National Transportation Statistics 1999

Introduction

Compiled and published by the Bureau of Transportation Statistics, U.S. Department of Transportation, *National Transportation Statistics 1999* presents statistics on the U.S. transportation system, including its physical components, economic performance, safety record, energy use, and environmental impacts. *National Transportation Statistics 1999* 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 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 3 details transportation's safety record, giving data on accidents, crashes, fatalities, and injuries for each mode and for hazardous materials.
- Chapter 4 presents data on transportation energy use and related environmental impacts.

Statistics 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. The web copy of this report also includes 1991–94 data.

The Bureau of Transportation Statistics (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 the extent of data errors, *National Transportation Statistics 1999* includes a brief discussion of the quality of the data presented in many of the tables.

Table of Contents

Table A Social and Economic Characteristics of the United States

	1980	1985	1990	1995	1996	1997	1998
Total U.S. resident population[a] (thousands)	**227,255**	**237,924**	**249,440**	**262,761**	**265,179**	**267,636**	**270,299**
Age[b] (thousands)							
Under 18	63,754	62,623	63,942	68,438	69,023	69,528	69,872
18–24 years	30,022	28,902	26,955	25,168	24,882	24,979	25,470
25–34	37,082	41,696	43,170	40,793	40,321	39,610	38,774
35–44	25,634	31,691	37,441	42,550	43,359	43,998	44,520
45–54	22,800	22,460	25,060	31,111	32,369	33,633	34,585
55–64	21,703	22,135	21,115	21,141	21,359	21,813	22,676
65 and over	25,550	28,415	31,081	33,560	33,867	34,076	34,401
Sex[c] (thousands)							
Male	110,053	116,160	121,271	128,499	129,746	131,018	132,046
Female	116,493	122,576	127,494	134,261	135,434	136,618	138,252
Metropolitan areas (population in millions)[d]							
Large (over 1 million)	118.7	U	132.9	U	148.6	U	U
Medium (250,000–999,999)	41.2	U	46.4	U	43.9	U	U
Small (less than 250,000)	17.1	U	18.6	U	19.2	U	U
Rural v. urban[e] (thousands)							
Rural	59,495	U	61,656	U	U	U	U
Urban	167,051	U	187,053	U	U	U	U
Regions[f] (millions)							
Northeast	49.1	49.9	50.8	51.4	51.6	51.6	51.6
South	75.4	81.4	85.5	91.8	93.1	94.2	95.4
Midwest	58.9	58.8	59.7	61.8	62.1	62.5	63.0
West	43.2	47.8	52.8	57.7	58.5	59.4	60.3
Immigrants admitted[g]	**530,639**	**570,009**	**1,536,483**	**720,461**	**915,900**	**U**	**U**

KEY: U = data are unavailable

Continued next page

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

	1980	1985	1990	1995	1996	1997	1998
Total area (square miles)[h]	**3,618,770**	**U**	**3,717,796**	**U**	**U**	**U**	**U**
Gross domestic product (Chained $ 1992 billions)[i]	**4,615.0**	**5,323.5**	**6,136.3**	**6,761.7**	**6,994.8**	**7,269.8**	**7,551.9**
Agriculture, forestry, fishing	58.2	85.4	99.4	106.2	114.2	127.6	U
Manufacturing	822.6	976.4	1,090.0	1,271.6	1,293.8	1,369.9	U
Mining	82.0	87.1	96.9	107.4	103.0	109.9	U
Construction	214.7	232.9	247.5	254.2	268.5	274.4	U
Transportation	149.3	165.6	176.7	216.1	229.7	241.5	U
Wholesale/retail trade	600.5	794.9	906.9	1,082.2	1,152.5	1,245.5	U
Finance, insurance, real estate	862.8	968.1	1,109.0	1,206.2	1,246.0	1,286.0	U
Services	810.8	963.9	1,181.7	1,305.3	1,349.1	1,398.6	U
Total civilian labor force (thousands)	**106,940**	**115,461**	**125,840**	**132,304**	**133,943**	**136,297**	**137,673**
Participation rate of men	77.4%	76.3%	76.4%	75.0%	74.9%	75.0%	74.9%
Participation rate of women	51.5%	54.5%	57.5%	58.9%	59.3%	59.8%	59.8%
Number of households (thousands)	**80,776**	**86,789**	**93,347**	**98,990**	**99,627**	**101,018**	**102,528**
Average size of households	**2.76**	**2.69**	**2.63**	**2.65**	**2.65**	**2.64**	**2.62**
Median household income (Chained $ 1992)[j]	**$30,764**	**$31,379**	**$32,752**	**$31,965**	**$32,339**	**$34,502**	**U**
Average household expenditures (Chained $ 1992)	**U**	**$30,973**	**$30,547**	**$29,996**	**$30,795**	**$31,141**	**U**

KEY: U = data are unavailable

Continued next page

[a] Estimates as of July 1 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, therefore, may not sum to total.

[c] 1995 through 1998 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 July1 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: 1980–97: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 2.

1998: ____. Population Estimates Program, Population Division, Internet site www.census.gov/population/estimates/nation/intfile2-1.txt, as of October 4, 1999.

Age: 1980–97: *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 14.

1998: ____. Population Estimates Program, Population Division, Internet site www.census.gov/population/estimates/nation/intfile2-1.txt.

Sex: 1980–97: *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 19.

1998: ____. Population Estimates Program, Population Division, Internet site www.census.gov/population/estimates/nation/intfile2-1.txt.

Metropolitan areas: 1980–90: *Statistical Abstract of the United States 1995* (Washington, DC: 1998), table 41.

1996: ____. *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 41.

Rural/urban: ____. table 46.

Regions: 1980–97: ____. table 29.

1998: ____. USA Statistics in Brief, Supplement to the Statistical Abstract of the United States 1998, Internet site www.census.gov/staab/www/brief.html.

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

1990–96: ____. *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 www.ins.usdoj.gov/80/graphics/boutins/statistics/index.htm.

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: ____. *Survey of Current Business* (Washington, DC: November 1997).

1995–97: ____. November 1998.

1998: ____. September 1999.

Civilian labor force: 1980–97: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1998* (Washington, DC: 1998), table 644.

1998: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey, Internet site www.bls.gov/webapps/legacy/cpsatabl.htm, table A-1.

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

1990–1997: ____, table 645.

1998: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey, Internet site www.bls.gov/webapps/legacy/cpsatabl.htm, table A-1.

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: ____. *USA Statistics in Brief*, Supplement to the *Statistical Abstract of the United States 1998*, Internet site www.census.gov/staab/www/brief.html.

Median household income: 1980–97: ____, table 738. Converted to chained 1992 dollars using a combination of deflators constructed from the Bureau of Labor Statistics' Consumer Price Index and the Bureau of Economics Analysis' chained type price index and Current Population Survey, March 1999.

Average household expenditures: 1980–97: U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey, Internet site www.bls.gov/csxhome.htm.

The Transportation System

Section A
Physical Extent

Table 1-1 U.S. Transportation System Mileage (Statute miles)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
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
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
Amtrak[c]	N	N	N	N	24,000	24,000	24,000	24,000	25,000	25,000
Transit[d]										
Commuter rail[c]	N	N	N	N	N	3,574	4,132	4,160	R3,682	4,417
Heavy rail	N	N	N	N	N	1,293	1,351	1,458	R1,478	1,527
Light rail	N	N	N	N	N	384	483	568	638	659
Navigable channels[e]	25,000	25,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	U
Oil pipeline[f]	190,944	210,867	218,671	225,889	218,393	213,605	208,752	200,500	200,500	U
Gas pipeline[g]	630,950	767,520	913,267	979,263	1,051,774	1,118,875	1,206,894	1,262,152	R1,276,315	1,257,887

KEY: N = data are nonexistent; R = revised; U = data are unavailable

[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 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 main. 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 Federal Highway Administration creates mileage-based tables derived from the Highway Performance Monitoring System, beginning with the 1997 issue of USDOT FHWA's Highway Statistics. See the accuracy profiles at the end of this chapter 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.

1996–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table HM-12.

Class I rail: 1960–97: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 44.

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

1985–97: 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 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.

Oil pipeline: 1960–96: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 64.

Gas pipeline: 1960–97: American Gas Association, *Gas Facts* (Arlington, VA : Annual issues), table 5-2 and similar tables in earlier editions.

Table 1-2 Number of U.S. Airports[a]

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Public use											
% with lighted runways	R66.2	68.1	R71.4	71.9	72.3	72.8	73.5	74.3	74.5	74.6	74.8
% with paved runways	R72.3	66.7	70.7	71.5	71.6	72.2	72.9	73.3	73.7	74.0	74.2
Total	**4,814**	**5,858**	**5,589**	**5,551**	**5,545**	**5,538**	**5,474**	**5,415**	**5,389**	**5,357**	**5,352**
Private use											
% with lighted runways	R15.2	9.1	7.0	6.8	6.6	6.3	6.2	6.4	6.4	6.4	6.3
% with paved runways	R13.3	17.4	31.5	32.0	32.2	32.7	33.0	33.0	32.9	33.0	33.2
Total	**10,347**	**10,461**	**11,901**	**12,030**	**12,301**	**12,779**	**12,869**	**12,809**	**12,903**	**12,988**	**13,418**
TOTAL airports	**15,161**	**16,319**	**17,490**	**17,581**	**17,846**	**18,317**	**18,343**	**18,224**	**18,292**	**18,345**	**18,770**
Certificated[b]											
Civil	N	N	N	N	N	N	577	572	577	566	566
Military	N	N	N	N	N	N	95	95	94	94	94
Total	**730**	**700**	**680**	**669**	**664**	**670**	**672**	**667**	**671**	**660**	**660**
General aviation	**14,431**	**15,619**	**16,810**	**16,912**	**17,182**	**R17,637**	**17,671**	**17,557**	**17,621**	**17,685**	**18,110**
TOTAL airports	**15,161**	**16,319**	**17,490**	**17,581**	**17,846**	**18,317**	**18,343**	**18,224**	**18,292**	**18,345**	**18,770**

[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.

KEY: N = data are nonexistent; R = revised

SOURCE: U.S. Department of Transportation, Federal Aviation Administration, *Administrator's Fact Book* (Washington, DC: Annual issues).

Table 1-3 U.S. Public Road and Street Mileage by Type of Surface (Millions of miles)

	1960	1965	1970	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996[c]	1997[c]
Paved[a]														
Low and intermediate type	0.672	0.758	0.897	0.967	1.041	1.015	1.025	1.030	1.026	1.010	1.043	1.062	1.066	[d]
High-type	0.558	0.696	0.762	0.888	1.032	1.099	1.230	1.250	1.277	1.268	1.299	1.316	1.314	[d]
Total	**1.230**	**1.455**	**1.658**	**1.855**	**2.073**	**2.114**	**2.255**	**2.280**	**2.303**	**2.278**	**2.342**	**2.378**	**2.380**	**2.410**
Unpaved[b] total	**2.315**	**2.235**	**2.072**	**1.983**	**1.787**	**1.750**	**1.612**	**1.604**	**1.598**	**1.628**	**1.564**	**1.534**	**1.544**	**1.548**
Total paved and unpaved	**3.546**	**3.690**	**3.730**	**3.838**	**3.860**	**3.864**	**3.867**	**3.884**	**3.901**	**3.905**	**3.907**	**3.912**	**R3.920**	**R3.946**

KEY: R = revised

[a] 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); and high-type rigid (Portland cement concrete roadway with or without a bituminous wearing surface of less than 1").

[b] 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.

[c] Includes the 50 states, the District of Columbia, and Puerto Rico.

[d] Source no longer sorts data into these particular categories. Thus, data are not consistent with previous year's data due to the exclusion of rural minor collector functional systems.

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 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 to totals due to rounding.

See table 1-4 for a detailed breakout.

Beginning with the 1997 issue of FHWA's Highway Statistics, a new method has been instituted for creating mileage based tables derived from the Highway Performance Monitoring System (HPMS) data. For record purposes, FHWA considers the mileage totals from table HM-20, Public Road Length, Miles by Functional System to be the controlling totals should a single value be required. Total mileage in this table does not match that in tables 1-1 and 1-4. See the accuracy profiles at the end of this chapter for additional details.

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.

1996–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table HM-12.

Table 1-4 U.S. Public Road and Street Mileage by Functional System[a]

	1990	1991	1992	1993	1994	1995	1996	1997
Urban mileage								
Principal arterials, interstates	11,527	11,602	12,516	12,877	13,126	13,164	R13,217	R13,247
Principal arterials, other freeways and expressways	7,668	7,709	8,491	8,841	8,994	8,970	R9,027	R9,063
Principal arterials, other	51,968	52,515	51,900	52,708	53,110	52,796	R52,983	R53,223
Minor arterials	74,659	74,795	80,815	86,821	87,857	88,510	R89,020	R89,185
Collectors	78,254	77,102	82,784	84,854	86,089	87,331	R87,790	R88,049
Local	520,568	526,139	548,560	559,776	564,609	568,935	R574,728	R583,973
Total	**744,644**	**749,862**	**785,066**	**805,877**	**813,785**	**819,706**	**826,765**	**R836,740**
Rural mileage								
Principal arterials, interstates	33,547	33,677	32,951	32,631	32,457	32,580	R32,820	R32,817
Principal arterials, other	83,802	86,747	94,947	96,770	97,175	97,948	98,131	98,257
Minor arterials	144,774	141,795	137,685	137,577	138,120	137,151	137,359	R137,497
Major collectors	436,352	436,746	434,072	432,222	431,115	431,712	R432,117	R432,714
Minor collectors	293,922	293,511	284,504	282,182	282,011	274,081	R273,198	R272,362
Local	2,129,885	2,141,582	2,131,856	2,117,952	2,111,932	2,119,048	R2,119,262	R2,135,485
Total	**3,122,282**	**3,134,058**	**3,116,015**	**3,099,334**	**3,092,810**	**3,092,520**	**R3,092,887**	**R3,109,132**
TOTAL urban and rural mileage	**3,866,926**	**3,883,920**	**3,901,081**	**3,905,211**	**3,906,595**	**3,912,226**	**R3,919,652**	**R3,945,872**

KEY: R = revised

[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 summary data, see table 1-3. 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.

1996–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table HM-20.

Table 1-5 Estimated U.S. Roadway Lane-Miles by Functional System

	1980	1985	1990	1995	1996[R]	1997[R]
Urban						
Interstates	48,458	57,295	62,214	71,377	71,790	72,257
Other arterials	333,673	371,649	399,376	445,828	449,480	453,623
Collectors	145,128	162,377	167,770	185,032	186,923	188,850
Local	867,986	951,018	1,041,136	1,137,870	1,149,456	1,167,946
Total	**1,395,245**	**1,542,339**	**1,670,496**	**1,840,107**	**1,857,649**	**1,882,676**
Rural						
Interstates	130,980	131,907	135,871	131,916	132,963	133,165
Other arterials	507,098	510,005	517,342	530,706	532,856	536,989
Collectors[a]	1,431,267	1,466,789	1,467,602	1,417,428	1,416,662	1,418,637
Local	4,457,584	4,366,954	4,259,770	4,238,096	4,238,524	4,270,970
Total	**6,526,929**	**6,475,655**	**6,380,585**	**6,318,146**	**6,321,005**	**6,359,761**
TOTAL lane-miles	**7,922,174**	**8,017,994**	**8,051,081**	**8,158,253**	**8,178,654**	**8,242,437**

a 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 2 lanes wide.

KEY: R = revised

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

1996–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

Table 1-6 Number of Stations Served by Amtrak and Rail Transit, Fiscal Year

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

KEY: U = data are unavailable

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 Annual Report,* Statistical Appendix (Washington, DC: Annual issues). U.S. Department of Transportation, Federal Transit Administration, *National Transit Database* (Washington, DC: Annual issues), table 18 and similar tables in earlier editions.

Table 1-7 Number of U.S. Water Ports and Facilities

	1990	1995	1996
Coastal			
Atlantic	59	58	62
Gulf	37	38	38
Pacific	83	79	86
Caribbean	8	8	8
Total coastal	**187**	**183**	**194**
Great Lakes	**73**	**82**	**82**
Inland	**45**	**44**	**45**
TOTAL	**305**	**309**	**321**

NOTES: Caribbean includes ports in Puerto Rico and the U.S. Virgin Islands. The number of U.S. ports for a particular year represents any U.S. port with activity of greater than one U.S. short ton, either domestic or foreign. The only facility included in this count of ports and facilities is the Louisiana Offshore Oil Platform.

SOURCE: U.S. Army, Corps of Engineers, Navigation Data Center, special tabulation, 1998.

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

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

	1991	1992	1993	1994	1995	1996	1997
Oil pipeline[a]							
Crude lines	115,860	112,990	112,990	114,000	114,000	114,000	U
Product lines	87,968	86,033	86,033	86,500	86,500	86,500	U
Total	**203,828**	**199,023**	**199,023**	**200,500**	**200,500**	**200,500**	**U**
Gas pipeline[b]							
Distribution mains	857,500	883,200	908,300	919,300	R936,800	R959,500	955,300
Transmission pipelines[c]	281,600	284,500	269,600	268,300	R263,900	R259,300	256,500
Field and gathering lines	86,300	86,200	73,100	70,400	R60,400	R57,500	46,100
Total	**1,225,358**	**1,253,924**	**1,251,095**	**1,257,971**	**R1,261,100**	**R1,276,315**	**1,257,887**

[a] Includes trunk and gathering lines for crude mileage.

[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.

KEY: R = revised; U = data are unavailable

SOURCES: **Oil pipeline:** 1960–96: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 64.

Gas pipeline: 1960–97: 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, and Vessels

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Air										
Air carrier[a]	2,135	2,125	2,679	2,495	3,808	4,678	6,083	7,411	7,478	7,616
General aviation[b] (active fleet)	76,549	95,442	[R]131,743	168,475	[R]211,045	210,654	196,800	[R]188,100	[R]191,100	192,400
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
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
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
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
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
Bus	272,129	314,284	377,562	462,156	528,789	593,485	626,987	685,503	694,781	697,548
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**
Transit[c]										
Motor bus	49,600	49,600	49,700	50,811	59,411	64,258	58,714	67,107	71,678	[P]72,170
Light rail cars	2,856	1,549	1,262	1,061	1,013	717	913	999	1,140	[P]1,229
Heavy rail cars	9,010	9,115	9,286	9,608	9,641	9,326	10,419	10,157	10,201	[P]10,242
Trolley bus	3,826	1,453	1,050	703	823	676	832	885	871	[P]859
Commuter rail cars and locomotives	N	N	N	N	4,500	4,035	4,415	4,565	4,665	[P]4,943
Demand responsive	N	N	N	N	N	14,490	16,471	29,352	30,804	[P]30,697
Other[d]	N	N	N	N	N	867	1,197	2,809	3,003	[P]3,440

KEY: N = data are nonexistent; P = preliminary; R = revised

Continued next page

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

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
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
Locomotive	29,031	27,780	27,077	27,846	28,094	22,548	18,835	18,812	19,269	19,684
Nonclass I freight cars	32,104	37,164	29,787	29,407	102,161	111,086	103,527	84,724	87,364	116,108
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
Amtrak										
Passenger train car	N	N	N	1,913	2,128	1,854	1,863	1,722	1,730	1,728
Locomotive	N	N	N	355	419	291	318	313	299	332
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
Self-propelled vessels[f]	6,543	6,083	6,455	6,144	7,126	7,522	8,236	8,281	8,293	8,408
Oceangoing steam and motor ships (1,000 gross tons and over)	2,926	2,376	1,579	857	864	737	636	509	495	477
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	[R]11,734,710	11,877,938	12,312,982

KEY: N = data are nonexistent; P = preliminary; R = revised

Continued next page

Number of U.S. Aircraft, Vehicles, and Vessels

[a] The data source for the air carrier time series has changed with this edition of National Transportation Statistics. 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] 1995–97 data may not be comparable to 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, railroad-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: _____. *1979 edition* (Washington, DC: 1979), table 5.1.

1980–85: _____. *Calendar Year 1986* (Washington, DC: 1986), table 5.1.

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

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: _____. *Calendar Year 1976* (Washington, DC: 1976), table 8-6.

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

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

1990–97: _____. General Aviation and Air Taxi Activity Survey, *Calendar Year 1997* (Washington, DC: unpublished), table 1.3, personal communication, March 19, 1999.

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 MV-201.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicles: 1970-94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit and combination trucks, and buses: 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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

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

Rail (all categories, except Amtrak): 1960–97: Association of American Railroads, *Railroad Facts 1998* (Washington, DC: 1998), pp. 48, 50.

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

1985–97: _____. *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues), p. 50.

Water transportation: *Nonself-propelled vessels and self-propelled vessels:* 1960–97: 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: 1960–97: U.S. Department of Transportation, Maritime Administration, *Merchant Fleets of the World* (Washington, DC: Annual issues).

Recreational boats: 1960–97: 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 and Vessels

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Civilian aircraft (shipments)											
Transport[a]	245	233	311	315	387	278	521	256	269	374	P533
Helicopters	N	598	482	864	1,366	384	603	292	278	346	P394
General aviation	7,588	11,852	7,283	14,072	11,881	2,029	1,144	1,077	1,130	1,569	P2,034
Highway											
Passenger car (new retail sales)	6,641,000	R9,332,000	8,400,000	R8,624,000	R8,979,000	R11,042,000	9,300,000	R8,635,000	8,527,000	8,272,000	8,142,000
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	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	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	U
Recreational vehicle (shipments)	N	192,830	380,300	339,600	178,500	351,700	347,300	475,200	466,800	438,800	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**
Transit (deliveries)											
Motor bus[e]	2,415	3,000	1,424	5,261	4,572	3,367	4,779	6,022	R6,016	P6,549	U
Light rail	0	0	0	0	32	63	55	38	39	P76	U
Heavy rail	416	580	308	127	130	441	10	72	10	P34	U
Trolley bus	0	0	0	1	98	0	118	3	R3	P0	U
Commuter rail	214	666	302	2,165	152	179	83	38	111	P198	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	U
Locomotive	389	1,387	1,029	772	1,480	522	530	928	761	743	U

KEY: N = data are nonexistent; P = preliminary; R = revised; U = data are unavailable

Continued next page

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

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Amtrak (deliveries)											
Passenger train car	N	N	N	109	109	0	58	76	R92	10	0
Locomotive	N	N	N	30	17	10	0	10	0	111	35
Water transport											
Merchant vessel[g]	20	13	13	15	23	14	0	R1	0	1	4
Recreational boat[h,R]	N	N	N	N	642,800	674,600	525,300	663,760	634,750	610,100	571,000

KEY: N = data are nonexistent; P = preliminary; R = revised; U = data are unavailable

[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: 1960–97: Aerospace Industries Association, *Aerospace Facts and Figures* (Washington, DC: Annual issues), "Civil Aircraft Shipments."

1998: _____. Internet site www.aia-aerospace.org/homepage/stats/A3.html, as of May 17, 1999.

Highway: Passenger cars and trucks: 1960-97: American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures, 1998* (Detroit, MI: 1998), p. 21 (passenger car) and p. 6 (truck), and similar tables in earlier editions.

1998: Ward's Communications, personal communication, Apr. 7, 1999.

Motorcycles: 1970–97: Motorcycle Industry Council, Inc., *Motorcycle Statistical Annual, 1998* (Irvine, CA: 1998), 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.

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

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: 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1999), table 54 and similar tables in earlier editions.

Class I rail: 1960–97: Association of American Railroads, *Railroad Facts 1998* (Washington, DC: 1998), p. 54 and similar tables in earlier editions.

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

1985–98: *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual Issues).

Water: Merchant vessel: 1960–97: U.S. Department of Transprotation, Maritime Administration, *Merchant Fleets of the World* (Washington, DC: Annual issues).

Recreational boat: 1980–98: National Marine Manufacturers Association, *Boating 1998* (Chicago, IL: 1999), annual retail unit estimates.

Table 1-11 U.S. Automobile and Truck Fleets by Use (Thousands)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Number of automobiles in fleets of 25 or more									
Business[a]	2,889	2,628	2,492	1,751	1,722	1,326	1,295	1,188	1,159
Government[b]	538	504	516	401	428	1,214	1,209	1,218	1,030
Utilities	551	544	548	386	382	376	376	377	359
Police	249	250	264	264	266	269	274	280	289
Taxi	141	141	140	140	141	139	130	181	190
Rental (includes vans and SUVs)	990	1,160	1,448	1,501	1,473	1,518	1,590	1,608	1,602
Number of automobiles in fleets of 4–24	U	U	U	U	U	4,200	4,250	4,373	4,921
Total	**5,358**	**5,227**	**5,408**	**4,443**	**4,412**	**9,042**	**9,124**	**9,225**	**9,550**
Number of trucks in fleets of 25 or more									
Business[c]	U	U	1,080	1,378	1,375	1,205	1,275	1,332	1,360
Government[b]	U	U	297	632	646	2,221	2,215	2,223	2,010
Utilities	U	U	593	493	487	480	482	483	459
Other (police, taxi, etc.)	U	U	7	7	7	7	7	7	8
Rental trucks (not vans and SUVs)	U	U	304	308	363	202	197	179	181
Number of trucks in fleets of 4–24	U	U	U	U	U	2,100	2,270	2,420	3,311
Total	**U**	**U**	**2,281**	**2,818**	**2,878**	**6,215**	**6,446**	**6,644**	**7,329**
TOTAL automobiles and trucks in fleets	**U**	**U**	**7,689**	**7,261**	**7,290**	**15,257**	**15,570**	**15,869**	**16,879**

[a] Includes driver schools.

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

[c] Businesses with 25 or more Class 1–5 trucks including leasing, construction, plumbing, heating, food distribution, pest control, cable TV, etc.

KEY: SUV = sport utility vehicles; U = data are unavailable

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

Table 1-12 Annual U.S. Motor Vehicle Production and Factory (Wholesale) Sales (Thousands)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Production										
Passenger cars	6,703	9,335	6,550	6,717	6,376	8,185	6,077	6,351	6,083	5,927
Commercial vehicles[a]	1,202	1,785	1,734	2,270	1,634	3,468	3,706	5,635	R5,749	6,192
Total	**7,905**	**11,120**	**8,284**	**8,987**	**8,010**	**11,653**	**9,783**	**11,985**	**R11,833**	**12,119**
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
Commercial vehicles[a]	1,194	1,752	1,692	2,272	1,667	3,464	3,725	5,713	5,776	6,153
Total	**7,869**	**11,057**	**8,239**	**8,985**	**8,067**	**11,467**	**9,775**	**12,023**	**11,916**	**12,223**

KEY: R = revised

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

NOTE: Factory sales can be greater than production total because of sales from previous year's inventory.

SOURCE: American Automobile Manufacturers Association, *Motor Vehicle Facts & Figures 1998* (Detroit, MI: 1998), p. 3.

Table 1-13 Retail[a] New Passenger Car Sales (Thousands)

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

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

1975, 1985–97: ____. *Motor Vehicle Facts & Figures 1998* (Detroit, MI: 1998), p. 21.

Table 1-14 New and Used Passenger Car Sales and Leases (Thousands)

	1990	1991	1992	1993	1994	1995	1996[R]	1997	1998
New passenger car sales[a]	**9,300**	**8,175**	**8,213**	**8,518**	**8,991**	**8,635**	**8,527**	**8,272**	**8,142**
Used passenger car sales[b]	**37,530**	**37,290**	**36,950**	**38,057**	**40,141**	**41,758**	**40,828**	**40,270**	**40,230**
Value of transactions ($ billions)	219	230	247	279	[R]312	[R]338	337	338	336
Average price (current $)	5,830	6,157	6,693	7,335	[R]7,781	[R]8,093	8,257	8,399	8,353
TOTAL new and used passenger car sales	**46,830**	**45,465**	**45,163**	**46,575**	**49,132**	**50,393**	**49,355**	**48,542**	**48,372**
New passenger car leases[c]	**534**	**667**	**882**	**1,197**	**1,715**	**1,795**	**1,808**	**2,062**	**1,985**

KEY: R = revised

[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:** 1990–97: American Automobile Manufacturers Association, Motor Vehicle Facts & Figures, 1998 (Detroit, MI: 1998), p. 21. 1998: Ward's Communications, personal communication, Apr. 7, 1999

Used passenger car sales: ADT Automotive, 1999 Used Car Market Report (Nashville, TN: 1999), p. 5.

Leased passenger cars: CNW Marketing/Research, Bandon, OR, personal communication, Jan. 25, 1999.

Table 1-15 Retail Sales of New Cars by Sector (Thousands)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Sales of new cars											
Consumer	5,645	7,103	6,252	5,907	6,100	7,092	5,677	[R]4,341	[R]4,052	3,875	3,997
Business	930	2,140	2,056	2,508	2,758	3,754	3,477	[R]4,203	[R]4,313	4,246	4,096
Government	66	89	94	123	124	132	147	144	134	112	137
Total	**6,641**	**9,333**	**8,402**	**8,538**	**8,982**	**10,978**	**9,300**	**[R]8,688**	**[R]8,499**	**8,232**	**8,230**
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	48.6
Business	14.0	22.9	24.5	29.4	30.7	34.2	37.4	48.4	50.7	51.6	49.8

KEY: R = revised

NOTE: Includes imported cars, but not vans, trucks, or sport utility vehicles.

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

Table 1-16 Period Sales, Market Shares, and Sales-Weighted Fuel Economies of New Domestic and Imported Automobiles, Selected Sales Periods[a] (Thousands)

	1980	1985	1990	1995	1996[R]	1997
Sales						
Total Units	9,095	10,969	9,224	8,725	8,652	8,261
Minicompact	428	52	77	45	34	40
Subcompact	3,441	2,382	2,030	1,518	1,315	1,510
Compact	599	3,526	3,156	3,290	3,492	2,937
Midsize	3,073	3,118	2,512	2,499	2,488	2,531
Large	1,336	1,516	1,279	1,321	1,259	1,162
Two-seater	216	374	170	53	62	81
Market share, %						
Minicompact	4.7	0.5	0.8	0.5	0.4	0.5
Subcompact	37.8	21.7	22.0	17.4	15.2	18.3
Compact	6.6	32.1	34.2	37.7	40.4	35.6
Midsize	33.8	28.4	27.2	28.6	28.8	30.6
Large	14.7	13.8	13.9	15.1	14.6	15.1
Two-seater	2.4	3.4	1.8	0.6	0.7	1.0
Fuel economy, mpg						
Fleet	23.2	27.0	27.6	28.0	28.3	28.3
Minicompact	29.4	32.7	26.4	27.0	27.2	26.3
Subcompact	27.3	30.1	31.3	31.7	32.1	32.6
Compact	22.3	29.6	28.9	30.2	30.4	30.0
Midsize	21.3	24.9	25.9	25.9	26.4	26.3
Large	19.3	22.3	23.5	24.1	24.2	24.5
Two-seater	21.0	27.6	28.0	24.7	25.4	26.3

KEY: mpg = miles per gallon; R = revised

[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, 1997, as cited in Oak Ridge National Laboratory, *Transportation Energy Data Book, Edition 18*, ORNL-6941 (Oak Ridge, TN: 1998), table 6.3, p. 6-4.

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

	1980	1985	1990	1995	1996[R]	1997
Sales						
Total units	2,217	4,235	4,515	5,934	6,237	6,527
Small pickups	516	864	678	357	[b]575	521
Large pickups	1,115	1,691	1,574	2,184	2,042	2,051
Small vans	14	438	933	1,257	1,230	1,216
Large vans	328	536	399	401	370	387
Small utility	76	478	738	1,225	1,379	1,715
Large utility	167	229	193	510	641	637
Market share, %						
Small pickups	23.3	20.4	15.0	6.0	9.2	8.0
Large pickups	50.3	39.9	34.9	36.8	32.7	31.4
Small vans	0.6	10.3	20.7	21.2	19.7	18.6
Large vans	14.8	12.7	8.8	6.8	5.9	5.9
Small utility	3.4	11.3	16.4	20.6	22.1	26.3
Large utility	7.5	5.4	4.3	8.6	10.3	9.8
Fuel economy, mpg						
Fleet	18.1	20.4	20.5	20.2	20.4	20.1
Small pickups	25.5	26.8	25.2	25.6	25.6	24.6
Large pickups	17.0	19.0	18.9	19.4	18.9	19.4
Small vans	19.6	23.9	23.1	22.8	22.8	22.9
Large vans	16.3	16.4	16.9	17.1	17.2	17.8
Small utility	16.9	22.1	21.9	20.8	21.1	19.6
Large utility	14.6	16.6	16.1	17.4	18.2	18.2

KEY: mpg = miles per gallon; R = revised

[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, 1997, as cited in Oak Ridge National Laboratory, *Transportation Energy Data Book, Edition 18*, ORNL-6941 (Oak Ridge, TN: 1998), table 6.10, p. 6-12.

Table 1-18 World Motor Vehicle Production (Thousands)

	Passenger cars							
	1961	**1971**	**1981**	**1991**	**1994**	**1995**	**1996**	**1997**
Argentina	78	193	139	114	338	227	269	366
Australia	182	393	352	269	323	314	303	320
Austria	8	1	7	14	45	59	97	98
Belgium	N	279	216	253	409	386	368	356
Brazil	98	342	406	705	1,248	1,297	1,459	1,680
Canada	328	1,083	803	1,060	1,214	1,337	1,279	1,374
China	N	N	N	81	250	321	382	482
Czech Republic[a]	59	149	181	173	174	208	263	321
France	988	2,694	2,612	3,188	3,175	3,051	3,148	2,259
Germany	1,802	3,829	3,758	4,677	4,094	4,360	4,540	4,678
India	22	42	42	179	237	330	396	410
Italy	694	1,701	1,257	1,633	1,341	1,422	1,318	1,563
Japan	250	3,718	6,974	9,753	7,802	7,611	7,864	8,491
Korea, South	N	N	69	1,158	1,806	2,003	2,265	2,308
Malaysia	N	N	N	102	137	164	176	280
Mexico	N	154	355	720	857	699	798	855
Netherlands	13	78	78	85	92	100	145	197
Poland	14	86	248	168	349	347	353	295
Portugal	N	N	N	N	38	41	119	186
Romania	N	N	N	84	85	71	76	108
Russia	149	518	1,324	1,308	796	838	868	982
Spain	55	453	855	1,943	1,974	2,131	2,213	2,342
Sweden	110	287	258	269	353	388	368	376
Taiwan	N	N	N	266	291	282	265	268
Turkey	N	13	25	196	213	233	208	243
United Kingdom	1,004	1,742	955	1,237	1,467	1,532	1,686	1,698
United States	5,522	8,584	6,253	5,439	6,614	6,351	6,083	5,927
Yugoslavia, Federal Republic of	15	114	240	213	8	8	9	11
Total world	**11,391**	**26,453**	**27,407**	**35,287**	**R35,730**	**36,111**	**37,318**	**38,474**
US % of world	**48%**	**32%**	**23%**	**15%**	**19%**	**18%**	**16%**	**15%**

KEY: N = data are nonexistent

Continued next page

Table 1-18 Cont'd World Motor Vehicle Production (Thousands)

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

KEY: N = data are nonexistent

Continued next page

Table 1-18 Cont'd World Motor Vehicle Production (Thousands)

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

[a] Formerly Czechoslovakia.

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

SOURCE: American Automobile Manufacturers Association, World Motor Vehicle Data (Detroit, MI: Annual issues), and unpublished revisions.

KEY: N = data are nonexistent

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

[a] Includes barge carriers.

[b] Includes integrated tug/barges.

KEY: DWT = deadweight tons; N = data are nonexistent; R = revised; RO/RO = roll-on/roll-off vessels

NOTES: Excludes nonmerchant type and/or Navy-owned vessels that are 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 any military forces. All data are as of December 31 of year shown.

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

Section C
Condition

Table 1-20 U.S. Airport Runway Pavement Conditions

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

[a] The U.S. Department of Transportation, Federal Aviation Administration's (FAA) National Plan of Integrated Airport Systems (NPIAS) 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.

NOTE: 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.

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

1993: ____. *National Plan of Integrated Airport Systems* (NPIAS), 1993-1997 (Washington DC: 1995).

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

Total number of airports: 1986—97: U.S. Department of Transportation, Federal Aviation Administration, Office of Airport Planning and Programming, National Planning Division, personal communication, 1997.

Table 1-21 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

NOTE: The Nationwide 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	(incl. vans)

SOURCE: The R. L. Polk Co., personal communication, May 13, 1999.

Table 1-22 Condition of U.S. Roadways by Functional System

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

KEY: N = data are nonexistent; R = revised; — = value too small to report.

Continued next page

Table 1-22 Cont'd **Condition of U.S. Roadways by Functional System**

	1990	1991	1992	1993	1994	1995	1996[R]	1997
Rural (continued)								
Very good (%)	36.2	36.1	20.4	[R]15.9	21.9	23.7	18.4	19.3
Unpaved (%)	11.1	11.0	10.7	10.9	10.7	10.2	10.1	N
Miles not reported	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**2,402**
Urban								
Interstates								
Miles reported	**11,527**	**11,603**	**12,466**	**10,738**	**12,338**	**12,307**	**12,430**	**12,477**
Poor (%)	8.6	[R]7.7	7.1	10.6	13.0	10.4	8.6	9.0
Mediocre (%)	[a]	[a]	13.2	30.9	29.9	26.8	28.3	27.0
Fair (%)	32.2	32.3	17.0	23.6	24.2	23.8	24.7	24.4
Good (%)	[a]	[a]	28.0	28.3	26.7	27.5	30.7	32.9
Very good (%)	59.1	[R]60.0	34.7	6.5	6.2	11.4	7.6	6.7
Unpaved (%)	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**2,140**	**788**	**857**	**787**	**771**
Other freeways and expressways								
Miles reported	**7,670**	**7,714**	**8,465**	**7,011**	**7,618**	**7,804**	**8,410**	**8,480**
Poor (%)	2.2	2.3	2.6	3.8	5.3	4.8	3.4	12.0
Mediocre (%)	[a]	[a]	5.9	9.4	12.7	9.8	8.7	34.2
Fair (%)	43.9	44.2	32.4	60.6	58.1	54.7	54.7	24.3
Good (%)	[a]	[a]	28.1	22.7	20.9	20.4	26.3	25.2
Very good (%)	53.9	53.5	31.0	3.5	2.9	10.3	6.8	4.2
Unpaved (%)	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**1,846**	**1,377**	**1,166**	**617**	**579**
Other principal arterials								
Miles reported	**51,987**	**52,349**	**52,165**	**30,337**	**38,598**	**41,444**	**44,498**	**45,009**
Poor (%)	5.9	6.6	6.8	9.2	[R]12.5	12.4	11.8	26.7
Mediocre (%)	[a]	[a]	11.5	13.3	16.3	14.7	14.1	33.0
Fair (%)	[R]49.0	49.1	34.8	55.0	50.8	47.2	48.9	16.5
Good (%)	[a]	[a]	21.4	19.3	16.6	15.9	17.5	17.8
Very good (%)	45.1	44.3	25.3	3.3	3.8	9.7	7.7	6.0
Unpaved (%)	N	N	N	N	N	N	N	N
Miles not reported	**N**	**N**	**N**	**22,498**	**14,492**	**11,352**	**8,485**	**8,209**
Minor arterials								
Miles reported	**74,656**	**74,979**	**80,368**	**[R]86,819**	**87,852**	**88,510**	**89,020**	**88,484**
Poor (%)	8.9	7.4	7.9	[R]7.9	6.7	6.7	6.9	7.2
Mediocre (%)	[a]	[a]	14.3	[R]13.8	12.3	13.6	13.0	13.0

KEY: N = data are nonexistent; R = revised; — = value too small to report.

Continued next page

Table 1-22 Cont'd Condition of U.S. Roadways by Functional System

	1990	1991	1992	1993	1994	1995	1996[R]	1997
Urban (continued)								
Fair (%)	48.5	49.9	34.1	[R]40.2	38.1	36.9	37.9	37.9
Good (%)	[a]	[a]	19.2	[R]18.4	20.5	20.4	20.7	21.4
Very good (%)	42.1	42.1	24.0	[R]19.4	22.1	22.1	21.1	20.6
Unpaved (%)	0.5	0.6	0.5	0.4	0.3	0.3	0.4	N
Miles not reported	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**374**
Collectors								
Miles reported	**78,248**	**77,097**	**82,657**	**[R]84,856**	**86,098**	**87,331**	**87,790**	**86,666**
Poor (%)	16.5	11.2	10.5	[R]10.6	9.8	9.7	9.7	10.6
Mediocre (%)	[a]	[a]	16.9	16.8	16.2	16.8	16.6	16.0
Fair (%)	50.4	53.5	35.2	[R]40.0	40.0	39.0	39.2	39.0
Good (%)	[a]	[a]	17.3	[R]16.1	17.0	17.2	18.2	18.4
Very good (%)	31.7	34.2	19.1	[R]15.5	16.0	16.6	15.4	15.9
Unpaved (%)	1.3	1.1	1.1	1.0	0.9	0.8	0.9	N
Miles not reported	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**663**

[a] Included in row below.

KEY: N = data are nonexistent; R = revised; — = value too small to report.

NOTES: Because of the transition to a new indicator for pavement condition beginning with U.S. Department of Transportation, Federal Highway Administration (FHWA) data published in 1993, comparisons between pre–1993 data and 1993 and later data are difficult. Thus, trend comparisons should be made with care. For additional information, the reader is referred to the accuracy profile for this table. Total mileage in this table will not match that in table 1-4 because of a change in the method of creating mileage–based tables derived from the Highway Performance Monitoring System, beginning with the 1997 issue of FHWA's Highway Statistics. Percents may not add to totals due to rounding.

SOURCES: 1990–92: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Annual issues), table HM–63.

1993–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table HM–63 for rural major collector, urban minor arterial, and urban collector, and table HM–64 for all other categories.

1996 (revised data): ____. Internet site www.fhwa.dot.gov/ohim/ohimstat.htm.

Table 1-23 Condition of U.S. Bridges

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

NOTES: Structurally deficient bridges: designated as 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 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 World Motor Vehicle Production (thousands) Administration, Office of Engineering, Bridge Division, National Bridge Inventory Database.

Table 1-24 Average Age of Rail, Bus, and Other Urban Transit Vehicles (Years)

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

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

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

KEY: U = data are unavailable

SOURCE: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database* (Washington, DC: Annual issues), table 27 and similar tables in earlier editions.

Table 1-25 Class I Railroad Locomotive Fleet by Year Built (Locomotive units)

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

[a] Disregards year of rebuilding.
[b] Includes data for 1970–74.
[c] Included in "Before 1970" figure.
[d] Includes data for 1990–94.
[e] Included in 1990 figure.

KEY: N = data are nonexistent

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

Table 1-26 Age and Availability of Amtrak Locomotive and Car Fleets

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

[a] Year-end daily average. Active units less backshop units undergoing 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.

KEY: N = data are nonexistent

SOURCES: 1972–80: Amtrak, *Amtrak Annual Report* (Washington, DC: Annual issues).
1985–98: _____. *Amtrak Annual Reports,* Statistical Appendix (Washington, DC: Annual issues).

Table 1-27 U.S. Flag Vessels by Type and Age (Number of vessels)

Age[a]	Dry cargo	Tanker	Towboat	Passenger[b]	Offshore support/ crewboats[c]	Dry barge	Tank/ liquid barge[d]	Total[R,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**

KEY: R = revised

Continued next page

Table 1-27 Cont'd U.S. Flag Vessels by Type and Age (Number of vessels)

Age[a]	Dry cargo	Tanker	Towboat	Passenger[b]	Offshore support/ crewboats[c]	Dry barge	Tank/ liquid barge[d]	Total[R,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[R]								
≤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**

[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 2 unclassified vessels are of unknown age; figures include vessels available for operation.

KEY: R = revised

SOURCE: U.S. Army Corps of Engineers, *Waterborne Transportation Lines of the United States*, Volume 1, National Summaries (New Orleans, LA: Annual issues)

Section D
Travel and Goods Movement

Table 1-28 U.S. Vehicle-Miles[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
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
General aviation[b]	1,769	2,562	3,207	[R]4,238	5,204	[R]4,673	[R]4,548	3,795	3,524	3,877
Highway[c]										
Passenger car and motorcycle	587,000	723,000	920,000	1,040,000	1,122,000	1,256,000	1,418,000	1,448,000	1,480,000	1,512,000
Motorcycle	[g]	[g]	3,000	5,600	10,200	9,100	9,600	9,800	9,900	10,100
Other 2-axle 4-tire vehicle	[g]	[g]	123,000	201,000	291,000	391,000	575,000	790,000	817,000	850,000
Truck										
Single-unit 2-axle 6-tire or more truck	98,600	128,800	27,100	34,600	39,800	45,400	51,900	62,700	64,100	66,800
Combination truck	28,900	31,700	35,100	46,700	68,700	78,100	94,300	115,500	118,900	124,500
Bus	4,300	4,700	4,500	6,100	6,100	4,500	5,700	6,400	6,600	6,800
Total highway	**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**	**2,560,000**
Transit										
Motor bus	1,576	1,528	1,409	1,526	1,677	1,863	2,130	2,184	2,221	[P]2,307
Light rail	75	42	34	24	18	17	24	35	38	[P]41
Heavy rail	391	395	407	423	385	451	537	537	543	[P]558
Trolley bus	101	43	33	15	13	16	14	14	14	[P]14
Commuter rail	N	N	N	173	179	183	213	238	242	[P]251
Demand responsive	N	N	N	N	N	247	306	507	548	[P]623
Ferry boat	N	N	N	N	[h]	[h]	2	3	3	2
Other	N	N	N	15	15	15	16	33	43	[P]45
Total transit[d]	**2,143**	**2,008**	**1,883**	**2,176**	**2,287**	**2,791**	**3,242**	**3,550**	**3,650**	**[P]3,841**
Rail										
Class I freight, train-miles	404	421	427	403	428	347	380	458	469	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

KEY: N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 1-28 Cont'd U.S. Vehicle-Miles[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Intercity/Amtrak[e], train-miles	209	172	93	30	30	30	33	32	30	32
Intercity/Amtrak[e], car-miles	2,208	1,775	690	253	235	251	301	292	278	288
Total train-miles[f]	**613**	**593**	**520**	**433**	**458**	**377**	**413**	**490**	**499**	**507**

KEY: N = data are nonexistent; P = preliminary; R = revised

[a] U.S. Department of Transportation, Bureau of Transportation Statistics has rounded some of the categories in this table as follows: to the nearest billion vehicle-miles—total highway, passenger car and motorcycle, and other 2-axle 4-tire vehicle; to the nearest 100 million vehicle-miles—motorcycle, truck, bus.

[b] 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 1985–97.

[c] In July 1997, the U.S. Department of Transportation, Federal Highway Administration published revised vehicle-miles 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] 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. Motor bus and demand responsive figures are also included in the bus figure for highway.

[e] Amtrak began operations in 1971.

[f] 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.

[g] 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.

[h] 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: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, table 2.

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

1985–97: 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: _____. *General Aviation Activity and Avionics Survey* (Washington, DC: Annual issues,) table 3.3.

1995–97: _____. *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*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1, sum of passenger car and motorcycle.

Motorcycle: 1970–85: _____. *Highway Statistics, Summary to 1985*, FHWA-PL-97-009 (Washington, DC: 1986), table VM-201A.

1990–97 _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle; single-unit 2-axle 6-tire or more truck; combination truck; and bus: 1960–94: _____. *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit: 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1999), table 40 and similar tables in earlier editions.

Rail: *Class I rail freight train- and car-miles:* 1960–97: Association of American Railroads, *Railroad Facts, 1998* (Washington, DC: 1997), 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.

1975–97: 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.

1980–97: Amtrak, Amtrak Corporate Reporting, Route Profitability System, personal communication, Dec. 9, 1998.

Table 1-29 Roadway Vehicle-Miles Traveled (VMT) and VMT per Lane-Mile by Functional Class

	1980	1985	1990	1995	1996[R]	1997
VMT (millions)						
Urban						
Interstate	161,242	216,188	278,901	341,515	351,579	361,371
Other arterials[a]	484,189	578,270	699,233	815,102	834,623	846,596
Collector	83,043	89,578	106,297	126,883	129,310	130,461
Local	126,791	160,062	191,053	205,907	208,374	222,024
Total	**855,265**	**1,044,098**	**1,275,484**	**1,489,407**	**1,523,886**	**1,560,452**
Rural						
Interstate	135,084	154,357	200,173	223,382	232,565	240,121
Other arterials[a]	262,774	282,803	330,866	368,595	378,847	391,481
Collector[b]	189,468	206,669	240,460	236,148	241,030	253,807
Local	84,704	86,899	97,379	105,164	109,520	114,511
Total	**672,030**	**730,728**	**868,878**	**933,289**	**961,962**	**999,920**
VMT per lane-mile (thousands)						
Urban						
Interstate	3,327	3,773	4,483	4,785	4,897	5,005
Other arterials[a]	1,451	1,556	1,751	1,828	1,858	1,868
Collector	572	552	634	686	692	693
Local	146	168	184	181	181	190
Total	**613**	**677**	**764**	**809**	**821**	**830**
Rural						
Interstate	1,031	1,170	1,473	1,693	1,749	1,803
Other arterials[a]	518	555	640	695	711	729
Collector[b]	132	141	164	167	170	179
Local	19	20	23	25	26	27
Total	**103**	**113**	**136**	**148**	**152**	**157**

[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 1-5 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:____. *Highway Statistics* (Washington, DC: Annual issues), tables VM-2 and VM-2A.

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

1996–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

KEY: R = revised

Table 1-30 U.S. Passenger-Miles[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Air										
Air carrier, certificated, domestic, all services	31,100	53,200	108,400	136,000	204,400	277,800	345,900	403,900	434,700	450,600
General aviation[b]	2,300	4,400	9,100	11,400	14,700	12,300	13,000	[R]10,400	10,600	12,500
Highway										
Passenger car and motorcycle[c,R]	1,145,000	1,395,000	1,754,000	1,960,000	2,024,000	2,106,000	2,294,000	2,298,000	2,349,000	2,400,000
Motorcycle[c,R]	[f]	[f]	3,000	6,000	12,000	12,000	12,000	12,000	12,000	12,000
Other 2-axle 4-tire vehicle[c,R]	[g]	[g]	226,000	363,000	521,000	688,000	1,000,000	1,296,000	1,339,000	1,394,000
Truck										
Single-unit 2-axle 6-tire or more truck	98,600	128,800	27,100	34,600	39,800	45,400	51,900	62,700	64,100	66,800
Combination truck	28,900	31,700	35,100	46,700	68,700	78,100	94,300	115,500	118,900	124,500
Bus[d]	N	N	N	N	N	94,900	121,400	136,100	139,100	144,900
Total[c,R]	**1,272,400**	**1,555,400**	**2,042,200**	**2,404,300**	**2,653,500**	**3,012,400**	**3,561,600**	**3,908,300**	**4,010,100**	**4,130,200**
Transit										
Motor bus[d]	N	N	N	N	21,800	21,200	21,000	18,800	19,100	[P]20,400
Light rail	N	N	N	N	381	350	571	860	957	[P]1,039
Heavy rail	N	N	N	N	10,600	10,400	11,500	10,600	11,500	[P]12,100
Trolley bus	N	N	N	N	219	306	193	187	184	[P]189
Commuter rail	4,200	4,100	4,600	4,500	6,500	6,500	7,100	8,200	8,400	[P]8,000
Demand responsive[d]	N	N	N	N	N	364	431	607	656	[P]928
Ferry boat	N	N	N	N	[h]	[h]	286	260	256	349
Other	N	N	N	N	390	439	124	273	348	[P]350
Total	**[i]4,200**	**[i]4,100**	**[i]4,600**	**[i]4,500**	**39,900**	**39,600**	**41,100**	**39,800**	**41,400**	**[P]43,300**

KEY: N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 1-30 Cont'd U.S. Passenger-Miles[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Rail										
Intercity/Amtrak[e]	17,100	13,300	6,200	3,900	4,500	4,800	[R]6,100	5,500	5,100	5,200

KEY: N = data are nonexistent; P = preliminary; R = revised

[a] BTS has rounded many of the categories in this table as follows: to the nearest billion passenger-miles—total highway, passenger car and motorcycle, motorcycle, and other 2-axle 4-tire vehicle; to the nearest 100 million passenger-miles—air carrier, truck, bus, transit categories except for the small categories; and rail.

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

[c] In July 1997, U.S. Department of Transportation, Federal Highway Administration (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] Amtrak began operations in 1971. Does not include contract commuter passengers.

[f] Included in passenger car and motorcycle.

[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-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 the FHWA by the average number of occupants for each vehicle type. Average vehicle occupancy rates (based on Nationwide Personal Transportation Survey data for 1977, 1983, and 1995) 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; 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; 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. For trucks, between 1960 and 1980, the average vehicle occupancy rate is assumed to be 1. From 1985 to present, the passenger-miles are estimated by FHWA using the Nationwide Personal Transportation Survey. 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: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, table 2.

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

1985–99: 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*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1, sum of passenger car and motorcycle.

Motorcycle: 1970–85: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A.

1990–97: _____. *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*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit 2-axle 6-tires or more truck, combination truck, and bus: 1970–94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit: 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1999), table 33 and similar tables in earlier editions.

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

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

1990–97: _____. *Amtrak Annual Report,* Statistical Appendix (Washington, DC: 1999), p. 49.

Table 1-31 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

Continued next page

Table 1-31 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
1–2 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

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

Continued next page

Table 1-31
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	%
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
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

[a] Includes other leisure purposes not shown separately.

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

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

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

Table 1-32 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**

Continued next page

Table 1-32 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	%
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**
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	9.0	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

Continued next page

Table 1-32 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	%
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 1-33 Passengers Boarded at the Top 50 U.S. Airports[a] (Thousands)

	Rank	1997 total enplaned passengers	Rank	1987 total enplaned passengers	% change 1987–97
Atlanta (Hartsfield International), GA	1	32,677	2	22,649	44
Chicago (O'Hare), IL	2	31,123	1	26,122	19
Dallas/Ft. Worth, TX	3	27,256	3	19,905	37
Los Angeles, CA	4	22,596	4	18,970	19
San Francisco, CA	5	16,858	6	13,117	29
Denver, CO	6	16,006	5	15,594	3
Detroit (Wayne County), MI	7	14,773	13	9,254	60
Phoenix (Sky Harbor International), AZ	8	14,650	14	8,785	67
Las Vegas (McCarran International), NV	9	14,011	21	6,836	105
St. Louis (Lambert-St. Louis), MO	10	13,956	11	9,727	43
Newark, NJ	11	13,783	8	11,289	22
Minneapolis/St. Paul, MN	12	13,775	15	8,310	66
Houston (Intercontinental), TX	13	12,708	20	6,929	83
Miami, FL	14	12,073	12	9,342	29
Seattle–Tacoma, WA	15	11,758	22	6,826	72
Orlando, FL	16	11,745	19	7,075	66
Boston (Logan International), MA	17	10,453	9	10,255	2
Charlotte (Douglas Municipal), NC	18	10,358	24	6,021	72
New York (La Guardia), NY	19	9,868	7	11,326	-13
New York (John F. Kennedy), NY	20	9,731	10	10,140	-4
Philadelphia, PA	21	9,714	23	6,603	47
Salt Lake City, UT	22	9,427	28	4,729	99
Pittsburgh, PA	23	9,224	16	8,156	13
Honolulu, HI	24	8,939	17	7,773	15
Cincinnati, OH	25	7,638	35	3,265	134
Washington (National), DC	26	7,010	18	7,113	-1
San Diego, CA	27	6,719	27	4,901	37
Baltimore, MD	28	6,311	31	4,010	57
Portland, OR	29	6,233	39	2,834	120
Tampa, FL	30	5,901	29	4,682	26

Continued next page

Table 1-33 Cont'd **Passengers Boarded at the Top 50 U.S. Airports[a] (Thousands)**

	Rank	1997 total enplaned passengers	Rank	1987 total enplaned passengers	% change 1987–97
Cleveland, OH	31	5,580	36	3,103	80
Ft. Lauderdale, FL	32	5,426	33	3,929	38
Kansas City, MO	33	5,143	30	4,481	15
Washington (Dulles International), DC	34	4,970	26	4,917	1
San Jose, CA	35	4,874	40	2,807	74
San Juan, PR	36	4,721	37	2,995	58
Chicago (Midway), IL	37	4,392	41	2,541	73
Oakland, CA	38	4,378	54	1,918	128
New Orleans, LA	39	4,199	34	3,311	27
Memphis, TN	40	4,156	25	5,023	-17
Houston (William P. Hobby), TX	41	3,917	32	3,930	0
Los Angeles (Orange County), CA	42	3,710	50	2,120	75
Nashville, TN	43	3,597	38	2,987	20
Indianapolis, IN	44	3,415	45	2,273	50
Dallas (Love Field), TX	45	3,413	42	2,436	40
Sacramento, CA	46	3,342	55	1,750	91
San Antonio, TX	47	3,242	43	2,425	34
Columbus, OH	48	3,239	57	1,695	91
Reno, NV	49	3,219	59	1,584	103
Albuquerque, NM	50	3,078	51	2,101	47
Total top 50		**479,285**		**350,864**	**37**
All airports		**574,612**		**448,914**	**28**

[a] Rank order by total enplaned passengers on large certificated air carriers, scheduled and nonscheduled operations.

NOTE: In 1987, Raleigh/Durham, NC, ranked 44th (2,316); Hartford, CT, ranked 46th (2,268); Ontario, CA, ranked 47th (2,232); West Palm Beach, FL, ranked 48th (2,229); and Dayton, OH, ranked 49th (2,167).

SOURCES: All airports, total enplaned passengers: 1987: 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, 1987* (Washington, DC: 1987), table 1.

1997: 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, 1997* (Washington, DC: 1998), table 1.

Airport ranking: 1987: U.S. Department of Transportation, Federal Aviation Administration, *FAA Statistical Handbook, Calendar Year 1987* (Washington, DC: 1987), table 4.11.

1997: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, 1999.

Table 1-34 Air Passenger Travel Arrivals in the United States from Foreign Countries (Thousands)

	1975	1980	1985	1990	1995	1996	1997
Flag of carrier							
United States	6,502	10,031	11,798	19,145	24,582	25,148	26,744
Foreign	6,144	10,231	12,357	17,269	22,328	24,704	27,571
Total arriving passengers	**12,646**	**20,262**	**24,156**	**36,414**	**46,910**	**49,853**	**54,315**
Country of embarkation[a]							
Australia	106	227	277	495	581	622	618
Bahama Islands	758	1,123	1,503	1,679	1,433	1,487	1,530
Barbados	76	135	216	228	222	212	203
Belgium	144	242	281	417	379	407	589
Bermuda	398	497	434	487	426	363	425
Brazil	212	300	352	584	1,112	1,176	1,388
Canada[b]	N	N	N	6,870	7,417	8,501	8,895
China/Taiwan	50	113	206	325	972	1,017	1,068
Colombia	173	315	279	286	481	499	586
Denmark	222	267	241	313	221	236	252
Dominican Republic	336	468	606	948	1,136	1,168	1,168
France	512	689	955	1,777	2,045	2,178	2,323
Germany	622	1,175	1,582	2,466	3,125	3,173	3,545
Grand Cayman	25	121	173	273	314	323	328
Greece	121	208	187	132	220	235	186
Haiti	91	133	192	233	314	303	289
Hong Kong	98	228	270	356	658	668	589
Ireland	220	220	274	448	642	721	716
Israel	84	189	294	204	412	483	482
Italy	431	537	662	792	1,007	1,047	1,097
Jamaica	457	429	707	975	1,124	1,136	1,162
Japan	1,095	1,624	2,435	4,528	5,676	6,349	6,736
Korea, Republic of	105	234	390	826	1,335	1,514	1,625
Mexico	1,626	2,886	2,719	4,313	4,884	5,591	6,124
Netherlands	312	427	583	837	1,580	1,774	2,074

KEY: N = data are nonexistent

Continued next page

Table 1-34 Cont'd
Air Passenger Travel Arrivals in the United States from Foreign Countries
(Thousands)

	1975	1980	1985	1990	1995	1996	1997
Netherland Antilles	213	327	407	388	339	305	368
Panama Republic	97	150	180	153	225	229	227
Philippines	108	194	145	246	397	379	410
Spain	306	312	419	558	604	618	675
Switzerland	236	312	452	616	733	790	910
United Kingdom	1,549	2,973	3,460	5,166	6,648	7,131	7,935
Venezuela	205	533	248	458	786	659	709
Total	**10,988**	**17,588**	**21,129**	**38,377**	**47,448**	**51,294**	**55,232**

KEY: N = data are nonexistent

[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 to 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.

1996–97: ____. *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).

Table 1-35 Air Passenger Travel Departures from the United States to Foreign Countries (Thousands)

	1975	1980	1985	1990	1995	1996	1997
Flag of carrier							
United States	5,912	9,369	10,696	17,628	22,231	22,901	24,302
Foreign	6,141	9,886	11,791	16,418	20,795	22,884	25,382
Total departing passengers	**12,053**	**19,256**	**22,487**	**34,046**	**43,026**	**45,785**	**49,684**
Country of debarkation[a]							
Australia	103	245	232	540	560	614	606
Bahama Islands	704	1,006	1,151	1,279	1,024	994	983
Barbados	74	126	204	230	217	210	200
Belgium	134	231	249	395	340	380	513
Bermuda	372	467	389	277	199	196	215
Brazil	206	291	322	560	1,024	1,135	1,292
Canada[b]	N	N	N	6,870	7,405	8,477	8,890
China/Taiwan	41	90	187	337	891	945	939
Colombia	171	299	294	277	461	467	567
Denmark	188	254	254	307	229	227	259
Dominican Republic	322	443	528	896	995	1,057	1,070
France	470	635	894	1,626	1,868	2,021	2,147
Germany	649	1,178	1,539	2,339	2,883	2,978	3,178
Grand Cayman	26	112	161	250	264	285	290
Greece	123	190	210	129	194	206	192
Haiti	81	124	169	201	292	288	284
Hong Kong	59	152	238	310	640	651	610
Ireland	163	212	233	311	409	449	488
Israel	105	186	255	259	426	492	499
Italy	409	495	660	731	955	1,006	1,055
Jamaica	416	382	607	888	987	988	1,018
Japan	1,183	1,602	2,255	4,471	5,452	6,187	6,796
Korea, Republic of	60	186	333	723	1,252	1,382	1,461
Mexico	1,525	2,886	2,671	4,136	4,568	5,133	5,613
Netherlands	304	409	562	777	1,444	1,636	1,920

KEY: N = data are nonexistent

Continued next page

Table 1-35 Cont'd
Air Passenger Travel Departures from the United States to Foreign Countries (Thousands)

	1975	1980	1985	1990	1995	1996	1997
Netherland Antilles	184	282	395	377	295	288	319
Panama Republic	100	142	209	183	214	221	240
Philippines	81	160	165	195	281	275	306
Spain	260	273	397	540	573	577	615
Switzerland	224	306	434	600	712	760	811
United Kingdom	1,446	2,840	3,322	4,903	6,372	6,693	7,475
Venezuela	198	518	245	444	778	644	698
Total	**10,381**	**16,722**	**19,764**	**36,361**	**44,204**	**47,862**	**51,549**

KEY: N = data are nonexistent

[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 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: 1975–90: 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 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.

1996–97: ____. *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).

Table 1-36 U.S.-Canadian Border Land-Passenger Gateways: 1998

	Entering U.S.
All U.S.-Canadian Land Gateways	
All personal vehicles	36,531,246
All personal vehicle passengers	88,126,832
All bus passengers	3,951,019
All pedestrians	585,917
Personal vehicles—top 5 gateways	
Detroit, MI	8,551,166
Buffalo-Niagara Falls, NY	7,355,745
Blaine, WA	3,278,118
Port Huron, MI	2,036,015
Calais, ME	1,467,937
Personal vehicle passengers—top 5 gateways	
Detroit, MI	19,496,143
Buffalo-Niagara Falls, NY	17,434,770
Blaine, WA	8,184,131
Port Huron, MI	5,444,004
Sault Ste. Marie, MN	4,693,465
Bus passengers—top 5 gateways	
Buffalo-Niagara Falls, NY	1,522,230
Detroit, MI	562,857
Blaine, WA	456,770
Champlain-Rouses Pt., NY	274,144
Port Huron, MI	126,611
Pedestrians—top 5 gateways	
Buffalo-Niagara Falls, NY	298,303
Calais, ME	47,843
International Falls-Ranier, MN	43,833
Sumas, WA	37,549
Portland, ME[a]	34,232

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

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

SOURCE: U.S. Department of Treasury, U.S. Customs Service, Office of Field Operations, Operations Management Database, 1999.

Table 1-37 U.S.-Mexican Border Land-Passenger Gateways: 1998

	Entering U.S.
All U.S.-Mexican Land Gateways	
All personal vehicles	83,854,491
All personal vehicle passengers	223,987,889
All bus passengers	3,638,812
All pedestrians	44,461,554
Personal vehicles—top 5 gateways	
San Ysidro/Otay Mesa, CA[a]	18,801,472
El Paso, TX	15,212,062
Laredo, TX	7,524,347
Hildago, TX	7,126,677
Calexico, CA	6,957,454
Personal vehicle passengers—top 5 gateways	
El Paso, TX	44,114,982
San Ysidro/Otay Mesa, CA[a]	41,363,236
Hildago, TX	24,943,370
Calexico, CA	20,733,213
Laredo, TX	18,810,878
Bus passengers—top 5 gateways	
Hildago, TX	1,515,376
San Ysidro/Otay Mesa, CA[a]	1,125,902
Laredo, TX	367,691
Brownsville, TX	266,924
El Paso, TX	118,213
Pedestrians—top 5 gateways	
Calexico, CA	8,492,078
San Ysidro/Otay Mesa, CA[a]	7,528,540
El Paso, TX	5,169,966
Laredo, TX	5,093,851
Nogales, AZ	47,796,884

[a] Data for San Ysidro are U.S. customs combined totals for San Ysidro, San Diego, and Otay Mesa.

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

SOURCE: U.S. Department of Treasury, U.S. Customs Service, Office of Field Operations, Operations Management Database, 1999.

Table 1-38 U.S. Ton-Miles of Freight (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air carrier, domestic, all services[a]	**553**	**1,353**	**R2,709**	**3,470**	**4,528**	**5,156**	**9,064**	**12,520**	**12,861**	**13,601**
Intercity truck	**285,000**	**359,000**	**412,000**	**454,000**	**555,000**	**610,000**	**735,000**	**921,000**	**R972,000**	**1,051,000**
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**
Domestic water transportation										
Coastwise	U	302,546	359,784	315,846	[d]631,149	610,977	479,134	440,345	408,086	349,843
Lakewise	U	75,918	79,416	68,517	61,747	48,184	60,930	59,704	58,335	62,166
Internal	U	109,701	155,816	180,399	227,343	232,708	292,393	306,329	296,791	294,023
Intraport	U	1,638	1,179	1,222	1,596	1,102	1,087	1,350	1,475	1,378
Total domestic water transportation[c]	**U**	**489,803**	**596,195**	**565,984**	**921,835**	**892,970**	**833,544**	**807,728**	**764,687**	**707,410**
Oil pipeline	**229,000**	**306,000**	**431,000**	**507,000**	**588,000**	**564,000**	**584,000**	**601,000**	**619,000**	**617,000**
TOTAL	**R1,562,000**	**1,854,000**	**R2,207,000**	**2,285,000**	**R2,988,000**	**2,949,000**	**3,196,000**	**3,648,000**	**R3,725,000**	**3,738,000**

KEY: R = revised; U = data are unavailable

[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.

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

1970–80: _____. Air Carrier Traffic Statistics (Washington, DC: Annual issues), p. 2, line 3.

1985–97: 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: 1960–97: Eno Transportation Foundation, Inc., Transportation in America, 1998 (Washington, DC: 1998), p. 44.

Class I rail: 1960–97: Association of American Railroads, Railroad Facts 1998 (Washington, DC: 1998), p. 27.

Domestic water transportation: 1965–97: 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.

1980–97: ____. Shifts in Petroleum Transportation (Washington, DC: Annual issues), table 1.

Table 1-39 Average Length of Haul, Domestic Freight and Passenger Modes (Miles)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Freight										
Air carrier	953	943	1,014	1,082	1,052	1,157	1,389	1,211	1,260	U
Truck[a]	272	259	263	286	363	366	391	416	R401	U
Class I railroad	461	503	515	541	616	665	726	843	842	851
Water										
Coastwise	1,496	1,501	1,509	1,362	1,915	1,972	1,604	1,652	1,526	1,330
Lakewise	522	494	506	530	536	524	553	514	508	507
Internal	282	297	330	358	405	435	R470	494	477	466
Oil pipeline										
Crude	325	320	300	633	871	777	805	752	761	U
Petroleum products	269	335	357	516	414	391	389	398	394	U
Passenger										
Air carrier, domestic, scheduled	583	614	R678	698	736	758	803	791	802	814
Bus, intercity	79	94	106	113	125	121	141	140	143	U
Commuter rail	21	21	22	23	23	24	22	24	24	U
Intercity/Amtrak[b]	R139	125	R79	R224	217	232	273	268	257	256

KEY: R = revised; U = data are unavailable

[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 table 1-38 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*, 1998 (Washington, DC: 1998), p. 71.

Class I railroad: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 36.

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

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

1975–97: Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 1998), 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*, 1998 (Washington, DC: 1998), p. 70.

Intercity/Amtrak: 1960–85: Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 1998), p. 70.

1990–97: Amtrak, *Amtrak FY98 Annual Report,* Statistical Appendix (Washington, DC: 1999), p. 49.

Table 1-40 Top U.S. Foreign Trade Freight Gateways by Value of Shipments: 1997
(1997 $ billions)

	Rank	Exports	Imports	Total
Kennedy International Airport, NY (a)	1	40.9	48.4	89.3
Port of Long Beach, CA (w)	2	19.1	66.2	85.3
Port of Detroit, MI (l)	3	42.4	40.1	82.5
San Francisco, Airport, CA (a)	4	35.8	39.1	74.9
Port of Los Angeles, CA (w)	5	16.1	57.3	73.4
Los Angles International Airport, CA (a)	6	36.5	32.3	68.8
Port of New York, NY and NJ (w)	7	20.6	47.4	68.0
Port of Buffalo-Niagara Falls, NY (l)	8	37.0	26.9	63.9
Port of Laredo, TX (l)	9	25.8	24.1	49.9
Port of Huron, MI (l)	10	12.1	26.1	38.2
Port of Houston, TX (w)	11	20.8	16.3	37.1
Chicago, IL (a)	12	18.5	17.9	36.4
Port of Seattle, WA (w)	13	10.3	23.3	33.6
Port of Charleston, SC (w)	14	12.1	15.2	27.3
Port of Oakland, CA (w)	15	9.9	15.5	25.4
Port of Norfolk, VA (w)	16	13.6	11.4	25.0
Port of El Paso, TX (l)	17	10.0	13.8	23.8
Miami International Airport, FL (a)	18	14.6	6.8	21.4
Port of Tacoma, WA (w)	19	4.5	15.1	19.6
Port of Baltimore, MD (w)	20	7.1	11.7	18.8
Port of New Orleans, LA (w)	21	9.9	8.8	18.7
Anchorage, AK (a)	22	4.8	11.9	16.7
Port of Miami, FL (w)	23	8.5	6.6	15.1
Port of Savannah, GA (w)	24	7.1	7.6	14.7
Port of Champlain-Rouses Pt., NY (l)	25	5.8	8.2	14.0
New Orleans, LA (a)	26	7.6	6.1	13.7
Cleveland, OH (a)	27	6.4	7.1	13.5
Port of Otay Mesa/San Ysidro, CA (l)	28	5.2	7.1	12.3
Port of Sourth Louisiana, LA (w)	29	7.8	2.6	10.4
Atlanta, GA (a)	30	5.1	5.2	10.3
Port of Blaine, WA (l)	31	5.3	4.9	10.2
Port of Portland, OR (w)	32	4.3	5.4	9.7
Port of Port Everglades, FL (w)	33	4.7	4.5	9.2
Port of Jacksonville, FL (w)	34	3.2	6.0	9.2
Port of Brownsville-Cameron, TX (l)	35	4.8	4.4	9.2

Key: a = air; l = land w = water.

Continued next page

Table 1-40 Cont'd **Top U.S. Foreign Trade Freight Gateways by Value of Shipments: 1997**
(1997 $ billions)

	Rank	Exports	Imports	Total
Newark, NJ (a)	36	4.7	4.2	8.9
Dallas-Fort Worth, TX (a)	37	4.0	4.9	8.9
Port of Nogales, AZ (l)	38	3.4	5.4	8.8
Port of Philadelphia, PA (w)	39	1.0	6.9	7.9
Port of Alexandria Bay, NY (l)	40	3.0	4.8	7.8
Boston Logan Airport, MA (a)	41	4.7	3.0	7.7
Port of Hildago, TX (l)	42	3.2	4.3	7.5
Port of Corpus Christi, TX (w)	43	1.4	5.9	7.3
Port of Eagle Pass, TX (l)	44	3.6	3.5	7.1
Port of Pembina, ND (l)	45	3.6	3.2	6.8
Great Lakes--All Customs ports	46	3.3	3.1	6.4
Port of Baton Rouge, LA (w)	47	2.2	3.9	6.1
Port of Sweetgrass, MT (l)	48	3.2	2.8	6.0
Houston International Airport, TX (a)	49	3.8	1.9	5.7
Port of Portal, ND (l)	50	2.8	2.8	5.6
Total top 50 gateways		**$546.1**	**$711.9**	**$1,258.0**

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 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, December 1998.

(w) Water: U.S. Department of Transportation, Maritime Administration, Office of Statistical and Economic Analysis, *U.S. Waterborne Exports and General Imports, Annual 1997* (Washington, DC: July 1999).

(l) Land: U.S. Department of Transportation, Bureau of Transportation Statistics, Transborder Surface Freight Data, 1999.

Table 1-41 U.S. Waterborne Freight (Million short tons)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
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
Imports	211.3	269.8	339.3	476.6	517.5	412.7	600.0	672.7	732.6	788.3
Exports	128.0	173.9	241.6	272.1	403.9	361.6	441.6	474.7	450.8	432.3
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
Inland	291.1	369.6	472.1	503.9	535.0	534.7	622.6	620.3	622.1	630.6
Coastal	209.2	201.5	238.4	231.9	329.6	309.8	298.6	266.6	267.4	263.1
Great Lakes	155.1	153.7	157.1	129.3	115.1	92.0	110.2	116.1	114.9	122.7
Intraport	104.2	102.9	81.5	78.3	94.2	74.3	86.4	83.1	89.0	89.8
Intraterritory	1.0	1.5	1.6	2.9	3.6	3.4	4.5	6.9	7.3	6.3
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**

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

SOURCE: U.S. Army Corps of Engineers, *Waterborne Commerce of the United States* (New Orleans, LA: February 1999), part 5, section 1.

Table 1-42 Tonnage for Top 50 U.S. Water Ports, Ranked by Total Tons (Millions)

	1997		1990		
	Rank	Total tons	Rank	Total tons	% change 1990–97
South Louisiana, LA	1	183.6	1	194.2	-5.5
Houston, TX	2	165.5	3	126.2	31.2
New York, NY and NJ	3	135.3	2	140.0	-3.4
New Orleans, LA	4	89.4	6	62.7	42.5
Corpus Christi, TX	5	86.8	7	62.0	39.9
Baton Rouge, LA	6	84.0	5	78.1	7.5
Valdez, AK	7	73.6	4	96.0	-23.3
Plaquemine, LA	8	63.6	8	56.6	12.4
Long Beach, CA	9	57.3	10	52.4	9.3
Texas City, TX	10	56.6	12	48.1	17.7
Tampa, FL	11	55.3	11	51.6	7.2
Pittsburgh, PA	12	51.7	19	35.5	45.7
Lake Charles, LA	13	51.3	16	40.9	25.5
Mobile, AL	14	49.1	15	41.1	19.4
Beaumont, TX	15	48.7	23	26.7	82.2
Norfolk Harbor, VA	16	46.3	9	53.7	-13.8
Philadelphia, PA	17	45.0	14	41.8	7.6
Duluth-Superior, MN and WI	18	41.9	17	40.8	2.8
Los Angeles, CA	19	41.8	13	46.4	-9.8
Baltimore, MD	20	40.0	18	39.5	1.2
Port Arthur, TX	21	37.3	20	30.7	21.6
St. Louis, MO and IL	22	31.3	22	27.1	15.4
Pascagoula, MS	23	31.3	24	26.5	18.2
Portland, OR	24	29.6	21	27.5	7.7
Seattle, WA	25	26.6	30	21.6	23.3
Freeport, TX	26	26.3	40	14.5	81.4
Huntington, WV	27	25.2	34	17.3	45.6
Chicago, IL	28	24.9	28	22.5	10.5
Paulsboro, NJ	29	24.4	27	23.3	4.6
Richmond, CA	30	21.7	32	21.2	2.6

Continued next page

Table 1-42 Cont'd Tonnage for Top 50 U.S. Water Ports, Ranked by Total Tons (Millions)

	1997		1990		
	Rank	Total tons	Rank	Total tons	% change 1990–97
Marcus Hook, PA	31	21.5	25	25.9	-16.9
Boston, MA	32	20.9	29	21.9	-4.6
Newport News, VA	33	20.8	26	24.9	-16.6
Tacoma, WA	34	20.7	31	21.4	-3.4
Port Everglades, FL	35	19.9	42	14.1	40.7
Jacksonville, FL	36	18.2	36	15.1	20.4
Detroit, MI	37	18.1	33	17.7	2.1
Cleveland, OH	38	18.1	41	14.4	26.0
Memphis, TN	39	18.0	47	12.4	45.6
Savannah, GA	40	17.9	44	13.6	31.9
Charleston, SC	41	17.9	54	9.7	84.5
Indiana Harbor, IN	42	16.5	37	14.7	12.5
Portland, ME	43	16.3	51	10.8	51.3
Lorain, OH	44	16.0	43	14.0	14.6
Toledo, OH	45	14.4	38	14.7	-1.8
San Juan, PR	46	14.1	39	14.5	-3.0
Anacortes, WA	47	13.9	35	15.4	-10.0
Two Harbors, MN	48	13.5	48	12.3	9.8
Cincinnati, OH	49	12.9	46	12.6	2.2
Honolulu, HI	50	12.7	50	11.3	12.0
Total top 50		**2,087.7**		**1,878.0**	**11.2**
All ports		**2,333.1**		**2,163.9**	**7.8**

NOTE: In 1990, Grays Harbor, Washington, ranked 45th (12.8) and Ashtabula, Ohio, ranked 49th (11.9).

