or an incapacitating injury, evident to observers at the scene of the accident. Includes lumps on head, abrasions, bruises, minor lacerations, and others. Excludes limping.

Possible Injury: Any injury reported or claimed that is not evident. Includes momentary unconsciousness, claim of injuries not obvious, limping, complaint of pain, nausea, hysteria, and others.

INJURY (Highway-Rail Grade Crossing): 1) An injury to one or more persons other than railroad employees that requires medical treatment; 2) An injury to one or more employees that requires medical treatment or that results in restriction of work or motion for one or more days, or one or more lost work days, transfer to another job, termination of employment, or loss of consciousness; 3) Any occupational illness affecting one or more railroad employees that is diagnosed by a physician.

INJURY (Rail): 1) Injury to any person other than a railroad employee that requires medical treatment, or 2) Injury to a railroad employee that

requires medical treatment or results in restriction of work or motion for one or more workdays, one or more lost workdays, termination of employment, transfer to another job, loss of consciousness, or any occupational illness of a railroad employee diagnosed by a physician.

INJURY (Recreational Boating): Injury requiring medical treatment beyond first aid as a result of an occurrence that involves a vessel or its equipment.

INJURY (Transit): Any physical damage or harm to a person requiring medical treatment or any physical damage or harm to a person reported at the time and place of occurrence. For employees, an injury includes incidents resulting in time lost from duty or any definition consistent with a transit agency's current employee injury reporting practice.

INJURY (Water): All personal injuries resulting from a vessel casualty that require medical treatment beyond first aid.

INLAND AND COASTAL CHANNELS: Includes the Atlantic Coast Waterways, the Atlantic Intracoastal Waterway, the New York State Barge Canal System, the Gulf Coast Waterways, the Gulf Intracoastal Waterway, the Mississippi River System (including the Illinois Waterway), Pacific Coast Waterways, the Great Lakes, and all other channels (waterways) of the United States, exclusive of Alaska, that are usable for commercial navigation.

INSTRUCTIONAL FLYING: Flying under the supervision of a flight instructor (excludes proficiency flying).

INTERCITY CLASS BUS I: As defined by the Bureau of Transportation Statistics, an interstate motor carrier of passengers with an average annual gross revenue of at least $1 million.

INTERCITY TRUCK: Truck that carries freight beyond local areas and commercial zones.

INTERMEDIATE -SIZE CAR: As designated by the automobile industry, a car with a wheelbase between 105 and 109 inches.

INTERNAL TRAFFIC (Water): Vessel movements (origin and destination) that take place solely on inland waterways located within the boundaries of the contiguous 48 states or within the state of Alaska. The term "internal traffic" also applies to carriage on both inland waterways and the water of the Great Lakes; carriage between offshore areas and inland waterways; and carriage occurring within the Delaware Bay, Chesapeake Bay, Puget Sound, and the San Francisco Bay, which are considered internal bodies of water rather than arms of the ocean.

INTERSTATE HIGHWAY: Limited access, divided highway of at least four lanes designated by the Federal Highway Administration as part of the Interstate System.

INTRAPORT (Water): Movement of freight within the confines of a port whether the port has one or several channels included in the port definition. Does not include car-ferries and general ferries moving within a port.

INTRATERRITORY TRAFFIC (Water): Traffic between ports in Puerto Rico and the U.S. Virgin Islands, which are considered a single unit.

JET FUEL: The term includes kerosene-type jet fuel and naphtha-type jet fuel. Kerosene-type jet fuel is used primarily for commercial turbojet and turboprop aircraft engines. Naphtha-type jet fuel is used primarily for military turbojet and turboprop aircraft engines.

LAKEWISE OR GREAT LAKES TRAFFIC: Waterborne traffic between U.S. ports on the Great Lakes system. The Great Lakes system is treated as a separate waterways system rather than as a part of the inland system.

LARGE CERTIFICATED AIR CARRIERS: An air carrier holding a certificate issued under section 401 of the Federal Aviation Act of 1958, as amended, that: 1) Operates aircraft designed to have a maximum passenger capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds, or 2) Conducts operations where one or both terminals of a flight stage are outside the 50 states of the United States, the District of Columbia, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands. Large certificated air carriers are grouped by annual operating revenues: 1) Majors (more than $1 billion in annual operating revenues), 2) Nationals (between $100 million and $1 billion in annual operating revenues), Large regionals ($20 million and $99,999,999 in annual operating revenues), and 4) Medium regionals (less than $20 million in annual operating revenues).