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.
1997: ____. Personal communication, Jan. 4, 1999.

Table 1-43 Modal Shares of Freight Shipments within the United States by Domestic Establishments: 1993 and 1997

Mode	Value (percent)		Tons (percent)		Ton miles (percent)	
	1993[R]	1997[P]	1993[R]	1997[P]	1993[R]	1997[P]
Truck (for-hire, private, both)	71.2	69.4	53.1	58.3	24.4	27.9
Rail (includes truck and rail)	5.3	4.8	13.2	11.2	27.5	26.7
Water	2.9	2.5	12.2	11.1	23.2	20.4
Pipeline	5.0	4.2	15.5	13.7	18.0	17.6
Parcel, postal, courier service	9.1	10.9	0.2	0.2	0.4	0.5
Air (includes truck and air)	2.2	2.7	0.0	0.0	0.1	0.2
Other and unknown modes	4.2	5.6	5.9	5.5	6.5	6.8
Total (domestic plus export shipments)	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

KEY: P = preliminary; R = revised

NOTE: Estimates for crude petroleum shipments by pipelines prepared for the Bureau of Transportation Statistics by Oak Ridge National Laboratory.

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, based on U.S. Department of Commerce, Bureau of the Census, *1993 Commodity Flow Survey: United States*, TC92-CF-52 (Washington, DC: 1995).

____. *1997 Commodity Flow Survey: United States Preliminary*, EC97TCF-US(P) (Washington, DC: 1999).

Table 1-44 Value, Tons, and Ton-Miles of Freight Shipments within the United States by Domestic Establishments: 1997 (Preliminary data ranked by value of shipments)

SCTG code	Commodity description	Value ($ billions)	Tons (millions)	Ton-miles (billions)	Value per Ton ($)	Miles per Ton (miles)
35	Electronic, electrical equipment and components,and office equipment	926	45	27	20,740	610
36	Motorized and other vehicles (including parts)	591	100	47	5,917	475
30	Textiles, leather, and articles of textiles or leather	550	51	30	10,795	598
40	Miscellaneous manufactured products	518	148	44	3,492	297
43	Mixed freight	451	235	28	1,920	118
34	Machinery	448	55	31	8,183	558
7	Other prepared foodstuffs and fats and oils	347	404	130	860	322
29	Printed products	316	81	25	3,902	303
24	Plastics and rubber	298	140	75	2,123	534
32	Base metal in primary or semifinished forms and in finished basic shapes	290	358	129	809	360
33	Articles of base metals	250	110	49	2,270	445
23	Chemical products and preparations (NEC)	214	97	46	2,200	469
21	Pharmaceutical products	206	10	6	20,582	590
17	Gasoline and aviation turbine fuel	192	900	140	213	155
5	Meat, fish, seafood, and other preparations	173	75	33	2,315	443
38	Precision instruments and apparatus	159	3	3	46,796	801
26	Wood products	138	344	102	401	296
20	Basic chemicals	137	280	118	490	422
27	Pulp, newsprint, paper, and paperboard	122	168	94	723	557
31	Nonmetallic mineral products	113	879	95	128	108
6	Milled grain products and preparations, and bakery products	109	106	50	1,034	473
37	Transportation equipment (NEC)	109	6	4	19,763	675
28	Paper or paperboard articles	107	81	23	1,321	288
3	Other agricultural products	106	215	88	496	411
39	Furniture, mattresses, lamps, lighting fittings, illuminated signs	101	21	12	4,906	572
8	Alcoholic beverages	89	85	33	1,049	385
18	Fuel oils	88	456	60	193	131
19	Coal and petroleum products (NEC)	68	444	83	154	187
4	Animal feed and products of animal origin (NEC)	67	240	49	279	203
2	Cereal grains	63	552	242	114	438

KEY: CFS = Commodity Flow Survey; NEC = not elsewhere classified; SCTG = Standard Classification of Transported Goods

Continued next page

Table 1-44 Cont'd
Value, Tons, and Ton-Miles of Freight Shipments within the United States by Domestic Establishments: 1997 (Preliminary data ranked by value of shipments)

SCTG code	Commodity description	Value ($ billions)	Tons (millions)	Ton-miles (billions)	Value per Ton ($)	Miles per Ton (miles)
9	Tobacco products	57	2	1	23,804	276
41	Waste and scrap	35	196	46	178	235
22	Fertilizers	32	205	47	154	231
15	Coal	27	1,250	520	22	416
25	Logs and other wood in the rough	18	495	40	37	81
14	Metallic ores and concentrates	12	77	32	157	419
13	Nonmetallic minerals (NEC)	12	236	54	49	230
12	Gravel and crushed stone	12	1,845	102	6	55
1	Live animals and live fish	9	8	2	1,106	279
11	Natural sands	4	451	27	9	60
10	Monumental or building stone	3	17	2	179	90
—	Commodity unknown	55	92	40	603	438
Total, all commodities from CFS[a]		**$7,624**	**11,563**	**2,808**	**$659**	**243**

[a] Total does not include estimates of crude oil shipments by pipeline and water, which were not fully captured in the CFS. The 1993 total in National Transportation Statistics 1998 (NTS98) (table 1-19 available at www.bts.gov/btsprod/nts) did include these estimates.

NOTE: The preliminary 1997 data reported in this table are based on the SCTG code, which is a different commodity classification code from the one used in the 1993 CFS. Therefore, the data in this table are not directly comparable to the 1993 data reported in NTS98. The Bureau of Transportation Statistics and the Census Bureau are retabulating the 1993 data using the SCTG, and that data will be available in subsequent NTS reports.

KEY: CFS = Commodity Flow Survey; NEC = not elsewhere classified; SCTG = Standard Classification of Transported Goods

SOURCES: U.S. Department of Transportation, Bureau of Transportation Statistics, based on U.S. Department of Commerce, Bureau of the Census, *1993 Commodity Flow Survey: United States*, TC92-CF52 (Washington, DC: 1995). ____. *1997 Commodity Flow Survey: United States Preliminary*, EC97TCF-US(P) (Washington, DC: 1999).

Table 1-45 Value of U.S. Land Exports to and Imports from Canada and Mexico by Mode ($ millions)

	1994	1995	1996	1997
Exports to Canada				
Truck	89,151.2	97,423.4	102,743.0	111,173.8
Rail	13,593.8	15,271.9	15,678.6	13,255.6
Pipeline	133.7	121.5	162.2	180.6
Other[a]	21,753.1	17,010.5	20,467.6	9,336.1
Mail	69.2	56.9	58.4	24.1
Total	**124,701.0**	**129,884.2**	**139,109.8**	**133,970.3**
To Mexico				
Truck	39,066.4	35,914.2	44,092.3	55,592.6
Rail	4,192.0	4,694.4	R5,119.2	5,648.0
Pipeline	0.4	1.0	R2.3	68.3
Other[a]	3,238.9	R2,025.8	2,539.9	2,860.5
Mail[b]	5.4	26.8	—	0.1
Total	**46,503.1**	**42,662.1**	**R51,753.4**	**64,169.5**
Imports from Canada				
Truck	79,456.3	88,964.9	98,400.6	99,814.8
Rail	30,322.9	R39,996.9	39,811.1	38,293.0
Pipeline	9,728.7	10,606.6	12,796.2	13,879.5
Other[a]	3,991.4	3,888.2	4,968.6	3,572.5
Mail	5.6	R5.2	7.0	0.4
FTZ[c]	U	R207.6	223.4	122.4
Total	**123,504.9**	**143,669.5**	**156,206.9**	**155,682.6**
From Mexico				
Truck	35,013.9	R43,014.3	R48,349.9	56,716.5
Rail	7,769.0	9,138.0	12,297.7	12,646.9
Pipeline	187.9	27.3	8.1	3.6
Other[a]	643.5	769.0	639.2	668.2
Mail	1.9	1.2	R1.5	0.2
FTZ[c]	U	R1,099.2	R2,015.6	2,119.6
Total	**43,616.2**	**54,049.1**	**R63,312.2**	**72,155.0**

KEY: — = value too small to report; R = revised; U = data are unavailable

Continued next page

Table 1-45 Cont'd Value of U.S. Land Exports to and Imports from Canada and Mexico by Mode ($ millions)

[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 estimates 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.

NOTE: 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, 1998.

Table 1-46 Crude Oil Transported in the United States by Mode (Billion ton-miles)

	1975	1980	1985	1990	1995	1996	1997
Number of ton-miles (billions)							
Pipelines[a]	288.0	362.6	334.4	334.8	335.9	338.3	337.4
Water carriers	40.6	[c]387.4	449.2	291.2	247.7	202.4	147.3
Motor carriers[b]	1.4	2.5	1.8	1.5	1.7	1.7	1.7
Railroads	1.5	0.5	0.8	0.7	0.8	0.8	0.5
Total	**331.5**	**753.0**	**786.2**	**628.2**	**586.0**	**543.2**	**486.9**
% of total							
Pipelines	86.9	48.2	42.5	53.3	57.3	62.3	69.3
Water carriers	12.2	51.4	57.2	46.4	42.3	37.3	[R]30.3
Motor carriers	0.4	0.3	0.2	0.2	0.3	0.3	0.3
Railroads	0.5	0.1	0.1	0.1	0.1	0.1	0.1

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

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

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

KEY: R = revised

SOURCES: 1975: Association of Oil Pipe Lines, *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 5.

1980–97: ____. *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 2.

Table 1-47 Transportation of Refined Petroleum Products within the United States by Mode

	1975	1980	1985	1990	1995	1996	1997
Number of ton-miles (billions)							
Pipelines[a]	219.0	225.6	229.9	249.3	265.2	280.9	279.1
Water carriers	257.4	230.4	141.2	157.8	153.2	154.1	148.3
Motor carriers[b]	26.2	24.3	26.9	28.2	24.6	28.0	26.0
Railroads	12.6	12.0	11.3	13.3	15.9	16.0	16.2
Total	**515.2**	**492.3**	**409.3**	**448.6**	**458.9**	**479.0**	**469.6**
% of total							
Pipelines	42.5	45.8	56.2	55.6	57.8	58.6	59.4
Water carriers	50.0	46.8	34.5	35.2	33.4	32.2	31.6
Motor carriers	5.1	5.0	6.6	6.3	5.3	R5.9	5.5
Railroads	2.4	2.4	2.7	2.9	3.5	3.3	3.5

KEY: R = revised

[a] The amounts carried by pipeline are 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 amounts carried by motor carriers are estimated.

NOTE: The 1993 data reported by the Association of Oil Pipe Lines (AOPL) for each mode are not directly comparable to 1993 Commodity Flow Survey (CFS) data and vary from the ton-miles of refined petroleum products moved by mode measured in the CFS and reported by the Census Bureau in *1993 Commodity Flow Survey: United States* (TC92-CF-52, p. 56). The differences are primarily definitional: the AOPL data cover the refined petroleum movement of all industries, while the CFS data cover movements by manufacturing, mining, wholesale trade, and selected retail services.

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

1980–97: ____. *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 3.

Table 1-48 Transportation of Crude Petroleum and Petroleum Products in the United States by Mode

	1975	1980	1985	1990	1995	1996	1997
Billions of ton-miles							
Pipelines[a]	507.0	588.2	564.3	584.1	601.1	619.2	616.5
Water carriers	298.0	[c]617.8	590.4	449.0	400.9	356.5	295.6
Motor carriers[b]	27.6	26.8	28.7	29.7	26.3	29.7	27.7
Railroads	14.1	12.5	12.1	14.0	16.6	16.8	16.7
Total	**846.7**	**1,245.3**	**1,195.5**	**1,076.8**	**1,044.9**	**1,022.2**	**956.5**
% of total							
Pipelines[a]	59.9	47.2	47.2	54.2	57.5	60.6	64.5
Water carriers	35.2	49.6	49.4	41.7	38.4	34.9	30.9
Motor carriers[b]	3.3	2.2	2.4	2.8	2.5	2.9	2.9
Railroads	1.7	1.0	1.0	1.3	1.6	1.6	1.8

[a] The amounts carried by pipeline are 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 amounts carried by motor carriers are estimated.

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

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

1980–97: ____. *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 1.

Table 1-49 Worldwide Commercial Space Launches

	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total 1990–98
United States										
Athena	0	0	0	0	0	1	0	0	0	1
Atlas	0	2	3	1	3	5	6	6	3	29
Conestoga	0	0	0	0	0	1	0	0	0	1
Delta	4	4	3	1	1	1	2	7	11	34
Pegasus	0	0	0	1	0	0	0	3	3	7
Titan	3	0	0	0	0	0	0	0	0	3
Total	**7**	**6**	**6**	**3**	**4**	**8**	**8**	**16**	**17**	**75**
Europe										
Ariane 4	5	6	6	6	8	8	9	11	9	68
Total	**5**	**6**	**6**	**6**	**8**	**8**	**9**	**11**	**9**	**68**
Russia										
Proton	0	0	0	0	0	0	2	6	4	12
Shtil	0	0	0	0	0	0	0	0	1	1
Start	0	0	0	0	0	0	0	1	0	1
Total	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**7**	**5**	**14**
Ukraine										
Zenit	0	0	0	0	0	0	0	0	1	1
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
China										
Long March 2C	0	0	0	0	0	0	0	1	4	5
Long March 2E	0	0	2	0	1	3	0	0	0	6
Long March 3	1	0	0	0	1	0	1	0	0	3
Long March 3B	0	0	0	0	0	0	1	2	0	3
Total	**1**	**0**	**2**	**0**	**2**	**3**	**2**	**3**	**4**	**17**
TOTAL space launches	**13**	**12**	**14**	**9**	**14**	**19**	**21**	**37**	**36**	**175**

NOTE: 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.

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

Section E
Physical Performance

Table 1-50 Passengers Denied Boarding by the Largest U.S. Air Carriers[a]

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Boarded (millions)	421	R429	445	449	457	460	481	503	514
Denied boarding[b] (thousands)									
Voluntary	561	599	718	632	771	794	899	1,018	1,081
Involuntary	67	47	46	51	53	49	58	54	45
Total	**628**	**646**	**764**	**683**	**824**	**843**	**957**	**1,072**	**1,126**

KEY: R = revised

[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 March issues).

Table 1-51 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
Total mishandled-baggage reports (millions)	**2.66**	**2.20**	**2.45**	**2.28**	**2.32**	**2.28**	**2.46**	**2.28**	**2.48**
Enplaned passengers (domestic) (millions)	395.7	408.5	417.0	407.5	435.7	439.8	464.0	459.8	481.7
Reports per 1,000 passengers	6.73	5.38	5.87	5.60	5.33	5.18	5.30	4.96	5.16

[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.

NOTE: 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 1-52 Flight Operations Arriving On Time by the Largest U.S. Air Carriers[a] (Percent)

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

[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).

NOTE: A flight is considered on time if it operated 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 1-53 U.S. Air Carrier Delay Greater Than 15 Minutes by Cause

	1987	1988	1989	R1990	1991	1992	1993	1994	1995	1996	1997
Operations delayed (thousands)	356	338	394	393	298	281	276	248	237	272	245
Cause (%)											
Weather	67	70	57	56	65	65	72	75	72	75	68
Airport terminal volume	11	9	29	35	27	27	22	19	18	18	22
ARTCC volume	13	12	8	2	0	0	0	0	0	0	0
Closed runways/taxiways	4	5	3	3	3	3	3	2	3	3	3
NAS equipment	4	3	2	1	2	2	2	2	3	2	3
Other	1	1	1	4	3	3	2	2	4	2	4

SOURCE: U.S. Department of Transportation, Federal Aviation Administration, *Aviation Capacity Enhancement Plan* (Washington, DC: Annual issues), figure 1-12 and similar tables in earlier editions.

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

Table 1-54 Annual Person-Hours of Delay per Eligible Driver

Urban area	1982	1986	1990	1992	1994	1995	1996	% change 1982–96	% change 1992–96
Kansas City, MO-KS	6	8	16	21	29	36	38	553	81
Nashville, TN	19	24	30	33	49	52	58	205	76
Indianapolis, IN	4	5	11	19	24	30	32	700	68
Orlando, FL	12	16	19	26	34	37	42	250	62
Louisville, KY-IN	9	13	21	28	37	38	45	400	61
Salt Lake City, UT	5	6	10	17	21	24	27	440	59
Corpus Christi, TX	5	7	7	12	16	19	19	280	58
Cincinnati, OH-KY	7	9	18	23	31	33	36	414	57
Jacksonville, FL	20	24	31	34	41	45	52	160	53
Albuquerque, NM	10	14	24	29	40	44	44	340	52
Fort Lauderdale-Hollywood-Pompano Beach, FL	13	17	21	26	33	37	39	200	50
Providence-Pawtucket, RI-MA	11	17	22	26	32	35	39	255	50
St. Louis, MO-IL	20	24	29	35	45	48	52	160	49
Oklahoma City, OK	8	10	14	19	22	25	28	250	47
Rochester, NY	4	7	13	17	18	24	25	525	47
Hartford-Middletown, CT	9	14	22	26	32	37	38	322	46
Bakersfield, CA	3	5	10	11	15	16	16	433	45
Fort Worth, TX	21	34	33	36	44	49	52	148	44
Atlanta, GA	29	47	43	48	58	62	69	138	44
Austin, TX	29	42	42	43	55	58	61	110	42
Cleveland, OH	5	8	14	17	21	22	24	380	41
Portland-Vancouver, OR-WA	16	18	26	34	39	44	48	200	41
Spokane, WA	8	12	14	15	20	19	21	163	40
Sacramento, CA	14	20	28	33	40	42	46	229	39
Tampa, FL	21	24	27	28	34	38	39	86	39

Continued next page

Table 1-54 Cont'd Annual Person-Hours of Delay per Eligible Driver

Urban area	1982	1986	1990	1992	1994	1995	1996	% change 1982–96	% change 1992–96
Las Vegas, NV	15	20	24	23	28	30	32	113	39
Allentown-Bethlehem-Easton, PA-NJ	12	17	25	26	34	34	36	200	38
Brownsville, TX	3	4	6	8	8	10	11	267	38
Charlotte, NC	17	22	26	27	31	35	37	118	37
Norfolk, VA	18	25	28	30	32	36	41	128	37
Eugene-Springfield, OR	4	6	11	11	10	11	15	275	36
Laredo, TX	6	6	8	11	11	14	15	150	36
Omaha, NE-IA	12	18	25	28	34	35	38	217	36
San Antonio, TX	14	25	23	28	30	36	38	171	36
Boulder, CO	5	6	8	9	11	12	12	140	33
Columbus, OH	11	14	21	24	27	28	32	191	33
Memphis, TN-AR-MS	7	10	17	24	29	32	32	357	33
Fresno, CA	10	15	17	17	19	21	22	120	29
Buffalo-Niagara Falls, NY	6	9	12	14	14	15	18	200	29
Tucson, AZ	12	14	19	21	24	26	27	125	29
San Jose, CA	34	50	55	53	54	62	68	100	28
Detroit, MI	30	36	47	54	59	64	69	130	28
Chicago, IL-Northwestern, IN	19	28	29	33	37	38	42	121	27
Harrisburg, PA	22	33	44	41	48	49	52	136	27
Milwaukee, WI	9	13	20	24	27	29	30	233	25
Minneapolis-St. Paul, MN	9	15	24	28	31	34	35	289	25
Pittsburgh, PA	13	20	24	25	27	31	31	138	24
Denver, CO	24	28	35	42	43	44	52	117	24
New Orleans, LA	15	25	26	26	30	31	32	113	23
Boston, MA	26	39	44	47	49	55	57	119	21

Continued next page

Table 1-54 Cont'd Annual Person-Hours of Delay per Eligible Driver

Urban area	1982	1986	1990	1992	1994	1995	1996	% change 1982–96	% change 1992–96
Colorado Springs, CO	5	13	20	24	26	28	29	480	21
Miami-Hialeah, FL	28	35	47	48	54	56	58	107	21
El Paso, TX-NM	5	9	11	15	19	20	18	260	20
Baltimore, MD	13	21	32	37	38	43	44	238	19
New York, NY-Northeastern, NJ	25	31	35	37	40	43	44	76	19
Albany-Schenectady-Troy, NY	6	10	13	16	18	19	19	217	19
Washington, DC-MD-VA	42	55	65	70	70	79	82	95	17
Dallas, TX	36	55	53	54	57	61	63	75	17
Salem, OR	6	11	16	19	22	23	22	267	16
San Diego, CA	12	19	31	33	34	36	38	217	15
Seattle-Everett, WA	26	41	55	62	67	67	71	173	15
Houston, TX	50	53	55	58	63	64	66	32	14
San Bernardino-Riverside, CA	33	55	59	58	60	60	65	97	12
Honolulu, HI	19	22	23	28	30	32	31	63	11
Los Angeles, CA	41	59	64	70	70	75	76	85	9
Beaumont, TX	4	9	9	12	12	13	13	225	8
Philadelphia, PA-NJ	20	25	24	27	27	27	28	40	4
San Francisco-Oakland, CA	39	60	66	65	65	66	66	69	2
Tacoma, WA	13	20	30	33	34	34	33	154	0
Phoenix, AZ	31	34	37	38	39	36	37	19	(3)

NOTES: 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. For a detailed explanation of the formulas used, see the source document.

SOURCE: Texas Transportation Institute, *Urban Roadway Congestion Annual Report 1998* (College Station, TX: 1998), table 7.

Table 1-55 Roadway Congestion Index

Urban area	1982	1986	1990	1992	1994	1995	1996	% change: Short-term 1992–1996 %	Short-term 1992–1996 Rank	Long-term 1982–1996 %	Long-term 1982–1996 Rank
Tacoma, WA	0.80	1.00	1.18	1.22	1.20	1.19	1.18	-3	1	48	62
Tampa, FL	0.94	0.96	1.05	1.07	1.07	1.08	1.06	-1	2	13	9
New Orleans, LA	0.98	1.09	1.12	1.10	1.11	1.10	1.09	-1	3	11	8
Houston, TX	1.17	1.21	1.12	1.12	1.12	1.13	1.11	-1	4	-5	1
Honolulu, HI	0.91	1.03	1.09	1.10	1.13	1.11	1.10	0	5	21	22
San Bernardino-Riverside, CA	1.11	1.15	1.21	1.22	1.20	1.22	1.22	0	5	10	7
San Francisco-Oakland, CA	1.01	1.24	1.36	1.33	1.33	1.33	1.33	0	5	32	47
San Diego, CA	0.78	1.00	1.22	1.22	1.21	1.22	1.23	1	8	58	67
Salem, OR	0.62	0.72	0.81	0.87	0.85	0.87	0.88	1	9	42	60
Boston, MA	0.90	1.04	1.06	1.07	1.08	1.08	1.09	2	10	21	23
Philadelphia, PA-NJ	1.00	1.06	1.05	1.05	1.05	1.06	1.07	2	11	7	4
Los Angeles, CA	1.22	1.42	1.55	1.54	1.52	1.54	1.57	2	12	29	39
Jacksonville, FL	0.91	0.95	0.93	0.97	0.97	0.98	0.99	2	13	9	5
Providence-Pawtucket, RI-MA	0.84	0.94	0.88	0.94	0.95	0.94	0.96	2	14	14	11
Hartford-Middletown, CT	0.76	0.85	0.89	0.91	0.93	0.93	0.93	2	15	22	25
Allentown-Bethlehem-Easton, PA-NJ	0.83	0.84	0.87	0.85	0.87	0.87	0.87	2	16	5	3
Fresno, CA	0.66	0.70	0.74	0.76	0.75	0.76	0.78	3	17	18	18
Colorado Springs, CO	0.57	0.69	0.71	0.72	0.74	0.74	0.74	3	18	30	43
Sacramento, CA	0.80	0.95	1.02	1.04	1.06	1.06	1.07	3	19	34	55
Milwaukee, WI	0.83	0.90	0.99	1.00	1.00	1.01	1.03	3	20	24	27
Miami-Hialeah, FL	1.05	1.14	1.27	1.30	1.32	1.33	1.34	3	21	28	36
New York, NY-Northeastern, NJ	1.01	1.06	1.14	1.14	1.15	1.16	1.18	4	22	17	14
Spokane, WA	0.70	0.80	0.79	0.81	0.84	0.83	0.84	4	23	20	21
Dallas, TX	0.84	1.04	1.05	1.07	1.09	1.10	1.11	4	24	32	48
San Jose, CA	0.86	0.97	1.05	1.07	1.06	1.09	1.11	4	24	29	40

Continued next page

Table 1-55 Cont'd Roadway Congestion Index

Urban area	1982	1986	1990	1992	1994	1995	1996	% change Short-term 1992–1996 %	Short-term 1992–1996 Rank	Long-term 1982–1996 %	Long-term 1982–1996 Rank
Boulder, CO	0.69	0.77	0.77	0.76	0.77	0.77	0.79	4	26	14	12
Tucson, AZ	0.87	0.83	0.92	0.98	0.99	1.00	1.02	4	27	17	17
Seattle-Everett, WA	0.95	1.09	1.20	1.22	1.24	1.24	1.27	4	28	34	53
Detroit, MI	1.06	1.05	1.13	1.19	1.24	1.24	1.24	4	29	17	16
Norfolk, VA	0.79	0.89	0.96	0.92	0.93	0.94	0.96	4	30	22	24
Chicago, IL-Northwestern, IN	1.02	1.15	1.25	1.28	1.28	1.31	1.34	5	31	31	46
Harrisburg, PA	0.77	0.79	0.81	0.84	0.86	0.87	0.88	5	32	14	10
Baltimore, MD	0.84	0.88	1.01	1.04	1.06	1.08	1.09	5	33	30	42
Pittsburgh, PA	0.78	0.79	0.82	0.81	0.83	0.84	0.85	5	34	9	6
Washington, DC-MD-VA	1.12	1.27	1.34	1.36	1.43	1.40	1.43	5	35	28	37
Kansas City, MO-KS	0.62	0.68	0.74	0.77	0.80	0.81	0.81	5	36	31	45
El Paso, TX-NM	0.63	0.75	0.74	0.76	0.78	0.79	0.80	5	37	27	33
Omaha, NE-IA	0.73	0.81	0.89	0.95	0.98	0.98	1.00	5	37	37	57
Buffalo-Niagara Falls, NY	0.65	0.62	0.69	0.74	0.79	0.78	0.78	5	39	20	20
Corpus Christi, TX	0.67	0.71	0.72	0.74	0.76	0.77	0.78	5	39	16	13
Portland-Vancouver, OR-WA	0.87	0.97	1.08	1.10	1.11	1.14	1.16	5	41	33	50
Phoenix, AZ	1.15	1.20	1.05	1.08	1.09	1.11	1.14	6	42	-1	2
Cincinnati, OH-KY	0.86	0.84	0.96	1.01	1.05	1.06	1.07	6	43	24	28
Atlanta, GA	0.91	1.09	1.14	1.17	1.18	1.22	1.24	6	44	36	56
Rochester, NY	0.57	0.60	0.75	0.82	0.82	0.87	0.87	6	45	53	65
Bakersfield, CA	0.51	0.58	0.63	0.64	0.66	0.67	0.68	6	46	33	52
Albuquerque, NM	0.78	0.96	0.98	0.95	0.99	1.00	1.01	6	47	29	41
Denver, CO	0.88	0.97	1.03	1.05	1.07	1.09	1.12	7	48	27	34
Beaumont, TX	0.65	0.69	0.70	0.71	0.73	0.74	0.76	7	49	17	15

Continued next page

Table 1-55 Cont'd Roadway Congestion Index

Urban area	1982	1986	1990	1992	1994	1995	1996	% change: Short-term 1992–1996 %	Short-term 1992–1996 Rank	Long-term 1982–1996 %	Long-term 1982–1996 Rank
Ft. Lauderdale-Hollywood-Pompano Beach, FL	0.87	0.85	0.94	0.96	0.99	1.01	1.03	7	50	18	19
Cleveland, OH	0.80	0.86	0.94	0.95	1.00	1.02	1.02	7	51	28	35
Fort Worth, TX	0.76	0.87	0.90	0.94	0.97	1.00	1.01	7	52	33	49
Albany-Schenectady-Troy, NY	0.52	0.60	0.73	0.75	0.77	0.79	0.81	8	53	56	66
Austin, TX	0.84	0.94	0.94	0.95	0.97	1.00	1.03	8	54	23	26
Columbus, OH	0.68	0.75	0.89	0.93	0.95	0.97	1.01	9	55	49	63
Nashville, TN	0.77	0.86	0.89	0.92	0.96	0.98	1.00	9	56	30	44
Oklahoma City, OK	0.72	0.76	0.79	0.83	0.85	0.88	0.91	10	57	26	30
San Antonio, TX	0.77	0.88	0.88	0.90	0.92	0.95	0.99	10	58	29	38
Charlotte, NC	0.71	0.78	0.86	0.89	0.94	0.95	0.98	10	59	38	58
St. Louis, MO-IL	0.83	0.93	0.95	0.95	0.98	1.01	1.05	11	60	27	32
Laredo, TX	0.58	0.61	0.63	0.66	0.69	0.71	0.73	11	61	26	29
Eugene-Springfield, OR	0.58	0.58	0.75	0.83	0.89	0.90	0.92	11	62	59	68
Las Vegas, NV	0.73	0.85	1.01	1.08	1.18	1.21	1.20	11	63	64	70
Salt Lake City, UT	0.63	0.68	0.85	0.90	0.94	0.97	1.00	11	64	59	69
Minneapolis-St. Paul, MN	0.76	0.89	0.95	0.99	1.04	1.07	1.12	13	65	47	61
Orlando, FL	0.72	0.76	0.77	0.80	0.86	0.89	0.91	14	66	26	30
Brownsville, TX	0.56	0.57	0.65	0.69	0.75	0.77	0.79	14	67	41	59
Louisville, KY-IN	0.78	0.80	0.86	0.90	0.95	0.98	1.04	16	68	33	51
Indianapolis, IN	0.67	0.81	0.84	0.85	0.92	0.96	1.00	18	69	49	64
Memphis, TN-AR-MS	0.83	0.80	0.89	0.92	0.94	0.96	1.11	21	70	34	54

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. For more detailed information on the methodology used in calculating this index, see the source document. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the study.

SOURCE: Texas Transportation Institute, *Urban Roadway Congestion Annual Report 1998* (College Station, TX: 1998), table 3.

Table 1-56 Congestion Index and Cost Values

Urban area	Roadway congestion index				Annual congestion cost per driver ($)				Annual congestion cost ($ millions)			
	1994 value	1996 value	1994 rank	1996 rank	1994 value	1996 value	1994 rank	1996 rank	1994 value	1996 value	1994 rank	1996 rank
Los Angeles, CA	1.52	1.57	1	1	1,035	1,205	1	2	9,185	10,805	1	1
Washington, DC-MD-VA	1.43	1.43	2	2	1,030	1,290	2	1	2,930	3,655	5	4
Chicago, IL-Northwestern, IN	1.28	1.34	5	3	545	670	26	26	3,225	4,005	3	3
Miami-Hialeah, FL	1.32	1.34	4	3	780	905	12	13	1,195	1,460	13	13
San Francisco-Oakland, CA	1.33	1.33	3	5	975	1,055	4	7	3,000	3,250	4	5
Seattle-Everett, WA	1.24	1.27	6	6	995	1,155	3	3	1,495	1,780	11	11
Atlanta, GA	1.18	1.24	11	7	850	1,095	8	4	1,595	2,110	9	9
Detroit, MI	1.24	1.24	6	7	860	1,095	7	4	2,655	3,165	6	6
San Diego, CA	1.21	1.23	8	9	520	620	28	31	1,015	1,200	14	17
San Bernardino-Riverside, CA	1.20	1.22	9	10	890	1,030	6	9	855	990	19	21
Las Vegas, NV	1.18	1.20	11	11	425	510	44	44	300	420	41	40
New York, NY-Northeastern, NJ	1.15	1.18	13	12	590	705	21	24	8,235	9,810	2	2
Tacoma, WA	1.20	1.18	9	12	510	535	29	42	220	240	48	52
Portland-Vancouver, OR-WA	1.11	1.16	16	14	585	765	22	20	545	765	24	23
Phoenix, AZ	1.09	1.14	18	15	580	590	24	37	950	1,070	17	19
Denver, CO	1.07	1.12	21	16	635	825	18	18	815	1,115	20	18
Minneapolis - St. Paul, MN	1.04	1.12	28	16	465	575	37	40	795	1,020	21	20
Dallas, TX	1.09	1.11	18	18	845	1,015	9	10	1,410	1,765	12	12
Houston, TX	1.12	1.11	15	18	935	1,055	5	7	2,040	2,405	7	7
Memphis, TN-AR-MS	0.94	1.11	43	18	425	505	44	45	290	365	43	44
San Jose, CA	1.06	1.11	23	18	805	1,070	10	6	955	1,315	16	14
Honolulu, HI	1.13	1.10	14	22	465	520	37	43	250	285	45	48
Baltimore, MD	1.06	1.09	23	23	565	715	25	23	950	1,205	17	16
Boston, MA	1.08	1.09	20	23	720	900	14	14	1,725	2,170	8	8
New Orleans, LA	1.11	1.09	16	23	440	500	43	48	375	430	32	39

Continued next page

Table 1-56 Cont'd Congestion Index and Cost Values

Urban area	Roadway congestion index				Annual congestion cost per driver ($)				Annual congestion cost ($ millions)			
	1994 value	1996 value	1994 rank	1996 rank	1994 value	1996 value	1994 rank	1996 rank	1994 value	1996 value	1994 rank	1996 rank
Cincinnati, OH-KY	1.05	1.07	26	26	460	590	39	37	445	570	27	28
Philadelphia, PA-NJ	1.05	1.07	26	26	385	445	49	53	1,585	1,825	10	10
Sacramento, CA	1.06	1.07	23	26	595	730	20	21	540	670	25	26
Tampa, FL	1.07	1.06	21	29	490	610	33	33	300	395	41	43
St. Louis, MO-IL	0.98	1.05	34	30	650	825	17	18	995	1,280	15	15
Louisville, KY-IN	0.95	1.04	40	31	540	720	27	22	340	475	38	34
Austin, TX	0.97	1.03	36	32	805	970	10	11	370	465	34	36
Ft. Lauderdale-Hollywood-Pompano Beach, FL	0.99	1.03	31	32	495	625	32	30	515	730	26	25
Milwaukee, WI	1.00	1.03	29	32	405	495	48	49	385	475	31	34
Cleveland, OH	1.00	1.02	29	35	305	390	57	58	435	570	28	28
Tucson, AZ	0.99	1.02	31	35	360	420	52	55	170	210	55	54
Albuquerque, NM	0.99	1.01	31	37	585	700	22	25	240	300	46	47
Columbus, OH	0.95	1.01	40	37	410	505	47	45	320	400	40	41
Fort Worth, TX	0.97	1.01	36	37	655	840	16	15	610	805	22	22
Indianapolis, IN	0.92	1.00	48	40	360	505	52	45	275	400	44	41
Nashville, TN	0.96	1.00	39	40	730	920	13	12	350	450	36	37
Omaha, NE-IA	0.98	1.00	34	40	500	595	31	36	205	250	50	51
Salt Lake City, UT	0.94	1.00	43	40	315	430	55	54	195	270	51	49
Jacksonville, FL	0.97	0.99	36	44	600	830	19	17	355	505	35	32
San Antonio, TX	0.92	0.99	48	44	450	605	41	35	405	550	30	30
Charlotte, NC	0.94	0.98	43	46	450	590	41	37	190	260	52	50
Norfolk, VA	0.93	0.96	46	47	460	645	39	28	350	505	36	32
Providence-Pawtucket, RI-MA	0.95	0.96	40	47	480	615	36	32	335	435	39	38
Hartford-Middletown, CT	0.93	0.93	46	49	490	640	33	29	240	320	46	46

Continued next page

Table 1-56 Cont'd Congestion Index and Cost Values

Urban area	Roadway congestion index				Annual congestion cost per driver ($)				Annual congestion cost ($ millions)			
	1994 value	1996 value	1994 rank	1996 rank	1994 value	1996 value	1994 rank	1996 rank	1994 value	1996 value	1994 rank	1996 rank
Eugene-Springfield, OR	0.89	0.92	50	50	125	220	68	66	20	35	66	66
Oklahoma City, OK	0.85	0.91	54	51	325	460	54	51	210	345	49	45
Orlando, FL	0.86	0.91	52	51	505	660	30	27	375	535	32	31
Harrisburg, PA	0.86	0.88	52	53	690	840	15	15	165	210	56	54
Salem, OR	0.85	0.88	54	53	310	395	56	57	40	55	65	65
Allentown-Bethlehem-Easton, PA-NJ	0.87	0.87	51	55	485	570	35	41	175	210	54	54
Rochester, NY	0.82	0.87	58	55	280	405	59	56	135	190	57	57
Pittsburgh, PA	0.83	0.85	57	57	385	485	49	50	595	755	23	24
Spokane, WA	0.84	0.84	56	58	290	340	58	60	70	85	62	62
Albany-Schenectady-Troy, NY	0.77	0.81	62	59	270	295	62	61	105	115	59	61
Kansas City, MO-KS	0.80	0.81	59	59	425	610	44	33	435	630	28	27
El Paso, TX-NM	0.78	0.80	61	61	280	290	59	62	115	125	58	60
Boulder, CO	0.77	0.79	62	62	125	125	68	70	10	10	69	70
Brownsville, TX	0.75	0.79	65	62	110	165	70	69	10	15	69	69
Buffalo-Niagara Falls, NY	0.79	0.78	60	64	215	285	65	63	180	240	53	52
Corpus Christi, TX	0.76	0.78	64	64	240	285	63	63	50	65	64	64
Fresno, CA	0.75	0.78	65	64	280	350	59	59	100	130	61	59
Beaumont, TX	0.73	0.76	68	67	150	180	66	68	15	20	67	67
Colorado Springs, CO	0.74	0.74	67	68	375	450	51	52	105	135	59	58
Laredo, TX	0.69	0.73	69	69	150	200	66	67	15	20	67	67
Bakersfield, CA	0.66	0.68	70	70	220	270	64	65	55	70	63	63

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 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. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the study.

SOURCE: Texas Transportation Institute, *Urban Roadway Congestion Annual Report 1998* (College Station, TX: 1998), table 17.

Table 1-57 Amtrak On-Time Performance Trends and Hours of Delay by Cause

	1980	1985	1990	1995	1996	1997	1998
On-time performance, total% (weighted)	69	81	76	76	71	74	79
Short distance (<400 miles)	71	82	82	81	76	79	81
Long distance (≥400 miles)	64	78	53	57	49	53	59
Hours of delay by cause							
Amtrak[a]	N	N	3,565	R5,527	5,193	5,310	4,796
Freight[b]	N	N	4,244	11,224	11,438	12,904	14,202
Other[c]	N	N	4,316	8,497	8,425	7,611	8,291
Total[d]	**N**	**N**	**12,126**	**R25,248**	**25,056**	**25,825**	**27,289**

KEY: N = data are nonexistent; R = revised

[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.

NOTE: 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).

1985–98: _____. *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues).

Section F
Accuracy Profiles

TABLE 1-1: U.S. Transportation System Mileage 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). 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* required of Class-I railroads. The STB defines Class I railroads as having operating revenues of $255 million or more. 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 independent rounding in 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 city timetables that railroad companies provide for engineers. The figures are estimates, but are considered reliable.

Transit

Figures are based on information in the U.S. Department of Transportation, Federal Transit Administration (FTA) National Transit Database. Transit data 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 certain data definitions.

Box 1-1.

Source and Accuracy Statements Highway Performance Monitoring System Sample Data

SAMPLE DESIGN

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

The data are collected independently by the 50 states, MPO's, 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.

The state DOT's 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 non-response 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 the specific item (for example, 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, andmajor 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 strata. Traffic volume is the most variable data item. Sampling error can be estimated directly based on the sample design for each strata 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 (VMT). It has not been repeated since due to the work involved and the limited impact of sampling error as compared to non-sampling 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 these state inventories. Measurement errors are unknown but the difficulty of collecting some of the zdata items is well known. For highway links not the responsibility of states, MPO's 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 data base and conduct logic edits prior to submittal. The reported data is 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.*

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 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. The data reported by the 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 nonre-

porters from year to year introduce minor reliability problems for time-series comparisons.

TABLE 1-2: 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 1-3: U.S. Public Road and Street Mileage by Type of Surface

TABLE 1-4: U.S. Public Road and Street Mileage by Functional System

TABLE 1-5: 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 (FHWA) 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 stud-

ies. 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 1-6: Number of Stations Served by Amtrak and Rail Transit

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 1-7: Number of U.S. Water Ports and Facilities

The data were furnished by personal communication with the U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center (or Navigation Data Center) *Waterborne Commerce of the United States, Part V, National Summaries* special tabulation. These figures are derived from self-reported data on monthly shipments from shippers and operators as required by federal law. This source is close to a census and is generally accurate. Some inaccuracies may arise from nonsampling error, such as lack of reporting from every shipper/operator, inability or unwillingness of respondents to provide correct information because of confidentiality concerns, and errors made in collection or coding/recoding.

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 1-9: Number of U.S. Aircraft, Vehicles, and Vessels

Air Carrier, Certificated, All Services

The 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 figures from 1960–80 originate from the *FAA Statistical Handbook of Aviation*. Later data are from FAA annual issues of the *General Aviation Activity Survey,* table 3.1. Prior to 1978, the FAA required all aircraft owners to revalidate and update their aircraft registration annually by completing the Aircraft Registration Eligibility, Identification, and Activity Report. The active fleet figures probably approached 100-percent reporting. In 1978, the FAA began using a triennial revalidation program for maintaining its masterfile, in which aircraft owners were contacted only if they had not responded to the FAA registry for three years. The FAA asserted that this change deteriorated the 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.

Also in 1978, the FAA began collecting data with the General Aviation Activity and Avionics Survey, which was renamed the General Aviation and Air Taxi Activity (GAATA) 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 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. FAA established three stratification design variables in the survey: the average annual hours flown per aircraft by aircraft type, the aircraft manufacturer/model characteristics, and the state of aircraft registration.

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 FAA set the standard error tolerance level based on a 95 percent confidence interval for large states, 90 percent confidence for small states, and 80 to 90 percent for various groups of aircraft types. 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 among others.

The reliability of general aviation fleet data comparisons over time would be decreased by changes implemented in 1978 and sampling error. Users should note that nonresponse bias might be a component of reliability errors in the

data from 1980 to 1990. The FAA conducted telephone nonresponse surveys 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 based on survey factors.

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. Differences that the user needs to consider in determining suitability of peer states include characteristics such as urban/rural similarities, population density, degree of urbanization, climate, geography, differing state laws and practices that influence data definitions, administrative control of the public road system, similarity of the basic state economies, traffic volume similarities, and the degree of state functional centralization. The FHWA has developed a set of variables that users can use to may 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 TIUS 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 state size; large (> 1.5 million trucks), medium (700,000 to 1.5 million), and small (< 700,000); and then by two truck sizes (< 14,000 lb).

Stratification in 1982 was then based on body type rather than vehicle weight. In 1992, the sampling universe was first subdivided geographically and then into five strata: pickups, vans, single-unit light, single-unit heavy, and

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. To reduce the burden on the respondents, the sample for 1997 was some 22,500 vehicles smaller than for 1992.

The accuracy and reliability of the TIUS survey depends jointly on sampling variability and nonsampling errors. One major source of nonsampling error is nonresponse; however, the 1992 TIUS achieved over 90.2 percent reporting (reported in the U.S. summary).

Transit

American Public Transit Association (APTA), *Transit Fact Book* reports these data. APTA figures are based on information in the Federal Transit Administration (FTA) National Transit Data Base. 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 misinterpret certain data definitions in federal guidelines.

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 (all categories)

The data are from annual issues of *Railroad Facts,* published 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* required of Class-I railroads. Thus, data estimates are considered very reliable. The STB defines Class I railroads as having operating revenues of $255 million or more. Although Class I railroads represent only 2 percent of railroads in the country, they account for over 70 percent of the industry's mileage.

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 on a daily basis), and location. This data should be considered very reliable.

Water Transport

The source for Inland Nonself-Propelled Vessels and Self-Propelled Vessel 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. A USACE official did report that less than 10 percent of the inland vessel fleet does not receive or respond to the annual survey. (USACE)

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 the 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 nonpowered 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. 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, and Vessels

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. The total output of all plants so classified would make up the "industry shipments" of the entire industry.

Transport

The AIA compiled the figures for transport vehicles from Boeing Corp., which is now the primary supplier for these aircraft.

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 except for foreign manufacturers.

Passenger Cars, Truck, Bus, and Recreational Vehicles

These data originated from *Motor Vehicle Facts and Figures* published by the American Automobile Manufacturers Association (AAMA), which ceased operations in 1998; data accuracy information could not be obtained.

Motorcycle

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 Bicycle Manufacturer's Association of America produced these data, however, they currently are not an active organization (a phone number was obtained but when called, a recording indicated that it was not in service) and detailed source data could not be obtained. Moreover, they were a lobbying group that represented the largest bike manufacturers (Huffy, Roadmaster, and Murray) and the figures probably do not reflect other manufacturers and in particular, specialty bike makers.

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 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).

Class I Rail

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* required of Class-I railroads. STB defines Class I railroads as having operating revenues of $255 million or more. 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. This data should be considered very reliable.

Water Transport

U.S. Department of Transportation, Maritime Administration (MARAD), which classifies vessels as merchant based on size and type, reported these figures in annual issues of *Merchant Fleets of the World*. MARAD compiles these figures from a data service provided by the Lloyd's Maritime Information Service. 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 shipowners and shipbuilders, 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.

TABLE 1-11: 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 data sources cover nearly 100 percent of fleet vehicles in the United States so estimates should be very accurate.

TABLE 1-12: Annual U.S. Motor Vehicle Production and Factory (Wholesale) Sales

TABLE 1-13: Retail New Passenger Car Sales

TABLE 1-14: New and Used Passenger Car Sales and Leases

TABLE 1-18: World Motor Vehicle Production

The American Automobile Manufacturers Association (AAMA) is the source of these data. The AAMA ceased operations on December 31, 1998 thus preventing the collection of data accuracy information.

Used Passenger Car Sales and Leased Passenger Cars

ADT Automotive, Used Car Market Report published these figures. The *Wall Street Journal* (WSJ) was the original source of the figures for the latest data. According to an ADT representative, publishing deadlines require them to use *WSJ* numbers until they can replace them with data from the National Automotive Dealers Association. 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 auto sales revenues. Polk is an additional source of data and maintains a database of state

vehicle registration data. For 1998, the ADT representative stated that Polk's data were within 5 percent of the CNW estimates.

TABLE 1-15: Retail Sales of New Cars by Sector

The U.S. Department of Commerce, Bureau of Economic Analysis, uses data from Ward's Communications automotive reports. The sectoral break down is derived from registration data obtained from R.L. Polk. Ward's obtains sales data directly from manufacturers. The sales-weighted fuel economy data is derived from U.S. Department of Transportation and U.S. Environmental Protection Agency figures. 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.

TABLE 1-16 and 1-17: 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) annual publication *Highway Vehicle MPG and Market Shares Report*, table 7 and similar tables. ORNL compiled this data from monthly "Ward's Automotive Reports." The data are managed by the ORNL Light-Duty Vehicles PC System. Comparisons and observations are made on the trends from one model year to the next. ORNL maintains a database of sales statistics, fuel economies, and vehicle characteristics that are updated quarterly from the Ward's report.

Several conventions have been adopted to facilitate these comparisons: use of sales-weighted averages, "sales" model years, unadjusted fuel economies, domestic and import categories, and vehicle size classification. For instance, "sales-weighted" mpg refers to the calculation of 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*. The method was changed dramatically in 1983 and data reliability prior to that year is questionable.

TABLE 1-19: 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 (MARAD), which classifies vessels as merchant based on size and type, compiles these figures from a data service provided by the Lloyd's Maritime Information Service. 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 shipowners and shipbuilders, 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.

TABLE 1-20: 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

National Planning Division of the Office of Airport Planning and Programming serves as the principal FAA organization responsible for program matters pertaining to national airport planning and other tasks. The NPIAS 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 percent of all enplanements and serve 91.5 percent of all aircraft (based on an estimated fleet of 200,000 aircraft). In 1997, there were 14,961 non-NPIAS airports. 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. State aviation agencies also are asked to additionally report on pavement quality. In 1990, for example, 7,165 runway observations were made. 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.

TABLE 1-21: 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 1-22: Condition of U.S. Roadways by Functional System

U.S. Department of Transportation, Federal Highway Administration (FHWA) collects data on pavement condition through the Highway Performance Monitoring System (HPMS) from each state, based on one of two rating schemes, the Present Serviceability Rating (PSR) and the International Roughness Indicator (IRI). IRI is used to measure Interstates, principal arterials, rural minor arterials, and other National Highway System roadways. PSR is used to measure 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 however, lower values indicate smoother roads (e.g., >170 for interstate pavement in poor condition to <60 for interstate pavement in very good condition).

The IRI is an objective measure of pavement roughness developed by the World Bank. The PSR is subjective and therefore less comparable. From 1993-1997, the IRI was used to measure Rural & Urban Interstates, Rural Other Principal Arterial, Rural Minor Arterial, Urban Other Freeways and Expressways, and Urban Other

Principal Arterial. The PSR was used to measure Rural Major Collector, Urban Minor Arterial, and Urban Collector. 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, therefore 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." The amount of miles not reported is given; for example, in 1995, about 15 percent of the mileage was not reported.

TABLE 1-23: 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. Some bridges will be inspected at greater intervals if a state was granted approval from FHWA. Data includes structure locations, dimensions, and conditions. A complete file of all bridges is collected and maintained, representing a very reliable census of bridge conditions. However, some inaccuracy may be attributable to variations in state inspector's adherence to the National Bridge Inspection Standards.

TABLE 1-24: Average Age of Rail, Bus, and Other Urban Transit Vehicles

These figures are based on information in the U.S. Department of Transportation, Federal Transit Administration (FTA) National Transit Database that only contain information for directly operated service. Section 15 of the Federal Transit Act requires over 500 federally funded transit agencies to provide detailed financial and operating data including vehicle inventories. The figures do not include purchased service mileage. 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.

TABLE 1-25: 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* required of Class-I railroads. STB defines Class I railroads as having operating revenues of $255 million or more. 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 1-26: 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. This data should be considered very reliable.

TABLE 1-27: 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. A USACE official did report that less than 10 percent of the inland vessel fleet does not receive or respond to the annual survey.

TABLE 1-28: U.S. Vehicle-Miles

TABLE 1-29: Roadway Vehicle-Miles Traveled (VMT) and VMT per Lane-Mile by Functional Class

TABLE 1-30: U.S. Passenger-Miles

Air Carrier, Certificated, Domestic, All Services

The U.S. Department of Transportation (USDOT), 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 about 90 air carriers operating aircraft that seat 60 or more passengers, or that have a payload capacity of more than 18,000 pounds; and/or fly jets; and/or operate internationally. Minor errors arise from nonreporting but amount to less than 1 percent of all passenger-miles. The figures do not include data for all airlines; notably, most scheduled commuter airlines and all nonscheduled commuter airlines are excluded. These, if added, might raise the total by about 5 percent for passenger-miles. (For vehicle-miles, adding scheduled commuter service would raise the total by 13 percent in 1995. See tables 3-9 and 3-10; note that table 3-9 presents domestic plus international aircraft miles.)

General Aviation

Passenger-mile numbers for 1975 to present are calculated by increasing 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), F*AA Statistical Handbook of Aviation*. Numbers in the handbook are based on the General Aviation and Air Taxi Activity Survey (GAATA). In 1993, about 12 percent of all registered aircraft were surveyed, with a response rate of 66 percent. 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 the Federal Highway Administration (FHWA) that contains highway characteristics data 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, we are unaware of any study or report that has statistically quantified the accuracy of vmt estimates. Some of the primary issues related to data quality are provided below:

1. The sampling procedures suggested in the TMG and HPMS *Field Manual* are designed to produce traffic volume estimates with an average 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 upon 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* (http://www.fhwa.dot.gov/ ohim/hs97/roadtxt.htm), 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 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 vmt for several reasons: a) Vehicle classification equipment can frequently misclassify vehicles (Harvey, B. A., Champion, G. H., Ritchie, S.M., and Ruby, C. D. 1995. *Accuracy of Traffic Monitoring Equipment*. Georgia Tech

Research Institute, GDOT 9210). b) 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. c) 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 Mingo, R.D., and H.K. Wolff. 1995. Improving National Travel Estimates for Combination Vehicles, *Transportation Research Record,* No. 1511. National Academy Press: Washington, DC, pp. 42–46.

5. FHWA adjusts questionable data using a variety of standard techniques and some 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 (NPTS), conducted by FHWA, and TIUS. Thus, PMT is subject to the same data 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 the U.S. Department of Transportation, Federal Transit Administration (FTA) National Transit Database. APTA conservatively adjusts the FTA data to include transit operators that do not report to the FTA database (private and very small operators and rural operators). There are about 6,000 transit operators in the country, according to APTA; only about 1,000 of these report to the FTA, but they account for perhaps 90 to 95 percent of total transit passenger-miles. Reliability varies by mode; the numbers for rail are comprehensive because there are so few rail operators, but the numbers for bus, ferry boat, and demand responsive are less reliable because there are so many operators.

Class I Rail (vehicle-miles)

Data are from the Association of American Railroad (AAR) annual report *Railroad Facts*. 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* required of Class I railroads. STB defines Class I railroads as having operating revenues of $255 million or more. 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 1-31: Travel in the United States by Selected Trip Characteristics: 1995

TABLE 1-32: 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 1-33: Passengers Boarded at the Top 50 U.S. Airports

The U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, is the source of these data. These numbers are based on 100 percent reporting of passengers by some 90 air carriers that operate aircraft with a passenger seating capacity of more than 60, or have a payload capacity of more than 18,000 pounds; and/or fly jets; and/or conduct international operations. The figures do not include passengers on all airlines; most scheduled commuter airlines and all nonscheduled commuter airlines are excluded.

TABLE 1-34: Air Passenger Travel Arrivals in the United States from Foreign Countries

TABLE 1-35: Air Passenger Travel Departures from the United States to 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 1-38: U.S. Ton-Miles of Freight

Air Carrier

Data are from the U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), Office of Airline Information. Large certificated air carriers (i.e., carriers with a certificate to operate aircraft that seat 60 or more passengers or that conduct international opera-

tions) base the data on 100-percent reporting of domestic freight activities on Form 41. Information about small certificated air carriers not included in this table represents less than 5 percent of freight ton-miles annually. The data series reported in the tables represent transportation of freight (property excluding passenger baggage), U.S. and foreign mail, and express mail within the 50 states of the United States, the District of Columbia, Puerto Rico, and the Virgin Islands. It also covers transborder traffic to Canada and Mexico by U.S. carriers.

Truck, Intercity

The data are 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 converting to ton-miles 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. Users should also note that the numbers are estimates.

Class I Rail

The data are from *Railroad Facts*, published by the Association of American Railroads (AAR). The data reported by the AAR are based on 100-percent reporting by Class I railroads to the Surface Transportation Board (STB), the successor of the ICC. 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 defined Class I railroads as having operating revenues of $255 million or more. Although the Class I railroads represented only 2 percent of the number of railroads in the country, they accounted for over 90 percent of the rail industry's freight revenues in 1996.

Domestic Water Transport

The data are from *Waterborne Commerce of the United States*, published by the U.S. Army Corps of Engineers (USACE).

Oil Pipeline

The data for 1960, 1965, and 1970 are from *Transportation in America* by Eno, and the data for 1975 to 1996 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's data are based on information reported by oil pipelines to the Federal Energy Regulatory Commission.

TABLE 1-39: Average Length of Haul, Domestic Freight and Passenger Modes

Air Carrier

The data in this table are from the U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information (OAI). Large certificated air are data based on 100 percent reporting of domestic freight activities. (Large certificated air carriers are those that hold a certificate to operate aircraft with a maximum seating capacity of more than 60 seats or that conduct international operations.) Data on small certificated air carriers, which represent less than 5 percent of ton-miles, are not included in this table.

Bus

The Eno Transportation Foundation, Inc. estimated figures are based on Class I carrier passenger data and vehicle miles data from Highway Statistics, an annually published report of the Federal Highway Administration.

Commuter Rail

Figures are from the Transit Fact Book, published annually by the American Public Transit Association (APTA). APTA's data are based on passenger-miles and passenger trip data from the Federal Transit Administration's National Transit Database. There are only a small number of commuter rail operators, which suggests an accurate count. Accuracy, however, depends largely on reporting by 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 1-40: Top U.S. Foreign Trade Freight Gateways by Value of Shipments: 1997

Data on 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. The United State's international merchandise trade statistics, therefore, are no longer derived exclusively from the administrative records of the Department of Energy and Treasury, but from Revenue Canada, the U.S. Customs Service and Excise as well. 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.

Data for land modes include (truck, rail pipeline, mail, and other) transshipments (shipments entering or exiting the United States by way of 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). Data presents 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 1-41: U.S. Waterborne Freight

The data are from *Waterborne Commerce of the United States*, published by the U.S. Army Corps of Engineers (USACE). The USACE data cover 100-percent reporting of domestic commodity movements on the navigable waters of the United States. All vessel and craft operators use ENG Forms 3925 and 3925b to report all freight and tonnage information for transporting goods on U.S. waters. Domestic water transport covers the 50 states, Puerto Rico, the Virgin Islands, Guam, America Samoa, Wake Island, and the U.S. Trust Territories. The data exclude certain movements: cargo carried on general ferries, coal and petroleum products loaded from shore facilities directly into vessels

for fuels, military cargo moved in Department of Defense vessels, and insignificant amounts of other government materials.

TABLE 1-42: Tonnage for 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, U.S. Customs Service and Excise as well. 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, USACE historically performed additional specialized edits at the port level, including the 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 1-44: Value, Tons, and Ton-Miles of Freight Shipments within the United States by Domestic Establishment: 1997

These data are collected via the 1997 Commodity Flow Survey (CFS) undertaken through a partnership between the U.S. Department of Commerce, Bureau of the Census (Census) and the U.S. Department of Transportation, Bureau of Transportation Statistics. The CFS is a continuation of statistics collected in the Commodity Transportation Survey from 1963 to 1977. The CFS was last conducted in 1993.

For the 1997 CFS, Census conducted a sample of 100,000 domestic establishments randomly selected from a universe of about 800,000 multiestablishment companies (manufacturing, wholesale trade, selected retail industries and auxiliary establishments, such as warehousing). It excludes 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 the two types of errors. The following is a description of

the sampling and nonsampling errors associated with the estimates computed from the 1997 CFS.

Measures of Sampling Variability

Because the estimates were based on a sample, exact agreement with results that would be obtained from a complete census of establishments in the CFS frame using the same enumeration procedure was not expected. However, because each establishment in the Standard Statistical Establishment List in the specified Standard Industrial Classifications had a known probability of being selected into the sample, it is possible to estimate the sampling variability of the estimates. 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.

Nonsampling Errors

The standard error and coefficient of variation measures sampling errors but does not measure any systematic biases in the data. Bias is the difference, averaged over all possible samples of the same size and design, between the estimate and the true value being estimated. In the CFS, as in other surveys, nonsampling errors can be attributed to many sources:

1. nonresponse,
2. response errors,
3. differences in the interpretation of questions,
4. mistakes in coding or recoding the data obtained, and
5. other errors of collection, response, coverage, and estimation.

A potentially large source of bias 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. For additional information about the CFS, the reader is referred to the *Guide to the 1997 Economic Census and Related Statistics* at www/census.gov/econ/www/guide.html.

TABLE 1-45: Value of U.S. Land Exports and Imports to 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 direct. For example, this dataset provides surface transportation information for individual 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 reflect when goods physically crossed 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. Despite these limitations, however, the TSFD 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 due to the fact that 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 1-46: Crude Oil Transported in the United States by Mode

TABLE 1-47: Transportation of Refined Petroleum Products within the United States by Mode

TABLE 1-48: Transportation of Crude Petroleum and Petroleum Products in the United States by Mode

Pipelines

The Association of Oil Pipe Lines (AOPL) obtains barrel-miles from the Federal Energy Regulatory Commission (FERC), which requires petroleum shippers to report annual shipments. AOPL then converts barrel-miles to ton-miles using conversion figures in the American Petroleum Institute's (API's) *Basic Petroleum Data Book*. Moreover, 16 percent of pipeline shipments are intrastate and not subject to the FERC reporting requirement. Thus, AOPL expands the FERC regulated ton-miles to total domestic ton-miles by dividing by 0.84.

AOPL also conducts periodic studies to estimate intrastate shipments.

Water Carriers

AOPL collects domestic ton-miles for water carriers from the U.S. Army Corps of Engineers *Waterborne Commerce of the U.S.*.

Motor Carriers

AOPL estimates ton-miles by obtaining tons and then multiplying 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 U.S. Department of Energy, Energy Information Administration's *Petroleum Supply Annual*, vol. 1, table 37. For products (tables 1-22 and 23), 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 movement of crude and products 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, table A.3. The U.S. Department of Transportation, Federal Railroad Commission provides the average length of haul for crude and products in *Carload Way Bill Statistics*, statement TD-1.

TABLE 1-49: 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. commercial space launches as authorized by the *Commercial Space Launch Act of 1984* and Executive Order 12465. Thus, every space launch must be approved and monitored by AST. Because data collection represents a census, data reliability is high.

TABLE 1-50: Passengers Denied Boarding by the Largest U.S. Air Carriers

TABLE 1-51: Mishandled Baggage Reports Filed by Passengers with the Largest U.S. Air Carriers

TABLE 1-52: Flight Operations Arriving On Time for the Largest U.S. Air Carriers

These numbers are based on data filed on a monthly basis by the largest U.S. air carriers – those that have at least 1 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. However, there are approximately 35 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 another, smaller airline not subject to the reporting requirement. Therefore, the Office of Airline Information in the U.S. Department of Transportation, Bureau of Transportation Statistics does not collect data on these flights. For example, this includes all

USAir shuttle flights, which are operated by Shuttle, Inc.

TABLE 1-53: Air Carrier Delay Greater than 15 Minutes by Cause

The U.S. Department of Transportation, Federal Aviation Administration (FAA), collects delay data from two different sources. First, FAA personnel record delays of more than 15 minutes through the Air Traffic Operations Management System. The cause of delay is also recorded, e.g., weather, terminal volume, closed runways, etc. The second data source originates from the Airline Service Quality Performance data. These figures are collected from airlines with 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).

TABLE 1-54: Annual Person-Hours of Delay per Eligible Drive

TABLE 1-55: Roadway Congestion Index

TABLE 1-56: Congestion Index and Cost Values

The Texas Transportation Institute (TTI), which provided these figures, principally relies on data from the U.S. Department of Transportation, Federal Highway Administration, Highway Performance Monitoring System database.

The roadway congestion index estimates congestion levels as perceived by individuals. 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 areawide 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 should refer to the TTI annual report *Urban Roadway Congestion* for more detailed algorithms and estimation procedures or their web site (http://mobility.tamu.edu/study/methodology.stm).

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 1-57: 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 very reliable.

Transportation and the Economy

Section A
Transportation and the Total Economy

Table 2-1a U.S. Gross Domestic Product (GDP) Attributed to For-Hire Transportation Services (Current $ billions)

	1990	1991	1992	1993	1994	1995[R]	1996[R]	1997
TOTAL GDP	**5,743.8**	**5,916.7**	**6,244.4**	**6,558.1**	**6,947.0**	**7,269.6**	**7,661.6**	**8,110.9**
GDP								
Trucking and warehousing	75.8	77.9	82.2	87.0	95.0	98.0	92.9	97.9
Air	39.4	40.8	43.0	47.8	51.7	53.9	65.2	74.4
Railroad	19.6	21.9	22.1	22.1	24.2	22.9	23.4	24.1
Transportation services	17.8	19.4	19.6	20.3	22.1	23.2	25.5	26.8
Local and interurban passenger transit	9.0	10.2	10.9	11.2	11.4	12.2	13.0	13.8
Water	9.7	10.7	10.3	10.1	10.9	10.9	11.7	12.8
Pipelines, except natural gas	5.0	5.0	4.9	4.8	4.6	4.9	5.2	5.6
Total	**176.4**	**185.8**	**192.8**	**203.3**	**219.9**	**226.1**	**237.0**	**255.5**
% of GDP								
Trucking and warehousing	1.3	1.3	1.3	1.3	1.4	1.3	1.2	1.2
Air	0.7	0.7	0.7	0.7	0.7	0.7	0.9	0.9
Railroad	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3
Transportation services	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
Water transportation	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2
Pipelines, except natural gas	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**	**3.1**	**3.1**	**3.2**
% of for-hire transportation								
Trucking and warehousing	43.0	41.9	42.6	42.8	43.2	43.3	39.2	38.3
Air	22.3	22.0	22.3	23.5	23.5	23.8	27.5	29.1
Railroad	11.1	11.8	11.5	10.9	11.0	10.1	9.9	9.4
Transportation services	10.1	10.4	10.2	10.0	10.1	10.3	10.8	10.5
Local and interurban passenger transit	5.1	5.5	5.7	5.5	5.2	5.4	5.5	5.4
Water transportation	5.5	5.8	5.3	5.0	5.0	4.8	4.9	5.0
Pipelines, except natural gas	2.8	2.7	2.5	2.4	2.1	2.2	2.2	2.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

KEY: R = revised

SOURCES: 1990–91: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: August 1996), table 10.

1992–97: ____. *Survey of Current Business* (Washington, DC: November 1998), table 10.

Table 2-1b U.S. Gross Domestic Product (GDP) Attributed to For-Hire Transportation Services (Chained 1992 $ billions)

	1990	1991	1992	1993	1994	1995[R]	1996[R]	1997
TOTAL GDP	**6,136.3**	**6,079.4**	**6,244.4**	**6,389.6**	**6,610.7**	**6,761.7**	**6,994.8**	**7,269.8**
GDP								
Trucking and warehousing	73.7	78.5	82.2	86.2	88.7	89.1	86.5	87.3
Air	39.5	39.4	43.0	44.2	51.4	50.6	63.5	72.6
Railroad	18.7	21.7	22.1	23.0	25.9	26.1	28.2	28.2
Transportation services	19.2	19.2	19.6	21.0	21.7	23.2	24.0	25.1
Local and interurban passenger transit	10.3	10.5	10.9	11.0	11.0	11.4	11.3	11.3
Water	10.7	11.1	10.3	10.5	10.8	11.0	10.7	11.0
Pipelines, except natural gas	4.8	5.2	4.9	5.2	4.8	4.9	6.3	6.8
Total	**176.7**	**185.5**	**192.8**	**201.1**	**214.3**	**216.1**	**229.7**	**241.5**
% of GDP								
Trucking and warehousing	1.2	1.3	1.3	1.3	1.3	1.3	1.2	1.2
Air	0.6	0.6	0.7	0.7	0.8	0.7	0.9	1.0
Railroad	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Transportation services	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
Water	0.2	0.2	0.2	0.2	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
Total	**2.9**	**3.1**	**3.1**	**3.1**	**3.2**	**3.2**	**3.3**	**3.3**
% of for-hire transportation								
Trucking and warehousing	41.7	42.3	42.6	42.9	41.4	41.2	37.7	36.1
Air	22.4	21.2	22.3	22.0	24.0	23.4	27.6	30.1
Railroad	10.6	11.7	11.5	11.4	12.1	12.1	12.3	11.7
Transportation services	10.9	10.4	10.2	10.4	10.1	10.7	10.4	10.4
Local and interurban passenger transit	5.8	5.7	5.7	5.5	5.1	5.3	4.9	4.7
Water	6.1	6.0	5.3	5.2	5.0	5.1	4.7	4.6
Pipelines, except natural gas	2.7	2.8	2.5	2.6	2.2	2.3	2.7	2.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

NOTE: For-hire transportation numbers may not equal total due to the nature of the chained dollar calculations.

SOURCES: 1990–91: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: August 1996), table 14.

1992–97: ____. *Survey of Current Business* (Washington, DC: November 1998), table 13, p. 37.

KEY: R = revised

Table 2-2a U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand (Current $ billions)

	1980	1985	1990	1995[R]	1996[R]	1997	1998
Personal consumption of transportation							
Motor vehicles and parts	87.0	175.7	210.3	255.4	264.8	269.5	290.5
Gasoline and oil	86.7	97.2	109.2	115.6	124.5	126.5	112.1
Transport services	64.7	100.0	143.7	203.1	222.3	240.3	252.7
Total	**238.4**	**372.9**	**463.2**	**574.1**	**611.6**	**636.3**	**655.3**
Gross private domestic investment							
Transportation structures	3.7	4.3	3.0	4.4	5.4	6.1	6.8
Transportation equipment	48.4	69.7	75.5	126.2	137.2	152.0	175.1
Total	**52.1**	**74.0**	**78.5**	**130.6**	**142.6**	**158.1**	**181.9**
Exports (+)							
Civilian aircraft, engines, and parts	14.1	13.5	32.2	26.1	30.8	41.4	54.7
Automotive vehicles, engines, and parts	17.4	24.9	36.5	61.8	65.0	74.0	72.3
Passenger fares	2.6	4.4	15.3	18.9	20.4	20.9	20.8
Other transportation	11.6	14.7	22.7	26.8	27.0	27.9	27.6
Total	**45.7**	**57.5**	**106.7**	**133.6**	**143.2**	**164.2**	**175.4**
Imports (–)							
Civilian aircraft, engines, and parts	3.1	5.3	10.5	10.7	12.7	16.6	21.6
Automotive vehicles, engines, and parts	28.3	64.9	88.5	123.8	128.9	140.8	150.3
Passenger fares	3.6	6.4	10.5	14.7	15.8	18.2	18.1
Other transportation	11.8	15.6	25.2	27.4	27.7	29.3	30.2
Total	**46.8**	**92.2**	**134.7**	**176.6**	**185.1**	**204.9**	**220.2**
Net exports of transportation-related goods and services[a]	**-1.1**	**-34.7**	**-28.0**	**-43.0**	**-41.9**	**-40.7**	**-44.8**
Government transportation-related purchases							
Federal purchases[b]	7.8	11.3	14.6	18.1	18.9	19.7	20.6
State and local purchases[b]	47.1	65.4	87.1	110.0	115.5	123.1	129.3
Defense-related purchases[c]	4.2	6.2	8.9	8.5	8.9	8.2	8.2
Total	**59.1**	**82.9**	**110.6**	**136.6**	**143.3**	**151.0**	**158.1**
TOTAL transportation-related final demand[d]	**348.5**	**495.1**	**624.3**	**798.3**	**855.6**	**904.7**	**950.4**
Gross Domestic Product	2,784.2	4,180.7	5,743.8	7,269.6	7,661.6	8,110.9	8,511.0
Total transportation in GDP (%)	**12.5%**	**11.8%**	**10.9%**	**11.0%**	**11.2%**	**11.2%**	**11.2%**

KEY: R = revised; U = data are unavailable

Continued next page

Table 2-2a Cont'd U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand (Current $ billions)

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 of persons.

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: 1980–90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1992–93: _____. *Survey of Current Business* (Washington, DC: August 1997), tables 2.2, 3.10, 4.3, 5.6, 5.8 and p.148.

_____. *Survey of Current Business* (Washington, DC: October 1997), tables 3.16 and 3.17.

1995–97: _____. Survey *of Current Business* (Washington, DC: August 1997), table 3.10.

_____. *Survey of Current Business* (Washington, DC: August 1998), tables 1.1, 2.2, 4.3, 5.6, and 5.8.

_____. *Survey of Current Business* (Washington, DC: October 1998), tables 3.10, 3.16, and 3.17.

1998: _____. *Survey of Current of Business* (Washington, DC: September 1999), tables 1.1, 2.2, 3.10, and 4.3.

Table 2-2b U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand (Chained 1992 $ billions)

	1980	1985	1990	1995[R]	1996[R]	1997	1998
Personal consumption of transportation							
Motor vehicles and parts	127.5	211.2	224.3	230.6	235.0	239.3	259.6
Gasoline and oil	88.6	97.8	107.3	114.3	116.0	117.9	119.9
Transport services	115.6	140.6	159.9	186.4	200.5	212.2	220.4
Total	**331.7**	**449.6**	**491.5**	**531.3**	**551.5**	**569.4**	**599.9**
Gross private domestic investment							
Transportation structures	5.5	4.8	3.1	3.9	4.6	4.9	5.2
Transportation equipment	74.2	88.4	81.2	119.4	127.6	140.3	162.0
Total	**79.7**	**93.2**	**84.3**	**123.3**	**132.2**	**145.2**	**167.2**
Exports (+)							
Civilian aircraft, engines, and parts	23.7	17.2	36.2	23.8	27.0	35.0	45.7
Automotive vehicles, engines, and parts	27.1	29.2	38.2	59.9	62.4	70.4	68.7
Passenger fares	4.1	6.4	17.4	17.2	18.6	19.7	19.8
Other transportation	15.6	17.8	23.3	26.0	25.5	26.3	26.9
Total	**70.5**	**70.6**	**115.1**	**126.9**	**133.5**	**151.4**	**161.1**
Imports(–)							
Civilian aircraft, engines, and parts	5.3	6.8	12.0	9.8	11.2	14.1	18.0
Automotive vehicles, engines, and parts	48.4	88.3	93.6	114.8	118.8	129.4	138.0
Passenger fares	5.2	8.8	12.1	14.1	15.0	16.3	16.0
Other transportation	17.1	19.1	26.8	26.5	26.1	28.1	29.6
Total	**76.0**	**123.0**	**144.5**	**165.2**	**171.1**	**187.9**	**201.6**
Net exports of transportation-related goods and services[a]	**-5.5**	**-52.4**	**-29.4**	**-38.3**	**-37.6**	**-36.5**	**-40.5**
Government transportation-related purchases							
Federal purchases[b]	12.7	14.2	15.8	16.2	16.5	16.8	17.0
State and local purchases[b]	74.6	80.4	90.7	101.5	104.2	108.8	111.7
Defense-related purchases[c]	5.1	7.1	9.2	8.2	8.7	7.9	7.7
Total	**92.4**	**101.7**	**115.7**	**125.9**	**129.4**	**133.5**	**136.3**
TOTAL transportation-related final demand[d]	**498.3**	**592.1**	**662.1**	**742.2**	**775.5**	**811.6**	**862.9**
Gross Domestic Product	4,615.0	5,323.5	6,136.3	6,761.7	6,994.8	7,269.8	7,551.9
Total transportation in GDP (%)	**10.8%**	**11.1%**	**10.8%**	**11.0%**	**11.1%**	**11.2%**	**11.4%**

KEY: R = revised; U = data are unavailable

Continued next page

Table 2-2b Cont'd U.S. Gross Domestic Product (GDP) Attributed to Transportation-Related Final Demand (Chained 1992 $ billions)

[a] Sum of exports and imports.

[b] Based on Fisher-Ideal Chain-Type Price indexes (U.S. Department of Commerce, Bureau of Economic Analysis). Chained 1992 $ value = (year n current dollar value/year n price index) * 100.

[c] Defense-related purchases are the sum of transportation of material and travel of persons.

[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: 1980–90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1995–97: _____. *Survey of Current Business* (Washington, DC: August 1997), table 3.11.

_____. *Survey of Current Business* (Washington, DC: August 1998), tables 1.2, 2.3, 4.4, 5.7, and 5.9; price index for federal, state, and local expenditures, p.101.

_____. *Survey of Current Business* (Washington, DC: October 1998), tables 3.11, 3.16, and 3.17.

1998: _____. *Survey of Current Business* (Washington, DC: September 1999), tables 1.2, 2.3, 3.11, and 4.4.