LARGE REGIONALS (Air): Air carrier groups with annual operating revenues between $20 million and $99,999,999.

LARGE CAR: As designated by the automobile industry, a car with a wheelbase greater than 114 inches.

LARGE TRUCK: Trucks over 10,000 pounds gross vehicle weight rating, including single-unit trucks and truck tractors.

LEASE CONDENSATE: A mixture consisting primarily of pentanes and heavier hydrocarbons, which are recovered as a liquid from natural gas in lease or field separation facilities. This category excludes natural gas liquids, such as butane and propane, which are recovered at natural gas processing plants or facilities.

LIGHT-DUTY VEHICLE: A vehicle category that combines light automobiles and trucks.

LIGHT RAIL: A streetcar-type vehicle operated on city streets, semiexclusive rights-of-way, or exclusive rights-of-way. Service may be provided by step-entry vehicles or by level boarding.

LIGHT TRUCK: Trucks of 10,000 pounds gross vehicle weight rating or less, including pickups, vans, truck-based station wagons, and sport utility vehicles.

LIQUEFIED NATURAL GAS (LNG): Natural gas, primarily methane, that has been liquefied by reducing its temperature to -260 °F. at atmospheric pressure.

LIQUEFIED PETROLEUM GAS (LPG): Propane, propylene, normal butane, butylene, isobutane, and isobutylene produced at refineries or natural gas processing plants, including plants that fractionate new natural gas plant liquids.

LOCOMOTIVE: Railroad vehicle equipped with flanged wheels for use on railroad tracks, powered directly by electricity, steam, or fossil fuel, and used to move other railroad rolling equipment.

LOCOMOTIVE-MILE: The movement of a locomotive unit, under its own power, the distance of 1 mile.

MAINS (Gas): A network of pipelines that serves as a common source of supply for more than one gas service line.

MAJORS (Air): Air carrier groups with annual operating revenues exceeding $1 billion.

MEDIUM REGIONALS (Air): Air carrier groups with annual operating revenues less than $20 million.

MERCHANDISE TRADE EXPORTS: Merchandise transported out of the United States to foreign countries whether such merchandise is exported from within the U.S. Customs territory, from a U.S. Customs bonded warehouse, or from a U.S. Foreign Trade Zone. (Foreign Trade Zones are areas, operated as public utilities, under the control of U.S. Customs with facilities for handling, storing, manipulating, manufacturing, and exhibiting goods.)

MERCHANDISE TRADE IMPORTS: Commodities of foreign origin as well as goods of domestic origin returned to the United States with no change in condition or after having been processed and/or assembled in other countries. Puerto Rico is a Customs district within the U.S. Customs territory, and its trade with foreign countries is included in U.S. import statistics. U.S. import statistics also include merchandise trade between the U. S. Virgin Islands and foreign countries even though the Islands are not officially a part of the U.S. Customs territory.

METHANOL: A light, volatile alcohol produced commercially by the catalyzed reaction of hydrogen and carbon monoxide. Methanol is blended with gasoline to improve its operational efficiency.

METHYL TERTIARY BUTYL ETHER (MTBE): A colorless, flammable, liquid oxygenated hydrocarbon that contains 18.15 percent oxygen. It is a fuel oxygenate produced by reacting methanol with isobutylene.

MID-SIZE CAR: See Intermediate-Size Car.

MINI-COMPACT CAR: An automobile industry designation usually consisting of cars with a wheelbase of less than 95 inches.

MINOR ARTERIALS (Highway): Streets and highways linking cities and larger towns in rural areas, in distributing trips to small geographic areas in urban areas (not penetrating identifiable neighborhoods).

MOTOR BUS (Transit): A rubber-tired, self-propelled, manually steered bus with fuel supply onboard the vehicle. Motor bus types include: intercity, school, and transit.

MOTORCYCLE: A two- or three-wheeled motor vehicle designed to transport one or two people, including motor scooters, minibikes, and mopeds.

NATIONALS (Air): Air carrier groups with annual operating revenues between $100 million and $1 billion.

NATURAL GAS: A naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in porous geologic formations beneath the Earth's surface, often in association with petroleum. The principal constituent is methane.

NATURAL GAS PLANT LIQUIDS: Liquids recovered from natural gas in processing plants or field facilities, or extracted by fractionators. They include ethane, propane, normal butane, isobutane, pentanes plus, and other products, such as finished motor gasoline, finished aviation gasoline, special naphthas, kerosene, and distillate fuel oil produced at natural gas processing plants.

NEAR MIDAIR COLLISION (Air): An incident in which the possibility of a collision occurred as a result of aircraft flying with less than 500 feet of separation, or a report received from a pilot or flight crew member stating that a collision hazard existed between two or more aircraft.

NONOCCUPANT (Automobile): Any person who is not an occupant of a motor vehicle in transport (e.g., bystanders, pedestrians, pedalcyclists, or an occupant of a parked motor vehicle).

NONRESPONSE ERROR: Error that results from some members of the sample or census not providing information. Nonresponse bias results from a systematic difference between those who do and those who do not respond to the measurement instrument.

NONSAMPLING ERROR: All sources of bias or inaccuracy in a study other than sampling error. Examples of nonsampling errors include processing, recording, or dataentry errors; nonresponse error; and response error.

NONSCHEDULED SERVICE (Air): Revenue flights not operated as regular scheduled service, such as charter flights, and all nonrevenue flights incident to such flight.

NONSELF-PROPELLED VESSEL (Water): A vessel without the means for self- propulsion. Includes dry cargo and tanker barges.

NONTRAIN INCIDENT: An event that results in a reportable casualty, but does not involve the movement of ontrack equipment, and does not cause reportable damage above the threshold established for train accidents.

NONTRESPASSERS (Rail): A person lawfully on any part of railroad property used in railroad operations, or a person adjacent to railroad premises when injured as the result of railroad operations.

NONVESSEL-CASUALTY-RELATED DEATH: A death that occurs onboard a commercial vessel but not as a result of a vessel casualty, such as a collision, fire, or explosion.

OCCUPANT: Any person in or on a motor vehicle in transport. Includes the driver, passengers, and persons riding on the exterior of a motor vehicle (e.g., a skateboard rider holding onto a moving vehicle). Excludes occupants of parked cars unless they are double parked or motionless on the roadway.

OCCUPATIONAL FATALITY: Death resulting from a job-related injury.

OPERATING EXPENSES (Air): Expenses incurred in the performance of air transportation, based on overall operating revenues and expenses. Does not include nonoperating income and expenses, nonrecurring items, or income taxes.

OPERATING EXPENSES (Rail): Expenses of furnishing transportation services, including maintenance and depreciation of the plant used in the service.

OPERATING EXPENSES (Transit): The total of all expenses associated with operation of an individual mode by a given operator. Includes distributions of "joint expenses" to individual modes and excludes "reconciling items," such as interest expenses and depreciation. Should not be confused with "vehicle operating expenses."

OPERATING EXPENSES (Truck): Includes expenditures for equipment maintenance, supervision, wages, fuel, equipment rental, terminal operations, insurance, safety, and administrative and general functions.

OPERATING REVENUES (Air): Revenues from the performance of air transportation and related incidental services. Includes l) Transportation revenues from the carriage of all classes of traffic

in scheduled and nonscheduled services, and 2) Nontransportation revenues consisting of federal subsidies (where applicable) and services related to air transportation.

OTHER FREEWAYS AND EXPRESSWAYS (Highway): All urban principal arterials with limited access but not part of the Interstate system.

OTHER PRINCIPAL ARTERIAL (Highway): Major streets or highways, many of multilane or freeway design, serving high-volume traffic corridor movements that connect major generators of travel.

OTHER RAIL REVENUE: This includes revenues from miscellaneous operations (i.e., dining- and bar-car services), income from lease of road and equipment, miscellaneous rental income, income from nonoperating property, profit from separately operated properties, dividend income, interest income, income from sinking and other reserve funds, release or premium on funded debt, contributions from other companies, and other miscellaneous income.

OTHER REVENUE VEHICLES (Transit): Other revenue-generating modes of transit service, such as cable cars, personal rapid transit systems, monorail vehicles, inclined railway cars, etc., not covered otherwise.

OTHER 2-AXLE 4-TIRE VEHICLES (Truck): Includes vans, pickup trucks, and sport utility vehicles.

OTHER WORK (General Aviation): Construction work (not Federal Aviation Regulations, Part 135), helicopter hoist, parachuting, aerial advertising, and towing gliders.