Table 2-3a U.S. Gross Domestic Demand (GDD) Attributed to Transportation-Related Final Demand (Current $ billions)

	1980	1985	1990	1995[R]	1996[R]	1997
Personal consumption of transportation						
Motor vehicles and parts	87.0	175.7	210.3	255.4	264.8	269.5
Gasoline and oil	86.7	97.2	109.2	115.6	124.5	126.5
Transportation services	64.7	100.0	143.7	203.1	222.3	240.3
Total	**238.4**	**372.9**	**463.2**	**574.1**	**611.6**	**636.3**
Gross private domestic investment						
Transportation structures	3.7	4.3	3.0	4.4	5.4	6.1
Transportation equipment	48.4	69.7	75.5	126.2	137.2	152.0
Total	**52.1**	**74.0**	**78.5**	**130.6**	**142.6**	**158.1**
Government transportation-related purchases						
Federal purchases[a]	7.8	11.3	14.6	18.1	18.9	19.7
State and local purchases[a]	47.1	65.4	87.1	110.0	115.5	123.1
Defense-related purchases[b]	4.2	6.2	8.9	8.5	8.9	8.2
Total	**59.1**	**82.9**	**110.6**	**136.6**	**143.3**	**151.0**
TOTAL domestic transportation-related final demand[c]	**349.6**	**529.8**	**652.3**	**841.3**	**897.4**	**945.4**
Gross Domestic Demand	2,799.1	4,294.9	5,815.1	7,353.5	7,752.8	8,204.3
Total transportation in GDD (%)	**12.5%**	**12.3%**	**11.2%**	**11.4%**	**11.6%**	**11.5%**

KEY: R = revised

[a] Federal purchases and state and local purchases are the sum of consumption expenditures and gross inventory.

[b] Defense-related purchases are the sum of transportation of material and travel of persons.

[c] Sum of total personal consumption of transportation, total gross private domestic investment and total government-related purchases.

SOURCES: 1980–90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1992–93: _____. *Survey of Current Business* (Washington, DC: August 1997), tables 2.2, 3.10, 4.3, 5.6, 5.8 and p. 148.

_____. *Survey of Current Business* (Washington, DC: October 1997), tables 3.16 and 3.17.

1995–97: _____. *Survey of Current Business* (Washington, DC: August 1997), table 3.10.

_____. *Survey of Current Business* (Washington, DC: August 1998), tables 2.2, 5.6, 5.8, and p. 148.

_____. *Survey of Current Business* (Washington, DC: October 1998), tables 3.10, 3.16, and 3.17.

Table 2-3b U.S. Gross Domestic Demand (GDD) Attributed to Transportation-Related Final Demand (Chained 1992 $ billions)

	1980	1985	1990	1995[R]	1996[R]	1997
Personal consumption of transportation						
Motor vehicles and parts	127.5	211.2	224.3	230.6	235.0	239.3
Gasoline and oil	88.6	97.8	107.3	114.3	116.0	117.9
Transportation services	115.6	140.6	159.9	186.4	200.5	212.2
Total	**331.7**	**449.6**	**491.5**	**531.3**	**551.5**	**569.4**
Gross private domestic investment						
Transportation structures	5.5	4.8	3.1	3.9	4.6	4.9
Transportation equipment	74.2	88.4	81.2	119.4	127.6	140.3
Total	**79.7**	**93.2**	**84.3**	**123.3**	**132.2**	**145.2**
Government transportation-related purchases						
Federal purchases[a]	12.7	14.2	15.8	16.2	16.5	16.8
State and local purchases[a]	74.6	80.4	90.7	101.5	104.2	108.8
Defense-related purchases[b]	5.1	7.1	9.2	8.2	8.7	7.9
Total	**92.4**	**101.7**	**115.7**	**125.9**	**129.4**	**133.5**
TOTAL domestic transportation-related final demand[c]	**503.8**	**644.5**	**691.5**	**780.5**	**813.1**	**848.1**
Gross Domestic Demand	4,581.5	5,482.8	6,199.8	6,855.0	7,101.1	7,396.5
Total transportation in GDD (%)	**11.0%**	**11.8%**	**11.2%**	**11.4%**	**11.5%**	**11.5%**

KEY: R = revised

[a] Federal purchases and state and local purchases are the sum of consumption expenditures and gross inventory.

[b] Defense-related purchases are the sum of transportation of material and travel of persons.

[c] Sum of total personal consumption of transportation, total gross private domestic investment, and total government-related purchases.

NOTE: The chained 1992 $ government purchases were calculated using chain-type formula: Chained 1992 $ value= (Quantity index for year n * 1992 current $ value)/100.

SOURCES: 1980–90: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

_____. *Survey of Current Business* (Washington, DC: October 1997), tables 3.16 and 3.17.

1995–97: _____. *Survey of Current Business* (Washington, DC: August 1997), table 3.11.

_____. *Survey of Current Business* (Washington, DC: August 1998), tables 2.3, 5.7, 5.9, and p. 152.

_____. *Survey of Current Business* (Washington, DC: October 1998), tables 3.11, 3.16, and 3.17.

Table 2-4a Contributions to Gross Domestic Product (GDP): Selected Industries
(Current $ billions)

	1990	1991	1992	1993	1994	1995[R]	1996[R]	1997
GDP by industry								
Services	1,059	1,108	1,201	1,267	1,350	1,445	1,544	1,657
Health care	308	338	369	387	410	429	446	460
Education	40	44	46	49	52	55	58	62
Finance, insurance, and real estate	1,024	1,082	1,148	1,218	1,268	1,362	1,449	1,570
Manufacturing	1,031	1,028	1,064	1,117	1,216	1,282	1,309	1,379
Durable goods	573	558	573	616	679	712	737	784
Nondurable goods	459	470	490	501	537	571	572	595
Government	793	840	874	903	934	963	994	1,028
Federal	294	313	321	323	325	328	335	338
State and local	499	527	552	579	609	635	659	690
Retail trade	504	517	544	573	615	641	673	713
Wholesale trade	367	388	406	423	468	491	520	563
Construction	245	229	230	242	269	286	312	329
For-hire transportation	176	186	193	203	220	226	237	256
Electric, gas, and sanitary services	159	172	175	183	194	197	205	209
Communications	147	154	161	176	185	193	208	212
Agriculture, forestry, and fishing	109	103	112	106	119	110	130	132
Mining	112	101	92	95	95	99	114	121
Total GDP	**5,744**	**5,917**	**6,244**	**6,558**	**6,947**	**7,270**	**7,662**	**8,111**
Statistical discrepancy	17	10	[R]45	[R]53	15	-27	-32	-56
% of GDP								
Services	18	19	19	19	19	20	20	20
Health care	5	6	6	6	6	6	6	6
Education	1	1	1	1	1	1	1	1
Finance, insurance, and real estate	18	18	18	19	18	19	19	19
Manufacturing	18	17	17	17	18	18	17	17
Durable goods	10	9	9	9	10	10	10	10
Nondurable goods	8	8	8	8	8	8	7	7

KEY: R = revised

Continued next page

Table 2-4a
Cont'd

Contributions to Gross Domestic Product (GDP): Selected Industries
(Current $ billions)

	1990	1991	1992	1993	1994	1995[R]	1996[R]	1997
Government	14	14	14	14	13	13	13	13
Federal	5	5	5	5	5	5	4	4
State and local	9	9	9	9	9	9	9	9
Retail trade	9	9	9	9	9	9	9	9
Wholesale trade	6	7	7	6	7	7	7	7
Construction	4	4	4	4	4	4	4	4
For-hire construction	3	3	3	3	3	3	3	3
Electric, gas, and sanitary services	3	3	3	3	3	3	3	3
Communications	3	3	3	3	3	3	3	3
Agriculture, forestry, and fishing	2	2	2	2	2	2	2	2
Mining	2	2	1	1	1	1	1	1

SOURCES: 1990–91: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: August 1996), table 10.
1992–97: ____. *Survey of Current Business* (Washington, DC: November 1998), table 10, p. 34

KEY: R = revised

Table 2-4b Contributions to Gross Domestic Product (GDP): Selected Industries
(Chained 1992 $ billions)

	1990	1991	1992	1993	1994	1995[R]	1996[R]	1997
GDP	**6,136**	**6,079**	**6,244**	**6,390**	**6,611**	**6,762**	**6,995**	**7,270**
Statistical discrepancy[a]	[R]19	[R]10	[R]45	[R]51	[R]14	-23	-27	-45
Services	1,182	1,174	1,201	1,224	1,257	1,305	1,349	1,399
Health services	357	363	369	365	370	373	377	379
Educational services	44	46	46	48	49	49	49	50
Finance, insurance, and real estate	1,109	1,106	1,148	1,174	1,197	1,206	1,246	1,286
Manufacturing	1,090	1,050	1,064	1,101	1,193	1,272	1,294	1,370
Durable goods	600	568	573	608	671	727	769	839
Nondurable goods	489	482	490	493	522	545	528	538
Government	867	874	874	876	878	877	878	884
Federal	328	328	321	315	307	297	290	287
State and local	539	545	552	561	571	580	588	597
Retail trade	546	534	544	566	601	626	666	714
Wholesale trade	361	381	406	417	449	456	487	532
Construction	248	229	230	234	250	254	269	274
For-hire transportation	177	186	193	201	214	216	230	242
Electric, gas, and sanitary services	168	172	175	179	193	196	205	206
Communications	149	157	161	172	177	181	192	196
Agriculture, forestry, and fishing	99	101	112	102	119	106	114	128
Mining	97	98	92	96	103	107	103	110
% of GDP								
Services	19	19	19	19	19	19	19	19
Health services	6	6	6	6	6	6	5	5
Educational services	1	1	1	1	1	1	1	1
Finance, insurance, and real estate	18	18	18	18	18	18	18	18
Manufacturing	18	17	17	17	18	19	18	19
Durable goods	10	9	9	10	10	11	11	12
Nondurable goods	8	8	8	8	8	8	8	7

KEY: R = revised

Continued next page

Table 2-4b
Cont'd

Contributions to Gross Domestic Product (GDP): Selected Industries
(Chained 1992 $ billions)

	1990	1991	1992	1993	1994	1995[R]	1996[R]	1997
Government	14	14	14	14	13	13	13	12
Federal	5	5	5	5	5	4	4	4
State and local	9	9	9	9	9	9	8	8
Retail trade	9	9	9	9	9	9	10	10
Wholesale trade	6	6	7	7	7	7	7	7
Construction	4	4	4	4	4	4	4	4
For-hire transportation	3	3	3	3	3	3	3	3
Electric, gas, and sanitary services	3	3	3	3	3	3	3	3
Communications	2	3	3	3	3	3	3	3
Agriculture, forestry, and fishing	2	2	2	2	2	2	2	2
Mining	2	2	1	2	2	2	1	2

[a] Equals the current dollar statistical discrepancy deflated by the implicit price deflator for gross domestic business product.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, National Accounts data, available at Internet site www.bea.doc.gov/bea/dn2/gpox.htm, as of Feb. 4, 1999.

KEY: R = revised

Table 2-5 Gross Domestic Product (GDP) by Major Social Function (Current $ billions)

	1991	1992	1993	1994	1995	1996	1997	1998
Housing	**1,376**	**1,469**	**1,563**	**1,681**	**1,758**	**[R]1,870**	**1,969**	**2,095**
%of total	23	24	24	24	24	24	24	25
Healthcare	**807**	**880**	**943**	**994**	**1,050**	**1,095**	**1,151**	**1,124**
% of total	14	14	14	14	14	14	14	15
Food	**782**	**803**	**832**	**865**	**895**	**929**	**956**	**982**
%of total	13	13	13	12	12	12	12	12
Transportation	**624**	**669**	**709**	**760**	**798**	**856**	**905**	**968**
% of total	11	11	11	11	11	11	11	11
Education	**409**	**428**	**446**	**469**	**497**	**526**	**559**	**590**
% of total	7	7	7	7	7	7	7	7
Other	**1,919**	**1,995**	**2,065**	**2,178**	**2,271**	**2,387**	**2,572**	**2,605**
% of total	32	32	31	31	31	31	32	31
TOTAL GDP	**5,917**	**6,244**	**6,558**	**6,947**	**7,270**	**7,662**	**8,111**	**8,511**

KEY: R = revised

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

SOURCE: 1991: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: January 1996), tables 2.4, 3.10, 4.3, 5.6, 5.8; June 1996, tables 3.16 and 3.17.

1992–94: ____. *Survey of Current Business* (Washington, DC: August 1997), tables 2.4, 3.10, 4.3, 5.6, 5.8: October 1997, tables 3.16, 3.17, and p. 148

1995–97: ____. *Survey of Current* Business (Washington, DC: August 1998), tables 2.4, 3.10, 4.3, 5.6, and 5.8; October 1998, tables 3.16, 3.17, and p. 148.

Table 2-6 National Transportation and Economic Trends

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Passenger-miles (billions)[R]	**1,327**	**1,630**	**2,171**	**2,560**	**2,895**	**3,325**	**3,946**	**4,348**	**4,482**	**4,621**	**U**
Index (1980 = 100)	45	56	74	88	100	115	136	150	155	160	U
Ton-miles (billions)	**[R]1,562**	**1,854**	**[R]2,207**	**2,285**	**[R]2,988**	**2,949**	**3,196**	**3,648**	**[R]3,725**	**3,738**	**U**
Index (1980 = 100)	52	62	74	76	100	99	107	122	125	125	U
Population[a] (millions)	**181**	**194**	**205**	**216**	**228**	**238**	**250**	**263**	**[R]265**	**268**	**U**
Index (1980 = 100)	79	85	90	95	100	104	110	115	[R]116	118	U
Industrial Production Index[b] (1992 = 100)[R]	**37**	**50**	**59**	**63**	**80**	**88**	**99**	**114**	**120**	**127**	**[P]131**
Gross Domestic Product											
Current $ (billions)	527	719	1,036	1,631	2,784	4,181	5,744	[R]7,270	[R]7,662	8,111	8,509
Index (1980 = 100)	19	26	37	59	100	150	206	261	[R]275	291	306
Chained (1992) $ (billions)	2,263	2,881	3,398	3,874	4,615	5,324	6,136	[R]6,762	[R]6,995	7,270	7,550

KEY: P = preliminary; R = revised; U = data are unavailable

[a] Estimates as of July 1. Includes Armed Forces abroad.

[b] Industrial Production Index covers manufacturing, mining, and utilities.

SOURCES: Passenger-miles: 1960–97: Summation of all modes from the passenger-miles table in chapter 1.

Ton-miles: 1960–97: Summation of all modes from the ton-miles table in chapter 1.

Population: 1960–97: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1998* (Washington, DC: 1998), table 2.

Industrial Production Index: 1960–98: Council of Economic Advisors, *Economic Report of the President* (Washington, DC: February 1999), table B-51.

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: _____. *Survey of Current Business* (Washington, DC: February 1999), tables 1.1 and 1.2.

Section B
Transportation and Consumer Expenditures

Table 2-7 Passenger and Freight Transportation Expenditures (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Passenger transportation										
Highway										
Auto purchases and ownership[a]	52,370	71,628	96,997	156,550	[R]270,344	[R]404,590	[R]510,731	[R]618,501	647,716	659,476
Local										
Bus and transit[b,R]	1,337	1,454	1,841	4,697	9,297	13,548	16,651	21,572	21,239	21,282
Taxi	1,107	1,113	2,145	3,416	5,195	5,636	7,111	[R]8,082	8,212	9,026
School bus	486	707	1,219	2,174	3,833	5,900	7,605	9,082	10,404	10,820
Intercity, bus	559	629	799	1,016	1,709	1,989	1,750	1,481	1,472	1,614
Total highway	**55,859**	**75,531**	**103,001**	**167,853**	**[R]290,378**	**[R]431,663**	**[R]543,848**	**[R]650,636**	**689,043**	**702,218**
Air total[c]	3,555	5,682	10,565	18,851	38,135	50,319	73,410	R81,256	87,027	93,467
Rail total[d]	759	598	464	1,212	2,976	3,875	4,521	R6,693	5,896	5,764
Water total (includes international)	281	345	287	294	304	576	1,345	1,658	1,741	1,828
Total passenger transportation expenditures	**60,454**	**82,156**	**114,317**	**188,210**	**[R]331,793**	**[R]486,433**	**[R]623,124**	**[R]740,243**	**783,707**	**803,277**

KEY: R = revised

Continued next page

Table 2-7 Cont'd Passenger and Freight Transportation Expenditures (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Freight transportation										
Highway										
Local, truck	14,289	23,779	28,819	37,287	60,545	82,200	108,350	128,352	132,973	143,744
Intercity										
Bus	42	70	122	156	235	245	126	130	132	134
Truck	17,958	23,628	33,553	47,400	94,551	123,200	162,300	219,627	235,440	257,807
Total highway	**32,289**	**47,477**	**62,494**	**84,843**	**155,331**	**205,645**	**270,776**	**348,109**	**368,545**	**401,685**
Air (domestic and international) total	354	708	1,171	1,838	4,013	6,817	13,706	18,869	20,397	22,674
Rail total	9,028	9,923	11,869	16,509	27,858	29,150	30,067	[R]34,360	35,059	35,349
Water total	3,487	3,903	5,257	8,221	15,498	[R]18,449	20,121	[R]22,738	24,564	24,545
Oil pipeline total	895	1,051	1,396	2,220	7,548	8,910	[R]8,387	[R]8,288	8,635	8,648
Other total[e]	1,714	1,869	1,791	2,208	3,488	4,642	7,774	[R]9,509	9,907	10,590
Total freight transportation expenditures	**47,767**	**64,931**	**83,978**	**115,839**	**213,736**	**[R]273,613**	**[R]350,831**	**[R]441,873**	**467,107**	**503,491**
TOTAL passenger and freight transportation expenditures	**108,221**	**147,087**	**198,295**	**304,049**	**[R]545,529**	**[R]760,045**	**[R]974,073**	**[R]1,182,116**	**1,250,814**	**1,306,768**

KEY: R = revised

[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 bridges and tunnel tolls, and nontransit parking lot funds.

[c] 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 forwarders' revenues after payment of live-haul carriers plus other shipper costs such as loading and unloading freight cars.

SOURCES: Passenger and freight: 1960, 1970–75: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), pp. 40, 42.

1965: _____. *Transportation in America, 1993* (Lansdowne, VA: 1994), pp. 42 (Passenger only); and Transportation in America 1997 (Washington, DC: 1997), p. 40 (Freight only).

1980–97: _____. *Transportation in America 1998, Supplement* (Washington, DC: 1999), pp. vii–x.

Table 2-8 Sale Price of Transportation Fuel to End-Users (Current ¢/gallon)

	1980	1985	1990	1995	1996	1997
Aviation fuel (excluding taxes)						
Aviation gasoline[a]	108.4	120.1	112.0	100.5	R111.6	P113.8
Jet fuel kerosene[a]	86.8	79.6	76.6	54.0	65.1	61.2
Highway fuel						
Gasoline (including taxes)						
Leaded[b]	119.1	111.5	114.9	U	U	U
Unleaded premium[b]	N	134.0	134.9	133.6	141.3	141.6
Unleaded regular[b]	124.5	120.2	116.4	114.7	123.1	123.4
All types	122.1	119.6	121.7	120.5	128.8	129.1
Diesel no. 2[a] (excluding taxes)	81.8	78.9	72.5	56.0	68.1	P64.2
Railroad fuel						
Diesel	82.6	77.8	69.2	60.0	67.7	67.8

KEY: N = data are nonexistent; P = preliminary; R = revised; U = data are unavailable

[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 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), tables 5.20 and 5.22.

Railroad fuel: Association of American Railroads, *Railroad Facts 1998* (Washington, DC: 1998), p. 60.

Table 2-9 Price Trend of Gasoline v. Other Consumer Goods and Services

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
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
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
Service station price (including taxes)										
Leaded	31.1	31.2	35.7	R56.7	119.1	111.5	114.9	N	N	N
Unleaded	N	N	N	N	124.5	120.2	116.4	114.7	123.1	123.4
Consumer price indices (1982–84 = 100)										
All items	30	32	39	54	82	108	131	152	157	161
Food	30	32	39	60	87	106	132	148	153	157
Shelter	25	27	36	49	81	110	140	166	171	176
Apparel and upkeep	46	48	59	73	91	105	124	132	132	133
Motor fuel	24	25	28	45	97	99	101	100	106	106
Medical care	22	25	34	48	75	114	163	221	228	235

[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.

KEY: N = data are nonexistent; R = revised

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 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 5.22.

Consumer price indices: Council of Economic Advisors, *Economic Report of the President* (Washington, DC: February 1999), tables B-60 and B-61.

Table 2-10 Producer Price Indices for Transportation Services

	Base date	1990	1991	1992	1993	1994	1995	1996	1997	1998[P]
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
Motor freight transportation and warehousing (SIC 42)	6/93	U	U	U	U	101.9	104.5	106.3	108.9	111.6
Water transportation (SIC 44)	12/92	U	U	100.0	99.7	100.0	103.0	103.7	104.2	105.5
Air transportation (SIC 45)	12/92	U	U	100.0	105.6	108.5	113.7	121.1	125.3	124.6
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
Travel agencies (SIC 4724)[R]	12/89	107.3	113.6	113.4	115.3	115.3	111.3	109.9	114.5	112.5
Freight transportation arrangement (SIC 4731)	12/94	U	U	U	U	100.0	99.8	101.5	101.4	99.8

KEY: P = preliminary; R = revised; U = data are unavailable

NOTE: 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, available at Internet site www.bls.gov, as of Feb. 24, 1999.

Table 2-11 Producer Price Indices for Transportation Equipment

	Base date	1990	1991	1992	1993	1994	1995	1996	1997	1998[P]
Transportation equipment (SIC 37)	12/84	115.6	119.8	123.0	126.3	130.1	132.2	134.2	134.1	133.6
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
Motor vehicles and passenger car bodies (SIC 3711)	6/82	119.9	125.3	129.1	133.2	138.0	139.1	140.4	138.7	136.8
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
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
Truck trailers (SIC 3715)	12/79	125.6	128.1	131.2	134.2	138.6	148.6	147.8	147.7	152.2
Motor homes built on purchased chassis (SIC 3716)	6/84	125.8	128.7	131.8	133.9	134.5	137.8	141.6	143.1	144.9
Aircraft (SIC 3721)	12/85	116.0	120.4	124.3	128.6	132.9	137.3	140.5	142.3	142.6
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	135.7
Aircraft parts and auxiliary equipment, NEC (SIC 3728)[R]	6/85	116.3	120.3	124.9	128.0	130.7	131.7	136.3	139.0	140.9
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
Boatbuilding and repairing (SIC 3732)[R]	12/81	136.0	140.1	144.9	147.7	150.2	154.6	159.6	165.0	168.6
Railroad equipment (SIC 3743)	6/84	114.2	117.3	118.7	119.8	122.6	127.6	129.6	127.4	127.5
Motorcycles, bicycles, and parts (SIC 3751)[R]	12/84	109.9	111.8	114.4	116.9	119.0	122.2	123.3	123.3	124.3
Travel trailers and campers (SIC 3792)	6/84	118.1	120.1	122.2	123.2	124.7	127.2	129.0	129.6	130.3
Transportation equipment, NEC (SIC 3799)[R]	6/85	112.5	114.9	116.1	117.2	119.1	123.3	126.6	128.7	131.4

KEY: NEC = not elsewhere classified; P = preliminary; R = revised

NOTE: 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, Internet site www.bls.gov, as of Feb. 24, 1999.

Table 2-12 Personal Expenditures by Category (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995[R]	1996[R]	1997
Transportation	42,900	59,100	81,100	130,200	238,400	372,800	463,300	574,100	611,600	636,400
Transportation as a % of total	12.9	13.3	12.5	12.7	13.5	13.8	12.1	11.6	11.7	11.6
Food and tobacco	89,200	108,800	154,600	238,200	376,200	497,300	672,500	780,400	805,200	832,300
Clothing, accessories, and jewelry	32,700	41,400	57,600	85,600	132,300	188,300	262,700	321,800	338,000	353,300
Personal care	5,600	8,100	11,800	16,700	26,600	39,100	57,300	71,800	75,000	79,400
Housing	48,200	65,400	94,000	147,000	255,200	407,100	586,300	750,400	787,400	829,800
Household operation	46,700	62,100	84,800	135,400	232,600	342,000	436,200	559,400	592,800	620,700
Medical care	22,100	34,100	60,000	107,900	206,400	366,700	615,600	875,000	912,400	957,300
Personal business	14,600	20,900	32,000	53,000	101,200	182,600	290,100	388,800	416,200	459,100
Recreation	18,500	26,800	43,100	70,500	116,300	185,900	281,600	404,200	432,300	462,900
Education and research	4,300	6,900	12,500	20,500	33,300	52,900	80,700	112,000	119,700	129,400
Religious and welfare activities	5,300	7,700	12,100	19,700	38,300	62,600	100,400	138,600	151,100	157,600
Foreign travel and other, net	2,100	2,900	4,500	4,400	3,500	7,500	-7,400	-22,700	-26,100	-24,400
TOTAL expenditures	**332,200**	**444,200**	**648,100**	**1,029,100**	**1,760,300**	**2,704,800**	**3,839,300**	**4,953,900**	**5,215,700**	**5,493,700**
Disposable Personal Income (DPI)[R]	363,800	494,800	728,100	1,162,600	1,980,500	3,003,200	4,171,400	5,277,000	5,534,700	5,795,100
Transportation as a % of DPI	11.8	[R]11.9	[R]11.1	11.2	[R]12.0	[R]12.4	11.1	[R]10.9	11.1	11.0

KEY: R = revised

SOURCES: All but DPI: 1960–91: U.S. Department of Commerce, Bureau of Economic Analysis, personal communication.

1992–93: ____. *Survey of Current Business* (Washington, DC: August 1997), table 2.4.

1994–97: ____. *Survey of Current Business* (Washington, DC: August 1998), table 2.4.

DPI: ____. Personal communication, Feb. 25, 1999.

Table 2-13 Personal Consumption Expenditures on Transportation by Subcategory (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	R1995	R1996	1997
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	141,600	143,500
New and used trucks and RVs	610	1,280	2,700	7,700	11,800	40,800	56,900	79,700	84,700	87,200
Tires, tubes, accessories, and parts	2,500	3,500	6,100	10,300	17,900	24,300	29,400	36,200	38,500	38,800
Repair and rental	5,500	7,700	12,300	19,800	34,000	60,500	87,300	128,700	143,600	154,900
Gasoline and oil	12,000	14,800	21,900	39,700	86,700	97,200	109,200	115,600	124,500	126,500
Tolls	310	460	650	820	1,100	1,520	2,000	2,800	2,800	3,000
Insurance premiums, less claims paid	2,000	2,400	3,800	3,800	9,400	10,000	18,000	29,400	31,500	34,400
Total	**39,500**	**55,100**	**74,200**	**118,920**	**218,300**	**344,900**	**426,900**	**531,900**	**567,300**	**588,300**
Purchased intercity transportation										
Railroad	310	280	210	270	300	480	800	800	800	800
Intercity bus	290	380	530	740	1,400	1,350	R1,000	1,100	1,100	1,200
Airline	680	1,280	3,100	5,900	12,800	17,600	23,900	27,900	28,500	31,500
Other	35	54	182	390	910	1,720	2,800	3,300	3,900	4,100
Total	**1,310**	**2,000**	**4,000**	**7,300**	**15,410**	**21,100**	**27,800**	**33,000**	**34,300**	**37,700**
Purchased local transportation										
Mass transit system	1,420	1,450	1,810	2,100	2,900	4,200	5,200	6,000	6,500	6,800
Taxi	610	610	1,180	1,970	1,870	2,600	2,600	3,200	3,500	3,600
Total	**2,000**	**2,100**	**2,990**	**4,100**	**4,770**	**6,800**	**7,800**	**9,100**	**10,000**	**10,400**
TOTAL transportation	**42,900**	**59,100**	**81,100**	**130,200**	**238,400**	**372,800**	**463,200**	**574,100**	**611,600**	**636,400**

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: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: August 1997), table 2.4.

1994–97: ____. *Survey of Current Business* (Washington, DC: August 1998), table 2.4.

KEY: R = revised; RVs = recreational vehicles

Table 2-14 Cost of Owning and Operating an Automobile[a]

	1975	1980	1985	1990	1995	1996	1997	1998
Total cost per mile[b,c] (current ¢)	14.4	21.2	23.2	33.0	41.2	42.6	44.8	46.1
Gas and oil	4.8	5.9	5.6	5.4	5.8	5.6	6.6	6.2
Gas and oil as a % of total cost	33.4	27.9	24.0	16.4	14.1	13.1	14.7	13.4
Maintenance	1.0	1.1	1.2	2.1	2.6	2.8	2.8	3.1
Tires	0.7	0.6	0.7	0.9	1.2	1.2	1.4	1.4
Total cost per 15,000 miles, (current $)[b]	2,154	3,176	3,484	4,954	6,185	6,389	6,723	6,908
Variable cost	968	1,143	1,113	1,260	1,440	1,440	1,620	1,605
Fixed cost[c]	1,186	2,033	2,371	3,694	4,745	4,949	5,103	5,303

[a] Based on 4-year/60,000 mile cycle.

[b] Fixed and total operating costs preceding 1985 are not comparable to figures after 1985. Fixed-cost depreciation from 1975–84 is based on receipt of average trade-in value after 4 years. After 1984, the depreciation is based on the vehicle's trade-in value after 6 years.

[c] Fixed costs (ownership costs) include: insurance, license, registration, taxes, depreciation, and finance charges.

NOTES: 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 1998 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 2-15a Average Passenger Fares (Current $)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air carrier, domestic, scheduled service	R33.01	R34.13	40.65	53.64	R84.60	92.53	107.86	106.66	R110.37	114.10
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
Transit, all modes[b] (unlinked)	0.14	0.16	0.22	0.27	0.30	0.53	0.67	0.87	0.93	P0.89
Commuter rail	0.64	0.71	0.84	1.04	1.41	2.85	2.90	3.13	3.25	P3.30
Intercity/Amtrak[c]	4.22	3.92	3.19	12.96	17.72	26.15	38.51	39.03	42.54	44.31

KEY: P = preliminary; R = revised

[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.

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:____. *Handbook of Airline Statistics, 1973* (Washington, DC: March 1974), part III, table 2 (enplanements); part IV, table 2 (passenger revenue).

1975–80: ____, *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).

1985–97: 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: 1960–93: Interstate Commerce Commission, *Transport Statistics in the United States, Motor Carriers* (Washington, DC: Annual issues), part 2.

1994–97: 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: 1960–97: 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.

1985–97: Amtrak, *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues) (transportation revenues/Amtrak system passenger trips).

Table 2-15b Average Passenger Fares (Chained 1992 $)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air carrier, domestic, scheduled service	381.69	222.19	222.56	218.71	192.77	127.44	112.62	87.12	88.64	88.02
Class I bus, intercity[a]	28.44	16.79	16.77	19.45	22.40	16.18	21.86	20.32	22.70	20.55
Transit, all modes[b] (unlinked)	1.00	0.98	0.97	0.96	0.67	0.76	0.78	0.86	0.83	0.78
Commuter rail	1.62	4.37	3.70	3.70	3.13	4.10	3.36	3.08	2.91	2.91
Intercity/Amtrak[c]	48.80	24.10	14.04	46.16	37.56	35.32	41.93	39.45	42.25	44.27

[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.

SOURCES: 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.

Section C
Transportation Revenues, Employment, and Productivity

Table 2-16 Average Passenger Revenue per Passenger-Mile (Current ¢)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air carrier, domestic, scheduled service	**6.1**	**6.1**	**6.0**	**7.7**	**11.5**	**12.2**	**13.4**	**13.5**	**R13.8**	**13.9**
Index (1980 = 100)	53	53	52	67	100	106	117	117	120	121
Class I bus,[a] intercity	**2.7**	**2.9**	**3.6**	**4.9**	**7.3**	**9.9**	**11.6**	**12.2**	**R12.3**	**11.9**
Index (1990 = 100)[R]	23	25	31	42	63	85	100	106	106	103
Commuter rail	**2.9**	**3.3**	**3.8**	**4.6**	**6.7**	**12.1**	**13.5**	**R13.1**	**R13.7**	**14.1**
Index (1990 = 100)[R]	21	24	28	34	50	90	100	97	101	104
Intercity/Amtrak[b]	**3.0**	**3.1**	**4.0**	**5.7**	**8.2**	**11.3**	**14.1**	**14.6**	**16.6**	**17.3**
Index (1990 = 100)[R]	21	22	28	40	58	80	100	103	118	123
Consumer Price Index (1982–84=100)	**30**	**32**	**39**	**54**	**82**	**108**	**131**	**152**	**157**	**161**

KEY: R = revised

[a] Regular route intercity service.

[b] 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 (passenger-miles); part IV, table 2 (passenger revenues).

1965–70: _____. *Handbook of Airline Statistics, 1973* (Washington, DC: March 1974), part III, table 2 (passenger-miles); part IV, table 2 (passenger revenues).

1975–80: _____. *Air Carrier Financial Statistics* (Washington, DC: Annual December issues), p. 2, line 3;

_____. *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), p. 4, line 9.

1985–97: 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.

_____. *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: 1960–97: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 50; *Transportation in America 1998*, *Supplement* (Washington, DC: 1999), p. xv.

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.

1985–97: Amtrak, *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues) (transportation revenues/passenger-miles).

Consumer Price Index: 1960–97: Council of Economic Advisors, *Economic Report of the President, 1999* (Washington, DC: 1999), table B-60.

Table 2-17 Average Freight Revenue per Ton-Mile (Current ¢)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air carrier, domestic, scheduled service	**22.8**	**20.5**	**21.9**	**28.2**	**46.3**	**48.8**	**64.6**	**76.5**	**81.5**	**79.7**
Index (1980 = 100)	49	44	47	61	100	105	140	R165	176	172
Truck[a]	**6.3**	**6.5**	**8.5**	**11.6**	**18.0**	**22.9**	**24.4**	**25.1**	**R26.0**	**26.1**
Index (1990 = 100)	26	26	35	48	74	94	100	103	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**
Index (1990 = 100)	53	48	54	77	108	114	100	90	88	90
Barge	**N**	**0.35**	**0.30**	**0.52**	**0.77**	**0.80**	**0.76**	**0.73**	**0.73**	**0.73**
Index (1990 = 100)	N	46	39	68	101	105	100	96	96	96
Oil pipeline	**0.32**	**0.28**	**0.27**	**0.37**	**[b]1.33**	**1.57**	**1.44**	**1.51**	**1.37**	**1.37**
Index (1990 = 100)	22	19	19	26	92	109	100	105	95	95
Producer Price Index (1982 = 100)	**33**	**34**	**39**	**58**	**88**	**105**	**119**	**128**	**131**	**132**

KEY: N = data are nonexistent; R = revised

[a] Represents Instruction 27 general freight common carriers since 1970, all of which are predominantly less-than-truckload carriers.

[b] Reflects entrance of Alaska pipeline moving crude petroleum to U.S. refineries between 1975 and 1980.

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: _____. *Handbook of Airline Statistics, 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975–80: _____. *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), pp. 4 and 14 (December 1976) and pp. 2 and 3 (December 1981).

1985–97: 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.

_____. *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: 1960–97: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1998), p. 49.

Class I rail: 1960–97: Association of American Railroads, *Railroad Facts 1998* (Washington, DC: 1998), p. 30.

Producer Price Index: 1960–97: Council of Economic Advisors, *Economic Report of the President, 1999* (Washington, DC: February 1999), table B-65.

Table 2-18 Total Operating Revenues (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air carrier, domestic, all services	2,200	3,700	7,200	12,000	26,400	37,600	58,000	70,900	R76,900	82,200
Trucking and courier services, except air	N	N	N	N	N	N	127,300	R161,800	172,700	183,200
Class I bus, intercity	460	610	720	960	1,400	1,230	940	920	910	1,000
Transit[a]	1,410	1,440	1,710	3,500	6,500	12,200	16,100	18,200	R19,200	19,000
Class I rail	9,500	10,200	12,000	16,400	28,300	27,600	28,400	32,300	32,700	33,100
Intercity/Amtrak[b]	N	N	N	250	430	830	1,310	1,500	R1,560	1,670
Water transportation (domestic)[c]	1,720	1,820	2,100	3,300	7,200	7,700	7,900	7,700	7,700	P7,700
Oil pipeline[d]	900	1,050	1,400	2,200	7,500	8,900	8,500	9,100	8,600	P8,700
Gas pipeline (investor-owned)[e]										
Transmission companies	3,200	4,100	5,900	11,900	41,600	45,700	21,800	12,100	12,100	10,300
Distribution companies	N	N	N	5,900	14,000	21,500	18,800	19,400	30,400	30,800
Integrated companies	N	N	N	7,000	17,300	17,400	10,100	10,900	U	U
Combination companies	N	N	N	5,800	13,000	19,300	15,400	16,000	U	U
Total industry[f]	**8,700**	**11,500**	**16,400**	**30,600**	**85,900**	**103,900**	**66,000**	**58,400**	**63,600**	**62,600**

KEY: N = data are nonexistent; P = preliminary; R = revised; U = data are unavailable

Continued next page

Table 2-18 Cont'd Total Operating Revenues (Current $ millions)

[a] Excludes commuter rail, automated guideway, urban boat, demand response, 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 and 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.

[f] Totals may not add due to rounding and lack of detailed breakout for some years.

NOTES: Air carrier, domestic, all services: 1960–70: Civil Aeronautics Board, *Handbook of Airline Statistics, 1973* (Washington, DC: March 1974).

1975–80: _____. *Air Carrier Financial Statistics* (Washington, DC: Annual issues), p. 1.

1985–97: 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: 1990–97: U.S. Department of Commerce, Bureau of the Census, *Transportation Annual Survey,* 1997 (Washington, DC: January 1999), table 1.

Intercity Class I bus: 1960–93: 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: 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1999), table 21, and similar tables in earlier editions.

Class I rail: 1960–97: Association of American Railroads, *Railroad Facts 1998* (Washington, DC: 1998), p. 12.

Intercity/Amtrak: 1975–80: Amtrak, State and Local Affairs Department and Public Affairs Department, personal communication.

1985–97: _____. *Amtrak Annual Report,* Statistical Appendix (Washington, DC: Annual issues).

Water transportation: 1960–97: Eno Transportation Foundation, Inc., *Transportation in America* (Washington, DC: Annual issues).

Oil pipeline: 1960–97: Eno Transportation Foundation, Inc., *Transportation in America* (Washington, DC: Annual issues).

Gas pipeline: 1960–97: American Gas Association, *Gas Facts* (Arlington, VA: Annual issues), tables 12-1, 12-2, and 12-3; and similar tables in income accounts section in earlier editions.

Table 2-19 Employment in For-Hire Transportation and Selected Transportation-Related Industries[a] (Thousands)

SIC		1960	1965	1970	1975	1980	1985	1990	1995[R]	1996[R]	1997[R]	1998[P]
	Total U.S. labor force	**54,189**	**60,763**	**70,880**	**76,945**	**90,406**	**97,387**	**109,403**	**117,191**	**119,608**	**122,690**	**125,830**
	For-hire transportation industry											
45	Air	191	229	352	363	453	522	[R]968	1,068	1,107	1,128	1,157
42	Trucking and warehousing	856	964	1,083	1,108	1,280	1,361	[R]1,395	1,587	1,637	1,667	1,707
41	Local and interurban passenger transit											
413	Intercity and rural bus	41	42	43	40	38	35	26	24	24	21	22
411	Local and suburban	U	U	U	69	79	92	141	203	218	230	237
415	School bus[b]	N	N	N	65	80	91	111	131	132	136	138
412	Taxi	121	110	106	85	53	38	32	31	31	31	31
	Other local and interurban[c]	[R]122	[R]117	[R]132	[R]11	15	21	28	30	32	33	34
40	Railroad	885	735	634	548	532	359	279	238	231	227	232
44	Water	N	228	212	194	211	185	177	175	174	180	187
46	Liquid pipeline	23	20	18	18	21	19	19	15	15	14	14
492	Natural gas pipeline[d]											
	Distribution	N	N	N	51	52	62	65	62	80	75	U
	Transmission	31	30	32	37	45	46	37	28	32	28	U
	Integrated	N	N	N	55	53	43	40	36	13	12	U
	Combination	N	N	N	52	52	53	50	42	39	31	U
	Noninvestor-owned	N	N	N	11	13	12	12	11	8	9	U
47	Transportation services	N	85	115	134	198	275	[R]336	401	418	439	449
	Total for-hire transportation	**[R]2,270**	**[R]2,560**	**[R]2,727**	**2,841**	**3,175**	**3,214**	**[R]3,716**	**4,082**	**4,191**	**4,261**	**4,208**

KEY: N = data are nonexistent; P = preliminary; R = revised; U = data are unavailable

Continued next page

Table 2-19 Cont'd Employment in For-Hire Transportation and Selected Transportation-Related Industries[a] (Thousands)

SIC		1960	1965	1970	1975	1980	1985	1990	1995[R]	1996[R]	1997[R]	1998[P]
37	**Equipment manufacturing**											
372	Aircraft and parts	605	601	644	499	633	616	712	451	458	500	523
371	Motor vehicles and equipment	724	843	799	792	789	883	812	971	967	985	988
374	Railroad equipment	43	56	51	57	71	33	33	38	36	33	34
373	Ship and boat building and repairing	141	160	172	194	221	187	188	160	159	157	162
301	Tires and inner tubes	105	102	116	124	115	94	84	80	80	78	79
	Other[e]	155	193	167	157	[R]168	241	244	170	165	167	167
	Total	**1,773**	**1,955**	**1,949**	**1,824**	**[R]1,996**	**2,054**	**2,073**	**1,870**	**1,865**	**1,920**	**1,953**
	Related industries											
553	Automotive and home supply stores	U	U	U	212	261	304	337	369	380	395	410
75	Automotive repair, services, and parking	U	U	U	439	571	730	914	1,020	1,080	1,124	1,159
	Gasoline service stations[f]	461	522	613	622	561	588	647	649	669	671	673
161	Highway and street construction	U	U	U	U	U	264	239	228	236	242	249
501	Motor vehicles, parts, and supplies	U	U	U	382	434	454	456	492	503	514	520
551	New and used car dealers	U	U	U	731	745	856	924	996	1,031	1,051	1,063
	Other automotive retail[g]	N	N	N	112	122	[R]141	[R]154	176	187	197	206
	Total	**[R]461**	**[R]522**	**[R]613**	**[R]2,498**	**[R]2,694**	**[R]3,337**	**[R]3,671**	**3,930**	**4,086**	**4,194**	**4,280**
	Government employment											
	U.S. DOT[h]	N	N	104	112	112	100	104	101	99	98	99
	State and local highway	532	577	607	604	559	549	569	560	U	U	U
	Total	**532**	**577**	**711**	**716**	**671**	**649**	**673**	**661**	**99**	**98**	**99**
	TOTAL transportation-related labor force [R]	**5,036**	**5,614**	**6,000**	**7,879**	**8,536**	**9,254**	**10,133**	**10,543**	**10,241**	**10,473**	**10,540**

KEY: N = data are nonexistent; P = preliminary; R = revised; U = data are unavailable

Continued next page

Table 2-19 Cont'd Employment in For-Hire Transportation and Selected Transportation-Related Industries[a] (Thousands)

[a] Annual averages.

[b] Does not include drivers employed by school districts.

[c] Difference between total of SIC 41 and sum of 411, 412, 413, and 415.

[d] 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.

[e] SIC 37 minus above equipment manufacturing classifications, except SIC 301.

[f] SIC 37 minus above equipment manufacturing classifications, except SIC 554.

[g] SIC 55 minus 551, 553, and 554.

[h] U.S. Department of Transportation was created in 1966. Data are for fiscal year, and include permanent civilians as well as temporaries and military.

NOTE: The employment totals in tables 2-19 and 2-20 differ. Table 2-19 shows employment in transportation and selected transportation-related industries. Table 2-20 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 jobs do not work in the transportation industry (e.g., a truck driver for a construction firm).

SOURCES: 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).

1990–98: _____. Internet site www.bls.gov, as of Feb. 25, 1999.

U.S. labor force: 1960–85: U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings* (Washington, DC: June 1997), table B-1.

1990–98: _____. Internet site www.bls.gov, as of Feb. 25, 1999.

Natural gas pipeline: 1975–97: 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).

1990–98: _____. *DOT Workforce Demographics* (Washington, DC : Annual issues).

State and local highway: 1960–95: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States, 1998* (Washington, DC: 1998), table 531 and similar tables in earlier editions.

Table 2-20 Employment by Transportation Occupation (Thousands)

	1985	1990	1995	1996	1997	1998
Total workers, 16 years and over[R]	107,150	118,793	124,900	126,708	129,558	131,463
Total workers in transportation occupations	3,681	[R]4,039	4,308	4,451	4,534	4,499
Transportation occupation as % of total workers, 16 and over	3.4	3.4	3.4	3.5	3.5	3.4
Motor vehicle operators						
Supervisors, motor vehicle operators	51	76	87	85	95	88
Truck drivers	2,412	2,627	2,860	3,018	3,075	3,012
Drivers–sales workers	214	201	158	156	150	159
Bus drivers	394	443	526	512	472	471
Taxicab drivers and chauffeurs	180	[R]213	211	203	248	273
Parking lot attendants	45	53	50	46	46	62
Motor transportation occupations, NEC	2	5	8	4	4	3
Total	**3,298**	**[R]3,618**	**3,900**	**4,024**	**4,090**	**4,069**
Rail transportation						
Railroad conductors and yardmasters	36	36	33	45	48	50
Locomotive operating occupations	59	46	51	49	53	41
Railroad brake, signal, and switch operators	46	28	17	15	14	7
Rail vehicle operators, NEC	7	8	3	7	6	6
Total	**148**	**118**	**104**	**116**	**121**	**104**
Water transportation						
Ship captains and mates, except fishing boats	32	[R]27	33	32	24	22
Sailors and deckhands	18	18	26	25	21	30
Marine engineers	1	2	3	8	2	3
Bridge, lock, and lighthouse tenders	8	6	4	5	5	8
Total	**59**	**53**	**66**	**70**	**52**	**63**
Air transportation						
Airplane pilots and navigators	77	114	114	114	120	113
Air traffic controllers	34	36	30	32	36	26
Total	**111**	**150**	**144**	**146**	**156**	**139**
Public transportation attendants	**65**	**100**	**94**	**95**	**115**	**124**

KEY: NEC = not elsewhere classified; R = revised

NOTES: Beginning in January 1998, data are not comparable with data in 1997 and earlier years because of the introduction of new composite estimation procedures and revised population controls used in the household survey. See source for additional information. The employment totals in tables 2-19 and 2-20 differ. Table 2-19 shows employment in transportation and related industries. Table 2-20 shows employment by transportation occupation. Some employees of transportation industries have non-transportation jobs (e.g., a bookkeeper in a trucking firm), and some people with transportation jobs 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 Sta*tistics, Employment and Earnings* (Washington, DC: Annual January issues), table 11 of the Household Data Annual Averages Tables.

____. Personal Communications, Apr. 15, 1998, Feb. 26, 1999, and unpublished revisions, Mar. 11, 1999 and Mar. 12, 1999.

Total workers, 16 and over: ____. *Employment and Earnings* (Washington, DC: January 1999), revised totals, table 1.

Table 2-21 Average Wage[a] and Salary Accruals Per Full-Time Equivalent Employee by Transportation Industry (Current $)

	1960	1965	1970	1975	1980	1985	1990	1995[R]	1996[R]	1997
Wages, U.S. labor force	4,812	5,805	7,740	10,805	15,789	21,285	26,396	30,902	32,034	33,438
Transportation industry	**5,835**	**6,989**	**9,396**	**13,550**	**20,818**	**25,333**	**29,019**	**32,264**	**33,285**	**34,507**
Air	6,929	8,495	12,027	17,035	25,649	32,133	35,106	39,022	37,597	38,934
Trucking and warehousing	5,396	6,623	8,672	12,765	19,204	22,400	25,979	29,377	30,343	31,717
Local and interurban passenger transit	4,877	5,553	6,996	[R]9,462	13,530	15,702	18,228	19,953	20,614	21,038
Railroad	6,241	7,460	10,110	14,987	25,049	36,611	43,634	51,300	54,566	56,803
Water	6,212	7,402	10,302	14,136	22,746	28,531	34,274	37,868	39,066	40,579
Pipelines, except natural gas	6,957	8,053	10,765	16,765	26,227	[R]37,316	43,737	57,867	59,143	60,500
Transportation services[b]	5,380	6,239	8,232	11,430	16,005	20,530	26,231	30,879	31,578	32,913

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 2-21. This table includes part-time employees, correctly weighted. Table 2-22 covers only full-time employees. 1960–85 data are based on the 1972 SIC codes; 1990–97 data are based on the 1987 SIC codes.

SOURCES: 1960–90: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Wealth Division, personal communication, 1997.

1995–97: ____. Survey of Current Business (Washington, DC: August 1997 and August 1998), table 6.6c.

Table 2-22 Median Weekly Earnings of Full-Time Wage and Salary Workers in Transportation by Detailed Occupation (Current $)

	1985	1990[R]	1995	1996	1997	1998
16 years and over, all[a]	**343**	**412**	**479**	**490**	**503**	**523**
Airplane pilots and navigators	738	910	956	1,138	1,079	1,383
Public transportation attendants	N	635	450	417	521	524
Motor vehicle operators	343	400	475	473	496	503
Supervisors, motor vehicle operators	N	520	549	583	589	595
Truck drivers	N	N	481	481	506	516
Drivers–sales workers	399	439	517	506	524	526
Bus drivers	344	355	419	396	405	428
Taxicab drivers and chauffeurs	262	307	352	374	405	379
Nonmotor vehicle operators	559	687	711	691	761	834
Rail transportation operators	599	717	741	740	814	849
Water transportation	463	547	624	586	641	812

KEY: N = data are nonexistent; R = revised

[a] Earnings for all workers, not just transportation related.

NOTE: Use care in comparing the figures in this table with those in table 2-21. This table does not include part-time employees; table 2-21 includes part-time employees correctly weighted.

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.

____. Personal communications, unpublished revisions, Mar. 11, 1999 and Mar. 15, 1999.

Water transportation: U.S. Department of Labor, Bureau of Labor Statistics, personal communications, Mar. 1 1999 and Mar. 11, 1999.

Table 2-23 Total Wage[a] and Salary Accruals by Transportation Industry (Current $ millions)

	1960	1965	1970	1975	1980	1985	1990	1995[R]	1996[R]	1997
Total wage and salary accruals	**272,800**	**363,700**	**551,500**	**814,700**	**1,377,600**	**1,995,700**	**2,757,500**	**3,444,600**	**3,643,200**	**3,896,600**
Transportation										
Air	1,270	1,850	4,030	5,890	11,030	15,800	24,260	28,410	39,200	41,310
Trucking and warehousing	4,590	6,270	9,120	13,790	23,760	29,730	39,980	52,530	47,000	50,500
Local and interurban passenger transit	1,310	1,430	1,870	2,380	3,420	4,270	5,670	7,660	8,290	8,790
Railroad	5,500	5,450	6,270	8,110	12,850	11,860	10,730	11,290	11,570	11,810
Water	1,380	1,580	2,110	2,600	4,570	5,060	5,620	6,330	6,490	6,940
Pipeline, except natural gas	160	150	180	290	580	710	830	870	830	850
Incidental services[b]	430	550	920	1,460	3,040	5,420	8,530	11,980	12,500	13,690
Total	**14,600**	**17,300**	**24,500**	**34,500**	**59,200**	**72,800**	**95,600**	**119,100**	**125,900**	**133,900**

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] Establishments furnishing services incidental to transportation, such as forwarding and packing services and arranging passenger and freight transportation.

NOTE: Totals may not add due to rounding.

SOURCE: 1960–1990: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Accounts, 1929–94 (Washington, DC: August 1998), table 6.3B.

1995–1997: _____. *Survey of Current Business* (Washington, DC: August 1998), table 6.3c.

Table 2-24 Labor Productivity Indices for Selected Transportation Industries

	1970	1975	1980	1985	1990	1995	1996
Output per hour worked							
Bus, Class I	118	107	111	96	95	105	93
Railroad	36	43	55	82	119	156	168
Petroleum pipelines	76	91	89	100	103	R116	131
Output per employee[a]							
Air	45	56	71	92	93	109	111
Bus, Class I	119	103	99	93	94	100	90
Trucking, except local	60	64	78	94	111	125	131
Petroleum pipelines	75	89	89	98	102	121	139

[a] 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.

KEY: R = revised

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Industry Productivity, Internet site www.bls.gov/iprhome.htm, as of Mar. 1, 1999.

Section D
Government Finance

Table 2-25a 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, Bureau of the Census, 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 www.bts.gov, Appendix A, tables A-2, A-4, and A-13.

Table 2-25b Federal, State, and Local Government Transportation-Related Revenues and Expenditures, Fiscal Year
(Constant 1992 $ millions)

	1985	1990	1991	1992	1993	1994	1995
Total government revenues	**64,545**	**74,136**	**79,373**	**80,199**	**82,961**	**83,521**	**86,681**
Federal	22,224	23,173	26,832	25,797	26,641	25,890	27,941
State and local	42,321	50,962	52,541	54,403	56,321	57,631	58,740
Total government expenditures	**92,357**	**105,906**	**110,129**	**112,863**	**112,831**	**118,343**	**119,585**
State and local expenditures, less federal grants[a]	58,873	73,441	76,927	78,544	77,414	81,456	82,671
Federal grants	22,029	21,293	21,241	21,364	22,045	22,626	23,144
Federal expenditures, less grants	11,455	11,172	11,961	12,955	13,371	14,261	13,770

[a] Based on data from the U.S. Department of Commerce, Bureau of the Census, 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 www.bts.gov, 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 2-26a Federal Transportation-Related Revenues, Fiscal Year
(Current $ millions)

	1980	1985	1990	1991	1992	1993	1994	1995	1996
Airport/airway trust fund[a]	2,274	3,598	4,945	6,206	5,918	6,096	6,027	6,291	3,128
Highway trust fund									
Highway account[b]	7,647	12,908	13,453	R15,303	16,572	16,864	R17,005	R19,377	22,638
Mass transit account	X	1,420	1,977	3,149	1,816	2,735	2,691	2,813	3,282
Water receipts[c]	381	463	1,147	1,325	1,474	1,591	1,394	1,701	1,469
Pipeline safety fund	X	X	10	11	14	15	19	35	31
Emergency preparedness fund	X	X	X	X	3	10	7	7	7
Total	**10,302**	**18,388**	**21,532**	**25,995**	**25,797**	**27,310**	**R27,143**	**R30,223**	**30,555**

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; 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.

NOTES: 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-1.

1985–95: _____. *Government Transportation Financial Statistics: Fiscal Years 1985–95*, Internet site www.bts.gov, table A-2.

1996: U.S. Executive Office of the President, Office of Management and Budget, *Budget of the United States Government, Appendix, Fiscal Year 1998* (Washington, DC: 1997).

Table 2-26b Federal Transportation-Related Revenues, Fiscal Year
(Constant 1992 $ millions)

	1980	1985	1990	1991	1992	1993	1994	1995	1996
Airport/airway trust fund[a]	3,656	R4,348	R5,322	R6,406	5,918	R5,947	R5,748	R5,816	2,809
Highway trust fund									
Highway account[b]	12,294	R15,600	R14,478	R15,796	16,572	R16,451	R16,220	R17,913	20,330
Mass transit account	X	1,716	R2,127	R3,251	1,816	R2,668	2,567	R2,600	2,947
Water receipts[c]	613	560	1,235	1,367	1,474	R1,552	R1,330	R1,573	1,319
Pipeline safety fund	X	X	11	11	14	14	18	32	28
Emergency preparedness fund	X	X	X	X	3	9	7	6	6
Total	**16,563**	**R22,224**	**R23,173**	**R26,832**	**25,797**	**R26,641**	**R25,890**	**R27,941**	**27,441**

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; 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.

NOTES: 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: 1997), table C-1.

1985–95: _____. *Government Transportation Financial Statistics: Fiscal Years 1985–95*, Internet site www.bts.gov, Appendix A, table A-2.

1996: U.S. Executive Office of the President, Office of Management and Budget, *Budget of the United States Government, Appendix, Fiscal Year 1998* (Washington, DC: 1997).

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 2-27a Federal Transportation 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[R]	2,837	3,054	2,844	3,048	3,357	3,502	3,473	3,565	3,374
Pipeline[a,R]	3	5	9	9	12	13	12	17	31
General support[b]	177	182	190	270	289	333	387	369	332
Total[R]	**23,961**	**27,705**	**30,166**	**32,166**	**34,319**	**36,305**	**38,672**	**39,930**	**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.

NOTES: Numbers may not add to totals due to rounding. For 1985 through 1994, water and pipeline expenditures have been revised. Revisions in water data reflects a new approach instituted by the U.S. Army Corps of Engineers. Pipeline expenditure data has been revised due to inconsistencies found during a routine audit of the database.

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: _____. *Government Transportation Financial Statistics: Fiscal Years 1985–95*, Internet site www.bts.gov, Appendix A, table A-4 and Appendix B, tables B-5 through B-12.

Table 2-27b Federal Transportation Expenditures by Mode, Fiscal Year (Constant 1992 $ millions)

	1980	1985[R]	1990	1991	1992	1993[R]	1994[R]	1995[R]	1996
Air	[R]6,048	5,980	[R]7,861	[R]8,549	9,313	9,803	9,678	9,604	9,102
Highway	18,820	18,167	[R]16,629	[R]16,371	16,773	17,638	19,127	18,565	18,531
Transit	5,317	4,142	4,124	4,043	3,675	3,430	3,596	4,136	3,929
Rail	3,489	1,278	575	805	900	791	793	956	893
Water[R]	4,561	3,691	3,061	3,146	3,357	3,416	3,312	3,296	3,030
Pipeline[a,R]	5	6	10	9	12	13	11	16	28
General support[b]	285	221	[R]204	279	289	325	369	341	298
Total[R]	**38,523**	**33,484**	**32,465**	**33,202**	**34,319**	**35,416**	**36,887**	**36,914**	**35,810**

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.

NOTES: Numbers may not add to totals due to rounding. For 1985 through 1994, water and pipeline expenditures have been revised. Revisions in water data reflects a new approach instituted by the U.S. Army Corps of Engineers. Pipeline expenditure data has been revised due to inconsistencies found during a routine audit of the database.

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: _____. *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: August 1998), table 3, "Chain Type Price Indexes."

Table 2-28 Cash Balances of the Transportation-Related Federal Trust Funds ($ millions)

	FY 1980	FY 1985	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
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
$ constant 1992	8,749	8,975	15,449	15,755	15,204	12,535	11,814	10,507	6,908	5,598
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
$ constant 1992	17,683	12,522	10,363	10,576	11,300	11,241	7,561	8,709	10,470	11,071
Transit account										
$ current	N	2,524	7,155	9,250	9,798	10,617	9,945	9,579	9,525	9,857
$ constant 1992	N	3,051	7,700	9,548	9,798	10,357	9,486	8,856	8,554	8,678
Harbor Maintenance Trust Fund										
$ current	N	N	30	74	121	305	451	621	865	1,106
$ constant 1992	N	N	32	76	121	298	430	574	777	974
Inland Waterway Trust Fund										
$ current	N	172	281	217	186	180	214	R238	275	300
$ constant 1992	N	208	302	224	186	176	204	R220	247	264
Oil Spill Liability Trust Fund										
$ current	N	N	345	647	866	1,024	993	R1,121	1,124	1,110
$ constant 1992	N	N	371	668	866	999	947	R1,036	1,009	977
Total all funds										
$ current	**16,441**	**20,483**	**31,795**	**35,697**	**37,475**	**36,499**	**31,916**	**R32,345**	**31,139**	**31,306**
$ constant 1992	**26,432**	**24,756**	**34,218**	**36,847**	**37,475**	**35,605**	**30,443**	**R29,902**	**27,965**	**27,563**

KEY: FY = fiscal year; N = data are nonexistent; 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: August 1998), table 3, "Chain Type Price Indexes."

Section E
Accuracy Profiles

TABLE 2-1. U.S. Gross Domestic Product attributed to Transportation Services (Current and chained 1992 dollars)

TABLE 2-2. U.S. Gross Domestic Product Attributed to Transportation-Related Final Demand (Current and chained 1992 dollars)

TABLE 2-3. U.S. Gross Domestic Demand Attributed to Transportation-Related Final Demand (Current and chained 1992 dollars)

TABLE 2-4. Contributions to Gross Domestic Product: Selected Industries (Current and chained 1992 dollars)

TABLE 2-5. Gross Domestic Product by Major Social Function

Tables 2-1 through 2-5 present data on transportation's contributions to the economy through consumption (or the money spent on transportation activity). The Bureau of Economic Analysis (BEA) provided this data from the *Survey of Current Business* (SCB) published by the Department of Commerce. 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. Most of the economic data is presented in terms of GDP based on BEA's national accounts databases. These databases are an accounting framework for macroeconomic data based on international standards for conducting economic analysis and reporting, compiling, and presenting data.

Table 2-3 presents transportation's economic impact in a different form, Gross Domestic Demand (GDD), to distinguish it from final demand for the products of the economy. It is also derived from the national accounts and refers to a country's domestic final demand, that 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. Two additional terms used in the tables also represent different presentation approaches. First, transportation-related final demand is analogous to one sector's GDP (i.e., the net measure of transportation's contribution to economic activity). Second, for-hire transportation encompasses transportation sectors of the economy and the value generated by moving people and goods.

GDP Methodology

The 1960 through 1985 data in table 2-1 are from the November 1993 issue of the SCB. The 1990 through1991 data and 1992 through 1996 data are from an August 1996 and November 1997 *SCB* issue respectively. The August 1996 issue presented improved estimates of GDP. This section describes BEA's methodology for distributing the current-dollar estimates of these components including transportation share GDP estimates. 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.

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. 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. This method produced separate estimates of gross output and intermediate inputs for a sector's GDP calculation.

Transportation GDP in chained dollars was estimated with the double-deflation method that relies on a chain-type quantity index formula. The double-deflation method requires gross output and intermediate input information. Principal source data for the transportation categories include: operating revenues of air carriers and Federal Express from the U.S. Department of Transportation and public sources (air); operating revenues for Class I motor carriers from historical records of the Interstate Commerce Commission and U.S. Census Bureau annual surveys (trucking and warehousing); BEA personal consumption expenditures (PCE), BLS, and trade sources (local and interurban passenger transit); operating revenues for Class I railroads and Amtrak (rail); and other trade sources (pipelines). Data sources for water were not provided (Yuskavage, 1996).

Table 2-1 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 through1981 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 detailed current-dollar inputs. BEA deflates import and domestic production separately. For deflation, quantities are approximated by real values (expressed at present with 1992 as the base period) that are calculated by dividing the current-dollar value of the component by its price index, where the price index uses 1992 as the base period. 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. For example, most of the annual source data used for estimating GDP are based on complete enumerations, such as federal government budget data, or are regularly adjusted to complete enumerations, such as the quinquennial economic censuses and census of governments. In addition, all the expenditure components of GDP are revised every 5 years to reflect BEA's benchmark I-O accounts, which are prepared within an internally consistent framework that tracks I-O flows in the economy. The following reliability comments are based on an October 1993 SCB article .

In the October 1993 SCB, BEA 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 2-1, 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.

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's 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.

NIPA & Transportation-Related Final Demand

For table 2-2, transportation-related final demand is reported from the National Income and Products Accounts (NIPA) parts of the SCB and 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 it includes only expenditures on the final products of the economy, transportation-related final demand is comparable to GDP and provides a measure of transportation's importance from a consumption perspective.

NIPA tables report the composition of production on the right side and the distribution of incomes earned in production on the left. 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 sub-accounts 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.

Transportation demand elements are drawn from these various accounts and are described in the next section. Discussion of the methodologies, sampling, and reliability behind these data are beyond the scope of this statement but can be accessed in other documents.[1]

---

[1] *An Introduction to National Economic Accounting, Methodology Paper No. 1* (1985)—NTIS accession no. PB85–247567. *Corporate Profits: Profits Before Tax, Profits Tax Liability, and Dividends, Methodology Paper No. 2* (1985)—NTIS accession no. PB85–245397. *Foreign Transactions, Methodology Paper No. 3* (1987)—NTIS accession no. PB88–100649. *GNP: An Overview of Source Data and Estimating Methods, Methodology Paper No. 4* (1987)—NTIS accession no. PB88–134838. *Government Transactions, Methodology Paper No. 5* (1988)—NTIS accession no. PB90–118480. *Personal Consumption Expenditures, Methodology Paper No. 6* (1990)—NTIS accession no. PB90–254244.

NIPA Data Elements

Personal Consumption Expenditures (PCE) for transportation include: road motor vehicles and parts, motorcycles, and other; motor fuels and lubricants; and transportation services. Road motor vehicles and parts consist of new automobiles, used automobiles, and other road motor vehicles such as new trucks, used trucks, and motorcycles. Motor vehicles used primarily for recreation, boats, noncommercial trailers, and aircraft are excluded. Road motor vehicle parts include tires, tubes, accessories, and other parts. Transportation services include repair, greasing, washing, parking, storage, rental, leasing, tolls, insurance, and purchased local and intercity transportation services.

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 trucks, buses, truck trailers, autos, aircraft, ships and boats, and railroad equipment.

Goods and services that are counted as part of the transportation-related exports include civilian aircraft, engines, and parts; road motor vehicles, engines, and parts; passenger fares, including the receipts of U.S. air and ocean/cruise carriers for the transportation of non-U.S. residents between the United States and foreign countries or between two foreign points; and other transportation. The total for road motor vehicle, engines and parts excludes boats, aircraft, and noncommercial trailers. Other transportation includes 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 the transportation of foreign freight between foreign points; port expenditure receipts (representing payments for goods and services purchased in the United States by foreign-operated carriers); and 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 the transportation-related imports include civilian aircraft, engines, and parts; road motor vehicles, engines, and parts; passenger fares, including the 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 other transportation. The total for road motor vehicle, engines and parts excludes boats, aircraft, and non-commercial trailers. Other transportation includes 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; port expenditure receipts (representing payments for goods and services purchased in foreign countries by U.S.-operated carriers); and 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 of roads, water, air, railroad, and transit. It also includes the government expenditures on transportation-related structures and equipment. Federal and state/local purchases represent the sum of consumption expenditures and gross inventory. The third item is defense-related purchases, including expenditures on 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 source and accuracy profile 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 2-6: National Transportation and Economic Trends

The *Statistical Abstract of the United States* provided 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. Because it is a survey, it is subject to sampling error, and of 50,000 households in the sampling frame, about 4 to 5 percent are unavailable for interview. Readers should also recognize that estimates based on the CPS will not agree with census counts because different procedures are used. Periodic 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.

The *Economic Report of the President* provided figures for the industrial production index; however, these data are from the Board of Governors of the Federal Reserve System. For annual figures, the individual industrial production (IP) indexes are constructed from a variety of source data including the quinquennial Censuses of Manufactures and Mineral Industries; the Annual Survey of Manufactures, prepared by the U.S. Department of Commerce, Bureau of the Census; the Minerals Yearbook, prepared by the U.S. Department of the Interior; and publications of the U.S. Department of Energy. Some data are therefore compiled from surveys and censuses. The Federal Reserve Board (FRB) uses this 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.

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. Readers

should refer to census information available online at www.census.gov.

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* provided the GDP estimates, and readers should refer to the source and accuracy profile statement for tables 2-1 through 2-5.

TABLE 2-7: 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 2-8: Average Price of Transportation Fuel to End-Users

The U.S. Department of Energy, Energy Information Administration's (EIA) *Annual Energy Review 1997*, tables 5.20 & 5.21, provided price data, except for railroad fuel. Data previous to 1981 were reported by the EIA from Bureau of Labor Statistics reports. Beginning in 1983, the EIA administered a series of surveys that collected 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.

Definition of Data Items

The sampling frame elements for form A consist of 134 companies that control a refinery or gas plant and represents a virtual census. Form B's sampling frame constitutes approximately 22,000 fuel resellers and retailers who responded to a 1994 EIA survey combined with companies from approximately 71 commercial and State lists. All sales of No. 2 distillate diesel fuel were not included in the sampling frame, however, because of the omission of certain service stations and smaller truck stops. Form C's sampling frame elements represent a census of suppliers and are comprised of 214 firms that import or transport 15 petroleum products across state lines.

Data Continuity

The EIA began the 782 series in 1983 and during the course of the transition from previous sources, they developed a method to compare data from the new survey 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. EIA first stratifies by sales volume for the form EIA-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 "non-certainty" companies were poststratified 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 2,200 should yield a less than 1-percent price coefficient of variation in their estimates. 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 2-9: Price Trend of Gasoline vs. 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 1996 retail gasoline prices. The remainder of this section discusses BLS's Consumer Price Index (CPI) data collection and estimation methods. BLS derives the average retail price of gasoline based on CPI data.

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 upon 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 the retail gasoline prices re-reported in table 2-9. Thus, this frame does not represent non-urban consumers.

For the outlet sampling frame, BLS relies on the Point-of-Purchase Survey (CPOPS) conducted by the Bureau of the Census. They conducted the CPOPS in 94 Primary Sampling Units (PSUs) identified by BLS. PSUs are based on urban counties, groups of contiguous urban counties, or MSA's. For the household sample, a non-compact 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 the 91 PSU's which are 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

The CPI is an average of price changes in an area for the various items. BLS defines the CPI as a fixed-quantity price index. It is a measure of the price change for a fixed collection of consumption goods and services purchased by urban consumers. The averaging algorithm relies on a weighting procedure that adjusts for the items relative importance in the population's spending patterns in a geographic area. BLS estimates separate CPI's for the urban United States, 4 regions, 4 size classes, 13 groups cross-classified by region and population size, and 29 local metropolitan statistical areas.

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 make 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 BLS's *Handbook of Methods* at http://stats.bls.gov/opub/hom/homhome.htm.

Effective in January 1999, BLS will use 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, will be used in index categories that comprise approximately 61 percent of total consumer spending represented by the CPI-U. Based upon BLS research, it is expected that planned 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 (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 non-urban consumption patterns. The CPI may also contain sampling error because it is estimated from a sample of consumer purchases. Non-sampling 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 POPS respondents were purchasing.

The CPI is also subject to response error when data are not collected because of nonresponse. BLS established a non-response auditing program in 1986. They report that response rates in 1990 for transportation commodities and services were above 90 percent.

Bias

Four categories of bias were identified in a BLS report . First, because of the fixed-weight nature of the index, the CPI creates substitution bias by placing too much weight on items from surveys in previous years that consumers may have shifted away from. Second, the study found that the index does not account for consumers switching to discount stores and results in an outlet bias. 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 contains a new product bias because the index inadequately reflects the consumer value of products introduced into the market. The commission concluded that the CPI overstates the true cost-of-living change by 1.1 percentage points per year.

Estimates of Variance

Numerous authors have attended to problems of statistical inference based on large stratified cluster sampling used in research including the methods for computing the CPI. A statistical technique called balanced repeated replication (BRR) produces better variance estimators according to several studies. The sample design for the CPI is tailored to allow for error estimations based on BRR techniques by making replicate selections of items and outlets for an index area. This structure enables BLS analysts to use BRR to estimate the variance of the index.

TABLE 2-10: Producer Price Indexes for Transportation Services

TABLE 2-11: Producer Price Indexes for Transportation Equipment

Data for 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 services. 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.

Sample Design

Sample designs for this survey begin with the specification of a universe frame of establishments for a given industry. The Unemployment Insurance System is the primary source of establishments for the sampling frame construction. Establishments are then clustered intro price-forming units equivalent to a companies profit-maximizing center. BLS then employs various stratification procedures appropriate to specific industries. For instance, some industries may be classified by geographically independent markets that then serve as the strata. Within each stratum, price-forming units are ordered by size to ensure the sample is proportionately distributed.

Data Collection

A BLS field economist seeks the cooperation of companies and visits an establishment or cluster of establishments selected for price sampling. The economist then 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 produces the producer price indexes with automated computer subsystems. Repricing schedules are optically scanned into databases and prices for over 100,000 items are collected and processed. BLS utilizes several different weighting schemes for the numerous indexes produced because more important products will have a greater effect on the movement of groupings of individual products. BLS utilizes net output of values of shipments 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 ship-

ments among establishments in the same industry, even if those establishments were separate firms. BLS will also make seasonal adjustments if statistical tests and economic rationale justify it. BLS will also impute 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 their 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 even more. 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 2-12: Personal Expenditures by Category

TABLE 2-13: Personal Consumption Expenditures on Transportation by Subcategory

Data used in these tables are from the *Annual Report of Consumer Expenditure Survey* of the Bureau of Labor Statistics. The Consumer Expenditure Survey (CEX) collects information from U.S. households and families on their buying habits (expenditures), income, and 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. The annual report of CEX includes integrated data in nine standard tables. The tables show average expenditures, income, and characteristics per consumer unit classified by 11 standard characteristics—quintiles of 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 data for a survey year are generally published in the annual report late in the following year. For example, the 1992 annual report was published in December 1993.

Sample Design

The CEX is a national probability sample of households that is designed to represent the total civilian noninstitutional population. The selection of households begins with the definition and selection of primary sampling units (PSU's), which consist of counties (or parts thereof), groups of counties, or independent cities. The set of sample PSU's used for the survey consists of 101 areas, of which 87 urban areas have also been selected by BLS for the Consumer Price Index program.

The sampling frame (i.e., the list from which housing units are chosen) for this survey is now generated from the 1990 census 100-percent detail file, which is augmented by a sample drawn from new construction permits and coverage improvement techniques to eliminate recognized deficiencies in the census. In addition, the sample for the Diary survey is doubled during the last 6 weeks of the year to collect expenditure data during the peak shopping period of the religious and New Year holidays.

The Interview survey is a rotating panel survey in which approximately 8,910 addresses are contacted in each of the calendar quarters. Allowing for bounding interviews, which are not included in the estimates, and for nonresponse (including vacancies), the number of completed interviews per quarter is targeted at 6,160. Each month, one-fifth of the units interviewed are new to the survey. Each panel is interviewed for five consecutive quarters and then dropped from the survey. BLS reported an 83 percent response rate for the 1994 Interview.

The Census Bureau selected a sample of approximately 8,020 addresses to participate annually in the Diary survey. This results in an effective annual sample size of 5,870 households, since many diaries are not completed due to refusals, vacancies, ineligibility, or the nonexistence of the household address. The actual workload of diaries is spaced over 52 weeks of the year. BLS reported an 81 percent response rate for the 1994 Interview.

Data Collection

BLS provides a handbook of methods for most of their data collections and this description draws partly from http://stats.bls.gov/opub/hom/homch16_a.htm. The current survey consists of two separate surveys (Interview and Diary), each with a different data collection technique and sample. In the Interview survey, each consumer unit (CU) in the sample is interviewed every three months over five calendar quarters. The sample for each quarter is divided into three panels, with CU's being interviewed every three months in the same panel of every quarter. 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 will be calculated using a model-assisted, design-based regression estimator.

Accuracy

The Consumer Expenditures Surveys are sample surveys and hence are 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 2-14: 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 1988 Chevrolet Cavalier LS,
2. a 1988 Ford Taurus GL, and
3. a 1998 Mercury Grand Marquis GS.

Thus, the estimates are not a reliable estimate 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, antilock brakes, cruise control, tilt steering wheel, tinted glass, emission equipment and rear window defogger.

TABLE 2-15: Average Passenger Fare (Current and chained 1992 dollars)

TABLE 2-18: Operating Revenues

Air

These data are based on 100 percent reporting of passenger fares and operating revenues by some 90 air carriers that operate aircraft with passenger seating capacity of more than 60 (or a payload capacity of more than 18,000 pounds) or conduct international operations. 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; notably most scheduled commuter airlines and all nonscheduled commuter airlines are excluded.

Class I Bus

Class I motor carriers of passengers are required to report financial and operating information to the Bureau of Transportation Statistics (BTS) using form MP-1. (Prior to 1996, Class I carriers were required to report to the Interstate Commerce Commission.) Class I motor carriers of passengers 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 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 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). 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 required of Class I railroads. The STB defines Class I railroads as having operating revenues of $255 million or more. 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

Created as a publicly-owned for-profit corporation, Amtrak collects its own financial data and reports this information in its annual report.

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 does 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 from the U.S.

Army Corps of Engineers' report Waterborne Commerce of the United States by estimated revenue per ton-mile.

Oil Pipeline

Eno Transportation Foundation, Inc., publishes these data, which are based on Federal Energy Regulatory Commission data and reported by the Oil Pipeline Research Institute for years 1977 to the present. 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 2-19: Employment in For-Hire Transportation and Selected Transportation-Related Industries

Employment data by industry are from the National Employment, Hours, and Earnings published by the Bureau of Labor Statistics (BLS), U.S. Department of Labor, which is a product of the Current Employment Statistics (CES) or establishment 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 business establishments.

Sample Design

BLS cooperates with State employment security agencies in the CES survey to collect data each month on employment, hours, and earnings from a sample of nonfarm establishments (including government). In early 1996, this sample included over 390,000 reporting units.

BLS stratifies the universe of establishments by industry and size groupings, which produces an efficient and equitable sample distribution. A total sample size sufficient to produce adequate employment estimates is determined and distributed among the size classes in each industry based on total employment in the industry/size class stratum (i.e., relative importance of each size class to its industry). In practice, this amounts to distributing the total number of establishments needed in the sample among the cells according to the ratio of the employment in each cell to the total employment in the industry. BLS stratified the surveys by size and geographic criteria to reduce sampling error.

Data Collection

Each month, State agencies cooperating with BLS in the survey collect data on employment, payrolls, and paid hours from a sample of establishments. Data are collected electronically from about two-thirds of the respondents; the remainder use mail or fax. The primary type of electronic reporting is touch-tone phone self-response; others are computer-assisted phone interviews and phone voice recognition technology. 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. All firms with 250 employees or more are asked to participate in the survey, as well as a sample of smaller firms.

A "shuttle" schedule (BLS form 790 series) is used for mail respondents. It is submitted each month by the respondent, edited by the State agency, and returned to the respondent for use again the following month.

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 lack of probability sampling 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.

TABLE 2-20: Employment by Detailed Transportation Occupation

TABLE 2-22: 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). 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 overall response rate is 79 percent.

Sample Design

The sample is selected primarily from the list of business establishments reporting to the state unemployment insurance program. Within

each State, the OES sample design 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. Long and short survey questionnaires are used. Both forms include specific occupational titles and definitions, establishment identification information, and several questions concerning the exact economic activity of the business. 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, called the "jackknife random group," to estimate the variance of occupational employment at the 3-digit industry/size-class level. In this technique, R subsamples are formed from the parent sample. Next, R estimates of total employment are calculated for each occupation, one employment estimate per subsample. The variability of the R employment estimates for each occupation is calculated and used as an estimate of the variance for each occupation. OES published reports show estimates of occupational employment and measurements of the sampling error associated with the estimates.

TABLE 2-21: Average Wage and Salary Accruals per Full-Time Equivalent Employee by Transportation Industry

TABLE 2-23 Total Wage and Salary Accruals by Transportation Industry

BEA's monthly *Survey of Current Business* (tables 6.3c and 6.6c) provided the 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 2-24: Labor Productivity Indices for Selected Transportation Industries

The Bureau of Labor Statistic's (BLS) *Industry Productivity Measures* provided the 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. This data comes from the Bureau of Transportation's publications *Air Carrier Traffic Statistics* and *Air Carrier Financial 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 2-12) 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 or call the Office of Productivity and Technology at BLS.

Accuracy

No measures of reliability are provided by BLS, probably because the collection is being conducted through a census. However, BLS makes an assumption that transportation outputs should be measured using the production of passenger- or freight-miles. Another school of thought might assume that many transporta-

tion 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 exactly how BEA measures transportation output and to evaluate BLS's assumption, they have compared the two approaches. Specifically, one study compared the different growth rates produced by the BLS and BEA approaches 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 .

GOVERNMENT REVENUES AND EXPENDITURES

TABLE 2-25: Federal, State, and Local Government Transportation-Related Revenues and Expenditures, Fiscal Year (Current and constant 1992 dollars)

TABLE 2-26: Federal Transportation-Related Revenues, Fiscal Year (Current and constant 1992 dollars)

TABLE 2-27: Federal Transportation Expenditures by Mode, Fiscal Year (Current and constant 1992 dollars)

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.[2] 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 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 non-census 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,

[2] 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).

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.[3]

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

[3] Public Law 101-508, 104 Stat. 1388 (November 5, 1990).

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 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 for air 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 2-A 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,

Box 2-A.

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 enforcement and safety activities of vehicle inspection agencies; law enforcement, and vehicle size and weight enforcement; street cleaning activities; and roads within parks maintained by a park agency.

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

7. loan guarantee defaults for railroad rehabilitation and improvement and Conrail labor protection.[4]

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).

REFERENCES

Federal Reserve Bulletin 83(2): 67.

Korn, E.L. and B.I. Graubard. 1991. "A Note on the Large Sample Properties of Linearization, Jackknife and Balanced Repeated Replication Methods for Stratified Samples." *The Annals of Statistics* 19 (4): 2275-2279.

Krewski, D. and J.N. K. Rao. 1981. "Inference from Stratified Samples: Properties of Linearization, Jackknife and Balanced Repeated Replication Methods." The Annals of Statistics 9(5): 1010-1019.

Kunze, K. and M. Jablonski (1998). *Productivity in service-producing industries*. Brookings Workshop on New Service-Sector Data, Washington, DC.

Landerfeld, J. S. and R. P. Parker (1997). "BEA's chain indexes, time series, and measures of long-term economic growth." *Survey of Current Business* 77(5): 58.

Parker, R. P. and J. E. Triplett (1996). "Chain-type measures of real output and prices in the U.S. national income and product accounts: an update." *Business Economics* 31(4): 37.

SCB (1991). "Gross Domestic Product as a measure of U.S. Production." *Survey of Current Business*.

Seskin, E. P. and R. P. Parker (1998). "A guide to the NIPA's." *Survey of Current Business* 78(3): 26.

U.S. Department of Labor, Bureau of Labor Statistics. 1997. Measurement Issues in the Consumer Price Index. Referenced at http://stats.bls.gov/cpigm697.htm on May 13, 1999.

Valliant, R. 1993. "Poststratification and Conditional Vairance Estimation." Jouenal of the American Statistical Association 88 (421): 89-96.

Young, A. H. (1993). "Reliability and accuracy of the quarterly estimates of GDP." *Survey of Current Business* 73(10): 29.

Young, A. H. and H. S. Tice (1985). "An introduction to national economic accounting." *Survey of Current Business* 65: 59.

Yuskavage, R. E. (1996). "Improved estimates of gross product by industry, 1959-94." *Survey of Current Business* 76(8): 133.

[4] 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.

Transportation Safety

Section A
Multimodal

Table 3-1 Transportation Fatalities by Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
U.S. air carrier[a]	499	261	146	124	1	526	39	168	380	8	1
Commuter carrier[b]	N	N	N	28	37	37	7	9	14	46	0
On-demand air taxi[c]	N	N	N	69	105	76	R51	52	63	39	45
General aviation[d]	787	1,029	1,310	1,252	1,239	956	R767	734	R632	660	621
Highway											
Passenger car occupants	N	N	N	25,929	27,449	23,212	24,092	22,423	R22,505	R22,199	21,164
Motorcyclists	790	1,650	2,280	3,189	5,144	4,564	3,244	2,227	R2,161	R2,116	2,284
Truck occupants[e]	N	N	N	5,817	8,748	7,666	9,306	10,216	R10,553	R10,972	11,375
Bus occupants	N	N	N	53	46	57	32	33	21	R18	36
Pedestrians	7,210	7,990	8,950	7,516	8,070	6,808	6,482	5,584	5,449	R5,321	5,220
Pedalcyclists	490	690	760	1,003	965	890	859	833	765	R814	761
Other[f]	27,909	36,759	40,637	1,018	669	628	584	501	609	R573	631
Total highway	**36,399**	**47,089**	**52,627**	**44,525**	**51,091**	**43,825**	**44,599**	**41,817**	**R,j42,065**	**42,013**	**41,471**
Railroad[g]											
Highway-rail grade crossing	1,421	1,610	1,440	917	833	582	698	579	488	461	431
Railroad	924	923	785	575	584	454	599	567	551	602	577
Transit[h]	**N**	**N**	**N**	**N**	**N**	**N**	**339**	**274**	**264**	**275**	**U**
Water											
Waterborne transportation[i]	N	N	178	243	206	131	85	46	50	46	31
Recreational boating	R739	1,360	1,418	1,466	1,360	1,116	865	829	709	R821	813
Pipeline											
Liquid pipeline	N	N	4	7	4	5	3	3	R5	0	1
Gas pipeline	N	N	26	8	15	28	6	18	R48	11	17
Total pipeline	**N**	**N**	**30**	**15**	**19**	**33**	**9**	**21**	**R53**	**11**	**18**
TOTAL fatalities	**U**	**U**	**U**	**U**	**U**	**U**	**R47,248**	**44,426**	**R44,697**	**R44,381**	**U**

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

Continued next page

Table 3-1 Cont'd Transportation Fatalities by Mode

[a] Carriers operating under 14 CFR 121, all scheduled and nonscheduled service. Since Mar. 20, 1997, include aircraft with 10 or more seats that formerly operated under 14 CFR 135. This change make it difficult to compare 14 CFR 121 and 14 CFR 135 accident statistics with previous years' 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 14 CFR 121 and 14 CDR 135 accident statistics with previous years' 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 not comparable 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] Fatalities resulting from vessel casualties only.

[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 those 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 (see tables 3-29 and 3-30 on transit). The reader cannot reproduce the total fatalities in this table by simply leaving out highway-rail grade-crossing fatalities count 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 3-31 on rail). An example of such a fatality is a bicyclist hit by a train at a grade crossing. See table 3-4 for a more complete breakout of fatalities for 1996 and 1997. 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 transportation are counted for the transit and rail modes, potentially overstating the risk for these modes. For the waterborne mode, fatalities from vessel casualties are counted in the total, and other fatalities are not counted. (Vessel casualties are incidents involving damage to vessels, for example, from collisions or groundings.) Fatalities not from vessel casualties include, for example, deaths from falling overboard or from accidents involving on-board equipment. Thus, fatalities for the waterborne mode are potentially understated.

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

1975: _____. *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: _____. *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.

1985–98: _____. Internet site *www.ntsb.gov/aviation*, table 5, as of Mar. 2, 1999.

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.

1985–98: _____. Internet site *www.ntsb.gov/aviation*, table 8, as of Mar. 2, 1999.

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.

1985–98: _____. Internet site *www.ntsb.gov/aviation*, table 9, as of Mar. 2, 1999.

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

1985–98: _____. Internet site *www.ntsb.gov/aviation*, table 10, as of Mar. 2, 1999.

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 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.

Continued next page

Table 3-1 Cont'd Transportation Fatalities by Mode

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

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

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

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

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

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

Transit: 1990–97: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics 1997* (Washington, DC: 1999), p. 21.

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: 1960–97: _____. Office of Boating Safety, *Boating Statistics* (Washington, DC: Annual issues).

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

Liquid and gas pipeline: 1970–98: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, Internet site http://ops.dot.gov as of Sept. 28, 1999)

Table 3-2 Transportation Injuries by Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air[a]											
U.S. air carrier[b]	N	N	107	81	19	30	R29	25	77	39	28
Commuter carrier[c]	N	N	N	N	14	16	11	25	2	1	2
On-demand air taxi[d]	N	N	N	N	43	R41	36	14	20	23	11
General aviation[e]	N	N	715	R769	R681	R483	R402	395	359	365	332
Highway											
Passenger car occupants	N	N	N	N	N	N	2,376,000	2,469,000	R2,458,000	R2,341,000	2,201,000
Motorcyclists	N	N	N	N	N	N	84,000	57,000	R55,000	R53,000	49,000
Truck occupants[f]	N	N	N	N	N	N	547,000	752,000	R794,000	R786,000	792,000
Bus occupants	N	N	N	N	N	N	33,000	19,000	20,000	17,000	16,000
Pedestrians	N	N	N	N	N	N	105,000	86,000	82,000	77,000	69,000
Pedalcyclists	N	N	N	N	N	N	75,000	67,000	R58,000	58,000	53,000
Other[g]	N	N	N	N	N	N	11,000	14,000	15,000	R17,000	12,000
Total highway[R]	**N**	**N**	**N**	**N**	**N**	**N**	**3,231,000**	**3,465,000**	**R3,383,000**	**3,348,000**	**3,192,000**
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
Railroad	16,113	21,930	17,934	50,138	58,696	31,617	22,736	12,546	10,948	10,227	10,156
Transit[i]	**N**	**N**	**N**	**N**	**N**	**N**	**54,556**	**57,196**	**55,288**	**56,132**	**U**
Water											
Waterborne transportation[j]	N	N	105	97	180	172	175	145	129	109	83
Recreational boating	929	927	780	2,136	2,650	2,757	3,822	4,141	4,442	4,555	4,613
Pipeline											
Liquid pipeline	N	N	21	17	15	18	7	11	13	5	2
Gas pipeline	N	N	233	214	177	108	69	53	114	R72	73
TOTAL injuries	**U**	**U**	**U**	**U**	**U**	**U**	**3,291,000**	**3,516,000**	**3,431,000**	**3,396,000**	**U**

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

Continued next page

Table 3-2 Cont'd Transportation Injuries by Mode

[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, includes only aircraft with 10 or more seats formerly operated under 14 CFR 135. This change makes it difficult to compare 14 CFR 121 and 14 CFR 135 accident statistics with previous years' 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 14 CFR 121 and 14 CFR 135 accident statistics with previous years' 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 not comparable 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] Injuries resulting from vessel casualties and nonvessel casualties.

[k] Injuries resulting from vessel casualties only.

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. Earlier editions of *National Transportation Statistics* (NTS), particularly the *1993 Historical Compendium*, 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:

- 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 those 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 (see tables 3-29 and 3-30 on transit).

The reader cannot reproduce the total injuries count in this table by simply leaving out 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 3-32 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: 1970–94: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995–97: _____. Analysis and Data Division, personal communications, Aug. 8, 1996, 1997, Mar. 10, 1999.

Commuter carrier, and on-demand air taxi: 1980–94: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995–97: _____. Analysis and Data Division, personal communications, 1996, 1997, 1998.

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

1995–97: _____. Analysis and Data Division, personal communications, 1996, 1997, 1998.

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: Nov. 1998), table 4.

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

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

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

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

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.

Continued next page

Table 3-2 Cont'd Transportation Injuries by Mode

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

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

Transit: 1990–97: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics* (Washington, DC: Annual issues).

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: 1960–97: _____. Office of Boating Safety, *Boating Statistics* (Washington, DC: Annual issues).

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

Liquid and gas pipeline: 1970–98: 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 Sept. 28, 1999.

Table 3-3 Transportation Accidents[a] by Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Air											
U.S. air carrier[b]	90	83	55	37	19	21	24	36	38	49	48
Commuter carrier[c]	N	N	N	48	38	R18	R15	R12	R11	17	8
On-demand air taxi[d]	N	N	N	152	171	R157	R107	75	R90	82	79
General aviation[e]	4,793	5,196	4,712	3,995	3,590	2,739	2,215	R2,053	R1,907	1,858	1,709
Highway											
Passenger car	N	N	N	N	N	N	5,560,000	5,523,000	R5,599,000	R5,423,000	U
Motorcycle	N	N	N	N	N	N	103,000	63,000	R66,000	R61,000	U
Truck[f]	N	N	N	N	N	N	2,524,000	3,071,000	R3,175,000	R3,225,000	U
Bus	N	N	N	N	N	N	60,000	58,000	57,000	53,000	U
Total highway crashes[a]	**N**	**N**	**N**	**N**	**N**	**N**	**6,471,000**	**6,699,000**	**R6,770,000**	**R6,624,000**	**6,335,000**
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	3,502
Railroad[g,i.]	N	N	8,095	8,041	8,205	3,275	2,879	2,459	2,443	2,397	2,575
Transit[j]	**N**	**N**	**N**	**N**	**N**	**N**	**R58,002**	**25,683**	**R25,166**	**R24,924**	**U**
Water											
Waterborne transportation[k]	N	N	2,582	3,310	4,624	3,439	3,613	4,196	3,799	3,704	2,837
Recreational boating	2,738	3,752	3,803	6,308	5,513	6,237	6,411	8,019	8,026	8,044	8,175
Pipeline											
Liquid pipeline	N	N	351	254	246	183	180	188	195	175	154
Gas pipeline	N	N	1,077	1,338	1,524	334	198	161	R187	175	232
TOTAL accidents	**U**	**U**	**U**	**U**	**U**	**U**	**R6,517,000**	**6,752,000**	**R6,819,000**	**6,675,000**	**U**

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

Continued next page

Table 3-3 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.

[c] All scheduled service operating under 14 CFR 135.

[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] Includes motor bus, commuter rail, heavy rail, light rail, demand responsive, van pool, and automated guideway. Accident figures include collisions with vehicles, objects, and people (except suicides), and derailments/vehicles going off the road. Accident figures do not include fires and personal casualties.

[k] Accidents resulting from vessel casualties only.

NOTES: The motor vehicle crash data in this table come from the U.S. Department of Transportation, National Highway Traffic Safety Adminstrations' 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. Earlier editions of *National Transportation Statistics* (NTS), particularly the *1993 Historical Compendium*, 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 those motor bus, trolley bus, demand responsive, and van pool accidents have been subtracted, because they are counted as railroad, highway, or highway-rail grade-crossing accidents (see tables 3-29 and 3-30 on transit).

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 3-32 on rail). An example of such an injury 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: Dec. 1968).

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

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

1980: _____. *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: _____. Press release, SB-99-06, Internet site *www.ntsb.gov/aviation*, table 5, as of Mar. 2, 1999.

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: _____. Internet site *www.ntsb.gov/aviation*, table 8, as of Mar. 2, 1999.

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: _____. Internet site *www.ntsb.gov/aviation*, table 9, as of Mar. 2, 1999.

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

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

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 1 for totals: _____. Personal communications for modal breakdowns.

1998: _____. *Traffic Safety Facts 1998,* DOT HS 808 983 (Washington, DC: October 1999), table 1.

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: _____. Office of Policy and Program Development, personal communication.

Continued next page

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

1985–91: _____. *Rail-Highway Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), table S.

1992–97: _____. *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1.

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

Railroad: 1970–91: U.S. Department of Transportation, Federal Railroad Administration, Office of Policy and Program Development, *Accident/Incident Bulletin* (Washington, DC: Annual issues), table 4.

1992–97: _____. *Railroad Safety Statistics Annual Report 1997* (Washington, DC: Sept. 1998), table 1-1.

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

Transit: 1990–97: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics 1997* (Washington, DC: 1999), p. 21.

Water: Waterborne transportation: 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: 1960–97: _____. Office of Boating Safety, *Boating Statistics* (Washington, DC: Annual issues).

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

Liquid and gas pipeline: 1970–98: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, Internet site http://ops.dot.gov as of Sept. 28, 1999)

Table 3-4 Distribution of Transportation Fatalities by Mode

	1997	%	1996[R]	%
Passenger car occupants	[R]22,199	50.0	22,505	50.4
Light-truck occupants	[R]10,249	23.1	9,932	22.2
Pedestrians struck by motor vehicles	[R]5,321	12.0	5,449	12.2
Motorcyclists	[R]2,116	4.8	2,161	4.8
Recreational boating	[R]821	1.8	709	1.6
Pedalcyclists struck by motor vehicles	[R]814	1.8	765	1.7
Large-truck occupants	[R]723	1.6	621	1.4
General aviation	660	1.5	632	1.4
Railroad[a] (excluding grade crossings)	602	1.4	551	1.2
Other and unknown motor vehicle occupants	[R]420	0.9	455	1.0
Other nonoccupants struck by motor vehicles[b]	[R]153	0.3	154	0.3
Heavy rail transit (subway)	77	0.2	74	0.2
Waterborne transportation (vessel casualties only)	46	0.1	50	0.1
Commuter air	46	0.1	14	0.03
Grade crossings, not involving motor vehicles[c]	42	0.1	73	0.2
Air taxi	39	0.1	63	0.1
Bus occupants (school, intercity, and transit)	[R]18	0.04	21	0.04
Transit buses, fatalities not related to accidents[d]	9	0.02	19	0.04
Gas distribution pipelines	[R]9	0.02	47	0.1
Air carriers (CFR 121)	8	0.02	380	0.9
Demand responsive transit, fatalities not related to accidents[d]	5	0.01	8	0.02
Light rail transit	3	<0.01	6	0.01
Hazardous liquid pipelines	0	0.0	5	0.01
Undetermined motor vehicle occupants	0	0.0	2	<0.01
Gas transmission pipelines	1	<0.01	1	<0.01
Total of all modes[e]	**44,381**	**100.0 %**	**44,697**	**100.0 %**
Other counts, redundant with above[f]				
Grade crossings, with motor vehicles	419		415	
Transit buses, accident-related fatalities	100		82	
Commuter rail	79		72	
Passengers on railroad trains	6		12	
Demand responsive transit, accident-related fatalities	2		3	

KEY: R = revised

Continued next page

Table 3-4 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 accidents for transit buses and demand responsive transit are not included under highway submodes. Includes suicides.

[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 response transit accidents, occupant fatalities are counted under "bus" and nonoccupant fatalities are counted under "pedestrians," "pedalcyclists," or other motor vehicle categories.

SOURCES: Air data: National Transportation Safety Board, Internet site *www.ntsb.gov/aviation*, as of Mar. 2, 1999.

Highway data: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1997* (DOT HS 808 806) (Washington, DC : November 1998), table 4, and personal communication, Oct. 4, 1999.

Railroad data: U.S. Federal Railroad Administration, *Railroad Safety Statistics, Annual Report 1997* (Washington, DC: September 1998), 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: _____. 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, Internet site http://ops.dot.gov as of Sept. 28, 1999.

Table 3-5 Highway-Rail Grade-Crossing Safety and Property Damage Data

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Fatalities	[a]1,440	917	833	582	698	579	488	461	[R]431
Injuries	3,272	3,860	3,550	2,687	2,407	1,894	1,610	1,540	[R]1,303
Accidents	[a]3,559	12,076	10,612	6,919	5,713	4,633	4,257	3,865	[P]3,502
Property damage									
Railroad vehicles and property	N	N	6.5	8.7	13.1	10.1	8.8	15.0	14.4
Highway vehicles	N	N	22.5	17.0	22.7	17.8	15.6	15.6	14.4
Total (current $ millions)	**N**	**N**	**29.0**	**25.7**	**35.8**	**27.9**	**24.4**	**30.6**	**[P]28.8**

KEY: N = data are nonexistent; P = preliminary; R = revised

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

NOTE: Damage to highway vehicles includes damage at both public and private grade crossings.

SOURCES: Fatalities, injuries, accidents, property damage — highway vehicles: 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.

1995–96: _____. *Highway-Rail Crossing Accident/Incident and Inventory Bulletin* (Washington, DC: Annual issues), tables S and 1.

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

1998: ____. Internet site (http://safetydata.fra.dot.gov/OfficeofSafety), as of May 4, 1999.

Property damage—rail vehicles and property: 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: ____. Internet site http://safetydata.fra.dot.gov, as of Aug. 17, 1999.

Table 3-6 Hazardous Materials Safety and Property Damage Data

	1975	1980	1985	1990	1995	1996	1997
Total fatalities	**27**	**19**	**8**	**8**	**7**	**120**	**11**
Accident-related	21	14	7	7	6	7	9
Air fatalities	**0**	**0**	**0**	**0**	**0**	**110**	**0**
Accident-related	0	0	0	0	0	0	0
Highway fatalities	**27**	**17**	**8**	**8**	**7**	**8**	**11**
Accident-related	21	12	7	7	6	5	9
Rail fatalities	**0**	**2**	**0**	**0**	**0**	**2**	**0**
Accident-related	0	2	0	0	0	2	0
Water fatalities	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0
Other[a] fatalities	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0
Total injuries	**648**	**626**	**253**	**R423**	**399**	**R1,173**	**226**
Accident-related	168	47	16	18	18	R864	16
Air injuries	**5**	**8**	**4**	**R39**	**32**	**32**	**24**
Accident-related	0	0	0	0	0	0	0
Highway injuries	**527**	**493**	**195**	**311**	**296**	**R215**	**157**
Accident-related	156	43	9	9	14	R22	11
Rail injuries	**99**	**121**	**53**	**73**	**71**	**R926**	**45**
Accident-related	12	4	7	9	4	842	5
Water injuries	**2**	**1**	**0**	**0**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0
Other[a] injuries	**15**	**3**	**1**	**0**	**0**	**0**	**0**
Accident-related	0	0	0	0	0	0	0
Total incidents	**10,951**	**R15,719**	**6,019**	**R8,880**	**R14,743**	**R13,937**	**13,853**
Accident-related	440	486	364	297	295	R330	306
Air incidents	**147**	**223**	**114**	**297**	**812**	**912**	**1,003**
Accident-related	0	0	0	0	0	0	1
Highway incidents	**10,063**	**14,161**	**4,752**	**R7,297**	**R12,766**	**R11,911**	**11,750**
Accident-related	330	347	302	249	245	R287	253
Rail incidents	**694**	**1,271**	**842**	**1,279**	**1,153**	**R1,108**	**1,096**
Accident-related	109	134	61	48	50	R43	52

KEY: R = revised

Continued next page

Table 3-6 Cont'd Hazardous Materials Safety and Property Damage Data

	1975	1980	1985	1990	1995	1996	1997
Water incidents	**28**	**34**	**7**	**7**	**12**	**6**	**4**
Accident-related	0	2	0	0	0	0	0
Other[a] incidents	**19**	**30**	**304**	**0**	**0**	**0**	**0**
Accident-related	1	3	1	0	0	0	0
Total property damage (current $ thousands)[b]	**8,090**	**10,829**	**22,993**	**32,353**	**30,908**	**R46,586**	**33,287**
Accident-related	6,051	6,236	20,268	24,792	23,516	R37,504	24,580
Air property damage	**8.9**	**12.3**	**12.3**	**142**	**97**	**87**	**332**
Accident-related	0	0	0	0	0	0	0
Highway property damage	**5,584**	**7,324**	**12,690**	**20,190**	**22,152**	**R29,007**	**24,583**
Accident-related	3,694	3,782	10,175	14,132	16,256	R22,044	17,241
Rail property damage	**2,488**	**2,952**	**10,274**	**11,952**	**8,485**	**R17,372**	**8,348**
Accident-related	2,357	2,357	10,094	10,660	7,260	15,460	7,339
Water property damage	**6.1**	**505**	**3.2**	**70**	**174**	**120**	**25**
Accident-related	0	81	0	0	0	0	0
Other[a] property damage	**3.5**	**35**	**14.4**	**0**	**0**	**0**	**0**
Accident-related	0.3	15.6	<0.1	0	0	0	0

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

[b] Property damage under $30,000 is reported to the nearest 0.1 thousand.

NOTE: Hazardous materials operations initiated in 1971. Property damage $30,000 or greater is reported to the nearest thousand, therefore the total may not equal the sum.

KEY: R = revised

SOURCES: 1975–85: U.S. Department of Transportation, Research and Special Programs Administration, Office of Hazardous Materials Safety, Hazardous Materials Information System Database, 1999.

1990–97: __. Internet site http://hazmat.dot.gov/brindex.htm as of Sept. 22, 1998.

Table 3-7 Transportation-Related Occupational Fatalities[a]

	1992	1993	1994	1995	1996[R]	1997
Fatalities						
Highway[b]	1,158	1,243	1,343	1,346	1,346	1,387
Nonhighway[c]	436	392	409	387	374	377
Aircraft	353	282	426	283	324	261
Worker struck by vehicle[d]	346	[R]365	391	388	353	367
Water vehicle[e]	109	120	94	87	119	109
Railway[f]	65	86	81	82	74	93
Transportation-related	**2,484**	**2,501**	**2,762**	**2,587**	**2,601**	**2,599**
Total occupational fatalities	6,217	6,331	6,632	6,275	6,202	6,218
% of total occupational fatalities						
Highway	19	20	20	21	22	22
Nonhighway	7	6	6	6	6	6
Aircraft	6	4	6	5	5	4
Worker struck by vehicle	6	6	6	6	6	6
Water vehicle	2	2	1	1	2	2
Railway	1	1	1	1	1	1
Transportation-related	**40**	**40**	**42**	**41**	**42**	**42**

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 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 vehicle.

[f] Includes collisions between railway vehicles, railway vehicle and other vehicle, railway vehicle and other object, and derailment.

NOTES: Totals for transportation categories may include subcategories not shown separately. Percentages may not add to total 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 way in which they died. For example, a sales-man traveling for business reasons who is killed in a rail accident would be listed under rail.

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, *News: National Census of Fatal Occupational Injuries*, Internet site www.bls.gov/oshhome.htm. 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 3-8 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 1995*, DOT HS 808 806 (Washington, DC: 1996); 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 1997* (Washington, DC: September 1998).

Federal Transit Administration: U.S. Department of Transportation, Federal Transit Administration, *Safety Management Information Statistics*, DOT-FTA-MA-26-9033-97-1 (Washington, DC: 1997).

Research and Special Programs Administration: Gas pipeline: 49 CFR 191.3 (as of Oct. 1, 1998).

Oil pipeline: 49 CFR 195.50 (as of Oct. 1, 1998).

U.S. Coast Guard: *Commercial shipping:* 46 CFR 4.05 (as of Oct. 1, 1998).

Recreational boating: 33 CFR 173.55 (as of July 1, 1998).

Section B
Air

Table 3-9 U.S. Air Carrier[a] Safety Data

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997[R]	1998[P]
Total fatalities	**499**	**261**	**146**	**124**	**1**	**526**	**39**	**168**	**380**	**8**	**1**
Total serious injuries	**N**	**N**	**107**	**81**	**19**	**30**	**[R]29**	**25**	**77**	**39**	**28**
Total accidents	**90**	**83**	**55**	**37**	**19**	**21**	**24**	**36**	**38**	**49**	**48**
Fatal	17	9	8	3	1	7	6	3	5	4	1
Aircraft-miles (millions)	**1,130**	**1,536**	**2,685**	**2,478**	**2,924**	**3,631**	**4,948**	**[R]5,654**	**[R]5,873**	**6,686**	**6,769**
Rates per 100 million aircraft-miles											
Fatalities	44	17	5.4	5.0	0.034	14	0.79	3.0	6.5	0.1	0.0
Serious injuries	N	N	4.0	3.3	0.65	0.83	[R]0.59	0.44	1.3	0.58	0.41
Total accidents	8.0	5.4	2.0	1.5	0.65	0.58	0.49	0.64	0.65	0.73	0.71
Fatal	1.5	0.59	0.30	0.081	0.034	0.19	0.12	0.053	0.085	0.060	0.015
Aircraft departures (thousands)	**N**	**N**	**N**	**N**	**5,479**	**6,307**	**8,092**	**[R]8,457**	**[R]8,229**	**10,300**	**10,318**
Rates per 100,000 aircraft departures											
Fatalities	N	N	N	N	0.018	8.3	0.48	2.0	4.6	0.078	0.010
Serious injuries	N	N	N	N	0.35	0.48	[R]0.36	0.30	0.94	0.38	0.27
Total accidents	N	N	N	N	0.35	0.33	0.30	0.43	0.46	0.48	0.47
Fatal	N	N	N	N	0.018	0.11	0.074	0.035	0.061	0.039	0.010
Flight hours (thousands)	**N**	**4,691**	**6,470**	**5,607**	**7,067**	**8,710**	**12,150**	**[R]13,505**	**[R]13,746**	**15,829**	**16,508**
Rates per 100,000 flight hours											
Fatalities	N	5.6	2.3	2.2	0.014	6.0	0.32	[R]1.2	2.8	0.1	0.0
Serious injuries	N	N	1.7	1.4	0.27	0.34	[R]0.24	0.19	0.56	0.25	0.17
Total accidents	N	1.8	0.85	0.66	0.27	0.24	0.20	0.27	0.28	0.31	0.29
Fatal	N	0.19	0.12	0.054	0.014	0.08	0.049	[R]0.022	0.036	0.025	0.006

KEY: N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 3-9 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 deregulated all-cargo carriers and commercial operators of large aircraft when those accidents occurred during 14 CFR 121 operations. Since Mar. 20, 1997, includes aircraft with 10 or more seats formerly operated under 14 CFR 135. This change makes it difficult to compare 14 CFR 121 and 14 CFR 135 accident statistics with previous years' data.

NOTES: Miles, departures, and hours are compiled by the U.S. Department of Transportation, Federal Aviation Administration.

With a few exceptions, the fatality, injury, and accident rates are expressed to two significant digits.

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

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

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

1980: _____. *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.

1985–98: _____. Available at (www.ntsb.gov/aviation) as of Mar. 2, 1999, table 5.

Serious injuries: 1970–94: _____. *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995–98: _____. Analysis and Data Division, personal communications, Aug. 8, 1996, 1997, Mar. 10, 1999.

Table 3-10 U.S. Commuter Air Carrier[a] Safety Data

	1980	1985	1990	1995	1996[R]	1997[R]	1998[P]
Total fatalities	**37**	**37**	**7**	**9**	**14**	**46**	**0**
Total serious injuries	**14**	**16**	**11**	**25**	**2**	**1**	**2**
Total accidents	**38**	**[R]18**	**[R]15**	**[R]12**	**11**	**17**	**8**
Fatal	8	7	4	2	1	5	0
Aircraft-miles (millions)	**192**	**301**	**450**	**550**	**591**	**267**	**186**
Rates per 100 million aircraft miles							
Fatalities	19	12	1.6	1.6	2.4	17	0
Serious injuries	7.3	5.3	2.4	4.5	0.3	0.2	0.3
Total accidents[b]	20	[R]6.0	[R]3.3	[R]2.2	1.9	6.4	4.3
Fatal[b]	4.2	2.3	0.9	0.4	0.2	1.9	0.0
Aircraft departures (thousands)	**1,777**	**2,561**	**3,160**	**[R]3,220**	**3,515**	**1,395**	**791**
Rates per 100,000 aircraft departures							
Fatalities	2.1	1.4	0.22	0.3	0.4	3.3	0.0
Serious injuries	0.79	0.62	0.35	0.78	0.06	0.07	0.25
Total accidents[b]	2.1	[R]0.70	[R]0.48	[R]0.37	0.31	1.2	1.0
Fatal[b]	0.45	0.27	0.13	0.06	0.03	0.36	0.00
Flight hours (thousands)	**1,176**	**1,737**	**2,342**	**[R]2,628**	**2,757**	**983**	**513**
Rates per 100 thousand flight hours							
Fatalities	3.15	2.13	0.30	0.34	0.51	4.68	0.00
Serious injuries	1.19	0.92	0.47	0.95	0.07	0.10	0.39
Total accidents[b]	3.23	[R]1.04	[R]0.64	[R]0.46	0.40	1.73	1.56
Fatal[b]	0.68	0.40	0.17	0.08	0.04	0.51	0.00

KEY: P = preliminary; R = revised

[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 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 1997 and 1998 data with previous years data.

[b] 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.

NOTE: Miles, departures, and hours are compiled by the U.S. Department of Transportation, Federal Aviation Administration.

SOURCE: 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.

1985–98: ___. Internet site www.ntsb.gov/aviation, table 8, as of Mar. 2, 1999.

Serious injuries: 1980–90: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995–98: ___. Analysis and Data Division, personal communications, 1996, 1997, 1998.

Table 3-11 U.S. Air Carrier[a] Fatal Accidents by First Phase of Operation

	1990	1991	1992	1993	1994	1995	1996	1997[P]
Phase of operation								
Approach/descent/landing	1	2	1	0	2	[R]2	0	0
Taxi/takeoff/climb	3	1	2	0	1	0	3	2
Cruise (inflight)	1	0	0	0	0	0	1	1
Standing (static)	1	1	1	1	0	0	0	1
Maneuvering[b]	0	0	0	0	1	0	0	0
Other/not reported	0	0	0	0	0	[R]1	1	0
TOTAL fatal accidents	**6**	**4**	**4**	**1**	**4**	**3**	**5**	**4**

KEY: P = preliminary; R = revised

[a] 14 CFR 121, scheduled operations. Before March 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 14CFR 135. This change makes it difficult to compare 1997 data with previous years' 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 Accidental Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues), table 18.

1996–97:_____. Personal communication, Mar. 10, 1999.

Table 3-12 U.S. Commuter Air Carrier[a] Fatal Accidents by First Phase of Operation

	1990	1991	1992	1993	1994	1995	1996	1997[P]
Phase of operation								
Approach/descent/landing	0	3	5	1	2	0	1	2
Taxi/takeoff/climb	0	0	1	1	0	1	0	1
Cruise (inflight)	3	2	1	1	1	0	0	0
Standing (static)	0	1	0	1	0	0	0	0
Maneuvering[b]	1	1	0	0	0	1	0	2
Other/not reported	0	1	0	0	0	0	0	0
Total fatal accidents	**4**	**8**	**7**	**4**	**3**	**2**	**1**	**5**

KEY: P = preliminary

[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 1997 data with previous years' 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 Accidental Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues), table 36.

1996–97: _____. Personal communication, Mar. 10, 1999.

Table 3-13 U.S. On-Demand Air Taxi Safety Data[a]

	1975	1980	1985	1990	1995	1996[R]	1997[R]	1998[P]
Total fatalities	**69**	**105**	**76**	**[R]51**	**52**	**63**	**39**	**45**
Total serious injuries	**N**	**43**	**[R]41**	**36**	**14**	**20**	**23**	**11**
Total accidents	**152**	**171**	**[R]157**	**[R]107**	**75**	**90**	**82**	**79**
Fatal	**24**	**46**	**35**	**[R]29**	**24**	**29**	**15**	**17**
Flight hours (thousands)	**2,526**	**3,618**	**2,570**	**2,249**	**[R]1,707**	**2,029**	**2,250**	**2,538**
Rates per 100,000 flight hours								
Fatalities	**2.7**	**2.9**	**3.0**	**[R]2.3**	**[R]3.0**	**3.1**	**1.7**	**1.8**
Serious injuries	N	1.2	[R]1.6	1.6	[R]0.82	1.0	1.0	0.4
Total accidents	6.0	4.7	[R]6.1	[R]4.8	[R]4.4	4.4	3.6	3.1
Fatal	0.95	1.3	1.4	[R]1.3	[R]1.4	1.4	0.67	0.67

KEY: N = data are nonexistent; P = preliminary; R = revised

[a] Air carriers operating under 14 CFR 135, nonscheduled service. Accidents on foreign soil and in foreign waters are excluded.

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.

1985–98: _____. Available at www.ntsb.gov/aviation, Aviation Accident Statistics, table 9, as of Mar. 2, 1999.

Serious injuries: 1980–90: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations* (Washington, DC: Annual issues).

1995–98: _____. Analysis and Data Division, personal communication, 1996, 1997, 1998.

Table 3-14 U.S. General Aviation[a] Safety Data

	1960[c]	1965[c]	1970[c]	1975	1980	1985	1990	1995	1996[R]	1997[R]	1998[P]
Total fatalities	**787**	**1,029**	**1,310**	**1,252**	**1,239**	**956**	**R767**	**734**	**632**	**660**	**621**
Total serious injuries[R]	**N**	**N**	**715**	**769**	**681**	**483**	**402**	**395**	**359**	**365**	**332**
Total accidents[b]	**4,793**	**5,196**	**4,712**	**3,995**	**3,590**	**2,739**	**2,215**	**R2,053**	**1,907**	**1,858**	**1,907**
Fatal	**429**	**538**	**641**	**633**	**618**	**498**	**443**	**412**	**360**	**356**	**361**
Flight hours (thousands)	**13,121**	**16,733**	**26,030**	**28,799**	**36,402**	**28,322**	**28,510**	**R24,906**	**24,881**	**25,473**	**26,796**
Rates per 100,000 flight hours											
Fatalities[R]	6.00	6.15	5.03	4.35	3.40	3.38	2.69	3.07	2.54	2.70	2.32
Serious Injuries[R]	N	N	2.75	R2.67	1.87	1.71	1.41	1.65	1.44	1.43	1.24
Total accidents	36.5	31.1	18.1	13.9	9.9	9.7	7.8	R8.2	7.7	7.3	7.1
Fatal	3.27	3.22	2.46	2.20	R1.69	1.75	1.55	R1.64	1.45	1.40	1.35

KEY: N = data are nonexistent; 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, resulting in an increase in the number of general aviation accidents by approximately 1.75%.

[c] Data for 1960, 1965, and 1970 include air taxi.

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

1985–98: _____. Available at www.ntsb.gov/aviation, Aviation Accident Statistics, table 10, as of Mar. 2, 1999.

Serious injuries: 1970–94: National Transportation Safety Board, *Annual Review of Aircraft Accident Data: General Aviation* (Washington, DC: Annual issues).

1995–98: _____. Analysis and Data Division, personal communications, 1996, 1997, 1998.

Table 3-15 Number of Pilot-Reported Near Midair Collisions (NMAC) by Degree of Hazard

	1980	1985	1990	1995[R]	1996[R]	1997[R]	1998
Degree of hazard							
Critical[a]	118	180	74	32	26	31	19
Potential[b]	319	423	266	139	101	105	74
No hazard[c]	122	133	114	63	55	70	41
Unclassified[d]	9	22	0	0	0	0	0
Open[e]	0	0	0	4	12	30	73
Total	**568**	**758**	**454**	**238**	**194**	**236**	**207**
NMAC involving aircraft operating under 14 CFR 121[R,f]	U	U	121	43	49	81	65

KEY: P = preliminary; R = revised: U = data are unavailable

[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 of separation 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 1997 and 1998 data with previous years' data.

NOTE: Includes air carriers, general aviation, military, and other aircraft (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: ____. Air Traffic Resource Management, personal communication, Mar. 18, 1999.

Table 3-16 Airline[a] Passenger Screening Results by Type of Weapons Detected, Persons Arrested, and Bomb Threats Received

	1980	1985	1990	1995	1996	1997	1998
Persons screened (millions)	**585**	**993**	**1,145**	**1,263**	**R1,497**	**1,660**	**1,903**
Type of weapon detected							
Firearms							
Handguns	1,878	2,823	2,490	2,230	1,999	1,905	1,401
Long guns	36	90	59	160	R156	162	114
Total	**1,914**	**2,913**	**2,843**	**2,390**	**R2,155**	**2,067**	**1,515**
Other/other dangerous articles[b]	108	74	304	N	N	N	N
Explosive/incendiary devices	8	12	15	N	N	N	N
Persons arrested							
Carrying firearms/explosives	1,031	1,310	R1,336	1,194	999	924	660
Giving false information	32	42	18	68	131	72	86
Bomb threats received							
Against airports	1,179	477	448	346	N	U	U
Against aircraft	268	153	338	327	N	U	U

KEY: N = data are nonexistent; R = revised; U = data are unavailable

[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–Dec. 31, 1985 (Washington, DC: May 1986).

1990–98: _____. *Annual Report to Congress on Civil Aviation Security* (Washington, DC: Annual issues), and personal communication, May 27, 1999.

Bomb threats received: _____. *Criminal Acts Against Civil Aviation* (Washington, DC: Annual issues).

Section C
Highway

Table 3-17 Motor Vehicle Safety Data

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Fatalities	**36,399**	**47,089**	**52,627**	**44,525**	**51,091**	**43,825**	**44,599**	**41,817**	**R42,065**	**R42,013**	**41,471**
Injuries	**N**	**N**	**N**	**N**	**N**	**N**	**3,231,000**	**3,465,000**	**3,511,000**	**R3,348,000**	**3,192,000**
Crashes	**N**	**N**	**N**	**N**	**N**	**N**	**6,471,000**	**6,699,000**	**6,842,000**	**R6,624,000**	**U**
Vehicle-miles (billions)	**719**	**888**	**1,110**	**1,328**	**1,527**	**1,775**	**2,144**	**2,423**	**R2,486**	**2,560**	**U**
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	U
Injuries	N	N	N	N	N	N	151	143	R140	133	U
Crashes	N	N	N	N	N	N	302	277	R272	264	U

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

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.

Injuries: ____.

Crashes: ____. 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.

1970–97: ____. *Highway Statistics*, 1996, FHWA-PL-98-003 (Washington, DC: 1997), table VM-1.

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 2.

Crash rates: Calculated by U.S. Department of Transportation, Bureau of Transportation Statistics.

Table 3-18 Occupant Fatalities by Vehicle Type and Nonoccupant Fatalities

	1975	1980	1985	1990	1995	1996[R]	1997[R]	1998
Vehicle occupant fatalities by vehicle type								
Passenger car								
Subcompact	3,834	7,299	7,993	8,309	6,791	6,618	6,220	U
Compact	614	927	2,635	5,310	6,899	7,288	7,195	U
Intermediate	1,869	3,878	4,391	4,849	4,666	4,670	4,794	U
Full	10,800	11,580	6,586	4,635	3,413	3,417	3,481	U
Unknown	8,812	3,765	1,607	989	654	512	509	U
Total	**25,929**	**27,449**	**23,212**	**24,092**	**22,423**	**22,505**	**22,199**	**21,164**
Truck								
Light	4,856	7,486	6,689	8,601	9,568	9,932	10,249	10,647
Large	961	1,262	977	705	648	621	723	728
Total	**5,817**	**8,748**	**7,666**	**9,306**	**10,216**	**10,553**	**10,972**	**11,375**
Other vehicles								
Motorcycle	3,189	5,144	4,564	3,244	2,227	2,161	2,116	2,284
Bus	53	46	57	32	33	21	18	36
Other/unknown vehicle type	[R]937	540	544	460	392	455	420	500
Total	**[R]4,179**	**5,730**	**5,165**	**3,736**	**2,652**	**2,637**	**2,554**	**2,820**
TOTAL vehicle occupant fatalities	**35,925**	**41,927**	**36,043**	**37,134**	**35,291**	**35,695**	**34,725**	**35,369**
Nonoccupant fatalities								
Pedestrian	7,516	8,070	6,808	6,482	5,584	5,449	5,321	5,220
Pedalcyclist	1,003	965	890	859	833	765	814	761
Other	81	129	84	124	109	154	153	131
Total	**8,600**	**9,164**	**7,782**	**7,465**	**6,526**	**6,368**	**6,288**	**6,112**
TOTAL traffic fatalities	**44,525**	**51,091**	**43,825**	**44,599**	**41,817**	**[a]42,065**	**42,013**	**41,471**

[a] Includes 2 fatalities that could not be assigned to a category above.

KEY: R = revised; U = data were unavailable at time of publication

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.

Breakout of passenger car types: ____. National Center for Statistics and Analysis, Fatality Analysis Reporting System Database, 1998.

Table 3-19 Passenger Car Occupant Safety Data

	1975	1980	1985	1990	1995	1996[R]	1997	1998
Fatalities	**25,929**	**27,449**	**23,212**	**24,092**	**22,423**	**22,505**	**[R]22,199**	**21,164**
Injuries	**N**	**N**	**N**	**2,376,000**	**2,469,000**	**2,458,000**	**[R]2,341,000**	**2,201,000**
Crashes	**N**	**N**	**N**	**5,560,000**	**5,523,000**	**5,599,000**	**5,537,000**	**U**
Vehicle-miles (billions)	**1,030**	**1,107**	**[R]1,249**	**[R]1,427**	**1,478**	**1,499**	**1,528**	**U**
Rates per 100 million vehicle-miles								
Fatalities	2.5	2.5	1.9	1.7	1.5	1.5	1.4	U
Injuries	N	N	N	167	167	164	[R]153	U
Crashes	N	N	N	390	374	374	[R]355	U

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

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. Earlier editions of *National Transportation Statistics* (NTS), particularly the *1993 Historical Compendium*, 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.

U.S. Department of Transportation, Bureau of Transportation Statistics has rounded vehicle-miles to the nearest billion.

Vehicle-miles in this table and in table 3-21 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 this table and table 3-21 should not be compared with the vehicle-miles table 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.

Crashes: ____. 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.

Table 3-20 Motorcycle Rider Safety Data

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fatalities	**3,244**	**2,806**	**2,395**	**2,449**	**2,320**	**2,227**	**R2,161**	**R2,116**	**2,284**
Injuries	**84,000**	**80,000**	**65,000**	**59,000**	**57,000**	**57,000**	**R55,000**	**R53,000**	**49,000**
Crashes	**103,000**	**106,000**	**72,000**	**72,000**	**67,000**	**63,000**	**R66,000**	**R61,000**	**U**
Vehicle-miles (billions)	**9.6**	**9.2**	**9.6**	**9.9**	**10.2**	**9.8**	**9.9**	**10.1**	**U**
Rates per 100 million vehicle-miles[a]									
Fatalities	34	31	25	25	23	23	22	21	U
Injuries	R882	R876	R681	600	R561	R587	R562	534	U
CrashesR	1,078	1,155	753	727	654	643	675	604	U

KEY: R = revised; U = data were unavailable at time of publication

[a] U.S. Department of Transportation, National Highway Traffic Safety Administration (USDOT/NHTSA) rounds their injury and crash data to the nearest thousand before publishing them, but they calculate injury rates using the unrounded data. USDOT/NHTSA also calculates fatality and injury rates using vehicle-miles expressed to a higher level of precision than shown here. U.S. Department of Transportation, Bureau of Transportation Statistics, has rounded vehicle-miles to the nearest 100 million. The fatality rates, expressed to 2 significant digits, are not affected by rounding the vehicle-mass.

NOTES: The injury and crash data in this table are from USDOT/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 were 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. Earlier editions of National Transportation Statistics (NTS), particularly the 1993 Historical Compendium, 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.

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.

Crashes: ____. Fatality Analysis Reporting System and General Estimates System, personal communication, Feb. 2, 1999.

Table 3-21 Truck Occupant Safety Data

	1975	1980	1985	1990	1995	1996	1997	1998
Fatalities								
Light truck	4,856	7,486	6,689	8,601	9,568	R9,932	R10,249	10,647
Large truck	961	1,262	977	705	648	621	R723	728
Total	**5,817**	**8,748**	**7,666**	**9,306**	**10,216**	**R10,553**	**R10,972**	**11,375**
Injuries								
Light truck	N	N	N	505,000	722,000	R761,000	R755,000	763,000
Large truck	N	N	N	42,000	30,000	33,000	31,000	29,000
Total	**N**	**N**	**N**	**547,000**	**752,000**	**R794,000**	**R786,000**	**792,000**
Crashes								
Light truck	N	N	N	2,152,000	2,709,000	R2,881,000	R2,901,000	U
Large truck	N	N	N	372,000	362,000	R378,000	R421,000	U
Total	**N**	**N**	**N**	**2,524,000**	**3,071,000**	**R3,175,000**	**R3,225,000**	**U**
Vehicle-miles (billions)								
Light truck	204	295	R389	R556	750	R787	824	U
Large truck	81	108	R124	R146	178	183	191	U
Rates per 100 million vehicle-miles								
Fatalities								
Light truck	2.4	2.5	1.7	R1.5	1.3	1.3	1.2	U
Large truck	1.2	1.2	0.8	0.5	0.4	0.3	0.4	U
Injuries								
Light truck	N	N	N	91	96	98	93	U
Large truck	N	N	N	R29	17	18	16	U
Crashes								
Light truck	N	N	N	R387	361	R366	R352	U
Large truck	N	N	N	R255	203	207	R220	U

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

Continued next page

Table 3-21 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. Earlier editions of *National Transportation Statistics* (NTS), particularly the 1993 *Historical Compendium*, 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.

U.S. Department of Transportation, Bureau of Transportation Statistics has rounded vehicle-miles to the nearest billion.

Vehicle-miles in this table and in table 3-19 are taken from the 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 tables 3-19 and this table should not be compared with the vehicle-miles table 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.

Crashes: ____. National Center for Statistics and Analysis, Fatality Analysis Reporting System Database and General Estimates System Database, 1998.

Crash rates: Calculated by the U.S. Department of Transportation, Bureau of Transportation Statistics.

Table 3-22 Bus Occupant Safety Data[a]

	1975	1980	1985	1990	1995	1996	1997	1998
Fatalities	**53**	**46**	**57**	**32**	**33**	**21**	**R18**	**36**
Injuries	**N**	**N**	**N**	**33,000**	**19,000**	**20,000**	**17,000**	**16,000**
Crashes	**N**	**N**	**N**	**60,000**	**58,000**	**57,000**	**53,000**	**U**
Vehicle-miles (billions)	**6.1**	**6.1**	**4.5**	**5.7**	**6.4**	**R6.6**	**6.8**	**U**
Rates per 100 million vehicle-miles								
Fatalities	0.9	0.8	1.3	0.6	0.5	0.3	R0.3	U
Injuries	N	N	N	R576	R298	R305	R247	U
Crashes	N	N	N	R1,048	R909	R869	775	U

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

[a] Bus includes school, transit, and intercity buses.

NOTES: The U.S. Department of Transportation, National Highway Traffic Safety Administration (U.S. DOT/NHTSA) rounds injury and crash data to the nearest thousand, but injury and crash rates are calculated using the unrounded data. USDOT/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. U.S. Department of Transportation, Bureau of Transportation Statistics has rounded vehicle-miles to the nearest 100 million.

SOURCES: Fatalities and injuries: 1975–98: U.S. Department of Transportation, National Highway Traffic Safety Administration, *Traffic Safety Facts 1998*, DOT HS 808 983 (Washington, DC: October 1999), table 4.

Crashes: 1990–98: _____. General Estimates System Database, personal communications.

Vehicle-miles: 1975–94: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1995* (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 3-23 Fatalities by Highest Blood Alcohol Concentration (BAC) in Highway Crashes

	1985	1990	1991	1992	1993	1994	1995[R]	1996[R]	1997	1998
Total fatalities	**43,825**	**44,599**	**41,508**	**39,250**	**40,150**	**40,716**	**41,817**	**42,065**	**[R]42,013**	**41,471**
Fatalities in alcohol-related crashes	**22,716**	**22,084**	**19,887**	**17,858**	**17,473**	**16,580**	**17,247**	**17,218**	**16,189**	**15,935**
Percent	51.8%	49.5%	47.9%	45.5%	43.5%	40.7%	41.2%	40.9%	[R]38.5%	38.4%
BAC = 0.00										
Number	21,109	22,515	21,621	21,392	22,677	24,136	24,570	24,847	[R]25,824	25,536
Percent	48.2%	50.5%	52.1%	54.5%	56.5%	59.3%	58.8%	59.1%	[R]61.5%	61.6%
BAC = 0.01–0.09										
Number	4,604	4,434	3,957	3,625	3,496	3,480	3,746	3,774	[R]3,480	3,479
Percent	10.5%	9.9%	9.5%	9.2%	8.7%	8.5%	9.0%	9.0%	8.3%	8.4%
BAC = 0.10+										
Number	18,111	17,650	15,930	14,234	13,977	13,100	13,501	13,444	[R]12,710	12,456
Percent	41.3%	39.6	38.4%	36.3%	34.8%	32.2%	32.3%	32.0%	30.3%	30.0%

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. 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.

Table 3-24 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
BAC = 0.08 per se laws[a]	2	4	5	10	13	13	15
BAC level 0.02 or less for persons younger than 21 years	0	0	3	12	[b]28	[b]38	[b]51
Administrative license revocation for DUI/DWI offenders	[b,R]21	[b]27	[b]30	[b]33	[b]38	[b,R]40	[b]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] Includes the District of Columbia.

NOTE: National Uniform Minimum Drinking Age Act, which standardized the minimum drinking age at 21, was enacted in 1984.

SOURCE: 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.

Table 3-25 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
Fatal crashes	**39,836**	**36,937**	**34,942**	**35,780**	**36,254**	**37,241**	**[R]37,494**	**[R]37,324**	**37,081**
Day of week									
Sunday	16.1	16.2	15.9	15.8	15.9	15.7	15.2	15.8	15.5
Monday	11.7	11.5	11.6	12.1	12.4	12.4	12.7	12.1	12.4
Tuesday	11.5	11.5	11.5	11.8	11.7	11.8	12.4	[R]11.9	12.4
Wednesday	11.5	11.9	12.3	12.0	12.3	11.9	12.2	13.0	12.4
Thursday	12.5	12.5	13.2	13.0	12.7	13.0	13.3	13.0	13.4
Friday	16.6	16.5	16.1	16.3	16.3	16.6	16.1	16.1	15.8
Saturday	19.9	19.9	19.3	19.0	[R]18.6	18.5	18.1	18.0	18.0
Unknown	0.02	0.03	0.01	0.02	[R]0.04	0.03	0.04	0.05	0.04
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
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
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
9 a.m. to noon	8.4	8.6	8.8	9.7	9.6	9.4	9.7	9.9	10.2
Noon to 3 p.m.	11.5	0.0	12.4	12.5	13.1	12.9	12.7	13.3	13.4
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
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
9 p.m. to midnight	15.9	15.8	15.3	14.7	14.3	14.6	14.6	14.1	13.8
Unknown	0.8	0.8	0.8	0.8	0.8	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	87.1
Rain	9.3	9.0	10.0	8.7	8.3	8.5	8.4	[R]8.8	8.8
Snow/sleet	1.6	1.9	2.0	2.2	1.8	2.4	2.7	2.5	1.6
Other/unknown	2.3	2.4	2.3	[R]2.1	[R]2.5	2.6	2.6	[R]2.3	2.5
Light condition									
Daylight	45.0	45.4	46.0	47.7	[R]49.5	[R]48.7	49.3	[R]50.3	50.4
Dark, but lighted	17.7	17.4	17.4	16.4	15.6	15.8	15.9	[R]15.6	14.8
Dark	32.7	33.0	32.4	31.5	[R]30.3	[R]30.3	30.3	[R]29.5	30.0
Dawn or dusk	4.2	3.9	3.9	4.2	4.2	[R]4.2	[R]4.2	4.2	4.3
Unknown	0.3	0.3	0.3	0.2	[R]0.2	[R]0.4	0.3	1.0	0.5

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.

Table 3-26 Motor Vehicle Fatal Crashes by Posted Speed Limit

	1975	1980	1985	1990	1995R	1996R	1997
Under 55 mph							
0-25 mph	2,617	2,865	2,504	2,234	1,893	1,896	R1,955
26-35 mph	6,099	8,527	7,889	7,756	6,681	6,445	R6,383
36-45 mph	4,276	6,256	6,813	7,092	6,938	7,096	R7,132
46-54 mph	2,241	2,431	2,072	2,054	1,927	1,908	R1,788
Total	**15,233**	**20,079**	**19,278**	**19,136**	**17,439**	**17,345**	**R17,258**
55 mph and above							
55 mph	16,094	20,352	18,862	17,556	16,753	14,097	R12,897
60 mph	N	N	N	18	16	523	R935
65 mph	N	N	N	2,175	2,323	3,214	R3,311
70 mph	N	N	N	0	38	1,282	1,633
Over 70 mph	N	N	N	0	10	344	475
Total	**16,094**	**20,352**	**18,862**	**19,749**	**19,140**	**19,460**	**R19,251**
Unknown, total	**7,834**	**4,853**	**1,055**	**951**	**662**	**689**	**R815**
TOTAL fatal crashes	**39,161**	**45,284**	**39,195**	**39,836**	**37,241**	**37,494**	**R37,324**

KEY: N = data are nonexistent; R = revised

NOTES: Congressional legislation implemented the national maximum 55 miles per hour (mph) speed limit in 1974. Amendments in 1987 and 1991 allowed states to increase speed limits to 65 mph on rural Interstates and similar highways. With the repeal of the National Maximum Speed Limit in late 1995, complete control of speed limits was returned to the states, some of which raised their maximum limits to 70 mph or above. Also see table 3-27.

SOURCE: 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.

Section D
Transit

Table 3-27 Transit Safety and Property Damage Data

	1990	1991	1992	1993	1994	1995	1996	1997
Fatalities[a]	**339**	**300**	**273**	**281**	**320**	**274**	**264**	**275**
Injuries[a]	**54,556**	**52,125**	**55,089**	**52,668**	**58,193**	**R57,196**	**55,288**	**56,132**
Accidents[b]	**R58,002**	**R46,467**	**36,380**	**30,559**	**29,972**	**25,683**	**25,166**	**24,924**
Incidents[a,b] (includes accidents)	**90,163**	**83,139**	**73,831**	**64,986**	**70,693**	**R62,471**	**59,392**	**61,560**
Vehicle-miles (millions)[R]	**2,490**	**2,478**	**2,510**	**2,535**	**2,581**	**2,620**	**2,605**	**2,702**
Rates per 100 million vehicle-miles[c,R]								
Fatalities (all reportable incidents)	13.6	12.1	10.9	11.1	12.4	10.5	10.1	10.2
Injuries (all reportable incidents)	2,191	2,104	2,195	2,078	2,255	2,180	2,122	2,077
Accidents	2,329	1,875	1,449	1,205	1,161	980	966	922
Property damage[d] (current $ millions)	**38.0**	**37.5**	**37.5**	**44.9**	**38.4**	**46.3**	**R57.6**	**55.5**

KEY: R = revised

[a] Totals do not include data for cable car, inclined plane, jitney, and ferry boat. This data appears in the footnotes for table 3-29.

[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.

[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, 994–$300,000, 1995–$3,300,000, 1996–$200,000, 1997–$700,000.

NOTE: 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 in the vehicle-miles table 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) 1997 Annual Report* (Cambridge, MA: March 1999), p. 21.

Table 3-28 Transit Safety Data by Mode[a] for All Reported Accidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997
Fatalities from accidents								
Motor bus[c]	92	80	91	79	90	69	82	100
Light rail	5	11	6	14	10	10	5	3
Heavy rail	51	59	33	37	41	43	32	28
Commuter rail	63	63	43	59	82	56	30	52
Demand responsive	0	2	0	2	2	1	3	2
Van pool	0	0	0	0	0	0	0	0
Automated guideway	1	0	0	0	0	0	0	0
Total	**212**	**215**	**173**	**191**	**225**	**179**	**152**	**185**
Injuries from accidents								
Motor bus[c]	18,876	19,016	20,556	20,862	19,663	20,879	21,222	20,145
Light rail	465	474	468	361	327	355	680	320
Heavy rail	296	308	273	365	309	348	431	336
Commuter rail	84	560	110	210	216	159	213	99
Demand responsive	286	200	233	224	399	395	379	499
Van pool	16	36	13	58	24	23	25	52
Automated guideway	0	0	0	1	1	0	0	1
Total	**20,023**	**20,594**	**21,653**	**22,081**	**20,939**	**22,159**	**22,950**	**21,452**
Accidents								
Motor bus[c]	R55,289	44,467	34,282	28,596	27,754	23,819	23,425	22,995
Light rail	699	671	600	449	512	309	341	363
Heavy rail	144	188	613	662	744	637	346	325
Commuter rail	R175	248	181	208	266	216	201	192
Demand responsive	R1,613	814	668	524	659	647	774	886
Van pool	81	79	35	119	36	54	78	160
Automated guideway	1	1	1	1	1	1	1	3
Total	**58,002**	**46,468**	**36,380**	**30,559**	**29,972**	**25,683**	**25,166**	**24,924**
Vehicle miles (millions)								
Motor bus[c]	1,668	1,661	1,688	1,690	1,702	1,702	R1,687	1,719
Light rail	24	27	28	27	34	34	37	41
Heavy rail	529	522	520	518	522	537	543	558
Commuter rail	187	188	188	206	210	217	203	216
Demand responsive	74	71	72	77	94	109	108	134
Van pool	8	8	13	16	18	19	25	33
Automated guideway	0.6	0.5	1.0	1.0	1.2	1.1	R1.4	1.4
Total	**2,490**	**2,478**	**2,510**	**2,535**	**2,581**	**2,620**	**R2,605**	**2,702**

KEY: R = revised

Continued next page

Table 3-28 Cont'd
Transit Safety Data by Mode[a] for All Reported Accidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997
Rates per 100 million vehicle-miles								
Fatalities from accidents								
Motor bus[c]	5.5	4.8	5.4	4.7	5.3	4.1	4.9	5.8
Light rail	20.8	40.3	21.2	51.1	29.6	29.0	13.5	7.3
Heavy rail	9.6	11.3	6.3	7.1	7.9	8.0	5.9	5.0
Commuter rail	33.6	33.5	22.9	28.6	39.0	25.8	14.8	24.1
Demand responsive	0	2.8	0	2.6	2.1	0.9	2.8	1.5
Van pool	0	0	0	0	0	0	0	0
Automated guideway	162.1	0	0	0	0	0	0	0
All modes	**8.5**	**8.7**	**6.9**	**7.5**	**8.7**	**6.8**	**5.8**	**6.8**
Injuries from accidents								
Motor bus[c]	1,132	1,145	1,218	1,234	1,155	1,227	1,258	1,172
Light rail	1,933	1,735	1,654	1,318	968	1,030	1,838	780
Heavy rail	56	59	52	71	59	65	79	60
Commuter rail	45	297	59	102	103	73	105	46
Demand responsive	386	282	324	292	425	361	351	372
Van pool	208	430	103	363	132	123	100	158
Automated guideway	0	0	0	104	85	0	0	71
All modes	**804**	**831**	**863**	**871**	**811**	**846**	**882**	**794**
Accidents								
Motor bus[c]	3,315	2,678	2,031	1,692	1,631	1,400	1,389	1,338
Light rail	2,906	2,456	2,121	1,639	1,516	897	922	885
Heavy rail	27	36	118	128	142	119	64	58
Commuter rail	93	132	96	101	127	100	99	89
Demand responsive	2,177	1,147	928	682	702	591	717	661
Van pool	1,052	944	278	744	198	289	312	485
Automated guideway	162	204	102	104	85	87	71	214
All modes	**2,329**	**1,875**	**1,449**	**1,205**	**1,161**	**980**	**967**	**922**

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
Fatalities:	2	1	0	1	0	0	1	0
Injuries:	378	327	399	383	616	598	354	357
Incidents:	186	411	400	411	650	536	301	353

b Accidents include collisions with vehicles, objects, people (except suicides), and derailments/vehicles going off road.

c Motor bus also includes trolley bus.

NOTE: 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 1997 Annual Report* (Cambridge, MA: March 1999).

Table 3-29 Transit Safety Data by Mode[a] for All Reported Incidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997
Fatalities from all incidents								
Motor bus[c]	110	88	99	83	108	82	101	109
Light rail	7	13	9	15	13	15	6	3
Heavy rail	117	103	91	83	85	79	74	77
Commuter rail	104	93	74	98	112	92	72	79
Demand responsive	0	3	0	2	2	6	11	7
Van pool	0	0	0	0	0	0	0	0
Automated guideway	1	0	0	0	0	0	0	0
Total	**339**	**300**	**273**	**281**	**320**	**274**	**264**	**275**
Injuries from all incidents								
Motor bus[c]	40,006	38,619	40,090	38,873	42,195	41,297	39,709	39,181
Light rail	1,244	1,251	1,268	982	1,181	1,319	1,604	1,087
Heavy rail	10,036	9,285	10,446	10,532	11,673	11,238	11,093	12,285
Commuter rail	2,438	2,308	2,546	1,560	2,374	2,374	1,953	2,388
Demand responsive	807	622	713	652	731	935	882	1,121
Van pool	21	40	19	59	29	25	27	54
Automated guideway	4	0	7	10	10	8	20	16
Total	**54,556**	**52,125**	**55,089**	**52,668**	**58,193**	**57,196**	**55,288**	**56,132**
All incidents								
Motor bus[c]	70,437	63,453	52,482	45,580	49,185	42,780	40,456	40,524
Light rail	1,465	1,543	1,492	1,136	1,413	1,276	1,350	1,173
Heavy rail	12,178	14,102	15,512	15,082	15,869	14,327	13,748	15,151
Commuter rail	3,031	2,716	3,160	2,111	3,115	2,847	2,449	3,078
Demand responsive	2,965	1,241	1,137	946	1,062	1,173	1,284	1,454
Van pool	84	83	40	121	39	58	80	162
Automated guideway	3	1	8	10	10	10	25	19
Total	**90,163**	**83,139**	**73,831**	**64,986**	**70,693**	**62,471**	**59,392**	**61,561**
Passengers served (millions)								
Motor bus[c]	5,000	4,780	4,728	4,585	4,567	4,539	4,464	4,554
Light rail	174	184	187	187	274	249	259	259
Heavy rail	2,252	2,123	2,119	1,960	2,149	2,034	2,157	2,430
Commuter rail	286	274	262	303	318	322	302	311
Demand responsive	14	13	13	15	17	18	17	48
Van pool	2	2	3	4	5	5	6	8
Automated guideway	6	4	6	5	6	6	6	6
Total	**7,646**	**7,380**	**7,318**	**7,059**	**7,335**	**7,172**	**7,211**	**7,616**

Continued next page

Table 3-29 Cont'd Transit Safety Data by Mode[a] for All Reported Incidents[b]

	1990	1991	1992	1993	1994	1995	1996	1997
Rates per 100 million passengers								
Fatalities from all incidents								
Motor bus[c]	2.2	1.8	2.1	1.8	2.4	1.8	2.3	2.4
Light rail	4.0	7.1	4.8	8.0	4.7	6.0	2.3	1.2
Heavy rail	5.2	4.9	4.3	4.2	4.0	3.9	3.4	3.2
Commuter rail	36.4	33.9	28.2	32.3	35.2	28.6	23.8	25.4
Demand responsive	0	23.1	0	13.3	11.8	33.3	64.7	14.6
Van pool	0	0	0	0	0	0	0	0
Automated guideway	16.7	0	0	0	0	0	0	0
All modes	**4.4**	**4.1**	**3.7**	**4.0**	**4.4**	**3.8**	**3.7**	**3.6**
Injuries from all incidents								
Motor bus[c]	800	808	848	848	924	910	890	860
Light rail	715	680	678	525	431	530	619	420
Heavy rail	446	437	493	537	543	553	514	506
Commuter rail	852	842	972	515	747	737	647	768
Demand responsive	5,764	4,785	5,485	4,347	4,300	5,194	5,188	2,242
Van pool	1,050	2,000	633	1,475	580	500	450	675
Automated guideway	67	0	117	200	167	133	333	267
All modes	**714**	**706**	**753**	**746**	**793**	**797**	**767**	**736**
All incidents								
Motor bus[c]	1,409	1,327	1,110	994	1,077	942	906	890
Light rail	842	839	798	607	516	512	521	453
Heavy rail	541	664	732	769	738	704	637	623
Commuter rail	1,060	991	1,206	697	980	884	811	990
Demand responsive	21,179	9,546	8,746	6,307	6,247	6,517	7,553	3,029
Van pool	4,200	4,150	1,333	3,025	780	1,160	1,333	2,025
Automated guideway	50	25	133	200	167	167	417	317
All modes	**1,179**	**1,127**	**1,009**	**921**	**964**	**871**	**824**	**808**

[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
Fatalities:	2	1	0	1	0	0	1	0
Injuries:	378	327	399	383	616	598	354	357
Incidents:	186	411	400	411	650	536	301	353

[b] Incidents include accidents (collisions with vehicles, objects, people (except suicide), 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.

NOTE: 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 1997 Annual Report* (Washington, DC: March 1999).

Section E
Railroad

Table 3-30 Railroad and Grade-Crossing Fatalities by Victim Class

	1980	1985	1990	1995	1996	1997	1998
Passengers on trains	**4**	**3**	**3**	**0**	**12**	**6**	**4**
Railroad only	4	3	3	0	12	6	2
Grade crossing only	0	0	0	0	0	0	2
Employees on duty	**97**	**46**	**40**	**34**	**33**	**37**	**27**
Railroad only	97	44	35	32	32	37	23
Grade crossing only	0	2	5	2	1	0	4
Employees not on duty	**4**	**2**	**0**	**2**	**0**	**0**	**2**
Railroad only	3	2	0	2	0	0	2
Grade crossing only	1	0	0	0	0	0	0
Contractor employees	**a**	**a**	**a**	**7**	**9**	**11**	**5**
Railroad only	a	a	a	7	9	11	5
Grade crossing only	a	a	a	0	0	0	0
Nontrespassers[b]	**746**	**511**	**554**	**443**	**365**	**363**	**326**
Railroad only	81	14	18	32	27	15	9
Grade crossing only	665	497	536	411	338	348	317
Trespassers	**566**	**474**	**700**	**660**	**620**	**646**	**644**
Railroad only	460	391	543	494	471	533	536
Grade crossing only	106	83	157	166	149	113	108
Volunteer employees	**N**	**N**	**N**	**N**	**N**	**0**	**0**
Railroad only	N	N	N	N	N	0	0
Grade crossing only	N	N	N	N	N	0	0
Railroad only	645	454	599	567	551	602	577
Grade crossing only	772	582	698	579	488	461	431
Motor vehicles	(N)	(521)	(614)	(508)	(415)	(419)	(U)
Nonmotor vehicles	(N)	(61)	(84)	(71)	(73)	(42)	(U)
Total	**1,417**	**1,036**	**1,297**	**1,146**	**1,039**	**1,063**	**1,008**

KEY: N = data are nonexistent; U = data are unavailable

[a] Prior to 1992, contractor employees were included with nontrespassers. They include 7 in 1980, 4 in 1985, 3 in 1990, and 3 in 1991.

[b] Beginning in 1997, nontresspassers off railroad property are also included.

NOTES: "Railroad only" includes fatalities from train accidents, train incidents, and nontrain incidents. This table includes information for both freight and passenger railroad operations.

SOURCES: 1980–94: 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).

1995–98: _____. Office of Safety, Internet site http://safetydata.fra.dot.gov/Officeofsafety/Prelim/1998/r03.htm as of July 23, 1999.

Table 3-31 Railroad and Grade-Crossing Injuries by Victim Class

	1980	1985	1990	1995	1996	1997	1998
Passengers on trains	**593**	**657**	**473**	**573**	**513**	**601**	**535**
Railroad only	569	646	462	543	489	558	516
Grade crossing only	24	11	11	30	24	43	19
Employees on duty	**56,331**	**29,822**	**20,970**	**10,777**	**9,199**	**8,295**	**8,398**
Railroad only	56,201	29,667	20,801	10,654	9,120	8,184	8,276
Grade crossing only	130	155	169	123	79	111	122
Employees not on duty	**671**	**419**	**326**	**252**	**228**	**263**	**219**
Railroad only	671	418	324	248	226	260	216
Grade crossing only	0	1	2	4	2	3	3
Contractor employees	**b**	**b**	**b**	**269**	**208**	**334**	**380**
Railroad only	b	b	b	268	208	333	379
Grade crossing only	b	b	b	1	0	1	1
Nontrespassers[a]	**3,923**	**2,672**	**2,581**	**1,869**	**1,660**	**1,540**	**1,236**
Railroad only	775	394	589	372	431	370	243
Grade crossing only	3,148	2,278	1,992	1,497	1,229	1,170	993
Trespassers	**728**	**734**	**793**	**700**	**750**	**728**	**677**
Railroad only	480	492	560	461	474	516	513
Grade crossing only	248	242	233	239	276	212	164
Volunteer employees	**N**	**N**	**N**	**N**	**N**	**6**	**14**
Railroad only	N	N	N	N	N	6	13
Grade crossing only	N	N	N	N	N	0	1
Railroad only	58,696	31,617	22,736	12,546	10,948	10,227	10,156
Grade crossing only	3,550	2,687	2,407	1,894	1,610	1,540	1,303
Motor vehicles	(N)	(2,561)	(2,332)	(1,825)	(1,545)	(1,494)	(U)
Nonmotor vehicles	(N)	(126)	(75)	(69)	(65)	(46)	(U)
Total	**62,246**	**34,304**	**25,143**	**14,440**	**12,558**	**11,767**	**11,459**

KEY: N = data are nonexistent; U = data are unavailable

[a] Beginning in 1997, nontresspassers off railroad property are also included.

[b] Prior to 1992, 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. 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).

1995–98: _____. Office of Safety, Internet site http://safetydata.fra.dot.gov/Officeofsafety/Prelim/1998/r03.htm, as of July 23, 1999.

Table 3-32 Train Fatalities, Injuries, and Accidents by Type of Accident

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fatalities											
Derailments	8	2	2	10	2	53	2	2	6	2	U
Collisions	20	6	8	5	1	14	8	7	16	9	U
Other	1	0	0	4	3	0	2	5	3	6	U
Total	**29**	**8**	**10**	**19**	**6**	**67**	**12**	**14**	**25**	**17**	**4**
Injuries											
Derailments	286	197	272	174	71	179	120	90	98	111	U
Collisions	341	223	139	103	59	87	118	151	146	51	U
Other	38	56	40	49	41	42	24	53	37	21	U
Total	**665**	**476**	**451**	**326**	**171**	**308**	**262**	**294**	**281**	**183**	**129**
Accidents											
Derailments	6,442	2,495	2,146	1,936	1,734	1,930	1,825	1,742	1,816	1,741	1,757
Collisions	1,201	366	315	261	207	205	240	235	205	202	168
Other	562	414	418	461	418	476	439	482	422	454	650
Total	**8,205**	**3,275**	**2,879**	**2,658**	**2,359**	**2,611**	**2,504**	**2,459**	**2,443**	**2,397**	**2,575**

KEY: U = data are unavailable

NOTE: Train accidents only. This table includes information for both freight and passenger railroad operations, but excludes all highway-rail grade-crossing accidents.

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: ____. *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1, 1-3, 5-6.

1998: ____. Internet site http://safetydata.fra.dot.gov/OfficeofSafety/Prelim/1998/r01.htm, as of July 29, 1999.

Table 3-33 Railroad Passenger Safety Data

	1990	1991	1992	1993	1994	1995	1996	1997
Passenger fatalities	**3**	**8**	**3**	**58**	**5**	**0**	**12**	**6**
Passenger injuries	**473**	**382**	**411**	**559**	**497**	**573**	**513**	**601**
Passenger train-miles (millions)	**72**	**74**	**74**	**75**	**75**	**76**	**U**	**78**
Fatalities per 100 million passenger train-miles	4	11	4	77	7	0	U	8
Injuries per 100 million passenger train-miles	660	520	560	750	660	750	U	770

KEY: U = data are unavailable

NOTE: A train-mile is the movement of a train (which can consist of many railcars) the distance of 1 mile. A train-mile differs from a railcar-mile, which is the movement of 1 railcar the distance of 1 mile. A 10-railcar train traveling 1 mile would be measured as 1 train-mile and 10 railcar-miles. Caution should be used when comparing train-miles with railcar-miles. Passenger train-miles have been calculated by the U.S. Department of Transportation, Bureau of Transportation Statistics, by summing all commuter rail train-miles reported to the U.S. Department of Transportation, Federal Transit Administration, and adding the sum to Amtrak train-miles (see the vehicle-miles table in chapter 1).

SOURCES: 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: ____. *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), tables 1-1, 1-3, 5-6.