OXYGENATES: Any substance that when added to motor gasoline increases the amount of oxygen in that gasoline blend. Includes oxygen-bearing compounds such as ethanol, methanol, and methyl tertiary butyl ether. Oxygenated fuel tends to give a more complete combustion of carbon into carbon dioxide (rather than monoxide), thereby reducing air pollution from exhaust emissions.

PASSENGER CAR: A motor vehicle designed primarily for carrying passengers on ordinary roads, includes convertibles, sedans, and stations wagons.

PASSENGER-MILE: 1) Air: One passenger transported 1 mile; passenger-miles for one interairport flight are calculated by multiplying aircraft miles flow by the number of passengers carried on the flight. The total passenger-miles for all flights is the sum of passenger-miles for all interairport flights. 2) Auto: One passenger traveling 1 mile; e.g., one car transporting two passengers 4 miles results in eight passenger-miles. 3) Transit: The total number of miles traveled by transit passengers; e.g., one bus transporting five passengers 3 miles results in 15 passenger-miles.

PASSENGER REVENUE: 1) Rail: Revenue from the sale of tickets. 2) Air: Revenues from the transport of passengers by air. 3) Transit: Fares, transfer, zone, and park-and-ride parking charges paid by transit passengers. Prior to 1984, fare revenues collected by contractors operating transit services are not included.

PASSENGER VESSELS: A vessel designed for the commercial transport of passengers.

PEDALCYCLIST: A person on a vehicle that is powered solely by pedals.

PEDESTRIAN: Any person not in or on a motor vehicle or other vehicle. Excludes people in buildings or sitting at a sidewalk cafe. The National Highway Traffic Safety Administration also uses an "other pedestrian" category to refer to pedestrians using conveyances and people in buildings. Examples of pedestrian conveyances include skateboards, nonmotorized wheelchairs, rollerskates, sleds, and transport devices used as equipment.

PERSON-MILES (American Travel Survey): An estimate of the aggregate distances traveled by all persons on a given trip based on the estimated transportation-network-miles traveled on that trip.

PERSON TRIP (American Travel Survey): A trip taken by an individual. For example, if three persons from the same household travel together, the trip is counted as one household trip and three person trips.

PERSONAL BUSINESS TRIP (American Travel Survey): A trip taken for a school-related activity or for personal or family business, including weddings and funerals.

PERSONAL-USE VEHICLE TRIP (American Travel Survey): A trip in which the principle means of transportation is a car, pickup truck, or van; other truck; rental car, truck, or van; recreational vehicle or motor home; or motorcycle or moped.

PLEASURE TRIP (American Travel Survey): A trip taken to visit friends or relatives or for leisure.

PERSONAL CASUALTY (Transit): 1) An incident in which a person is hurt while getting on or off a transit vehicle (e.g., falls or door incidents), but not as a result of a collision, derailment/left roadway, or fire. 2) An incident in which a person is hurt while using a lift to get on or off a transit vehicle, but not as a result of a collision, derailment/left roadway, or fire. 3) An incident in which a person is injured on a transit vehicle, but not as a result of a collision, derailment/left roadway, or fire. 4) An incident in which a person is hurt while using a transit facility. This includes anyone on transit property (e.g., patrons, transit employees, trespassers), but does not include incidents resulting from illness or criminal activity.

PERSONAL WATERCRAFT: Craft less than 13 feet in length designed to be operated by a person or persons sitting, standing, or kneeling on the craft rather than within the confines of a hull.

PETROLEUM (Oil): A generic term applied to oil and oil products in all forms, such as crude oil, lease condensate, unfinished oils, petroleum products, natural gas plant liquids, and nonhydrocarbon compounds blended into finished petroleum products.

PROPERTY DAMAGE (Transit): The dollar amount required to repair or replace transit property (including stations, right of way, bus stops, and maintenance facilities) damaged during an incident.

PUBLIC ROAD: Any road under the jurisdiction of and maintained by a public authority (federal, state, county, town, or township, local government, or instrumentality thereof) and open to public travel.

RAIL MOTOR CARS: Self-propelled passenger rail cars that are driven by electric motors energized from an electrified roadway or by a generator driven by a diesel or gas turbine engine.

RAPID RAIL TRANSIT: Transit service using rail cars driven by electricity usually drawn from a third rail, configured for passenger traffic, and usually operated on exclusive rights-of-way. It generally uses longer trains and has longer station spacing than light rail.

REFORMULATED GASOLINE: Gasoline whose composition has been changed to meet performance specifications regarding ozone-forming tendencies and release of toxic substances into the air from both evaporation and tailpipe emissions. Reformulated gasoline includes oxygenates and, compared with gasoline sold in 1990, has a lower content of olefins, aromatics, volatile components, and heavy hydrocarbons.

RESIDUAL FUEL OIL: The heavier oils that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations and that conform to American Society for Testing and Materials (ASTM) Specifications D396 and 976. Includes, among others, Navy Special oil used in steam-powered vessels in government service and No. 6 oil used to power ships. Imports of residual fuel oil include imported crude oil burned as fuel.

RESPONSE ERROR: Error that results from the tendency of people to answer a question falsely, deliberate misrepresentation, unconscious falsification, or misunderstanding of what is required.

REVENUE: Remuneration received by carriers for transportation activities.

REVENUE PASSENGER: 1) Air: Person receiving air transportation from an air carrier for which remuneration is received by the carrier. Air carrier employees or others, except ministers of religion, elderly individuals, and handicapped individuals, receiving reduced rate charges (less than the applicable tariff) are considered nonrevenue passengers. Infants, for whom a token fare is charged, are not counted as passengers. 2) Transit: Single-vehicle transit rides by initial-board (first-ride) transit passengers only. Excludes all transfer rides and all nonrevenue rides. 3) Rail: Number of one-way trips made by persons holding tickets.

REVENUE PASSENGER ENPLANEMENTS (Air): The total number of passengers boarding aircraft. Includes both originating and connecting passengers.

REVENUE PASSENGER LOAD FACTOR (Air): Revenue passenger-miles as a percent of available seat-miles in revenue passenger services. The term is used to represent the proportion of aircraft seating capacity that is actually sold and utilized.

REVENUE PASSENGER-MILE: One revenue passenger transported 1 mile.

REVENUE PASSENGER TON-MILE (Air): One ton of revenue passenger weight (including all baggage) transported 1 mile. The passenger weight standard for both domestic and international operations is 200 pounds.

REVENUE TON-MILE: One short ton of freight transported 1 mile.

REVENUE VEHICLE-MILES (Transit): One vehicle (bus, trolley bus, streetcar) traveling 1 mile while revenue passengers are on board generates one revenue vehicle-mile. Revenue vehicle-miles reported represent the total mileage traveled by vehicles in scheduled or unscheduled revenue-producing services.

ROAD OIL: Any heavy petroleum oil, including residual asphaltic oil, that is used as a dust palliative and surface treatment on roads and highways. It is generally produced in 6 grades from 0, the most liquid, to 5, the most viscous.

ROLL ON/ROLL OFF VESSEL: Ships that are designed to carry wheeled containers or other wheeled cargo and use the roll on/roll off method for loading and unloading.

ROUND-TRIP DISTANCE (American Travel Survey): The estimated transportation network-miles traveled at the time of the trip from the household residence to the destination and back.

RURAL HIGHWAY: Any highway, road, or street that is not an urban highway.

RURAL MILEAGE (Highway): Roads outside city, municipal district, or urban boundaries.

SAMPLING ERROR: The estimated inaccuracy of the results of a study when a population sample, rather than a census, is used to explain the behavior of the total population. (Also referred to as margin of error and standard error.)

SCHEDULED SERVICE (Air): Transport service operated pursuant to published flight schedules.

SCHOOL BUS: A passenger motor vehicle that is designed or used to carry more than 10 passengers, in addition to the driver, and, as determined by the Secretary of Transportation, is likely to be significantly used for the purpose of transporting pre-primary, primary, or secondary school students between home and school.

SCHOOL-BUS-RELATED CRASH: Any crash in which a vehicle, regardless of body design, used as a school bus is directly or indirectly involved, such as a crash involving school children alighting from a vehicle.

SCOW (Water): Any flat-bottomed, nonself-propelled, rectangular vessel with sloping ends. Large scows are used to transport sand, gravel, or refuse.

SELF-PROPELLED VESSEL: A vessel that has its own means of propulsion. Includes tankers, containerships, dry bulk cargo ships, and general cargo vessels.

SERIOUS INJURY (Air Carrier/General Aviation): An injury that requires hospitalization for more than 48 hours, commencing within 7 days from the date when the injury was received; results in a bone fracture (except simple fractures of fingers, toes, or nose); involves lacerations that cause severe hemorrhages, nerve, muscle, or tendon damage; involves injury to any internal organ; or involves second- or third-degree burns or any burns affecting more than 5 percent of the body surface.