Table 3-34 Railroad System Safety and Property Damage Data (Excludes highway-rail grade-crossing accidents)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Fatalities	**785**	**575**	**584**	**454**	**599**	**567**	**551**	**602**	**577**
Injuries[a]	**[e]17,934**	**50,138**	**58,696**	**31,617**	**22,736**	**12,546**	**10,948**	**10,227**	**10,156**
Accidents[b]	**8,095**	**8,041**	**8,205**	**3,275**	**2,879**	**2,459**	**2,443**	**2,397**	**2,575**
Train-miles (millions)[c,d]	**839**	**755**	**718**	**571**	**609**	**670**	**671**	**677**	**683**
Rates per 100 million train-miles									
Fatalities	94	76	81	80	98	85	82	89	84
Injuries	N	6,640	8,180	5,540	3,740	1,870	1,630	1,511	1,487
Accidents	970	1,070	1,140	570	470	370	360	354	377
Property damage (current $ millions)	**121.6**	**177.4**	**267.4**	**179.3**	**198.7**	**189.2**	**212.3**	**210.4**	**U**

KEY: N = data are nonexistent; U = data are unavailable

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

[b] Train accidents only; excludes highway-rail grade-crossing accidents.

[c] 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 1996, Group II rail accounted for 68 million train-miles and other rail for 22 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 1996, Class I yard/switching train-miles totaled 75 million. (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.

[d] 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.

[e] Fatalities, injuries, and property damage resulting from train accidents, train incidents, and nontrain incidents; see **table 3-5** for highway-rail grade-crossing data; excludes highway-rail grade-crossing accidents.

NOTES: This table includes information for both freight and passenger railroad operations.

SOURCES: Fatalities, injuries, 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: ____. *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998.)

1998: ____. Internet site http://safetydata.dra.dot.gov/OfficeofSafety/Prelim/1998/r03.htm, as of Aug. 2, 1999.

Train miles: 1970–90: U.S. Department of Transportation, Federal Transit Administration, *National Transit Database* (Washington, DC: Annual issues), form 406.

1990–98: U.S. Department of Transportation, Federal Railroad Administration, Internet site http://safetydata.dra.dot.gov/OfficeofSafety/ Prelim/1998/r02.htm, as of May 4, 1999.

Table 3-35 Fatalities and Injuries of On-Duty Railroad Employees

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Employee fatalities									
Accidents/incidents, total	**40**	**35**	**34**	**47**	**31**	**34**	**33**	**37**	**27**
Grade-crossing accidents and incidents	5	1	2	3	1	2	1	0	4
Train accidents and incidents only (grade-crossing excluded)	20	22	23	32	25	27	24	U	U
Employee hours (millions)	**N**	**530.7**	**517.0**	**519.7**	**518.6**	**510.3**	**504.6**	**504.0**	**514.9**
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
Grade-crossing accidents and incidents	N	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.00	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
Train-miles (millions)[a]	**609**	**577**	**594**	**614**	**655**	**670**	**671**	**677**	**683**
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
Grade-crossing accidents and incidents	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.00	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
Employee injuries									
Accidents/incidents, total	**20,970**	**19,626**	**17,755**	**15,363**	**13,080**	**10,777**	**9,199**	**8,295**	**8,398**
Grade-crossing accidents and incidents	169	147	157	143	126	123	79	111	122
Train accidents and incidents only (grade-crossing excluded)	3,282	3,003	2,274	1,832	1,703	1,500	1,303	U	U

KEY: N = data are nonexistent; U = data are unavailable

Continued next page

Table 3-35 Cont'd Fatalities and Injuries of On-Duty Railroad Employees

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Employee hours (millions)	**N**	**530.7**	**517.0**	**519.7**	**518.6**	**510.3**	**504.6**	**504.0**	**514.9**
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
Grade-crossing accidents and incidents	N	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
Train accidents and incidents only (grade-crossing excluded)	N	5.7	4.4	3.5	3.3	2.9	2.6	U	U
Train-miles (millions)[a]	**609**	**577**	**594**	**614**	**655**	**670**	**671**	**677**	**683**
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
Grade-crossing accidents and incidents	0.3	0.3	0.3	0.2	0.2	0.2	0.1	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

KEY: N = data are nonexistent; U = data are unavailable

[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 1996, Group II rail accounted for 68 million train-miles, and other rail for 22 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 1996, Class I yard/switching train miles totaled 75 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.

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: ____. *Railroad Safety Statistics Annual Report 1997* (Washington, DC: September 1998), table 1-1, 1-3.

1998: ____. Internet site http://safetydata.fra.dot.gov/OfficeofSafety/Prelim/1998/r01.htm and r03.htm, as of July 29, 1999.

Section F
Water

Table 3-36 Waterborne Transportion Safety and Property Damage Data Related to Vessel Casualties

	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
Fatalities[a]	178	243	206	131	85	46	50	46	31
Injuries	105	97	180	172	175	145	129	109	83
Accidents[b]	2,582	3,310	4,624	3,439	3,613	4,196	3,799	3,704	2,837
Vessels[c]	4,063	5,685	7,694	5,694	5,494	6,849	6,075	5,819	4,192
Property damage (current $ millions)	U	U	U	U	U	127.2	111.8	128.5	88.4

KEY: P = preliminary; U = data are unavailable

[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 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). 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 3-37 Waterborne Transportation Safety Data not Related to Vessel Casualties

	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
Fatalities[a]	420	330	281	130	101	137	111	108	76
Injuries	U	U	U	U	U	1,916	1,298	947	357
Vessels[b]	U	321	274	128	98	131	[R]1,409	1,023	415

KEY: P = preliminary; R = revised; U = data are unavailable

[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 in 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 3-38 Recreational Boating Safety, Alcohol Involvement, and Property Damage Data

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Fatalities	R739	1,360	1,418	1,466	1,360	1,116	865	829	709	R821	813
Injuries	929	927	780	2,136	2,650	2,757	3,822	4,141	4,442	4,555	4,613
Accidents	2,738	3,752	3,803	6,308	5,513	6,237	6,411	8,019	8,026	8,044	8,175
Vessels involved	3,785	4,792	4,762	8,002	6,954	8,305	8,591	11,534	11,306	11,396	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	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	U
Injuries	37.1	14.5	10.5	29.3	30.8	28.7	34.7	35.4	37.3	37.0	U
Accidents	110	59	51	86	64	65	58	69	67	65	U
Accident reports with alcohol involvement	N	N	N	N	N	279	568	472	601	697	U
Property damage (current $ millions)	3.2	4.7	8.2	10.4	16.4	20.0	23.8	21.5	22.8	29.0	U

[a] In 1994, the U.S. Coast Guard changed their methodology for calculating the number of recreational boats; from 1975 to present, the figures cited represent the number of numbered boats, not an estimate, as previously reported. Accident, fatality, and injury rates have been recalculated accordingly.

[b] Includes $11 million damage due to a boat fire.

KEY: N = data are nonexistent; R = revised; U = data were unavailable at time of publication

NOTE: Only a small fraction of property damage 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 3-39 Personal Watercraft Safety Data

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total 1987–97
Fatalities	5	20	20	28	26	34	35	56	68	57	84	433
Injuries	156	254	402	532	708	730	915	1,338	1,617	1,837	1,812	10,301
Accidents	376	650	844	1,162	1,513	1,650	2,236	3,002	3,986	4,099	4,070	23,588
Sales[a]	29,000	48,000	64,000	72,000	68,000	79,000	107,000	142,000	200,000	191,000	176,000	1,176,000
Use[b]	92,756	126,881	178,510	241,376	305,915	372,283	454,545	600,000	760,000	900,000	1,000,000	5,032,266

[a] Estimates from the National Marine Manufacturers Association.

[b] Estimates from the Personal Watercraft Industry Association.

NOTE: Personal watercraft are 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 the hull.

SOURCE: U.S. Department of Transportation, United States Coast Guard, Office of Boating Safety, Boating Accident Report Database, 1998.

Table 3-40 U.S. Coast Guard Search and Rescue Statistics, Fiscal Year

	1985	1990	[c]1991	1992	1993	1994	1995	1996	1997
Cases	60,775	52,899	52,411	52,645	52,455	53,266	49,136	42,956	40,639
Responses	70,237	[R]64,072	67,816	69,856	69,784	70,328	63,672	55,710	52,141
Sorties	88,449	84,033	84,872	88,388	88,147	[R]70,334	63,680	98,423	91,722
Time on sortie (hours)	249,018	[R]282,988	286,745	309,805	309,014	325,590	340,804	430,052	402,541
Lives saved	6,497	4,378	4,371	5,547	4,689	[d]23,068	4,411	4,992	3,836
Lives lost before notification[a]	259	612	742	544	796	579	457	593	444
Lives lost after notification[b]	1,076	459	349	406	414	336	299	358	287
Total lives lost	**1,335**	**1,071**	**1,091**	**950**	**1,210**	**915**	**756**	**951**	**731**
Persons otherwise assisted	138,791	116,998	113,335	131,537	118,190	115,622	100,425	84,248	74,740
Value of property lost ($ million)	424.3	366.9	210.9	316.8	316.3	390.7	222.1	274.5	414.3
Value of property assisted ($ millions)	2,376.8	2,014.1	2,253.7	1,945.8	2,482.2	2,828.9	4,397.3	3,487.7	1,755.9
Property loss prevented ($ million)	905.4	790.4	646.3	538.7	908.8	1,452.4	[R]2,448.6	2,213.8	877.5

KEY: R = revised

[a] Those persons whose lives were lost before the Coast Guard was notified of an incident.

[b] Those persons whose lives were lost in an incident to which the Coast Guard was responding, but who were alive at the time the Coast Guard was notified of the incident.

[c] Calculations are lower in fiscal year 1991 due to incomplete data submissions by two districts.

[d] The Search and Rescue Management Information Systems 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 FY 1994 was determined to be 15,179.

NOTE: Responses are the number of U.S. Coast Guard units involved. Sorties are the number of trips made by boat, aircraft, or cutter.

SOURCES: U.S. Department of Transportation, U.S. Coast Guard, Search and Rescue Management Information Systems Database, 1998.

Section G
Pipeline

Table 3-41 Hazardous Liquid and Natural Gas Pipeline Safety and Property Damage Data

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Fatalities									
Total liquid	4	7	4	5	3	3	5	0	1
Total gas	26	8	15	28	6	R18	R48	10	17
Transmission	U	U	1	6	0	2	1	1	1
Distribution	U	U	14	22	6	16	R47	R9	16
Injuries									
Total liquid	21	17	15	18	7	11	13	5	2
Total gas	233	214	177	108	R69	R53	R114	R72	73
Transmission	U	U	13	12	17	10	5	5	11
Distribution	U	U	164	96	52	43	R109	R67	62
Incidents									
Total liquid	351	254	246	183	180	188	195	R175	154
Total gas	1,077	1,338	1,524	334	R198	R161	R187	R175	232
Transmission	U	U	389	129	89	64	R77	R73	98
Distribution	U	U	1,135	205	109	97	R110	R102	134
Property damage (current $ millions)									
Total liquid	1.2	2.2	5.7	5.1	15.7	32.5	49.7	36.6	57.2
Total gas	3.3	5.0	R10.0	22.9	R18.9	R21.0	R29.4	24.6	47.8
Transmission	U	U	8.8	13.4	11.3	10.0	R13.1	12.1	29.7
Distribution	U	U	1.2	9.5	7.6	11.0	R16.3	12.5	18.1

KEY: P = preliminary; R = revised; U = data are unavailable

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. See also table 4-47 for data on oil spills.

SOURCE: U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, personal communication, 1999; also available at http://ops.dot.gov as of Sept. 28, 1999.

Section H
Accuracy Profiles

AIR DATA

TABLE 3-1: Transportation Fatalities by Mode

TABLE 3-2: Transportation Injuries by Mode

TABLE 3-3: Transportation Accidents by Mode

TABLE 3-4: Distribution of Transportation Fatalities by Mode

TABLE 3-7: Transportation-Related Occupational Fatalities

TABLE 3-9: U.S. Air Carrier Safety Data

TABLE 3-10: U.S. Commuter Air Carrier Safety Data

TABLE 3-11: U.S. Air Carrier Fatal Accidents by First Phase of Operation

TABLE 3-12: U.S. Commuter Air Carrier Fatal Accidents by First Phase of Operation

TABLE 3-13: U.S. On-Demand Air Taxi Safety Data

TABLE 3-14: U.S. General Aviation Safety Data

National Transportation Safety Board investigators perform onsite and offsite investigation 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 (GAATA) 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 GAATA Survey results. For information about the GAATA Survey, please refer to chapter 1, accuracy profile for table 1-9.

TABLE 3-15: Number of Pilot-Reported Near Midair Collisions by Degree of Hazard

Data are provided voluntarily by air carriers, general aviation companies, and the military who fill out Near Midair Collision reports, which are 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 3-16: 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 3-1: Transportation Fatalities by Mode

TABLE 3-2: Transportation Injuries by Mode

TABLE 3-3: Transportation Accidents by Mode

TABLE 3-4: Distribution of Transportation Fatalities by Mode

TABLE 3-5: Highway-Rail Grade-Crossing Safety and Property Damage Data

TABLE 3-7: Transportation-Related Occupational Fatalities

TABLE 3-17: Motor Vehicle Safety Data

TABLE 3-18: Occupant Fatalities by Vehicle Type and Nonoccupant Fatalities

TABLE 3-19: Passenger Car Occupant Safety Data

TABLE 3-20: Motorcycle Rider Safety Data

TABLE 3-21: Truck Occupant Safety Data

TABLE 3-22: Bus Occupant Safety Data

TABLE 3-23: Fatalities by Highest Blood Alcohol Concentration in Highway Crashes

TABLE 3-24: Number of States with Different Types of Anti-DUI/DWI Legislation in Effect as of January 1 of the Listed Year

TABLE 3-25: Motor Vehicle Fatal Crashes by Day of Week, Time of Day, and Weather and Light Conditions

TABLE 3-26: Motor Vehicle Fatal Crashes by Posted Speed Limit

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 accidents involving at least one motor vehicle traveling on a trafficway that was contributory to an injury or fatality or resulted in property damage. 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.

Various sources suggest 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.)

TRANSIT DATA

TABLE 3-1: Transportation Fatalities by Mode

TABLE 3-2: Transportation Injuries by Mode

TABLE 3-3: Transportation Accidents by Mode

TABLE 3-4: Distribution of Transportation Fatalities by Mode

TABLE 3-27: Transit Safety and Property Damage

TABLE 3-28: Transit Safety Data by Mode for All Reported Accidents

TABLE 3-29: Transit Safety Data by Mode for All Reported Incidents

The data for this report are obtained from the USDOT, 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. Some 400 transit agencies report and, because some agencies own and operate more than one form of transit, approximately 500 transit services are covered. These transit agencies are responsible for 90 to 95 percent of passenger-miles traveled on transit. Other transit operators are encouraged to submit NTD forms.

The transit operators report on fatalities, injuries, accidents, incidents, and property damage in excess of $1,000. Electronic reporting has recently been implemented for the NTD. A certification from a company's Chief Executive Officers must accompany all NTD reports along with an independent auditor's statement. When an NTD report is received, a validation process is set up that includes a preliminary review of the data for completeness. The report is further reviewed and outstanding items are 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. The major categories are further broken down 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 accidents adopted in this report. 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 3-A.)

RAILROAD DATA

TABLE 3-1: Transportation Fatalities by Mode

TABLE 3-2: Transportation Injuries by Mode

Box 3-A.
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.

Counting fatalities not necessarily directly related to transportation potentially overstates the risk for the rail and transit modes. For the waterborne mode,fatalities from vessel casualties are counted in the total and other fatalities are not counted. (Vessel casualties are incidents involving damage to vessels, for example, from collisions, groundings, fires, or explosions.) Fatalities not from vessel casualties include deaths from falls or from accidents involving onboard equipment. Thus,fatalities for the waterborne mode are potentially understated. (The above information about fatalities also applies to injuries.)

TABLE 3-3: Transportation Accidents by Mode

TABLE 3-4: Distribution of Transportation Fatalities by Mode

TABLE 3-5: Highway-Rail Grade-Crossing Safety and Property Damage Data

TABLE 3-7: Transportation-Related Occupational Fatalities

TABLE 3-30: Railroad and Grade-Crossing Fatalities by Victim Class

TABLE 3-31: Railroad and Grade-Crossing Injuries by Victim Class

TABLE 3-32: Train Fatalities, Injuries, and Accidents by Type of Accident

TABLE 3-33: Railroad Passenger Safety Data

TABLE 3-34: Railroad System Safety and Property Damage Data

TABLE 3-35: 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 $6,300, 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 3-1: Transportation Fatalities by Mode

TABLE 3-2: Transportation Injuries by Mode

TABLE 3-3: Transportation Accidents by Mode

TABLE 3-4: Distribution of Transportation Fatalities by Mode

TABLE 3-7: Transportation-Related Occupational Fatalities

TABLE 3-36: Waterborne Transportation Safety and Property Damage Data Related to Vessel Casualties

TABLE 3-37: Waterborne Transportation Safety Data not Related to Vessel Casualties

U.S. waterborne fatalities and injuries 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 the notification of marine casualties for certain circumstances, including loss of life and injuries that require medical treatment beyond first aid and, for these individuals engaged or employed onboard a vessel in commercial service, that render a person unfit to perform routine duties.

Additionally, regulations require the Marine Inspection Office to investigate certain incidents occurring as a result of outer continental shelf activities. 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 3-1: Transportation Fatalities by Mode

TABLE 3-2: Transportation Injuries by Mode

TABLE 3-3: Transportation Accidents by Mode

TABLE 3-4: Distribution of Transportation Fatalities by Mode

TABLE 3-38: Recreational Boating Safety, Alcohol Involvement, and Property Damage Data

TABLE 3-39: Personal Watercraft Safety Data

TABLE 3-40: U.S. Coast Guard Search and Rescue Statistics, Fiscal Year

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 3-1: Transportation Fatalities by Mode

TABLE 3-2: Transportation Injuries by Mode

TABLE 3-3: Transportation Accidents by Mode

TABLE 3-4: Distribution of Transportation Fatalities by Mode

TABLE 3-41: Hazardous Liquid and Natural Gas Pipeline Safety and Property Damage Data

U.S. fatality and injury data for natural gas and liquid 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 natural gas and liquid pipeline fatality and injury definitions.)

TABLE 3-6: Hazardous Materials Safety 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 USDOT, Research and Special Programs Administration 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. 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.

Transportation, Energy, and the Environment

Section A
U.S. Energy Consumption 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
Domestic production											
Crude oil[a]	7.04	7.80	9.64	[R]8.38	8.60	8.97	7.36	6.56	6.47	6.45	[E]6.24
Natural gas plant liquids	0.93	1.21	1.66	1.63	1.57	1.61	1.56	1.76	1.83	1.82	[E]1.75
Total	**7.96**	**9.01**	**11.30**	**10.01**	**10.17**	**10.58**	**[R]8.92**	**8.32**	**8.30**	**8.27**	**7.99**
Gross imports											
Crude oil[b]	1.02	1.24	1.32	[R]4.11	5.26	3.20	5.89	7.23	7.51	8.23	8.55
Petroleum products[c]	0.80	1.23	2.10	1.95	1.65	1.87	2.12	1.61	1.97	1.94	1.83
Total	**1.81**	**2.47**	**3.42**	**6.06**	**6.91**	**5.07**	**8.02**	**[R]8.84**	**9.48**	**10.16**	**10.38**
Exports	**0.20**	**0.19**	**0.26**	**0.21**	**0.54**	**0.78**	**0.86**	**0.95**	**0.98**	**1.00**	**0.93**
U.S. net imports[d]	1.61	2.28	3.16	5.85	[R]6.37	4.29	7.16	7.89	8.50	9.16	9.45
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	U
By the transportation sector	5.14	6.04	7.78	8.95	9.55	9.85	10.97	[R]11.73	11.98	12.10	U
World petroleum consumption	21.34	31.14	46.81	56.20	63.07	60.10	65.99	[R]69.93	71.52	73.01	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	U
Transportation petroleum use as % of domestic petroleum production	64.6	67.0	68.8	89.4	93.9	93.1	[R]123.0	141.0	144.3	146.3	U
Transportation petroleum use as % of domestic petroleum consumption	52.4	52.5	52.9	54.8	56.0	62.6	64.6	65.9	61.1	58.8	U

KEY: E = estimate; R = revised; U = data are unavailable

[a] Includes lease condensate.

[b] Includes imports for the Strategic Petroleum Reserve, which began in 1977.

[c] Beginning in 1985 motor gasoline blending components and aviation gasoline blending components are included.

[d] 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.

1975–98: _____. *Monthly Energy Review*, DOE/EIA-0035 (99/03) (Washington, DC: March 1999), tables 3.1A (domestic production); 3.1B (imports and exports); and 10.2 (U.S. petroleum consumption).

World petroleum consumption: 1960–96: _____. *Annual Energy Review 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 11.9.

1997: _____. *International Petroleum Statistics Report*, March 1999, table 2.1, available at www.eia.doe.gov/emev/ipsr/, as of Apr. 5, 1999.

Table 4-2 U.S. Consumption of Energy from Primary Sources by Sector (Quadrillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995[R]	1996[R]	1997	1998
Energy consumption											
Transportation	10.56	12.40	16.06	18.21	19.66	20.02	22.49	24.03	24.57	24.89	24.99
% of total	24.1	23.5	24.2	25.9	25.9	27.2	27.7	27.6	27.4	27.5	27.6
Industrial	16.26	19.24	21.92	20.39	21.07	17.67	19.62	21.24	21.95	22.06	21.38
% of total	37.1	36.5	33.0	28.9	27.7	23.9	24.1	24.4	24.4	24.3	23.6
Residential and commercial	8.75	10.00	12.14	11.60	10.72	9.78	9.55	10.31	10.96	10.71	10.05
% of total	20.0	19.0	18.3	16.4	14.1	13.2	11.8	11.8	12.2	11.8	11.1
Energy input at electric utilities	8.19	11.01	16.27	20.35	24.51	26.52	[R]29.62	31.63	32.55	32.98	33.98
% of total	18.7	20.9	24.5	28.8	32.3	35.8	36.4	36.3	36.2	36.4	37.6
Total	**43.80**	**52.68**	**66.43**	**70.55**	**75.96**	**73.98**	**[R]81.28**	**87.21**	**90.04**	**90.63**	**90.42**
Percentage of primary demand met by petroleum											
Transportation	96.0	[R]95.7	95.3	96.7	96.7	97.4	[R]97.4	97.0	97.0	96.9	97.0
Industrial	35.4	35.3	35.5	40.0	45.2	44.2	42.4	40.6	41.5	42.2	42.3
Residential and commercial	39.8	38.6	35.4	[R]32.8	[R]28.3	25.9	22.7	20.2	20.0	20.0	21.0
Electric utilities	6.7	6.7	13.0	15.6	10.7	4.1	4.2	2.1	2.2	2.5	3.4

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 sectors include only fossil and renewable fuels consumed directly. The data for electric utilities include all fuels (fossil, nuclear, geothermal, hydroelectric, 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. In 1997, for example, an estimated 0.6 quadrillion Btu of renewable energy used by the residential and commercial sectors and 2.6 quadrillion Btu of renewable energy used by the industrial sector are not included. In table 4-6, these contributions of renewable energy are included starting in 1990; thus, the totals in this table differ from the totals in table 4-6 for 1990 and subsequent years. The totals in table 4-6 are the best numbers for total energy consumption in the United States 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.

1975–98:_____. *Monthly Energy Review*, DOE-EIA-0035(99/03) (Washington, DC: April 1999), 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[R]	1996[R]	1997	1998
Transportation	10.13	11.87	15.31	[R]17.61	19.01	19.50	21.81	23.31	23.84	24.11	24.25
Industrial	5.75	6.79	7.79	8.15	9.53	7.81	8.32	8.62	9.10	9.31	9.05
Residential and commercial	3.49	3.87	4.31	[R]3.81	3.04	2.52	2.17	2.08	2.20	2.14	2.11
Electric utilities	0.55	0.73	2.12	3.17	2.63	1.09	1.25	0.66	0.73	0.82	1.17
Total petroleum demand	**19.92**	**23.26**	**29.53**	**[R]32.74**	**34.21**	**30.92**	**33.55**	**34.67**	**35.87**	**36.38**	**36.58**
Transportation as % of total	50.9	51.0	51.8	53.8	55.6	63.1	65.0	67.2	66.5	66.3	66.3

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 that sectors use 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.

1975–98: _____. *Monthly Energy Review*, DOE/EIA-0035(99/03) (Washington, DC: April 1999), tables, 2.3, 2.4, 2.5, and 2.6.

Table 4-4 U.S. Energy Consumption by the Transportation Sector (Quadrillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998
Energy consumption (all sectors)	**43.80**	**52.68**	**66.43**	**70.55**	**75.96**	**73.98**	**R81.28**	**R87.21**	**R90.04**	**90.63**	**90.42**
Total transportation consumption[a]	10.60	12.43	16.09	18.24	19.70	20.07	R22.53	R24.07	R24.61	24.93	25.04
% of total energy consumption	R24.2	23.6	24.2	25.9	25.9	27.1	27.7	R27.6	R27.3	27.5	27.7
Total primary consumption[b]	10.56	12.40	16.06	18.21	19.66	20.02	22.49	R24.03	R24.57	24.89	24.99
Coal	R0.074	R0.017	0.007	0.001	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
Natural gas[c]	0.36	0.52	0.74	0.60	0.65	0.52	0.68	0.72	0.73	0.78	0.75
Trillion cubic feet	0.35	0.50	0.72	0.58	R0.64	0.50	0.66	0.70	0.71	0.75	E0.73
Petroleum products[d]	10.13	11.87	15.31	17.61	19.01	19.50	21.81	R23.31	R23.84	24.11	24.25
Million barrels	1,881	2,205	2,840	3,267	3,495	3,595	4,004	R4,281	E,R4,385	E4,417	U
Electricity	0.011	0.010	0.009	0.010	0.011	0.013	0.014	0.013	R0.013	0.014	0.014
Electrical system energy losses	0.027	0.023	0.021	0.025	0.026	0.030	0.031	0.027	R0.028	0.029	0.029

KEY: Btu = British thermal unit; E = estimate; R = revised; U = data are unavailable

[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.

NOTE: Energy consumption (all sectors) differs from totals in table 4-2 for 1990 and subsequent years.

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.

1975–98: _____. Monthly Energy Review, DOE/EIA-0035(99/03) (Washington, DC : March 1999), table 2.2 and table 2.5.

Total primary consumption: 1960–70: _____. Annual Energy Review 1990, DOE/EIA-0384(90) (Washington, DC: May 1991), table 4.

1975–98: _____. Monthly Energy Review, DOE/EIA-0035(99/03) (Washington, DC: March 1999), table 2.5.

Coal: *Btu:* 1960–70: _____. Annual Energy Review 1997, DOE/EIA-0384(97) (Washington, DC: July 1998), table 7.3, and A5 for conversion.

1975–98: _____. Monthly Energy Review, DOE/EIA-0035(99/03) (Washington, DC: March 1999), table 2.5.

Short tons: 1960–98: _____. Annual Energy Review 1997, DOE/EIA-0384(97) (Washington, DC: July 1998), table 7.3.

Natural gas: *Btu:* 1960–70: _____. Annual Energy Review 1997, DOE/EIA-0384(97) (Washington, DC: July 1998), table 6.6, and A4 for conversion.

1975–98: _____. Monthly Energy Review, DOE/EIA-0035(99/03) (Washington, DC: March 1999), table 2.5.

Cubic feet: 1960–70: _____. Annual Energy Review 1997, DOE/EIA-0384(97) (Washington, DC: July 1998), table 6.6.

1975–98: _____. Monthly Energy Review, DOE/EIA-0035(99/03) (Washington, DC: March 1999), table 4.4.

Petroleum products: *Btu:* 1960–70: _____. Annual Energy Review 1997, DOE/EIA-0384(97) (Washington, DC: July 1998), table 2.1.

1975–98: _____. Monthly Energy Review, DOE/EIA-0035(99/03) (Washington, DC: March 1999), table 2.5.

Barrels: 1960–97: _____. Annual Energy Review 1997, DOE/EIA-0384(97) (Washington, 18: July 1998), table 5.12b (barrels/day x 365 or 366 for leap years).

Electricity and electrical system energy losses: 1960–70: ____. State Energy Data Report 1993 (Washington, DC: July 1995), table 15.

1975–98: _____. Monthly Energy Review, DOE/EIA-0035(99/03) (Washington, DC: March 1999), table 2.5.

Section B
Transportation Energy Consumption by Mode

Table 4-5 Fuel Consumption by Mode of Transportation

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air										
Certificated carriers[a]										
Jet fuel (million gallons)	1,954	3,889	7,857	7,558	9,096	10,121	R12,290	12,812	13,188	13,660
General aviation[b]										
Aviation gasoline (million gallons)	242	292	551	412	520	421	353	276	287	290
Jet fuel (million gallons)	N	56	208	453	766	691	663	544	568	639
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	R69,419	70,069
Other 2-axle 4-tire vehicle	N	[e]	12,313	19,081	23,796	27,363	35,611	45,605	R47,354	49,370
Single-unit 2-axle 6-tire or more truck	N	13,848	3,968	5,420	6,923	7,399	8,357	9,216	R9,409	9,573
Combination truck	N	6,658	7,348	9,177	13,037	14,005	16,133	19,777	R20,193	20,294
Bus	827	875	820	1,053	1,018	834	895	968	R990	1,026
Transit[c]										
Electricity (million kWh)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	P5,018
Motor fuel (million gallons)										
Diesel	208	248	271	365	431	609	651	678	R693	P687
Gasoline and other nondiesel fuels[d]	192	124	68	8	11	46	34	61	61	P58
Compressed natural gas[R]	N	N	N	N	N	N	N	11	15	P23
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

KEY: kWh = kilowatt-hour; N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 4-5 Cont'd Fuel Consumption by Mode of Transportation

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Amtrak										
Electricity (million kWh)	N	N	N	180	254	295	330	304	293	282
Distillate/diesel fuel (million gallons)	N	N	N	63	64	65	82	66	71	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
Distillate/diesel fuel oil (million gallons)	787	652	819	1,098	1,478	1,699	2,065	2,339	2,491	2,574
Gasoline (million gallons)	N	N	598	730	1,052	1,053	1,300	1,060	994	987
Pipeline										
Natural gas (million cubic feet)	347,075	500,524	722,166	582,963	634,622	503,766	659,816	700,335	711,446	751,595

KEY: kWh = kilowatt-hour; N = data are nonexistent; 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 accurracy 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 liquified 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:* 1960–97: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, Apr. 5, 1999.

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: _____. *General Aviation and Air Taxi Activity Survey* (Washington, DC: Annual issues), table 5.1, and similar tables in earlier editions.

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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit: *Electricity/motor fuel/compressed natural gas:* 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), tables 63, 64, 65, and similar tables in earlier editions.

Rail: 1960–97: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1998), p. 40.

Amtrak: 1975–97: 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.

1985–97: 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: 1970–97: 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: ____., table 1.

Table 4-6 Energy Consumption by Mode of Transportation (Trillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air										
Certificated carriers[a]										
Jet fuel	264	525	1,061	1,020	1,228	1,366	R1,659	1,730	1,780	1,844
General aviation[b]										
Aviation gasoline	29	35	66	50	63	51	42	33	34	35
Jet fuel	N	8	28	61	103	93	90	73	77	86
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	R8,677	8,759
Other 2-axle 4-tire vehicle	N	[e]	1,539	2,385	2,975	3,420	4,451	5,701	R5,919	6,171
Single-unit 2-axle 6-tire or more truck	N	1,921	550	752	960	1,026	1,159	1,278	R1,305	1,328
Combination truck	N	923	1,019	1,273	1,808	1,942	2,238	2,743	R2,801	2,815
Bus	115	121	114	146	141	116	124	134	137	142
Transit[c]										
Electricity	10	9	9	9	8	14	17	17	17	P17
Motor fuel										
Diesel	29	34	38	51	60	84	90	94	R96	P95
Gasoline and other nondiesel fuels[d]	24	16	9	1	1	6	4	8	8	7
Compressed natural gas	N	N	N	N	N	N	N	R2	R2	3
Rail, Class I (in freight service)										
Distillate/diesel fuel	480	498	492	507	541	431	432	483	496	496

KEY: Btu = British thermal unit; kWh = kilowatt-hour; N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 4-6 Cont'd Energy Consumption by Mode of Transportation (Trillion Btu)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Amtrak										
Electricity	N	N	N	1	1	1	1	1	1	1
Distillate/diesel fuel	N	N	N	9	9	9	11	9	10	10
Water										
Residual fuel oil	592	463	565	608	1,340	687	947	881	853	750
Distillate/diesel fuel oil	109	90	114	152	205	236	286	324	346	357
Gasoline	N	N	75	91	132	132	163	133	124	123
Pipeline										
Natural gas	358	516	745	601	654	519	680	722	734	775

[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 liquified natural gas, methanol, and propane, except compressed natural gas.

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

NOTE: The following conversion rates were used:

Jet fuel = 135,000 Btu/gallon

Compressed natural gas = 138,700 Btu/gallon

Aviation gasoline = 120,200 Btu/gallon

Distillate fuel = 138,700 Btu/gallon

Automotive gasoline = 125,000 Btu/gallon

Residual fuel = 149,700 Btu/gallon

Diesel motor fuel = 138,700 Btu/gallon

Natural gas = 1,031 Btu/ft^3

Electricity 1kWh = 3,412 Btu, negating electrical system loses. To include electrical system loses, multiply this conversion factor by approximately 3.

SOURCES: Air: *Certificated carriers:* 1960–97: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, Apr. 5, 1999.

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: _____. *General Aviation and Avionics Survey* (Washington, DC: Annual issues), table 5.1 and similar tables in earlier editions.

KEY: Btu = British thermal unit; kWh = kilowatt-hour; N = data are nonexistent; P = preliminary; R = revised

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.

1995–97: _____. *Highway Statistics* (Washington DC: Annual issues), table VM-1.

Transit: *Electricity/motor fuel/compressed natural gas:* 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), tables 63, 64, 65 and similar tables in earlier editions.

Rail: 1960–97: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1998), p. 40.

Amtrak: 1975–95: Amtrak, State and Local Affairs Department, personal communication.

1996–97: Calculated values based on figures in table 4-5.

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.

1985–97: 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: 1970–97: 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: ____., table 1.

Table 4-7 Domestic Demand for Gasoline (Million gallons)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Highway	**55,429**	**66,979**	**85,598**	**99,354**	**101,183**	**103,545**	**109,529**	**117,061**	**119,515**	**120,938**
Nonhighway										
Agriculture	2,292	1,963	1,932	1,565	1,059	1,081	681	927	918	984
Aviation[a]	1,324	501	393	410	413	382	361	367	344	335
Marine	61	96	598	730	1,052	1,053	1,300	1,060	994	987
Other[b]	1,656	1,647	1,080	938	1,131	1,490	1,733	838	825	990
Total nonhighway	**5,332**	**4,208**	**4,003**	**3,642**	**3,655**	**4,005**	**4,076**	**3,192**	**3,081**	**3,297**
TOTAL demand	**60,761**	**71,187**	**89,601**	**102,996**	**104,838**	**107,550**	**113,606**	**120,253**	**122,595**	**124,235**

[a] Does not include aviation jet fuel.

[b] Includes state, county, and municipal use, industrial and commercial use, construction uses, and miscellaneous.

NOTES: A complete and uniform classification of nonhighway use is not possible due to differences among the states as to what classes of nonhighway use are eligible for exemptions or refunds and because states do not apply for all refunds. 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. All data are subject to review and revision. 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.

1996–97: _____. Highway Statistics (Washington, DC: Annual issues), table MF-21.

Nonhighway: 1960–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table MF-24, and unpublished revisions.

Table 4-8 Certificated Air Carriers[a] Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
Number of aircraft[R]	**2,135**	**2,125**	**2,679**	**2,495**	**3,808**	**4,678**	**6,083**	**7,411**	**7,478**	**7,616**	**U**
Average miles flown per aircraft (thousands)[R]	**487**	**667**	**949**	**932**	**768**	**740**	**776**	**759**	**783**	**791**	**U**
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
International operations	182	284	475	[R]377	401	415	760	998	1,043	1,114	1,191
Fuel consumption											
Domestic operations	1,954	3,889	7,857	7,558	9,096	10,121	[R]12,290	12,812	13,188	13,660	13,877
International operations	566	1,280	2,243	1,949	1,938	2,477	3,977	4,513	4,662	4,964	5,186
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
International operations	0.32	0.22	0.21	0.19	0.21	0.17	0.19	0.22	0.22	0.22	0.23

KEY: P = preliminary; 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: _____. *FAA Statistical Handbook of Aviation, Calendar Year 1979* (Washington, DC: 1979), table 5.1.

1980–85: _____. *FAA Statistical Handbook of Aviation, Calendar Year 1986* (Washington, DC: 1986), table 5.1.

1990–97: _____. *FAA Statistical Handbook of Aviation, Calendar Year 1997* (Washington, DC: unpublished), personal communication, Mar. 19, 1999.

Aircraft-miles flown: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, tables 2 and 13.

1965–70: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975–80: _____. *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.

Fuel consumption: 1960–98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, Apr. 5, 1999.

Table 4-9 Motor Vehicle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Vehicles registered (thousands)[a]	73,858	90,358	111,242	137,913	161,490	177,133	193,057	205,427	210,441	211,580
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	2,560,000
Fuel consumed (million gallons)	57,880	71,104	92,329	108,984	114,960	121,301	130,755	143,834	147,365	150,332
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
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
Average fuel consumed per vehicle (gallons)	784	787	830	790	712	685	677	700	700	711

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.

1995–97: _____. *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[R]	1998[P,R]	1999[P]
Alternative fuels								
Liquefied petroleum gases	208,142	264,655	248,467	232,701	239,158	238,356	245,058	250,322
Compressed natural gas	16,823	21,603	24,160	35,162	46,923	64,295	76,852	87,389
Liquefied natural gas	585	1,901	2,345	2,759	3,247	3,714	6,338	6,888
Methanol, 85%[a]	1,069	1,593	2,340	[R]2,023	[R]1,775	1,554	1,395	1,301
Methanol, neat	2,547	3,166	3,190	2,150	347	347	1,923	1,923
Ethanol, 85%[a]	21	48	80	190	694	1,280	1,615	2,243
Ethanol, 95%[a]	85	80	140	995	2,699	1,136	59	59
Electricity	359	288	430	663	773	1,010	1,301	1,414
Total	**229,631**	**293,334**	**281,152**	**[R]276,643**	**[R]295,616**	**311,692**	**334,541**	**351,539**
Oxygenates								
Methyl-tertiary-butyl-ether[b]	1,175,000	2,069,200	2,018,800	2,691,200	2,749,700	3,104,200	3,080,600	3,087,100
Ethanol in gasohol	701,000	760,000	845,900	910,700	660,200	830,700	857,100	831,400
Traditional fuels								
Gasoline[c]	110,135,000	111,323,000	113,144,000	115,943,000	117,783,000	119,336,000	121,465,000	123,103,000
Diesel	23,866,000	24,296,630	27,293,370	28,555,040	30,101,430	31,949,270	32,460,640	33,111,570
Total	**134,001,000**	**135,620,000**	**140,437,000**	**144,498,000**	**147,884,000**	**151,285,000**	**153,926,000**	**156,215,000**
TOTAL fuel consumption[d]	**134,231,000**	**135,913,000**	**140,719,000**	**[R]144,775,000**	**[R]148,180,000**	**151,597,000**	**154,260,000**	**156,566,000**

[a] The remaining portion of 85% methanol and both 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 and traditional fuels. Oxygenate consumption is included in gasoline consumption.

KEY: P = preliminary; R = revised

NOTE: Numbers may not add to totals due to rounding. Estimates for 1999 are based on plans or projections.

SOURCE: U.S. Department of Energy, Energy Information Administration, available at www.eia.doe.gov as of Mar. 1, 1999.

Table 4-11 Passenger Car and Motorcycle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
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
Motorcycles	574	1,382	2,824	4,964	5,694	5,444	4,259	3,897	3,872	3,826
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	1,502,000
Motorcycles	[a]	[a]	3,000	5,600	10,200	9,100	9,600	9,800	9,900	10,100
Fuel consumed (million gallons)										
Passenger cars	41,171	49,723	67,819	74,140	69,982	71,518	69,568	68,072	69,221	69,867
Motorcycles	[a]	[a]	60	113	204	182	191	196	198	202
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
Motorcycles	[a]	[a]	1.1	1.1	1.8	1.7	2.2	2.5	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
Motorcycles	[a]	[a]	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	538
Motorcycles	[a]	[a]	21	23	36	33	45	50	51	53

KEY: R = revised

Continued next page

Table 4-11 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.

1995–97: ____. Highway Statistics (Washington, DC: Annual issues), table VM-1.

All other categories: 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.

1995–97: _____. *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.

1995–1997: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

All other categories: 1970–85: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1985*, table VM-201A.

1990–97: _____. *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[R]	1997
Number registered (thousands)	14,211	20,418	27,876	37,214	48,275	65,738	69,134	70,224
Vehicle-miles traveled (millions)	123,000	201,000	291,000	391,000	575,000	790,000	817,000	850,000
Fuel consumed (million gallons)	12,313	19,081	23,796	27,363	35,611	45,605	47,354	49,370
Average miles traveled per vehicle (thousands)	8.7	9.8	10.4	10.5	11.9	12.0	11.8	12.1
Average miles traveled per gallon	10.0	10.5	12.2	14.3	16.1	17.3	17.2	17.2
Average fuel consumed per vehicle (gallons)	866	934	854	735	738	694	685	703

KEY: R = revised

NOTE: 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 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A
1995–97: _____. *Highway 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[R]	1997
Number registered (thousands)	3,681	4,232	4,374	4,593	4,487	5,024	5,266	5,293
Vehicle-miles (millions)	27,100	34,600	39,800	45,400	51,900	62,700	64,100	66,800
Fuel consumed (million gallons)	3,968	5,420	6,923	7,399	8,357	9,216	9,409	9,573
Average miles traveled per vehicle (thousands)	7.4	8.2	9.1	9.9	11.6	12.5	12.2	12.6
Average miles traveled per gallon	6.8	6.4	5.8	6.1	6.2	6.8	6.8	7.0
Average fuel consumed per vehicle (gallons)	1,078	1,281	1,583	1,611	1,862	1,835	1,787	1,808

KEY: R = revised

NOTES: In 1995, the U.S. Department of Transportation, Federal Highway Administration revised its vehicle categories beginning with 1993 data. These are passenger car, other 2-axle 4-tire vehicle, single-unit 2-axle 6-tire or more truck, and combination truck. 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: 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.
1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues).

Table 4-14 Combination Truck Fuel Consumption and Travel

	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Number registered (thousands)	787	905	1,131	1,417	1,403	1,709	1,696	1,747	1,790
Vehicle-miles traveled (millions)	31,700	35,100	46,700	68,700	78,100	94,300	115,500	118,900	124,500
Fuel consumed (million gallons)	6,658	7,348	9,177	13,037	14,005	16,133	19,777	20,193	20,294
Average miles traveled per vehicle (thousands)	40.3	38.8	41.3	48.5	55.6	55.2	68.1	68.1	69.6
Average miles traveled per gallon	4.8	4.8	5.1	5.3	5.6	5.8	5.8	5.9	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

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.
1995–97: _____. *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[R]	1997
Number registered (thousands)	272	314	378	462	529	593	627	686	695	698
Vehicle-miles traveled (millions)	4,300	4,700	4,500	6,100	6,100	4,500	5,700	6,400	6,600	6,800
Fuel consumed (million gallons)	827	875	820	1,053	1,018	834	895	968	990	1,026
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
Average miles traveled per gallon	5.3	[R]5.3	5.5	5.8	6.0	5.4	6.4	6.6	6.6	6.7
Average fuel consumed per vehicle[R] (gallons)	3,039	2,784	2,172	2,279	1,926	1,405	[R]1,428	1,412	1,425	1,471

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.
1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-16 Transit Industry Electric Power and Primary Energy Consumption and Travel[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997[P]
Number of vehicles	65,292	61,717	61,298	62,183	75,388	[R]94,368	92,961	115,874	122,362	123,580
Vehicle-miles traveled	2,143	2,008	1,883	2,176	2,287	2,791	3,242	3,550	3,650	3,841
Electric power consumed (million kWh hours)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	5,018
Primary energy consumed (thousand gallons)										
Diesel	208,100	248,400	270,600	365,060	431,400	608,738	651,030	678,286	692,714	687,089
Gasoline and other nondiesel fuels[b]	191,900	124,200	68,200	7,576	11,400	45,704	33,906	60,730	61,213	58,023
Compressed natural gas[R]	N	N	N	N	N	N	N	10,740	15,092	23,357

KEY: Btu = British thermal unit; kWh = kilowatt hour; N = data are nonexistent; 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 1995–97, 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: The heat equivalent factors used in Btu conversions are: diesel = 138,700 Btu/gallon; electric = 3,412 Btu/kWh, negating electrical system losses (to include electrical system loses, multiply this conversion factor by approximately three); gasoline = 125,000 Btu/gallon.

SOURCE: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), tables 40, 44, 63, 64, 65, and similar tables in earlier editions.

Table 4-17 Class I Rail Freight Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
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
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
Miles traveled (millions)										
Freight train-miles[c]	404	421	427	403	428	347	380	458	469	475
Locomotive unit-miles	N	N	N	1,479	1,531	1,228	1,280	1,445	1,465	1,423
Car-miles	28,170	29,336	29,890	27,656	29,277	24,920	26,159	30,383	31,715	31,660
Average miles traveled per vehicle (thousands)										
Locomotives	N	N	N	53.1	54.5	54.5	68.0	76.8	76.0	72.3
Cars	14.3	16.3	16.8	16.0	17.1	17.5	21.6	24.9	25.6	24.9
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
Cars	8.13	8.17	8.43	7.56	7.50	8.01	8.40	8.73	8.86	8.86
Fuel consumed (million gallons)	3,463	3,592	3,545	3,657	3,904	3,110	3,115	3,480	3,579	3,575
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

[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.

KEY: N = data are nonexistent

SOURCES: All data except for locomotive unit-miles: Association of American Railroads, *Railroad Facts 1997* (Washington, DC: October 1998), pp. 33, 34, 40, 48, 50.

Locomotive unit-miles: 1975–90: _____. *Railroad Ten-Year Trends* (Washington,DC: Annual issues).

1995–97: _____. *Analysis of Class I Railroads* (Washington, DC: Annual issues).

Table 4-18 Amtrak Fuel Consumption and Travel

	1972	1975	1980	1985	1990	1995	1996	1997	1998
Number in use									
Locomotives	185	355	419	291	318	313	299	332	345
Cars	1,569	1,913	2,128	1,854	1,863	1,722	1,730	1,728	1,962
Miles traveled (millions)									
Train-miles	26	30	30	30	33	32	30	32	33
Car-miles	213	253	235	251	301	292	276	288	312
Locomotive fuel consumed									
Electric (million of kWh hours)	N	180	254	295	330	304	293	282	275
Diesel (million gallons)	N	63	64	65	82	66	71	75	75
Average miles traveled per car	136,000	132,000	110,000	135,000	162,000	170,000	160,000	167,000	159,000

KEY: Btu = British thermal unit; kWh = kilowatt hour; N = data are nonexistent

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.

1985–98: ____. *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Miles traveled: *Train-miles:* 1972–98: _____. *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Car-miles: 1972: _____. *Train Information System Reports* (Washington, DC: no date).

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, no date.

1990–98: _____. Amtrak Corporate Reporting, Route Profitability System, personal communication, Dec. 9, 1998.

Locomotive fuel consumed: *Electric:* 1975–90: _____. State and Local Affairs Department, personal communication, no date.

1995–98: _____. Amtrak State and Local Affairs Department, personal communication, June 25, 1999.

Diesel: 1975–90: _____. State and Local Affairs Department, personal communication, no date.

1995–98: _____. Amtrak State and Local Affairs Department, personal communication, June 25, 1999.

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[c]	Total	Electricity	Natural gas	Coal and other[d]	Total
1987									
Defense	20.2	294.5	695.3	2.3	1,012.3	106.1	105.4	56.8	1,280.5
Energy	1.4	3.1	0.5	0.2	5.1	18.8	6.1	18.6	48.6
Postal Service	9.2	3.9	0.0	0.2	13.3	10.3	4.3	0.7	28.5
Veterans Affairs	0.5	2.4	0.0	0.0	2.9	7.1	13.7	1.2	24.9
Transportation	1.2	7.4	5.3	0.0	14.0	4.0	1.0	0.0	19.0
GSA	0.1	0.5	0.0	0.0	0.6	7.7	2.4	2.3	13.1
NASA	0.2	0.9	1.3	0.0	2.3	5.8	2.6	0.3	11.1
Justice	1.9	0.5	0.2	0.1	2.7	1.4	3.6	0.5	8.1
Agriculture	3.4	0.3	0.1	0.2	3.9	1.7	1.6	0.1	7.3
Interior	2.0	1.3	0.1	0.8	4.2	1.2	1.0	0.2	6.6
Health and Human Services	0.4	2.5	0.0	0.1	3.0	1.9	1.6	0.0	6.6
Other[a]	2.6	2.2	0.7	0.0	5.5	3.7	2.3	0.4	11.9
Total	**43.1**	**319.5**	**703.3**	**4.0**	**1,069.8**	**169.9**	**145.6**	**80.9**	**1,466.2**
1997[P]									
Defense	3.3	148.9	504.8	13.3	670.4	101.3	97.9	30.0	899.6
Energy	1.0	1.7	0.3	0.3	3.4	17.5	16.6	6.9	44.4
Postal Service	12.3	2.8	0.0	0.0	16.0	15.2	7.4	0.5	38.2
Veterans Affairs	0.6	1.3	0.0	0.0	1.9	9.1	14.2	1.5	26.8
Transportation	0.5	1.0	4.8	6.9	13.2	5.0	1.4	0.1	19.7
GSA	0.1	0.2	0.0	0.0	0.3	9.2	3.4	1.5	14.3
NASA	0.1	0.5	1.0	0.0	1.6	6.8	3.0	0.2	11.8

KEY: Btu = British thermal unit; GSA = General Services Administration; 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)

	Petroleum								
	Motor gasoline	Distillate and residual fuel oil	Jet fuel and aviation gas	Other[c]	Total	Electricity	Natural gas	Coal and other[d]	Total
Justice	2.7	0.5	1.3	0.0	4.0	3.5	4.3	0.3	12.1
Agriculture	4.3	0.4	0.1	0.2	5.0	2.0	1.5	0.3	8.9
Interior	0.8	0.7	0.0	0.6	2.1	1.4	1.3	0.1	5.0
Health and Human Services	0.0	1.6	0.1	0.1	1.7	2.5	2.4	0.0	6.6
Other[b]	1.1	2.9	0.9	0.1	5.0	9.4	3.6	0.7	18.7
Total	**26.7**	**162.4**	**513.2**	**21.6**	**724.0**	**182.9**	**157.1**	**42.2**	**1,106.1**

[a] 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.

[b] 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.

[c] Includes liquefied petroleum gases.

KEY: Btu = British thermal unit; GSA = General Services Administration; NASA = National Aeronautics and Space Administration; P = preliminary

[d] Includes purchased steam, coal, and other.

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 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 1.13.

Section C
Transportation Energy Intensiveness and Fuel Efficiency

Table 4-20 Energy Intensiveness of Passenger Modes (Btu per passenger-mile)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Air										
Certificated air carrier										
Domestic operations	8,483	[R]9,864	9,781	7,502	6,009	4,918	[R]4,797	4,283	4,096	4,092
International operations	[R]8,530	8,646	7,627	7,049	4,129	4,566	4,249	3,934	3,897	3,957
Highway[R]										
Passenger car	4,495	4,455	4,841	4,743	4,348	4,267	3,812	3,721	3,702	3,657
Other 2-axle 4-tire vehicle	N	N	6,810	6,571	5,709	4,971	4,451	4,399	4,421	4,427
Motorcycle	a	a	2,500	2,354	2,125	1,896	1,990	2,042	2,063	2,104
Transit motor bus	**N**	**N**	**N**	**N**	**2,742**	**3,389**	**3,718**	**4,161**	**4,029**	**3,835**
Amtrak	**N**	**N**	**N**	**2,383**	**2,148**	**2,089**	**[R]2,066**	**1,838**	**2,153**	**2,200**

KEY: Btu = British thermal unit; N = data are nonexistent; R = revised

[a] Included in passenger car.

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 and 125,000 Btu/gallon for passenger car, other 2-axle 4-tire vehicle, and motorcycle.

SOURCES: Air: *Certificated air carriers:* 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, tables 2 and 13.

1965–70: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975–80: _____. *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), pp. 4 and 14 (December 1976) and pp. 2 and 3 (December 1981).

1985–97: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), pp. 2 and 3, line 1.

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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970–90: _____. *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1970–85: _____. *Highway Statistics, Summary to 1985*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1990–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit motor bus: 1980–96: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1998), tables 63, 64; and 65.

1997: Eno Transportation Foundation, Inc., *Transportation in America, 1997* (Lansdowne, VA: 1997), p. 47.

Amtrak: 1975–90: Amtrak, State and Local Affairs Department, personal communication.

1995–97: ____. Personal communication, June 25, 1999.

Table 4-21 Energy Intensiveness of Certificated Air Carriers, All Services[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
Aircraft-miles (millions)											
Domestic operations	858	1,134	2,068	1,948	2,523	3,046	3,963	4,629	[R]4,811	4,911	5,031
International operations	182	284	475	[R]377	401	415	760	998	[R]1,043	1,114	1,191
Available seat-miles (millions)											
Domestic operations	52,930	96,399	218,020	247,245	350,717	455,099	570,558	[R]629,389	[R]639,013	651,918	661,997
International operations	14,045	32,984	65,044	68,579	97,762	110,578	182,652	[R]215,623	[R]220,708	228,689	237,118
Passenger-miles (millions)											
Domestic operations	31,099	53,226	108,442	136,000	204,368	277,836	345,873	403,888	434,652	450,612	464,395
International operations	8,951	19,990	39,695	[R]37,325	63,354	73,237	126,363	154,869	161,512	169,356	172,015
Fuel consumed (million gallons)											
Domestic operations	1,954	3,889	7,857	7,558	9,096	10,121	[R]12,290	12,812	13,188	13,660	13,877
International operations	566	1,280	2,243	1,949	1,938	2,477	3,977	4,513	4,662	4,964	5,186
Seats per aircraft											
Domestic operations	61.7	85.0	105.4	126.9	139.0	149.4	144.0	136.0	132.8	132.7	131.6
International operations	77.2	116.1	136.9	[R]181.9	243.8	266.5	240.3	216.1	[R]211.6	205.3	199.1
Seat-miles per gallon											
Domestic operations	27	25	28	33	39	45	46	[R]49	48	48	48
International operations	25	26	29	35	50	45	46	48	47	46	46
Energy intensiveness (Btu/passenger-mile)[b]											
Domestic operations	8,483	[R]9,864	9,781	7,502	6,009	4,918	[R]4,797	4,283	[R]4,096	4,092	4,034
International operations	[R]8,530	8,646	7,627	7,049	4,129	4,566	4,249	3,934	[R]3,897	3,957	4,070

KEY: Btu = British thermal units; P = preliminary; R = revised

Continued next page

Table 4-21 Cont'd Energy Intensiveness of Certificated Air Carriers, All Services[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
Load factor (%)											
Domestic operations	58.8	55.2	49.7	55.0	58.3	61.0	60.6	64.2	68.0	69.1	70.2
International operations	63.7	60.6	61.0	54.4	64.8	66.2	69.2	71.8	73.2	74.1	72.5

KEY: Btu = British thermal units; P = preliminary; R = revised

[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. Heat equivalent factor used for Btu conversion is 135,000 Btu/gallon.

SOURCES: Aircraft-miles, available seat-miles, and passenger-miles: 1960: Civil Aeronautics Board, Handbook of Airline Statistics 1969 (Washington, DC: 1970), part III, tables 2 and 13.

1965–70: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975–80: _____. *Air Carrier Traffic Statistics* (Washington, DC: 1976), pp. 4 and 14; (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 December issues). Aircraft miles: pp. 2 and 3, line 27 plus line 50; seat-miles: line 12 plus line 42; passenger-miles: line 1.

Fuel consumed: 1960–98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, Apr. 5, 1999.

Seats per aircraft, seat-miles per gallon, energy intensiveness, and load factor: Derived by calculation.

Table 4-22 Energy Intensiveness of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
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	1,502,000
Other 2-axle 4-tire vehicle	N	N	123,000	201,000	291,000	391,000	575,000	790,000	817,000	850,000
Motorcycle	[b]	[b]	3,000	5,600	10,200	9,100	9,600	9,800	9,900	10,100
Passenger-miles (millions)[a,R]										
Passenger car	1,145,000	1,395,000	1,751,000	1,954,000	2,012,000	2,094,000	2,282,000	2,286,000	2,337,000	2,388,000
Other 2-axle 4-tire vehicle	N	N	226,000	363,000	521,000	688,000	1,000,000	1,296,000	1,339,000	1,394,000
Motorcycle	[b]	[b]	3,000	6,000	12,000	12,000	12,000	12,000	12,000	12,000
Fuel consumed (million gallons)										
Passenger car	41,171	49,723	67,819	74,140	69,982	71,518	69,568	68,072	69,221	69,867
Other 2-axle 4-tire vehicle	N	N	12,313	19,081	23,796	27,363	35,611	45,605	47,354	49,370
Motorcycle	[b]	[b]	60	113	204	182	191	196	198	202
Energy intensiveness (Btu/passenger-mile)[R]										
Passenger car	4,495	4,455	4,841	4,743	4,348	4,267	3,812	3,721	3,702	3,657
Other 2-axle 4-tire vehicle	N	N	6,810	6,571	5,709	4,971	4,451	4,399	4,421	4,427
Motorcycle	[a]	[a]	2,500	2,354	2,125	1,896	1,990	2,042	2,063	2,104

KEY: Btu = British thermal unit; N = data are nonexistent; R = revised

Continued next page

Table 4-22 Cont'd Energy Intensiveness of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

[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, 1.59, 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, 1.64, 1.64, 1.64; motorcycle (1960–97): 1.1, 1.1, 1.1, 1.1, 1.2, 1.3, 1.3, 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 Btu/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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1960–94: _____. *Highway Statistics Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1970–85: _____. *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.

1990–97 _____. *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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Table 4-23 Average Fuel Efficiency of U.S. Passenger Cars, Light Trucks, and Light-Duty Vehicles

	1980	1985	1990	1995	1996	1997	1998
Average U.S. passenger car fuel efficiency (mpg) (calendar year)							
Passenger car	15.9	17.4	20.2	21.1	R21.2	21.5	U
Other 2-axle 4-tire vehicle	12.2	14.3	16.1	17.3	R17.2	17.2	U
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	23.4	23.6
Imported	28.6	30.3	28.5	27.9	27.7	27.5	27.6
Passenger car							
Domestic	22.6	26.3	26.9	27.7	28.3	27.9	28.0
Imported	29.6	31.5	29.9	30.3	29.7	29.8	29.9
Light truck (<8,500 lbs GVWR)							
Domestic	16.8	19.6	20.3	20.3	20.5	20.1	20.5
Imported	24.3	26.5	23.0	21.5	R22.2	22.1	22.9
CAFE standards (mpg)[a] (model year)							
Passenger car	20.0	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

KEY: CAFE = Corporate Average Fuel Economy; GVWR = gross vehicle weight rating; mpg = miles per gallon; R = revised; U = data are unavailable

[a] Assume 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] Two wheel drive/four 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.

1995–97: _____. *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, personal communication, Sept. 29, 1997.

1995–98: Manufacturer's preliminary estimates for the U.S. Department of Transportation, National Highway Traffic Safety Administration, personal communications, Sept. 29, 1997 and Nov. 19, 1998.

CAFE standards: 1980–98: U.S. Department of Transportation, National Highway Traffic Safety Administration, Consumer Programs Division, NPS-32, personal communications, July 26, 1996, Sept. 29, 1997, and Nov. 19, 1998.

Table 4-24 Energy Intensiveness of Transit Motor Buses

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997[P]
Vehicle-miles (millions)	1,576	1,528	1,409	1,526	1,677	1,863	2,130	2,184	2,165	2,307
Passenger-miles (millions)	N	N	N	N	21,800	21,200	21,000	18,800	19,100	20,400
Fuel consumed (million gallons diesel)	208	248	271	365	431	518	563	564	549	564
Energy intensiveness (Btu/passenger-mile)	N	N	N	N	2,742	3,389	3,718	4,161	4,029	3,835

KEY: Btu = British thermal unit; N = data are nonexistent; P = preliminary

NOTE: Heat equivalent factor used for Btu conversion is 138,700 Btu/gallon.

SOURCE: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), table 75 and similar tables in earlier editions.

Table 4-25 Energy Intensiveness of Class I Railroad[a] Freight Service

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
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
Car-miles (millions)	28,170	29,336	29,890	27,656	29,277	24,920	26,159	30,383	31,715	31,660
Tons per car load	44	49	55	61	67	68	67	65	67	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
Energy intensiveness (Btu/revenue freight ton-mile)	839	714	643	672	589	492	418	370	366	368
Energy intensiveness (Btu/car-mile)	17,051	16,983	16,450	18,341	18,495	17,310	16,516	15,886	15,652	15,662

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: October 1998), pp. 34, 37, and 40.

Table 4-26 Energy Intensiveness of Amtrak Service

	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Revenue passenger-miles (millions)	3,931	4,503	4,785	R6,057	R6,273	6,091	6,199	5,921	5,545	5,050	5,166	5,304
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
Electric (millions of kWh)[a]	180	254	295	330	303	300	301	309	304	293	282	275
Diesel (million gallons)	63	64	65	82	82	82	83	75	66	71	75	75
Energy intensiveness (Btu/revenue passenger-mile)[a]	2,383	2,148	2,089	R2,066	R1,978	R2,024	R2,018	1,935	1,838	2,153	2,200	2,138

KEY: Btu = British thermal unit; kWh = kilowatt hour; R = revised

[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 Btu/gallon; electric = 3,412 Btu/kWh.

SOURCES: Revenue passenger-miles: Amtrak, *Amtrak Annual Report*, Statistical Appendix (Washington, DC: Annual issues).

Locomotive fuel consumed: *Electric:* 1975–91: Amtrak, State and Local Affairs Department, personal communication, no date.

1992–98: Amtrak, State and Local Affairs Department, personal communication, June 25, 1999.

Diesel: 1975–93: Amtrak, State and Local Affairs Department, personal communication, no date.

1994–98: Amtrak, State and Local Affairs Department, personal communication, June 25, 1999.

Table 4-27 Annual Wasted Fuel Due to Congestion

Urban area	Gallons wasted (millions)							% change	
	1982	1986	1990	1992	1994	1995	1996	1982–96	1992–96
Albany-Schenectady-Troy, NY	3	5	7	9	10	10	10	233	11
Albuquerque, NM	4	7	14	16	23	26	27	575	69
Allentown-Bethlehem-Easton, PA-NJ	5	8	12	13	16	18	19	280	46
Atlanta, GA	54	92	105	126	160	178	196	263	56
Austin, TX	13	23	27	29	38	40	43	231	48
Bakersfield, CA	0	2	3	4	5	5	6	NM	50
Baltimore, MD	26	43	73	88	94	107	110	323	25
Beaumont, TX	0	1	1	1	2	2	2	NM	100
Boston, MA	87	131	158	164	169	190	196	125	20
Boulder, CO	0	0	1	1	2	2	2	NM	100
Brownsville, TX	0	0	0	1	1	1	2	NM	100
Buffalo-Niagara Falls, NY	8	11	14	17	18	19	22	175	29
Charlotte, NC	6	10	13	16	18	22	24	300	50
Chicago, IL-Northwestern, IN	145	211	237	276	315	322	358	147	30
Cincinnati, OH-KY	10	12	24	32	45	49	52	420	63
Cleveland, OH	11	16	29	37	44	48	53	382	43
Colorado Springs, CO	2	5	6	8	10	11	13	550	63
Columbus, OH	11	13	20	26	31	33	37	236	42
Corpus Christi, TX	1	2	3	4	5	6	7	600	75
Dallas, TX	74	120	124	127	141	157	164	122	29
Denver, CO	39	49	63	73	79	84	100	156	37
Detroit, MI	122	143	197	235	261	282	285	134	21
El Paso, TX-NM	3	5	7	9	12	12	12	300	33
Eugene-Springfield, OR	0	2	2	2	2	2	3	NM	50
Fort Worth, TX	26	43	46	49	61	70	75	188	53

KEY: NM = not meaningful

Continued next page

Table 4-27 Cont'd **Annual Wasted Fuel Due to Congestion**

Urban area	Gallons wasted (millions)							% change	
	1982	1986	1990	1992	1994	1995	1996	1982–96	1992–96
Fresno, CA	4	5	7	8	10	11	12	200	50
Ft. Lauderdale-Hollywood-Pompano Beach, FL	16	23	32	39	50	59	66	313	69
Harrisburg, PA	7	10	13	14	17	18	18	157	29
Hartford-Middletown, CT	6	9	14	19	24	27	28	367	47
Honolulu, HI	12	16	18	22	24	25	25	108	14
Houston, TX	129	166	176	188	204	211	222	72	18
Indianapolis, IN	4	5	12	21	27	35	37	825	76
Jacksonville, FL	13	17	25	28	35	39	45	246	61
Kansas City, MO-KS	8	10	21	30	44	55	58	625	93
Laredo, TX	0	0	0	1	2	2	2	NM	100
Las Vegas, NV	7	11	18	20	29	33	38	443	90
Los Angeles, CA	469	710	818	880	892	964	984	110	12
Louisville, KY-IN	7	11	20	23	33	35	43	514	87
Memphis, TN-AR-MS	6	9	17	24	29	32	34	467	42
Miami-Hialeah, FL	55	69	94	101	115	121	130	136	29
Milwaukee, WI	12	17	28	33	39	41	43	258	30
Minneapolis-St. Paul, MN	19	32	57	68	78	88	94	395	38
Nashville, TN	10	14	19	22	35	37	42	320	91
New Orleans, LA	18	28	30	32	37	38	39	117	22
New York, NY-Northeastern, NJ	478	546	692	737	798	867	883	85	20
Norfolk, VA	17	25	31	32	35	40	46	171	44
Oklahoma City, OK	6	7	11	16	22	26	32	433	100
Omaha, NE-IA	6	9	14	16	20	20	22	267	38
Orlando, FL	9	13	19	27	36	42	48	433	78
Philadelphia, PA-NJ	86	107	118	144	154	157	162	88	13

KEY: NM = not meaningful

Continued next page

Table 4-27 Cont'd Annual Wasted Fuel Due to Congestion

Urban area	Gallons wasted (millions)							% change	
	1982	1986	1990	1992	1994	1995	1996	1982–96	1992–96
Phoenix, AZ	46	61	75	83	90	90	96	109	16
Pittsburgh, PA	26	41	50	53	57	67	67	158	26
Portland-Vancouver, OR-WA	18	23	33	43	53	60	69	283	60
Providence-Pawtucket, RI-MA	10	17	22	27	33	36	40	300	48
Rochester, NY	3	6	9	12	13	17	18	500	50
Sacramento, CA	14	21	35	44	53	56	62	343	41
Salem, OR	1	2	3	4	4	5	5	400	25
Salt Lake City, UT	4	4	9	15	19	23	25	525	67
San Antonio, TX	15	28	30	36	40	48	51	240	42
San Bernardino-Riverside, CA	37	60	73	79	84	84	91	146	15
San Diego, CA	25	46	86	95	101	106	113	352	19
San Francisco-Oakland, CA	156	247	295	290	296	298	301	93	4
San Jose, CA	44	72	86	91	93	108	120	173	32
Seattle-Everett, WA	48	81	121	133	147	149	162	238	22
Spokane, WA	2	4	5	5	7	7	8	300	60
St. Louis, MO-IL	41	51	64	78	99	106	117	185	50
Tacoma, WA	6	11	17	20	22	22	22	267	10
Tampa, FL	13	16	20	22	29	34	35	169	59
Tucson, AZ	6	7	11	13	16	17	19	217	46
Washington, DC-MD-VA	133	193	238	272	288	323	333	150	22

NOTES: "Wasted" fuel is the difference between fuel consumed in estimated existing conditions and the fuel consumption if all traffic was 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. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the study.

KEY: NM = not meaningful

SOURCE: Texas Transportation Institute, *Urban Roadway Congestion Annual Report 1998* (College Station, TX: 1998), table 11.

Table 4-28 Wasted Fuel per Eligible Driver

Urban area	Gallons wasted							% change	
	1982	1986	1990	1992	1994	1995	1996	1982–96	1992–96
Albany-Schenectady-Troy, NY	8	13	18	23	26	26	26	225	13
Albuquerque, NM	12	19	36	40	56	62	63	425	58
Allentown-Bethlehem-Easton, PA-NJ	16	25	35	36	44	50	51	219	42
Atlanta, GA	44	70	64	71	85	92	102	132	44
Austin, TX	43	62	63	66	83	85	90	109	36
Bakersfield, CA	0	11	14	17	20	20	23	NM	35
Baltimore, MD	20	30	47	55	56	64	65	225	18
Beaumont, TX	0	11	10	11	20	20	18	NM	64
Boston, MA	38	58	64	69	70	79	81	113	17
Boulder, CO	0	0	13	13	25	25	25	NM	92
Brownsville, TX	0	0	0	13	11	11	22	NM	69
Buffalo-Niagara Falls, NY	10	14	17	20	21	23	26	160	30
Charlotte, NC	22	32	37	41	43	51	55	150	34
Chicago, IL-Northwestern, IN	27	39	41	48	53	54	60	122	25
Cincinnati, OH-KY	11	14	27	34	46	51	54	391	59
Cleveland, OH	8	12	21	26	31	33	36	350	38
Colorado Springs, CO	10	23	26	32	36	38	43	330	34
Columbus, OH	17	20	30	35	40	42	47	176	34
Corpus Christi, TX	6	10	15	19	24	27	30	400	58
Dallas, TX	54	82	81	81	84	92	94	74	16
Denver, CO	36	41	50	60	62	64	74	106	23
Detroit, MI	44	50	67	77	85	92	99	125	29
El Paso, TX-NM	10	15	18	23	29	29	28	180	22
Eugene-Springfield, OR	0	14	13	13	13	13	19	NM	46
Fort Worth, TX	32	51	51	54	66	74	78	144	44

KEY: NM = not meaningful

Continued next page

Table 4-28 Cont'd Wasted Fuel per Eligible Driver

Urban area	Gallons wasted							% change	
	1982	1986	1990	1992	1994	1995	1996	1982–96	1992–96
Fresno, CA	16	18	23	23	28	30	32	100	39
Ft. Lauderdale-Hollywood-Pompano Beach, FL	18	24	30	39	48	54	56	211	44
Harrisburg, PA	35	50	62	61	71	72	72	106	18
Hartford-Middletown, CT	14	20	30	39	49	55	56	300	44
Honolulu, HI	26	33	33	42	44	46	45	73	7
Houston, TX	72	79	80	87	94	95	97	35	11
Indianapolis, IN	6	7	16	28	36	45	47	683	68
Jacksonville, FL	28	35	45	49	59	65	74	164	51
Kansas City, MO-KS	10	11	23	32	43	54	56	460	75
Laredo, TX	0	0	0	13	20	20	20	NM	54
Las Vegas, NV	21	28	34	32	41	43	46	119	44
Los Angeles, CA	61	85	92	100	100	108	110	80	10
Louisville, KY-IN	12	18	31	38	52	54	65	442	71
Memphis, TN-AR-MS	11	15	26	36	43	46	47	327	31
Miami-Hialeah, FL	39	48	64	67	75	77	81	108	21
Milwaukee, WI	13	18	30	35	41	43	45	246	29
Minneapolis-St. Paul, MN	14	22	36	41	46	50	53	279	29
Nashville, TN	26	34	42	48	73	76	86	231	79
New Orleans, LA	22	35	37	38	44	45	45	105	18
New York, NY-Northeastern, NJ	37	45	52	53	57	62	63	70	19
Norfolk, VA	28	38	42	43	46	52	59	111	37
Oklahoma City, OK	12	13	20	27	34	37	43	258	59
Omaha, NE-IA	17	24	36	40	49	48	52	206	30
Orlando, FL	19	24	28	39	49	53	59	211	51
Philadelphia, PA-NJ	27	34	33	37	37	38	39	44	5

KEY: NM = not meaningful

Continued next page

Table 4-28 Cont'd Wasted Fuel per Eligible Driver

Urban area	Gallons wasted							% change	
	1982	1986	1990	1992	1994	1995	1996	1982–96	1992–96
Phoenix, AZ	43	47	52	54	55	52	53	23	(-2)
Pittsburgh, PA	18	28	33	35	37	43	43	139	23
Portland-Vancouver, OR-WA	22	27	38	49	57	63	69	214	41
Providence-Pawtucket, RI-MA	16	26	33	39	47	51	56	250	44
Rochester, NY	6	14	20	25	27	36	38	533	52
Sacramento, CA	22	28	42	49	58	62	67	205	37
Salem, OR	8	17	25	31	31	38	36	350	16
Salt Lake City, UT	8	7	15	25	31	37	40	400	60
San Antonio, TX	22	38	34	41	44	53	56	155	37
San Bernardino-Riverside, CA	53	82	86	85	88	88	95	79	12
San Diego, CA	18	29	47	50	52	54	58	222	16
San Francisco-Oakland, CA	58	88	98	96	96	97	98	69	2
San Jose, CA	50	72	80	78	78	90	98	96	26
Seattle-Everett, WA	39	61	82	92	98	98	105	169	14
Spokane, WA	10	18	22	21	29	28	32	220	52
St. Louis, MO-IL	29	34	42	51	65	69	75	159	47
Tacoma, WA	19	31	45	49	51	50	49	158	0
Tampa, FL	31	33	36	39	48	52	54	74	38
Tucson, AZ	18	19	28	30	34	35	38	111	27
Washington, DC-MD-VA	61	81	93	100	101	114	118	93	18

KEY: NM = not meaningful

NOTES: An eligible driver is someone 16 years and older who is eligible for a driver's license. "Wasted" fuel is the difference between fuel consumed in estimated existing conditions and the fuel consumption if all traffic was 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. The cities shown represent the 50 largest metropolitan areas, as well as others chosen by the states sponsoring the study.

SOURCE: Texas Transportation Institute, *Urban Roadway Congestion Annual Report 1998* (College Station, TX: 1998), table 12.

Section D
Air Pollution

Table 4-29 Federal Exhaust Emissions Certification Standards for Newly Manufactured Gasoline- and Diesel-Powered Light-Duty Vehicles [a,b] (Grams per mile)

Engine type and pollutant	Prior to control	1968 –69	1970 –71	1972	1973 –74	1975 –76	1977 –79	1980	1981	1982 –86	1987 –93	1994+[b]	
Gasoline													
HC total	11	[e]	2.2	3.4		1.5		0.41				0.41	([f])
Nonmethane HC	[d]	[f]										0.25	(0.31)
CO	80	[e]	23	39		15		7.0	3.4			3.4	(4.2)
Cold-temperature CO[c]	[d]	[f]										10	([f])
NO_X	4	[f]			3.0	3.1	2.0		1.0			0.4	(0.6)
Particulates	[d]	[f]										0.08	(0.10)
Diesel													
HC total	11	[f]				1.5		0.41				0.41	([f])
Nonmethane HC	[d]	[f]										0.25	(0.31)
CO	80	[f]				15		7.0	3.4			3.4	(4.2)
NO_X	4	[f]				3.1	2.0		1.0			1.0	(1.25)
Particulates	[d]	[f]								0.60	0.20	0.08	(0.10)
Test procedure		7-mode		CVS-72		CVS-75							
Useful life (intermediate)[b]		[f]										5 yrs/50,000 miles	
(full)		5 yrs/50,000 miles										10 yrs/100,000 miles	

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_X = nitrogen oxides

[a] 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 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 nonmethane HC and NO_X tested over the new Supplemental Federal Test Procedure will be phased-in during model years 2000–02; 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] No estimate available.

[e] In 1968–69, exhaust emissions standards were issued in parts per million rather than grams per mile and are, therefore, incompatible with this table.

[f] No standard set.

SOURCE: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personnal communication, April 1999.

Table 4-30a Federal Exhaust Emissions 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	1968 –69	1970 –71	1972	1973 –74	1975	1976 –78	1979 –81	1982 –83	1984	1985 –86	1987	1988 –93	1994	1995+
Gasoline															
HC total	11	[g]	2.2	3.4		2.0		1.7		0.8				[h] (0.8)	
Nonmethane HC	[f]	[h]												0.25 (0.31)	
CO	80	[g]	23	39		20		18		10				3.4 (4.2)	
Cold-temperature CO[d]	[f]	[h]												10 ([h])	
NO_x	4	[h]			3.0	3.1		2.3					1.2	0.4 (0.6)	
Particulates	[f]	[h]													0.08 (0.1)
Diesel															
HC total	11	[h]					2.0	1.7		0.8				[h] (0.8)	
Nonmethane HC	[f]	[h]												0.25 (0.31)	
CO	80	[h]					20	18		10				3.4 (4.2)	
NO_x	4	[h]					3.1	2.3					1.2	1.0[i] (1.25)[i]	
Particulates	[f]	[h]							0.6			0.26			0.08 (0.1)
LDT1 weight critera[e]		GVWR up through 6,000 lb						GVWR up to 8,500 lb					GVWR up to 6,000 lb; LVW up to 3,750 lb		
Test procedure[b]		7-mode		CVS-72		CVS-75									
Useful life (intermediate)[c]		[h]												5 yrs/50,000 miles	
(full)		5 yrs/50,000 miles									11 yrs/120,000 miles			10 yrs/100,000 miles	

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_x = nitrogen oxides

Continued next page

Table 4-30a Cont'd Federal Exhaust Emissions 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 gross vehicle weight rating (GVWR) up through 6,000 lb 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 lb GVWR. During 1988–93, light-duty trucks were divided into three subcategories that coincide with the current LDT1, LDT2, and LDT3-LDT4 categories. The standards for LDT2, LDT3, and LDT4 are given 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 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 nonmethane HC and NO_x tested over the new Supplemental Federal Test Procedure will be phased-in during model years 2000–02; 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 of 10 years/100,000 miles (these standards are shown in parentheses). This applied to all pollutants except HCs, which were only required to meet standards for a full useful life of 11 years/120,000 miles. Tier 1 exhaust standards (except NO_x standards for diesels, see footnote i) were phased in at a rate of 40% for 1994, 80% for 1995, and 100% for 1996.