SMALL CERTIFICATED AIR CARRIER: An air carrier holding a certificate issued under section 401 of the Federal Aviation Act of 1958, as amended, that operates aircraft designed to have a maximum seating capacity of 60 seats or fewer or a maximum payload of 18,000 pounds or less.

STATE AND LOCAL HIGHWAY EXPENDITURES: Disbursements for capital outlay, maintenance and traffic surfaces, administration and research, highway law enforcement and safety, and interest on debt.

STREETCARS: Relatively lightweight passenger rail cars operating singly or in short trains, or fixed rails in right-of-way that are not always separated from other traffic for much of the way. Streetcars do not necessarily have the right-of-way at grade crossings with other traffic.

SUBCOMPACT CAR: As designated by the automobile industry, a car with a wheelbase between 95 and 99 inches.

SUPPLEMENTAL AIR CARRIER: An air carrier authorized to perform passenger and cargo charter services.

TANKER: An oceangoing ship designed to haul liquid bulk cargo in world trade.

TON-MILE (Truck): The movement of 1 ton of cargo the distance of 1 mile. Ton-miles are calculated by multiplying the weight in tons of each shipment transported by the miles hauled.

TON-MILE (Water): The movement of 1 ton of cargo the distance of 1 statute mile. Domestic ton-miles are calculated by multiplying tons moved by the number of statute miles moved on the water (e.g., 50 short tons moving 200 miles on a waterway would yield 10,000 ton-miles for that waterway). Ton-miles are not computed for ports. For coastwise traffic, the shortest route that safe navigation permits between the port of origin and destination is used to calculate ton-miles.

TRAFFICWAY (Highway): Any right-of-way open to the public as a matter of right or custom for moving persons or property from one place to another, including the entire width between property lines or other boundaries.

TRAIN LINE MILEAGE: The aggregate length of all line-haul railroads. It does not include the mileage of yard tracks or sidings, nor does it reflect the fact that a mile of railroad may include two or more parallel tracks. Jointly-used track is counted only once.

TRAIN-MILE: A train-mile is the movement of a train, which can consist of many cars, the distance of 1 mile. A train-mile differs from a vehicle-mile, which is the movement of one car (vehicle) the distance of 1 mile. A 10-car (vehicle) train traveling 1 mile is measured as 1 train-mile and 10 vehicle-miles. Caution should be used when comparing train-miles to vehicle-miles.

TRANSIT VEHICLE: Includes light, heavy, and commuter rail; motor bus; trolley bus; van pools; automated guideway; and demand-responsive vehicles.

TRANSSHIPMENTS: Shipments that enter or exit the United States by way of a U.S. Customs port on the northern or southern border, but whose origin or destination was a country other than Canada or Mexico.

TRAVEL PARTY (American Travel Survey): Household and nonhousehold members traveling together on a trip.

TRESPASSER (Rail): Any person whose presence on railroad property used in railroad operations is prohibited, forbidden, or unlawful.

TRIP (American Travel Survey): Roundtrip travel to a destination at least 100 miles from home. The following types of trips are excluded: 1) travel as part of an operating crew on a train, airplane, truck, bus, or ship; 2) regular commuting to work or school; 3) one-way trips to move to a new destination; and 4) trips by members of the Armed Forces while on active duty.

TROLLEY BUS: Rubber-tired electric transit vehicle, manually steered and propelled by a motor drawing current, normally through overhead wires, from a central power source.

TRUST FUNDS: Accounts that are specifically designated by law to carry out specific purposes and programs. Trust Funds are usually financed with earmarked tax collections.

TUG BOAT: A powered vessel designed for the towing or pushing of ships, dumb barges, pushed-towed barges, and rafts, but not for the carriage of goods.

U.S. FLAG CARRIER OR AMERICAN FLAG CARRIER (Air): One of a class of air carriers holding a Certificate of Public Convenience and Necessity issued by the U.S. Department of Transportation and approved by the President, authorizing scheduled operations over specified routes between the United States (and/or its territories) and one or more foreign countries.

UNLEADED GASOLINE: See Gasoline.

UNLINKED PASSENGER TRIPS (Transit): The number of passengers who board public transportation vehicles. A passenger is counted each time he/she boards a vehicle even if on the same journey from origin to destination.