[d] 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.

[e] GVWR is the maximum design loaded weight. Loaded vehicle weight (LVW) is the curb weight (nominal vehicle weight) plus 300 lb.

[f] No estimate available.

[g] In 1968–69, exhaust emissions standards were issued in parts per million rather than grams per mile (g/mi) and are, therefore, incompatible with this table.

[h] No standard set.

[i] Diesel vehicles are exempt from the Tier 1 NOx standard until model year 2004. Until that time, they may meet the previous 5 years/50,000 miles standard of 1.0 g/mi and a 10 years/100,000 miles standard of 1.25.

SOURCES: U.S. Environmental Protection Agency, Office of Air and Radiation, personal communications, Mar. 26, 1998 and Feb. 2, 1999. U.S. Environmental Protection Agency, Office of Air and Radiation, Office of Mobile Sources, *Federal and California Light-Duty Exhaust Emission Standards*, EPA420-B-98-001 (Washington, DC: 1998). Also available from http://www.epa.gov/oms/stds-ld.htm.

Table 4-30b **Federal Exhaust Emissions 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	1968 –69	1970 –71	1972	1973 –74	1975	1976 –78	1979 –81	1982 –83	1984	1985 –86	1987	1988 –93	1994	1995+
Gasoline															
HC total	11	[g]	2.2	3.4		2.0		1.7		0.80				[h] (0.80)	
Nonmethane HC	[f]	[h]												0.32 (0.40)	
CO	80	[g]	23	39		20		18		10				4.4 (5.5)	
Cold-temperature CO[d]	[f]	[h]												12.5 ([h])	
NO_x	4	[h]			3.0	3.1		2.3					1.7	0.7 (0.97)	
Particulates	[f]	[h]													0.08 (0.10)
Diesel															
HC total	11	[h]					2.0	1.7		0.80				[h] (0.80)	
Nonmethane HC	[f]	[h]												0.32 (0.40)	
CO	80	[h]					20	18		10				4.4 (5.5)	
NO_x	4	[h]					3.1	2.3					1.7	[h] (0.97)	
Particulates	[f]	[h]							0.60			0.13			0.08 (0.10)
LDT2 weight criteria[e]		GVWR up to 6,000 lb						GVWR up to 8,500 lb					GVWR up to 6,000 lb; LVW over 3,750 lb		
Test procedure[b]		7-mode		CVS-72		CVS-75									
Useful life (intermediate)[c]		[h]												5 yrs/50,000 miles	
(full)		5 yrs/50,000 miles												10 yrs/100,000 miles	

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_x = nitrogen oxides

Continued next page

Table 4-30b Cont'd Federal Exhaust Emissions 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 gross vehicle weight rating (GVWR) up through 6,000 lb 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 lb GVWR. During 1988–93, light-duty trucks were divided into three subcategories that coincide with the current LDT1, LDT2, and LDT3-LDT4 categories. The standards for LDT1, LDT3, and LDT4 are given in tables 4-30a, 4-30c, 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 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 nonmethane HC and NO_x tested over the new Supplemental Federal Test Procedure will be phased-in during model years 2000–02; 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 of 10 years/100,000 miles (these standards are shown in parentheses). This applied to all pollutants except HCs, which were only required to meet standards for a full useful life of 11 years/120,000 miles. Tier 1 exhaust standards were phased in at a rate of 40% for 1994, 80% for 1995, and 100% for 1996.

[d] 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.

[e] GVWR is the maximum design loaded weight. Loaded vehicle weight (LVW) is the curb weight (nominal vehicle weight) plus 300 lb.

[f] No estimate available.

[g] In 1968–69, exhaust emissions standards were issued in parts per million rather than grams per mile (g/mi) and are, therefore, incompatible with this table.

[h] No standard set.

SOURCE: U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, Mar. 26, 1998 and Feb. 2, 1999. U.S. Environmental Protection Agency, Office of Air and Radiation, Office of Mobile Sources, *Federal and California Light-Duty Exhaust Emission Standards*, EPA420-B-98-001 (Washington, DC: 1998). Also available from http://www.epa.gov/oms/stds-ld.htm.

Table 4-30c Federal Exhaust Emissions 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	1968 –69	1970 –71	1972	1973 –74	1975	1976 –78	1979 –81	1982 –83	1984	1985 –86	1987	1988 –89	1990	1991 –95	1996+
Gasoline																
HC total	11	[g]	2.2	3.4		2.0		1.7		0.80						[h] (0.80)
Nonmethane HC	[f]	[h]														0.32 (0.46)
CO	80	[g]	23	39		20		18		10						4.4 (6.4)
Cold-temperature CO[d]	[f]	[h]														12.5 ([h])
NO_x	4	[h]			3.0	3.1		2.3						1.7		0.7 (0.98)
Particulates	[f]	[h]														[h] (0.10)
Diesel																
HC total	11	[h]					2.0	1.7		0.80						[h] (0.80)
Nonmethane HC	[f]	[h]														0.32 (0.46)
CO	80	[h]					20	18		10						4.4 (6.4)
NO_x	4	[h]					3.1	2.3						1.7		[h] (0.98)
Particulates	[f]	[h]							0.60			0.50	0.45		0.13	[h] (0.10)
LDT3 weight criteria[e]		GVWR up to 6,000 lb						GVWR up to 8,500 lb					Any ALVW			ALVW up to 5,750 lb
													GVWR 6,0001–8,500 lb			
Test procedure[b]		7-mode		CVS-72		CVS-75										
Useful life (intermediate)[c]		[h]												5 yrs/50,000 miles		
(full)		5 yrs/50,000 miles									11 yrs/120,000 miles					

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_x = nitrogen oxides

Continued next page

Table 4-30c Cont'd Federal Exhaust Emissions 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 gross vehicle weight rating (GVWR) up through 6,000 lb 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 lb GVWR. During 1988–93, light-duty trucks were divided into three subcategories that coincide with the current LDT1, LDT2, and LDT3-LDT4 categories. The standards for LDT1, LDT2, and LDT4 are given in tables 4-30a, 4-30b, 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 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 nonmethane HC and NO_x tested over the new Supplemental Federal Test Procedure will be phased-in during model years 2002–04; 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 of 11 years/120,000 miles (these standards are shown in parentheses). This applied to all pollutants except HC and particulates for all LDT3s and NO_x for diesel-powered LDT3s, which were only required to meet standards for full useful life standards. Tier 1 exhaust standards were phased in during 1996–97 at rates of 50 and 100%, respectively.

[d] 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.

[e] GVWR is the maximum design loaded weight. Adjusted loaded vehicle weight (ALVW) is the numerical average of the GVWR and the curb weight.

[f] No estimate available.

[g] In 1968–69, exhaust emissions standards were issued in parts per million rather than grams per mile (g/mi) and are, therefore, incompatible with this table.

[h] No standard set.

SOURCE: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999.

Table 4-30d Federal Exhaust Emissions 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	1968 –69	1970 –71	1972	1973 –74	1975	1976 –78	1979 –81	1982 –83	1984	1985 –86	1987	1988 –89	1990	1991 –95	1996+
Gasoline																
HC total	11	[g]	2.2	3.4		2.0		1.7		0.80						[h] (0.80)
Nonmethane HC	[f]	[h]														0.39 (0.56)
CO	80	[g]	23	39		20		18		10						5.0 (7.3)
Cold-temperature CO[d]	[f]	[h]														12.5 ([h])
NO_x	4	[h]			3.0	3.1		2.3						1.7		1.1 (1.53)
Particulates	[f]	[h]														[h] (0.12)
Diesel																
HC total	11	[h]					2.0	1.7		0.80						[h] (0.80)
Nonmethane HC	[f]	[h]														0.39 (0.56)
CO	80	[h]					20	18		10						5.0 (7.3)
NO_x	4	[h]					3.1	2.3						1.7		[h] (1.53)
Particulates	[f]	[h]							0.60			0.50	0.45		0.13	[h] (0.12)
LDT3 weight criteria[e]		GVWR up to 6,000 lb						GVWR up to 8,500 lb					Any ALVW			ALVW up to 5,750 lb
													GVWR 6,0001–8,500 lb			
Test procedure[b]		7-mode		CVS-72		CVS-75										
Useful life (intermediate)[c]		[h]													5 yrs/50,000 miles	
(full)		5 yrs/50,000 miles									11 yrs/120,000 miles					

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_x = nitrogen oxides

Continued next page

Table 4-30d Cont'd Federal Exhaust Emissions 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 gross vehicle weight rating (GVWR) up through 6,000 lb 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 lb GVWR. During 1988–93, light-duty trucks were divided into three subcategories that coincide with the current LDT1, LDT2, and LDT3-LDT4 categories. The standards for LDT1, LDT2, and LDT3 are given in tables 4-30a, 4-30b, 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 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 nonmethane HC and NO_x tested over the new Supplemental Federal Test Procedure will be phased-in during model years 2002–04; 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 of 11 years/120,000 miles (these standards are shown in parentheses). This applied to all pollutants except HC and particulates for all LDT3s and NO_x for diesel-powered LDT3s, which were only required to meet standards for full useful life standards. Tier 1 exhaust standards were phased in during 1996–97 at rates of 50 and 100%, respectively.

[d] 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.

[e] GVWR is the maximum design loaded weight. Adjusted loaded vehicle weight (ALVW) is the numerical average of the GVWR and the curb weight.

[f] No estimate available.

[g] In 1968–69, exhaust emissions standards were issued in parts per million rather than grams per mile (g/mi) and are, therefore, incompatible with this table.

[h] No standard set.

SOURCE: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personal communication, April 1999.

Table 4-31a 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 lb		GVWR over 8,500 lb			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 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 set standard.

[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, personnal communication, April 1999.

Table 4-31b 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 lb		GVWR over 8,500 lb			GVWR over 14,000 lb						
Test procedure (gasoline)[c]	13-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 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 set standard.

[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.

SOURCE: 40 CFR 86, Subpart A (July 1, 1998). U.S. Environmental Protection Agency, Office of Air and Radiation, personnal communication, April 1999.

Table 4-32 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		5			
	170–749 cc	1.0–13.8	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 miles), whichever comes first			
(Class II)	170–279 cc		5 years or 18,000 km (11,185 miles), whichever comes first			
(Class III)	280 cc and greater		5 years or 30,000 km (18,641 miles), 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).

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

[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.

[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, 1999.

Table 4-33 Federal Exhaust Emissions Standards for Newly Manufactured and In-Use Aircraft Engines [a, b]

Engine type[c]	Pollutant	Year engine manufactured						
		1974–75	1976–77	1978–82	1983	1984–96	1997–99	2000+
Turboprop								
	Smoke					$187(rO)^{-0.168\ h}$		
Class T3 turbojet								
	CO (g/kN)[d]						118	
	HC (g/kN)[d]					19.6		
	NO_x (g/kN)[d]						$40 + 2(rPR)^{j}$	$32 + 1.6(rPR)^{k}$
	Smoke			25		$83.6(rO)^{-0.274\ i}$		
Class T8 turbojet								
	CO (g/kN)[d]						118	
	HC (g/kN)[d]					19.6		
	NO_x (g/kN)[d]						$40 + 2(rPR)^{j}$	$32 + 1.6(rPR)^{k}$
	Smoke	30[e]				$83.6(rO)^{-0.274\ i}$		
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]						$40 + 2(rPR)^{j}$	$32 + 1.6(rPR)^{k}$
	Smoke		$83.6(rO)^{-0.274\ f}$		$83.6(rO)^{-0.274\ g}$	$83.6(rO)^{-0.274\ i}$		
TSS engines (supersonic aircraft engines)								
	HC (g/kN)					$140(0.92)^{rPR}$		
	Smoke					$83.6(rO)^{-0.274\ i}$		

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

Continued next page

Table 4-33 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 otherwised 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 airlines 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] Applies to engines with rO>26.7 kN.

[e] 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.

[f] Engines with rated output rO≥129 kN. This is also the in-use standard for all such aircraft engines.

[g] Engines with rO<26.7 kN. Smoke number may not exceed 50.

[h] rO > 1,000 kW

[i] Engines with rO≥26.7 kN. Smoke number may not exceed 50.

[j] 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.

[k] 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.

SOURCES: 40 CFR 87, Subparts A–D, July 1, 1998 Edition Jane's Information Group Inc. 1992. *Jane's All the World's Aircraft, 1992–93*. Alexandria, VA.

Table 4-34 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; PM = particulate matter

Continued next page

Table 4-34 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 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 locomotives 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 edition.

Table 4-35 Federal Exhaust Emissions Standards for Newly Manufactured Marine Spark-Ignition Outboard, Personal Watercraft, and Jet-Boat Engines[a] (g/kWh)

Year	HC + NO_x (g/kWh)		Warranty period	Useful life[e]
	Rated power < 4.3 kW	Rated power >= 4.3 kW[c,d]		
1998[b]	278.00	(0.917 x (151 + 557/$P^{0.9}$)) + 2.44	1 yr for all emissions-related components	Outboard engines: 350 h/10 y Personal watercraft: 350 h/5 y
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 y/200 h 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 y/200 h for all emissions-related components; 3 y/200 h 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; h = hour; HC = hydrocarbon; hp = horsepower; kW = kilowatt; kWh = kilowatt hour; NO_x = nitrogen oxides; y = year

[a] 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 nonroad compression-ignition engine standards. Federal standards are in development for marine compression-ignition engines over 50 hp.

[b] The standards for personal watercraft did not go into effect until 1999, although the standard went into effect for outboard engines in 1998.

[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 4-36 National Average Vehicle Emissions Rates by Vehicle Type and Fuel (Grams per mile)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Gasoline (assuming zero RFG)									
Light-duty vehicles									
Exhaust and nonexhaust hydrocarbons (HC)	3.09	2.91	R2.77	2.65	2.57	2.49	0.00	2.36	2.29
(Exhaust HC)	(2.05)	(R1.92)	(1.81)	(1.72)	(1.66)	(R1.60)	(1.55)	(R1.51)	(1.47)
(Nonexhaust HC)	(1.04)	(R0.99)	(R0.96)	(0.93)	(0.91)	(R0.89)	(0.87)	(R0.85)	(0.82)
Exhaust carbon monoxide (CO)	24.68	23.42	22.40	21.65	21.10	20.52	20.14	19.86	19.52
Exhaust nitrogen oxide (NO_x)	1.81	1.76	1.72	1.69	1.67	1.61	1.56	1.51	1.45
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
(Exhaust HC)	(3.24)	(3.03)	(2.80)	(2.61)	(2.46)	(2.31)	(2.21)	(2.13)	(2.05)
(Nonexhaust HC)	(1.44)	(1.31)	(1.21)	(1.16)	(1.11)	(1.07)	(1.03)	(1.01)	(0.96)
Exhaust CO	36.32	34.01	31.78	30.03	28.62	27.41	26.83	26.38	25.69
Exhaust NO_x	2.36	2.25	2.16	2.10	2.04	1.97	1.95	1.92	1.87
Heavy-duty vehicles									
Exhaust and nonexhaust HC	11.89	10.90	10.06	9.24	8.49	7.89	R7.30	6.70	6.11
(Exhaust HC)	(7.45)	(6.79)	(6.22)	(5.53)	(4.92)	(4.51)	(4.13)	(3.73)	(3.33)
(Nonexhaust HC)	(4.44)	(R4.11)	(3.84)	(3.71)	(3.57)	(3.38)	(3.17)	(2.97)	(2.78)
Exhaust CO	131.19	120.49	111.05	101.92	93.61	85.10	76.97	69.13	61.07
Exhaust NO_x	6.49	6.28	6.05	5.85	5.69	5.48	5.36	5.25	5.05
Motorcycles									
Exhaust and nonexhaust HC	4.68	4.56	4.48	4.41	4.38	4.33	4.29	4.29	4.27
(Exhaust HC)	(2.31)	(2.19)	(2.11)	(R2.05)	(2.02)	(1.96)	(1.93)	(1.92)	(1.90)
(Nonexhaust HC)	(2.37)	(2.37)	(2.37)	(2.36)	(2.36)	(2.37)	(2.36)	(2.37)	(2.37)
Exhaust CO	20.89	20.61	20.60	20.59	20.59	20.47	20.47	20.47	20.35
Exhaust NO_x	0.85	0.85	0.85	0.85	0.85	0.84	0.84	0.84	0.83

KEY: R = revised; GVWR = gross vehicle weight rating; RFG = reformulated gasoline

Continued next page

Table 4-36 Cont'd National Average Vehicle Emissions Rates by Vehicle Type and Fuel (Grams per mile)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Diesel									
Light-duty vehicles									
Exhaust HC	0.73	0.74	0.75	0.75	0.76	0.77	0.76	0.74	0.71
Exhaust CO	1.68	1.71	1.72	1.73	1.74	1.74	1.74	1.71	1.67
Exhaust NO_x	1.65	1.67	1.68	1.68	1.66	1.64	1.60	1.55	1.48
Light-duty trucks									
Exhaust HC	1.08	1.14	1.15	1.14	1.13	1.11	1.09	1.05	0.98
Exhaust CO	2.03	2.10	2.09	2.07	2.04	2.02	1.99	1.95	1.88
Exhaust NO_x	1.97	2.00	1.99	1.97	1.94	1.90	1.85	1.78	1.67
Heavy-duty vehicles									
Exhaust HC	3.30	3.08	2.89	2.75	2.65	2.54	2.44	2.36	2.30
Exhaust CO	13.71	13.38	13.07	12.76	12.50	12.28	12.08	11.93	11.77
Exhaust NO_x	21.05	19.59	18.14	16.89	15.81	14.79	13.96	13.33	12.66
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
(Exhaust HC)	(2.56)	(2.40)	(2.25)	(2.13)	(2.03)	(1.93)	(1.86)	(1.80)	(1.74)
(Nonexhaust HC)	([R]1.19)	([R]1.12)	(1.06)	(1.02)	(0.99)	(0.97)	(0.94)	(0.91)	(0.88)
Exhaust CO	29.97	28.29	26.81	25.62	24.68	23.75	23.11	22.58	21.94
Exhaust NO_x	3.09	2.99	2.89	2.80	2.73	2.63	2.56	2.50	2.41

KEY: R = revised; GVWR = gross vehicle weight rating; 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 lb or more GVWR); motorcycle (on highway only). This table revises the data shown last year because it is based on MOBILE5b, the U.S. Environmental Protection Agency's (USEPA) latest highway vehicle emissions factor model. Interested readers can learn more about the MOBILE5b model at the following USEPA internet site: www.epa.gov/omswww/omshome.htm. Emissions factors are national averages based on the following assumptions: ambient temperature 75° F, daily temperature range 60°–84° F, average traffic speed 19.6 miles per hour (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 reformulated gasoline.

Data for nonexhaust HC does not exist for light-duty vehicles, light-duty trucks, and heavy-duty vehicles.

SOURCE: U.S. Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory, personal communication, Mar. 30, 1999.

Table 4-37 National Average Vehicle Emissions Rates by Vehicle Type Using Reformulated Gasoline (Grams per mile)

	1995	1996	1997	1998
Light-duty vehicles				
Exhaust HC	1.43	R1.38	R1.34	1.30
Nonexhaust HC	0.69	R0.68	R0.66	0.64
Total HC	**2.12**	**2.06**	**2.00**	**1.94**
Exhaust CO	16.46	16.14	15.90	15.62
Exhaust NO_x	1.59	1.54	1.49	1.43
Light-duty trucks				
Exhaust HC	2.11	2.02	1.93	1.84
Nonexhaust HC	0.85	0.80	0.78	0.75
Total HC	**2.96**	**2.82**	**2.71**	**2.59**
Exhaust CO	22.15	21.62	21.20	20.59
Exhaust NO_x	1.96	1.93	1.91	1.85
Heavy-duty vehicles				
Exhaust HC	4.40	4.02	3.62	3.22
Nonexhaust HC	2.53	2.38	2.24	2.10
Total HC	**6.93**	**6.40**	**5.86**	**5.32**
Exhaust CO	72.26	65.30	58.59	51.68
Exhaust NO_x	5.47	5.35	5.24	5.04
Motorcycles				
Exhaust HC	1.92	1.89	1.88	1.86
Nonexhaust HC	1.91	1.91	1.91	1.91
Total HC	**3.83**	**3.80**	**3.79**	**3.77**
Exhaust CO	17.46	17.46	17.46	17.36
Exhaust NO_x	0.84	0.84	0.84	0.83
Average of all RFG and diesel vehicles				
Exhaust HC	R1.77	1.70	1.64	1.58
Nonexhaust HC	0.74	0.73	0.71	0.67
Total HC	**2.52**	**2.43**	**2.35**	**2.25**
Exhaust CO	19.38	18.83	18.37	17.81
Exhaust NO_x	2.61	2.54	2.48	2.39

KEY: 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 °F, daily temperature range 60–84 °F, average traffic speed 19.6 miles per hour (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, personal communication, Mar. 30, 1999.

Table 4-38 Estimates of National Emissions of Carbon Monoxide (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997
Transportation								
Highway vehicles	88.03	83.13	78.05	77.39	57.85	54.11	R53.26	50.26
Off-highway								
Aircraft	0.51	0.60	0.74	0.83	0.90	0.94	0.95	1.01
Railroads	0.07	0.08	0.10	0.11	0.12	0.11	0.11	0.12
Marine vessels	0.01	0.02	0.04	0.04	0.08	0.08	0.08	0.09
Other off-highway[a]	1.35	1.44	1.55	1.64	R2.22	R2.33	2.34	2.37
Total transportation	**R89.96**	**85.27**	**R80.47**	**80.01**	**R61.18**	**R57.57**	**R56.75**	**53.84**
Fuel combustion	4.63	4.48	7.30	8.49	5.51	5.93	R5.98	4.82
Industrial processes[b]	9.84	7.54	6.95	5.28	4.77	4.61	4.62	4.81
Waste disposal and recycling	7.06	3.23	2.30	1.94	1.08	1.19	1.20	1.24
Miscellaneous[c, R]	16.68	15.45	19.68	19.93	23.26	19.86	22.38	22.74
Total nontransportation	**38.21**	**30.70**	**36.23**	**35.64**	**34.62**	**31.59**	**34.18**	**33.61**
TOTAL all sources[R]	**128.18**	**115.97**	**116.70**	**115.64**	**95.79**	**89.15**	**90.93**	**87.45**

KEY: R = revised

[a] Other off-highway comprises off-road recreational vehicles, 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, and logging vehicles; health services, cooling towers, nontransportation-related fugitive dust; 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 Update: 1970–1997* (EPA 454/E-98-007) (Research Triangle Park, NC: December 1998), table A-1; also available at www.epa.gov/ttn/chief/trends97/emtrnd.html as of Mar. 1, 1999.

Table 4-39 Estimates of National Emissions of Nitrogen Oxides (Million short tons)

	1970	1975	1980	1990	1995	1996	1997
Transportation							
Highway vehicles	7.39	8.65	8.62	7.04	7.32	R7.25	7.04
Off-highway							
Aircraft	0.07	0.09	0.11	0.16	0.17	0.17	0.18
Railroads	0.50	0.59	0.73	0.93	0.99	0.92	0.95
Marine vessels	0.04	0.05	0.11	0.23	0.23	0.23	0.24
Other off-highway[a]	0.07	0.08	0.09	R0.15	R0.17	R0.17	0.18
Total transportation	**R8.06**	**R9.45**	**9.66**	**R8.51**	**R8.88**	**R8.74**	**8.57**
Fuel combustion	10.06	10.49	11.32	10.89	10.83	R10.52	10.72
Industrial processes[b]	0.78	R0.54	0.56	0.80	0.77	0.78	0.81
Waste disposal and recycling	0.44	0.16	0.11	0.09	0.10	0.10	0.10
Miscellaneous[c, R]	1.84	2.50	3.22	3.14	3.19	3.34	3.37
Total nontransportation	**13.12**	**13.69**	**15.21**	**14.92**	**14.89**	**14.74**	**15.00**
TOTAL all sources[R]	**21.18**	**23.13**	**24.87**	**23.44**	**23.77**	**23.47**	**23.58**

KEY: R = revised

[a] Other off-highway comprises off-road 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, and logging vehicles; health services, cooling towers, nontransportation-related 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 Update: 1970–1997* (EPA 454/E-98-007) (Research Triangle Park, NC : December 1998), table A-2; also available at Internet site www.epa.gov/ttn/chief/trends97/emtrnd.html as of Mar. 1, 1999.

Table 4-40 Estimates of National Emissions of Volatile Organic Compounds (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997
Transportation								
Highway vehicles	12.97	10.55	8.98	9.38	6.31	5.70	R5.49	5.23
Off-highway								
Aircraft	0.10	0.12	0.15	0.17	0.18	0.18	0.18	0.19
Railroads	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05
Marine vessels	0.01	0.01	0.03	0.03	0.05	0.05	0.05	0.05
Other off-highway[a]	0.50	0.53	0.56	0.59	R0.72	0.59	R0.62	0.62
Total transportation	**13.60**	**R11.23**	**R9.74**	**R10.19**	**R7.31**	**6.57**	**R6.38**	**6.14**
Fuel combustion	0.72	0.66	1.05	1.57	1.01	1.07	1.08	0.86
Industrial processes[b]	12.33	11.10	12.10	R9.50	9.01	9.71	9.05	9.39
Waste disposal and recycling	1.98	0.98	0.76	0.98	0.99	1.07	0.43	0.45
Miscellaneous[c, R]	2.12	1.93	2.51	1.99	2.62	2.14	2.35	2.38
Total nontransportation	**17.15**	**14.67**	**16.42**	**14.04**	**13.63**	**13.99**	**12.91**	**13.08**
TOTAL all sources[R]	**30.75**	**25.89**	**26.17**	**24.23**	**20.94**	**20.56**	**19.29**	**19.21**

KEY: R = revised

[a] Other off-highway comprises off-road 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; solvent utilization, storage, and transport.

[c] Miscellaneous comprises nonroad gasoline- and diesel-powered construction, industrial, lawn and garden, farm, light-commercial, and logging vehicles; geogenic sources, catastrophic and accidental releases, health services, cooling towers, non-transportation-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 Update: 1970–1997* (EPA 454/E-98-007) (Research Triangle Park, NC : December 1998); table A-3; also available at www.epa.gov/ttn/chief/trends97/emtrnd.html as of Mar. 1, 1999.

Table 4-41 Estimates of National Emissions of Particulate Matter (PM-10)[a] (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997
Transportation								
Highway vehicles	0.44	0.47	0.40	0.36	0.34	0.29	[R]0.28	0.27
Off-highway								
Aircraft	0.02	0.03	0.03	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
Marine vessels	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03
Other off-highway[b,R]	0.01	0.03	0.04	0.04	0.04	0.05	0.05	0.05
Total transportation-fuel-related[R]	**0.51**	**0.57**	**0.52**	**0.50**	**0.51**	**0.44**	**0.43**	**0.42**
Transportation-related fugitive dust								
Unpaved highways	N	N	N	11.64	11.23	10.36	[R]12.06	12.31
Paved highways	N	N	N	5.08	2.25	2.41	[R]2.39	2.52
Total transportation[R]	**N**	**N**	**N**	**17.22**	**13.98**	**13.21**	**14.88**	**15.25**
Fuel combustion	2.87	2.25	2.45	1.54	1.20	1.18	1.19	1.10
Industrial processes[c]	7.67	3.70	2.75	1.06	1.04	0.95	0.94	0.98
Waste disposal and recycling	1.00	0.37	0.27	0.28	0.27	0.29	0.29	0.30
Miscellaneous[d,R]	1.03	0.92	1.30	25.48	13.35	11.14	15.90	15.97
Total nontransportation	**12.57**	**7.24**	**6.77**	**28.36**	**15.86**	**13.56**	**18.32**	**18.35**
TOTAL all sources[R]	**13.08**	**7.80**	**7.29**	**45.58**	**29.84**	**26.76**	**33.20**	**33.58**

KEY: N = data are nonexistent; R = revised

[a] Particulate matter less than 10 microns in size.

[b] Other off-highway comprises off-road recreational, airport service and railway maintenance vehicles, and recreational marine vessels.

[c] Industrial processes comprises 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, and logging vehicles; 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 are constantly evolving 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 Update: 1970–1997* (EPA 454/E-98-007) (Research Triangle Park, NC: December 1998); table A-5; also available at www.epa.gov/ttn/chief/trends97/emtrnd.html as of Mar. 1, 1999.

Table 4-42 Estimates of National Emissions of Particulate Matter (PM-2.5)[a] (Million short tons)

	1990	1991	1992	1993	1994	1995	1996	1997
Transportation								
Highway vehicles	0.28	0.29	0.28	0.26	0.26	0.23	0.22	0.21
Aircraft	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
Marine vessels	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Other off-highway[b]	0.04	0.04	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	1.86
Paved roads	0.56	0.60	0.61	0.62	0.63	0.59	0.60	0.63
Total transportation	**2.67**	**2.71**	**2.67**	**2.74**	**2.74**	**2.50**	**2.74**	**2.82**
Nontransportation								
Fuel combustion	0.91	0.89	0.93	0.85	0.84	0.90	0.94	0.85
Industrial processes[c]	0.56	0.57	0.58	0.50	0.50	0.50	0.50	0.52
Waste disposal and recycling	0.23	0.24	0.24	0.29	0.27	0.25	0.25	0.25
Miscellaneous[d]	3.59	3.32	3.23	2.91	3.60	2.94	3.85	3.87
Total nontransportation	**5.29**	**5.02**	**4.98**	**4.55**	**5.21**	**4.59**	**5.54**	**5.49**
TOTAL	**7.96**	**7.74**	**7.64**	**7.29**	**7.95**	**7.08**	**8.29**	**8.31**

[a] Particulate matter less than 2.5 microns in size.

[b] Other off-highway comprises nonroad gasoline and diesel recreational, airport service and railway maintenance vehicles, and recreational marine vessels.

[c] Industrial processes comprises 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 nonroad diesel construction, industrial, lawn and garden, farm, light-commercial, and logging vehicles; 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 evolve and undergo major changes on a periodic basis. 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 Update: 1970-1997* (EPA 454/E-98-007) (Research Triangle Park, NC: December 1998), table A-6; also available at Internet site www.epa.gov/ttn/chief/trends97/emtrnd.html as of Mar. 1, 1999.

Table 4-43 Estimates of National Emissions of Sulfur Dioxide (Million short tons)

	1970	1975	1980	1985	1990	1995	1996	1997
Transportation								
Highway vehicles	0.41	0.50	0.52	0.52	0.54	0.30	R0.32	0.32
Off-highway								
Aircraft	<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	0.11
Marine vessels	0.04	0.05	0.12	0.14	0.25	0.24	0.24	0.25
Total transportation	**0.49**	**R0.60**	**0.70**	**0.73**	**R0.93**	**R0.67**	**R0.68**	**0.69**
Fuel combustion	23.46	22.66	21.39	20.02	20.29	16.23	R16.81	17.26
Industrial processes[a]	7.09	4.68	3.77	2.43	1.86	R1.59	R1.60	1.67
Waste disposal and recycling	0.01	0.05	0.03	0.03	0.04	0.05	0.05	0.05
Miscellaneous[b, R]	0.11	0.02	0.01	0.01	0.56	0.65	0.68	0.70
Total nontransportation	**30.67**	**27.41**	**25.20**	**22.49**	**22.75**	**18.52**	**19.14**	**19.68**
TOTAL all sources[R]	**31.16**	**28.01**	**25.91**	**23.23**	**23.68**	**19.19**	**19.81**	**20.37**

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, other nonroad gasoline, diesel, 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 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-4; also available at Internet site www.epa.gov/ttn/chief/trends97/emtrnd.html as of Mar. 1, 1999

Table 4-44 Estimates of National Emissions of Lead (Thousand short tons)

	1970	1975	1980	1985	1990	1995	1996	1997
Transportation								
Highway vehicles	171.96	130.21	60.50	18.05	0.42	0.02	0.02	0.02
Aircraft	1.40	1.12	0.89	0.69	0.62	R0.54	R0.51	0.50
Total transportation[R]	**173.36**	**131.33**	**61.39**	**18.74**	**1.04**	**0.56**	**0.53**	**0.52**
Fuel combustion	10.62	10.35	4.30	0.52	0.50	0.49	0.49	0.50
Industrial processes[a]	26.36	11.38	3.94	2.53	2.47	2.27	R2.27	2.25
Waste disposal and recycling	2.20	1.60	1.21	0.87	0.80	R0.60	R0.62	0.65
Miscellaneous[b]	8.34	5.01	3.32	0.23	0.16	<0.01	<0.01	<0.01
Total nontransportation	**47.52**	**28.32**	**12.77**	**4.15**	**3.93**	**3.37**	**3.39**	**3.41**
TOTAL	**220.87**	**159.66**	**74.15**	**22.89**	**4.98**	**R3.92**	**R3.91**	**3.92**

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 gave 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-8; also available at Internet site www.epa.gov/ttn/chief/trends97/emtrnd.html as of Mar. 1, 1999.

Table 4-45 Air Pollution Trends in Selected Metropolitan Statistical Areas
(Number of days with PSI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	PSI days > 100 (1997)	Number of trend sites	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Akron, OH	7	6	5	46	15	9	30	8	10	8	12	11	6
Albany-Schenectady-Troy, NY	13	3	7	23	4	4	9	5	5	6	3	4	3
Albuquerque, NM	26	0	21	9	9	8	5	0	0	1	1	0	0
Allentown-Bethlehem-Easton, PA	9	13	7	35	11	10	14	3	6	10	17	6	13
Atlanta, GA	17	36	9	44	17	52	24	19	42	13	43	22	26
Austin-San Marcos, TX	5	6	5	7	4	4	3	1	2	4	12	0	0
Bakersfield, CA	18	58	7	126	114	97	109	100	97	97	104	109	55
Baltimore, MD	23	30	16	60	28	29	50	23	48	41	36	28	30
Baton Rouge, LA	12	16	6	17	11	28	11	5	5	7	15	7	8
Bergen-Passaic, NJ	9	5	8	27	12	9	11	2	3	5	10	3	5
Birmingham, AL	17	8	17	33	5	28	5	12	10	6	32	15	8
Boston, MA-NH	27	10	24	28	12	7	13	9	6	10	8	2	8
Buffalo-Niagara Falls, NY	21	1	21	31	4	8	9	3	1	4	6	3	1
Charleston-North Charleston, SC	9	3	8	11	5	1	2	0	2	2	1	3	3
Charlotte-Gastonia-Rock Hill, NC-SC	31	31	10	43	13	31	12	11	23	9	13	18	26
Chicago, IL	64	10	42	40	16	5	21	4	3	8	21	6	9
Cincinnati, OH-KY-IN	25	14	21	57	19	19	22	3	13	19	22	11	11
Cleveland-Lorain-Elyria, OH	43	16	24	45	19	10	23	11	13	23	24	17	12
Columbus, OH	14	14	9	24	7	4	9	1	6	7	7	11	5
Dallas, TX	22	32	8	37	18	24	2	11	11	15	36	12	15
Dayton-Springfield, OH	13	13	10	37	10	13	12	2	11	14	11	18	9
Denver, CO	32	0	20	35	16	11	7	8	3	2	2	0	0
Detroit, MI	35	12	30	35	18	11	28	8	5	13	14	13	12
El Paso, TX	22	4	17	15	26	22	7	11	9	8	5	7	3
Fort Lauderdale, FL	19	0	7	3	6	1	0	2	4	1	1	1	0

Continued next page

Table 4-45 Cont'd

Air Pollution Trends in Selected Metropolitan Statistical Areas

(Number of days with PSI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	PSI days > 100 (1997)	Number of trend sites	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Fort Worth-Arlington, TX	8	14	8	27	17	16	20	7	9	31	28	14	14
Fresno, CA	16	75	9	110	91	62	83	61	59	55	60	65	50
Gary, IN	22	12	19	37	16	14	12	5	1	6	17	11	12
Grand Rapids-Muskegon-Holland, MI	10	10	7	36	16	10	20	4	2	6	11	6	6
Greensboro-Winston-Salem-High Pt, NC	22	17	8	46	8	12	5	2	21	9	8	6	13
Greenville-Spartanburg-Anderson, SC	8	10	4	35	3	2	3	4	7	4	5	7	9
Harrisburg-Lebanon-Carlisle, PA	7	9	7	39	10	10	21	1	15	12	13	3	9
Hartford, CT	15	16	14	39	19	13	23	15	14	18	15	5	16
Honolulu, HI	12	0	4	0	0	0	0	0	0	0	0	0	0
Houston, TX	29	47	26	72	43	54	37	32	28	45	65	28	47
Indianapolis, IN	31	12	31	39	15	9	12	7	9	22	19	13	12
Jacksonville, FL	17	4	15	4	4	3	0	2	3	2	1	1	4
Jersey City, NJ	8	9	7	30	14	15	25	9	19	11	14	5	9
Kansas City, MO-KS	25	18	22	23	5	2	11	1	3	10	22	10	18
Knoxville, TN	21	38	13	33	2	23	10	7	20	13	20	19	36
Las Vegas, NV-AZ	19	6	6	30	45	22	10	6	9	14	4	5	0
Little Rock-North Little Rock, AR	8	1	7	9	1	1	3	0	2	2	7	1	1
Los Angeles-Long Beach, CA	38	66	36	239	222	174	174	178	137	144	109	94	63
Louisville, KY-IN	26	18	17	49	15	10	15	2	19	27	21	10	13
Memphis, TN-AR-MS	15	17	12	44	8	24	9	14	16	11	18	17	14
Miami, FL	12	3	10	8	6	1	1	3	6	1	2	1	3
Middlesex-Somerset-Hunterdon, NJ	4	19	4	35	19	22	24	8	11	9	15	8	18
Milwaukee-Waukesha, WI	22	5	18	40	17	8	24	3	4	8	13	5	4
Minneapolis-St. Paul, MN-WI	41	0	24	11	8	4	2	3	0	2	7	2	0
Monmouth-Ocean, NJ	4	21	3	0	14	21	20	6	11	3	6	12	12

Continued next page

Table 4-45 Cont'd

Air Pollution Trends in Selected Metropolitan Statistical Areas

(Number of days with PSI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	PSI days > 100 (1997)	Number of trend sites	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Nashville, TN	19	24	19	55	11	31	13	6	18	21	27	23	20
Nassau-Suffolk, NY	8	12	4	22	14	20	25	5	15	10	9	6	8
New Haven-Meriden, CT	10	19	10	26	11	15	30	10	12	13	14	8	19
New Orleans, LA	13	7	10	24	4	6	2	5	6	8	18	8	6
New York, NY	40	24	28	57	30	37	50	11	19	21	19	15	23
Newark, NJ	15	13	12	41	21	23	33	10	12	14	20	12	13
Norfolk-VA Beach-Newport News, VA-NC	12	17	11	23	4	8	6	7	12	4	3	4	15
Oakland, CA	33	0	19	8	6	4	4	3	4	3	12	11	0
Oklahoma City, OK	12	4	12	8	6	4	4	2	2	7	13	3	4
Omaha, NE-IA	13	0	9	7	1	1	0	0	0	0	1	1	0
Orange County, CA	12	3	12	56	58	46	35	38	25	15	9	9	3
Orlando, FL	14	5	9	2	9	4	1	4	4	3	1	1	4
Philadelphia, PA-NJ	49	39	34	53	44	39	48	24	50	26	30	22	32
Phoenix-Mesa, AZ	52	44	23	29	34	13	11	15	17	11	25	17	15
Pittsburgh, PA	56	21	38	43	21	19	22	9	13	19	25	11	20
Portland-Vancouver, OR-WA	17	0	12	9	5	12	10	6	0	3	2	6	0
Providence-Fall River-Warwick, RI-MA	21	11	11	18	9	13	18	5	7	7	11	4	10
Raleigh-Durham-Chapel Hill, NC	18	24	4	4	14	15	6	1	11	2	1	1	13
Richmond-Petersburg, VA	11	21	10	37	11	6	18	8	30	13	19	5	21
Riverside-San Bernardino, CA	56	123	36	185	190	158	159	175	167	148	125	118	106
Rochester, NY	8	6	8	24	5	5	16	2	0	1	6	0	6
Sacramento, CA	35	19	13	88	71	66	69	48	22	37	34	33	2
St. Louis, MO-IL	60	15	53	44	29	24	33	16	9	32	35	20	15
Salt Lake City-Ogden, UT	26	2	12	16	22	5	20	9	2	4	4	9	1
San Antonio, TX	7	3	7	7	3	4	3	1	3	4	18	3	3

Continued next page

Table 4-45 Cont'd

Air Pollution Trends in Selected Metropolitan Statistical Areas

(Number of days with PSI values greater than 100 at trend sites and all monitoring sites)

	All sites		Trend sites										
	Total number of sites	PSI days > 100 (1997)	Number of trend sites	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
San Diego, CA	28	16	20	123	128	97	67	66	57	45	47	31	14
San Francisco, CA	11	0	9	1	0	0	0	0	0	0	2	0	0
San Jose, CA	11	0	8	24	21	10	13	3	4	2	9	7	0
Scranton-Wilkes Barre-Hazleton, PA	11	11	10	30	6	9	15	3	8	6	10	4	9
Seattle-Bellevue-Everett, WA	23	1	16	20	7	10	5	3	0	3	0	6	1
Springfield, MA	13	10	13	29	10	13	15	12	13	12	10	5	10
Syracuse, NY	8	2	4	1	2	1	2	0	0	0	0	0	0
Tacoma, WA	9	0	7	10	4	5	1	3	0	2	0	1	0
Tampa, FL	32	4	22	9	4	6	1	1	1	3	2	3	4
Toledo, OH	8	5	5	29	8	3	6	1	4	9	7	10	3
Tucson, AZ	27	1	21	6	2	1	0	1	1	1	3	0	1
Tulsa, OK	13	7	12	23	5	16	12	2	4	12	21	14	7
Ventura, CA	15	48	13	108	93	70	89	55	44	64	66	62	44
Washington, DC-MD-VA-WV	47	31	32	56	27	26	49	15	47	21	30	18	28
West Palm Beach-Boca Raton, FL	10	0	6	0	1	0	0	0	3	0	0	0	0
Wilmington-Newark, DE-MD	12	21	5	28	12	9	12	7	10	5	12	3	6
Youngstown-Warren, OH	14	10	9	25	8	3	14	5	2	0	11	5	3

NOTES: The Pollutant Standards Index (PSI) 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. A PSI 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 1988 and 1997. This table has been substantially revised from last year.

SOURCE: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *National Air Quality and Emissions Trends Report, 1997* (Research Triangle Park, NC: 1999), table A-15.

Table 4-46 Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants

(Condensed nonattainment area list as of Dec. 7, 1998)

Ref. no.	States	Consolidated nonattainment area name[a]	Number of areas in nonattainment[d]						Area population, in 1000s[n]					
			O_3[e]	CO	SO_2	PM-10	Pb	NO_2	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

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

Continued next page

Table 4-46 Cont'd

Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants

(Condensed nonattainment area list as of Dec. 7, 1998)

Ref. no.	States	Consolidated nonattainment area name[a]	Number of areas in nonattainment[d]						Area population, in 1000s[n]					
			O_3[e]	CO	SO_2	PM-10	Pb	NO_2	O_3[d]	CO	SO_2	PM-10	Pb	Total exposed
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	Canon City	•	•	•	1	•	•				12		12
31	CO	Colorado Springs	•	1	•	•	•	•		353				353
32	CO	Denver-Boulder	•	1	•	1	•	•		1,800		1,836		1,836
33	CO	Fort Collins	•	1	•	•	•	•		106				106
34	CO	Lamar	•	•	•	1	•	•				8		8
35	CO	Longmont	•	1	•	•	•	•		52				52
36	CO	Pagosa Springs	•	•	•	1	•	•				1		1
37	CO	Steamboat Springs	•	•	•	1	•	•				6		6
38	CO	Telluride	•		•	1	•	•				1		1
39	CT	Greater Connecticut	1	•	•	1	•	•	2,470			126		2,470
40	DC-MD-VA	Washington	1	•	•	•	•	•	3,923					3,923
41	GA	Atlanta	1	•	•	•	•	•	2,653					2,653
42	GA	Muscogee Co. (Columbus)	•	•	•	•	1	•					179	179
43	GU[b]	Piti Power Plant	•	•	1	•	•	•			0			0
44	GU[b]	Tanguisson Power Plant	•	•	1	•	•	•			0			0
45	ID	Boise	•	•	•	1	•	•				125		125
46	ID	Bonner Co.(Sandpoint)	•	•	•	1	•	•				26		26
47	ID	Fort Hall Indian Reservation	•	•	•	1	•	•				74		74
48	ID	Portneuf Valley	•	•	•	1	•	•				1		1
49	ID	Shoshone Co.	•	•	•	2	•	•				13		13
50	IL-IN	Chicago-Gary-Lake County	1	•	1	3	•	•	7,887		475	625		7,887

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

Continued next page

Table 4-46 Cont'd **Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants**
(Condensed nonattainment area list as of Dec. 7, 1998)

Ref. no.	States	Consolidated nonattainment area name[a]	Number of areas in nonattainment[d]						Area population, in 1000s[n]					
			O_3[e]	CO	SO_2	PM-10	Pb	NO_2	O_3[d]	CO	SO_2	PM-10	Pb	Total exposed
51	IN	Marion Co. (Indianapolis)	•	•	•	•	1[h]	•					16	16
52	KY	Boyd Co. (Ashland)	•	•	1[g]	•	•	•			51			51
53	KY-IN	Louisville	1	•	•	•	•	•	834					834
54	LA	Baton Rouge	1	•	•	•	•	•	559					559
55	MA	Springfield (W. Mass)	1	•	•	•	•	•	812					812
56	MA-NH	Boston-Lawrence-Worcester	1	•	•	•	•	•	5,507					5,507
57	MD	Baltimore	1	•	•	•	•	•	2,348					2,348
58	MD	Kent and Queen Anne Cos.	1	•	•	•	•	•	52					52
59	ME	Portland	1	•	•	•	•	•	441					441
60	MI	Muskegon	1	•	•	•	•	•	159					159
61	MN	Minneapolis-St. Paul	•	1	•	1	•	•		2,310		272		2,310
62	MN	Olmsted Co. (Rochester)	•	•	1	•	•	•			71			71
63	MO	Dent	•	•	•	•	1	•					2	2
64	MO	Liberty-Arcadia	•	•	•	•	1	•					2	2
65	MO-IL	St. Louis	1	•	•	•	1[i]	•	2,390				2	2,390
66	MT	Butte	•	•	•	1	•	•				33		33
67	MT	Columbia Falls	•	•	•	1	•	•				2		2
68	MT	Kalispell	•	•	•	1	•	•				11		11
69	MT	Lame Deer	•	•	•	1	•	•				0		0
70	MT	Lewis & Clark (E. Helena)	•	•	1	•	1[j]	•			2		2	2
71	MT	Libby	•	•	•	1	•	•				2		2
72	MT	Missoula	•	1	•	1	•	•		43		43		43
73	MT	Polson	•	•	•	1	•	•				3		3
74	MT	Ronan	•	•	•	1	•	•				1		1
75	MT	Thompson Falls	•	•	•	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

Continued next page

Table 4-46 Cont'd

Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants

(Condensed nonattainment area list as of Dec. 7, 1998)

Ref. no.	States	Consolidated nonattainment area name[a]	Number of areas in nonattainment[d]						Area population, in 1000s[n]					
			O_3[e]	CO	SO_2	PM-10	Pb	NO_2	O_3[d]	CO	SO_2	PM-10	Pb	Total exposed
76	MT	Whitefish	•	•	•	1	•	•				3		3
77	MT	Yellowstone Co. (Laurel)	•	•	1	•	•	•			5			5
78	NE	Douglas Co. (Omaha)	•	•	•	•	1	•					1	1
79	NH	Portsmouth-Dover-Rochester	1	•	•	•	•	•	183					183
80	NM	Anthony	•	•	•	1	•	•				1		1
81	NM	Grant Co.	•	•	1	•	•	•			27			27
82	NM	Sunland Park	1[f]	•	•	•	•	•	8					8
83	NV	Central Steptoe Valley	•	•	1	•	•	•			2			2
84	NV	Las Vegas	•	1	•	1	•	•		258		741		741
85	NV	Reno	•	1	•	1	•	•		134		254		254
86	NY-NJ-CT	New York-N. New Jersey-Long Island	1	1	•	1	•	•	17,943	13,155		1,487		17,943
87	OH	Cleveland-Akron-Lorain	•	•	3	1	•	•			1,898	1,412		1,898
88	OH	Coshocton Co.	•	•	1	•	•	•			35			35
89	OH	Gallia Co.	•	•	1	•	•	•			30			30
90	OH	Jefferson Co. (Steubenville)	•	•	1	1	•	•			80	4		80
91	OH	Lucas Co. (Toledo)	•	•	1	•	•	•			462			462
92	OH-KY	Cincinnati-Hamilton	1	•	•	•	•	•	1,705					1,705
93	OR	Grants Pass	•	1	•	1	•	•		17		17		17
94	OR	Klamath Falls	•	1	•	1	•	•		18		17		18
95	OR	LaGrande	•	•	•	1	•	•				11		11
96	OR	Lakeview	•	•	•	1	•	•				2		2
97	OR	Medford	•	1	•	1	•	•		62		63		63
98	OR	Oakridge	•	•	•	1	•	•				3		3
99	OR	Springfield-Eugene	•	•	•	1	•	•				157		157
100	PA	Lancaster	1	•	•	•	•	•	423					423

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

Continued next page

Table 4-46 Cont'd

Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants

(Condensed nonattainment area list as of Dec. 7, 1998)

Ref. no.	States	Consolidated nonattainment area name[a]	Number of areas in nonattainment[d]						Area population, in 1000s[n]					
			O_3[e]	CO	SO_2	PM-10	Pb	NO_2	O_3[d]	CO	SO_2	PM-10	Pb	Total exposed
101	PA	Pittsburgh-Beaver Valley	1	•	2	1	•	•	2,468		446	75		2,468
102	PA	Warren Co	•	•	2	•	•	•			22			22
103	PA-DE-NJ-MD	Philadelphia-Wilmington-Trenton	1	•	•	•	•	•	6,010					6,010
104	PA-NJ	Allentown-Bethlehem		•	1						91			91
105	PR	Guaynabo Co.	•	•	•	1	•	•				85		85
106	RI	Providence (all of RI)	1	•	•	•	•	•	1,003					1,003
107	TN	Shelby Co. (Memphis)	•	•	•	•	1[k]	•					826	826
108	TN	Nashville	•	•	•	•	1[l]	•					81	81
109	TX	Beaumont-Port Arthur	1	•	•	•	•	•	361					361
110	TX	Dallas-Fort Worth	1	•	•	•	1[m]	•	3,561				264	3,561
111	TX	El Paso	1	1	•	1	•	•	592	54		515		592
112	TX	Houston-Galveston-Brazoria	1	•	•	•	•	•	3,731					3,731
113	UT	Ogden	•	1	•	1	•	•		63		63		63
114	UT	Salt Lake City	•	•	1	1	•	•			725	725		725
115	UT	Tooele Co.	•	•	1	•	•	•			26			26
116	UT	Utah Co. (Provo)	•	1	•	1	•	•		85		263		263
117	WA	Olympia-Tumwater-Lacey	•	•	•	1	•	•				63		63
118	WA	Seattle-Tacoma	•	•	•	3	•	•				730		730
119	WA	Spokane	•	1	•	1	•	•		279		177		279
120	WA	Wallula	•	•	•	1	•	•				47		47
121	WA	Yakima	•	•	•	1	•	•				54		54
122	WI	Door Co.	1	•	•	•	•	•	26					26
123	WI	Manitowoc Co.	1	•	•	•	•	•	80					80
124	WI	Marathon Co. (Wausau)	•	•	1	•	•	•			115			115
125	WI	Milwaukee-Racine	1	•	•	•	•	•	1,735					1,735

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

Continued next page

Table 4-46 Cont'd

Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants
(Condensed nonattainment area list as of Dec. 7, 1998)

Ref. no.	States	Consolidated nonattainment area name[a]	Number of areas in nonattainment[d]						Area population, in 1000s[n]					
			O_3[e]	CO	SO_2	PM-10	Pb	NO_2	O_3[d]	CO	SO_2	PM-10	Pb	Total exposed
126	WI	Oneida Co. (Rhinelander)	•	•	1	•	•	•			31			31
127	WV	Follansbee	•	•	•	1	•	•				3		3
128	WV	New Manchester Gr. (in Hancock Co)	•	•	1	•	•	•			10			10
129	WV	Wier.-Butler-Clay (in Hancock Co)	•	•	1	1	•	•			25	22		25
130	WY	Sheridan	•	•	•	1	•	•				13		13
National totals (130 areas)[c]			**38**	**20**	**33**	**78**	**10**	**0**	**99,824**	**34,047**	**4,664**	**29,919**	**1,375**	**113,090**

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

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.

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 available at http://www.epa.gov/airs/nonattn.html as of June 18, 1999.

Section E
Water Pollution, Noise, and Solid Waste

Table 4-47 Annual Oil Spills in U.S. Navigable Waters by Vessel Type (Thousands of gallons)

	1982	1984	1986	1988	1990	1992	1994	1996	1998[P]
Vessels									
Tankships, incidents	279	238	196	222	249	193	174	49	103
Volume	1,220	4,664	1,165	852	4,977	118	69	[R]284	26
Tank barges, incidents	547	499	516	486	458	322	385	90	216
Volume	2,147	2,484	1,510	3,164	1,042	149	877	542	260
Other vessels, incidents	1,383	1,530	900	1,300	1,779	4,795	4,736	3,512	2,630
Volume	412	1,863	161	370	418	398	331	753	296
Total incidents, vessels	**2,209**	**2,267**	**1,612**	**2,008**	**2,486**	**5,310**	**5,295**	**3,651**	**2,949**
Volume	3,779	9,012	2,836	4,386	6,437	665	1,277	1,578	582
Nonvessel[a]									
Total incidents	**5,275**	**5,991**	**3,381**	**2,990**	**5,692**	**4,181**	**4,145**	**723**	**5,159**
Volume	6,566	8,994	1,446	2,200	1,528	1,210	18,236	424	911
TOTAL incidents, vessels and nonvessels	**7,484**	**8,258**	**4,993**	**4,998**	**8,178**	**9,491**	**9,440**	**4,374**	**8,108**
TOTAL volume	**10,345**	**18,006**	**4,282**	**6,586**	**7,965**	**1,876**	**19,513**	**2,002**	**1,493**

KEY: P = preliminary; R = revised

[a] Nonvessel includes facilities, pipelines, other shoreside marine sources, and unknown sources.

SOURCES: 1982–96: U.S. Department of Transportation, U.S. Coast Guard, Marine Safety and Environmental Protection, Resource Management Directorate (G-MRI-1), personal communication, Apr. 3, 1998; and Oct. 3, 1997 (for 1995 data) and Oct. 16, 1995 (for 1982–94 data).

1997–98: 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.

Table 4-48 Leaking Underground Storage Tank Releases and Cleanups

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Confirmed releases									
Cleanups initiated	51,770	79,506	129,074	171,082	209,797	238,671	252,615	292,446	314,965
Cleanups not initiated	35,758	47,689	55,383	65,940	60,770	64,964	64,873	49,327	56,422
Total	**87,528**	**127,195**	**184,457**	**237,022**	**270,567**	**303,635**	**317,488**	**341,773**	**371,387**
Confirmed releases									
Cleanups completed	16,905	26,666	55,444	87,065	107,448	131,272	152,683	178,297	203,247
Releases not cleaned up	70,623	100,529	129,013	149,957	163,119	172,363	164,805	163,476	168,140
Total	**87,528**	**127,195**	**184,457**	**237,022**	**270,567**	**303,635**	**317,488**	**341,773**	**371,387**

NOTE: All numbers are cumulative. 1998 data are current to Sept. 20, 1998.

SOURCE: U.S. Environmental Protection Agency, Office of Underground Storage Tanks, personal communications, Nov. 17 and 18, 1998.

Table 4-49 Highway Noise Barrier Construction (Miles)

	Unknown	1970–79	1980–89	1990	1995	Total 1970–95
Type I barriers[a]	6	104	422	45	78	R946
Type II barriers[b]	0	71	130	20	31	252
All other types[c]	N	2	15	1	6	24
Total length	**6**	**R179**	**567**	**65**	**R114**	**1,318**
Cost (1995 $ millions)	N	130	624	92	141	987

KEY: N = data are nonexistent; 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.

NOTES: Miles have been converted from kilometers. Totals may not match the sum of yearly estimates due to rounding and conversion from metric. Note that 6 miles of noise barriers can neither be assigned a year of construction nor a cost. Additionally, 17 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: 1996), table 3.

Table 4-50 Motor Vehicles Scrapped[a] (Thousands)

	1970	1975	1980	1985	1990	1995	1996	1997	1998
Passenger cars	7,461	5,669	8,405	7,729	8,897	7,414	7,527	8,244	6,819
Trucks	837	908	1,732	2,100	2,177	2,918	R3,284	4,265	4,846
Total motor vehicles	**8,298**	**6,577**	**10,137**	**9,829**	**11,074**	**10,332**	**R10,811**	**12,509**	**11,665**

[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, June 7, 1999.

KEY: R = revised

Section F
Accuracy Profiles

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 (DOE) 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 a variable's total volume. 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.

The monthly surveys provide the data that are used in the monthly and annual reports. The surveys 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 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. All companies with activities in the surveyed areas are required to

Table 1.
Average Response Rates for Monthly Surveys, 1994

Survey site	Average universe site	Average number of respondents	Percent
Refinery	243	237	97.4
Bulk terminal	332	331	99.6
Pipeline	85	85	99.6
Crude oil stocks	164	164	99.7

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: 1994).

respond except those with oxygenate and propane operations, which are sampled monthly. Monthly data are reviewed more carefully than the weekly data and EIA expends considerable effort to ensure that it's 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 preliminary 1996 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.

No complicated survey is likely to be 100 percent accurate. EIA lists four sources of potential systematic errors:

1. First, 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. Second, some members of the target population do not respond. EIA reports that the monthly surveys receive over 97 percent response. For some points, the average response is over 99 percent, or all but one out of several hundred recipients. Survey respondents are required by law to respond, but some nonresponse is inevitable, especially among small companies. EIA assumes that 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. EIA's response rate is very good, probably covering over 99 percent of production (assuming that bigger companies always respond eventually.) Furthermore, 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 8.25 mmbd in 1997 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 third and probably most serious problem is 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.

EIA offers an electronic reporting system that can review the data before transmission. Gross errors or missing data are likely to be flagged for review by the company. However, not all errors will be picked up by the system, and not all companies use the system. Again, the problems are more likely to be with smaller companies that must manually transfer data from accounting files to the survey. It is inevitable that some employees won't take this task seriously. Others may make mistakes in the process of transferring numbers. Some errors will be picked up in

EIA's review process or later by the company and corrected.

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 significant 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 (e.g., in table 4-1) 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 (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 (USDOT) Federal Highway Administration (FHWA). It should be noted that transportation consumption cannot be estimated separately from other sectors, because sometimes the amount allocated to transportation is the total supply of a product minus that used by other sectors such as electricity.

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 2 shows the ratio of fuel supplied to the sector to

Table 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).

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 division into sectoral use is known to within plus or minus several percentage points, or perhaps about half a quadrillion British thermal unit (Btu) in table 4-1.

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 1997, FHWA reported 121 billion gallons of gasoline sold nationally for highway use (equivalent to 15.13 quads of energy.) EIA's table 5.12b of the *Annual Energy Review 1997* lists 7.89 mmbd of gasoline supplied for the transportation sector, the same as 121 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 8.01 mmbd in 1997, which is probably accurate to the first decimal place and

maybe a little better. The transportation sector's 7.89 mmbd would have about the same accuracy, which implies an accuracy of about plus or minus 1.5 billion gallons.

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 measure of 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 survey 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, as discussed above. 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 must 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. It can be expected that 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

Even collectively, all other fuels (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 (form EIA-819A and 819M), as noted above. Consumption is estimated from production, net imports, and stock changes. Refineries and other entities are required to report data on oxygenates, and the U.S. Department of Energy (DOE) Energy Information Administration (EIA) also monitors production capability to provide a crosscheck. Thus, oxygenate 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 for various alternative vehicles are important sources of information on this activity. Since most are working 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 (USDOT) Federal Transit Administration (FTA) 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 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 probably may not. These 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 the region are used to esti-

mate 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 survey 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 and probably not very accurate. However, the changes from year to year should be more accurate.

FUEL AND ENERGY CONSUMPTION BY MODE

TABLE 4-5: Fuel Consumption by Mode of Transportation

TABLE 4-6: Energy Consumption by Mode of Transportation

TABLE 4-8: Certificated Air Carrier Fuel Consumption and Travel

TABLE 4-9: Motor Vehicle Fuel Consumption and Travel

TABLE 4-11: Passenger Car and Motorcycle Fuel Consumption and Travel

TABLE 4-12: Other 2-Axle 4-Tire Vehicle Fuel Consumption and Travel

TABLE 4-13: 2-Axle 6-Tire or More Truck Fuel Consumption and Travel

TABLE 4-14: Combination Truck Fuel Consumption and Travel

TABLE 4-15: Bus Fuel Consumption and Travel

TABLE 4-16: Transit Industry Electric Power and Primary Energy Consumption and Travel

TABLE 4-17: Class I Rail Freight Fuel Consumption and Travel

TABLE 4-18: Amtrak Fuel Consumption and Travel

Fuel consumption data are collected quite differently than supply data collected by the U.S. Department of Energy (DOE) Energy Information Administration (EIA). For example, highway fuel consumption is based on U.S. Department of Transportation (USDOT) Federal Highway Administration (FHWA) data collected from the 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 the FHWA. All states plus the District of Columbia report the total of fuel sold along with travel by highway category and vehicle registration. Data typically flows from state revenue offices to the state department of transportation to the FHWA. Even if the reporting is reasonably accurate, some data are always anomalous or missing and must be modified to fit expected patterns. In addition, as discussed above, 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 vehicle's fuel tank, the tracer indicates diversion from a non-taxed source.

Breaking fuel use down by classes of cars, trucks, and buses introduces further potential 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 Truck Inventory and Use Survey (TIUS), 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 VMT and fuel economy are just estimates, not hard data.

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.

The APTA figures are based on data from the USDOT Federal Transit Administration (FTA) National Transit Database. 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. FTA data account for about 90 to 95 percent of total passenger-miles. Prior to 1984, APTA did not include most rural and demand responsive systems. Reliability varies by mode; the numbers of rail are comprehensive because there are relatively few rail operators, but the data for bus, ferry boat, and demand response are less reliable because there are many operators.

Air

Data on large scheduled airlines (with revenues over $100 million per year) are collected by the USDOT, Bureau of Transportation Statistics, Office of Airline Information (OAI), via form 41. This form includes fuel use. The responses probably are 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 4-3 or 4-7.

The USDOT, Federal Aviation Administration (FAA) conducts annually the General Aviation and Air Taxi Activity Survey. Beginning in 1978, this survey covers general aviation aircraft in the United States using the FAA registry as the sampling frame. For instance, in 1997, a sample of 29,954 aircraft were identified and surveyed from an approximate population of 251,571 registered general aviation aircraft. FAA's objective was to obtain estimates by stratifying the sampling frame by flight-hour variation by state, aircraft type, and aircraft manufacturer/model group.

Two types of error can be attributed to all survey research: sampling and nonsampling. In terms of sampling error, the FAA set the standard error tolerance level at a 95 percent confidence interval for large states; 90 percent for small states; and 90 to 80 percent for various groups of aircraft types. Standard errors can be standardized for comparability by dividing the standard error by the estimate and multiplying by 100. This quantity, referred to as the percent standard error, never rose about five-tenths of a percent for the general aviation fleet from 1980 to 1995, and it was seven-tenths of a percent in 1996.

Nonsampling errors could include nonresponse, a respondent's inability or unwillingness to provide correct information, differences in interpretation of questions, and data entry mistakes, among others. The reliability of general aviation fleet data comparisons over time would decrease because of changes implemented in 1978 and sampling errors discussed above. Users should note that nonresponse bias may be a component of reliability errors in the data from 1980 to 1990. The FAA conducted nonresponse surveys for 1977, 1978, and 1979 and found no significant differences or inconsistencies between respondent and nonrespondent replies. The FAA discontinued the nonresponse survey in 1980 to save money. Nonresponse surveys were resumed in 1990, and the FAA found notable differences between respondent and nonrespondent replies, and thus revised 1990 to 1995 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 1-14, 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.

EIA reports that 1996 net production of jet fuel in the United States was about 24 billion gallons. The total of private and government consumption was about 23 billion gallons, which is close to production. Accounting for DOD foreign purchases would widen the difference, but overall, consumption of jet fuel is fairly well defined.

Rail

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* required of Class I railroads. STB defines Class I railroads as having operating revenues of $255 million or more. Although Class I railroads encompass for only 2 percent of the number of railroads in the country, they account for over 70 percent of the industry's mileage operated and 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. Recent Amtrak fuel use data are no longer listed here.

Transit

The APTA figures are based on information in FTA's National Transit Data Base, 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. 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).

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 30,000 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 92.8 percent response rate for the 1997 survey. The EIA also provides estimates of the sampling error for geographic areas and U.S. averages are 1.9 for residential distillate fuel oil, 2.2 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 87 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 also is likely that some consumption is missed. For example, Health and Human Resources reported less than 0.1 trillion British thermal units of motor gasoline (800,000 gallons) used in 1997, down from 0.4 trillion in 1987, an unlikely reduction. 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 Intensiveness of Passenger Modes

TABLE 4-21: Energy Intensiveness of Certificated Air Carriers, All Services

TABLE 4-22: Energy Intensiveness of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

TABLE 4-24: Energy Intensiveness of Transit Motor Buses

TABLE 4-26: Energy Intensiveness of Amtrak Service

TABLE 4-25: Energy Intensiveness of Class I Railroad Freight 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 1-28 and 1-29. 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 hard 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). 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* required of Class-I railroads. STB defines Class I railroads as having operating revenues of $255 million or more. 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. For passenger travel, Amtrak data (table 4-26) have been unavailable for several years.

TABLE 4-27: Annual Wasted Fuel Due to Congestion

TABLE 4-28: Wasted Fuel per Eligible Driver

The Texas Transportation Institute (TTI) provided these figures. They obtain most of their data from the Highway Performance Monitoring System (HPMS) database compiled by the Federal Highway Administration (FHWA), which in turn relies on data submitted by state Departments of Transportation. (See box 1-1 for detailed information about the HPMS.) Because of interstate variation, TTI reviews and adjusts data and then receives feedback from selected state and local agencies. TTI documentation reports that previous year's data estimates have been changed and may differ from past publications. Wasted fuel is an estimate of urban area fuel consumption rates in congested and free-flow travel. These tables present the total value of extra fuel consumed because of congested speeds.

Model Structure

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. Annual wasted fuel is the sum of the total recurring and incident wasted fuel amounts.

Assumptions

The TTI study's unit of analysis is based on the U.S. Census Bureau's definition of an urbanized area. This definition requires that an urbanized area, the central city, and its surrounding "fringe" areas have a population of at least 50,000. The fringe areas must be contiguous to the central city and have a population density of more than 1,000 persons per square mile. The principal parameters of TTI's analysis consist of areawide estimates of vehicle-miles of travel (VMT), lane-miles of roadway (Ln-Mi), travel speed, and fuel economy for urban areas. TTI estimates travel speed for freeway and principal arterial street links using daily

traffic volumes per lane. Moreover, each link speed is categorized as being uncongested (60 mph on freeways and 35 on arterial streets), moderately congested (38 mph on freeways and 28 on arterials), heavily congested (33 mph on freeways and 25 on arterials), or severely congested (30 mph on freeways and 23 on arterial streets). Average fuel economy is calculated with a linear regression.

Parameter Estimation

The Annual Wasted Fuel estimate is derived with multiplication and division of variables resulting from an iterative process also primarily estimated from summation, multiplication, and division. Additional parameters of consequence and their data sources include Statewide average fuel cost estimates (published by the American Automobile Association, 1996) 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 faces 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 nonsampling error for their model.

Information about sensitivity analysis or external reviews of the model could not be obtained and users should interpret the data cautiously. Readers should refer to the TII annual report *Urban Roadway Congestion* for more detailed algorithms and estimation procedures or their Internet site (http:// mobility.tamu.edu/study/methodology.stm).

ENVIRONMENT

TABLE 4-36: National Average Vehicle Emissions Rates by Vehicle Type and Fuel

TABLE 4-37: National Average Vehicle Emissions Rates by Vehicle Type Using Reformulated Gasoline (RFG)

Average emissions factors for each vehicle and fuel type are generated by the U.S. Environmental Protection Agency Mobile Source Emissions Factor Model (MOBILE). 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 vehicle type, age, and fuel type for the nation's fleet and assuming the Federal Test Procedure conditions. They do 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 4-38, 4-39, and 4-40: Estimates of National Emissions of Carbon Monoxide (CO), Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOC)

Emissions of CO, NOx and VOC 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.

Highway vehicle emissions of CO, NO_x, and VOC are generated by Mobile Source Emissions Factor Model (MOBILE), which calculates county-level emissions based on per-mile vehicle emissions factors and vehicle travel (vehicle-miles) and adjusts emissions rates based on fuel characteristics, vehicle fleet composition, emissions control measures, average vehicle speed, and other factors that can affect emissions. Emissions rates used by MOBILE are based on vehicle certification tests, emissions standards, and in-use vehicle tests and are updated approximately every three years. Vehicle travel estimates by vehicle type and highway type are taken from the U.S. Department of Transportation, Federal Highway Administration's Highway Performance Monitoring System, which is based on an annual survey of state traffic counts. 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 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.

TABLE 4-41: Estimates of National Emissions of Particulate Matter (PM-10)

TABLE 4-42: Estimates of National Emissions of Particulate Matter (PM-2.5)

Particulate 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.

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,

[1] Public Law 91-604 84 Stat. 1705 December 31, 1970.

weather, etc.). Vehicle travel estimates by vehicle type and highway type are taken from the U.S. Department of Transportation Federal Highway Administration Highway Performance Monitoring System which is based on an annual survey of State traffic counts. 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 from paved and unpaved roads are calculated by multiplying vehicle-miles of travel on each type of road by emissions factors for each vehicle type and road type (which accounts for silt loadings for different highway types).

Nonhighway vehicle emissions are calculated by applying a growth factor (based on modal activity trends) to modal 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.

TABLE 4-43: Estimates of National Emissions of Sulfur Dioxide

Sulfur dioxide (SO_2) 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.

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.

TABLE 4-44: Estimates of National Emissions of Lead

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.

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, which is 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 4-45: Air Pollution Trends in Selected Metropolitan Statistical Areas

TABLE 4-46: Areas in Nonattainment of National Ambient Air Quality Standards for Criteria Pollutants

Concentrations of pollutants in the ambient air are directly measured at U.S. Environmental Protection Agency air quality monitoring sites 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 4-47: Annual Oil Spills in U.S. Navigable Waters by Vessel Type

Oil spill data is an inventory of confirmed oil spills into navigable waterways reported to the National Response Center and maintained by the U.S. Coast Guard (USCG), Office of Marine Safety and Environmental Protection. Spill volumes reflect the amount of oil released into the water as estimated by the USCG site investigator and do not account for the volume of oil recovered. Spill volumes released from vessels are typically estimated by subtracting the amount of oil remaining in the vessel after the spill from the amount reported to be onboard prior to the release.

TABLE 4-48: Leaking Underground Storage Tank Releases and Cleanups

The national inventory of corrective actions 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 represent an inventory of reported spills and corrective actions and can be affected by general accounting errors, some of which have changed semi-annual counts by as many as 2,000 actions.

TABLE 4-49: Highway Noise Barrier Construction

Highway noise barrier construction extent and costs represent best estimates supplied to U.S. Department of Transportation Federal Highway Administration by state highway agencies (SHAs). Therefore, individual SHA definitions of barrier information and costs may differ, leading to nonuniformity and/or anomalies among state data, which will in turn affect national totals. Still, annual national trends should be consistent as long as individual state methodologies remain so.

TABLE 4-50: Motor Vehicles Scrapped

The annual numbers of scrapped motor vehicles are one component of The Polk Company's Vehicles in Operation database. This database is a census of vehicles that are currently registered in all states within the United States and is based on vehicle registration and title records received by Polk from state departments of motor vehicles (DMV). The database is updated 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 subse-

[2] Public Law 94-580 90 Stat. 2795 October 21, 1976.

quently 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.

REFERENCES

U.S. Department of Energy, Energy Information Administration. 1994. *Accuracy of Petroleum Supply Data*. Tammy G. Heppner and Carol L. French, eds. Washington, DC.

U.S. Department of Energy, Energy Information Administration. 1990. *Energy Consumption by End-Use Sector, A Comparison of Measures by Consumption and Supply Surveys,* DOE/EIA-0533. Washington, DC.

U.S. Environmental Protection Agency, Office of Mobile Sources. 1998. *MOBILE5 Information Sheet #7: NOx Benefits of Reformulated Gasoline Using MOBILE5a*. Ann Arbor, MI. September 30.

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. 1998. *National Air Pollutant Emission Trends*, *Procedure Document, 1900-1996*. EPA-454/R-98-008. Research Triange Park, NC. May.

U.S. Environmental Protection Agency, Office of Mobile Sources. 1996. Memorandum on Release of MOBILE5b. (Revised Chapter 2 for the Users Guide to MOBILE5). October 11.

U.S. Environmental Protection Agency, Office of Air Quality and Standards, Emission Factor and Inventory Group. 1995. *Compilation of Air Pollutant Emission Factors AP-42, Volume II: Mobile Sources*. Appendix H. Fifth ed. June 30.

U.S. Environmental Protection Agency, Office of Mobile Sources (OMS). 1995. *Draft User's Guide to PART5: A Program for Calculating Particle Emissions from Motor Vehicles,* EPA-AA-AQAB-94-2. Ann Arbor, MI. February.

U.S. EPA, Office of Mobile Sources. 1994. *Users Guide to MOBILE5 (Mobile Source Emission Factor Model),* EPA-AA-TEB-94-01. Ann Arbor, MI. May.

U.S. Environmental Protection Agency, Office of Air and Radiation. 1992. *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources,* EPA-450/4-81-026d (Revised).

Modal Profiles

Air Carrier Profile

Financial	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Operating revenues ($ thousands)								
Domestic total[a,b]	2,178,339	7,181,030	26,440,297	57,960,508	70,885,050	76,890,526	82,249,568	87,012,347
Majors, all services	[e]1,942,635	[e]6,272,775	[f]23,012,073	[h]53,333,552	[h]64,317,169	[h]70,036,709	[h]74,942,391	[h]77,650,810
Nationals, all services	146,481	736,831	3,182,418	[i]4,167,552	[i]5,935,773	[i]5,990,391	[i]6,163,458	[i]7,931,742
Large regionals, all services	N	N	245,806	[j]459,404	[j]632,108	[j]863,426	[j]1,143,719	[j]1,429,796
International total	705,938	2,109,497	6,442,144	17,990,355	23,433,483	25,046,820	27,318,034	26,894,781
Majors, all services	705,938	2,109,497	[g]5,976,221	[h]16,761,376	[h]19,892,111	[h]21,524,274	[h]23,608,853	[h]23,356,233
Nationals, all services	N	N	465,923	[i]901,352	[i]3,282,606	[i]3,326,467	[i]3,376,014	[i]3,005,449
Large regionals, all services	N	N	N	[j]327,627	[j]258,766	[j]196,079	[j]333,166	[j]533,099
Total certificated[a]	2,795,054	9,119,103	32,882,441	75,950,863	94,318,533	101,937,346	109,567,602	113,907,128
Operating expenses ($ thousands)								
Domestic total[a]	2,052,094	7,001,668	26,465,999	58,953,086	66,119,699	71,573,073	75,731,215	78,888,432
Majors, all services	1,907,785	6,256,039	[f]23,150,527	[h]54,209,401	[h]59,721,080	[h]64,793,763	[h]68,307,270	[h]70,114,852
Nationals, all services	144,309	745,629	3,058,289	[i]4,297,823	[i]5,750,372	[i]5,847,797	[i]6,163,923	[i]7,354,647
Large regionals, all services	N	N	257,183	[j]445,862	[j]648,247	[j]931,513	[j]1,260,021	[j]1,418,933
International total	665,660	2,065,605	6,642,095	18,914,480	22,335,257	24,155,203	25,249,593	25,743,706
Majors, all services	665,660	2,065,605	[g]6,171,366	[h]17,746,006	[h]19,061,258	[h]20,807,517	[h]21,688,642	[h]22,321,441
Nationals, all services	N	N	470,729	[i]853,361	[i]3,025,707	[i]3,166,097	[i]3,253,249	[i]2,932,329
Large regionals, all services	N	N	N	[j]315,113	[j]248,292	[j]181,589	[j]307,702	[j]489,937
Total certificated[a]	2,717,754	9,067,273	33,108,094	77,867,566	88,454,956	95,728,276	100,980,807	104,632,138
Inventory[c]								
Number of carriers								
Total domestic and international	[k]55	[k]39	[k]72	[k]62	[k]86	[k]96	[k]91	[k]87
Majors	N	N	12	12	11	12	13	13

KEY: N = data are nonexistent; P = data are preliminary; R = revised

Continued next page

Air Carrier Profile
Cont'd

Inventory[c]	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Nationals	N	N	17	16	26	33	31	30
Regionals	N	N	43	34	49	51	47	44
Number of aircraft available for service								
Total domestic and international	2,135	2,690	2,818	4,727	5,567	5,961	5,770	6,144
Majors	N	N	2,071	3,854	4,039	4,422	4,352	4,605
Nationals	N	N	432	650	1,143	1,167	967	1,113
Regionals	N	N	315	223	385	372	451	426
Number of employees								
Total domestic and international	169,872	304,690	354,264	588,926	608,188	[R]634,866	658,566	696,649
Majors	118,189	214,021	318,973	549,100	533,313	564,631	597,953	623,389
Nationals	12,470	24,913	29,922	32,077	59,444	56,586	48,709	59,620
Regionals	N	N	5,369	7,749	15,431	[R]13,649	11,904	13,640
Performance								
Aircraft revenue-miles (thousands)								
Domestic[b]								
Certificated, all services[a]	[l]858,451	[l]2,067,598	[m]2,523,375	[n]3,963,263	[n]4,629,394	[n]4,811,453	[n]4,910,948	[n]5,031,477
Major, all services[a]	716,961	1,778,065	2,113,669	[o]3,547,339	[o]3,953,287	[o]4,083,664	[o]4,191,113	[o]4,260,046
Nationals, all services[a]	94,794	247,055	330,528	[p]351,946	[p]569,641	[p]614,519	[p]594,241	[p]620,372
Large regionals, all services[a]	N	N	56,995	[m]60,542	[m]85,363	[m]96,573	[m]112,682	[m]131,931
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]1,190,685
Major, all services[a]	N	N	330,391	[p]666,231	[p]822,283	[p]859,483	[p]917,109	[p]1,003,726
Nationals, all services[a]	N	N	66,499	[u]48,812	[u]141,870	[u]150,147	[u]145,821	[u]128,906
Large regionals, all services[a]	N	N	2,948	[v]60,542	[v]27,761	[v]22,519	[v]47,138	[v]55,074

KEY: N = data are nonexistent; P = data are preliminary; R = revised

Continued next page

Air Carrier Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Medium regionals, all services, domestic and international[a]	N	N	23,204	[w]9,017	[w]28,847	[w]27,861	[w]16,660	[w]22,107
Total certificated[a]	1,040,056	2,542,264	2,924,346	4,723,601	5,627,052	5,854,766	6,024,764	622,162
Aircraft revenue-hours								
Domestic[b]								
Certificated, all services[a]	3,672,900	5,133,161	[m]6,247,795	[n]9,717,375	[n]11,378,134	[n]11,871,886	[n]12,060,253	[n]12,442,943
Major, all services[a]	2,802,317	4,066,480	4,941,327	[o]8,524,236	[o]9,257,260	[o]9,584,525	[o]9,828,418	[o]9,955,640
Nationals, all services[a]	606,146	908,935	919,187	[p]1,016,491	[p]1,839,835	[p]1,981,219	[p]1,882,975	[p]2,022,521
Large regionals, all services[a]	N	N	267,522	[m]167,826	[m]223,007	[m]260,985	[m]315,506	[m]417,299
International								
Certificated, all services[a]	608,736	977,325	[r]819,518	[s]1,556,760	[s]2,021,060	[s]2,113,467	[s]2,235,441	[s]2,390,348
Major, all services[a]	N	N	668,199	[p]1,351,349	[p]1,634,465	[p]1,712,416	[p]1,819,583	[p]1,992,776
Nationals, all services[a]	N	N	140,329	[u]101,533	[u]314,066	[u]329,311	[u]309,948	[u]279,009
Large regionals, all services[a]	N	N	7,583	[v]88,641	[v]59,572	[v]48,619	[v]97,304	[v]111,933
Medium regionals, all services, domestic and international[a]	N	N	123,411	[w]24,059	[w]70,989	[w]68,278	[w]41,960	[w]54,113
Total certificated[a]	4,281,636	6,110,486	7,190,724	11,298,194	13,399,194	13,985,353	14,295,694	14,833,291
Revenue passenger-miles (thousands)								
Domestic[b]								
Certificated, all services	31,098,944	108,441,978	[m]204,367,599	[n]345,872,950	[n]403,887,802	[n]434,651,687	[n]450,612,482	[n]464,394,550
Majors, all services	29,430,428	99,903,229	182,984,795	[o]327,112,620	[o]368,701,100	[o]395,099,254	[o]410,906,050	[o]422,545,555
Nationals, all services	1,170,779	7,642,071	20,466,712	[p]16,756,818	[p]29,255,179	[p]33,000,546	[p]33,241,082	[p]34,673,924
Large regionals, all services	N	N	711,868	[m]1,752,615	[m]4,381,267	[m]5,443,071	[m]5,778,338	[m]6,115,603
International								
Certificated, all services	[l]8,950,672	[l]39,695,392	[r]63,354,387	[s]126,362,697	[s]154,869,249	[s]161,512,010	[s]169,356,100	[s]172,015,002

KEY: N = data are nonexistent; P = data are preliminary; R = revised

Continued next page

Air Carrier Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Majors, all services	N	N	54,318,160	[p]118,268,507	[p]137,986,520	[p]145,330,811	[p]153,564,956	[p]157,398,986
Nationals, all services	N	N	8,659,592	[u]6,794,533	[u]16,128,695	[u]14,681,127	[u]13,616,245	[u]12,308,123
Large regionals, all services	N	N	330,288	[v]1,219,706	[v]676,925	[v]505,337	[v]2,148,486	[v]2,240,510
Medium regionals, all services, Domestic and international[a]	N	N	250,571	[w]330,848	[w]1,627,365	[w]2,103,551	[w]713,425	[w]1,126,851
Total certificated[a]	40,049,616	148,137,370	267,972,557	472,566,495	558,757,051	596,163,697	619,968,582	636,409,552
Average passenger revenue/ passenger-mile (Domestic, scheduled service)	6.09	6.00	11.49	13.43	13.48	13.76	13.97	14.04
Average passenger fare (Domestic, scheduled service)	30.01	40.65	84.60	107.86	106.66	110.37	114.10	114.08
Revenue passenger enplanements (thousands)								
Domestic[b]								
Certificated, all services[a]	[l]56,352	[l]153,662	[m]275,182	[n]428,767	[n]506,789	[n]538,394	[n]548,735	[n]568,022
Major, all services[a]	48,678	122,866	223,237	[o]393,927	[o]441,650	[o]466,743	[o]478,253	[o]488,494
Nationals, all services[a]	5,949	26,726	47,145	[p]32,015	[p]55,656	[p]62,183	[p]61,316	[p]67,664
Large regionals, all services[a]	N	N	3,748	[m]2,566	[m]7,136	[m]7,887	[m]8,203	[m]10,485
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]57,442
Major, all services[a]	N	N	23,949	[p]42,207	[p]44,155	[p]46,302	[p]48,614	[p]49,610
Nationals, all services[a]	N	N	2,343	[u]2,632	[u]8,114	[u]7,401	[u]6,896	[u]6,227
Large regionals, all services[a]	N	N	149	[v]1,246	[v]556	[v]405	[v]1,231	[v]1,537
Medium regionals, all services, Domestic and international[a]	N	N	1,125	[w]300	[w]2,386	[w]1,988	[w]989	[w]1,447
Total certificated[a]	62,256	169,922	302,821	475,193	559,653	592,909	605,502	625,464

KEY: N = data are nonexistent; P = data are preliminary; R = revised

Continued next page

Air Carrier Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Revenue passenger								
Load factor (%) (scheduled service)								
Domestic[b]								
Certificated	58.5	48.9	[m]58.0	[n]60.4	[n]65.4	[n]67.9	[n]69.1	[n]70.2
Majors	59.5	49.3	58.1	[o]60.6	[o]65.7	[o]68.5	[o]69.7	[o]70.7
Nationals	41.9	43.6	58.4	[p]56.6	[p]61.9	[p]61.5	[p]63.2	[p]65.1
Large regionals	N	N	47.7	[m]48.7	[m]56.0	[m]60.4	[m]60.7	[m]63.5
International								
Certificated	62.2	53.0	[r]62.8	[s]69.1	[s]71.8	[s]73.3	[s]74.1	[s]72.8
Majors	N	N	62.8	[p]69.1	[p]72.1	[p]73.7	[p]74.4	[p]72.9
Nationals	N	N	65.5	[u]73.4	[u]67.7	[u]67.8	[u]69.6	[u]70.9
Large regionals	N	N	73.9	[v]66.5	[v]44.5	[v]0.0	[v]64.9	[v]46.0
Medium regionals, all services, domestic and international[a]	N	N	[w]46.7	[w]0.0	[w]59.3	[w]66.7	[w]49.7	[w]50.7
U.S. international passenger travel								
Total passenger-arrivals (thousands)								
Flag of carrier								
United States	[x]1,332	[x]5,531	[y]10,031	[y]19,145	[z]24,582	[y]25,148	[y]26,744	[y]27,390
Foreign	1,234	4,343	10,231	17,269	22,328	24,704	27,571	28,791
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
Foreign	1,136	4,147	9,886	16,418	20,795	22,884	25,382	26,350

KEY: N = data are nonexistent; P = data are preliminary; R = revised

Continued next page

Air Carrier Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Total revenue ton-miles (thousands)[d]								
Domestic[b]								
Certificated, all services	[l]3,732,949	[l]13,876,802	[m]24,964,907	[n]43,651,162	[n]52,910,081	[n]56,326,750	[n]58,658,887	[n]60,199,183
Majors, all services	3,332,483	12,589,057	21,427,534	[o]39,107,033	[o]47,015,642	[o]50,096,661	[o]52,254,323	[o]53,554,024
Nationals, all services	121,157	850,477	3,336,057	[p]3,561,283	[p]4,996,345	[p]231,398	[p]5,317,576	[p]5,356,205
Large regionals, all services	N	N	180,042	[m]945,929	[m]718,659	[m]863,449	[m]971,942	[m]1,052,477
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]31,453,944
Majors, all services	N	N	7,377,733	[p]17,803,825	[p]21,517,789	[p]22,880,295	[p]24,971,379	[p]25,794,344
Nationals, all services	N	N	2,261,534	[u]1,229,849	[u]4,116,380	[u]4,603,920	[u]4,657,365	[u]4,165,930
Large regionals, all services	N	N	44,438	[v]835,701	[v]513,476	[v]396,142	[v]1,240,303	[v]1,440,865
Medium regionals, all services domestic and international[a]	N	N	28,178	[w]143,457	[w]327,474	[w]432,606	[w]190,298	[w]289,282
Total certificated[a]	5,024,285	20,185,503	34,682,153	63,770,534	79,205,765	84,504,471	89,603,186	91,653,127
Revenue ton-miles of freight (thousands)[d]								
Domestic[b]								
Certificated, all services	552,756	2,708,900	[m]4,528,316	[n]9,063,864	[n]12,520,057	[n]12,860,845	[n]13,601,412	[n]13,756,246
Majors, all services	321,176	U	3,129,087	[o]6,395,767	[o]10,145,537	[o]10,586,741	[o]11,163,518	[o]11,299,469
Nationals, all services	3,850	U	1,289,510	[p]1,885,600	[p]2,070,570	[p]1,931,201	[p]1,993,498	[p]1,885,312
Large regionals, all services	N	N	108,864	[m]770,670	[m]280,512	[m]318,542	[m]398,153	[m]440,898
International								
Certificated, all services	[l]268,156	[l]1,566,105	[r]3,353,371	[s]7,339,660	[s]10,854,620	[s]12,031,634	[s]14,008,685	[s]14,258,825
Majors, all services	N	N	1,945,660	[p]5,976,973	[p]7,719,138	[p]8,347,214	[p]9,614,881	[p]10,054,448
Nationals, all services	N	N	1,395,575	[u]550,409	[u]2,549,371	[u]3,140,921	[u]3,295,738	[u]2,941,496

KEY: N = data are nonexistent; U = data are unavailable

Continued next page

Air Carrier Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Large regionals, all services	N	N	11,409	[V]713,733	[V]445,783	[V]345,609	[V]1,025,455	[V]1,216,815
Medium regionals, all services, Domestic and international[a]	N	N	3,124	[W]110,372	[W]163,766	[W]222,251	[W]118,854	[W]176,633
Total certificated[a]	820,907	3,755,436	7,884,811	16,513,896	23,374,677	24,892,479	27,610,097	28,015,071
Safety								
Air carrier fatalities								
Operating under 14 CFR 121 (airlines)								
Scheduled services	N	N	[B]0	[BB]39	[BB]166	[BB]342	[BB]3	[BB]1
Nonscheduled services	N	N	1	0	2	38	5	0
Operating under 14 CFR 135								
Scheduled services (commuters)	N	N	37	7	9	14	46	0
Nonscheduled services (on–demand air taxis)	N	N	105	[R]51	52	63	39	45
Total[a]	[AA]499	[AA]146	143	[R]97	229	457	93	46
Air carrier accidents								
Operating under 14 CFR 121 (airlines)								
Scheduled services	N	N	15	22	34	32	44	41
Nonscheduled services	N	N	4	2	2	6	5	7
Operating under 14 CFR 135								
Scheduled services (commuters)	N	N	[R]38	[R]15	[R]12	[R]11	17	8
Nonscheduled services (on–demand air taxis)	N	N	[R]171	[R]107	75	[R]90	82	79
Total[a]	[AA]90	[AA]55	227	[R]146	[R]123	139	148	135

KEY: N = data are nonexistent; P = data are preliminary; R = revised

Continued next page

Air Carrier Profile
Cont'd

Safety Cont'd	1960	1970	1980	1990	1995	1996[R]	1997[R]	1998[P]
Fatal air carrier accidents								
Operating under 14 CFR 121 (airlines)								
Scheduled services	N	N	0	6	2	3	3	1
Nonscheduled services	N	N	1	0	1	2	1	0
Operating under 14 CFR 135								
Scheduled services (commuters)	N	N	8	4	2	1	5	0
Nonscheduled services (on–demand air taxis)	N	N	46	[R]29	24	29	15	17
Total[a]	[AA]17	[AA]8	55	[R]39	29	35	24	18

KEY: N = data are nonexistent; P = data are preliminary; R = revised

[a] Totals derived by addition/subtraction and may not appear directly in the data source or may include data not shown separately. Increase in medium regional figures for 1992 due to inclusion of Continental Micronesia, and Atlas Air.

[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] _____. *Air Carrier Financial Statistics,* December 1981 (Washington, DC), pp. 3/28, 44.

[g] _____. pp. 42, 44.

[h] U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), (pre-1995, U.S. Department of Transportation, Research and Special Programs Administration), *Air Carrier Financial Statistics, December 1991/1990, 1992/1991, 1993/1992, 1994/1993, 1995/1994, 1996/1995* (Washington, DC) p. 3.

[i] _____. pp. 30, 31, 32.

[j] _____. pp. 65, 72.

[k] U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), Office of Airline Information, personal communication.

[l] Civil Aeronautics Board, *Handbook of Airline Statistics, 1973,* (Washington, DC), Part III, Tables 2, 4, 7, 13.

[m] _____. *Air Carrier Traffic Statistics, December 1981* (Washington, DC), pp. 2, 5, 46, 84.

[n] U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), (pre-1995, U.S. Ddepartment 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* (Washington, DC), p. 2.

[o] _____. p. 5.

[p] _____. pp. 52, 53, 59.

[q] _____. pp. 118, 119, 132, 133.

[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 (BTS), (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* (Washington, DC), p. 3.

[t] _____. p 6.

[u] _____. pp. 52, 53, 56, 60.

[v] _____. pp. 118, 119, 133, 134.

[w] _____. pp. 178, 182, 187.

Air Carrier Profile
Cont'd

[x] U.S. Department of Justice, Immigration and Naturalization Service, *Report of Passenger Travel Between the U.S. and Foreign Countries, 1960, 1970* (Washington, DC).

[y] U.S. Department of Transportation, Research and Special Programs Administration, *U.S. International Air Travel Statistics* (Washington, DC: Annual issues), tables IIa and IId.

[z] U.S. Department of Commerce, International Trade Administration, *U.S. International Air Passenger Statistics Report, Calendar Year 1995,* (Washington, DC), tables IIa, IId.

[AA] National Transportation Safety Board, RE-50, personal communication.

[BB] _____. *NTSB Press Release, SB99-06,* 1999, and earlier issues.

General Aviation Profile

Financial	1960	1970	1980	1990	1995	1996	1997
Expenditures ($ millions)							
Aircraft	[h]202	[h]339	[h]2,853	[h]3,518	[h]4,260	[h]5,297	[h]7,031
Operating costs	693	1,696	5,200	6,754	6,220	6,443	6,665
Total	895	2,035	8,053	10,272	10,480	11,740	13,696
Inventory							
Number of active aircraft by use							
Corporate	N	[i]6,835	[i]14,860	[i]10,100	[i]9,800	[i]9,300	[i]10,411
Business	N	26,900	49,391	33,100	26,200	28,200	27,716
Instructional	N	10,727	14,862	18,600	14,800	14,300	14,663
Personal	N	65,398	96,222	112,600	109,300	109,600	115,630
Aerial application	N	5,455	7,294	6,200	5,100	5,400	4,858
Aerial observation	N	N	N	4,900	4,700	3,200	3,311
External load	N	N	N	N	200	400	186
Other work[a]	N	2,054	2,813	1,400	1,100	1,100	579
Air taxi/air tours[b]	N	N	N	5,800	4,100	3,900	4,948
Sight seeing[c]	N	N	N	N	900	900	677
Other	N	8,249	17,045	4,100	6,300	6,700	5,250
Public use	N	N	N	N	N	4,200	4,130
Total	[i]76,549	[R]131,743	[R]211,045	196,800	[R]188,100	[R]191,100	[R]192,400
Performance							
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
Business	[j]5,699	[j]7,204	8,434	4,417	3,191	3,152	3,006
Instructional	1,828	6,791	5,748	7,244	4,106	4,425	4,956
Personal	3,172	6,896	8,894	9,276	9,320	8,893	9,644

KEY: N = data are nonexistent; R = revised

Continued next page

General Aviation Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996	1997
Aerial application	N	N	2,044	1,872	1,557	1,787	1,562
Aerial observation	N	N	N	1,745	1,385	1,036	1,261
External load	N	N	N	N	118	203	112
Other work[a]	N	N	1,053	572	268	262	139
Air taxi/air tours[b]	N	N	N	2,249	1,527	1,773	2,120
Sight seeing[c]	N	N	N	N	206	186	127
Other	2,422	5,139	4,925	475	1,121	644	819
Public use[d]	N	N	N	N	N	1,021	1,096
Total	13,121	26,030	36,430	30,763	25,667	26,100	27,713
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**
Passenger-miles[e] (millions)	**[h]2,300**	**[h]9,100**	**[h]14,700**	**[h]13,000**	**[hR]10,400**	**[h]10,600**	**[h]12,500**
Fuel consumed[e] (million gallons)	**[l]242**	**[l]759**	**[l]1,286**	**[l]1,016**	**[l]820**	**[l]854**	**[l]929**
Aviation gasoline	242	551	520	353	276	287	290
Jet fuel	N	208	766	663	544	568	639
Safety							
Fatalities[f]							
Corporate	N	[m]28	[n]66	[n]21	[n]15	[nR]20	[n]3
Business	N	148	126	[R]80	73	[R]44	53
Instructional	N	93	73	[R]62	44	[R]40	38
Personal	N	726	[R]808	[R]492	488	[R]413	436
Aerial application	N	41	32	17	15	[R]10	18
Other	N	174	[R]134	[R]95	[R]99	[R]105	122
Total	[m]787	1,310	1,239	[R]767	734	[R]632	660
Accidents							
Fatal	[o]429	[o]641	[o]618	[o]443	[o]412	[oR]360	[o]356
Total	4,793	4,712	3,590	2,215	[R]2,053	1,907	1,858

KEY: N = data are nonexistent; R = revised

Continued next page

General Aviation Profile
Cont'd

Safety Cont'd	1960	1970	1980	1990	1995	1996	1997
Accident rate[g] (per 100,000 flight hours)							
Fatal	3.3	2.5	1.7	1.6	R1.6	1.5	1.4
Total	36.5	18.1	9.9	7.8	R8.2	7.7	7.3

KEY: N = data are nonexistent; 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 necessarily match those in table 3-14, due to differences in when the total fatalities data was received and the data breakdown by type of flying. NTSB constantly updates and reclassifies accident and fatality data.

1994–95 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,* 1998 (Washington, DC: 1998), 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] _____. Table 1.4

[k] _____. Table 3.3.

[l] _____. Table 5.1.

[m] National Transportation Safety Board, RE-50, personal communication.

[n] _____. *Annual Review of Aircraft Accident Data, U.S. General Aviation, Calendar Year 1996* (Washington, DC: May 1999), charts 27, 39, 40, 41, 42 and 43.

[o] _____. *NTSB Press Release,* SB99-06 (Washington, DC: 1999, and earlier issues).

Highway Profile

Financial	1960	1970	1980	1990	1995	1996	1997
Government receipts ($ millions)							
Total federal	2,771	6,160	9,949	14,576	19,851	23,280	21,554
Highway trust fund[a]	[i]2,531	[i]5,464	[i]7,615	[i]13,380	[j]18,835	[j]22,029	[j]20,500
Other	240	696	2,334	1,196	1,016	1,251	1,054
State and local total							
State and D.C.	6,055	11,737	19,666	40,026	50,064	51,474	55,306
Local	2,367	3,866	10,219	20,842	26,432	26,827	29,586
Total	11,193	21,763	39,834	75,444	96,347	101,581	106,446
Government expenditures ($ millions)							
Total federal	197	425	874	664	1,402	1,579	1,314
Highway trust fund[a]	27	83	315	358	1,092	1,289	1,102
Other[b]	170	342	559	306	310	290	212
State and local total							
State and D.C.	7,125	14,100	25,936	45,609	56,981	59,709	61,534
Local	3,435	6,304	14,953	29,135	35,095	36,870	38,624
Total	10,757	20,829	41,763	75,408	93,478	98,158	101,472
State highway user tax revenues[c] ($ millions)							
Motor fuel tax	[k]3,374	[k]6,433	[k]9,485	[k]19,658	[k]26,881	[l]27,555	[l]28,477
Other motor fuel receipts[d]	22	44	92	220	108	63	55
Motor vehicle registration fees	[m]1,514	[m]2,873	[m]5,173	[m]10,257	[m]11,942	[n]13,234	[n]13,631
Other motor vehicle fees[e]	235	577	1,490	3,353	4,416	4,689	4,704
Motor carrier taxes[f]	110	176	323	695	770	726	729
Miscellaneous fees	68	181	615	1,761	3,307	3,489	3,785
Total	5,323	10,284	17,177	35,944	47,424	49,756	51,381

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Highway Profile
Cont'd

Inventory	1960	1970	1980	1990	1995	1996	1997
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	[q]691,191	[q]692,767
Under federal control[g]	111,912	187,696	246,130	178,188	170,568	168,913	167,369
Under local control	2,345,317	2,274,714	2,234,327	2,241,608	2,231,029	2,232,669	2,248,357
County roads	1,742,404	1,732,981	1,542,984	1,616,634	1,626,927	1,627,528	1,642,468
Town and township roads	538,651	510,174	458,231	437,460	424,529	426,170	426,433
Other local roads	64,262	31,559	233,112	187,514	179,573	178,971	179,456
Total rural mileage	3,116,125	3,169,412	3,230,936	3,122,282	3,092,520	3,092,773	3,108,493
Urban mileage							
Under state control	50,158	74,103	97,287	95,778	111,766	111,870	112,226
Under federal control[g]	N	N	1,495	1,024	1,509	1,474	1,464
Under local control	N	N	530,119	647,842	706,431	713,333	722,418
County roads	N	N	71,357	95,929	117,518	117,228	117,487
Town and township roads	N	N	37,583	42,752	60,561	60,926	74,402
Other local roads	379,410	486,567	421,179	509,161	528,352	535,179	530,529
Total urban mileage	429,568	560,670	628,901	744,644	819,706	826,677	836,108
Total rural and urban mileage	3,545,693	3,730,082	3,859,837	3,866,926	3,912,226	3,919,450	3,944,601
Rural/urban mileage by functional system							
Rural mileage							
Interstate	N	N	[r]31,905	[rR]33,547	[r]32,580	[sR]32,820	[sR]32,817
Other principal arterial	N	N	82,569	83,802	97,948	98,131	98,257
Minor arterial	N	N	149,057	144,774	137,151	137,359	137,498
Major collector	N	N	439,000	436,352	431,712	[R]432,117	[R]432,714
Minor collector	N	N	299,613	293,922	274,081	[R]273,198	[R]272,362

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Highway Profile
Cont'd

Inventory Cont'd	1960	1970	1980	1990	1995	1996	1997
Local	N	N	2,228,792	2,129,885	2,119,048	2,119,154	2,134,836
Total rural mileage	[t]3,116,125	[t]3,169,412	3,230,936	3,122,282	3,092,520	3,092,773	3,108,488
Urban mileage							
Interstate	N	N	9,215	11,527	13,164	13,218	13,249
Other freeways and expressways	N	N	6,774	7,668	8,970	9,022	9,062
Other principal arterial	N	N	44,155	51,968	52,796	52,973	53,230
Minor arterial	N	N	66,377	74,659	88,510	89,022	89,196
Collector	N	N	68,387	78,254	87,331	87,918	88,042
Local	N	N	433,993	520,568	568,935	574,524	583,330
Total urban mileage	429,568	560,670	628,901	744,644	819,706	826,677	836,109
Total rural and urban mileage	3,545,693	3,730,082	3,859,837	3,866,926	3,912,226	3,919,450	3,944,597
U.S. roads and streets by surface							
Paved mileage							
Rural	919,082	1,188,080	[t]1,490,050	[t]1,550,283	[t]1,591,334	[u]1,581,864	[u]1,605,804
Urban	311,387	470,341	582,642	704,539	786,934	798,208	804,131
Total	1,230,469	1,658,421	2,072,692	2,254,822	2,378,268	2,380,072	2,409,935
Percent paved	34.7%	44.5%	53.7%	58.3%	60.8%	60.7%	61.1%
Unpaved mileage							
Rural	[t]2,197,043	[t]1,981,332	[t]1,740,886	[t]1,571,999	[t]1,501,186	[u]1,518,498	[u]1,510,330
Urban	118,181	90,329	46,259	40,105	32,772	35,415	38,019
Total	2,315,224	2,071,661	1,787,145	1,612,104	1,533,958	1,553,913	1,548,349
Percent unpaved	65.3%	55.5%	46.3%	41.7%	39.2%	39.6%	39.3%
Number of employees							
State and local govt. streets and highways	[v]532,000	[v]607,000	[v]559,000	[v]569,000	[v]560,000	U	U
Highway and street construction	U	U	U	[w]238,700	[w]227,900	[w]236,100	[w]241,800

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Highway Profile
Cont'd

Performance	1960	1970	1980	1990	1995	1996	1997
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	[y]240,121
Other principal arterial	N	N	132,958	175,133	215,567	221,403	228,704
Minor arterial	N	N	129,816	155,733	153,028	157,444	162,777
Major collector	N	N	150,186	190,512	186,212	190,923	201,480
Minor collector	N	N	39,282	49,948	49,936	50,107	52,327
Local	N	N	84,704	97,379	105,164	109,520	114,511
Total rural	400,463	539,472	672,030	868,878	933,289	961,962	999,920
Urban							
Interstate	13,365	81,532	161,242	278,901	341,515	351,579	361,371
Other freeways and expressways	N	N	79,690	127,465	151,509	157,502	161,015
Other principal arterial	N	N	229,469	335,543	370,365	377,776	384,982
Minor arterial	N	N	175,030	236,225	293,228	299,345	300,599
Collector	N	N	83,043	106,297	126,883	129,310	130,461
Local	N	N	126,791	191,053	205,907	208,374	222,024
Total urban	318,299	570,252	855,265	1,275,484	1,489,407	1,523,886	1,560,452
Total rural and urban	718,762	1,109,724	1,527,295	2,144,362	2,422,696	2,485,848	2,560,372
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 R]3,424,616	[AA]3,579,333	[AA]3,508,685
Asphalt and road oil	[BB]110,000	[BB]163,000	[BB]145,000	[CC]176,340	[CC]177,543	[CC]177,205	[CC]184,383
Total	1,488,095	2,361,310	2,882,143	3,289,554	[R]3,602,159	3,756,538	3,693,068
Safety							
Fatalities	[DD]36,399	[DD]52,627	[DD]51,091	[DD]44,599	[DD]41,817	[DD]42,065	[DD R]42013

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Highway Profile
Cont'd

Safety Cont'd	1960	1970	1980	1990	1995	1996	1997
Injuries	N	N	N	3,231,000	3,465,000	R3,383,000	R3,348,000
Crashes	N	N	N	6,471,000	6,699,000	R6,770,000	R6,624,000

KEY: N = data are nonexistent; R = revised; U = data are unavailable

[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 1994 error by the Treasury Department in reconciling estimated deposits to the actual tax revenue. The correction was made after the close of fiscal year 1994 and is shown in fiscal year 1995 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: The (motor vehicle) injury and crash data in this profile come from NHTSA'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 (PAR) 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 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.

In 1998, FHWA instituted a new method of creating mileage based tables derived from Highway Peformance Monitoring System (HPMS) data. See accuracy profiles at the end of chapter 1 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] ____. *Highway Statistics* (Washington, DC: 1996, 1997), tables HF-10A and HF-10.

[k] ____. *Highway Statistics, Summary to 1995,* FHWA-PL-97-009 (Washington, DC: July 1997), table MF-201A.

[l] ____. *Highway Statistics* (Washington, DC: 1996, 1997), table MF-1.

[m] ____. *Highway Statistics, Summary to 1995,* FHWA-PL-97-009 (Washington, DC: July 1997), table MV-202.

[n] ____. *Highway Statistics* (Washington, DC:199, 1996, table MV-2.

[o] ____. *Highway Statistics, Summary to 1985,* FHWA-PL-97-009 (Washington, DC: July 1997), table M-203.

[p] ____. Table HM-210.

[q] ____. *Highway Statistics* (Washington, DC: 1996, 1997), table HM-10.

[r] ____. Table HM-220.

[s] ____. *Highway Statistics* (Washington, DC: 1996, 1997), table HM-20.

[t] ____. *Highway Statistics, Summary to 1995,* FHWA-PL-97-009 (Washington, DC: July 1997), table HM-212.

[u] ____. Table HM-12.

[v] U.S. Department of Commerce, *Statistical Abstract of the United States,*1998, table 531.

[w] ____. Internet site (www.bls.gov), as of Feb. 25, 1999.

[x] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC), table VM-201.

[y] ____. *Highway Statistics 1997,* FHWA-PL-98-020 (Washington, DC: November 1998), table VM-2, VM-2A.

[z] ____. *Highway Statistics, Summary to 1995,* FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A (total fuel consumed divided by 42).

[AA] ____. *Highway Statistics* (Washington, DC: 1996, 1997), table VM-1.

[BB] U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, 1960–1980* (Washington, DC), p. 13.

[CC] U.S. Department of Energy, Energy Information Administration, *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	1996[R]	1997
Personal auto expenditures ($ millions)							
New and used cars[a]	[g]16,571	[g]26,754	[g]57,243	[g]124,040	[gR]139,600	[g]141,600	[g]143,500
Tires, tubes, accessories, and parts	2,487	6,087	17,926	29,426	[R]36,200	38,500	38,800
Gasoline and oil	12,004	21,921	86,689	109,245	115,600	124,500	126,500
Tolls	310	652	1,104	2,036	2,800	2,800	3,000
Insurance premiums less claims paid	2,029	3,752	9,443	18,043	29,400	31,500	34,400
Repair, greasing, washing, parking, storage, rental, and leasing	5,519	12,329	34,022	[R]87,277	128,700	143,600	154,900
Auto registration fees	[h]867	[h]1,668	[h]2,893	[h]6,054	[h]7,043	[i]7,698	[i]8,163
Driver's license fees	119	222	370	638	823	893	865
Total[a]	39,906	N	209,690	[R]376,759	[R]460,166	491,091	510,128
Taxi expenditures ($ millions)	**[g]609**	**[g]1,180**	**[g]1,866**	**[g]2,577**	**[g]3,200**	**[g]3,500**	**[g]3,600**
Inventory							
Number of vehicle registrations							
Passenger car and motorcycle	[Rj]62,245,422	[j]92,067,655	[j]127,294,783	[j]137,959,958	[k]132,283,966	[k]133,599,940	[k]133,575,077
Other 2-axle 4-tire vehicle	[e]	14,210,591	27,875,934	48,274,555	65,738,322	69,133,913	70,224,082
Motorcycle	574,032	2,824,098	5,693,940	4,259,462	3,897,191	3,871,599	3,826,373
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**
Number of employees							
Taxicabs	[m]120,700	[m]106,400	[m]52,500	[n]32,400	[Ro]30,700	[o]30,500	[o]30,600
Automotive dealers and service stations	1,267,200	1,617,400	1,688,500	2,063,100	[R]2,189,600	2,266,700	2,313,900
Motor vehicles, parts, and supplies	N	N	434,300	456,000	[R]492,100	502,800	513,600
Auto repair, services, and parking	N	N	570,900	913,700	[R]1,020,100	1,080,000	1,124,300

KEY: N = data are nonexistent; R = revised

Continued next page

Automobile Profile
Cont'd

Performance	1960	1970	1980	1990	1995	1996[R]	1997
Vehicle-miles (millions)							
Passenger car and motorcycle							
Rural highway							
Rural interstate	N	[p]62,342	[p]89,488	[p]117,519	[k]115,991	[k]120,323	[k]121,026
Rural other arterial	[p]233,452	182,213	180,857	211,066	212,063	217,559	221,406
Other rural roads	80,171	179,533	180,314	219,325	199,878	203,147	211,986
All rural	313,623	N	527,932	547,910	527,932	541,029	554,418
Urban highway[b]							
Urban interstate	N	69,369	124,480	184,783	205,489	214,817	215,507
Other urban Streets	N	426,222	546,671	685,129	714,670	726,928	741,971
All urban	273,389	N	920,159	869,912	920,159	938,745	957,478
Total rural and urban highway	587,012	N	1,448,091	1,417,822	1,448,091	1,479,774	1,511,896
Other 2-axle 4-tire vehicle							
Rural highway							
Rural interstate	[e]	6,766	19,952	46,298	63,329	65,779	68,992
Rural other arterial	[e]	29,808	56,137	87,474	118,305	122,212	129,699
Other rural roads	[e]	37,017	73,471	94,059	113,838	119,504	128,146
All rural	[e]	N	295,472	307,495	295,472	307,495	326,837
Urban highway[c]							
Urban interstate	[e]	6,252	23,067	71,500	109,807	112,908	116,670
Other urban streets	[e]	43,443	118,308	275,239	384,750	396,137	406,789
All urban	[e]	N	494,557	509,045	494,557	509,045	523,459
Total rural and urban highway	[e]	N	790,029	816,540	790,029	816,540	850,296
Vehicle-miles (millions)							
Passenger car and motorcycle	[j]587,012	[j]919,679	[j]1,121,810	[j]1,417,823	1,448,091	1,479,774	1,511,896
Other 2-axle 4-tire vehicle	[e]	123,286	290,935	574,571	790,029	816,540	850,296

KEY: N = data are nonexistent; R = revised

Continued next page

Automobile Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996[R]	1997
Motorcycle	[f]	2,979	10,214	9,574	9,797	9,920	10,076
Total	587,012	N	2,238,120	1,992,394	2,238,120	2,306,234	2,372,268
Passenger-miles[c] (millions)							
Passenger car and motorcycle	[a]1,145,000	[a]1,754,000	[a]2,024,000	[a]2,294,000	2,298,000	2,349,000	2,400,000
Other 2-axle 4-tire vehicle	[e]	226,000	521,000	1,000,000	1,296,000	1,339,000	1,394,000
Motorcycle	[f]	3,000	12,000	12,000	12,000	12,000	12,000
Total	1,145,000	1,980,000	2,545,000	3,294,000	3,594,000	3,688,000	3,794,000
Average miles traveled per vehicle							
Passenger car and motorcycle	9,518	9,989	8,813	10,277	10,947	11,076	11,319
Other 2-axle 4-tire vehicle	[e]	8,676	10,437	11,902	12,018	11,811	12,108
Motorcycle	[f]	1,055	1,794	2,244	2,514	2,562	2,633
Fuel consumed (million gallons)							
Passenger car and motorcycle	41,171	67,879	70,186	69,759	68,268	69,419	70,069
Other 2-axle 4-tire vehicle	[e]	12,313	23,796	35,611	45,605	47,354	49,370
Motorcycle	[f]	60	204	191	196	198	202
Average fuel consumption per vehicle (gallons)							
Passenger car and motorcycle	668	737	551	506	516	520	525
Other 2-axle 4-tire vehicle	[e]	866	854	738	694	685	703
Motorcycle	[f]	21	36	45	50	51	53
Average miles traveled per gallon of fuel consumed							
Passenger car and motorcycle	14.3	13.5	16.0	20.3	21.2	21.3	21.6
Other 2-axle 4-tire vehicle	[e]	10.0	12.2	16.1	17.3	17.2	17.2
Motorcycle	[f]	50.0	50.0	50.0	50.0	50.0	50.0

KEY: N = data are nonexistent; R = revised

Continued next page

Automobile Profile
Cont'd

Safety	1960	1970	1980	1990	1995	1996[R]	1997
Number of occupants and nonoccupant fatalities							
Passenger car	N	N	[q]27,449	[q]24,092	[q]22,423	[q]22,505	[q]R22199
Motorcycle	790	2,280	5,144	3,244	2,227	2,161	[R]2116
Bicycle[d]	490	760	965	859	833	765	[R]814
Pedestrian[d]	7,210	8,950	8,070	6,482	5,584	5,449	[R]5321
Occupant fatality rates							
Per 100 million vehicle-miles							
Passenger car	4.7	3.8	2.5	1.7	1.5	1.5	1.4
Motorcycle	N	76.5	50.4	33.9	22.7	21.8	20.9
Per 10,000 registered vehicles							
Passenger car	5.1	3.9	2.6	2.0	1.8	1.8	1.8
Motorcycle	N	8.1	9.0	7.6	[R]5.7	5.6	5.5
Vehicle involvement rate (fatal crashes)							
Per 100 million vehicle-miles							
Passenger car	N	5.6	3.5	2.4	2.1	2.0	[R]2.0
Motorcycle	N	22.9	[R]50.9	34.3	23.1	[R]21.9	[R]21.4
Per 10,000 registered vehicles							
Passenger car	N	5.6	[R]3.7	2.8	2.5	2.5	2.4
Motorcycle	N	8.2	[R]9.1	7.7	5.8	5.6	5.6

KEY: N = data are nonexistent; R = revised

[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 reassignment 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.

[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, personal communication; and *Survey of Current Business* (Washington, DC: August 1998), table 2.4.

[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] _____. *Highway Statistics* (Washington, DC: Annual issues), table MV-2.

Continued next page

Automobile Profile
Cont'd

j _____. *Highway Statistics, Summary to 1995,* FHWA-97-009 Washigton, DC: July 1997), table VM–201A.

k _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

l _____. *Highway Statistics* (Washington, DC: Annual issues), table DL-22.

m U.S. Department of Labor, Bureau of Labor Statistics, *Employment, Hours and Earnings, United States, 1909-1994* (Washington, DC: September 1994), SIC codes 412, 55, 501, and 75.

n _____. *Employment, Hours and Earnings, United States, 1988-1996* (Washington, DC: July 1996), SIC codes 412, 55, 501, and 75.

o _____. internet site www.bls.gov, as of Apr. 19, 1999, SIC codes 412, 55, 501, and 75.

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

q 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	1996[R]	1997
Operating revenues, total[a] ($ millions)	**N**	**N**	**N**	**[f]127,314**	**[f]161,806**	**[f]172,743**	**[f]183,153**
Local trucking	N	N	N	31,397	43,830	46,589	49,972
Trucking, except local	N	N	N	74,465	91,675	97,586	103,847
Local trucking with storage	N	N	N	4,115	5,154	5,502	5,860
Courier services, except by air	N	N	N	17,337	21,147	23,066	23,474
Operating expenses, total[a] ($ millions)	**N**	**N**	**N**	**118,968**	**151,628**	**162,825**	**170,998**
Local trucking	N	N	N	28,049	38,695	41,325	43,871
Trucking, except local	N	N	N	70,965	88,061	94,390	98,570
Local trucking with storage	N	N	N	3,885	4,817	5,121	5,439
Courier services, except by air	N	N	N	16,069	20,055	21,989	23,118
Truck highway-user taxes ($ millions)							
State	[g]1,709	[g]3,429	[g]6,731	[g]12,691	[g]13,844	U	[g]15,750
Federal	1,121	2,203	3,157	6,665	11,273	U	12,260
Total[b]	2,830	5,632	9,888	19,356	[R]25,117	U	28,010
Inventory							
Number of truck registrations							
Single-unit truck	N	[h]3,681,405	[h]4,373,784	[h]4,486,981	[i]5,023,670	[i]5,266,029	[i]5,293,358
Combination truck	N	905,082	1,416,869	1,708,895	1,695,751	1,746,586	1,789,968
Total	[m]11,914,249	4,586,487	5,790,653	6,195,876	6,719,421	7,012,615	7,083,326
Number of employees							
Trucking and courier services, except air	N	[j]998,500	[j]1,182,000	[jR]1,273900	[kR]1,440,000	[k]1,481,000	[k]1,506,900
Truck drivers and deliverymen	[l]1,477,000	[l]1,565,000	[l]1,931,000	[l]2,148,000	[l]2,861,000	[l]2,542,000	[l]2,490,000
Number of trucking and courier establishments[a]	**N**	**[m]64,756**	**[m]69,796**	**[m]90,709**	**[m]112,887**	**[m]116,861**	**U**

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Truck Profile
Cont'd

Performance	1960	1970	1980	1990	1995	1996[R]	1997
Vehicle-miles (millions)							
Rural highway							
Rural interstate	N	[n]10,069	[n]25,111	[n]35,789	[i]43,351	[i]45,721	[i]49,309
Rural other arterial	N	17,625	24,789	31,331	37,056	37,875	39,135
Other rural roads	N	11,550	18,876	22,572	25,624	25,884	26,118
All rural roads	[n]84,508	39,244	68,776	89,692	106,031	109,480	114,562
Urban highway[c]							
Urban interstate	N	5,634	13,135	22,163	25,639	26,256	28,547
Other urban streets	N	17,337	26,580	34,387	46,486	47,235	48,236
All urban streets	42,896	22,971	39,715	56,550	72,125	73,491	76,783
Total rural and urban highway	127,405	62,215	108,491	146,242	178,156	182,971	191,345
Single-unit truck[d]	[h]98,551	[h]27,081	[h]39,813	[h]51,901	62,705	64,072	66,845
Combination truck	28,854	35,134	68,678	94,341	115,451	118,899	124,500
All trucks	127,405	62,215	108,491	146,242	178,156	182,971	191,345
Passenger-miles[e] (millions)							
Single-unit truck[d]	98,551	27,081	39,813	51,901	62,705	64,072	66,845
Combination truck	28,854	35,134	68,678	94,341	115,451	118,899	124,500
All trucks	127,405	62,215	108,491	146,242	178,156	182,971	191,345
Ton-miles, intercity (millions)	**[o]285,000**	**[o]412,000**	**[o]555,000**	**[o]735,000**	**[o]921,000**	**[o]972,000**	**[o]1,051,000**
Fuel consumed (million gallons)							
Single-unit truck	N	[h]3,968	[h]6,923	[h]8,357	[h]9,216	[h]9,409	[h]9,573
Combination truck	N	7,348	13,037	16,133	19,777	20,193	20,294
All trucks	[h]15,882	11,316	19,960	24,490	28,993	29,602	29,867
Average fuel consumption per vehicle (gallons)							
Single-unit truck	N	1,078	1,583	1,862	1,835	1,787	1,808
Combination truck	N	8,119	9,201	9,441	11,663	11,561	11,338

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Truck Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996[R]	1997
All trucks	1,333	2,467	3,447	3,953	4,315	4,221	4,217
Average miles traveled per gallon of fuel consumed							
Single-unit truck	N	6.8	5.8	6.2	6.8	6.8	7.0
Combination truck	N	4.8	5.3	5.8	5.8	5.9	6.1
All trucks	8.0	5.5	5.4	6.0	6.2	6.2	6.4
Average miles traveled per vehicle							
Single-unit truck	N	7,356	9,103	11,567	12,482	12,167	12,628
Combination truck	N	38,819	48,472	55,206	68,083	68,075	69,554
All trucks	10,693	13,565	18,736	23,603	26,514	26,092	27,013
Average length of haul (domestic freight) (miles)	[p]272	[p]263	[p]363	[p]391	[p]416	[p]401	U
Safety							
Occupant fatalities							
Light truck	N	N	[q]7,486	[q]8,601	[q]9,568	[q]9,932	[q]10,224
Large truck	N	N	1,262	705	648	621	717
All trucks	N	N	8,748	9,306	10,216	10,553	10,941
Occupant fatality rate							
Per 100 million vehicle-miles							
Light truck	N	N	2.5	[R]1.5	1.3	1.3	1.2
Large truck	N	N	1.2	0.5	0.4	0.3	0.4
All trucks	N	N	2.2	1.3	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
Large truck	N	N	2.2	[R]1.1	1.0	[R]0.9	1.0
All trucks	N	N	2.4	1.7	1.5	1.5	1.5

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Truck Profile
Cont'd

Safety Cont'd	1960	1970	1980	1990	1995	1996[R]	1997
Vehicle involvement rate (fatal crashes)							
Per 100 million vehicle-miles							
Light truck	N	N	4.3	2.8	2.3	2.3	2.2
Large truck	N	N	5.0	[R]3.3	2.5	2.6	2.5
All trucks	N	N	4.5	2.9	2.4	2.4	2.3
Per 10,000 registered vehicles							
Light truck	N	N	4.2	3.1	2.8	2.8	2.8
Large truck	N	N	9.3	[R]7.7	6.7	6.8	6.9
All trucks	N	N	5.0	[R]3.6	3.2	3.2	3.2

KEY: N = data are nonexistent; R = revised; U = data are unavailable

[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] Sum of components may not equal total due to independent 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 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, the Federal Highway Administration 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. Bureau of the Census, *Transportation Annual Survey* (Washington, DC : December 1998), table 1.

[g] American Trucking Associations, *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] _____. *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] _____. 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] _____. 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	1994	1995	1996[R]	1997
Expenditures ($ thousands)								
School bus	[b]486,000	[b]1,219,000	[b]3,833,000	[b]7,605,000	[b]7,847,000	[b]9,082,000	[b]10,404,000	[b]10,820,000
Operating revenues ($ thousands)								
Intercity bus, class I	[c]463,100	[c]721,700	[c]1,397,378	[c]943,268	[c]870,354	[d]917,298	[d]911,504	[d]999,918
Operating expenses ($ thousands)								
Intercity bus, class I	405,400	639,000	1,318,372	1,026,213	918,522	899,176	878,185	947,556
Inventory								
Number of operating companies								
Intercity bus, class I	143	71	61	31	27	[d]28	[d]27	U
Number of vehicles								
All buses	[e]272,129	[e]377,562	[e]528,789	[e]626,987	[e]670,423	[e]685,503	[e]694,781	[e]697,548
Number of employees								
Intercity and rural bus	[f]40,500	[f]43,400	[fR]37,900	[f]R26,100	[f]23,600	[gR]23,800	[g]23,800	[g]21,200
School bus	N	N	79,900	111,200	125,900	[R]131,100	132,200	135,700
Performance								
Vehicle-miles (millions)								
All buses								
Rural highway								
Interstate rural	N	[h]339	[h]533	[h]567	[h]683	[h]711	[i]742	[i]794
Other arterial rural	N	944	991	995	1,154	1,134	1,201	1,241
Other rural	N	1,266	1,511	1,882	1,893	1,972	2,015	2,068
All rural	[h]2,332	2,549	3,035	3,444	3,730	3,817	3,958	4,103
Urban highway[a]								
Interstate urban	N	277	560	455	627	580	598	647
Other urban	N	1,718	2,464	1,828	2,052	1,986	2,007	2,086

KEY: N = data are nonexistent; R = revised

Continued next page

Bus Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1994	1995	1996[R]	1997
All urban	2,014	1,995	3,024	2,283	2,679	2,566	2,605	2,733
Total rural and urban highway	4,346	4,544	6,059	5,726	6,409	6,383	6,563	6,836
Passenger-miles (millions)								
All buses	N	N	N	121,400	135,900	136,100	139,136	144,923
Number of revenue passengers (thousands)								
Intercity bus, total	[b]366,000	[b]401,000	[b]370,000	[b]334,000	[b]343,200	[b]366,500	[b]347,900	[b]350,600
Average miles traveled per vehicle								
All buses	[l]15,970	[l]12,035	[l]11,458	[l]9,133	[l]9,560	[i]9,365	[i]9,446	[i]9,799
Fuel consumed (million gallons)								
All buses	827	820	1,018	895	964	968	990	1,026
Average fuel consumption per vehicle (gallons)								
All buses	3,039	2,172	1,925	1,427	1,438	1,412	1,424	1,470
Average miles traveled per gallon of fuel consumed								
All buses	5.3	5.5	6.0	6.4	6.6	6.6	6.7	6.6
Average revenue per passenger-mile (cents) (intercity)	**[b]2.71**	**[b]3.60**	**[b]7.26**	**[b]11.55**	**[b]11.61**	**[b]12.19**	**[b]12.30**	**[b]11.93**
Safety								
Number of fatalities								
School bus-related	N	N	[k]150	[k]115	[kR]107	[kR]23	[k]136	[kR]131
School bus								
Occupants	N	N	9	11	[R]4	13	10	10
Other vehicle								
Occupants	N	N	88	64	64	72	101	[R]97

KEY: N = data are nonexistent; R = revised

Continued next page

Bus Profile
Cont'd

Safety Cont'd	1960	1970	1980	1990	1994	1995	1996[R]	1997
Nonoccupants	N	N	53	40	R39	R38	25	R24
Occupant fatalities								
All buses	N	N	46	32	R20	R42	R30	R18
School buses	N	N	14	13	2	R18	18	R8
Cross country buses	N	N	23	2	7	6	3	4
Transit buses	N	N	6	3	R8	R4	5	3
Other and unknown	N	N	3	14	R3	14	3	3
Fatalities in vehicular accidents								
All buses	N	N	390	340	R293	R340	297	335
Occupant fatality rate								
Per 100 million vehicle-miles								
All buses	N	N	0.8	0.6	0.3	0.5	0.3	0.2
Per 10,000 registered vehicles								
All buses	N	N	0.9	0.5	0.3	0.5	0.4	0.2
Vehicle involvement rate								
Per 100 million vehicle-miles								
All buses	N	N	5.4	R5.0	R4.1	R4.6	R5.2	R4.5
Per 10,000 registered vehicles								
All buses	N	N	6.2	4.6	R3.9	R4.3	R5.0	R4.4

KEY: N = data are nonexistent; R = revised

[a] Urban consists of travel on all roads and streets in urban places of 5,000 or greater population.

NOTE: See transit profile for transit bus data.

SOURCES: Unless otherwise noted, refer to chapter tables for sources:

[b] Eno Transportation Foundation, Inc., *Transportation In America, 1998* (Washington, DC: 1998), 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 (DOT), 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] _____. Internet site www.bls.gov, as of Apr. 19, 1999.

[h] U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics,* Summary to 1985 (Washington, DC: July 1997), table VM-201.

[i] _____. Highway Statistics (Washington, DC: Annual issues), table VM-1.

[j] _____. *Highway Statistics, Summary to 1995,* FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

[k] _____. National Highway Traffic Safety Administration (NHTSA), *Traffic Safety Facts 1998,* DOT HS 808 983 (Washington, DC: October 1998).

Transit Profile

Financial	1960	1970	1980	1990	1995	1996	1997[P]
Passenger operating revenues ($ millions)							
Passenger fares	**[IR]1,335**	**[I]1,639**	**[I]2,556**	**[I]5,890**	**[IR]6,801**	**[IR]7,416**	**[I]7,599**
Motor bus	N	N	N	2,967	[R]3,287	[R]3,515	3,620
Heavy rail	N	N	N	1,741	2,018	2,322	2,351
Light rail	N	N	N	83	127	144	139
Trolley bus	N	N	N	46	54	55	57
Demand response	N	N	N	41	[R]146	[R]157	174
Ferry boat[a]	N	N	N	56	60	54	48
Commuter rail	N	N	N	952	[R]1,078	[R]1,146	1,178
Other[b]	N	N	N	26	46	[R]24	32
Other operating revenue	[R]72	68	248	895	2,812	[R]2,982	2,962
Total operating revenues	[R]1,407	1,707	2,805	[R]6,786	9,613	[R]10,346	10,561
Operating assistance[c]							
State and local	N	N	2,611	8,297	7,811	[R]8,210	7,835
Federal	N	N	1,093	970	817	[R]597	578
Total operating assistance	N	N	3,705	9,267	[R]8,628	[R]8,807	8,413
Total revenues	[R]1,407	1,707	6,510	16,053	18,241	[R]19,151	18,974
Operating expenses ($ millions)							
Motor bus	N	N	N	[j]8,903	[j]10,321	[jR]10,575	[j]11,035
Heavy rail	N	N	N	3,825	3,523	3,402	3,474
Light rail	N	N	N	237	376	[R]442	478
Trolley bus	N	N	N	109	139	135	140
Demand response	N	N	N	518	1,000	[R]1,187	1,283
Ferry boat[a]	N	N	N	171	210	183	239
Commuter rail	N	N	N	1,939	2,211	[R]2,294	2,279
Other[b]	N	N	N	41	67	124	88

KEY: N = data are nonexistent; NA = not applicable; P = preliminary; R = revised; ~ = included in heavy rail figure; + = included in motor bus figure

Continued next page

Transit Profile
Cont'd

Financial Cont'd	1960	1970	1980	1990	1995	1996	1997[P]
Total operating expenses[d]	N	N	6,247	15,742	17,849	[R]18,341	19,015
Depreciation and amortization	N	N	[k]278	[k]1,593	[kR]2,601	[kR]2,885	[k]3,118
Other reconciling items	N	N	186	644	1,091	[R]1,034	1,114
Total expenses	1,377	1,996	6,711	17,979	[R]21,540	[R]22,260	23,248
Average passenger revenue per passenger-mile ($)							
Motor bus	N	N	N	[il]0.14	[il]0.17	[il]0.18	[il]0.18
Heavy rail	N	N	N	0.15	0.19	0.20	0.20
Light rail	N	N	N	0.15	0.15	0.15	0.13
Trolley bus	N	N	N	0.24	0.29	0.30	0.30
Demand response	N	N	N	0.10	0.29	0.24	0.19
Ferry boat[a]	N	N	N	0.20	0.23	0.21	0.14
Commuter rail	N	N	N	0.14	0.13	0.14	0.15
Other[b]	N	N	N	0.21	0.17	0.07	0.09
All modes	N	N	N	0.14	[R]0.06	[R]0.18	0.18
Average passenger fare ($)							
Motor bus	N	N	N	[m]0.52	[m]0.66	[m]0.70	[m]0.70
Heavy rail	N	N	N	0.74	0.99	1.08	0.97
Light rail	N	N	N	0.47	0.50	0.55	0.53
Trolley bus	N	N	N	0.36	0.45	0.47	0.47
Demand response	N	N	N	0.60	2.26	2.21	1.83
Ferry boat[a]	N	N	N	1.11	1.31	1.12	0.89
Commuter rail	N	N	N	2.90	3.13	3.24	3.30
Other[b]	N	N	N	0.90	1.57	1.33	0.66
All modes	0	0	0	0.67	0.87	0.93	0.89

KEY: N = data are nonexistent; NA = not applicable; P = preliminary; R = revised; ~ = included in heavy rail figure; + = included in motor bus figure

Continued next page

Transit Profile
Cont'd

Inventory	1960	1970	1980	1990	1995	1996	1997[P]
Number of systems							
Motor bus	[n]1,236	[n]1,075	[n]1,022	[n]2,685	[n]2,250	[n]2,250	[n]2,250
Heavy rail	31	15	11	12	14	14	14
Light rail	~	~	9	17	22	22	22
Trolley bus	19	6	5	5	5	5	5
Demand response	N	N	N	3,193	5,214	5,214	5,214
Ferry boat[a]	N	N	16	27	25	25	25
Commuter rail	N	N	18	14	16	16	18
Other[b]	N	N	5	35	69	69	70
Total[e]	1,286	1,096	1,055	5,078	5,973	5,973	5,975
Number of vehicles							
Motor bus	[o]49,600	[o]49,700	[o]59,411	[o]58,714	[o]67,107	[oR]71,678	[o]72,170
Heavy rail	9,010	9,286	9,641	10,419	10,157	10,201	10,242
Light rail	2,856	1,262	1,013	913	999	1,140	1,229
Trolley bus	3,826	1,050	823	832	885	871	859
Demand response	N	N	N	16,471	29,352	[R]30,804	30,697
Ferry boat[a]	N	N	N	108	110	109	118
Commuter rail	N	N	4,500	4,415	4,565	4,665	4,943
Other[b]	N	N	N	1,089	2,699	[R]2,894	3,322
Total	65,292	61,298	75,388	92,961	115,874	[R]122,362	123,580
Number of employees[f]							
Motor bus	[p]121,300	[p]101,598	N	[p]162,189	[p]181,973	[pR]190,152	197,962
Heavy rail	35,100	36,442	N	46,102	45,793	45,793	45,935
Light rail	+	+	N	4,066	4,935	[R]5,728	5,961
Trolley bus	+	+	N	1,925	1,871	2,084	2,037
Demand response	N	N	N	22,740	39,882	[R]44,667	47,666

KEY: N = data are nonexistent; NA = not applicable; P = preliminary; R = revised;
~ = included in heavy rail figure; + = included in motor bus figure

Continued next page

Transit Profile
Cont'd

Inventory Cont'd	1960	1970	1980	1990	1995	1996	1997[P]
Ferry boat[a]	N	N	N	2,813	2,697	2,830	3,385
Commuter rail	N	N	N	21,443	22,320	[R]22,604	22,487
Other[b]	N	N	N	898	1,169	[R]1,086	1,043
Total	156,400	138,040	189,300	262,176	300,491	[R]314,944	326,476
Performance							
Vehicle-miles (millions)							
Motor bus	[q]1,576	[q]1,409	[q]1,677	[q]2,130	[q]2,184	[qR]2,221	[q]2,307
Heavy rail	391	407	385	537	537	543	558
Light rail	75	34	18	24	35	38	41
Trolley bus	101	33	13	14	14	14	14
Demand response	N	N	N	306	507	[R]548	623
Ferry boat[a]	N	N	2	2	3	3	3
Commuter rail	N	N	179	213	238	242	251
Other[b]	N	N	13	16	33	R43	45
Total	2,143	1,883	2,287	3,242	3,550	[R]3,650	3,841
Unlinked passenger trips (millions)							
Motor bus	N	[r]5,034	[r]5,837	[r]5,677	[r]4,848	[r]R4,887	[r]5,199
Heavy rail	N	1,881	2,108	2,346	2,033	2,157	2,430
Light rail	N	124	133	175	251	261	263
Trolley bus	N	182	142	126	119	117	121
Demand response	N	N	–	68	88	[R]93	95
Ferry boat[a]	N	N	63	50	47	48	54
Commuter rail	N	N	280	328	344	[R]352	357
Other[b]	N	N	4	29	33	R33	39
Total	N	7,332	8,567	8,799	7,763	[R]7,948	8,558

KEY: N = data are nonexistent; NA = not applicable; P = preliminary; R = revised; ~ = included in heavy rail figure; + = included in motor bus figure

Continued next page

Transit Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996	1997[P]
Passenger-miles (millions)							
Motor bus	N	N	[l]21,790	[l]20,981	[l]18,819	[l]19,096	[l]20,357
Heavy rail	N	N	10,558	11,475	10,559	11,530	12,056
Light rail	N	N	381	571	860	957	1,039
Trolley bus	N	N	219	193	187	184	189
Demand response	N	N	N	431	607	656	928
Ferry boat[a]	N	N	c	286	260	256	349
Commuter rail	N	N	6,516	7,082	8,244	8,351	8,038
Other[b]	N	N	390	124	273	348	350
Total	N	N	39,854	41,143	39,808	41,378	43,306
Average trip length (miles)							
Motor bus	N	N	N	N	[s]4	[s]4	[s]4
Heavy rail	N	N	N	N	5	5	5
Light rail	N	N	N	N	3	4	4
Trolley bus	N	N	N	N	2	2	2
Demand response	N	N	N	N	8	9	10
Ferry boat[a]	N	N	N	N	6	5	7
Commuter rail	N	N	N	N	24	24	23
Vanpool	N	N	N	N	35	34	33
Other[b]	N	N	N	N	1	1	1
All modes	N	N	N	N	5	5	5
Average speed (miles per hour)							
Motor bus	N	N	N	N	[t]13	[t]13	[t]13
Heavy rail	N	N	N	N	21	21	21
Light rail	N	N	N	N	14	14	16
Trolley bus	N	N	N	N	8	8	8

KEY: N = data are nonexistent; NA = not applicable; P = preliminary; R = revised; ~ = included in heavy rail figure; + = included in motor bus figure

Continued next page

Transit Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996	1997[P]
Demand response	N	N	N	N	15	15	15
Ferry boat[a]	N	N	N	N	6	7	8
Commuter rail	N	N	N	N	34	33	34
Vanpool	N	N	N	N	35	37	36
Other[b]	N	N	N	N	6	7	7
All modes	N	N	N	N	15	15	15
Energy consumption, diesel (million gallons)							
Motor bus	N	N	N	[u]563	[u]564	[uR]578	564
Heavy rail	NA	NA	NA	NA	NA	NA	NA
Light rail	NA	NA	NA	NA	NA	NA	NA
Trolley bus	NA	NA	NA	NA	NA	NA	NA
Demand response	N	N	N	15	29	[R]31	35
Ferry boat[a]	N	N	N	20	22	22	24
Commuter rail	N	N	N	53	63	[R]62	64
Other[b]	N	N	N	[R]> 1	[R]< 1	[R]< 1	< 1
Total	[u]208	[u]271	[u]431	651	678	[R]693	687
Gasoline and other nondiesel fuels[g]	192	68	11	33	61	61	58
Compressed natural gas	U	U	U	U	11	15	23
Total	192	69	11	[v]34	[v]71	[vR]76	81
Energy consumption (million kWh)							
Motor bus	NA	NA	NA	NA	NA	NA	NA
Heavy rail	N	N	N	[w]3,284	[w]3,401	[w]3,332	[w]3,253
Light rail	N	N	N	239	288	[R]321	372
Trolley bus	N	N	N	69	100	69	78
Demand response	NA	NA	NA	NA	NA	NA	NA

KEY: N = data are nonexistent; NA = not applicable; P = preliminary; R = revised; ~ = included in heavy rail figure; + = included in motor bus figure

Continued next page

Transit Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996	1997[P]
Ferry boat[a]	NA	NA	NA	NA	NA	NA	NA
Commuter rail	N	N	N	1,226	1,253	[R]1,255	1,282
Other[b]	N	N	N	19	26	[R]30	33
Total	[w]2,908	[w]2,561	[w]2,446	[w]4,837	5,068	[R]5,007	5,018
Safety[h]							
Fatalities, all modes	N	N	N	339	274	264	275
Injuries, all modes	N	N	N	54,556	57,196	55,288	56,132
Incidents, all modes	N	N	N	90,163	62,471	59,392	61,560

KEY: N = data are nonexistent; NA = not applicable; P = preliminary; R = revised; ~ = included in heavy rail figure; + = included in motor bus figure

[a] Excludes international, rural, rural interstate, island and urban park ferries.

[b] 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 oeprate 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 non-deisel 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 Transit Association, *1999 Transit Fact Book* (Washington, DC: 1999), tables 21, 22, D2 and similar tables for prior years.

[j] _____. 1999 edition table 30, and similar tables in earlier years.

[k] _____. 1999 edition table 28, and similar tables in earlier years.

[l] _____. 1999 edition table 33, and similar tables in earlier years.

[m] _____. 1999 edition table 24, and similar tables in earlier years.

[n] _____. 1999 edition table 4, and similar tables in earlier years.

[o] _____. 1999 edition table 44, and similar tables in earlier years.

[p] _____. 1999 edition table 61, and similar tables in earlier years.

[q] _____. 1999 edition table 40, and similar tables in earlier years.

[r] _____. 1999 edition table 31, and similar tables in earlier years.

[s] _____. 1999 edition table 37, and similar tables in earlier years.

[t] _____. 1999 edition table 42, and similar tables in earlier years.

[u] _____. 1999 edition table 63, and similar tables in earlier years.

[v] _____. 1999 edition table 64, and similar tables in earlier years.

[w] _____. 1999 edition table 65, and similar tables in earlier years.

Rail Profile

Financial	1960	1970[a]	1980	1990	1995	1996	1997
Class I[b]							
Operating revenues ($ millions)							
Passenger	[f]640	[f]421	[f]446	[f]94	[f]89	[f]59	[f]60
Freight	8,025	10,922	26,350	27,471	31,356	31,889	32,322
Other	849	649	1,462	805	835	745	736
Total	9,514	11,992	28,258	28,370	[R]32,280	[R]32,693	33,118
Operating expenses ($ millions)[c]	8,775	11,478	26,355	24,652	27,897	26, 331	27,291
Amtrak							
Total revenue ($ millions)	N	162	429	[h]1,308	[h]1,497	[h]1,555	[h]1,674
Total expenses ($ millions)	N	301	1,103	2,012	2,305	2,318	2,436
Inventory							
Class I[b]							
Number of vehicles							
Class I freight cars	1,658,292	[f]1,423,921	[f]1,168,114	[f]658,902	[f]583,486	[f]570,865	[f]568,493
Other nonclass I freight cars	307,194	360,260	542,713	553,359	635,441	669,708	701,926
Freight cars, total	1,965,486	1,784,181	1,710,827	1,212,261	1,218,927	1,240,573	1,270,419
Locomotives	29,031	27,077	28,094	18,835	18,812	19,269	19,684
Number of companies	106	71	38	14	11	10	9
Number of employees	780,494	566,282	458,994	216,424	188,215	181,809	177,981
Miles of road owned	207,334	196,479	164,822	119,758	108,264	105,779	102,128
Amtrak							
Number of vehicles							
Passenger							
Train-cars	N	[g]1,569	[g]2,128	[h]1,863	[h]1,722	[h]1,730	[h]1,728
Locomotives	N	185	419	318	313	299	332
Number of employees	N	[j]1,500	[j]21,416	[j]24,000	23,646	[g]23,278	[g]23,555
System route mileage	N	N	[k]24,000	[k]24,000	24,000	[h]25,000	[h]25,000

KEY: N = data are nonexistent; R = revised

Continued next page

Rail Profile
Cont'd

Performance	1960	1970[a]	1980	1990	1995	1996	1997
Class I[b]							
Car mileage, freight (thousands)	[f]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
Train mileage, freight (thousands)	404,464	427,065	428,498	379,582	458,271	468,792	474,954
Locomotive mileage (thousands)							
Freight	[l]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
Train and yard switching	N	N	212,040	135,806	150,840	153,798	141,461
Total	N	N	1,531,050	1,280,365	1,444,691	1,465,149	1,423,229
Revenue ton-miles of freight (millions)	[f]572,309	[f]764,809	[f]918,958	[f]1,033,969	[f]1,305,688	[f]1,355,975	[f]1,348,926
Average length of haul, freight (miles)	461	515	616	726	843	842	851
Fuel consumed in freight service (million gallons)	3,463	3,545	3,904	3,115	3,480	3,579	3,575
Average miles traveled per vehicle							
Locomotive[R]	N	N	54,497	67,978	76,796	76,037	72,304
Car	14,332	16,753	17,113	21,579	24,926	25,565	24,921
Average miles traveled per gallon							
Train	0.12	0.12	0.11	0.12	0.13	0.13	0.13
Car	8.13	8.43	7.50	8.40	8.73	8.86	8.86
Amtrak							
Passenger train car-miles (millions)	N	[m]213	[m]235	[m]301	[p]292	[p]276	[p]288
Passenger train-miles (millions)	N	26	30	33	32	30	32
Passenger locomotive-miles (millions)	N	N	41	49	48	U	U
Revenue passengers carried (millions)	N	17	21	22	21	20	20
Revenue passenger-miles (millions)	N	3,039	4,503	[h]6,057	[h]5,545	[h]5,050	[h]5,166
Average passenger fare (dollars)	N	[n]8.3	17.7	38.5	39.0	42.5	44.3
Average passenger revenue/ passenger-mile (cents)	N	4.5	8.2	14.1	14.6	16.6	17.3

KEY: N = data are nonexistent; R = revised

Continued next page

Rail Profile
Cont'd

Performance Cont'd	1960	1970[a]	1980	1990	1995	1996	1997
Average passenger trip length (miles)	N	182.6	217.0	273.0	267.6	[R]256.9	255.8
Locomotive fuel consumed							
Diesel (million gallons)	N	N	64	82	[q]66	[q]71	[q]75
Electric kWh (millions)	N	N	254	330	304	293	282
Safety[d,o]							
Number of fatalities, railroads and grade crossings							
Passenger on trains	34	10	4	3	0	12	6
Employees on duty	215	179	97	40	34	33	37
Employees not on duty	N	N	4	0	2	0	0
Trespassers	637	607	566	700	660	620	646
Non-trespassers	1,459	1,535	739	551	443	365	363
Contractor employees	N	N	7	3	7	9	11
Railroad and grade crossing, total	2,345	2,225	1,417	1,297	1,146	1,039	1,063
Grade crossing only	1,421	1,440	833	698	579	488	461
Railroad only[e]	924	785	584	599	567	551	602

KEY: N = data are nonexistent; R = revised

[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] _____. *Statistical Appendix to Amtrak Annual Report,* annual issues.

[i] _____. Human Resources Information Center, personal communication.

[j] _____. Public Affairs, personal communication.

[k] _____. 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] _____. *Train Earnings Reports.*

[o] 1960-80: U.S. Department of Transportation, Federal Railroad Administration, Systems Support Division, RRS-22, personal communication.

1990-96: _____. *Accident/Incident Bulletin,* annual issues, tables 7 and 9.

1997: _____. *Railroad Safety Statistics, Annual Report 1997,* table 1-3.

[p] Amtrak Corporate Reporting, Route Profitability System, Washington D.C., personal communication, June 1999.

[q] Amtrak General Acounting, Pennsylvania, personal communication, June 1999.

Water Transport Profile

Financial	1960	1970	1980	1990	1995	1996	1997
Operating revenues ($ millions)							
Domestic freight	[i]1,722	[i]2,070	[i]7,219	[i]7,940	[i]7,712	[iR]7,684	[i]7,702
Coastal waterways	747	834	3,155	3,066	2,774	[R]2,782	[i]2,693
Inland waterways	461	621	2,395	2,956	2,964	3,044	3,126
Great lakes	227	239	513	615	585	[R]579	626
Locks, channels	287	376	1,156	1,303	1,389	[R]1,279	1,257
International freight	1,765	3,187	8,279	12,181	17,161	17,281	17,644
Passenger, total	281	287	304	1,345	1,658	1,741	1,828
Domestic passenger, intercity	14	12	21	58	78	82	86
International passenger[a]	267	275	283	1,287	1,580	1,659	1,742
Revenues of U.S. commercial fishing Fleet (domestic landings) ($ millions)	**[j]354**	**[j]613**	**[j]2,237**	**[j]3,522**	**[jR]3,770**	**[j]3,487**	**[j]3,467**
Inventory							
Number of domestic inland Vessel operators[b]	**[k]228**	**[k]380**	**[k]403**	**[k]565**	**[k]557**	**[k]554**	**U**
Number of employees							
Ships, boat building, and repairing	[l]141,200	[l]171,800	[l]220,500	[m]187,700	[nR]159,600	[nR]158,800	[n]157,000
Water transportation[c]	N	212,300	211,200	176,600	[R]174,500	[R]174,100	180,400
Number of employees[d]							
Passenger/combo	[o]8,560	[o]2,178	[o]618	[o]642	[o]642	[o]321	[o]321
Cargo	28,668	22,257	9,878	7,019	[r]5,400	4,964	4,831
Tankers	12,053	10,567	8,722	4,471	[r]4,261	3,965	3,785
Total	49,281	35,000	19,218	12,132	[r]10,303	9,250	8,937
Mileage of commercially Navigable channels	**[i]25,000**	**[i]26,000**	**[i]26,000**	**[i]26,000**	**[i]26,000**	**[i]26,000**	**[i]U**

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Water Transport Profile
Cont'd

Inventory Cont'd	1960	1970	1980	1990	1995	1996	1997
Number of vessels							
Total nonself-propelled	[p]16,777	[p]19,377	[p]31,662	[p]31,209	[p]31,360	[p]32,811	[p]33,011
Dry cargo barges and scows	14,025	15,890	27,426	27,091	27,342	28,743	29,006
Tankers	2,429	3,281	4,166	3,913	3,985	4,036	3,971
Railroad car floats	323	206	70	13	33	32	34
Total self-propelled	6,543	6,455	7,126	8,236	8,281	8,293	8,408
Dry cargo/passenger	1,796	1,761	2,036	2,678	2,804	2,782	2,905
Ferries, railroad car	31	17	67	135	172	173	183
Tankers	489	421	330	213	178	161	147
Towboats/tugs	4,203	4,248	4,693	5,210	5,127	5,177	5,173
U.S. merchant marine ships (over 1,000 gross tons)							
Total U. S. flag	[q]2,926	[q]1,579	[q]864	[q]636	[q]509	[q]495	477
Passenger/cargo	309	171	65	10	13	15	14
Freighters	2,138	1,076	471	367	295	292	288
Bulk carriers	57	38	20	26	20	15	14
Tankers	422	294	308	233	181	173	161
Privately owned	1,008	U	578	408	319	302	285
Government owned	1,918	U	286	228	190	193	192
Number of recreational boats (thousands)[e]	**[r]2,500**	**[r]7,400**	**[r]8,600**	**[r]11,000**	**[r]11,700**	**[r]11,900**	**[r]12,313**
Performance							
Ton-miles (thousands)[f]							
Domestic water freight							
Coastwise	N	[s]359,784,000	[s]631,149,247	[s]479,133,600	[s]440,345,100	[s]408,086,100	[s]349,843,000
Internal	N	155,816,000	227,342,991	292,393,300	306,329,100	296,790,600	62,165,900

KEY: N = data are nonexistent; U = data are unavailable

Continued next page

Water Transport Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996	1997
Lakewise	N	79,416,000	61,747,114	60,929,900	59,703,900	58,335,300	294,023,000
Intraport	N	1,179,000	1,596,412	1,087,000	1,349,600	1,474,500	1,378,100
Total	N	596,195,000	921,835,764	853,543,800	807,727,700	764,686,500	707,410,000
Tons of freight hauled (thousands)							
Domestic							
Coastwise	209,197	238,440	329,609	298,637	266,612	267,389	263,100
Internal	291,057	472,123	534,979	622,595	620,324	622,081	630,600
Lakewise	155,109	157,059	115,124	110,159	116,127	114,870	122,700
Intraport[R]	104,193	81,475	94,184	86,378	83,104	89,011	89,800
Intraterritory	[R]1,017	1,630	3,588	4,529	6,868	7,327	U
Total	760,573	950,727	1,077,483	1,122,299	1,093,035	1,100,679	1,112,500
Exports							
Great Lakes ports	23,150	35,932	45,077	32,898	32,968	31,855	33,209
Coastal ports	104,810	205,698	358,806	408,688	441,732	418,940	399,104
Total	**127,961**	**241,629**	**403,883**	**441,586**	**474,700**	**450,794**	**432,313**
Imports							
Great Lakes ports	12,851	26,406	15,515	17,578	18,897	24,503	24,532
Coastal ports	198,466	312,934	502,006	582,412	653,760	708,090	763,771
Total	211,316	339,340	517,521	599,970	672,657	732,593	788,303
Average haul, domestic system (miles)[f]							
Coastwise	1,496	1,509	1,915	1,604	1,652	1,526	1,330
Internal	282	330	405	[R]470	494	477	466
Lakewise	522	506	536	553	514	508	507
Cargo capacity (short tons)							
Total nonself-propelled vessels	[p]16,355,657	[p]24,026,024	[p]44,875,116	[p]48,603,351	[p]51,140,530	[p]54,086,973	[p]54,974,961
Dry cargo barges	12,147,006	17,695,275	34,486,851	37,973,654	39,971,443	42,748,644	43,710,093

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Water Transport Profile
Cont'd

Performance Cont'd	1960	1970	1980	1990	1995	1996	1997
Tankers	4,208,651	6,330,749	10,388,265	10,629,697	11,169,087	11,338,329	11,264,868
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
Dry cargo/passenger	12,188,956	10,815,977	8,011,587	7,042,263	6,484,707	6,208,011	6,685,719
Tankers	3,716,925	8,468,073	15,894,753	12,681,525	9,298,692	8,642,242	7,476,020
Fuel consumption (thousand barrels)							
Diesel fuel and distillate	[i]18,730	[i]19,503	[i]35,201	[i]52,310	[i]47,098	[i]51,848	[i]50,180
Residual fuel oil	94,084	89,850	213,131	148,764	153,125	138,213	114,044
Gasoline	9,200	14,238	25,048	30,962	25,250	23,659	23,505
Total	122,014	123,591	273,380	232,036	225,473	213,720	187,729
Safety							
Fatalities in waterborne transport (vessel casualties only)							
Freight	N	[t]30	[t]8	[t]0	[t]0	[t]0	[t]2
Tankship	N	4	4	5	0	0	0
Passenger vessel	N	1	5	3	4	2	1
Tug/towboat	N	22	14	13	1	1	4
Offshore supply	N	N	N	2	2	2	0
Fishing vessel	N	77	60	47	18	38	22
Recreational vessel	N	N	N	3	20	3	7
MODU[g]	N	N	N	0	0	0	4
Platform	N	N	N	1	0	1	0
Freight barge	N	N	N	0	0	0	5
Tank barge	N	H	N	0	0	0	0
Miscellaneous	N	44	56	11	1	3	1
Total	N	178	206	85	46	50	46

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Water Transport Profile
Cont'd

Safety Cont'd	1960	1970	1980	1990	1995	1996	1997
Injuries in waterborne transport							
Freight	N	14	8	10	1	0	3
Tankship	N	19	9	13	5	5	1
Passenger vessel	N	10	10	51	50	60	37
Tug/towboat	N	10	27	19	18	12	20
Offshore supply	N	N	N	9	10	7	3
Fishing Vessel	N	13	28	31	32	32	25
Recreational vessel	N	N	N	2	19	7	5
MODU[g]	N	N	N	13	0	0	2
Platform	N	N	N	9	1	0	0
Freight barge	N	N	N	3	0	0	6
Tank barge	N	N	N	3	3	1	0
Miscellaneous	N	39	98	12	6	5	7
Total	N	105	180	175	145	129	109
Fatalities in recreational boating (vessel casualties only)							
Air thrust	N	N	N	N	[r]4	[r]1	[r]6
Propeller	N	N	N	N	475	363	434
Inboard	N	[r]119	[r]100	[r]50	N	N	N
Outboard	N	774	609	454	N	N	N
Inboard/outboard	N	28	47	53	N	N	N
Jet	N	N	10	25	68	61	83
Sail	N	44	43	20	4	8	15
Manual (oars, paddle)	N	205	272	182	148	109	150
Other	N	29	14	5	8	8	10
Propulsion unknown	N	219	265	76	122	159	121
Total	[Rr]739	1,418	1,360	865	829	709	[R]821

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Water Transport Profile
Cont'd

[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.