URBAN HIGHWAY: Any road or street within the boundaries of an urban area. An urban area is an area including and adjacent to a municipality or urban place with a population of 5,000 or more. The boundaries of urban areas are fixed by state highway departments, subject to the approval of the Federal Highway Administration, for purposes of the Federal-Aid highway program.

VANPOOL (Transit): Public-sponsored com-

muter service operating under prearranged schedules for previously formed groups of riders in 8- to 18-seat vehicles. Drivers are also commuters who receive little or no compensation besides the free ride.

VEHICLE MAINTENANCE (Transit): All activities associated with revenue and nonrevenue (service) vehicle maintenance, including administration, inspection and maintenance, and servicing (cleaning, fueling, etc.) vehicles. In addition, it includes repairs due to vandalism or to revenue vehicle accidents.

VEHICLE-MILES (Highway): Miles of travel by all types of motor vehicles as determined by the states on the basis of actual traffic counts and established estimating procedures.

VEHICLE-MILES (Transit): The total number of miles traveled by transit vehicles. Commuter rail, heavy rail, and light rail report individual car-miles, rather than train-miles for vehicle-miles.

VEHICLE OPERATIONS (Transit): All activities associated with transportation administration, including the control of revenue vehicle movements, scheduling, ticketing and fare collection, system security, and revenue vehicle operation.

VESSEL CASUALTY (Water): An occurrence involving commercial vessels that results in 1) Actual physical damage to property in excess of $25,000; 2) Material damage affecting the seaworthiness or efficiency of a vessel; 3) Stranding or grounding; 4) Loss of life; or 5) Injury causing any person to remain incapacitated for a period in excess of 72 hours, except injury to harbor workers not resulting in death and not resulting from vessel casualty or vessel equipment casualty.

VESSEL-CASUALTY-RELATED DEATH: Fatality that occurs as a result of an incident that involves a vessel or its equipment, such as a collision, fire, or explosion. Includes drowning deaths.

WATERBORNE TRANSPORTATION: Transport of freight and/or people by commercial vessels under U.S. Coast Guard jurisdiction.

WAYBILL: A document that lists goods and shipping instructions relative to a shipment.

WEEKEND TRIP (American Travel Survey): Travel by persons who stay one or two nights away, including a Friday and/or Saturday night. Travel over three to five nights including a Friday and/or Saturday night stay is defined as a long-weekend trip.

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Italic page numbers refer to metric conversions.

C

S

Y

U.S./Metric Conversions

U.S. to Metric

Length (approximate)

1 yard (yd) = 0.91 meters (m)

1 mile (mi) = 1.61 kilometers (km)

Mass/Weight (approximate)

1 pound (lb) = 0.45 kilograms (kg)

1 short ton = 2,000 pounds (lbs) = 0.91 metric tons (t)

Volume (approximate)

1 quart (qt) = 0.95 liters (l)

1 gallon (gal) = 3.78 liters (l)

Energy Units (approximate)

1 British thermal unit (Btu) = 250 calories = 1,055 joules (J)

1 calorie (cal) = 4.1868 joules (exactly) (J)

1 kilowatt hour = 3.6 megajoules (exactly) (mj)

1 barrel of oil = 42 U.S. gallons (gal) = 0.16 cubic meters (m3)

1 quadrillion Btu (Quad) = about 170 million barrels (mbbl) of crude oil

Metric to U.S.

Length (approximate)

1 meter (m) = 3.28 feet (ft)

1 meter (m) = 1.09 yards (yd)

1 kilometer (km) = 0.62 miles (mi)

Mass/Weight (approximate)

1 gram (gm) = 0.035 ounces (oz)

1 kilogram (kg) = 2.21 pounds (lb)

1 metric ton (t) = 1,000 kilograms (kg) = 1.1 short tons

Volume (approximate)

1 liter (l) = 1.05 quarts (qt)

1 liter (l) = 0.26 gallons (gal)

Energy

1 joule = 0.24 calories (cal)

1 metajoule = 106 joules

1 petajoule = 1015 joules

1 exajoule = 1018 joules

SOURCE: U.S. Department of Commerce, National Institute of Standards and Technology.

For additional information, contact the U.S. Department of Commerce, Office of Metric Programs, Washington, DC 20239, (301) 975-3690, Internet site www.nist.gov/metric.

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