SOURCES: Unless otherwise noted, refer to chapter tables for sources:

[i] Eno Transportation Foundation Inc., *Transportation in America, 1998* (Washington, DC: 1998), 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] _____. *Employment, Hours and Earnings, 1988–1996* (Washington, DC: August 1996), SICs 373 and 44.

[n] _____. Internet site www.bls.gov, as of Apr. 19, 1999.

[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.

[t] U.S. Coast Guard, Office of Investigations and Analysis, G-MAO-2, personal communication.

Natural Gas Pipeline Profile

Financial ($ millions)	1960	1970	1980	1990	1995	1996[R]	1997
Transmission pipeline companies							
Total operating revenues	[d]3,190	[d]5,928	[e]41,604	[e]21,756	[e]12,092	[e]12,050	[e]10,339
Total operating expenses[a]	2,698	5,088	39,709	19,484	9,534	9,603	7,862
Taxes (federal, state, local)[b]	319	376	1,991	1,245	1,582	1,643	1,531
Operation and maintenance	2,095	4,203	36,480	17,058	6,680	6,802	5,381
Distribution pipeline companies							
Total operating revenues	N	N	[d]14,013	[f]18,750	[f]19,421	[f]30,407	[f]30,817
Total operating expenses[a]	N	N	13,263	17,125	17,402	27,917	31,395
Taxes (federal, state, local)[b]	N	N	1,136	1,625	1,888	2,668	3,211
Operation and maintenance	N	N	11,791	14,544	14,170	23,301	26,062
Investor-owned, total industry							
Total operating revenues	N	N	[g]85,918	[g]66,027	[g]58,434	[g]63,600	[g]62,617
Total operating expenses[a]	N	N	81,789	60,137	50,800	56,695	69,375
Taxes (federal, state, local)[b]	N	N	4,847	4,957	6,186	6,362	7,182
Operation and maintenance	N	N	74,508	51,628	40,041	45,785	47,760
Inventory							
Pipeline mileage							
Transmission	[h]183,700	[h]252,200	[i]266,500	[i]280,100	[i]264,900	[i]259,300	[i]256,500
Distribution	391,400	594,800	701,800	837,300	935,000	959,500	955,300
Field and gathering	55,800	66,300	83,500	89,500	62,200	57,500	46,100
Total	630,950	913,267	1,051,774	1,206,894	1,262,152	1,276,315	1,257,887
Number of employees							
Investor-owned companies	206,400	211,700	215,400	204,200	179,000	171,600	154,900
Transmission pipeline companies	[j]31,400	[j]32,400	[k]45,200	[k]37,400	[k]28,000	[k]32,300	[k]27,500
Distribution pipeline companies	N	N	52,100	64,700	[R]61,600	79,700	75,200

KEY: N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Natural Gas Pipeline Profile
Cont'd

Inventory Cont'd	1960	1970	1980	1990	1995	1996[R]	1997
Integrated pipeline companies	N	N	53,200	39,900	36,400	12,700	12,300
Combination pipeline companies	N	N	52,200	50,100	42,100	38,700	30,600
Total	N	N	202,700	192,100	168,100	163,500	145,600
Number of interstate natural gas pipeline companies[c]	[l]87	[l]89	[l]91	[l]132	[m]133	[m]138	U
Performance (million cubic ft.)							
Marketed production, total	[n]12,771,038	[n]21,920,642	[n]20,179,724	[n]18,593,792	[n]19,506,474	[n]19,750,793	[n]19,865,182
Delivered to consumers, total	[o]10,382,681	[o]19,018,462	[o]18,216,233	[o]16,818,882	[o]19,660,161	[o]20,005,508	[o]20,018,683
Consumed, total	11,966,537	21,139,386	19,877,293	18,715,090	21,580,665	21,966,991	21,972,770
Gas used as a pipeline fuel, total	347,075	722,166	634,622	659,816	700,335	711,446	751,595
Safety							
Fatalities	N	[p]26	[p]15	[p]6	[p]18	[pR]48	[p]11
Injuries	N	233	177	69	53	[R]114	88
Incidents	N	1,077	1,524	198	161	[R]187	181

KEY: N = data are nonexistent; R = revised; U = data are unavailable

[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] _____. *Gas Facts* (Arlington, VA: Annual issues), table 12-3, and similar tables in earlier edtiions.

[f] _____. table 12-2.

[g] _____. table 12-1.

[h] _____. *Gas Facts, 1979* (Arlington, VA:), table 44.

[i] _____. *Gas Facts* (Arlington, VA: Annual issues), table 5-1, and similar tables in earlier editions.

[j] _____. *Gas Facts, 1979* (Arlington, VA:), table 153.

[k] _____. *Gas Facts* (Arlington, VA: Annual issues), table 14–2, and similar tables in earlier editions.

[l] U.S. Department of Energy, Energy Information Administration, *Statistics of Interstate Natural Gas Pipeline Companies* (Washington, DC: Annual issues), preface.

[m] Federal Energy Regulatory Commission, personal communication.

[n] _____. U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual, 1997* (Washington, DC: October 1998), table 98.

[o] _____. Table 100.

[p] 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, as of Mar. 18, 1999.

Oil Pipeline Profile

Financial	1960	1970	1980	1990	1994	1995	1996	1997
Operating revenues ($ millions)								
FERC-regulated	[c]770	[c]1,188	[c]6,340	[c]7,163	[c]6,950	[c]7,631	[c]7,262	[c]7,335
Nonregulated	125	208	1,208	1,342	1,323	1,420	[R]1,373	1,400
Total	895	1,396	7,548	8,505	8,273	9,051	[R]8,635	8,735
Inventory								
Number of FERC-regulated companies	[d]87	[d]101	[d]130	[d]150	[d]158	[d]161	[d]160	U
Number of employees, pipeline companies[a]	[e]23,100	[e]17,600	[e]21,300	[f]18,500	[f]17,100	[gR]15,100	[g]14,500	[g]14,300
Miles of pipeline (statute miles)[b]								
Crude lines	[h]141,085	[h]146,275	[h]129,831	[h]118,805	[h]114,000	[h]114,000	[h]114,000	U
Product lines	49,859	72,396	88,562	89,947	86,500	86,500	86,500	U
All lines	190,944	218,671	218,393	208,752	200,500	200,500	200,500	U
Performance								
Intercity ton-miles (millions)								
Crude oil	N	N	[i]362,600	[i]334,800	[i]322,600	[i]335,900	[i]338,300	U
Petroleum products	N	N	225,600	249,300	268,800	265,200	280,900	U
Total	[i]229,000	[i]431,000	588,200	584,100	591,400	601,100	619,200	617,000
Tons transported (millions)	468.4	790.3	960.8	1,057.4	[R]1,099.0	[R]1,121.0	[R]1,116.0	1,110.0
Average length of haul (statute miles)								
Crude oil	[j]325	[j]300	[j]871	[j]805	[j]756	[j]752	[j]761	U
Petroleum products	269	357	414	389	400	398	394	U
Safety								
Fatalities	N	[k]4	[k]4	[k]3	[k]1	[k]3	[k]5	[k]0
Injuries	N	21	15	7	1,858	11	13	5
Incidents	N	351	246	180	[R]243	188	195	175

KEY: FERC = Federal Energy Regulatory Commission; N = data are nonexistent; R = revised; U = data are unavailable

Continued next page

Oil Pipeline Profile
Cont'd

[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] _____. *Employment, Hours and Earnings, United States, 1988–1996* (Washington, DC: July 1996), SIC 46.

[g] _____. Internet site 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] _____. pp. 44, 59.

[j] _____. p. 71.

[k] 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, as of Mar. 18, 1999.

Metric Conversion Tables

Table 1-1M U.S. Transportation System Kilometers (Statute kilometers)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
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
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
Amtrak[c]	N	N	N	N	38,624	38,624	38,624	38,624	40,234	40,234
Transit[d]										
Commuter rail[c]	N	N	N	N	N	5,752	6,649	6,695	R5,926	7,108
Heavy rail	N	N	N	N	N	2,081	2,174	2,346	R2,379	2,457
Light rail	N	N	N	N	N	618	777	913	1,027	1,061
Navigable channels[e]	40,234	40,234	41,843	41,843	41,843	41,843	41,843	41,843	41,843	U
Oil pipeline[f]	307,295	339,358	351,917	363,533	351,469	343,764	335,954	322,673	322,673	U
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	R2,054,030	2,024,373

KEY: N = data are nonexistent; R = revised; U = data are unavailable

[a] All public road and street kilometers. Prior to 1980, some kilometers of nonpublic roadways are included. No consistent data on private road kilometers are available. Includes U.S. states and District of Columbia.

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

[c] Portions of the Class I freight, Amtrak, and Transit-Commuter Rail networks share common trackage. Amtrak data represent miles of track operated.

[d] Transit system kilometer is measured in directional route-kilometers. A directional route-kilometer is the kilometer in each direction over which public transportation vehicles travel while in revenue service. Directional route-kilometers 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] In the mid-1950s, the U.S. Army Corps of Engineers estimated that there were approximately 40,000 kilometers of commercially important navigable channels in the United States. That number has been adjusted from time to time, for example, by the addition of the 377-kilometer Tennessee-Tombigbee Waterway in the early 1980s. The 40,000 plus kilometer number has been universally quoted for decades, but has definitional and methodological uncertainties. The Corps is currently developing a rigorous, geographic information system-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. Note that the St. Lawrence Seaway is not included in this number because three of the five subsections are solely in Canadian waters, and the others are in international boundary waters. Note that there are a total of 17,500 kilometers of commercially significant shallow-draft inland waterways subject to fuel taxes. These waterways are defined by the Inland Waterways Revenue Act of 1978 (P.L. 95-502) as amended by the Water Resources Development Act of 1986 (P.L. 96-662). There are, in addition, deep-draft waterways of great industrial significance.

[f] Includes trunk and gathering lines for crude kilometers.

[g] Excludes service pipe. Data not adjusted to common diameter equivalent. Kilometers 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 kilometers.

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.

1996–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table HM-20.

Class I rail: 1960–97: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 44.

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

1985–97: Ibid., *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 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.

Oil pipeline: 1960–96: Eno Transportation Foundation, Inc., *Transportation in America, 1998* (Washington, DC: 1999), p. 64.

Gas pipeline: 1960–97: American Gas Association, *Gas Facts* (Arlington, VA : Annual issues), table 5-2 and similar tables in earlier editions.

Table 1-5M Estimated U.S. Roadway Lane-Kilometers by Functional Class

	1980	1985	1990	1995	1996[R]	1997[R]
Urban						
Interstates	77,986	92,207	100,124	114,870	115,535	116,286
Other arterials	536,995	598,111	642,733	717,491	723,368	730,035
Collectors	233,561	261,320	270,000	297,780	300,823	303,925
Local	1,396,888	1,530,515	1,675,546	1,831,224	1,849,870	1,879,627
Total	**2,245,429**	**2,482,154**	**2,688,403**	**2,961,365**	**2,989,596**	**3,029,873**
Rural						
Interstates	210,792	212,284	218,663	212,298	213,983	214,308
Other arterials	816,095	820,773	832,581	854,089	857,549	864,200
Collectors[a]	2,303,401	2,360,568	2,361,876	2,281,129	2,279,896	2,283,075
Local	7,173,786	7,027,931	6,855,435	6,820,554	6,821,243	6,873,460
Total	**10,504,074**	**10,421,557**	**10,268,556**	**10,168,070**	**10,172,671**	**10,235,043**
TOTAL lane kilometers	**12,749,503**	**12,903,711**	**12,956,959**	**13,129,436**	**13,162,268**	**13,264,917**

[a] 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 2 lanes wide.

KEY: R = revised

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

1996–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

Table 1-28M U.S. Vehicle-Kilometers[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
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	7,903
General aviation[b]	2,847	4,123	5,161	[R]6,820	8,375	[R]7,520	[R]7,319	6,107	5,671	6,239
Highway										
Passenger car and motorcycle[c]	944,685	1,163,556	1,480,596	1,673,718	1,805,684	2,021,336	2,282,050	2,330,330	2,381,829	2,433,328
Motorcycle[c]	[d]	[d]	4,828	9,012	16,415	14,645	15,450	15,772	15,933	16,254
Other 2-axle 4-tire vehicle[c]	[d]	[d]	197,949	323,478	468,319	629,254	925,373	1,271,382	1,314,834	1,367,942
Truck										
Single-unit 2-axle 6-tire or more truck	158,681	207,284	43,613	55,683	64,052	73,064	83,525	100,906	103,159	107,504
Combination truck	46,510	51,016	56,488	75,156	110,562	125,690	151,761	185,879	191,351	200,363
Bus	6,920	7,564	7,242	9,817	9,817	7,242	9,173	10,300	10,622	10,944
Total[R]	**1,157,118**	**1,429,097**	**1,785,889**	**2,137,853**	**2,458,434**	**2,856,586**	**3,451,882**	**3,898,797**	**4,001,795**	**4,120,082**
Transit										
Motor bus	2,537	2,460	2,268	2,456	2,699	2,998	3,428	3,515	3,574	[P]3,713
Light rail	120	67	54	38	28	27	39	56	61	[P]66
Heavy rail	629	636	655	681	619	725	864	864	874	[P]898
Trolley bus	162	69	53	25	21	25	22	23	23	[P]23
Commuter rail	N	N	N	278	288	295	343	383	389	[P]404
Demand responsive	N	N	N	N	N	398	492	816	882	[P]1,003
Ferry boat	N	N	N	N	[e]	[e]	4	5	5	3
Other	N	N	N	24	25	24	26	53	69	[P]72
Total[f]	**3,449**	**3,232**	**3,030**	**3,502**	**3,681**	**4,492**	**5,217**	**5,713**	**5,874**	**[P]6,181**
Rail										
Class I freight, train-kilometers	650	678	687	649	689	558	612	737	754	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

KEY: N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 1-28M Cont'd U.S. Vehicle-Kilometers[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Intercity/Amtrak[g], train-kilometers	336	277	150	48	48	48	53	51	48	51
Intercity/Amtrak[g], car-kilometers	3,554	2,857	1,110	407	378	404	484	470	444	463
Total train-kilometers[h]	**987**	**954**	**837**	**697**	**737**	**607**	**665**	**789**	**803**	**816**

KEY: N = data are nonexistent; P = preliminary; R = revised

[a] U.S. Department of Transportation, Bureau of Transportation Statistics has rounded some of the categories in this table as follows: to the nearest billion vehicle-kilometers:— total highway; passenger car and motorcycle; and other 2-axle 4-tire vehicle; to the nearest 100 million vehicle-kilometers: motorcycle; truck; bus.

[b] 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. Kilometers in source is multiplied by 1.852 to convert from nautical kilometers for 1985–1997

[c] In July 1997, the U.S. Department of Transportation, Federal Highway Administration 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] 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.

[e] Ferry boat included with other.

[f] 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 bwtween 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 responsive figures are also included in the bus figure for highway.

[g] Amtrak began operations in 1971.

[h] 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.

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

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

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

1985–97: 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: _____. *General Aviation Activity and Avionics Survey* (Washington, DC: Annual issues,) table 3.3.

1995–97: _____. *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*, FHWA-PL-97-009 (Washington, DC: July 1997), table 8-5.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1, sum of passenger car and motorcycle.

Motorcycle: 1970–85: _____. *Highway Statistics, Summary to 1985*, FHWA-PL-97-009 (Washington, DC: 1986), table VM-201A.

1990–97 _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle; single-unit 2-axle 6-tire or more truck; combination truck; and bus: 1960–90: _____. *Highway Statistics, Summary to 1995*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit: 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1999), table 40 and similar tables in earlier editions.

Rail: *Class I rail freight train- and car-kilometers:* 1960–97: Association of American Railroads, *Railroad Facts*, 1998 (Washington, DC: 1997), p. 33 (train-kilometers) and p. 34 (car-kilometers).

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

1975–97: Amtrak, Statistical Appendix to FY… *Amtrak Annual Report* (Washington, DC: Annual issues).

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

1980–97: Amtrak, Amtrak Corporate Reporting, Route Profitability System, personal communication, December 9, 1998.

Table 1-29M Roadway Vehicle-Kilometers Traveled (VKT) and VKT Per Lane-Kilometer by Functional Class

	1980	1985	1990	1995	1996[R]	1997
VKT (millions)						
Urban						
Interstate	259,494	347,921	448,848	549,615	565,812	581,570
Other arterials[a]	779,227	930,635	1,125,306	1,311,780	1,343,196	1,362,464
Collector	133,645	144,162	171,068	204,198	208,104	209,957
Local	204,050	257,595	307,470	331,375	335,345	357,313
Total	**1,376,416**	**1,680,313**	**2,052,693**	**2,396,968**	**2,452,457**	**2,511,304**
Rural						
Interstate	217,397	248,414	322,147	359,498	374,277	386,437
Other arterials[a]	422,894	455,127	532,477	593,196	609,695	630,028
Collector[b]	304,919	332,602	386,983	380,043	387,900	408,463
Local	136,318	139,850	156,716	169,245	176,255	184,288
Total	**1,081,527**	**1,175,993**	**1,398,324**	**1,501,983**	**1,548,128**	**1,609,215**
VKT per lane-kilometers (thousands)						
Urban						
Interstate	5,355	6,072	7,215	7,700	7,880	8,055
Other arterials[a]	2,335	2,504	2,818	2,942	2,990	3,007
Collector	921	888	1,020	1,104	1,113	1,115
Local	235	271	295	291	292	306
Total	**987**	**1,090**	**1,230**	**1,303**	**1,321**	**1,336**
Rural						
Interstate	1,660	1,883	2,371	2,725	2,815	2,902
Other arterials[a]	834	892	1,029	1,118	1,144	1,174
Collector[b]	213	227	264	268	274	288
Local	31	32	37	40	42	43
Total	**166**	**182**	**219**	**238**	**245**	**253**

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

For rurals: they represent the sum of other principal arterials and minor arterials.

[b] Collector is the sum of major collector and minor collector for rural.

NOTE: See table 1-5 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: _____. *Highway Statistics* (Washington, DC: Annual issues), tables VM-2 and VM-2A.

Lane kilometers: 1980-95: _____. Office of Highway Information Management (Washington, DC: 1997), table HM-260 (unpublished) and users may note minor differences in table-to-table kilometer totals. For record purposes, U.S. DOT/FHWA considers the kilometer totals from the Table HM-20, Public Road Length.

1996–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table HM-60.

KEY: R = revised

Table 1-30M U.S. Passenger-Kilometers[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Air										
Air carrier, certificated, domestic, all services	50,051	85,617	174,453	218,871	328,950	447,076	556,672	650,014	699,582	725,170
General aviation[b]	3,701	7,081	14,645	18,347	23,657	19,795	20,921	[R]16,737	17,059	20,117
Highway										
Passenger car and motorcycle[c,R]	1,842,699	2,245,035	2,822,789	3,154,314	3,257,312	3,389,278	3,691,835	3,698,273	3,780,349	3,862,426
Motorcycle[c,R]	[d]	[d]	4,828	9,656	19,312	19,312	19,312	19,312	19,312	19,312
Other 2-axle 4-tire vehicle[c,R]	[e]	[e]	363,712	584,192	838,468	1,107,229	1,609,344	2,085,710	2,154,912	2,243,426
Truck										
Single-unit 2-axle 6-tire or more truck	158,681	207,284	43,613	55,683	64,052	73,064	83,525	100,906	103,159	107,504
Combination truck	46,510	51,016	56,488	75,156	110,562	125,690	151,761	185,879	191,351	200,363
Bus[f]	N	N	N	N	N	152,727	195,374	219,032	223,860	233,194
Total[c,R]	**2,047,729**	**2,503,174**	**3,286,602**	**3,869,346**	**4,270,394**	**4,847,988**	**5,731,840**	**6,289,799**	**6,453,630**	**6,646,913**
Transit										
Motor bus[f]	N	N	N	N	35,084	34,118	33,796	30,256	30,738	[P]32,831
Light rail	N	N	N	N	613	563	919	1,384	1,540	[P]1,672
Heavy rail	N	N	N	N	17,059	16,737	18,507	17,059	18,507	[P]19,473
Trolley bus	N	N	N	N	352	492	311	301	296	[P]304
Commuter rail	6,759	6,598	7,403	7,242	10,461	10,461	11,426	13,197	13,518	[P]12,875
Demand responsive[f]	N	N	N	N	N	586	694	977	1,056	[P]1,493
Ferry boat	N	N	N	N	[g]	[g]	460	418	412	562
Other	N	N	N	N	628	707	200	439	560	[P]563
Total	**[h]6,759**	**[h]6,598**	**[h]7,403**	**[h]7,242**	**64,213**	**63,730**	**66,144**	**64,052**	**66,627**	**[P]69,685**

KEY: N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 1-30M Cont'd U.S. Passenger-Kilometers[a] (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Rail										
Intercity/Amtrak[i]	27,520	21,404	9,978	6,276	7,242	7,725	[R]9,817	8,851	8,208	8,369

KEY: N = data are nonexistent; P = preliminary; R = revised

[a] Several categories of passenger–kilometers are based on rounded numbers, as noted in table 1-30 (U.S. Passenger Miles).

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

[c] In July 1997, U.S. Department of Transportation, Federal Highway Administration (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 Included in passenger car and motorcycle.

[d] Included in passenger car and motorcycle.

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

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

[g] Ferry boat included in other.

[h] Includes Commuter Rail figures only.

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

NOTES: Air carrier passenger-kilometers are computed by summation of the products of the aircraft-kilometers flown on each inter-airport 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 the FHWA by the average number of occupants for each vehicle type. Average vehicle occupancy rates (based on Nationwide Personal Transportation Survey data for 1977, 1983 and 1995) are as follows: Passenger-car (1960-1997): 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; motorcycle (1960-1997): 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); other 2-axle 4-tire vehicle (1960-1997): 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. For trucks, between 1960 and 1980, the average vehicle occupancy rate is assumed to be 1. From 1985 to present, the passenger-kilometers are estimated by the FHWA using the Nationwide Personal Transportation Survey. 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: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, table 2.

1975–80: _____. *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*, FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1, Sum of Passenger Car and Motorcycle. Vehicle-kilometers multiplied by vehicle occupancy rates.

Motorcycle: 1970–85: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics, Summary to 1985* (Washington, DC: 1986), table VM-201A.

1990–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1. Vehicle-kilometers multiplied by vehicle occupancy rates.

Other 2-axle 4-tire vehicle: 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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Single-unit 2-axle 6-tires or more truck, combination truck, and bus: 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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit: 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: 1999), table 33 and similar tables in earlier editions.

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

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

1990–97: _____. *Amtrak Annual Report,* Statistical Appendix (Washington, DC: 1999), p. 49.

Table 1-38M U.S. Ton-Kilometers of Freight (Millions)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air carrier, domestic, all services[a]	**807**	**1,975**	**R3,955**	**5,066**	**6,611**	**7,528**	**13,233**	**18,279**	**18,777**	**19,857**
Intercity truck	**416,092**	**524,130**	**601,509**	**662,827**	**810,285**	**890,583**	**1,073,080**	**1,344,634**	**R1,419,093**	**1,534,431**
Class I rail[b]	**835,555**	**1,018,883**	**1,116,600**	**1,101,187**	**1,341,653**	**1,280,372**	**1,509,566**	**1,906,268**	**1,979,686**	**1,969,395**
Domestic water transport[c]										
Coastwise	U	441,708	525,275	461,126	d921,460	892,009	699,522	642,891	595,794	510,761
Lakewise	U	110,838	115,946	100,033	90,149	70,347	88,956	87,166	85,167	90,761
Internal	U	160,161	227,487	263,378	331,914	339,747	426,886	447,232	433,307	429,265
Intraport	U	2,392	1,721	1,785	2,331	1,609	1,587	1,971	2,153	P2,012
Oil pipeline	**334,334**	**446,752**	**629,248**	**740,206**	**858,464**	**823,424**	**852,624**	**877,443**	**903,723**	**900,803**
TOTAL	**R2,280,477**	**2,706,789**	**R3,222,159**	**3,336,037**	**R4,362,397**	**4,305,458**	**4,666,071**	**5,325,979**	**R5,438,397**	**5,457,376**

KEY: R = revised; U = data are unavailable

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

[b] All public road and street kilometers. Prior to 1980, some kilometers of nonpublic roadways are included. No consistent data on private road kilometers are available.

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

[d] Reflects start up between 1975 and 1980 of Alaska pipeline and consequent water transport 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: _____. *Air Carrier Traffic Statistics* (Washington, DC: Annual issues), p. 2, line 3.

1985–97: 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: 1960–97: Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 1998), p. 44.

Class I rail: 1960–97: Association of American Railroads, *Railroad Facts* 1998 (Washington, DC: 1998), p. 27.

Domestic water transportation: 1965–97: 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.

1980–97: ____. *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 1.

Table 1-39M Average Length of Haul, Domestic Freight and Passenger Modes (Kilometers)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Freight										
Air carrier	1,534	1,518	1,632	1,741	1,693	1,862	2,235	1,949	2,028	U
Truck[a]	438	417	423	460	584	589	629	669	R645	U
Class I railroad	742	810	829	871	991	1,070	1,168	1,357	1,355	1,370
Water										
Coastwise	2,408	2,416	2,429	2,192	3,082	3,174	2,581	2,659	2,456	2,140
Lakewise	840	795	814	853	863	843	890	827	818	816
Internal	454	478	531	576	652	700	R756	795	768	750
Oil pipeline										
Crude	523	515	483	1,019	1,402	1,250	1,296	1,210	1,225	U
Petroleum products	433	539	575	830	666	629	626	641	634	U
Passenger										
Air carrier, domestic, scheduled	938	988	R1,091	1,123	1,184	1,220	1,292	1,273	1,291	1,310
Bus, intercity	127	151	171	182	201	195	227	225	230	U
Commuter rail	33	34	36	37	37	38	35	39	39	U
Intercity/Amtrak[b]	R224	201	R127	R360	349	373	439	431	414	412

KEY: R = revised; U = data are unavailable

[a] Total class I motor carriers of freight (LTL, specialized, and others)

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

NOTE: Average length of haul for freight is calculated by dividing ton-kilometers in table 1-38 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-kilometers by revenue passenger enplanements; for commuter rail, intercity bus, and Amtrak it is calculated by dividing passenger-kilometers by number of passengers.

SOURCES: Freight: *Air carrier, truck:* Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 1998), p. 71.

Class I railroad: Association of American Railroads, *Railroad Facts* (Washington, DC: 1998), p. 36.

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

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

1975–97: Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 1998), 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).

Bus, intercity, and commuter rail: Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 1998), p. 70.

Intercity/Amtrak: 1960–85: Eno Transportation Foundation, Inc., *Transportation in America*, 1998 (Washington, DC: 1998), p. 70.

1990–97: _____. *Amtrak FY98 Annual Report,* Statistical Appendix (Washington, DC: 1999), p. 49.

Table 1-41M U.S. Waterborne Freight (Million metric tonnes)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Foreign	307.8	402.5	527.0	679.2	835.9	702.5	944.9	1,040.9	1,073.6	1,107.3
Imports	191.7	244.8	307.8	432.3	469.5	374.4	544.3	610.2	664.6	715.1
Exports	116.1	157.8	219.2	246.9	366.4	328.1	400.6	430.6	409.0	392.2
Domestic	690.0	752.2	862.5	858.5	977.5	920.0	1,018.1	991.6	998.5	1,009.2
Inland	264.0	335.3	428.3	457.2	485.3	485.0	564.8	562.7	564.3	572.0
Coastal	189.8	182.8	216.3	210.4	299.0	281.0	270.9	241.9	242.6	238.7
Lakes	140.7	139.4	142.5	117.3	104.4	83.4	99.9	105.3	104.2	111.3
Intraport	94.5	93.3	73.9	71.0	85.4	67.4	78.4	75.4	80.7	81.5
Intraterritory	0.9	1.3	1.5	2.6	3.3	3.1	4.1	6.2	6.6	5.7
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**

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

SOURCE: U.S. Army Corps of Engineers, *Waterborne Commerce of the United States* (New Orleans, LA: February 1999), part 5, section 1.

Table 1-46M Crude Oil Transported in the United States by Mode (Billion tonne-kilometers)

	1975	1980	1985	1990	1995	1996	1997
Number of billion tonne-kilometers							
Pipelines[a]	420.5	529.4	488.2	488.8	490.4	493.9	492.6
Water carriers	59.3	[c]565.6	655.8	425.1	361.6	295.5	215.1
Motor carriers[b]	2.0	3.6	2.6	2.2	2.5	2.5	2.5
Railroads	2.2	0.7	1.2	1.0	1.2	1.2	0.7
Total	**484.0**	**1099.4**	**1147.8**	**917.2**	**855.5**	**793.1**	**710.9**
% of total							
Pipelines	86.9	48.2	42.5	53.3	57.3	62.3	69.3
Water carriers	12.2	51.4	57.2	46.4	42.3	37.3	[R]30.3
Motor carriers	0.4	0.3	0.2	0.2	0.3	0.3	0.3
Railroads	0.5	0.1	0.1	0.1	0.1	0.1	0.1

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

[b] The amounts carried by motor carriers are estimated.

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

KEY: R = revised

SOURCES: 1975: Association of Oil Pipe Lines, *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 5.

1980–97: ____. *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 2.

Table 1-47M Transportation of Refined Petroleum Products within the United States by Mode

	1975	1980	1985	1990	1995	1996	1997
Number of billion tonne-kilometers							
Pipelines[a]	319.7	329.4	335.6	364.0	387.2	410.1	407.5
Water carriers	375.8	336.4	206.1	230.4	223.7	225.0	216.5
Motor carriers[b]	38.3	35.5	39.3	41.2	35.9	40.9	38.0
Railroads	18.4	17.5	16.5	19.4	23.2	23.4	23.7
Total	**752.2**	**718.7**	**597.6**	**654.9**	**670.0**	**699.3**	**685.6**
% of total							
Pipelines	42.5	45.8	56.2	55.6	57.8	58.6	59.4
Water carriers	50.0	46.8	34.5	35.2	33.4	32.2	31.6
Motor carriers	5.1	5.0	6.6	6.3	5.3	R5.9	5.5
Railroads	2.4	2.4	2.7	2.9	3.5	3.3	3.5

KEY: R = revised

[a] The amounts carried by pipeline are 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 amounts carried by motor carriers are estimated.

NOTES: The 1993 data reported by the Association of Oil Pipe Lines (AOPL) for each mode are not directly comparable to 1993 Commodity Flow Survey (CFS) data and vary from the tonne-kilometers of refined petroleum products moved by mode measured in the CRFS and reported by the Census Bureau in 1993 *Commodity Flow Survey: United States* (TC92-CF-52 page 56). The differences are primarily definitional: the AOPL data cover the refined petroleum movement of all industries, while the CFS covers movements by manufacturing, mining, wholesale trade, and selected retail services.

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

1980–97: ____. *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 3.

Table 1-48M Transportation of Crude Petroleum and Petroleum Products in the United States by Mode (Billion tonne-kilometers)

	1975	1980	1985	1990	1995	1996	1997
Billions of tonne-kilometers							
Pipelines[a]	740.2	858.8	823.9	852.8	877.6	904.0	900.1
Water carriers	435.1	[c]902.0	862.0	655.5	585.3	520.5	431.6
Motor carriers[b]	40.3	39.1	41.9	43.4	38.4	43.4	40.4
Railroads	20.6	18.2	17.7	20.4	24.2	24.5	24.4
Total	**1,236.2**	**1,818.1**	**1,745.4**	**1,572.1**	**1,525.5**	**1,492.4**	**1,396.5**
% of total							
Pipelines[a]	59.9	47.2	47.2	54.2	57.5	60.6	64.5
Water carriers	35.2	49.6	49.4	41.7	38.4	34.9	30.9
Motor carriers[b]	3.3	2.2	2.4	2.8	2.5	2.9	2.9
Railroads	1.7	1.0	1.0	1.3	1.6	1.6	1.8

[a] The amounts carried by pipeline are 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 tonne-kilometers for pipelines not federally regulated (16%).

[b] The amounts carried by motor carriers are estimated.

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

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

1980–97: ____. *Shifts in Petroleum Transportation* (Washington, DC: Annual issues), table 1.

Table 4-3M Domestic Demand for Refined Petroleum Products by Sector (Petajoules)

	1960	1965	1970	1975	1980	1985	1990	1995[R]	1996[R]	1997	1998
Transportation	10,688	12,524	16,153	[R]18,580	20,057	20,574	23,011	24,593	25,153	25,437	25,585
Industrial	6,067	7,164	8,219	8,599	10,055	8,240	8,778	9,095	9,601	9,823	9,548
Residential and commercial	3,682	4,083	4,547	[R]4,020	3,207	2,659	2,289	2,195	2,321	2,258	2,226
Electric utilities	579	771	2,237	3,346	2,770	1,155	1,323	694	770	865	1,234
Total petroleum demand	**21,016**	**24,541**	**31,156**	**34,544**	**36,088**	**32,627**	**35,401**	**36,576**	**37,845**	**38,383**	**38,594**
Transportation as % of total	50.9	51.0	51.8	53.8	55.6	63.1	65.0	67.2	66.5	66.3	66.3

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 Joules 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.

1975–98: _____. *Monthly Energy Review*, DOE/EIA-0035(99/03) (Washington, DC: April 1999), tables, 2.3, 2.4, 2.5, and 2.6.

Table 4-5M Fuel Consumption by Transportation Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air										
Certificated carriers[a]										
Jet fuel (million liters)	7,397	14,721	29,742	28,610	34,432	38,312	R46,523	48,499	49,922	51,709
General aviation[b]										
Aviation gasoline (million liters)	916	1,105	2,086	1,560	1,968	1,594	1,336	1,045	1,086	1,098
Jet fuel (million liters)	N	212	787	1,715	2,900	2,616	2,510	2,059	2,150	2,419
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	R262,780	265,240
Other 2-axle 4-tire vehicle	N	[e]	46,610	72,229	90,078	103,580	134,802	172,634	R179,254	186,886
Single-unit 2-axle 6-tire or more truck	N	52,420	15,021	20,517	26,206	28,008	31,635	34,886	R35,617	36,238
Combination truck	N	25,203	27,815	34,739	49,350	53,015	61,070	74,864	R76,439	76,821
Bus	3,131	3,312	3,104	3,986	3,854	3,157	3,388	3,664	R3,748	3,884
Transit[c]										
Electricity (million kWh)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	P5,018
Motor fuel (million liters)										
Diesel	787	939	1,026	1,382	1,632	2,305	2,464	2,567	R2,623	P2,601
Gasoline and other nondiesel fuels[d]	727	469	257	30	42	174	129	231	231	P220
Compressed natural gas[R]	N	N	N	N	N	N	N	42	57	P87
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

KEY: kWh = kilowatt-hour; N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 4-5M Cont'd Fuel Consumption by Transportation Mode

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Amtrak										
Electricity (million kWh)	N	N	N	180	254	295	330	304	293	282
Distillate/diesel fuel (million liters)	N	N	N	238	242	246	310	250	269	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
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
Gasoline (million liters)	N	N	2,264	2,763	3,982	3,986	4,921	4,013	3,763	3,736
Pipeline										
Natural gas (million cubic meters)	9,828	14,173	20,449	16,508	17,970	14,265	18,684	19,831	20,146	21,283

[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.

[c] Prior to 1984, excludes commuter rail, automated guideway, ferryboat, demand responsive vehicles, and most rural and smaller systems. Series not continuous between 1983 and 1984.

[d] Gasoline and all other nondiesel fuels such as compressed natural gas, methanol and propane, except compressed natural gas.

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

KEY: kWh = kilowatt-hour; N = data are nonexistent; P = preliminary; R = revised

SOURCES: Air: *Certificated air carriers:* 1960–97: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, Apr. 5, 1999.

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: _____. *General Aviation and Air Taxi Activity Survey* (Washington, DC: Annual issues), table 5.1, and similar tables in earlier editions.

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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Transit: *Electricity/motor fuel/compressed natural gas:* 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), tables 63, 64, 65, and similar tables in earlier editions.

Rail: 1960–97: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1998), p. 40.

Amtrak: 1975–97: Amtrak, State and Local Affairs Department, personal communication (Washington, DC).

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.

1985–97: 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: 1970–97: 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: ____., table 1.

Table 4-6M Energy Consumption by Transportation Mode (Petajoules)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Air										
Certificated carriers[a]										
Jet fuel	278	554	1,119	1,077	1,296	1,442	R1,750	1,825	1,878	1,946
General aviation[b]										
Aviation gasoline	31	37	70	52	66	53	45	35	36	37
Jet fuel	N	8	30	65	109	98	94	77	81	91
Highway										
Gasoline, diesel and other fuels										
Passenger car and motorcycle	5,430	6,558	8,952	9,793	9,256	9,456	9,200	9,003	R9,155	9,241
Other 2-axle 4-tire vehicle	N	[e]	1,624	2,516	3,138	3,609	4,696	6,014	R6,245	6,511
Single-unit 2-axle 6-tire or more truck	N	2,027	581	793	1,013	1,083	1,223	1,349	R1,377	1,401
Combination truck	N	974	1,075	1,343	1,908	2,049	2,361	2,894	R2,955	2,970
Bus	121	128	120	154	149	122	131	142	144	150
Transit[c]										
Electricity	10	9	9	10	9	15	17	18	18	P18
Motor fuel										
Diesel	30	36	40	53	63	89	95	100	R101	P100
Gasoline and other nondiesel fuels[d]	25	16	9	1	1	6	4	8	8	8
Compressed natural gas	N	N	N	N	N	N	N	R2	R2	3
Rail, Class I (in freight service)										
Distillate/diesel fuel[R]	507	526	519	535	571	455	456	509	524	523
Amtrak										
Electricity	N	N	N	1	1	1	1	1	1	1
Distillate/diesel fuel	N	N	N	9	9	10	12	10	10	11

KEY: kWh = kilowatt-hour; N = data are nonexistent; P = preliminary; R = revised

Continued next page

Table 4-6M Cont'd Energy Consumption by Transportation Mode (Petajoules)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Water										
Residual fuel oil	624	489	596	641	1,414	725	999	930	900	791
Distillate/diesel fuel oil	115	95	120	161	216	249	302	342	365	377
Gasoline	N	N	79	96	139	139	171	140	131	130
Pipeline										
Natural gas	378	544	786	634	690	548	718	762	774	818

KEY: kWh = kilowatt-hour; N = data are nonexistent; P = preliminary; R = revised

[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, urban ferryboat, demand responsive vehicles, and most rural and smaller systems. Series not continuous between 1983 and 1984.

[d] Gasoline and all other nondiesel fuel, except compressed natural gas.

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

NOTE: 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

Distillate fuel = 38,657,950 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/m^3

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 carriers:* 1960-75: Civil Aeronautics Board, Handbook of Airline Statistics 1977 (Washington, DC: 1977), table 2.

1980: ____. Fuel Cost and Consumption,Twelve Months Ended Dec 31, 1984 (Washington, DC: 1985)

1985-97: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication.

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: _____. *General Aviation and Avionics Survey* (Washington, DC: Annual issues), table 5.1 and similar tables in earlier editions.

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.

1995–97: _____. *Highway Statistics* (Washington DC: Annual issues), table VM-1.

Transit: *Electricity/motor fuel/compressed natural gas:* 1960–97: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), tables 63, 64, 65 and similar tables in earlier editions.

Rail: 1960–97: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1998), p. 40.

Amtrak: 1975–90: Amtrak, State and Local Affairs Department, personal communication (Washington, DC).

1996–97: Calculated values based on figures in table 4-7.

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.

1985–97: 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: 1970–97: 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: ____., table 1.

Table 4-7M Domestic Demand for Gasoline (Million liters)

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Highway	**209,820**	**253,541**	**324,025**	**376,094**	**383,019**	**391,960**	**414,614**	**443,125**	**452,412**	**457,800**
Nonhighway										
Agriculture	8,675	7,432	7,313	5,924	4,009	4,091	2,579	3,508	3,475	3,727
Aviation[a]	5,011	1,898	1,488	1,551	1,563	1,444	1,366	1,389	1,301	1,267
Marine	230	365	2,264	2,762	3,983	3,986	4,923	4,014	3,761	3,737
Other[b]	6,270	6,235	4,087	3,551	4,280	5,639	6,562	3,172	3,124	3,749
Total nonhighway	**20,185**	**15,930**	**15,152**	**13,788**	**13,834**	**15,160**	**15,430**	**12,083**	**11,662**	**12,479**
TOTAL demand	**230,005**	**269,471**	**339,178**	**389,882**	**396,854**	**407,121**	**430,044**	**455,209**	**464,074**	**470,279**

[a] Does not include aviation jet fuel.

[b] Includes state, county, and municipal use, industrial and commercial, construction, and miscellaneous.

NOTES: A complete and uniform classification of nonhighway use is not possible due to differences among the states as to what classes of nonhighway use are eligible for exemptions or refunds and because states do not apply for all refunds. 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. All data are subject to review and revision. 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: July 1997), table MF-221.

1996–97: _____. Highway Statistics (Washington, DC: Annual issues), table MF-21.

Nonhighway: 1960–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table MF-24, and unpublished revisions.

Table 4-8M Certificated Air Carrier[a] Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
Number of aircraft[R]	**2,135**	**2,125**	**2,679**	**2,495**	**3,808**	**4,678**	**6,083**	**7,411**	**7,478**	**7,616**	**U**
Aircraft- kilometers (millions)											
Domestic operations	1,381	1,825	3,328	3,135	4,060	4,902	6,378	7,450	[R]7,743	7,903	8,097
International operations	293	457	764	[R]607	645	668	1,223	1,606	[R]1,679	1,793	1,917
Fuel consumption(million liters)											
Domestic operations	7,397	14,721	29,742	28,610	34,432	38,312	[R]46,523	48,499	49,922	51,709	52,530
International operations	2,143	4,845	8,491	7,378	7,336	9,376	15,055	17,084	17,648	18,791	19,631
Average kilometers flown per aircraft (thousands)[R]	**784**	**1,074**	**1,528**	**1,408**	**1,236**	**1,191**	**1,250**	**1,222**	**1,260**	**1,273**	**U**
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
International operations	0.14	0.09	0.09	0.08	0.09	0.07	0.08	0.09	0.10	0.10	0.10

[a] Aircraft carrying passengers or cargo for hire under 14 CFR 121 and 14 CFR 135.

KEY: P = preliminary; R = revised: U = data are unavailable

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: _____. *FAA Statistical Handbook of Aviation, Calendar Year 1979* (Washington, DC: 1979), table 5.1.

1980–85: _____. *FAA Statistical Handbook of Aviation, Calendar Year 1986* (Washington, DC: 1986), table 5.1.

1990–97: _____. *FAA Statistical Handbook of Aviation, Calendar Year 1997* (Washington, DC: unpublished), personal communication, Mar. 19, 1999.

Aircraft-kilometers flown: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, tables 2 and 13.

1965–70: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975–80: _____. *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), pp. 4 and 14; and (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 Traffic Statistics* (Washington, DC: Annual issues, December), pp. 2 and 3, line 27 plus line 50.

Fuel consumption: 1960–98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, Apr. 5, 1999.

Table 4-9M Motor Vehicle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Vehicles registered (thousands)[a]	73,858	90,358	111,242	137,913	161,490	177,133	193,057	205,427	210,441	211,580
Vehicle-kilometers traveled (millions)	1,157,000	1,429,000	1,786,000	2,137,000	2,457,000	2,857,000	3,450,000	3,899,000	4,001,000	4,120,000
Fuel consumed (million liters)	219,100	269,158	349,503	412,549	435,171	459,174	494,962	544,471	557,837	569,069
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
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
Average fuel consumed per vehicle (liters)	2,966	2,979	3,142	2,991	2,695	2,592	2,564	2,650	2,651	2,690

[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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

KEY: R = revised

Table 4-11M Passenger Car and Motorcycle Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
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
Motorcycles	574	1,382	2,824	4,964	5,694	5,444	4,259	3,897	3,872	3,826
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	2,417,000
Motorcycles	[a]	[a]	4,800	9,000	16,400	14,600	15,400	15,800	15,900	16,300
Fuel consumed (million liters)										
Passenger cars	155,849	188,222	256,723	280,650	264,911	270,725	263,344	257,681	262,030	264,475
Motorcycles	[a]	[a]	227	428	772	689	723	742	750	765
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
Motorcycles	[a]	[a]	1.7	1.8	2.9	2.7	3.6	4.1	4.1	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
Motorcycles	[a]	[a]	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	2,038
Motorcycles	[a]	[a]	80	86	136	127	170	190	194	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.

1995–97: ____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

All other categories: 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-kilometers and fuel consumed from VM-201A.

1995–97: _____. *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.

1995–1997: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

All other categories: 1970–85: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics Summary to 1985*, table VM-201A.

1990–97: _____. *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[R]	1997
Number registered (thousands)	3,681	4,232	4,374	4,593	4,487	5,024	5,266	5,293
Vehicle-kilometers traveled (millions)	43,600	55,700	64,100	73,100	83,500	100,900	103,200	107,500
Fuel consumed (million liters)	**15,021**	**20,517**	**26,206**	**28,008**	**31,635**	**34,886**	**35,617**	**36,238**
Average kilometers traveled per vehicle (thousands)	11.8	13.2	14.7	15.9	18.6	20.1	19.6	20.3
Average kilometers traveled per liter	2.9	2.7	2.4	2.6	2.6	2.9	2.9	3.0
Average fuel consumed per vehicle (liters)	4,080	4,848	5,992	6,098	7,050	6,944	6,764	6,846

KEY: R = revised

NOTES: In 1995, the U.S. Department of Transportation, Federal Highway Administration revised its vehicle type categories for 1993 data and later. 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. Pre-1993 data have been reassigned to the closest available category.

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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues).

Table 4-14M Combination Truck Fuel Consumption and Travel

	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Number registered (thousands)	787	905	1,131	1,417	1,403	1,709	1,696	1,747	1,790
Vehicle-kilometers traveled (millions)	51,000	56,500	75,200	110,600	125,700	151,800	185,900	191,400	200,400
Fuel consumed (million liters)	**25,203**	**27,815**	**34,739**	**49,350**	**53,015**	**61,070**	**74,864**	**76,439**	**76,821**
Average kilometers traveled per vehicle (thousands)	64.8	62.4	66.5	78.1	89.6	88.8	109.6	109.6	112.0
Average kilometers traveled per liter	2.0	2.0	2.2	2.2	2.4	2.5	2.5	2.5	2.6
Average fuel consumed per vehicle (liters)	32,044	30,732	30,722	34,831	37,780	35,737	44,148	43,754	42,917

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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

KEY: R = revised

Table 4-15M Bus Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Number registered (thousands)	272	314	378	462	529	593	627	686	695	698
Vehicle-kilometers traveled (millions)	6,900	7,600	7,200	9,800	9,800	7,200	9,200	10,300	10,600	10,900
Fuel consumed (million liters)	**3,131**	**3,312**	**3,104**	**3,986**	**3,854**	**3,157**	**3,388**	**3,664**	**3,748**	**3,884**
Average kilometers traveled per vehicle (thousands)	25.4	24.2	19.1	21.2	18.5	12.1	14.7	15.0	15.3	15.6
Average kilometers traveled per liter	2.2	[R]2.4	2.3	2.5	2.5	2.3	2.7	2.8	2.8	2.8
Average fuel consumed per vehicle[R] (liters)	11,504	10,539	8,221	8,625	7,287	5,319	5,404	5,345	5,392	5,564

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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

KEY: R = revised

Table 4-16M Transit Industry[a] Electric Power and Primary Energy Consumption

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997[P]
Number of vehicles	65,292	61,717	61,298	62,183	75,388	[R]94,368	92,961	115,874	122,362	123,580
Vehicle-kilometers traveled	3,449	3,232	3,030	3,502	3,681	4,492	5,217	5,713	5,874	6,181
Electric power consumed (million kWh hours)	2,908	2,584	2,561	2,646	2,446	4,216	4,837	5,068	5,007	5,018
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	2,600,915
Gasoline and other nondiesel fuels[b]	726,421	470,148	258,165	28,678	43,154	173,008	128,348	229,888	231,716	219,641
Compressed natural gas[R]	N	N	N	N	N	N	N	40,655	57,129	88,416

[a] Prior to 1984, excludes commuter rail, automated guideway, urban ferryboat, demand response, and most rural and smaller systems.

[b] For 1992–96 includes gasoline, propane, liquid petroleum gas, liquefied natural gas, kerosene and all other nondiesel fuels except compressed natural gas. From 1960 to 1991, includes gasoline and propane. Series not contiguous between 1991 and 1992.

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.

KEY: kWh = kilowatt hour; N = data are nonexistent; P = preliminary; R = revised

SOURCE: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), tables 40, 44, 63, 64, 65, and similar tables in earlier editions.

Table 4-17M Class I Rail Freight Service Fuel Consumption and Travel

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
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
Cars[bR]	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
Kilometers traveled (millions)										
Freight train-kilometers[c]	650	677	687	648	689	559	611	738	754	764
Locomotive unit-kilometers	N	N	N	2,380	R2,464	1,976	2,060	2,326	2,358	2,290
Car-kilometers	45,335	47,212	48,103	44,508	47,117	40,105	42,099	48,897	51,040	50,952
Average kilometers traveled per vehicle (thousands)										
Locomotives	N	N	N	85.5	R87.7	87.6	109.4	123.6	122.4	116.3
Cars	23.1	26.2	27.0	25.8	27.5	28.2	34.7	40.1	41.1	40.1
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
Cars	3.46	3.47	13.57	3.22	3.19	3.41	3.57	3.71	3.77	3.77
Fuel consumed (million liters)	**13,109**	**13,597**	**13,419**	**13,843**	**14,778**	**11,773**	**11,792**	**13,173**	**13,548**	**13,533**
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

KEY: N = data are nonexistent; R = revised

[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-kilometers.

SOURCES: **All data except for locomotive unit-kilometers:** Association of American Railroads, *Railroad Facts 1997* (Washington, DC: October 1998), pp. 33, 34, 40, 48, 50.

Locomotive unit-kilometers:
1975–90: _____. *Railroad Ten-Year Trends* (Washington,DC: Annual issues).
1995–97: _____. *Analysis of Class I Railroads* (Washington, DC: Annual issues).

Table 4-19M U.S. Government Energy Consumption by Agency and Source (Petajoules)

Agency	Petroleum					Nonpetroleum			
	Motor gasoline	Distillate and residual fuel oil	Jet fuel and aviation gas	Other[c]	Total	Electricity	Natural gas	Coal and other[d]	Total
1987									
Defense	21.3	310.7	733.6	2.4	1,068.0	111.9	111.2	59.9	1,351.0
Energy	1.5	3.3	0.5	0.2	5.4	19.8	6.4	19.6	51.3
Postal Service	9.7	4.1	0.0	0.2	14.0	10.9	4.5	0.7	30.1
Veterans Affairs	0.5	2.5	0.0	0.0	3.1	7.5	14.5	1.3	26.3
Transportation	1.3	7.8	5.6	0.0	14.8	4.2	1.1	0.0	20.0
General Services Administration	0.1	0.5	0.0	0.0	0.6	8.1	2.5	2.4	13.8
NASA	0.2	0.9	1.4	0.0	2.4	6.1	2.7	0.3	11.7
Justice	2.0	0.5	0.2	0.1	2.8	1.5	3.8	0.5	8.5
Agriculture	3.6	0.3	0.1	0.2	4.1	1.8	1.7	0.1	7.7
Interior	2.1	1.4	0.1	0.8	4.4	1.3	1.1	0.2	7.0
Health and Human Services	0.4	2.6	0.0	0.1	3.2	2.0	1.7	0.0	7.0
Other[a]	2.7	2.3	0.7	0.0	5.8	3.9	2.4	0.4	12.6
Total	**45.5**	**337.1**	**742.0**	**4.2**	**1,128.7**	**179.3**	**153.6**	**85.4**	**1,546.9**
1997[P]									
Defense	3.5	157.1	532.6	14.0	707.3	106.9	103.3	31.7	949.1
Energy	1.1	1.8	0.3	0.3	3.6	18.5	17.5	7.3	46.8
Postal Service	13.0	3.0	0.0	0.0	16.9	16.0	7.8	0.5	40.3
Veterans Affairs	0.6	1.4	0.0	0.0	2.0	9.6	15.0	1.6	28.3
Transportation	0.5	1.1	5.1	7.3	13.9	5.3	1.5	0.1	20.8
General Services Administration	0.1	0.2	0.0	0.0	0.3	9.7	3.6	1.6	15.1
NASA	0.1	0.5	1.1	0.0	1.7	7.2	3.2	0.2	12.4
Justice	2.8	0.5	1.4	0.0	4.2	3.7	4.5	0.3	12.8

KEY: P = preliminary; NASA = National Aeronautics and Space Administration

Continued next page

Table 4-19M Cont'd U.S. Government Energy Consumption by Agency and Source (Petajoules)

Agency	Petroleum					Nonpetroleum			
	Motor gasoline	Distillate and residual fuel oil	Jet fuel and aviation gas	Other[c]	Total	Electricity	Natural gas	Coal and other[d]	Total
Agriculture	4.5	0.4	0.1	0.2	5.3	2.1	1.6	0.3	9.4
Interior	0.8	0.7	0.0	0.6	2.2	1.5	1.4	0.1	5.3
Health and Human Services	0.0	1.7	0.1	0.1	1.8	2.6	2.5	0.0	7.0
Other[b]	1.2	3.1	0.9	0.1	5.3	9.9	3.8	0.7	19.7
Total	**28.2**	**171.3**	**541.5**	**22.8**	**763.9**	**193.0**	**165.7**	**44.5**	**1,167.0**

KEY: P = preliminary; NASA = National Aeronautics and Space Administration

[a] 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.

[b] 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.

[c] Includes liquefied petroleum gases.

[d] Includes purchased steam, coal, and other.

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 kilowatthour, 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 1997*, DOE/EIA-0384(97) (Washington, DC: July 1998), table 1.13.

Table 4-20M Energy Intensiveness of Passenger Modes (Thousand joules per passenger-kilometer)

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Air										
Certificated air carrier										
Domestic operations	5,561	[R]6,467	6,412	4,918	3,940	3,224	[R]3,145	2,808	2,685	2,683
International operations	5,592	5,668	5,000	4,621	2,707	2,993	2,786	2,579	2,555	2,594
Highway[R]										
Passenger car	2,947	2,921	3,174	3,110	2,851	2,797	2,499	2,439	2,427	2,398
Other 2-axle 4-tire vehicle	N	N	4,465	4,308	3,743	3,259	2,918	2,884	2,898	2,902
Motorcycle	a	a	1,639	1,543	1,393	1,243	1,305	1,339	1,353	1,379
Transit motor bus	**N**	**N**	**N**	**N**	**1,798**	**2,222**	**2,438**	**2,728**	**2,641**	**2,514**
Amtrak	**N**	**N**	**N**	**1,562**	**1,408**	**1,370**	**[R]1,354**	**1,205**	**1,412**	**1,442**

KEY: N = data are nonexistent; R = revised

[a] Included in passenger car.

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.

SOURCES: Air: *Certificated air carriers:* 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, tables 2 and 13.

1965–70: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975–80: _____. *Air Carrier Traffic Statistics* (Washington, DC: 1976, 1981), pp. 4 and 14 (December 1976) and pp. 2 and 3 (December 1981).

1985–97: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, *Air Carrier Traffic Statistics* (Washington, DC: Annual December issues), pp. 2 and 3, line 1.

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.

Passenger-kilometers calculated by multiplying vehicle-kilometers by average vehicle occupancy rates. Vehicle-kilometers derived by subtracting unrevised motorcycle vehicle-kilometers from combined revised passenger car and motorcycle vehicle-kilometers.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1970–90: _____. *Highway Statistics Summary to 1995,* FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Passenger-kilometers calculated by multiplying vehicle-kilometers by average vehicle occupancy rates.

Motorcycle: 1970–85: _____. *Highway Statistics Summary to 1985,* FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1990–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Passenger-kilometers calculated by multiplying vehicle-kilometers by average vehicle occupancy rates.

Transit motor bus: 1980–96: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), tables 63, 64; and 65.

1997: Eno Transportation Foundation, Inc., *Transportation in America, 1997* (Washington, DC: 1997), p. 47

Amtrak: 1975–90: Amtrak, State and Local Affairs Department (Washington, DC).

1994–97: ____. Personal communication (Washington, DC: June 25, 1999).

Table 4-21M Energy Intensiveness of Certificated Air Carriers, All Services[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
Aircraft-kilometers (millions)											
Domestic operations	1,381	1,825	3,328	3,135	4,060	4,902	6,378	7,450	[R]7,743	7,903	8,097
International operations	293	457	764	[R]607	645	668	1,223	1,606	[R]1,679	1,793	1,917
Available seat-kilometers (millions)											
Domestic operations	85,183	155,139	350,869	397,902	564,424	732,411	918,224	[R]1,012,903	[R]1,028,392	1,049,160	1,065,381
International operations	22,603	53,083	104,678	110,367	157,333	177,958	293,950	347,012	355,195	368,039	381,604
Passenger-kilometers (millions)											
Domestic operations	50,049	85,659	174,520	218,871	328,898	447,134	556,629	649,995	699,505	725,190	747,371
International operations	14,405	32,171	63,883	[R]60,069	101,958	117,864	203,362	249,237	259,928	272,552	276,831
Fuel consumed (million liters)											
Domestic operations	7,397	14,721	29,742	28,610	34,432	38,312	[R]46,523	48,499	49,922	51,709	52,530
International operations	2,143	4,845	8,491	7,378	7,336	9,376	15,055	17,084	17,648	18,791	19,631
Seats per aircraft											
Domestic operations	61.7	85.0	105.4	126.9	139.0	149.4	144.0	136.0	132.8	132.7	131.6
International operations	77.2	116.1	136.9	[R]181.9	243.8	266.5	240.3	216.1	[R]211.6	205.3	199.1
Seat-kilometers per liter											
Domestic operations	12	11	12	14	16	19	20	[R]21	[R]21	20	20
International operations	11	11	12	15	21	19	20	20	20	20	19
Energy intensiveness (1000 joules/passenger-kilometer)[b]											
Domestic operations	5,561	6,467	6,412	4,918	3,939	3,224	[R]3,145	2,807	[R]2,685	2,683	2,645

KEY: P = preliminary; R = revised

Continued next page

Table 4-21M Cont'd Energy Intensiveness of Certificated Air Carriers, All Services[a]

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997	1998[P]
International operations	[R]5,596	5,667	5,001	[R]4,621	2,707	2,993	2,785	2,579	[R]2,555	2,594	2,668
Load factor (%)											
Domestic operations	58.8	55.2	49.7	55.0	58.3	61.0	60.6	64.2	67.9	69.1	70.2
International operations	63.7	60.6	61.0	54.4	64.8	66.2	69.2	71.8	73.3	74.1	72.5

KEY: P = preliminary; R = revised

[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 4 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 include all 4 air carrier groups, scheduled and charter, passenger service only. Heat equivalent factor used for joules conversion is 37,626,700 joules/liter.

SOURCES: Aircraft-kilometers, available seat-kilometers and passenger-kilometers: 1960: Civil Aeronautics Board, *Handbook of Airline Statistics 1969* (Washington, DC: 1970), part III, tables 2 and 13.

1965–70: _____. *Handbook of Airline Statistics 1973* (Washington, DC: 1974), part III, tables 2 and 13.

1975–80: _____. *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 Traffic Statistics*

(Washington, DC: Annual December issues), aircraft kilometers: pp. 2 and 3, line 27 plus line 50, seat-kilometers: line 12 plus line 42, passenger-kilometers: line 1.

Fuel consumed: 1960–98: U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information, personal communication, Apr. 5, 1999.

Seats per aircraft, seat-kilometers per liter, energy intensiveness, and load factor: Derived by calculation.

Table 4-22M Energy Intensiveness of Passenger Cars, Other 2-Axle 4-Tire Vehicles, and Motorcycles

	1960	1965	1970	1975	1980	1985	1990	1995	1996[R]	1997
Vehicle-kilometers (millions)										
Passenger car	944,685	1,163,556	1,475,768	1,664,062	1,789,591	2,006,852	2,265,956	2,314,237	2,365,736	2,417,235
Other 2-axle 4-tire vehicle	N	N	197,949	323,478	468,319	629,254	925,373	1,271,382	1,314,834	1,367,942
Motorcycle	[b]	[b]	4,828	9,012	16,415	14,645	15,450	15,772	15,933	16,254
Passenger-kilometers (millions)[a,R]										
Passenger car	1,842,699	2,245,035	2,817,961	3,144,658	3,238,000	3,371,576	3,670,914	3,680,570	3,761,037	3,843,113
Other 2-axle 4-tire vehicle	N	N	363,712	584,192	838,468	1,107,229	1,609,344	2,085,710	2,154,912	2,243,426
Motorcycle	[b]	[b]	4,828	9,656	19,312	19,312	19,312	19,312	19,312	19,312
Fuel consumed (million liters)										
Passenger car	155,849	188,222	256,723	280,650	264,911	270,725	263,344	257,681	262,030	264,475
Other 2-axle 4-tire vehicle	N	N	46,610	72,229	90,078	103,580	134,802	172,634	179,254	186,886
Motorcycle	[b]	[b]	227	428	772	689	723	742	750	765
Energy intensiveness (1,000 joules/passenger-kilometer)[R]										
Passenger car	2,947	2,921	3,174	3,109	2,850	2,797	2,499	2,439	2,427	2,398
Other 2-axle 4-tire vehicle	N	N	4,465	4,308	3,743	3,259	2,918	2,884	2,898	2,902
Motorcycle	b	b	1,639	1,543	1,393	1,243	1,304	1,338	1,352	1,379

KEY: N = data are nonexistent; R = revised

Continued next page

Table 4-22M Cont'd Energy Intensiveness 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 Nationwide Personal Transportation Survey, 1977, 1983, 1995. Average vehicle occupancy rates are as follows:

passenger car (1960-1997): 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 (1960-1997): 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 (1960-1997): 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 data from 1993 and later. 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.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Other 2-axle 4-tire vehicle: 1960–90: _____. *Highway Statistics, Summary to 1995,* FHWA-PL-97-009 (Washington, DC: July 1997), table VM-201A.

1995–97: _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Motorcycle: 1970–85: _____. *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.

1990–97 _____. *Highway Statistics* (Washington, DC: Annual issues), table VM-1.

Passenger-kilometers: Vehicle-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.

1995–97: _____. *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
Average U.S. passenger car fuel efficiency (kpl) (calendar year)							
Passenger car	7.1	7.8	9.0	9.4	R9.5	9.6	U
Other 2-axle 4-tire vehicle	5.5	6.4	7.2	7.7	R7.7	7.7	U
New vehicle fuel efficiency (kpl)[a] (model year)							
Light-duty vehicle (passenger cars plus light trucks)							
Domestic	9.6	10.7	10.7	10.6	10.8	10.5	10.6
Imported	12.8	13.6	12.8	12.5	12.4	12.3	12.3
Passenger car							
Domestic	10.1	11.8	12.0	12.4	12.7	12.5	12.5
Imported	13.2	14.1	13.4	13.6	13.3	13.3	13.4
Light truck (<3,865 kg GVWR)							
Domestic	7.5	8.8	9.1	9.1	9.2	9.0	9.2
Imported	10.9	11.9	10.3	9.6	R9.9	9.9	10.2
CAFE standards (kpl)[a] (model year)							
Passenger car	8.9	12.3	12.3	12.3	12.3	12.3	12.3
Light truck	7.2/6.3[c]	8.7	8.9	9.2	9.3	9.3	9.3

KEY: CAFÉ = corporate average fuel economy; GVWR = gross vehicle weight rating; kpl = kilometers per liter; R=revised; U = data are unavailable

[a] Assume 55% city- and 45% highway-kilometers sales-weighted harmonic average.

[b] Sales-weighted harmonic average of the combined passenger car and light truck fuel economies.

[c] 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: Passenger car and other 2-axle 4-tire vehicles: 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.

1995–97: _____. *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, personal communication, Sept. 29, 1997.

1995–98: Manufacturer's preliminary estimates for the U.S. Department of Transportation, National Highway Traffic Safety Administration, personal communications, Sept. 29, 1997 and Nov. 19, 1998.

CAFE standards: 1980–98: U.S. Department of Transportation, National Highway Traffic Safety Administration, Consumer Programs Division, NPS-32, personal communications July 26, 1996, Sept. 29, 1997, and Nov. 19, 1998.

Table 4-24M Energy Intensiveness of Transit Buses

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997[P]
Vehicle-kilometers (millions)	2,536	2,459	2,268	2,456	2,699	2,998	3,428	3,515	3,484	3,713
Passenger-kilometers (millions)	N	N	N	N	35,000	34,000	34,000	30,000	30,000	33,000
Fuel consumed (million liters diesel)	787	939	1,026	1,382	1,632	1,961	2,131	2,135	2,078	2,135
Energy intensiveness (1,000 joules/passenger-kilometer)	N	N	N	N	10,380	12,829	14,076	15,751	15,251	14,516

KEY: N = data are nonexistent; P = preliminary

NOTE: Heat equivalent factor used for joules conversion is 38,657,950 joules/liter.

SOURCE: American Public Transit Association, *Transit Fact Book* (Washington, DC: February 1999), table 75 and similar tables in earlier editions.

Table 4-25M Energy Intensiveness of Class I Railroad[a] Freight Service

	1960	1965	1970	1975	1980	1985	1990	1995	1996	1997
Revenue freight tonne-kilometers (millions)	835,555	1,018,883	1,116,600	1,101,187	1,341,653	1,280,372	1,509,566	1,906,268	1,979,686	1,969,395
Car-kilometers (millions)	45,335	47,212	48,103	44,508	47,117	40,105	42,099	48,897	51,040	50,952
Tonnes per car load	40	44	50	55	61	61	60	59	60	57
Fuel consumed (million liters)	13,109	13,597	13,419	13,843	14,778	11,773	11,792	13,173	13,548	13,533
Energy intensiveness (1,000 joules/revenue freight tonne-kilometer)	606	516	465	486	426	355	302	267	265	266
Energy intensiveness (1,000 joules/car-kilometer)	11,178	11,134	10,784	12,024	12,125	11,348	10,828	10,415	10,261	10,268

[a] Class 1 railroads are those that have operating revenues of $255 million or more.

NOTE: The heat equivalent factor used for joules conversion is 38,657,950 joules/liter.

SOURCE: Association of American Railroads, *Railroad Facts* (Washington, DC: October 1998), pp. 34, 37, and 40.

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 or gas from an LNG facility resulting in personal injury necessitating in-patient 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 damage to all railroads involved in the event 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, could seeding, firefighting, and insect control purposes.

AERIAL OBSERVATION FLYING (General Aviation): Any use of an aircraft for aerial mapping and photography, survey, patrol, 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 alcohols; 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 constituents. 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 in aviation gasoline.

BARREL OF 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 in unpackaged bulk form, such as oil, grain, ore, and coal. 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 its holds are cleaned.

BUS: Large motor vehicle used to carry more than 10 passengers, including 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.

CAFÉ 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 empty or loaded refer 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. Nonscheduled or charter operations may also be conducted by these carriers. Certificated air carriers operate large aircraft (30 seats or more for 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 to Baltimore, New York to Puerto Rico, San Francisco to Hawaii, Alaska to 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 serving intracounty rather than statewide travel. In urban areas, streets providing 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 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 of 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 its published flight schedules that specify the times, day of the week, and places between which these flights are performed. Until March 20, 1997, a commuter aircraft had 30 or fewer passenger seats and a payload capability of 7,500 pounds or less. Starting on March 20, 1997, the size of the aircraft subject to 14 CFR 135 was reduced 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, derived 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 CAFÉ, automobile manufacturers are required by law to produce vehicle fleets with a composite sales-weighted fuel economy which cannot be lower than the CAFÉ standards in a given year, or for every vehicle which does not meet the standard, a fine is paid for every one-tenth of a mile per gallon 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, non-fixed schedule transit 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 1 person dies within 30 days of the crash as a result of that crash.

FATAL INJURY (Air): Any injury that results in death within 30 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/roll-off 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 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 activities 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 using 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 loaded into or on the vehicle. Actual weight may be less than or greater than gvwr.

HARBOR MAINTENANCE TRUST FUND: See Trust Funds.

HAZARDOUS MATERIAL: Any toxic explosive, corrosive, combustible, poisonous, or radioactive material that poses a risk to the public's health, safety, or property when transported in commerce.

HEAVY RAIL (Transit): An electric railway with the capacity to transport a heavy volume of 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 cross 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 railroad 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-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 on 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, that is evident to observers at the scene of the accident in which the injury occurred. Includes lumps on head, abrasions, bruises, minor lacerations and others. Excludes limping.

Possible Injury: Any injury reported or claimed that is not a fatal injury, incapacitating injury, or nonincapacitating evident injury. Includes momentary unconsciousness, claim of injuries not evident, 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: Include 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 takes 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 either electricity or steam or by fossil fuel, that moves 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 or from a U.S. Customs bonded warehouse or 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 that is 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): 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 produced at natural gas processing plants, such as finished motor gasoline, finished aviation gasoline, special naphthas, kerosene, and distillate fuel oil.

NEAR MIDAIR COLLISION (Air): An incident associated with the operation of an aircraft in which a possibility of collision occurs as a result of proximity of less than 500 feet to another aircraft, or a report is 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 do not respond to the measurement instrument.

NONSAMPLING ERROR: All the sources of bias or inaccuracy in a study besides sampling error. Examples of nonsampling errors include processing, recording, or data entry errors; nonresponse error; and response error.

NONSCHEDULED SERVICE (Air): Revenue flights that are not operated in regular scheduled service, such as charter flights, and all nonrevenue flights incident to such flight.

NONSELF-PROPELLED VESSEL (Water): A vessel not containing within itself the means for its own propulsion. Includes dry cargo and tanker barges.

NONTRAIN INCIDENT: An event that results in a reportable casualty, but does not involve the movement of on-track equipment, nor causes reportable damage above the threshold established for train accidents.

NONTRESPASSERS (Rail): A person who is lawfully on any part of railroad property that is used in railroad operations, or a person who is adjacent to railroad premises when injured as the result of railroad operations.

NONVESSEL-CASUALTY-RELATED DEATH: 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 who is 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 traumatic 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 control of access not on the Interstate system.

OTHER PRINCIPAL ARTERIAL (Highway): Major streets or highways, many with 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 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: Motor vehicles used primarily for carrying passengers, including 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., 1 car transporting 2 passengers 4 miles results in 8 passenger-miles. 3) Transit: The total number of miles traveled by transit passengers; e.g., 1 bus transporting 5 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 esti-

mated 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 only 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 to such schools from home or from such schools to home.

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): Large, flat-bottomed nonself-propelled vessel 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 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 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, propelled by a motor drawing current, normally through overhead wires, from a central power source not onboard the vehicle.

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: A powered vessel designed for the towing of 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 commuter 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 and repairs due 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 the 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 or Saturday night stay is defined as a long-weekend trip.

Acronyms and Initialism

AAA	American Automobile Association
AADT	Annual Average Daily Traffic
AAMA	American Automobile Manufacturers Association
AAR	Association of American Railroads
AIA	Aerospace Industries Association
ALVW	Adjusted Loaded Vehicle Weight
AMIO	Alien Migrant Interdiction Operations
AOPL	Association of Oil Pipelines
APTA	American Public Transit Association
ATS	American Travel Survey
ATV	All-Terrain Vehicle
BAC	Blood Alcohol Concentration
BEA	Bureau of Economic Analysis
BTS	Bureau of Transportation Statistics
Btu	British Thermal Unit
CFR	U.S. Code of Federal Regulation
CFS	Commodity Flow Survey
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CVS	Certification Vehicle Standard
dwt	Deadweight Tons
EPA	U.S. Environmental Protection Agency
EIA	Energy Information Administration
FAA	Federal Aviation Administration
FARS	Fatality Analysis Reporting System Database
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FRA	Federal Railway Administration
FTA	Federal Transit Administration
FTP	Federal Test Procedure
FTZ	Foreign Trade Zone
GAATAA	General Aviation and Air Taxi Activity and Avionics
GAMA	General Aviation Manufacturers Association
GES	General Estimates System
GIS	Geographic Information System
g/mi	Grams Per Mile
GVWR	Gross Vehicle Weight Rating
HC	Hydrocarbon
HPMS	Highway Performance Monitoring System
ICC	Interstate Commerce Commission
IO	Investigative Officer
IRI	International Roughness Index
LDT	Light-Duty Truck
LMIS	Loyd's Maritime Information System
LnMi	Lane-Miles of Roadway

LR	Lloyd's Register
LVW	Loaded Vehicle Weight
mmbd	Million Barrels Per Day
MIC	Motorcycle Industry Council, Inc.
MOBILE	Mobile Source Emissions Factor Model
mpg	Miles Per Gallon
MSIS	Marine Safety Information System
MTBE	Methyl Tributyl Ether
MVMA	Motor Vehicle Manufacturers Association
NDC	Navigation Data Center
NHTSA	National Highway Traffic Safety Administration
NO_x	Nitrogen Oxides
NOPS	National Operations Center
NPIAS	National Plan of Integrated Airport Systems
NPTS	Nationwide Personal Transportation Survey
NTD	National Transit Database
NTS	National Transportation Statistics
NTSB	National Transportation Safety Board
OAI	Office of Airline Information
OIG	Office of the Inspector General
OST	Office of the Secretary of Transportation
PAR	Police Accident Report
PMT	Passenger Miles of Travel
PSI	Pollutant Standard Index
PSR	Present Serviceability Rating
RFG	Reformulated Gasoline
RO/RO	Roll-On/Roll-Off
RSPA	Research and Special Programs Administration
RTECS	Residential Transportation Energy Consumption Survey
RVP	Reid Vapor Pressure
SAMIS	Safety Management Information Statistics
SO_2	Sodium Dioxide
STB	Surface Transportation Board
TMG	Traffic Monitoring Guide
TIUS	Truck Inventory and Use Survey
TSFD	Transborder Surface Freight Data
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOC	U.S. Department of Commerce
USDOT	Department of Transportation
USSR	Union of Soviet Social Republic
TIUS	Truck Inventory and Use Survey
TTI	Texas Transportation Institute
VMT	Vehicle-Miles Traveled
VOC	Volatile Organic Compounds
WSJ	Wall Street Journal
WTLUS	Waterborne Transportation Lines of the United States

Index

B

D

E

F

G

H

M

N

O

P

R

S

T

V

W

Y